

# **Acronyms and Glossary of Rice Related Terminology**

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## Acronyms and Glossary of Rice Terminology

This reference guide will allow you to:

- sample the alphabet soup of acronyms representing the many agencies involved in different parts of the rice sector, the various rice varieties, diseases and pests, experimental procedures, and more from AAACU to ZLH,
- access 3000 terms used by rice growers, researchers, and teachers, and
- link to the FAO's *Glossary of Biotechnology for Food and Agriculture*.

Explore the links on the left side of the screen to view each of these resources.

## Acronyms

### A

- AAACU** Asian Association of Agricultural Colleges and Universities
- AAAE** Asian Association of Agricultural Engineers (Headquarters: Thailand)
- AAAS** American Association for the Advancement of Science
- AAASA** Association for the Advancement of Agricultural Sciences in Africa
- AAATDC** Association for the Advancement of Appropriate Technology for Developing Countries (Headquarters: Michigan, USA)
- AACC** American Association of Cereal Chemists
- AARD** Agency for Agricultural Research and Development (Indonesia)
- AASE** African Association of Science Editors
- AAT** Accelerated aging treatment
- AAU** Assam Agricultural University (India)
- ABA** Abscisic acid analogue
- AB-DLO** Research Institute for Agrobiolgy and Soil Fertility (The Netherlands)
- ABS** Active barrier system (for rat control)
- AC** 1) Amylose content  
2) Anther culture
- ACAST** see ACASTD
- ACASTD** Advisory Committee on the Application of Science and Technology to Development
- ACEID** Asian Centre of Educational Innovation for Development (Headquarters: Thailand)
- ACIAR** Australian Centre for International Agricultural Research
- ACSN** Asian Cropping Systems Network
- ACVAFS** American Council of Voluntary Agencies for Foreign Service (Headquarters: New York, USA)
- ADAB** Agricultural Development Agencies in Bangladesh
- ADB** Asian Development Bank (Headquarters: Philippines)
- ADC** Agricultural Development Council (formerly CECA) (New York, USA)
- ADPC** Area under disease progress curve
- ADRAO** Association pour le Developpement de la Riziculture en Afrique de l'Ouest (WARDA, C"te d'Ivoire)
- ads** Air-dried soil
- AERCC** Agricultural Economics Research Council of Canada
- AEZ** Agroecological Zone
- AFB** Axial flow blower
- AFLP** Amplification fragment length polymorphism

**AFNETA** Alley Farming Network for Tropical Africa

**AFP** Agence France Presse

**AG** Anastomosis group

**AGCD** Administration Generale de la Cooperation au Developpement de Belgique (Belgium)

**AGDP** Agricultural gross domestic products

**AGLINET** Agricultural Libraries Network

**AGPET** Agricultural Process Engineering and Technology

**AGRICOLA** Agricultural on-line access (Headquarters: USA)

**AGRIS** International Information System for the Agricultural Sciences and Technology (affiliated with FAO, Italy)

**ai** Active ingredient

**AIBA** Agriculture Information Bank for Asia (Headquarters: Philippines)

**AICARP** All India Coordinated Agronomic Research Project

**AICORP** All India Coordinated Oilseeds Research Project

**AICRIP** All India Coordinated Rice Improvement Project

**AICSMSP** All India Coordinated Scheme of Micronutrients in Soils and Plants

**AIDAB** Australian International Development Assistance Bureau

**AIEDP** Asian Institute for Economic Development and Planning (Headquarters: Thailand)

**AIFST** Australian Institute of Food Science and Technology

**AIRD** Asian Institute for Rural Development (Headquarters: India)

**AIRAT** African Irrigated Rice Advanced Trial

**AIRON** African Irrigated Rice Observational Nursery

**AIRPSS** African Irrigated Rice Preliminary Screening Set

**AIT** Asian Institute of Technology (Headquarters: Thailand)

**ALK** Alkalinity

**ALP** Amplicon length polymorphism

**ALRESS** African Lowland Rice Evaluation and Screening Set

**Amax** Maximum photosynthetic rate

**AMDP** Agricultural Mechanization Development Program (UPLB, Philippines)

**AMIC** Asian Mass Communication Research and Information Centre (Headquarters: Singapore)

**AMTEC** Agricultural Machinery Testing and Evaluation Center (UPLB, Philippines)

**AMTID** Application of Modern Technology to International Development (Washington, DC)

**AMY** Amylose

**ANSI** American National Standards Institute

**AP** Accounts payable

**APAU** Andhra Pradesh Agricultural University (India)

**APCFFT** Asian and Pacific Council Food and Fertilizer Technology Center

**APEID** Asian Programme of Educational Innovation for Development (Headquarters: Thailand)

**APHIS** Animal and Plant Health Inspection Service/USDA (Washington, DC)

**APPA** Agronomy, Plant Physiology, and Agroecology Division (IRRI)

**APS** Agricultural production system

**AR** 1) Absorption ratio  
2) Accounts receivable

**ARA** Acetylene-reducing activity

**ARBN** 1) Asian Rice Biotechnology Network  
2) African Rice Blast Nursery

**ARC** 1) Agricultural Resources Center  
2) Agricultural Research Council  
3) Agricultural Research Center

**ARDA** Research and Development Abstracts of USAID (Washington, DC)

**AREEO** Agricultural Research, Education, Extension Organization (Iran)

**ARFSN** Asian Rice Farming Systems Network (IRRI)

**ARG** Auto radiogram

**ARI** 1) Agricultural Research Institute  
2) Agrarian Reform Institute (UPLB, Philippines)  
3) Agricultural Research Institute and Agricultural Board (USA)

**ARS/USDA** Agricultural Research Service/United States Department of Agriculture

**ARTP** African Rice Testing Program

**AS** 1) Agrarian system  
2) Ammonium sulfate  
3) Anaerobic seeder

**ASA** American Society of Agronomy

**ASAE** American Society of Agricultural Engineers

**ASCA** Association for Scientific Cooperation in Asia (Headquarters: Australia)

**ASCI** American Standard Code for Information Interchange

**ASEAN** Association of Southeast Asian Nations

**asl** Above sea level

**ASS** Acid sulfate soils

**ASPP** American Society of Plant Physiology

**ASTA** American Seed Trade Association

**ASV** Alkali spreading value

**ATI** Agricultural Training Institute (Department of Agriculture, Philippines)

**ATP** Adenosine triphosphate

**ATR** Apparent translocation rate



**AURAT** African Upland Rice Advanced Trial

**AVRDC** Asian Vegetable Research and Development Center (Taiwan)

**AURON** African Upland Rice Observational Nursery

**AURPSS** African Upland Rice Preliminary Screening Set

**AWOL** Absence without leave

**AYT** Advanced yield trial

## B

**B** Bulk population

**BAC** Bacterial artificial chromosome

**BA-ELISA** Biotin-avidin enzyme-linked immunosorbent assay

**BAHC** Biospheric aspects of the hydrological cycle

**Bak** Bakanae

**BALITBIOTECK** Balai Penelitian Bioteknologi Tanaman Pangan (Research Institute for Food Crop Biotechnology; Indonesia; formerly BORIF; see RIFCB)

**BALITJAS** Balai Penelitian Tanaman Jagung dan Serealia Lain (Research Institute for Maize and Other Cereals; Indonesia; formerly MORIF; see RIMC)

**BALITKABI** Balai Penelitian Tanaman Kacang-Kacangan dan Umbi-Umbian (Research Institute for Legumes and Root Crops; Indonesia; formerly MARIF; see RIFLER)

**BALITPA** Balai Penelitian Tanaman Padi (Research Institute for Rice; Indonesia; formerly SURIF; see RIR)

**BALITTRA** Balai Penelitian Tanaman Pangan Lahan Rawa (Research Institute for Food Crops in Swampy Areas; Indonesia; formerly BARIF; see RIFSA)

**BARC** Bangladesh Agricultural Research Council

**BARD** Bangladesh Academy for Rural Development

**BAR1** 1) Bihar Agricultural Research Institute (India)

2) Bangladesh Agricultural Research Institute

**BARIF** Banjarbaru Research Institute for Food Crops (Indonesia; now BALITTRA; see RIFSA)

**BARR** Board on Agriculture and Renewable Resources (Washington, DC)

**BAU** 1) Bangladesh Agricultural University

2) Birsa Agricultural University (India)

**BB** Bacterial blight

**BB&I** Basal broadcast and incorporated

**BC** Backcross

**B:C** Benefit-to-cost ratio

**BC1** First backcross generation

**BC2** Second backcross generation

**BC<sub>n</sub>** nth backcross generation

**BCN** Backcross nursery

**BCPC** British Crop Protection Council

**BD1** (DR1) Flat bed batch dryer (1-ton capacity)

**BD2** Wooden vertical bin batch dryer

**BEP** Break-even point

**BEST** Bicol Experiment Station (Philippines)

**BGA** Blue-green algae

**BI** Black iron

**B&I** Broadcast and incorporated

**BIDS** Bangladesh Institute of Development Studies

**BIFAD** Board for International Food and Agricultural Development (Agency for International Development, Washington, DC)

**Biocon** Biological control

**BIOSIS** Bioscience Information Service of Biological Abstracts (USA)

**BIOTECH** National Institute of Biotechnology and Applied Microbiology (Philippines)

**BIOTROP** Southeast Asia Ministry of Education Organization: Regional Center for Tropical Biology (Headquarters: Indonesia)

**BIP** Books in Print

**BIR** Bureau of Internal Revenue

**BI** Blast disease

**BLB** Bacterial leaf blight

**BLS** Bacterial leaf streak

**BMZ/GTZ** Bundesminister fur Wirtschaftliche Zusammenarbeit (Federal Ministry for Economic Cooperation)/Gesellschaft fur Technische Zusammenarbeit (German Agency for Technical Cooperation)

**BN** Blast nursery

**BNETD** Bureau National d'Etudes Techniques de Developpement (Cote d'Ivoire)

**BNF** Biological nitrogen fixation

**BORIF** Bogor Research Institute for Food Crops (Indonesia; now BALITBIOTECK; see RIFCB)

**BOSTID** Board on Science and Technology for International Development (Washington, DC)

**BOT** Board of Trustees

**BPH** Brown planthopper

**BR** Bypass ratio

**BRP** Brown rice protein

**BRRI** Bangladesh Rice Research Institute

**BS** 1) Bachelor of Science  
2) Best split  
3) Brown spot

**BSA** Bulk segregant analysis

**BWDB** Bangladesh Water Development Board

**BPI** Bureau of Plant Industry (Philippines)

**BPI** Bank of the Philippine Islands

**BRIARC** Bicol Region Integrated Agricultural Research (Philippines)

**BSFR** Broadcast seeded flooded rice

**BShR** Brown sheath rot

**BSR** Broadcast seeded rice  
**Bt** Bacillus thuringiensis  
**BVP** Basic vegetative phase

## C

**CA** Carbonic anhydrase

**CA19** Press wedge granular fertilizer applicator

**CA22** Plunger auger granular fertilizer applicator

**CAAMS** Chinese Academy of Agricultural Mechanization Sciences

**CAAS** 1) Canadian Association of African Studies (Ottawa)

2) Chinese Academy of Agricultural Sciences

**CABI** Centre for Agriculture and Biosciences International (UK)

**CABO-DLO** Centrum voor Agrobiologisch Onderzoek (Centre for Agrobiological Research, The Netherlands)

**CACMI** Comite Africain pour la Coordination des Moyens d'Information (African Committee for the Coordination of Information Media, Ghana)

**CaHa** 1) Older fraction of humic acid bound to calcium

2) Calcium humates

**CALA** Complexe Agricole du Lac Alaotra (Agricultural Complex of Lake Alaotra, Madagascar)

**CARD** 1) Center for Agricultural Research and Development (Iowa, USA)

2) Communicators for Agricultural and Rural Development (Philippines)

3) Center for Agricultural Research and Development (Bhutan)

**CARDI** Caribbean Agricultural Research and Development Institute (Trinidad)

**CARI** Central Agricultural Research Institute (Sri Lanka)

**CARIS** Current Agricultural Research Information Systems (FAO)

**CARRDI** Cambodian Rice Research and Development Institute

**CAST** Council of Agricultural Science and Technology (Headquarters: Iowa, USA)

**CATIE** Centro Agronomico Tropical de Investigacion y Enseñanza (Tropical Agricultural Centre for Research and Education, (Costa Rica)

**CAZRI** Central Arid Zone Research Institute (India)

**CBD** Convention on Biological Diversity

**CC** Chlorophyll content

**CCIC** Canadian Council for International Cooperation (Ottawa)

**CCOD** Current Contents on diskette

**CCRIA** Cooperative Central Research Institute of Agriculture

**CDAET** Centre for Development of Appropriate Agriculture Engineering Technology (Indonesia)

**cDNA** Complementary DNA

**CDNA** Complementary acid

**CD-ROM** Compact disk-read only memory

**CE** 1) Cross-ecosystems

2) Cross Ecosystems Research Program (IRRI)

**CEAT** College of Engineering and Agro-Industrial Technology (UPLB, Philippines)

**CEC** 1) Cation exchange capacity  
2) Continuing Education Center (UPLB, Philippines)

**CEDA** Centre for Economic Development and Administration (Nepal)

**CEDEGE** Comision de Estudios Para el Desarrollo de la Cuenca de Rio Guayas (Ecuador)

**CEDIA** Centro de Investigaciones Arroceras (Rice Research Center, Dominican Republic)

**CEDO** Centre for Educational Development Overseas (UK)

**CEM** College of Economics and Management (UPLB, Philippines)

**CENARGEN** National Centre for Genetic Resources (Brazil)

**CENRADERU** Centre National de la Recherche Applique au Developpement Rural (National Research Center for Rural Development, Madagascar)

**CENTA** Centro Nacional de Tecnologia Agropecuaria (Mexico)

**CEPLAC** Comissao Executiva do Plano Recuperayao Economico-rural da Lavoura Cacaueria (Executive Commission for the Economic Recuperation of Cayao, Brazil)

**CEPLAES** Centro de Planificacion y Estudios Sociales (Ecuador)

**CERES** Crop estimation through resource and environment synthesis

**CERI** Centre for Educational Research and Innovation (OEEC, France)

**CF** Crude fiber

**CFA** Cercle France Afrique (France)

**CFTC** Commonwealth Fund for Technical Cooperation (also FCCT, UK)

**CFTRI** Central Food Technological Research Institute (India)

**CFTU/CIIFAD** Conservation Farming in the Tropical Uplands/Cornell International Institute for Food, Agriculture, and Development (USA)

**CFU** Colony-forming unit/s

**CGFPI** Consultative Group on Food Production and Investment in Developing Countries (United Nations, affiliated with IBRD)

**CGIAR** Consultative Group on International Agricultural Research (Headquarters: Washington, DC)

**CGR** Crop growth rate

**CH<sub>4</sub>** Methane

**CHE** College of Human Ecology (UPLB, Philippines)

**CHEMRAWN** Chemical Research Applied to World Need (Headquarters: Washington, DC)

**CHO** Carbohydrates

**CIADP** Cagayan Integrated Agricultural Development Project (Philippines)

**CIAP** Cambodian-IRRI-Australian Project

**CIAE** Central Institute of Agricultural Engineering (India)

**CIARCO** Centro de Investigaciones Agropecuarias Region Centro Occidental (Venezuela)

**CIAT** Centro Internacional de Agricultura Tropical (International Center for Tropical Agriculture, Colombia)

**CIBC** Commonwealth Institute of Biological Control (Trinidad)

**CIC** Cassava Information Centre (Colombia)

**CICP** Consortium for International Crop Protection (California, USA)

**CID** Consortium on International Development (Utah, USA)

**CIDA** Canadian International Development Agency

**CIDAGRO** Centro de Informacion y Documentacion Agropecuaria

**CIE** Commonwealth Institute of Entomology (Panama)

**CIEI** Center for International Environment Information (New York, USA)

**CIET** Centro Internacional de Ecologia Tropical (Venezuela)

**CIFE** Central Institute of Fisheries Education (India)

**CIFOR** Center for International Forestry Research (Indonesia)

**CIFRI** Central Inland Fisheries Research Institute (India)

**CIIFAD** Cornell International Institute for Food, Agriculture, and Development (New York, USA)

**CIMDER** Centro de Investigaciones Multidisciplinarias en Desarrollo Rural (Colombia)

**CIMMYT** Centro Internacional de Mejoramiento de Maiz y Trigo (International Maize and Wheat Improvement Center, Mexico)

**CIO** Comite Inter Organismes (CIRAD, INRA, and ORSTOM of France)

**CIP** 1) Cataloging-In-Publication  
2) Centro Internacional de la Papa (International Potato Center, Peru)

**CIRAD** Centre de Cooperation International en Recherche Agronomique pour le Developpement (Center for International Cooperation in Development-oriented Agricultural Research, France)

**CIRAD-CA** Annual Crops Department of CIRAD

**CIRED** Centre International de Recherches sur l'Environnement et le Developpement (France)

**CL4** Confinement level 4 greenhouses and grounds

**CLG** Chemiluminigram

**CLK** Chalkiness

**CLRRI** Cuu Long Delta Rice Research Institute (Vietnam)

**CLSU** Central Luzon State University (Philippines)

**cm** centimeter/s

**cM** centiMorgan/s

**CM** Commercial model

**CMA/IIM** Centre for Management in Agriculture/Indian Institute of Management

**CMC** Critical moisture content

**CMS** Cytoplasmic male sterility

**CMU** Chiang Mai University (Thailand)

**C:N** Carbon-to-nitrogen ratio

**CNIA** Centro Nacional de Investigaciones Agropecuarias (Peru, Argentina, Colombia, Dominica, San Salvador)

**CNPAF** Centro Nacional de Pesquisa--Arroz (Brazil)

**CNRRI** China National Rice Research Institute

**CODATA** Committee on Data for Science and Technology (ICSU, France)

**CONICYT** Commission Nacional de Investigacion Cientifica y Tecnologica (Chile)

**COPR** Centre for Overseas Pest Research (UK)

**COSTED** Committee on Science and Technology in Developing Countries (ICSU, France)

**COTA** Collectif d'Echanges pour la Technologie Approprie (Belgium)

**CP** 1) Centrifugal pump  
2) Crude protein

**CP2** Watt-miser electric pump

**CP3** Watt-miser centrifugal pump

**CPRIME** Consultative Program on Rice Mechanization (Philippines)

**CREMNET** Crop Resources Management Network (IRRI)

**CRIFC** Central Research Institute for Food Crops (Indonesia)

**CRIN** Caribbean Rice Improvement Network

**CRRN** Caribbean Rice Research Network

**CRIG** Cocoa Research Institute of Ghana

**CRRRI** Central Rice Research Institute (India)

**CRSP** Collaborative Research Support Program (USAID)

**CRURRS** Central Rainfed and Upland Rice Research Station (India)

**CS** 1) Completely sterile  
2) Computer services  
3) Cropping system

**CSEAS** Center for Southeast Asian Studies (Headquarters: Philippines)

**CSIR** Council for Scientific and Industrial Research (Ghana, India, New Zealand, etc.)

**CSIRO** Commonwealth Scientific and Industrial Research Organization (Australia)

**CSN** Cropping Systems Network

**CSRRI** Central Soil Salinity Research Institute (India)

**CSTD** United Nations Center for Science and Technology for Development (USA)

**CT** Cold tolerance

**CTAB** Cetyltrimethylammonium bromide

**CV** 1) Coefficient of variation  
2) Curriculum vitae

**CW** Caseworm



**CWD** Courseware Development

**CY** Crop year

## D

**D** Duration of treatment

**d** Day/s

**DAA** Days after anthesis

**DAC** Development Assistance Committee

**DAD** Days after draining

**DAE** Days after emergence

**DAF** 1) Days after flowering

2) DNA amplification fingerprinting

**DAH** Days after harvest

**DAI** Days after inoculation

**DANIDA** Danish International Development Agency (Copenhagen)

**DAP** Days after planting

**DAPE** Days after panicle emergence

**DAPI** Days after panicle initiation

**DARE** Department of Agricultural Research and Education (India)

**DAS** Days after seeding/sowing

**DAS-ELISA** Double antibody sandwich enzyme-linked immunosorbent assay

**DASA** Days after straw application

**DAT** 1) Days after treatment

2) Days after transplanting

**DB** Data base

**DBH** Days before harvest/heading

**DBI** Days before inoculation

**DBMS** Data base management system

**DBPE** Days before panicle emergence

**DBPI** Days before panicle initiation

**DBS** Days before seeding

**DBT** Days before transplanting

**DE** Days after emergence

**DG** Director General

**DGGE** Denaturing gradient gel electrophoresis

**DGISP** Danish Government Institute of Seed Pathology

**DH** 1) Double haploid

2) Deadheart/s

**DHL** Doubled haploid lines

**DIA** Diaphorase

**DIS** Data and Information System

**DLA** Diseased leaf area

**DLO** Agricultural Research Department, Ministry of Agriculture, Nature Conservation and Fisheries (The Netherlands)

**DM** Dry matter

**DMI** Dry matter intake

**DMP** Dry matter production

**DMRT** Duncan's multiple range test

**DMS** Dry matter solubles

**DNA** Deoxyribonucleic acid

**DOA** Department of Agriculture

**DOA&E** Department of Agriculture and Extension

**DOASL** Department of Agriculture, Sri Lanka

**DOLE** Department of Labor and Employment (Philippines)

**DOS** 1) Date of seeding  
2) Disk operating system

**DOST** Department of Science and Technology (Philippines)

**DOT** Date of transplanting

**DP** 1) Degree of polymerization  
2) Deep-placed

**DPR** Disposal report form

**DR** Dryer

**DRAAE** Department de Recherches Agronomique et Agroéconomique (Department of Agronomic Research and Agro-economy, FOFIFA, Madagascar)

**DRD** Department de Recherches-Developpement (Department of Research Development, FOFIFA, Madagascar)

**DRR** 1) Department de Recherches Rizicoles (Department of Rice Research, FOFIFA, Madagascar)  
2) Directorate of Rice Research (India)

**DRT** Drought

**DS** Dry season

**DSA** 1) Indian Dairy Science Association  
2) International Development Service of America

**DSC** Development Studies Center (affiliated with the Australian National University)

**DSI** Disease severity index

**DSR** Direct seeded rice

**DSS** Decision support system

**DSSAT** Decision Support System for Agrotechnology Transfer

**DTRI** Dairy Training and Research Institute (UPLB, Philippines)

**dw** Dry weight

**DWR** Deepwater rice

**DWS** Direct wet seedbed

**DWSR** Direct wet seeded rice

## E

**E4/E6** Ratio of light absorption at wavelengths 465/665 nm

**EACA** E-amino-caproic acid

**EADI** European Association of Development Research and Training Institutes  
(Headquarters: Austria)

**EAG** Electroantennogram

**EAP** Ecoregional action plan

**EC** 1) Electrical conductivity

2) Emulsifiable concentrate

3) European Community (Collective name given to the consolidation of the European Coal and Steel Community, the Common market, and the European Atomic Energy Community)

**ECA** Economic Commission for Latin America (Chile, affiliated with the UN, also CEA)

**ECART** European Consortium for Agricultural Research in the Tropics

**ECC** Employee Compensation Commission

**ECE** Economic Commission for Europe (UN)

**ECL** Enhanced chemiluminescence

**ECLA** Communauté Economique de L'Afrique (Economic Community of West African States, Headquarters: Burkina Faso)

**ECSA** Eastern, Central, and Southern Africa

**ECSSID** European Cooperation in Social Science Information and Documentation

1) Environmental Defense Fund (Washington, DC)

2) European Development Fund (Fonds Europeen de Developpement, Belgium; also FED)

**EDI** Economic Development Institute (Washington, DC; affiliated with IBRD)

**EDITEAST** Association of Editors in the South East Asian Region (Indonesia)

**EDPITAF** Educational Development Projects Implementing Task Force (Philippines)

**EDTA** Ethylenediaminetetraacetic acid

**EE** Ether extract

**EEC** European Economic Community (Headquarters: Belgium)

**EIA** Environmental impact assessment

**ELISA** Enzyme-linked immuno sorbent assay

**ELON** Elongation

**E-Mail** Electronic mail

**EMAPA** Empresa Maranhense de Pesquisa Agropecuaria (Brazil)

**EMASAR** Ecological Management of Semi-Arid Rangelands in Africa, the Near East, and Middle East

**EMBRAPA** Empresa Brasileira de Pesquisa Agropecuaria (Brazilian Institute for Agricultural Research)

**EPA** Environmental Protection Agency (USA)

**EMC** Equilibrium moisture content

**Ent** Entomology

**EPAMIG** Empresa de Pesquisa Agropecuaria de Minas Gerais (Brazil)

**Epan** Class A pan evaporation

**EPC** Engineered pest control

**EPPD** Entomology and Plant Pathology Division (IRRI)

**ERDA** Energy Research and Development Administration (Washington, DC)

**ERIC** Educational Resources Information Center (Washington, DC)

**ESCAP** Economic and Social Commission for Asia and the Pacific (Headquarters, Thailand)

**ESP** Exchangeable sodium percentage

**EST** Esterase

**ESYT** Environment-specific yield test

**Et** Actual evapotranspiration

**ETH** Eidgenossische Technische Hochschule (Swiss Federal Institute of Technology, Zurich)

**ETL** Economic threshold level

**ETS** Expressed tagged site

**EU** European Union

**EUROPICA** European Program in Chemistry of the Atmosphere

**EUSIDIC** European Association of Scientific Information Dissemination Centres (The Netherlands)

**EWS** Early wet season

## F

**F** Fertile

**F1** First filial generation

**F2** Second filial generation

**F<sub>n</sub>** nth filial generation

**FA** Fulvic acid

**FADINAP** Fertilizer Advisory, Development and Information Network for Asia and the Pacific

**FAME** Fatty acid methyl esters

**FAO** Food and Agriculture Organization (UN)

**FARMI-VISCA** Farm and Resource Management Institute--Visayas State College of Agriculture (Philippines)

**FAVD** Favorable rainfed village dummy

**fb** Followed by

**FB** Flat bed dryer

**FC** Forage chopper

**FCCT** See CFTC

**FCRI** Field Crops Research Institute (Thailand)

**FCS** Free choice screening test

**FCSSP** Federation of Crop Science Societies of the Philippines

**FDC** Spikelet fertility depression coefficient

**FDD** Farm ditch density

**FDP** Fructose 1,6-diphosphatase

**FE** Field emergence

**FEBTC** Far East Bank and Trust Company (Philippines)

**FED** Fonds Europeen de Developpement (European Development Fund)

**FF** 1) First flowering

2) Ford Foundation

**FFHC** Freedom From Hunger Campaign (FAO)

**FFSM** Federation des Fondations pour la Sante Mondiale (Federation of World Health Foundations, Headquarters: Switzerland)

**FFTRI** Fruit and Food Technology Research Institute (South Asia)

**FIDA** Fonds International de Developpement Agricole (International Fund for Agricultural Development) (UN, France)

**FIIEWS** Food Information and Early Warning System (FAO, UN)

**FIFABE** Fikambanana Fampandrosoana ny Lemak'i Betsiboka (Association for the Development of the Plain of Betsiboka, Madagascar)

**FINIDA** Finnish International Development Assistance

**FIPA** Federation Internationale des Producteurs Agricoles (International Federation

of Agricultural Producers; also IFAP)

**FISH** Fluorescent in situ hybridization

**FITC** Foundation for International Technological Cooperation (Washington, DC)

**FL** Flowering

**FMDN** Farm Machinery Development Network

**FMG** Malagasy francs

**FNRI** Food and Nutrition Research Institute (Philippines)

**FOFIFA** Foibe Fikarohana Ampiharina amin-ny Fampandrosoana ny Ambanivohitra (Centre National de la Recherche Applique au Developpement Rural, National Center for Applied Research Rural Development, Madagascar)

**FOPPS** Farm Operations, Plant Protection, and (Pest) Surveillance (IRRI)

**FORI** Forest Research Institute (UPLB, Philippines)

**FP** Flood-Prone Rice Program (IRRI)

**FPRDI** Forest Products Research and Development Institute (UPLB, Philippines)

**FPRL** Forest Products Research Laboratory (UK)

**FR** 1) Fault report

2) Farm reservoir

**FRT** Floating rototiller

**FS** 1) False smut

2) Financial statement

**FSR** Farming system research

**FSRI** Farming Systems Research Institute (Thailand)

**FSSRI** Farming Systems and Soil Resources Institute (UPLB, Philippines)

**fw** Fresh weight

**FYM** Farmyard manure



## G

**G** 1) Good

2) Granules

**GA3** Gibberellic acid

**GAAS** Guangdong Academy of Agricultural Sciences (China)

**GASGA** 1) Group for Assistance on the Storage of the Grains in Africa

2) Group for Assistance on Systems Relating to Grain After Harvest

**GAIM** Global analysis, interpretation, and modelling

**GAWI** German Corporation for Technical Assistance to Developing Countries

**GB** 1) Gene Bank

2) Germplasm Bank

3) Great Britain

**GBIRET** Germplasm Bank Information Retrieval

**GBPU** G.B. Pant University (India); see GPU&T

**GC** Gel consistency

**GC7** Portable grain cleaner

**GCA** General combining ability

**GCDE** Germplasm conservation, dissemination, and evaluation

**GCM** General circulation model

**GCTE** Global change and terrestrial ecosystems

**GD** Growth duration

**GDP** Gross domestic product

**GxE** Genotype x environment interaction

**GEF** Global environment facility

**GELCON** Gel consistency

**GELTEMP** Gel temperature

**GEMS** Global Environmental Monitoring System (Kenya)

**GERDAT** Groupement d'Etudes et de Recherches pour le Developpement de l'Agronomie Tropicale (France)

**GEU** Genetic evaluation and utilization

**GF** Grain filling

**GFD** Grain filling duration

**GFR** Grain filling rate

**GH** Greenhouse

**GHC** Green hairy caterpillar

**GIDA** International Group for Agricultural Development in Latin America

**GISH** Genome in situ hybridization

**GL** Generalized Leontief

**GLH** Green leafhopper

**GM** 1) Gall midge

2) Green manure

**GMD** Geometric mean diameter

**GMI** Mild stunting and yellowing, slightly profuse tillering, erect growth habit

**GMO** Moderate stunting and yellowing, slightly profuse tillering, spreading growth habit

**GOC** General operating costs

**GP** Germination percentage; germination in polythelene glycol solution

**GPS** Global positioning system

**GPUA&T** G.B. Pant University of Agriculture and Technology (India)

**GRC** Genetic Resources Center (IRRI)

**GRL** Grain length

**GRS** Grain shape

**GSV** Grassy stunt virus

**GT** Gelatinization temperature

**GTZ** Deutsche Gesellschaft für Technische Zusammenarbeit (German Agency for Technical Cooperation, Germany)

**GW** Grain weight

## H

**ha** Hectare/s

**HA** Humic acid

**HAU** Haryana Agricultural University (India)

**HB** Hybridization block

**HCES** Honam Crop Experiment Station (Republic of Korea)

**HD** High density

**HDI** High density index

**HI** Harvest index

**HPLC** High performance liquid chromatography

**HR** Highly resistant

**HRD** Human resources development

**HRR** Head rice recovery

**HS** Highly susceptible

**HT** 1) Height

2) Hydro tiller

**HT1** Hydro tiller (regular)

**HT2** Hydro tiller (modified)

**HT3** Mini hydro

**HU** Centrifugal huller

**HW** Hand weeding

**HWR** Hull weight ratio

**HWT** Hot water treatment



I 1) Indica

2) Intermediate

**IAA** Indoleacetic acid

**IAAE** International Association of Agricultural Economics (Headquarters: UK)

**IAAP** Intensive Agricultural Area Program (India)

**IAC** 1) Instituto Agronomico Campinas (Brazil)

2) International Agricultural Center (The Netherlands)

**IACOD** International Agency for Cooperation on Development (Switzerland)

**IADP** Intensive Agricultural District Program (India)

**IADS** International Agricultural Development Service (New York, USA)

**IAE** Institute for Agricultural Engineering (Indonesia; formerly CDAET, Center for Development of Appropriate Agricultural Engineering Technology)

**IAEA** International Atomic Energy Agency (Austria)

**IARC/s** International Agricultural Research Center/s

**IARI** Indian Agricultural Research Institute

**IARI-WTC** Indian Agricultural Research International, Water Technology Center (New Delhi)

**IARPCB** International Association for Research on Plantain and other Cooking Bananas (Nigeria)

**IAS** Institute of Agricultural Sciences (Republic of Korea)

**IASRI** Indian Agricultural Statistics Research Institute

**IB** Inclusion body

**IBCP** IRRI-Burma-CIDA Project

**IBGE** Instituto Brasileiro de Geografica e Estatistica (Brazil)

**IBPGR** International Board for Plant Genetic Resources (Italy; became IPGRI in 1994)

**IBRD** International Bank for Reconstruction and Development (World Bank)

**IBSNAT** International Benchmark Sites Network for Agrotechnology Transfer

**IBSRAM** International Board for Soil Research and Management (Thailand)

**ICA** 1) International Cooperative Alliance (UK)

2) Instituto Colombiano Agropecuario (Colombia)

3) International Council for Aquaculture (Philippines)

**ICAR** Indian Council of Agricultural Research

**ICARDA** International Centre for Agricultural Research in the Dry Areas (Syria)

**ICASA** International Consortium for Application of Systems Approach to Agriculture (University of Hawaii, USA)

**ICASALS** International Center for Arid and Semi-Arid Land Studies (Texas, USA)

**ICDUP** International Council for the Development of Underutilized Plants

**ICGEB** International Center for Genetic Engineering and Biotechnology (United Nations Development Organization)

**ICID** International Commission on Irrigation and Drainage (India)

**ICIMOD** International Centre for Integrated Mountain Development (Nepal)

**ICIPE** International Centre of Insect Physiology and Ecology (Kenya)

**ICLARM** International Center for Living Aquatic Resources Management (Philippines)

**ICP** Intercountry Program on Integrated Pest Control

**ICRAF** International Centre for Research in Agroforestry (Kenya)

**ICRISAT** International Crops Research Institute for the Semi-Arid Tropics (India)

**ICS** Institute of Computer Science (UPLB, Philippines)

**ICSU** International Council of Scientific Unions (Headquarters: France)

**ICTA** Instituto de Ciencia y Tecnologia Agricolas (Guatemala)

**ICWG-GR** Inter-Center Working Group on Genetic Resources

**IDA** International Development Association (Washington, DC)

**IDESSA** Institut des Savanes (Africa)

**IDH** Isocitric dehydrogenase

**IDIAP** Instituto de Investigacion Agropecuaria de Panama

**IDPS** IRRI Discussion Paper Series

**IDRC** International Development Research Centre (Canada)

**IDRON** International Rainfed Lowland Rice Observational Nursery

**IDRYN** International Deepwater Rice Yield Nursery

**IEA** Initial environmental assessment

**IESAM** Institute of Environmental Science and Management (UPLB, Philippines)

**IEF** Isoelectric focusing

**IFRI** Inland Fisheries Research Institute (Philippines)

**IFRON** International Floating Rice Observational Nursery

**IIRON** International Irrigated Rice Observational Nursery

**IIRYN-E** International Irrigated Rice Yield Nursery--Early

**IIRYN-M** International Irrigated Rice Yield Nursery--Medium

**IIRYN-VE** International Irrigated Rice Yield Nursery--Very Early

**IESAM** Institute of Environmental Science and Management (UPLB, Philippines)

**IFAD** International Fund for Agricultural Development (Italy)

**IFAIN** Instituto de Fomento Agroindustrial (Costa Rica)

**IFCC** Institut Francais du Cafe, du Caçao, et d'Autres Plantes Stimulantes

**IFDC** International Fertilizer Development Center (Alabama, USA)

**IFDP** Institute for Food Development Policy (USA)

**IFPRI** International Food Policy and Research Institute (Washington, DC)

**IFRPD** Institute of Food Research and Product Development (Thailand)

**IFS** International Foundation of Science (Sweden)

**IGAC** International Global Atmospheric Chemistry Project

**IGAU** Indira Gandhi Agricultural University (India)

**IGBP** International Geosphere-Biosphere Programme: A Study of Global Change (ICSU, Australia)

**IGBP-DIS** IGBP Data and Information System

**IGCCBD** Inter-Governmental Committee on the Convention on Biological Diversity

**IGF** International Genetics Federation

**IgG** Specific immunoglobulin

**IGLIC** International Grain Legume Information Centre (Nigeria)

**IGUAT** Indira Gandhi University of Agriculture and Technology (India)

**IHPR** Insect host plant resistance

**IIASA** International Institute for Applied Systems Analysis (Austria)

**IIBC** International Institute of Biological Control (UK)

**IIE** Imperial Institute of Entomology (UK)

**IIHR** Indian Institute for Horticultural Research

**IIMI** International Irrigation Management Institute (Sri Lanka)

**IIRR** International Institute for Rural Reconstruction (Philippines)

**IIT** Indian Institute of Technology (India)

**IITA** International Institute of Tropical Agriculture (Nigeria)

**I/J** Indica/japonica

**ILCA** International Livestock Centre for Africa (Ethiopia; combined with ILRAD in 1994 to form ILRI)

**ILO** International Labour Organization

**ILRAD** International Laboratory for Research on Animal Diseases (Kenya; combined with ILCA in 1994 to form ILRI)

**ILRI** 1) International Institute for Land Reclamation and Improvement (The Netherlands)  
2) International Livestock Research Institute (Kenya and Ethiopia)

**INCA** Instituto Nacional de Ciencias Agrícolas (Cuba)

**INEP** Instituto Nacional de Estudio e Pesquisas Educacionais (Brazil)

**INEPA** Institute of Entomology and Parasitology of Africa (Ghana)

**INERA** Institut National pour l'Etude et la Recherche Agronomiques (Zaire)

**INGER** International Network For Genetic Evaluation of Rice (formerly International Rice Testing Program, IRTP)

**INIA** Instituto Nacional de Investigaciones Agrarias (Spain)

**INIAA** Instituto Nacional de Investigacion Agraria y Agroindustrial (Peru)

**INIAP** Instituto Nacional de Investigaciones Agropecuarias (Ecuador)

**INIBAP** International Network for the Improvement of Banana and Plantain (France, now part of IPGRI)

**INIFAP** Instituto Nacional de Investigaciones Forestales y Agropecuarias (Mexico)

**INNOTECH** Regional Centre for Educational Innovation and Technology (Philippines)

**INSAET** Institute of Agricultural Engineering and Technology (UPLB, Philippines)

**INSA** 1) Indian National Science Academy  
2) National Institute of Agricultural Sciences (Vietnam)

**INSAET** Institute of Agricultural Engineering and Technology (UPLB, Philippines)

**INSFFER** International Network on Soil Fertility and Fertilizer Evaluation for Rice

**INSOTEC** Instituto de Investigaciones Socio-Economicas y Tecnologicas

**INSURF** International Network on Soil Fertility and Sustainable Rice Farming

**INTA** Instituto Nacional Tecnologia Agropecuaria (Argentina)

**INTSORMIL** International Sorghum and Millet Program (Headquarters: Nebraska, USA)

**INTSOY** International Soybean Program (Headquarters: Illinois and Puerto Rico, USA)

**IORD** International Organization for Rural Development (Belgium)

**IPB** Institute of Plant Breeding (UPLB, Philippines)

**IPGRI** International Plant Genetic Resources Institute (formerly IBPGR)

**IPM** Integrated Pest Management

**IPMN** Integrated Pest Management Network

**IPMRN** Integrated Pest Management Research Network

**IPPC** International Plant Protection Center (Oregon, USA)

**IPR** Intellectual property rights

**IR** 1) Infrared spectrophotometry  
2) Irrigated Rice Research Program (IRRI)  
3) Irrigated rice

**IRA** Institute of Agronomic Research (Cameroon)

**IRAEN** International Rice Agro-Economic Network

**IRAF** Institut de Recherches Agronomiques et Forestieres (Cameroon)

**IRALON** International Rice Acid Lowland Soils Observational Nursery

**IRALSN** International Rice Acid Lowland Soil Nursery

**IRAM** 1) Institut de Recherches Agronomiques de Malagasy  
2) Institut de Recherches et Application de Methodes de Developpement (Institute of Research and Application of Development Methods, France)

**IRAT** Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres (Institute for Research in Tropical Agriculture, France)

**IRAUSN** International Rice Acid Upland Soil Nursery

**IRBBN** International Rice Bacterial Blight Nursery

**IRBN** International Rice Blast Nursery

**IRBN-L** International Rice Blast Nursery--Lowland

**IRBN-U** International Rice Blast Nursery--Upland

**IRBON** International Rice Boro Observational Nursery

**IRBPHN** International Rice Brown Planthopper Nursery

**IRC** 1) International Rice Commission (Italy)  
2) Interrow cultivation

**IRCTN** International Rice Cold Tolerance Nursery

**IRDP** Integrated Rural Development Programme (Zambia)

**IRDSN** International Rice Drought Screening Nursery (now IRDTN)

**IRDTN** International Rice Drought Tolerance Nursery

**IRDWON** International Rice Deep Water Observational Nursery

**IRDWYN** International Rice Deep Water Yield Nursery

**IRFAON** International Rice Finegrain Aromatic Observational Nursery

**IRGA** Instituto Rio Grandense do Arroz (Brazil)

**IRGC** International Rice Germplasm Center (IRRI)

**IRGD** Irrigated village dummy

**IRGMN** International Rice Gall Midge Nursery

**IRHON** International Rice Hybrid Observational Nursery

**IRIS** Inarihan River Irrigation System (Philippines)

**IRLON** International Rainfed Lowland Rice Observational Nursery (formerly IRRSWON)

**IRLYN** International Rainfed Lowland Rice Yield Nursery

**IRLYN-E** International Rainfed Lowland Rice Yield Nursery--Early

**IRLYN-M** International Rainfed Lowland Rice Yield Nursery--Medium (formerly IRRSWYN-E)

**IRON** International Rice Observational Nursery

**IRON-VE** International Rice Observational Nursery--Very Early

**IRON-E** International Rice Observational Nursery--Early

**IRON-M** International Rice Observational Nursery--Medium

**IRIS** Inarihan River Irrigation System (Philippines)

**IRRI** International Rice Research Institute (Philippines)

**IRRI-BN** International Rice Research Institute--Blast Nursery

**IRRN** International Rice Research Notes (formerly IRRI Newsletter)

**IRRSWON** International Rainfed Rice Shallow Water Observational Nursery (now IRLON)

**IRRSWON-E** International Rainfed Rice Shallow Water Observational Nursery--Early (now IRLON)

**IRRSWON-M** International Rainfed Rice Shallow Water Observational Nursery--Medium (now IRLON)

**IRRSWYN-E** International Rainfed Rice Shallow Water Yield Nursery--Early (now IRLYN-E)

**IRRSWYN-M** International Rainfed Rice Shallow Water Yield Nursery--Medium (now IRLYN-M)

**IRS** Internationally recruited staff



**IRSATON** International Rice Salinity and Alkalinity Tolerance Observational Nursery (now IRSSTN)

**IRSBN** International Rice Stem Borer Nursery

**IRSGON** International Rice Slender Grain Observational Nursery

**IRSSTN** International Rice Soil Stress Nursery

**IRSTON** International Rice Salinity Tolerance Observational Nursery (now IRSSTN)

**IRTIP** International Rice Testing and Improvement Program

**IRTN** International Rice Tungro Nursery

**IRTON** International Rice Temperate Observational Nursery

**IRPT** International Rice Testing Program (now INGER)

**IRUSS** International Rice Ufra Screening Set

**IRUN** International Rice Ufra Nursery

**IRWBPHN** International Rice Whitebacked Planthopper Nursery

**IRWIT** International Rice-Wheat Integrated Trial

**IRYN** International Rice Yield Nursery

**IRYN-E** International Rice Yield Nursery--Early

**IRYN-M** International Rice Yield Nursery--Medium

**IRYN-VE** International Rice Yield Nursery--Very Early

**ISABU** Institut des Sciences Agronomiques du Burundi

**ISAID** Institute for the Study and Application of International Development (Canada)

**ISAR** Institut des Sciences Agronomiques du Rwanda

**ISBN** International standard book number

**ISDEF** International Soil Data Exchange File

**ISFEIP** International Soil Fertility Evaluation and Improvement Program

**ISMARC** Irrigation System Management Research Committee

**ISNAR** International Service for National Agricultural Research (The Netherlands)

**ISO** International Standardization Organization

**ISRA** Institut Senegal de Recherches Agricoles

**ISRIC** International Soil Reference and Information Centre (includes the former International Soil Museum, The Netherlands)

**ISSN** International standard serial number

**ISSS** International Soil Science Society (Italy)

**ISTA** International Seed Testing Association (Switzerland)

**ISWRN** International Spring Wheat Rust Nursery

**ITPRON** International Tide-Prone Rice Observational Nursery

**ITRON** International Tidal Wetland Rice Observational Nursery

**IUBS** International Union of Biological Sciences (France)

**IUCN** International Union for the Conservation of Nature and Natural Resources (Switzerland)

**IUPAC** International Union of Pure and Applied Chemistry (Headquarters: UK)

**IURON** International Upland Rice Observational Nursery

**IURON-E** International Upland Rice Observational Nursery--Early

**IURON-M** International Upland Rice Observational Nursery--Medium

**IURYN** International Upland Rice Yield Nursery

**IURYN-E** International Upland Rice Yield Nursery--Early

**IURYN-M** International Upland Rice Yield Nursery--Medium

**IVB** Inner vascular bundle

**IVOMD** In vitro organic matter digestibility

**IVRI** Indian Veterinary Research Institute

**IVTDMD** In vitro total dry matter digestibility

## J

**J** Japonica

**j2** Juveniles

**JACODEC** Japan Agricultural Chemicals Overseas Development Commission

**JARI** Jute Agricultural Research Institute (India)

**JAU** Jiangxi Agricultural University (China)

**JCAD** Joint Committee on Agricultural Research and Development (AID)

**JICA** Japan International Cooperation Agency

**JICT** Japan Information Center of Science and Technology

**JIRCAS** Japan International Research Center for Agricultural Sciences

**JNAU** Jawaharlal Nehru Agricultural University (India)

## **K**

**KARI** Kenya Agricultural Research Institute

**KAU** Kerala Agricultural University (Thailand)

**KB** Kilobase

**kg** Kilogram/s

**KG** KG growth cabinet room

**KKU** Khon Kaen University (Thailand)

**KSU** Kansas State University (USA)

**KU** Kasetsart University (Thailand)

## L

**L** Liter  
**L/B** Length/breadth ratio of grain  
**L:W** Length-to-width ratio  
**LAI** Leaf area index  
**LAN** Local area network  
**LAR** Leaf area ratio  
**LAC** Latin America and the Caribbean  
**Lao PDR** Lao People's Democratic Republic  
**LC** 1) Letter of credit  
2) Library of Congress (USA)  
**LC50** Concentration that causes 50% mortality  
**LCP** Light compensation point  
**LCR** Ligase chain reaction  
**LD** Low density  
**LD50** Duration, in days, to 50% mortality  
**LDG** Lodging  
**LEISA** Low external input and sustainable agriculture  
**LER** Land equivalent ratio  
**LEW** Leaf epicuticular wax  
**LF** Leaf folder  
**LIPI** Indonesian Institute of Sciences  
**LIRRTTP** Lao-IRRI Rice Research and Training Project  
**LMPCR** Ligase mediated polymerase reaction  
**Lr** Leaf rolling  
**LRDC** Land Resources Development Centre (UK)  
**LRP** Less reactive phosphate  
**LSc** Leaf scald  
**LSD** Least significant difference  
**LSS** Literature Search System  
**LTCCE** Long-term continuous cropping experiment  
**LTFE** Long-term fertility experiment  
**LT-IBDS** Low temperature in-bin drying and storage  
**LTR** Light transmission ratio  
**LUCC** Land-use/cover change  
**LWD** Leaf water potential

## M

**M** 1) Maintainer

2) Mutant

**MAALS** Monosomic alien addition lines

**MAAP** Multiple arbitrary amplicon profiling

**MACROS** Modules for annual crop simulation

**MADA** Muda Agricultural Development Authority (Indonesia)

**MAFF** Ministry of Agriculture, Forestry, and Fisheries (Japan)

**MAFI** Ministry of Agriculture and Food Industries (Vietnam)

**MARC** Machine readable cataloging

**MARDI** Malaysian Agricultural Research and Development Institute

**MARI** Maros Agricultural Research Institute (Indonesia)

**MARIF** Malang Research Institute for Food Crops (Indonesia; now BALITKABI; see RIFLER)

**MAS** Myanmar Agricultural Service

**MAT** Maturity duration

**Mb** Megabase

**MBRC** Marginal benefit cost ratio

**MBPS** Modified bulk pedigree selection

**MC** 1) Moisture content

2) Multiple cross

**MCA** Monoclonal antibodies

**MCD** Multiple cropping department

**m-d** Man-days

**MDS** Minimum data set

**MGR** Magnaporthe grisea repeat

**MH** Major pedological horizon

**MHA** Mobile humic acid

**MHE** Ministry of Higher Education (Philippines)

**MIFS** Myanmar-IRRI Farming Systems

**MITS** Multicrop inverted-T seeder

**MM** Materials management

**MMPU** Multimode power unit

**MOD** Ministry of Overseas Development (UK)

**MORIF** Maros Research Institute for Food Crops (Indonesia; now BALITJAS; see RIMC)

**MOU** Memorandum of Understanding

**MP** Matric potential

**MPTO** Motor cycle power take-off  
**MPTS** Multipurpose tree species  
**MR** 1) Mail room/radioroom  
2) Memorandum of receipt  
3) Mildly resistant  
4) Milled rice  
5) Milling recovery  
6) Moderately resistant  
**mRNA** Messenger RNA  
**MRRTC** Maligaya Rice Research and Training Center (Philippines)  
**MS** 1) Male sterile  
2) Mildly susceptible  
3) Moderately susceptible  
**MSc** Master of Science  
**SST** Modified seedbox screening test  
**MSU** Michigan State University (USA)  
**MMSU** Mariano Marcos State University (Philippines)  
**MOA** Ministry of Agriculture  
**MT** 1) Maximum tillering  
2) Metric ton  
**MTA** Material transfer agreement  
**MTCB** Minimum temperature for chloroplast biogenesis  
**MTP** Medium-Term Plan  
**MV/s** Modern variety/ies  
**MVP** Marginal value products  
**MVR** Rate of MV adoption  
**MW** Molecular weight

## **N**

**NA** Nonanoic weight

**NAFC** National Agriculture and Food Council (Philippines)

**NAL** National Agricultural Library (Philippines)

**NARC** 1) Nepal Agricultural Research Council

2) National Agricultural Research Center (Japan)

**NARP** National Agricultural Research Project (India)

**NARS/s** National Agricultural Research System/s

**NAS** National Academy of Sciences (Washington, DC)

**NAU** Nanjing Agricultural University (China)

**NBI** National Bureau of Investigation (Philippines)

**NBPGR** National Bureau of Plant Genetic Resources (India)

**NBLS** Narrow brown leaf spot

**NBS** Narrow brown spot

**NC** No-choice screening test

**NCAER** National Council for Applied Economic Research (India)

**NCP** 1) Noncapsid protein

2) Nutrition Center of the Philippines

**NCPC** National Crop Protection Center (Philippines)

**NCRE** National Cereals Research and Extension

**NCRW** National Commission on the Role of Women (Philippines)

**NCSO** National Census and Statistics Office (Philippines)

**NCRI** National Cereals Research Institute (Nigeria)

**NCSU** North Carolina State University (USA)

**Ndfa** Contribution of atmospheric nitrogen

**NDUAT** Narendra Deva University of Agriculture and Technology (India)

**NEC** National Executive Council (Papua New Guinea)

**NEDA** National Economic and Development Authority (Philippines)

**NEDECO** Netherlands Development Co.

**NERC** National Environment Research Center (Alabama, USA)

**NFAC** National Agriculture and Food Council (Philippines)

**NFDC** National Fertilizer Development Center (Tennessee, USA)

**NFE** Nitrogen-free extract

**NFNC** National Food and Nutrition Commission (Zambia)

**NFS** Nitrogen fixation stimulation

**NFTAL** Nitrogen fixation in tropical agricultural legumes

**NGA** National Grains Authority (Philippines)

**NGO** Nongovernmental Organization



**NHI** Nitrogen harvest index  
**NIA** National Irrigation Administration (Philippines)  
**NIAB** Nuclear Institute for Agriculture and Biology (Pakistan)  
**NIAE** National Institute of Agricultural Engineering (now Silsoe Research Institute, UK)  
**NIAR** National Institute of Agrobiological Resources (Japan)  
**NIB** National Irrigation Board (Philippines)  
**NIG** National Institute of Genetics (Japan)  
**NIL** Near-isogenic line/s  
**NIR** Near-infrared reflectance  
**NIRD** National Institute for Rural Development (India)  
**NIRS** National Irrigation Research Station (Zambia)  
**NIST** National Institute of Standards and Technology (Department of Commerce, USA)  
**NLB** Neem leaf bitters  
**Nm<sup>3</sup>** Normal cubic meter  
**NMC** Nonmorphogenic calli  
**NMR** Nuclear magnetic resonance spectroscopy  
**NoET** Number of effective tillers/hill  
**NoFG** Number of filled grains/panicle  
**NORAD** Norwegian Agency for International Development  
**NORAGRIC** Norwegian Centre for International Agricultural Development  
**NPGRCC** National Plant Genetic Resources Conservation Center (China)  
**NPGRL** National Plant Genetic Resources Laboratory (Philippines)  
**NPR** Nominal protection rate  
**NPT** New plant type  
**NRI** Natural Research Institute (UK)  
**NRIP** National Rice Improvement Programme (Nepal)  
**NRS** Nationally recruited staff  
**NRSMC** National Research and Seed Multiplication Center (Philippines)  
**NSB** Neem seed bitters  
**NSC** Nonstructural carbohydrates  
**NSDB** National Science Development Board (Philippines)  
**NSERC** National Sciences and Engineering Research Council of Canada (Ottawa)  
**NSKE** Neem seed kernel extract  
**NSN** National Screening Nursery  
**NSSL** National Seed Storage Laboratory (USA)  
**NSTDA** National Science and Technology Development Agency (Nigeria)  
**NT** Nontilled or no tillage

**NTP** Nucleoside 5'triphosphate

**NUE** Nitrogen use efficiency

**NUFFIC** Netherlands Universities Foundation for International Cooperation

## O

- OA** Osmotic adjustment
- OCLC** On-line Computer Library Center
- od** Orange discoloration
- ODA** Overseas Development Administration (UK)
- ODAI** Operation de Developpement Agricole Integre (Operation for Integrated Agricultural Development)
- ODASE** Operation de Developpement de Agricole du Sud-Est (Project for the Agricultural Development of the Southeast Region)
- ODC** Overseas Development Council (USA)
- ODEMO** Operation de Developpement du Moyen-Ouest (Project for the Development of the Middle-West)
- ODEPA** Oficina de Planificacion Agricola (Chile)
- ODI** Overseas Development Institute (UK)
- ODM** Overseas Development Ministry (formerly Department of Technical Cooperation, UK)
- ODNRI** Overseas Development of Natural Resources Institute (UK)
- ODR** Operation de Developpement Rizicole (Project for Rice Development)
- OEEC** Organization for Economic Cooperation and Development (formerly OECD, France)
- OEDF** Overseas Economic Development Fund (Japan)
- OFCF** Overseas Farmers' Cooperative Federation
- OM** Organic matter
- OMS** Organic matter solubles
- ON** Observational nursery
- ONADER** Operation Nationale pour le Developpement de la Riziculture (Guinea)
- ONB** Office National des Barrages et de l'Irrigation (Burkina Faso)
- OPAC** On-line public access catalog
- ORP** Operational Research Project (India)
- ORSTOM** Institut Francais de Recherche Sceintifique pour le Developpement en Cooperation (French Institute of Scientific Research for Development)
- OS** 1) Operating systems  
2) Out of stock
- OSU** 1) Ohio State University (USA)  
2) Oklahoma State University (USA)  
3) Oregon State University (USA)
- OUAT** Orissa University of Agriculture and Technology (India)
- OVB** Outer vascular bundle
- OYT** Observational yield trial/test

**OYWR** Outstanding Young Women in Rice Science

## P

**P** Primary tillers

**P+H** Plow and harrow

**PA** Prune agar

**PAB** Photosynthetically active radiation

**PAGASA** Philippine Atmospheric, Geophysical, and Astronomical Services Administration

**PAGE** Polyacrylamide gel electrophoresis

**PAPR** Partially acidulated phosphate rock

**PAR** Photosynthetic aquatic biomass

**PARC** Pakistan Agricultural Research Council

**PAU** Punjab Agricultural University (India)

**PB** Primary branch

**PBH** Plowing, broadcasting, harrowing

**PCARRD** Philippine Council for Agriculture, Forestry, and Natural Resources Research and Development (Philippines)

**PCR** Polymerase chain reaction

**Pd** Domestic price

**PDA** Potato dextrose agar

**PDSS** Phosphorus decision support system

**PEEM** Panel of Experts on Environmental Management for Vector Control

**PEG** Polyethylene glycol

**PEM** Programme Engrais Malagasy (Malagasy Fertilizer Program)

**PES** Provincial Extension Service (Papua New Guinea)

**PEt** Potential evapotranspiration

**PF** Partially fertile

**PFGE** Pulse field gel electrophoresis

**PFP** partial factor productivity

**Pg'** Gross photosynthesis

**PGM** Phosphoglucomutase

**PGMS** Photo-sensitive genic male sterile/sterility

**PGR** Plant growth regulator

**PHILARM** Philippine Association of Research Managers

**PhilRice** Philippine Rice Research Institute

**PhilVolcs** Philippine Institute of Volcanology and Seismology

**PHT** Postharvest technology

**PHTRC** Postharvest Horticulture Training and Research Center (Philippines)

**pI** Isoelectric point

**PI** Panicle initiation

**PIDE** Pakistan Institute of Development Economics

**PMIS** Projects Monitoring Information System (UNESCO)

**PMVR** Predicted value of MV adoption ratio

**PN** Pedigree nursery

**PNF** Philippine News and Features

**PNUE** Photosynthetic N use efficiency

**PPD** Plant population density

**PPP** Purchasing power parity

**PR** 1) Partial resistance  
2) Phosphate rock

**PRA** Participatory rural appraisal

**PRF** Pulse repetition frequency

**PRIFAS** Programme de Recherches Interdisciplinaires Francais sur les Acridiens du Sahel

**PROC** People's Republic of China

**PS** 1) Partially sterile  
2) Potential sink  
3) Pedigree selection

**PSAE** Philippine Society of Agricultural Engineers

**PSP** Photoperiod sensitive

**PSS** Preliminary screening set

**PT** Power tiller

**PT3** 6-8 hp power tiller with steering clutches

**PT5** 5 hp power tiller

**PT6** 3 to 8 hp power tiller

**PTO** Power take off

**PTR** Prosperity through rice

**PTR2** Prosperity through rice phase 2

**PTCRD** Philippine Training Center for Rural Development

**PU** 1) Axial flow pump  
2) Prilled urea

**PU4** 6" diam. axial flow pump

**PU5** 10" diam. axial flow pump

**PUDOC** Centre for Agricultural Publishing and Documentation (The Netherlands)

**PVC** Polyvinyl chloride

**Pw** World price

**PWD** Ponding water depth

**PYT** Preliminary yield trial

## Q

**QE** Quantum efficiency

**QTL/s** Quantitative trait locus/loci

## R

**R** 1) Resistant

2) Restorer

3) Restorer line

4) Dark respiration

**RADPC** Relative area under disease progress curve

**RAPD** Random amplified polymorphic DNA

**RAU** Rajendra Agricultural University (India)

**RAVC** Return after variable cost

**RB** 1) Relay broadcast

2) Rice bug

**RCBD** Randomized complete block design

**RCI** Rice cropping intensity

**RDA** Rural Development Administration (Republic of Korea)

**RDA-CES** Rural Development Administration-Crop Experiment Station (Republic of Korea)

**rDNA** recombinant DNA

**RDV** Rice dwarf virus

**RE** Ethanol synthesis

**RE** Reaper

**RF** 1) Fertility restorer gene

2) Rockefeller Foundation

**RFLP** Restriction fragment length polymorphism

**RG** Rate of germination

**RGA** Rapid generation advance

**RGR** Relative growth rate

**RGSV** Rice grassy stunt virus

**RH** 1) Relative humidity

2) Rice hispa

**RHS** Rice hull stove

**RI** Ragged leaves

**RIARS** Regional Integrated Agricultural Research System

**RIEPT** Red Internacional de Evaluacion de Pastos Tropicales

**RIFCB** Research Institute for Food Crop Biotechnology (Indonesia; see BALITBIOTEK and BORIF)

**RIFLER** Research Institute for Legumes and Root Crops (Indonesia; see BALITKABI and MARIF)

**RIFSA** Research Institute for Food Crops in Swampy Areas (Indonesia; see BALITTRA and BARIF)



**RIL** Recombinant inbred lines

**RIP** Rolling injection planter

**RIMC** Research Institute for Maize and Other Cereals (Indonesia; see BALITJAS and MORIF)

**RKN** Root knot nematode

**RL** 1) Root length  
2) Rainfed lowland  
3) Rainfed Lowland Rice Program

**RLCU** Reactive layer coated urea

**RLH** Relative lesion height

**RLIN** Research Libraries Information Network

**RLL** Relative lesion length

**RLR** Rainfed lowland rice

**RLREP** Rainfed Lowland Rice Ecosystems Program

**RLRRC** Rainfed Lowland Rice Research Consortium

**RM** Rice mill

**RMD** Relay, manual, delayed

**RMP** Relay, manual, prompt

**RNA** Ribonucleic acid

**RNAM** Regional Network for Agricultural Machinery (Institute of Agricultural Engineering and Technology, UPLB, Philippines)

**RP** Recurrent parent (for backcross)

**RPA** Rice polish agar

**RPM** Revolutions per minute

**rRNA** Ribosomal ribonucleic acid

**RRSV** Rice ragged stunt virus

**RRTC** Rice Research and Training Centre (Egypt)

**RS** 1) Remote sensing  
2) Researcher's split  
3) Row seeder  
4) Simple random sampling

**RS10** Vertical slit seeder

**RS2** Multi-hopper lowland seeder (6 rows)

**RS3** Multi-crop upland seeder (5 rows)

**RS4** Inclined seedplate planter

**RS6** Drum seeder (8 rows for rice)

**RSHT** Routine seed health test

**RSR** Row seeded rice

**RSV** Ragged stunt virus

**RT-PCR** Reverse transcriptase-Polymerase chain reaction  
**RTBV** Rice tungro bacilliform virus  
**RTD** Rice tungro disease  
**RTSV** Rice tungro spherical virus  
**RTV** Rice tungro virus  
**RUG** Rijksuniversiteit Gent  
**RVDB** Rice viruses data base  
**RVIG** Rice varietal improvement group  
**R-W** Rice-wheat  
**RWIC** Rice-Blast International Collaboration  
**RWM** Rice whorl maggot  
**RYMV** Rice yellow mottle virus  
**RYT** Replicated yield trial

## S

**S** 1) Satisfactory/standard

2) Secondary tillers

3) Sink size

4) Sterile

5) Susceptible

**S&P** Seepage and percolation

**SAARC** South Asian Association for Regional Cooperation

**SABRAO** Society for the Advancement of Breeding Researches in Asia and Oceania

**SACCAR** Southern African Centre for Cooperation in Agricultural Research and Training (Headquarters: Botswana)

**SADC** Southern African Development Coordination Conference (Headquarters: Botswana)

**SAL** Salinity

**SAP** Specific amplicon polymorphism

**SAREC** Swedish Agency for Research Cooperation with Developing Countries

**SARIF** Sukarami Research Institute for Food Crops (Indonesia)

**SARP** Systems Analysis and Simulation for Rice Production

**SAWAH** Simulation algorithm for water flow in aqueous in habitats

**SB** 1) Secondary branches

2) Soybean

3) Stem borer

**SBD** Soil bulk density

**SBRRS** Suphan Buri Rice Research Station (Thailand)

**SC** 1) Single cross

2) Stripper combine

**SCA** Specific combining ability

**SCAR** Sequence characterized amplified region

**SCOPE** Scientific Committee on Problems of the Environment (ICSU, France)

**SCOT** Conseil Services de Consultante en Observation de la Torre (France)

**SCSFA** Short chain saturated fatty acid

**SCU** Sulfur-coated urea

**SD** Standard deviation

**SDC** Swiss Development Cooperation

**SDI** Stress day index

**SDM** Shoot dry matter

**SDS** Sodium dodecyl sulfate

**SDS-PAGE** Sodium dodecyl sulfate-polyacrylamide gel electrophoresis

**SDW** Seedling dry weight

**SEA** Estado de Agricultura de Republica Dominicana (Dominican Republic)

**SEADAG** Southeast Asian Development Advisory Group (The Asia Society, New York, USA)

**SEAFDEC** Southeast Asian Fisheries Development Centre (Philippines)

**SEAPPO** Southeast Asia and Pacific Plant Protection Organization

**SEARCA** Southeast Asian Regional Center for Graduate Study and Research in Agriculture (Headquarters: Philippines)

**SEM** Scanning electron microscopy

**SEMOC** Sementes de Mozambique, Lte

**SEMRY** Society for the Expansion and Modernization of Rice in Yagova (Cameroon)

**SES** Standard evaluation system for rice

**SF** Spikelet fertility

**SFR** Small-farm reservoir

**SFRIS** San Fabian River Irrigation System (Philippines)

**SG** Stripper gatherer

**SH** Standard heterosis

**ShB** Sheath blight

**ShR** Sheath rot

**ShS** Sheath spot

**SIDA** Swedish International Development Authority

**SIDO** Small Industries Development Organization (Zambia)

**SIP** Sipa pump

**SIP1** 6-inch diam. sipa pump

**SIP2** 7.5-inch diam. sipa pump

**SIP3** 10-inch diam. sipa pump

SIP4 4-inch diam. sipa pump

**SKD** Shikimate dehydrogenase

**SL** 1) Shoot length  
2) Sick leave

**SLW** Specific leaf weight

**SMB** Soil microbial biomass

**SMIC** Sorghum and Millet Information Centre (India)

**SMT** Soil moisture tension

**SN** Source nursery

**SOAMA** Societe d'Andapa Mamokatra (Society for the Development of Andapa Region, Madagascar)

**SOC** Soil organic carbon

**SOD** Superoxide dismutase

**SODEMO** Societe de Developpement de la Plaine de Morondava (Society for the Development of the Plain of Morondava, Madagascar)

**SOM** Soil organic matter

**SOMALAC** Societe d'Aménagement de la Plaine de Morondava (Regional Development Authority for the Development of the Plain of Morondava, Madagascar)

**SPAD** Soil and Plant Analyzer Development (Japan)

**SPANS** Spatial analysis systems

**SR** 1) Soil resistance  
2) Stem rot

**SRS** Stratified random sampling

**SS** Systematic sampling

**SSB** Striped stem borer

**SSC** Sodium chloride/Sodium citrate (buffer)

**SSCP** Single strand conformational polymorphism

**SSD** Single seed descent

**SSFm** Small-scale farm mechanization

**SSR** Single Sequence Repeat

**SSSA** Soil Science Society of America

**SSST** Standard seedbox screening test

**ST** Stripper thresher

**STENANT** Area under share tenancy

**STR** Short tandem repeat

**STS** Sequence tagged site

**SUB** Submergence

**SURIF** Sukamandi Research Institute for Food Crops (Indonesia; now BALITPA; see RIR)

**SW2** Savonius windmill-piston pump setup

**SWCB** Southwestern corn borer

**SWP** Shallow well pump

**SWRI** Surface water retention index

**SWS** Soil and Water Sciences (Soil Microbiology, Soil Science, and Water and Sciences) Division (IRRI)

## T

**t** ton/s

**T** 1) Temperature

2) Tertiary tillers

**TAC** Technical Advisory Committee (CGIAR)

**TAE** Tris/acetate (buffer)

**TAHAP** Thai-Australian Highland Agricultural Project

**TAN** Tax account number (IRRI)

**TAP** Tapak-tapak pump

**TAP2** 4-inch diam. treadle pump

**TARC** Tropical Agriculture Research Center (now JIRCAS, Japan)

**TARI** Taiwan Agricultural Research Institute

**TARO** Tanzania Agricultural Research Institute

**TAS** Telomere associated sequence

**TBE** Tris/borate electrophoresis (buffer)

**TC** Thresher/Cleaner

**TDMY** Total dry matter yield

**TDR** 1) Time domain reflectometry

2) Tropical Development and Research Institute (UK)

**TDRI** 1) Thailand Development Research Institute

2) Tropical Development and Research Institute (formerly Tropical Products Institute, UK)

**TE** 1) Time for emergence

2) Tris/EDTA (buffer)

**TFP** Total factor productivity

**TISTR** Thailand Institute of Scientific and Technological Research

**TNAU** Tamil Nadu Agricultural University (India)

**TNAU-WTC** Tamil Nadu Agricultural University, Water Technology Center (India)

**TNRRI** Tamil Nadu Rice Research Institute (India)

**TPE** Department of Theoretical Production Ecology (WAGeningen, The Netherlands)

**TPE-WAG** Theoretical Production Ecology-Wageningen Agricultural University (The Netherlands)

**TPR** Transplanted rice

**TPRI** Tropical Pesticides Research Institute (Tanzania)

**TPT** Treadle paddy thresher

**TR** Transplanter

**TR4** Rice transplanter (6 rows manual)

**TR5** Rice transplanter (8 rows manual)

**TS** Transition season  
**TSP** Triple superphosphate  
**TSRI** Taiwan Sugar Research Institute  
**TTC** Triple test cross  
**TTM1** Test tube miller (laboratory machine)  
**TUAT** Tokyo University of Agricultural Technology  
**TV** Traditional variety  
**TVA** Tennessee Valley Authority (USA)  
**TVC** Total variable cost

## U

- UAF** University of Agriculture and Forestry (Vietnam)
- UAS** 1) University of Agricultural Sciences (India)  
2) Urea-ammonium sulfate
- UC** 1) University of California  
2) University of Cantho (Vietnam)
- UES** Urea-elemental sulfur
- UG** Unfilled grain
- UH** University of Hawaii (USA)
- UICN** Union Internationale pour la Conservation de la Nature et des Ressources (International Union for Conservation of Nature and Natural Resources)
- UKMO** United Kingdom Meteorological Office
- UMMB** Urea-molasses minimal block
- UNACASTD** United Nations Advisory Committee on the Application of Science and Technology to Development
- UNCED** United Nations Conference on Environment and Development
- UNCRD** United Nations Centre for Regional Development (Japan)
- UNDCP** United Nations Drug Central Program
- UNDP/WB** United Nations Development Programme/World Bank
- UNEP-GRID** United Nations Environment Programme-Global Resources Information Database (Kenya)
- UNESCO** United Nations Educational, Scientific, and Cultural Organization (France)
- UNFSSTD** United Nations Financing System in Science and Technology Development
- UNICEF** United Nations International Children's Emergency Fund
- UNIDO** United Nations Industrial Development Organization (Austria)
- UNITAR** United Nations Institute for Training and Research (New York, USA)
- UNRISD** United Nations Research Institute for Social Development
- UNU** United Nations University
- UNVDA** Upper Nun Valley Development Authority (Cameroon)
- UP** Uttar Pradesh (India)
- UPGMA** Unweighted pair group method, arithmetic mean
- UPLB** University of the Philippines Los Baños
- UPM** Universiti Pertanian Malaysia (Malaysia)
- UPRHS** Upper Pampanga River Integrated Irrigation System (Philippines)
- URARTIP** Unified Rice Applied Research, Training, and Information Program
- UREAP** Ratio of urea-N price to rough rice price
- URICC** Upland Rice Research Intercenter Coordinating Committee
- URRC** Ubon Rice Research Center (Thailand)
- URYN-E** International Upland Rice Yield Nursery--Early



**URYT** Upland Rice Yield Trial

**USAID** United States Agency for International Development (also AID)

**USDA** United States Department of Agriculture

**USEPA** United States Environmental Protection Agency

**USG** Urea supergranule

**UTRIS** Upper Talavera Irrigation System (Philippines)

**UV** Ultraviolet light

**UV-B** Ultraviolet-B

## V

**VAM** Vesicular-arbuscular mycorrhizal fungi

**VB** Vascular bundles

**VCRIAS** Vietnam Central Research Institute for Agricultural Sciences

**VISCA** Visayas State College of Agriculture (Philippines)

**VNTR** Variable number tandem repeat

**VRBL** Variable

## W

- WA** Wild abortive (cytoplasm including male sterility)
- WAI** 1) Weeks after incubation  
2) Weeks after inoculation
- WARDA** West Africa Rice Development Association (Cote d'Ivoire)
- WAS** Weeks after seeding
- WAU** Wageningen Agricultural University (The Netherlands)
- WAZ** Westdeutsche Allgemeine Zeitung
- WB** World Bank
- WBPH** White backed planthopper
- WC** Wide compatibility
- WCRP** World Climate Research Programme
- WDC** World Data Centre (Headquarters: France)
- WDR** Well drilling rig
- WE** Weeder
- WE1** IRRI power weeder
- WE3** Push-type hand weeder
- WE4** Conical weeder (push-type single and double)
- WFC** World Food Council (Headquarters: Canada)
- WH** White head
- WHO** World Health Organization
- WI** Wrinkled leaves
- WMO** World Meteorological Organization
- WLS** White leaf streak
- WM** Whorl maggot
- WS** Wet season
- WSB** White stem borer
- WSR** Wet seeded rice
- WSRP** Wide-specific repeated probe
- wt** Weight
- WT** Weeks after transplanting
- WTD** Water table depth
- WUE** Water use efficiency

## X

**XDH** Xanthine dehydrogenase

**Xoo** *Xanthomonas oryzae pv. oryzae*

## Y

**YAC** Yeast artificial chromosome

**Yd** Yellow discoloration

**YEL** Youngest fully emerged leaf blade

**YLD** Yield

**YSB** Yellow stem borer

## Z

**ZAU** Zhejiang Agricultural University (China)

**ZLH** Zigzag leafhopper

## Glossary

### Glossary of Rice Terminology

The need for a general glossary of the terminology used in rice production and rice research has been evident in the production of earlier documents, such as the Dictionary of Commonly Used Terms in Crop Improvement With particular reference to Rice, by A.O. Abifarin of IITA, Nigeria, in 1984, and the Rice Production Glossary published by IRRI in 1990.

The present Glossary, loaded in September 1996, includes most of the terms used in these books and many more. Major additions came from glossaries annexed to proceedings of rice conferences and workshops published in the past by IRRI and partners.

It was first compiled by Janice Puckridge. Gene Hettel coordinated the review by IRRI scientists who made various additions and corrections. Jay Maclean did the final sorting and collation and prepared the Glossary for the Web page.

Thanks to all those who contributed to the Glossary. It is a tedious rather than a glamorous task, but the efforts by the various scientists and editors should be much appreciated by all who use this Glossary.

The definitions given herein pertain only to the agricultural usage of the terms, many of which have other or broader meanings not described. However, given this restriction, it would nevertheless be presumptuous to suggest that the Glossary is fully accurate or complete. We welcome and look forward to additions and corrections for future editions, which will make the Glossary even more helpful.

## A Terms

**A line.** The male sterile parent involving cytoplasmic or cytoplasmic genetic male sterility developed to produce hybrid seed. It is also known as a cytoplasmic male sterile line.

**abnormal growth.** Growth that deviates from the normal type or form due to various environmental factors such as disease, pests, soil condition, humidity, temperature, etc.

**absolute plating efficiency.** The number of individual cells that give rise to colonies relative to the number of cells plated; expressed in percentage.

**absorb.** To take in by chemical or molecular action or use as nourishment in the physiological processes of the plant.

**absorption.** The process by which a substance passes from one system into another, e.g., from the soil solution into a plant's root cell or from the leaf surface into the leaf cells.

**absorption, active.** Movement of ions and water into the plant root as a result of metabolic processes by the root, frequently against an activity gradient.

**acaricide.** A pesticide that kills mites and ticks.

**accession.** 1). An addition (of a variety or strain) to a national or other register of varieties obtained by field collection or exchange. 2). A variety, strain, or population registered at a research center and worth conserving.

**accession list.** A reference list of a collection of cultivars, germplasm, or breeding lines that are stored or maintained.

**accession number.** The identification number assigned to an accession.

**acclimation/acclimatization.** Adjustment or adaptation of an individual to a different climate or environment.

**achene.** Small, dry fruit with one seed.

**achlorophyllous.** Lacking chlorophyll.

**acid equivalent (a.e.).** The portion of pesticide that is theoretically converted into acid.

**acid soil.** A soil with a pH value of less than 7.0; for practical purposes, soils with pH below 6.6.

**acid sulfate soil.** A soil with a pH value of less than 4.0 when air-dried; contains a high amount of sulfate and yellow jarosite mottles. Abnormal growth of plants in this soil is due to (i) toxicity from aluminum, iron, and hydrogen sulfide; and (ii) phosphorus deficiency.

**acquired characters.** Phenotypic (see phenotype) changes produced on a plant by the environment during the plant's development. Such characters (defined) are uninheritable.

**actinomycetes.** 1). Bacteria with branching filaments. 2). A nontaxonomic term applied to a group of organisms with characteristics intermediate between the simple bacteria and the true fungi.

**active collection.** A breeder's term for a collection of germplasm that is used often and is maintained live.

**active ingredient (a.i.).** The potent portion of a compound (such as fertilizer,



insecticide, fungicide or herbicide applied on the soil or plant) used as basis to estimate the chemical effect. Useful for comparing the strength or toxicity of chemicals.

**active vegetative stage.** The growth stage of plants when there is rapid development of leaves, tillers, branches, or stems.

**acuminate.** Gradually tapering to a sharp, prolonged point (e.g., rice leaves).

**acute rodenticide.** A poison for rodents that acts swiftly and causes death shortly after ingestion. An example is zinc phosphide.

**adapt.** To fit or adjust to a particular environment or a set of specific climatic conditions through a change in the plant's growth and development.

**adaptability.** The ability to adapt to different environments by modifications in physiological responses.

**adaptation.** The process of becoming suited to new or different environmental conditions or for particular functions.

**adaptiveness.** Degree of being adapted to a certain environment or environments.

**adaptive research.** Research conducted to validate, modify, or calibrate a new technology to specific soil, climate, socioeconomic, or environmental characteristics of a given area.

**adaxial.** Upper. The side toward the axis. Ventral.

**additive effects of genes.** The effects produced by the sum of more than one pair of genes to improve desirable characters or suppress undesirable characters of a plant.

**additive genes.** Genes that have no dominance and the effect of each gene can be added to the phenotype.

**ADP.** Adenosine-5'-diphosphate, a complex sugar-phosphorus compound formed as a result of expenditure of energy and the loss of a phosphate group from the energy-rich ATP (adenosine triphosphate) compounds.

**adsorption.** 1). The taking up of molecules or ions at a surface, including exchangeable cations and anions on soil particles. 2). The sticking of a liquid, or gaseous or dissolved substance to a solid, resulting in higher concentration of the substance.

**adult.** The mature stage.

**adult (Entomology).** The mature stage of an insect which occurs after the nymphal or pupal stages. Adult insects usually have wings and mature sexual organs.

**adult plant resistance.** Resistance manifested mainly in maturing plants and less apparent in the seedling stage.

**advanced generation.** A generation later than the fourth or fifth after crossing. In general, most of the major genes are fixed at the advanced generation.

**adventitious prop roots.** Roots formed at the higher nodes above the soil surface.

**adventitious roots.** Roots developing from the part of a plant other than roots, which are formed from nodes of the plant. After 10-20 days of growth, all roots of the rice plant are adventitious roots.

**aerenchyma.** The lysigenous intercellular spaces in the parenchyma layer forming a system of air passages which ramifies through the leaves, stems, and roots of a rice plant.

**aerate.** To impregnate with a gas, usually air.

**aerial branching at nodes (Br).** New shoots which develop at nodes high on the culm following the cutting of panicles.

**aerial roots.** Roots that grow above the ground from the nodes.

**aerial tillers.** Tillers that grow above the ground level.

**aerobic.** Growing only in the presence of molecular oxygen. Having molecular oxygen as part of the environment.

**aerobic digestion.** The partial biological decomposition of suspended organic matter in waste water or sewage under aerated conditions.

**aeroponics.** A technique in growing plants wherein the plants derive their nutrients and water from a mist of air and aqueous solution that come in contact with the roots.

**aestivation.** The inactive or dormant state of a larva during summer.

**AFLP.** Amplification fragment length polymorphism. A variant DNA amplification product of different size produced by DAF, PCR, or RAPD technique.

**African rice.** Refers only to the cultivated *O. glaberrima*.

**agar.** Mucilage derived from a seaweed. It forms a gel with water. It is used to solidify culture media on which microorganisms are grown.

**aged rice.** Rice that is kept at least 4 mo after harvest. Expands more on cooking and less sticky than cooked, freshly harvested rice.

**agrarian system.** A historically constituted and durable mode of exploitation of the environment; a technical system adapted to the bioclimatic conditions of a given area and which complies with its social conditions and needs at that moment.

**agricultural lime.** A soil amendment consisting principally of calcium carbonate but including magnesium carbonate and perhaps other materials. This is used to furnish calcium and magnesium as elements for the growth of plants and to neutralize soil acidity.

**agricultural production system.** The whole structured set of plants, animals, and activities selected by a farmer for his production unit to achieve its goals. It is a global system that is finalized by farmer socioeconomic objectives and related management strategy.

**agriculture.** The practice of cultivation, farming, tillage and horticulture; plant and animal production.

**agroclimatic.** Relating to the relationship between crop adaptation and climate.

**agroecological zones.** Geographical mapping units based on climatic conditions and land forms that determine relatively homogeneous crop growing environments.

**agroeconomics.** The economics of agriculture.

**agronomic characters.** Plant characters related to crop production usually observed during plant growth; e.g., height, maturity, tiller number, panicle size, yield and quality factors.

**agronomy.** 1). Science of agriculture that deals with all aspects of field crop production and soil management. 2). An applied ecological science.

**ahu rice.** An early rice similar to "Aus"; grown in Assam, India.

**albic horizon.** A soil horizon from which clay and iron oxide have been removed (USDA, 1975).

**albino.** A plant that lacks chlorophyll and turns white; a deficiency in normal pigment.

**aleurone layer.** 1). The peripheral layer of endosperm of the grain beneath the seed coat which envelops the endosperm and contains oil and protein. 2). It is a layer of high-protein cells surrounding the storage cells of the endosperm. Its function is to secrete hydrolytic enzymes for digesting food reserves in the endosperm.

**alien gene.** A gene transferred to the cultivated species from another related or unrelated species.

**aliquot.** A small part or portion of a given amount (such as 5 ml out of 100 ml solution).

**alkali soil.** A soil containing sufficient exchangeable sodium to adversely affect crop production. Its sodium adsorption ratio is greater than 15 and pH is > 8.5.

**alkali spreading value.** The degree of spreading of six grains of milled rice in 10 ml 1.7% KOH for 23 h at room temperature or 30°C using a seven-point score (7=completely spread, and 1=no reaction). Gelatinization temperature of starch is estimated based on spreading value: low (6-7); intermediate (4-5); intermediate-high (3); and high (1-2).

**alkaline.** Having a pH higher than 7.

**alkaline soil.** A soil with a pH value higher than 7.0; CaCO<sub>3</sub> in the upper horizon from a few percent to 95%.

**alkalinity.** The quality, state, or degree of being alkaline.

**allele.** One of several possible mutational forms of a gene at a given genetic locus. One diploid individual can have a maximum of two forms (alleles), but there may be several alternate alleles in the species.

**allelemorph.** In Mendelian inheritance, a pair of alternative forms of a gene in which one may be dominant and the other recessive.

**alleles, multiple.** A series of alleles (more than 2) that affect the development of a character.

**alleles, pseudo.** Alleles that are functionally similar but structurally different.

**allelism.** The relationship between alleles in different parents. When the alleles of two parents belong to the same gene (locus), they are allelic; otherwise, non-allelic.

**allelism test (complementation test).** A test for determining whether changes occurred in the same gene so that complementation between genes is possible.

**allelochemicals.** Nonnutritional substances produced by a plant that affect the behavior, growth, health, or physiology of another plant or insect.

**allelopathy.** The phenomenon of suppressing the growth of one plant species by another through the release of a toxic substance.

**allogamous.** Capable of cross fertilization or having cross-fertilizing nature.

**allogamy.** Cross fertilization; opposite of autogamy.

**allomone.** An allelochemical that causes negative effects on the recipient organism.

**allopolyploid/allopolyploid.** A polyploid containing genetically different sets of chromosomes from two or more species, e.g., *O. minuta* with BBCC genomes is an allopolyploid.

**allozyme.** see isozyme.

**alluvial fan.** A fan or cone-shaped mass of sand and gravel deposited by a stream where it emerges from a narrow valley and spreads on to a plain or wide valley.

**alluvial.** Pertaining to alluvium; a clayey, silty, sandy, or gravelly material deposited by a stream or other bodies of running water.

**alluvial soil.** Soil that has been deposited by any form of running water.

**alluvium.** Mineral material (sand, silt, and clay) deposited by rivers.

**alternate host.** An individual or plant other than the main or preferred host upon which a parasite (or its spores, eggs, larvae, etc.) or a disease organism (pathogen) could live.

**aman rice.** A term used in Bangladesh and east India for lowland rice grown in the wet season during June to November.

**ambient air.** Air that reflects surrounding environmental conditions.

**amensalism.** An interaction between two organisms in which one organism is suppressed by toxins produced by the second.

**American wild rice.** Not a species of rice. It is a wild grass found in the USA with grains similar to those of rice. Its scientific name is *Zizania aquatica*.

**amino acid.** A substance with both basic and acidic properties synthesized by plants and animals; considered the building blocks of proteins.

**ammonia volatilization.** The escape of nitrogen from the soil or floodwater as ammonia gas; causes loss of urea and the ammonium form of nitrogen fertilizer from floodwater or saturated soil surfaces.

**amphidiploid.** 1). Said of plants resulting from a cross between two different species and having the total chromosome complement of the parent species. 2). Name given to allopolyploids which are produced when different genomes are combined through interspecific hybridization.

**amplicon.** DNA region defined by two opposing primer amplification sites.

**amylase.** The enzyme responsible for catalyzing the breakdown of starch into sugars; may be active in one of two forms: a-amylase and b-amylase.

**amylopectin.** 1). A component of starch that has a high molecular weight, long-branched chain structures, and does not tend to gel in aqueous solutions. 2). A type of starch molecule composed of long-branched chains of glucose units (a polysaccharide). 3). The major and branched fraction of starch, a glucose polymer with 5,000--19,000 glucose units and mean chain length of 18-22 glucose units. This fraction contributes directly to gel consistency and has a long linear chain fraction in high amylose starch.

**amylose.** 1). In cereal endosperm, it is the starch fraction of molecules or residues made up of glucose units, straight short chains (see nonwaxy endosperm). 2). The essentially linear fraction of starch, a polymer of glucose (dextrose) with up to 1,000 glucose units. It gives a blue complex with iodine and contributes directly to cooked rice hardness. It is measured colorimetrically by its blue complex with iodine in acetate buffer.

**amylose content.** The value representing the starch fraction of milled rice, or the amount of starch in the grain that determines its eating and cooking quality. Low-amylose rice varieties are moist, sticky, and glossy after cooking. Rice with a high amylose content cooks dry and fluffy.

**anaerobic holding system.** A closed storage unit for partial digestion of liquid organic wastes in the absence of oxygen.

**anaerobic.** The absence of molecular oxygen.

**analysis of variance (ANOVA or ANOV).** (1) A statistical procedure that allows subdivision of the total variation among experimental units into known sources of variation and provides a measure for each source. (2) The statistical analysis that tests the significance of variable sources.

**anaphase.** The stage of cell division (mitosis and meiosis) in which the chromosome halves move toward the opposite poles of the spindle.

**anastomosis.** A union of a hypha or vessel with another resulting in exchange of their contents. Fusion of hyphal cells of fungi involving the cell wall or cytoplasm.

**anatomy.** Study of the internal structure of living beings.

**anatropous.** Descriptive of an ovule in which the body is bent backward along the funiculus and adnate to it.

**androgenesis.** The development of a haploid individual from a pollen grain or microspore.

**anesthetize.** To immobilize.

**aneuploid.** An individual with a chromosome number that is not an exact multiple of the haploid chromosome complement.

**angiosperm.** Flowering plant. One of a group of plants whose seeds are enclosed in a mature ovary (fruit).

**anisomeric genes.** Several genes that have one-directional and unequal effects. Their expressivity and heritability are intermediate between those of major genes and polygenes.

**annealing.** Formation of fully or partially double-stranded DNA molecules from complimentary single-stranded molecules.

**annual.** Yearly; used for plants which complete their life cycle (seed to seed production and death) in 1 year or less.

**antagonism.** In plant nutrition, the interference of one element with the absorption or utilization of an essential nutrient by plants.

**antagonistic symbiosis.** A symbiotic association which is destructive to one of the symbionts or partners involved in the association.

**anteapical.** Just near the apex.

**antenna (insects).** A movable segmented appendage occurring in pairs on the head of an insect.

**antennal base.** A fixed area around the point of origin of the antenna.

**antenodal.** Any area before or preceding a node in an insect's wing.

**anther.** The saclike structure of the male part (stamen) of a flower in which the pollen is formed. Anthers normally have two lobes or cavities that dehisce at anthesis and allow the pollen to disperse.

**anther/microspore culture.** In vitro culture of anthers or microspores which allows the production of homozygous diploid (doubled haploid) plants.

**anthesis.** The action or period of opening of a flower; the period of pollination, specifically the time when the stigma is ready to receive the dispersed pollen and fertilization takes place.

**anthocyanin.** Any of a class of soluble glycoside pigments that are responsible for most of the blue to red colors in leaves, flowers, and other plant parts.

**anthraquic.** Pertaining to an aquatic soil moisture regime induced by human action such as bunding and leveling of land, or irrigation.

**antibiosis** The antagonistic association between two organisms producing detrimental effects on one of them. It could also mean an association between one organism and a metabolic product of another.

**antibiotic.** A chemical substance produced by certain microorganisms that retards or inhibits the growth of other microorganisms. Substance that acts to destroy or inhibit the growth of a microbe (e.g., bacteria or fungi).

**antibody.** A protein produced in a warm-blooded animal in reaction to an injected foreign antigen and capable of reacting to that antigen.

**antidote.** A remedy to counteract the toxic effects of a pesticide (e.g., atropine sulfate for carbamate and phosphate poisoning).

**antigen.** Foreign protein and occasionally complex lipids, carbohydrates, and some nucleic acids, which upon injection into a warm-blooded animal, induce the production of antibodies.

**antisense.** Strand of DNA or RNA complementary to the sense strand of a gene. Sense and antisense strands anneal in vivo and cause inactivation of the gene's expression.

**antiserum.** The blood serum of a warm-blooded animal that contains antibodies.

**antixenosis.** A term proposed by Kogan and Ortman to replace nonpreference. It conveys the idea that the plant is avoided as a bad host. A property of the plant that makes it not attractive to some feeding or ovipositing insects.

**AP-PCR.** Single primer amplification method developed by Welsh and McClelland. Usually large single primers of 20-30 nucleotides are annealed to target DNA then amplified by PCR under nonstringent conditions for two cycles. Then stringency (i.e., temperature) is increased. Products are separated by polyacrylamide gel electrophoresis and autoradiography.

**apiculate.** Ending in a short-pointed tip.

**apiculus.** A small extension of the lemma or palea.

**apomixis.** An asexual method of reproduction in which the seed develops without the union of egg and sperm. The resulting embryos have the same genetic constitution as that of the seed parent.

**apospory.** A form of apomixis in which the embryo develops from the somatic cells of the nucellus.

**appendage.** Any external outgrowth of a plant that does not have any apparent essential function.

**application rate.** The amount of fertilizer, insecticide, or herbicide applied per unit area or volume in experiments or commercial production.

**applied research.** Research in which results can be used immediately by the farmer and can be applied to the peculiar problems of a country or a region.

**appressorium.** The swollen tip of a hypha or germ tube that facilitates attachment and penetration of the host tissue by the fungus pathogen.

**aquatic plant.** A plant that grows and develops in standing water and provides sufficient aeration to the parts under water.

**aquic.** Pertaining to a soil moisture regime characterized by water saturation of the soil at all depths for a least a few weeks every year (USDA, 1975).

**aquorizem.** Soil characterized by a distinct accumulation horizon of iron oxide and manganese oxide below the traffic pan, formed as result of wetland rice cultivation.

**areolate.** Marked out into small spaces, reticulate.

**argillic horizon.** A soil horizon enriched by clay that has moved downward (USDA, 1975).

**aridic.** A soil moisture regime that limits plant growth during much of the growing season.

**aril.** An outer covering of the seed arising from the stalk of the ovule or below the hilum, the pulpy inner pod.

**armyworm.** The larva of the family Noctuidae which often travels in large populations from field to field. The armyworm moths are ash to light brown, with mottled forewings that have irregular white or light gray spots near the extreme tip or with two pale semicircular spots in the middle. Adults migrate from the grassy areas or upland crops to ricefields and deposit their eggs. The larvae move in armies and may eat entire rice plants.

**aroma.** A distinct smell or odor.

**artesian water.** Groundwater confined under hydrostatic pressure.

**arthropods.** Any member of phylum Arthropoda having segmented body, thick exoskeleton that is shed from time to time, a number of jointed appendages, i.e., legs, antennae, cerci, etc., and a nervous system with double ventral cord.

**artificial manure.** Any form of nutrient source that is not of natural origin.

**artificial medium.** A substance having an agar base with different chemicals or other constituents developed to replace the normal food or diet in rearing insects or pathogens.

**arthropod.** Animals in the Arthropoda, a phylum consisting of animals with jointed limbs, e.g., the Insecta (insect) and Arachnida (mites and spiders).

**artificial diet.** Food source, other than the natural host plant, consisting of amounts of various components which are mixed and provided to insects in the rearing program. The diet may be holidic (chemically pure), meridic (one or more chemically undefined materials such as wheat germ), or xenic (host plant materials plus supplemental nutrients).

**ascomycetes.** A group of fungi producing their sexual spores within asci.

**ascospore.** A sexually produced spore borne in an ascus.

**ascus.** A saclike cell of a hypha in which meiosis occurs and which contains the ascospores, usually eight.

**asexual reproduction.** Reproduction that does not involve fertilization or the fusion of sexually dissimilar gametes.

**ash, plant.** The inorganic residue, principally oxides, which remains after the ignition of plant tissue.

**Asian rice.** *Oryza sativa* L. The cultivated rice believed to have originated in Asia.

**assimilates.** Building blocks of carbohydrates manufactured by the leaves of the rice plant.

**assimilation.** 1). The utilization of inorganic and organic substances in cell synthesis. 2). Uptake of CO<sub>2</sub> by a leaf or canopy during the day time or plant foods utilized in building up a protoplasm and cell walls of the plant. 3). Computer

modeling of the rice crop growth.

**asymmetrical.** Parts not equal or symmetrically arranged.

**asynapsis.** Failure of pairing of homologous chromosomes during meiosis.

**ATP.** Adenosine triphosphate, a nucleotide consisting of adenine, ribose sugar, and three phosphate groups; the major source of usable chemical energy in metabolism. On hydrolysis, ATP loses one phosphate to become adenosine diphosphate (ADP), releasing usable energy.

**attack.** 1). To cause growth retardation or an economic yield loss from disease, insect, bird or other pests 2). To try to solve a problem at its source.

**auchenorrhyncha.** A suborder of Hemiptera in which the beak appears to rise from the inferior portion of the head and in which the tarsi have three tarsomeres.

**auricle.** 1). A pair of small ear-like appendages borne at the base of the leaf blade and usually arising at the sides where the ligule and the base of the collar are joined. 2). An ear-shaped appendage, usually occurring at the junction of the leaf sheath and the blade that may not be present in older leaves.

**aus rice.** A photoperiod-insensitive, rainfed, drought-prone, lowland, or upland rice, broadcast and transplanted during the early part of the wet season from March to September in Bangladesh and from April to August in east India.

**autoclave.** An airtight chamber that can be filled with steam under pressure or surrounded by another chamber for the steam and that is used for sterilizing, cooking or other purposes requiring moist temperatures above 212 °F or 100 °C . Used for sterilization.

**autogamy.** Fertilization arising from self-pollination.

**autoinfection.** Infection of a host by a microorganism or virus produced within or upon the body of the same host individual.

**autopolyploid.** A polyploid which possesses duplication of the same set of chromosomes, or more than two sets of chromosomes, coming from same species.

**autoradiogram.** The photographic record of a chromatogram that contains radioactively labeled compounds. Prepared by exposing a sensitive photographic film to the radioactive radiation by placing it in contact with the chromatogram.

**autoradiography.** A method used to detect radioactive substances by their property to darken film superimposed on the compounds. Can be used on whole organisms or molecules separated by molecular methods such as electrophoresis.

**autosomes.** Chromosomes not associated with sex of the bearer.

**autotroph.** A cell or organism that manufactures its own food from CO<sub>2</sub> and other small inorganic compounds by the process of photosynthesis.

**auxins.** A group of growth regulators or plant hormones (natural or synthetic) that may stimulate cell growth and induce cell elongation or division; often induce adventitious roots, root development, and other growth processes including seed germination.

**available nutrient.** An element in the soil which can be readily absorbed and assimilated by growing plants.

**available water.** Water in a soil that can be readily absorbed by plant roots.

**avirulent microorganism.** Plant pathogenic microorganism not capable of producing infection on the host plant avoidance. Preventing a stress, such as early-maturing rice varieties that could be harvested before the drought sets in.



**awn.** A bristlelike extension of varying length originating from the lemma of the rice spikelet. Present in some varieties.

**axenic.** Free of all other associated life, said of organisms isolated in soil culture; germ-free.

**axil.** The upper angle between a leaf or a branch or a stem from which it arises.

**axillary.** Arising in an axil.

**azolla.** A water fern that fixes nitrogen symbiotically with the blue-green alga *Anabaena*.

## B Terms

**B line.** The fertile counterpart parent of a cytoplasmic male sterile A line which is used as male parent to maintain the A line. It is also known as a maintainer line.

**B1, B2 (BC1, BC2).** The first and second backcrosses or backcross generations.

**bacillus.** A rod-shaped bacterium.

**back furrow.** A raised ridge of soil formed when the furrow slice overlaps another slice, this ridge is slightly higher than the other ridges.

**backcross.** 1). A breeding method in which a desired character such as insect resistance is transferred into an improved variety carrying it as a recurrent parent to reinforce or increase the gene frequency of the character. 2). F1 hybrid which is again crossed to either of its parents.

**backcross breeding.** A method for developing a new variety in which a simply inherited trait is transferred through the backcross method.

**backcross nursery.** Frequently used in hybrid rice breeding. Breeding nursery where male sterile plants identified among the test crosses (CMS x elite maintainer line) and their backcross progenies are crossed with the male parents with the objective of transferring cytoplasmic male sterility into the nuclear genotype of the elite maintainer line.

**backcross parent/recurrent parent.** One of the parents of a hybrid with which the hybrid is repeatedly crossed.

**backcross ratio.** The proportion of heterozygotes to recessive homozygotes expected in a backcross.

**backswamp.** A depressed marshy area on a river floodplain behind the natural levees where surface drainage is hampered by surrounding higher land.

**bacteria.** Any of numerous unicellular microorganisms of the class Schizomycetes, occurring in a wide variety of forms, existing either as free-living organisms or as parasites, and having a wide range of biochemical, often pathogenic properties.

**bacterial leaf blight (BLB).** A disease of rice caused by the bacteria *Xanthomonas campestris* pv. *oryzae*. The leaf stage of BLB is the most widespread and, therefore, causes the most damage. The early symptoms include yellow, undulating lesions along the margins of the upper portion of the leaf blades. The lesions develop rapidly parallel to the veins and extend laterally to the healthy regions. In extreme cases, a large portion of the entire leaf blade becomes infected, turns yellow or dirty white, and finally dies.

**bacterial leaf streak (BLS).** A bacterial disease of rice caused by *Xanthomonas oryzae* pv. *oryzicola*. The organism attacks chiefly the parenchymatous tissue between the leaf veins and, in the early stages, remains confined to the interveinal spaces. It may enter the leaf through the stomata or through wounds which are mainly caused by storms. The symptoms manifested are the appearance of fine, interveinal, long or short lines which are water-soaked and grayish. The lesions extend and coalesce to form larger patches and become yellow from the death of cells. At this stage, the symptoms are difficult to distinguish from those of bacterial leaf blight. The disease is limited to the tropics.

**bactericide.** A chemical compound that kills bacteria.

**bacteriocins.** Bactericidal substances produced by certain strains of bacteria and active against some other strains of the same or closely related species.

**bacteriophage.** A virus that infects bacteria, usually with destruction or lysis of the host cell.

**bacteriostatic.** A chemical or physical agent that prevents multiplication of bacteria without killing them.

**bacteroid.** An irregular form of cells of certain bacteria.

**bagging.** 1). The act of covering the reproductive parts of a plant to prevent cross pollination or physical damage. This is an important process in cereal breeding. 2). Filling plastic or hemp bags with grain.

**bakanae.** A Japanese word meaning "foolish seedling," used to describe the seedborne disease that causes abnormal elongation of rice plants. Caused by the fungus *Gibberella fujikuroi*. Gibberellin, a growth hormone produced by the pathogen, is responsible for the abnormal plant elongation.

**bao.** A floating rice mixed crop of aus and aman rice, i.e., early and late varieties sown during the early part of the wet season. A practice frequently used in Assam, India.

**bar.** A unit of pressure equal to 1 million dynes per square centimeter.

**barriers.** A fence or similar material object that separates rats from the field. A factor that stops organisms from spreading or from cross-pollinating.

**basal.** At, near, or toward the base or beginning.

**basal application.** Broadcasting or applying fertilizer into the soil before seeding or transplanting the crop.

**basal roots.** Roots developing from basal nodes and growing into the soil.

**basal tillers.** Tillers produced from basal nodes near the soil surface; the term 'basal' is used to differentiate the tillers produced on the upper nodes from those developing at the base.

**base.** 1). (General) The essential ingredient, the foundation of a construction, bottom of a plant or any part of a structure and the part of an appendage nearest the body in arthropods. 2). Chemical group or substance having the property of accepting a proton (H<sup>+</sup>) from water to release OH<sup>-</sup>. 3). In DNA and RNA, the general term given to adenine (A), cytosine (C), guanine (G), uracil (U), and thymine (T), the five N-containing compounds released from nucleic acids by vigorous hydrolysis.

**basepair.** 1). Complementary pair of hydrogen-bonded bases (A = T; G = C) that links two polynucleotide strands as in DNA. 2). A unit of length in nucleic acid molecules that is equal to one base pair. 3). Abbreviated as bp.

**basic research.** Research that deals with fundamental principles of organisms.

**basidiomycetes.** A group of fungi producing sexual spores (basidiospores) on basidia (see basidium).

**basidiospores.** Sexual spores of basidiomycete fungi.

**basidium.** A club-shaped structure on which spores are produced.

**batch.** A quantity of material destined for one test.

**basin.** Lowest part of a floodplain landscape, usually saucer-shaped.

**beak.** The proboscis or the protruding mouthpart structure of a sucking insect.

**bed planting.** A method of planting in which seed is planted on beds. Often two or more seed rows are planted on each bed.

**bedding.** Preparing a series of flat-topped parallel ridges usually no wider than two

crop rows, separated by shallow trenches usually less than the width between crop rows.

**benchmark.** A point of reference for measurements as in topographical surveys and land leveling.

**benthos.** Organisms living at the bottom of a water body, crawling or burrowing into the detritus and sediment; those on the surface are the epibenthos, and those beneath are the endobenthos.

**berlese funnel.** A collection apparatus used to catch arthropods. Made up of funnels containing a piece of screen or hardware cloth, with a light heating system mounted above and a collecting jar below provided with alcohol to catch small arthropods that escape and fall from material that is placed on the screen.

**berry.** A fleshy, indehiscent, usually many-seeded fruit.

**bias.** A consistent and false departure of an observed quantity from its proper value. The average error of an estimate. Prejudice, favoring one treatment over another.

**biconvex.** Convex on both sides.

**bidentate.** Having two teeth.

**biennial weeds.** Weeds that complete their life cycle in two years.

**bifid.** Cleft or divided into two parts.

**bimodal.** A frequency distribution having two modes.

**bioassay.** The measurement of the potency of any physical, chemical, and biological components by means of the response it produces in a test organism.

**biochemical oxygen demand (BOD).** The quantity of oxygen used in the biochemical oxidation of organic matter in a specified time, at a specified temperature, and under specified conditions.

**biodegradable.** Types of material subject to break down by biochemical processes.

**biodiversity.** The totality of all the species of plants and animals in an area.

**biolistics.** Process by which DNA molecules are propelled into a recipient cell using coated microprojectiles shot from a 'gene gun.' The method of propulsion may vary and ranges from electric discharge to helium blast.

**biological control.** The action of natural enemies--parasites, parasitoids, predators, and pathogens--in maintaining another organism's density at a lower level than it would occur in their absence. If control is facilitated by man, it is called applied biological control. If not, it is called natural biological control.

**biological denitrification.** Loss of nitrogen from the soil due to microbial activity. Microbial reduction of oxidized inorganic nitrogen compounds serving as nominal electron acceptors in anaerobic respiratory pathways lead to nitrogen losses to the atmosphere as N<sub>2</sub> or N<sub>2</sub>O.

**biological factors.** Characteristics of the plant that influence the health, vitality, and quality of harvested products.

**biological N<sub>2</sub> fixation.** The conversion of inert atmospheric N into usable form by living organisms.

**biological insect control.** A method of pest control that relies on beneficial enemies to reduce pest populations to tolerable levels. It involves human manipulation of natural enemies of insects.

**biological systems.** Refers to cropping and livestock systems.

**biology.** The study or science of living things.

**Biometrics/biometry.** The science that deals with statistics to explain biological phenomena.

**bionomics.** The life history, habits, breeding, and adaptations of organisms.

**biotechnology.** 1). Any technique that manipulates living organisms (or parts of organisms) to make or modify products, to improve plants or animals, or to develop microorganisms for specific uses. An applied biological science--e.g., recombinant DNA technology. 2). The various industrial processes that involve the use of biological systems; the collection of microbial and other biochemical processes carried out on an industrial scale. It includes, but is not limited to, the industrial aspects of genetic engineering. Other areas of biotechnology deal with fermentation technology (antibiotics), hybridoma technology (monoclonal antibodies), and agricultural technology (plant and animal transformation).

**biotic.** Having a mode of life.

**biotic environment.** Insect pests, plant pathogens, weeds, other crop plants, small animals, and human beings make up the biotic environment.

**biotic/abiotic stresses.** Limitations imposed on development which occur because of biological (biotic) or physical (abiotic) factors.

**biotrophs.** Parasitic fungi that need a living host to complete their life cycles.

**biotypes.** 1). Individuals or populations of plants or animals that are morphologically alike but physiologically different. 2). A population of insects capable of surviving on and damaging varieties that are resistant to other populations of the same insect species.

**bisect.** A profile of plants and soil showing the vertical and lateral distribution of roots and tops in their natural position.

**bisexual.** Said of a flower with both stamen and pistil.

**bivalent.** A pair of homologous identical chromosomes derived from two parents united in the first mitotic division.

**bivoltine.** Having two generations in a year.

**blackhead stage.** Stage in the development of insect eggs wherein the head can be observed as black spot through the chorion.

**blade.** The linear-lanceolate, flat sessile, and free portion of the monocot leaf.

**blanket drive.** A term used when farmers form a line and move across a field or area to control pests, such as rats.

**blast.** A disease caused by the fungus *Pyricularia grisea*. Leaf lesions are typically spindle-shaped, wide in the center and pointed toward either end. Large lesions usually develop gray centers. The disease can have different forms: leaf blast, node blast, or neck blast. Lesions on panicle neck nodes may result in empty panicles (often called rice blast), "rotten neck" or "neck rot" symptoms.

**blast nursery.** A specially prepared nursery where many test materials of rice are grown to determine their resistance to blast, usually at the seedling stage. The test period usually lasts for 30 days from seeding time.

**blight.** 1). Any agent causing widespread white coloring, yellowing or blackening necrosis of leaves and shoots. 2). A plant disease symptom characterized by the presence of extensive necrotic areas on plant organs.

**block.** A grouping of experimental units made according to homogeneity of

experimental units, sometimes called replication. Blocking is an effective way to control experimental error. If the number of experimental units in a block is equal to the number of treatments, the block is said to be "complete" (and is equivalent to replication). Otherwise, it is "incomplete."

**block sampling.** A group sampling of experimental units which divides the project area into a grid system of square blocks.

**bloodworm.** The red aquatic larva of dipterous flies of the genus Chironomus.

**bloom.** A flower or flowers of a seed plant.

**blotched white.** White spots that give a pie -bald appearance.

**blotting.** Any one of a number of techniques whereby chromatographically or electrophoretically separated DNA, RNA, or protein molecules can be transferred from the support medium, such as a gel, to another medium such as filter paper or membrane matrix. The transfer can be achieved by capillary action (southern blotting, northern blotting, western blotting) or by electrophoresis (electroblotting).

**blue-green algae.** Algae that contribute to the maintenance of soil fertility especially in ricefields.

**BOD.** Biological oxygen demand; the amount of oxygen required to stabilize the demands from aerobic action in the decomposition of organic matter.

**body.** The trunk. In insects, it refers to the thorax alone, abdomen alone, or thorax and abdomen.

**bold grain.** Grain that is broad in shape.

**Boliland rice** (Sierra Leone). Rice grown in fields that may be flooded for 2-4 months.

**boot.** A rapidly growing panicle enveloped by the flagleaf sheath. In tissue culture, this refers to the panicle collected when the distance between the collar of the flagleaf and subtending leaf is about 7 to 8 cm.

**booting.** Bulging of the flag leaf sheath due to the growing panicle inside.

**booting stage.** The reproductive phase of rice growth and development when the developing panicle causes a swelling of the culm. The swollen area is referred to as the boot.

**border effect.** In experiments, the difference in performance of plants planted at the edges of a plot and of those planted at the center of the plot.

**border row.** A row of plants around test plots which protect test entries from a border row effect, such as a greater than normal growth due to lack of competition for nutrients and light, lower insect populations than on plants surrounded by other plants, etc.

**borer.** An insect larva making tunnels or burrows inside the plant stem.

**boro rice.** An irrigated, high-yielding, cold-tolerant, relatively pest-free and photoperiod-insensitive rice cultivated during the winter months in India and Bangladesh.

**bract.** A reduced or modified leaf at the based of a flower or flower head. A leaf from the axis of which a flower arises.

**bracteole.** A bract borne on a secondary axis, as on a petiole; a reduced leaf.

**brachycera.** A suborder of Diptera or flies where adults have very short antennae and 1-2 segmented maxillary palps.

**brachypterous.** With short or abbreviated wings.

**braided stream.** A shallow, wide stream of interconnected channels with intervening bars and islands exposed at low stream levels.

**bran.** The outer layers of a cereal grain, including the pericarp, tegmen, embryo, aleurone layer, and a small portion of the starch endosperm, which are removed in milling.

**branch.** A division of the stem or axis of growth.

**breakdown of resistance.** The inability to maintain resistance when attacked by a newly selected insect biotype that has a gene for virulence at every locus corresponding to a gene for resistance in the host.

**breed.** A particular type or variety. An artificial mating group derived from a common ancestor for genetic study and domestication.

**breeder seed.** Seed of the highest genetic purity produced for maintaining purity of a variety. It is used to produce foundation seed.

**breeder stock.** Refers to the reserve of seed of a given variety available in an institution and the varieties maintained by a breeder for distribution or use in the breeding program.

**breeding.** The art and science of improving plants and animals genetically for the benefit of mankind.

**breeding line.** A genetic line bred in a crossing program, before it is named and officially released for commercial cultivation.

**bristle.** A short and blunt seta. A stiff hair.

**brittle culm.** Culm that break easily, particularly at maturity, due to low content of a-cellulose in cell walls.

**broadcast.** To apply seeds or granules by hand or machine over a surface area. To spread randomly.

**broadcast aman rice.** Deepwater rice sown in March and April alone or mixed with aus and transplanted in May after boro rice is harvested. It grows in the monsoon floodwater with depths from 0.5 up to 4.0 m from June to September and generally harvested during November and December. Some of these rices are photoperiod-sensitive.

**broadcast planting.** A method of planting in which the seeds or seedlings are dropped or thrown over the entire surface area of the field.

**broadcast tillage (total surface tillage).** Complete coverage of the entire surface area as contrasted to partial coverage in bands or strips.

**broadcasting.** The action of spreading seeds, fertilizer, or pesticides on the surface of the field at random, by hand or by machine.

**broadleaf weeds.** Weeds belonging to either subclass Monocotyledonae or Dicotyledonae. They are identified by their fully expanded, broadleaf structure and netted venation.

**beaked hull.** The tip of the lemma is curved over the palea.

**broken grain (brokens).** Grain that has broken into two or more pieces during milling.

**bromocresol green.** A brominated dye which acts as a pH indicator. In studies to determine the feeding activity of hoppers, bromocresol green-treated filter paper

reacts by changing color when it comes in contact with honeydew.

**brood.** All individuals that hatch at about one time from eggs laid by one set of parents and which normally mature at about the same time.

**brown planthopper.** An insect that causes burnt-like appearance on rice when in large numbers. Scientific name: *Nilaparvata lugens*.

**brown rice.** Rice grain with its hulls removed but not polished.

**brown spot.** A disease of rice caused by the fungus *Helminthosporium oryzae*, with leaf symptoms consisting of brown and oval spots with gray or whitish centers. The disease is also observed on the grains. The disease is closely associated with abnormal or poor soil and its occurrence serves as an indicator of poor soil conditions for rice production. It is sometimes called "poor man's disease."

**bud.** A short embryonic stem tip bearing leaves or flowers or both.

**buffering.** Chemically, the ability to resist change in pH.

**bug.** A loose term used for a number of insects referring to the suborder Hemiptera, including winged and wingless species. In the strict sense, it refers to suborder Heteroptera.

**bulb.** An underground fleshy offspring of a plant that develops roots and shoots.

**bulk.** All the seeds of the same crop species mixed together.

**bulk breeding method.** The growing of genetically diverse populations of self-pollinated crops in a bulk plot with or without mass selection, followed by single plant selection.

**bulk density, soil.** The mass of dry soil per unit volume, normally expressed in megagrams per cubic meter or grams per cubic centimeter.

**bulk segregant analysis.** Detection strategy used to define molecular regions controlling a certain phenotype. Large populations of organisms are usually pooled (bulked) into two classes representing distinguishing phenotypes. DNA profiling by DAF or RAPD is used to detect distinguishing band patterns.

**bund.** An embankment used to control the flow of water; a division between fields.

**bush.** A low woody plant with a number of branches at, or near, ground level.

**butterfly.** A common term for any member of Lepidoptera belonging to Rhopalocera.

**BVP.** Basic vegetative phase; the juvenile growth stage of a plant that is not affected by photoperiod.

**by-product.** A substance obtained during the manufacture of another substance, e.g. bran is a by-product of milled rice.



## C Terms

**caddisfly.** A member of the insect order Trichoptera.

**cage.** An enclosure for confining plants and insects.

**cage wheel.** Cage-type steel wheel commonly used on hand tractors.

**calcar.** An anatomical spur (spine or spike ) or spur-like projection in an insect.

**calcareous soil.** Soil that contains sufficient calcium carbonate or calcium-magnesium carbonate to effervesce visibly when treated with cold 0.1N hydrochloric acid.

**calciphytes.** Plants that require or tolerate considerable amounts of calcium or, are associated with soils rich in calcium.

**calibration.** Adjustment of model parameters to obtain model behavior that corresponds with observed behavior.

**calibration of sprayer.** A series of steps done primarily to determine the volume of spray solution and time needed to spray a given area of field considering other factors (e.g., swath of the sprayer, pressure exerted inside the sprayer, or the sprayman's walking speed at an even pace).

**callus.** A mass of thin walled undifferentiated cells, developed as a result of wounding or culture on nutrient media. Plant cells which proliferate on a defined medium and lack morphological differentiation.

**calorie.** A unit of measure of energy in food.

**calyx.** The outer ring of flower made up of separate or joined sepals, usually green and leaflike.

**cambic horizon.** A subsurface soil horizon that has undergone marked alteration due to the soil-forming processes (USDA, 1975).

**camera lucida.** A microscope with an attached mirror-like device that enables one to illustrate accurately objects seen through.

**camouflage.** An adaptation where the color of an organism's body blends with the background.

**capsid.** The protein coat of viruses forming the closed shell or tube that contains the nucleic acid.

**capsule.** 1). A fruit that sheds the seed when dry, consisting of more than one carpel. 2). a plastic structure enveloping a chemical. 3). A relatively thick layer of mucopolysaccharides that surrounds some kinds of bacteria.

**campylotropous.** Used with reference to an ovule or seed. So curved as to bring the apex and base nearly together. Horseshoe shaped.

**carbohydrate.** A chemical compound manufactured and accumulated by plants-- e.g., sugar, starch, or **cellulose**. The name is derived from the fact that the relative proportions of C, H, and O in simple carbohydrates is  $(\text{CH}_2\text{O})_x$ .

**carbon cycle.** The sequence of transformations whereby carbon dioxide is fixed in living organisms by photosynthesis or by chemosynthesis, liberated by respiration and by the death and decomposition of the fixing organism, used by heterotrophic species, and ultimately returned to its original state.

**carbon-nitrogen ratio.** The ratio of the weight of organic carbon to the weight of total nitrogen in soil or organic material.

**carnivore.** A flesh eater. An insect eating another insect.

**carnoy fluid.** A fixative consisting of 6 parts 95% ethanol, 3 parts chloroform, and 1 part glacial acetic acid.

**carpel.** One of the floral units that compose the fruit. A simple pistil or one of the structures of a compound pistil.

**carrier(s).** 1). Transport proteins that bind specific solutes and undergo conformational change in order to transport the solute across the membrane. 2). A material necessary to hold pesticide and fertilizer elements in a form suitable for application.

**caruncle.** An outgrowth on a seed developed by proliferation of integumentary tissue adjacent to the micropyle.

**caryopsis.** A small one-seeded dry indehiscent fruit (as in grasses) with a thin membranous pericarp adhering so closely to the seed that fruit and seed are incorporated in one body forming a single grain (wheat and barley). In rice, brown rice is the caryopsis.

**caseworm.** Insect of the species *Nymphula depunctalis* whose larva lives in a case consisting of a piece of rolled rice leaf.

**catalase.** An enzyme that catalyzes the degradation of hydrogen peroxide to water and the oxidation by hydrogen peroxide of alcohol to aldehydes.

**catalog.** An index of taxonomic literature arranged by taxa so as to provide ready reference to at least the most important taxonomic references to the taxon involved.

**catalyst.** A substance which accelerates the rate of a chemical reaction without itself being consumed in the process. Enzymes are catalysts.

**catch crop.** A crop planted usually very early in the cropping season. It matures early or earlier than the main crop to produce some food before the main crop matures. Could be a short-duration crop grown in between two croppings of a main crop.

**caterpillar.** The soft-bodied larva of butterfly and moth.

**caudad.** Towards the tail.

**causal organism (causal agent).** An organism (bacterium, fungus, virus, nematode, or mycoplasma) or agent that causes a disease or disorder.

**cell.** A unit mass of protoplasm surrounded by a cell membrane and containing one or more units of nuclear material.

**cellulase.** An enzyme that breaks down cellulose.

**cellulose.** A long-chain complex carbohydrate compound (polysaccharide) with the general formula  $(C_6H_{12}O_6)_n$ . It is the chief substance forming cell walls and woody parts of plants.

**cellulose acetate filter.** Plastic film that eliminates UV-C radiation (wavelength less than 290 nm) and transmits UV-B and longer wavelengths.

**Celsius.** A temperature scale devised by Anders Celsius in which the freezing point of H<sub>2</sub>O or melting point of ice is set at 0° and the boiling point of water is set at 100°. Also called centigrade.

**center of distribution.** Center of origin; the hypothesized geographical area from which any organism or species has spread.

**centiMorgan (cM).** Unit of recombination. Named after the geneticist Morgan. One

cM is equivalent to one percent recombination.

**central shoots.** The new growth that emerges from the middle point of the plant.

**centromere.** Chromosomal region functioning as the spindle attachment region to allow chromosome and/or chromatid separation during mitosis and meiosis.

**cephalic.** The area of the head region.

**cephalothorax.** The fused head and thorax in orders Arachnida and Crustacea.

**cercospora leaf spot.** A disease caused by the fungus *Cercospora janseana* characterized by the presence of short, elliptical to linear, brown lesions mainly on the leaves but also on leaf sheaths, pedicels, and glumes. The lesions are 2-10 mm long and 1 mm wide. Also referred to as narrow brown leaf spot

**cereal.** Seeds of flowering plants of the grass family (Graminaceae) cultivated for the food value of their grains, e.g., rice, wheat, sorghum, maize, oat, barley, rye, and millet.

**certified seeds.** Seeds used for commercial crop production produced from foundation or registered seeds under the regulation of a legally constituted agency. In hybrid rice, they are first generation seeds produced directly from CMS x restorer lines grown as per certification standards.

**chaetotaxy.** The arrangement of bristles in an insect's body.

**chalcidoidea.** Animals belonging to superfamily Apocrita of order Hymenoptera that have reduced wing venation, pronotum separated from tegula by the prepectus, no subantennal groove, and hind tibia without a spur reduced for preening.

**character.** An attribute of an organism resulting from gene action.

**characterization.** Description of the physical, biological or socioeconomic features of a system.

**Chargaff's rules.** Stipulate that in double-stranded DNA, the amount of adenine (A) equals that of thymine (T) and the amount of guanine (G) equals that of cytosine (C). Accordingly, A binds to T and G to C by hydrogen bonds, giving the DNA molecule the properties needed for replication and information storage.

**check.** 1). A row or plot of a selected variety included in an experiment for comparison with other treatments. 2). A standard for testing and evaluation.

**check row marker.** A manually operated (usually pulled) light tool (common in Laguna, Philippines) used to mark the soft ricefield surface in perpendicular directions to form a grid; used as guide for transplanting of rice seedlings.

**check row planting.** A planting pattern where each hill is aligned in rows and columns and if the row and column are equidistant, each hill has also diagonal alignments.

**chelate.** Pincer-like.

**chemical decomposition.** A process where a chemical substance changes into simpler compounds or constituent elements.

**chemical fixation.** The process by which certain nutrient elements in a soil are converted from their available form to unavailable form. Examples are potassium, ammonium, and phosphorus fixation.

**chemical name.** The systematic name of a chemical compound according to the rules of nomenclature set by the International Union of Pure and Applied Chemistry.

**chemical oxygen demand (COD).** A measure of the oxygen-consuming capacity of

inorganic and organic matter present in water or wastewater.

**chemodenitrification.** Nonbiological processes leading to the production of gaseous forms of nitrogen (molecular nitrogen or an oxide of nitrogen).

**chewing mouthparts.** Mouthparts with well-developed mandible for chewing.

**chi-square (x<sup>2</sup>).** A statistical test commonly used for attribute or categorical data (i.e., to test for a fixed ratio, for independence in a contingency table, or for homogeneity of a ratio), for homogeneity of variance test, and for goodness of fit. Chi-square is a nonsymmetric, continuous probability distribution which is the null distribution, or asymptotic null distribution, of many test statistics including Bartlett's test for homogeneity of variance and the so called chi-square tests of goodness-of-fit and independence in contingency tables.

**chimera.** An individual, organ, or part consisting of tissues of diverse genetic constitution.

**chisel.** A narrow tool that is used to break up soil. A very sharp hand tool used to cut and shape wooden objects and tools.

**chlamydospore.** A thick-walled asexual spore of a fungus formed by modification of a hyphal cell.

**chlorina.** Yellowish green appearance as a result of chlorophyll deficiency. Plants are often smaller than normal.

**chlorofluorocarbon (CFC).** Any of several gaseous compounds that are derivatives of methane, contain carbon chlorine and fluorine, and are used especially as aerosol propellants and refrigerants; suspected to be a major cause of ozone depletion.

**chloroplast.** A plastid containing chlorophyll; seat of photosynthesis in eukaryotes.

**chloroplast structures.** Located in the leaves and serve as small photosynthetic factories within the leaf.

**chlorosis.** Yellowing or discoloration of the normally green parts of chlorophyll-bearing plants due to diseases or nutritional/physiological disorders.

**chromatid.** Threadlike structures formed by the longitudinal division of a chromosome during mitotic prophase and known as a daughter chromosome during anaphase.

**chromatin.** 1). Complex form of eukaryotic nuclear material at the times between cellular divisions (cf., euchromatin, heterochromatin). 2). The substance of chromosomes, now known to include DNA, chromosomal proteins, and chromosomal RNA.

**chromomere.** One of the visible enlargements of the chromonema at which nucleoproteins appear to be concentrated. Some regard these to be the physical seat of the genes, commonly regarded as actual carrier of genes. Others consider these as optical artifacts due to the coiled state of the chromonema.

**chromosome.** Structural unit of the cell nucleus which carries in linear order the genes responsible for the determination and transmission of hereditary characteristics. The term is applicable not only to the nuclear chromosomes but more loosely to the DNA of viruses, bacteria, and the chloroplast and mitochondria of eukaryotes.

**chromosome cytology.** Study of chromosome sets of organisms.

**chromosome walking.** Chromosome analysis in which cloned chromosomal segments are used to isolate the neighboring DNA fragments.

**chronic rodenticides.** Slow-acting rodent poisons or anticoagulants. Their principal action is to prevent blood from clotting, thereby causing slow and painless death to the animal through continuous internal bleeding and external bleeding.

**cicadelloidea.** A superfamily within the Auchenorrhyncha (Hemiptera) having long hind tibia lined with numerous spines, transverse platelike hind coxae, 2 or no ocelli, but no tegulae.

**ciliate.** 1). Fringed with hair. 2). With hairs on the margin.

**ciliate ring.** A ringlike structure at the base of the rice panicle.

**ciliated.** Fringed with a row of parallel cilia or hairs.

**circuitous pattern.** A plowing pattern or technique where the operator first moves clockwise around the field, then counterclockwise toward the center. It is commonly used in small rectangular fields.

**cladistic analysis.** Phylogenetic analysis of taxa.

**clasping.** Partly wholly surrounding.

**classification.** The systematic grouping of plants based on natural relationships or botanical classification.

**claw-shaped spikelets (clw).** Spikelets with undersized paleas that are overlapped by recurved lemmas; synonymous to "parrot's beak."

**clean tillage (clean culture, clean cultivation).** A process of frequent cultivation or plowing to prevent growth of all vegetation except the particular crop desired during the growing season.

**cleistogamy.** Fertilization taking place in an unopened flower.

**climatic analysis.** Analysis of data over an extended period of time, including precipitation, maximum and minimum temperature, relative humidity, wind, and radiation.

**climax.** A plant community of the most advanced type capable of development under, and in dynamic equilibrium with, the prevailing environment.

**clipping.** 1). To cut leaves with scissors or shears. 2). To cut off briskly the margins, ends, or a small portion of an object or plant.

**clod.** A compact coherent mass of soil, varying in size. Usually produced by breaking up soil by plowing, especially when performed on clayey or fine-textured soils that are either too wet or too dry. Seldom occurs in sandy soil.

**clone.** 1). A group of cells, tissues, or plants which are in principle genetically identical. 2). Progenies resulting from sexual or vegetative propagation. A group of plants vegetatively produced from the same original stock.

**clone library.** A large collection of bacterial or viral recombinant DNA clones that contain many of the DNA sequences from a single organism. Two general kinds of clone libraries are gene libraries and cDNA libraries.

**cloned DNA (passenger).** The DNA segment that is spliced into a vector and that subsequently replicates along with the vector in a host cell in the cloning stage of recombinant DNA technology.

**cluster.** Things grouped together because of similar characteristics or physical proximity. Closely crowded inflorescence.

**cluster spikelets (CI).** Spikelets that show a clumped arrangement on the primary or secondary panicle branches with two or more spikelets per branch. Bunched

arrangement of spikelets in groups of 10-48 is termed "super clustering."

**CMS (cytoplasmic male sterile) line.** A line whose anthers produce no pollen or only abortive pollens. A genetic factor which induces sterility is present in its cytoplasm. No seed is set on this line by selfing. But its pistil is normal and can produce seeds when pollinated by a restorer or maintainer line.

**co-dominance.** The situation in which both alleles at the locus influence the phenotype of the heterozygote resulting in a new phenotypic class.

**coalesce.** To come together, e.g. two or more lesions coalesce to form a large spot or lesion.

**coarse-textured soil.** Sandy, loamy sand, or sandy loam soil.

**cocoon.** A covering of silk or similar fibrous material spun by the larvae of moths and other insects as protection during their pupal stage.

**coding.** The process by which the sequence of nucleotides within a certain area of RNA determines the sequence of amino acids in the synthesis of a particular protein.

**codon.** 1). Arrangement of three nucleotides in mRNA controlling the insertion of an amino acid into a polypeptide. 2). The coding unit, consisting of three adjacent nucleotides, which codes for a specific amino acid.

**coefficient of correlation.** The ratio of the covariance of two variables to the product of the standard errors of two variables; the square root of the coefficient of determination. This value indicates how one variable is related to another.

**coefficient of variation (CV).** A relative measure of variation estimated as the ratio of the standard deviation to the sample mean. It affords a valid comparison of small and large things and is independent of the unit of measurement. When the variance is the error variance, it is used to indicate the degree of precision of a given experiment.

**cohesion.** The tendency of a substance to cling together; the mutual attraction among molecules or particles comprising a substance that allows it to cling together as a continuous mass.

**cold tolerance.** Ability of a plant to grow and develop normally under cold conditions. Tolerance for low temperature in a plant.

**coleoptile.** The cylinder-like, protective membrane of certain species that protects the plumule as it emerges through the soil. The coleoptile is photoperiod-sensitive and stops growth when exposed to light, allowing the plumule to break through and continue growth.

**coleorrhiza.** A transitory membrane or sheath covering the emerging radicle (root apex) in some species. It serves the same function for the root as the coleoptile does for the plumule.

**coliform.** A general term for a group of bacteria. It has special significance in public health because they inhabit the intestinal tract of humans and animals.

**collar.** The joint between the leaf sheath and leaf blade.

**collection.** A gathering of different strains, varieties, or species for preservation until evaluated or multiplied. A set of varieties used and maintained by a researcher is called a working collection.

**colluvial.** Pertaining to colluvium, a deposit of soil and rock material at the base of a slope.

**colluvium.** A mixture of weathered materials moving by gravity and deposited at

the foot of a slope (as opposed to alluvium).

**colony.** A distinguishable localized population within a species.

**colony (bacterial).** A mass of many bacterial cells derived from a single cell by growth on an agar plate containing nutrient medium.

**colorimeter.** An instrument for chemical analysis of liquids by comparison of the color of the given liquid with its standard colors.

**comb-tooth harrow.** Cultivating implement with spikes or teeth resembling a comb.

**combined tillage operations.** The simultaneous operation of two or more different types of tillage tools or implements (subsoiler-lister, lister planter, or plow planter) to simplify control or reduce the number of trips over the field.

**combining ability.** The ability of a genotype (inbred, pureline, or synthetic/composite) to transfer its desirable traits to its crosses. General combining ability is the average performance of a strain in a series of crosses; specific combining ability is a deviation in a cross from performance predicted on the basis of general combining ability of the parents.

**combustion.** A chemical reaction, specially oxidation, accompanied by the production of light and heat.

**commensalism.** Interaction between two species in which one species is benefited while the other is unaffected.

**commodity-oriented research.** Research focused on a given agricultural product.  
compacted soil. Soil set hard and dry.

**compaction.** Increasing soil bulk density and decreasing porosity by application of mechanical forces to the soil.

**companion cell.** One of the elongated parenchyma cells lying next to and supposedly associated physiologically with the sieve tube in many seed plants, developing with the sieve tube in the same mother cell, sometimes extending the full length of the sieve tube, and readily identified by its small size and denser protoplasm.

**compatibility.** The characteristic of a substance that allows it to be mixed in a formulation without undesirably altering the characteristics or effects of the individual components.

**compatible.** Said of plants with morphologic and genetic traits enabling them to cross-pollinate, bud, or graft easily to produce progenies.

**competition.** A rivalry between two or more organisms for a limiting factor in the environment.

**competitive ability.** The success of one species or a variety to produce a greater proportion of offspring in the next generation at the expense of another.

**complementary DNA (cDNA).** DNA synthesized by reverse transcriptase from an mRNA template.

complementary genes. Two or more genes, neither of which when alone is capable of producing a phenotypic effect, but which "complement" each other and work as a team to produce an effect.

**complementary RNA (cRNA).** Synthetic RNA produced by transcription from a specific DNA single-stranded template.

**complete fertilizers.** A classification of fertilizer materials guaranteed to contain three of the major required elements, namely, N, P, and K.

**complete heading.** When all panicles of a plant (or a plot of plants) have emerged.

**complete tillage.** A tillage sequence made up of one broadcast, primary tillage operation and one or more broadcast, secondary tillage operations, plus one or more cultivation, either broadcast or strip.

**completely randomized design (CRD).** An experimental design in which no blocking technique is employed and treatments could be randomly assigned to any experimental plot. It is appropriate only for cases with homogeneous experimental units.

**component technology.** The cultural techniques used in the management of a cropping pattern. These include choice of variety, time, and methods of tillage and crop establishment, fertilization, field-level water management, pest management, and harvesting.

**composite variety.** A variety consisting of a number of components, such as inbred lines, all types of hybrids, populations, etc. A stage in the process of creating new varieties. To have common characters, such as similar growth period, degrees of resistance to lodging or to a pathogenic agent. The stability of the composite variety is limitless. The term is used whenever the plant involved is not to be extended.

**composite.** In plant breeding, said of a population developed by putting together several individuals with distinct genotypes.

**compost.** Organic residues or a mixture of organic residues and soil that have been piled, moistened, and allowed to undergo biological decomposition.

**compound.** Composed of several similar parts.

**compressed.** Flattened laterally.

**concentration.** The quantity of active ingredient expressed as mass per unit volume, or an amount of a substance based on its proportion to the whole or a specified amount and expressed as mass per unit volume of the resulting solution or mixture, e.g., g/l, ppm.

**concrete bed.** A plant bed, usually in a screenhouse, which has concrete sides.

**condensation.** A process in which vapor molecules cohere to each other and change to liquid.

**conditional response.** Plant's response to quantitative or qualitative reactions.

**conidiophore.** A specialized hypha on which one or more conidia are produced.

**conidium.** A spore formed asexually, usually at the tip or side of a conidiophore.

**conservation.** The preservation of materials for future use that can be propagated.

**conserved stock.** An accession, cultivar, or a portion or subdivision of a strain or pure line selected for maintenance at a center.

**constraint.** A factor or climatic condition that prevents the plant from reaching its full growth or yielding capacity.

**consumptive use.** The water used per unit of time in plant growth by the combined processes of evaporation, transpiration, and retention in the plant.

**contact herbicide.** A herbicide that kills only the plant tissue at and very close to the site of application.

**contact insecticide.** An insecticide that penetrates the outer covering or cuticle of



the insect and kills it.

**contiguous.** Touching or near each other.

**contiguous drought.** Drought resulting from irregular precipitation patterns which cause a moisture deficit during the rainy season.

**continuous data.** Observations made by measuring some attributes of subjects so that any value in a certain range is possible (c.f. discrete data).

**continuous submergence or flood irrigation.** A method of applying irrigation water in which the soil is submerged from transplanting up to about 2 weeks before harvest.

**continuous variation.** Variation of a quantitative measure observed in characters controlled by the polygenic system.

**control.** 1). (verb) To check, to have power and authority, to guide, to make available, to manage, to be reliant on another's action or permission, to restrain, mechanism that regulates, to study the basis for comparing results, to reduce the incidence or severity of problems. 2). (noun) A check used to compare with different treatments in an experiment.

**controlled traffic.** Tillage in which all operations are performed in fixed paths so that recompaction of soil by machinery does not occur outside the selected paths.

**conventional tillage.** The combined primary and secondary tillage operations normally performed in preparing a seedbed for a given crop grown in a given geographical area.

**convergent improvement.** (Plant breeding) Reciprocal addition to each of two inbred lines of the dominant favorable genes lacking in one line and present in the other.

**cooperator.** A person who works closely with another in research activities.

**coordinated trial.** Trials conducted in many places made up of the same treatments organized by a research center or a group of members with regional and national focus.

**cordate.** Leaves of plants that are heart-shaped.

**coriaceous.** Having a leathery texture.

**corm.** The swollen part of the base of the stem that is capable of producing new shoots.

**correlation, coefficient of.** A measure of the degree of association between two variables and is computed as the ratio of the covariance of the two variables to the product of their standard errors. Values vary between -1 and +1.

**correlation.** A mutual relationship between two things such that an increase or decrease of one is generally associated with an increase or decrease of the other. Linear correlation is measured by the correlation coefficient ( $r$ ), which may range from -1 to +1.

**corolla.** The ring of usually showy flower structures inside the calyx made up of separate or joined petals.

**corrugated paper.** A thick, coarse paper with a ridged or furrowed surface, such as that used in cardboard box construction.

**corymb.** A flat-topped inflorescence with the lower branches longer than the upper so that all flowers are at the same level.

**costate.** Ribbed; having one or more longitudinal ribs.

**cost effective.** Balancing the expenses, debt, with the sale, and having a profit margin.

**cotransformation.** The simultaneous transformation of an organism with two or more genes, one or more of which is silent (non-selected) while at least one gene confers antibiotic resistance or another identifiable or selectable trait.

**cotyledon.** First leaf developed by the embryo in seed plant. In most dicotyledon seeds, they are thickened and are storage sites of reserve food for use by the germinating seedling. Also called "seed-leaf."

**coupling.** A device used to connect the ends of two adjacent objects, as in pipes or tubes.

**covariance, analysis of.** The simultaneous analysis of the sums of squares and cross-products of two or more variables. It uses the concepts of both analysis of variance and of regression. It is applicable only if there exists a concomitant variable (called covariate) which can not be controlled but is closely related to the variable of interest.

**covariance.** A statistical measure used in computing the correlation coefficient between two variables; the covariance is the sum of  $(x-X)(y-Y)$  over all pairs of values for the variables  $x$  and  $y$ , where  $X$  is the mean of  $x$  values, and  $Y$  is the mean of the  $y$  values.

**cover crop.** A crop planted to prevent soil erosion and to provide humus.

**covered smut.** A disease affecting cereal grain crops.

**creek** A small stream channel usually in tidal areas in a coastal marsh, or between the mud banks of an estuary.

**crinkle.** A disease whose causal agent is yet unknown.

**critical nutrient concentration.** The nutrient concentration in the plant or its organs at the time the nutrient becomes deficient for growth.

**critical photoperiod.** The longest photoperiod at which the plant will flower, or beyond which the plant will not flower.

**critical reaction.** In biology, that pH at which a biological process becomes too slow to be measured or at which organisms die.

**crop.** Plants on a farm that are managed for economic purposes, producing a physical product for farm use or sale.

**crop damage.** Any reduction in quantity or quality of yield that results from injury caused by environmental factors, chemicals, or pests.

**crop development.** The sequence of processes and events involved in producing new tissues and organs throughout the crop cycle. Change in growth stage (phenology) and morphogenesis (new organs).

**crop growth rate.** The crop's rate of dry matter accumulation.

**crop injury.** Visible and measurable symptoms and/or signs caused by physical or biological pathogens, insects, weeds, and other factors.

**crop loss.** A reduction in value and/or financial return due to damage; often measured as the difference between actual yield and attainable yield due to the effects of one or more pathogens or pests.

**crop removal.** Absorption of soil nutrients by crops.

**crop residue management.** The operation and management of crop land to remove stubble, stalks, and other crop residue or maintain them on the surface to prevent wind and water erosion, to conserve water, and to decrease evaporation.

**crop rotation.** A planned sequence of growing crops in a regularly recurring succession on the same area of land, as contrasted to continuous culture of one crop or growing different crops in a haphazard order.

**cropping pattern.** The spatial and temporal combination of crops on a plot and the management used to produce them.

**Cropping intensity index (CII).** A time-weighted land-use index that evaluates the fraction of the total hectare-months available to the farmer that are used for crop production.

**cropping system (farming).** The crop production activity of a farm. It comprises all components required for the production of a set of crops in a farm and the relationship between the crops and the environment. These components include all necessary physical and biological factors as well as technology, labor, and management.

**cropping system (research).** The set of techniques performed on plots which are handled in an identical way. Each cropping system is defined by the kind of crops and their succession order and the itineraries of techniques applied to these several crops, including the choice of varieties for selected crops.

**cross.** A hybrid between two genetically dissimilar parents.

**cross contamination.** In insect rearing, a situation where a culture of one insect species is infested with insects of another species.

**cross cultivation (cross plowing).** The tillage of a field, orchard, etc., in which the field is cultivated in one direction followed by cultivation at right angles to the first.

**cross-designations.** Codes or numbers assigned to crosses made in a breeding program as a means to identify the crosses, usually with a letter prefix to identify the research institute followed by a number.

**cross-fertilization.** The fertilization of egg nuclei (ovules) of one plant by the pollen from another plant.

**cross-numbering.** An identification and numbering system used to name and number the different crosses produced by researchers everywhere.

**cross-protection.** The phenomenon in which a plant tissue infected with one strain of a virus is protected from infection by other strains of the same virus.

**cross-pollination.** The transfer of pollen from the flowers (florets) of one plant to the stigma of another plant. It may or may not lead to fertilization.

**crossing over (X-over).** Genetic recombination during meiosis resulting in the exchange of (usually) equivalent segments between homologous chromosomes.

**crosswise.** Across, from side to side, when plowing in a field.

**culm.** The stem of a grass or sedge. The round smooth-surfaced, ascending axis of the shoot, consisting of hollow internodes joined by solid nodes.

**culm length.** Length of the rice stem from the base of the plant to the base of the panicle or neck node.

**cultigen.** A plant species known only in cultivation with its origin from domestication; for example, *O. sativa* and *O. glaberrima*.

**cultipack.** A soil crushing and firming operation utilizing wide rollers having

corrugated or jagged working surfaces.

**cultivar.** 1). A variety. 2). A cultivated variety; the international term for variety.

**cultivate.** 1). Preparing the land for planting or sowing seed. 2). To grow crops or plants.

**cultivated variety.** A named group of plants within a cultivated species that is distinguishable by a character or group of characters and that maintains its identity when propagated either asexually or sexually.

**cultivation.** 1). A tillage operation used in preparing land for seeding or transplanting or later for weed control and for loosening the soil. 2). The processes used in growing field crops, vegetables, plants, fruits, trees, flowers, and fish.

**cultural control.** The use of agronomic practices such as soil tillage, varying planting time, fertility level, sanitation, water management, crop diversification, crop rotation, and short-duration cultivars to reduce pest populations or stresses.

**cultural practices.** Activities or operations that are usually carried out in raising field crops, e.g., land preparation, seed selection, crop establishment, fertilization, etc.

**culture.** (n) The rearing of organisms such as insect to serve as a source of varietal resistance studies. (v) To artificially grow microorganisms or plant tissue on a prepared food material; a colony of microorganisms or plant cells artificially maintained on such food material.

**culture medium.** In insect rearing, a food source for the insect.

**cumulative degree day sum.** A physiological unit of time calculated as the number of degrees above a threshold temperature x the number of days accumulated. Similar to day degree or degree day.

**cumulative infiltration.** Total volume of water infiltrated per unit area during a specified time period.

**cumulic.** Derived from accumulation. Descriptive of a wetland type where 100 mm of accumulated water will stay for more than 7 days when the soil has been puddled, even without rain or irrigation.

**cuneate.** Wedge-shaped, tapering toward point of attachment.

**cuticle.** In plants, it is a thin layer over the aerial parts (particularly leaves) It functions to protect the plant from injury and to prevent excessive water loss.

**cutting.** A section of a plant capable of developing into a new plant.

**cutworm.** Scientific name: *Spodoptera litura*. A pest primarily of upland rice. Lowland rice suffers only from cutworm larvae migrating from adjacent grassy areas. Seedlings may be cut at ground level; the larvae defoliate older plants. .

**cytogenetics.** Branch of biology that deals with the correlated study of genetics and cytology.

**cytokinins.** A group of plant growth-regulating substances and hormones (natural or synthetic) that regulate cell division and shoot formation.

**cytology.** Branch of biology that deals with the study of structure, function, development, reproduction, and life history of cells.

**cytoplasm.** All the protoplasm of a cell except the nucleus.

**cytoplasmic heredity/inheritance.** The transmission of characters from parent to offspring through the cytoplasm of the germ cell.

## D Terms

**DAF.** DNA amplification fingerprinting. A method of general DNA amplification (cf., PCR) using a single primer of between 5 and 20 nucleotides in length (8-mers are optimal).

**dam (pitting, basin listing).** 1). Forming pits, small basins, or water-holding cavities at intervals with appropriate equipment, for irrigating fields. 2). A structure for impounding and storing available water as a reservoir for further use.

**damage, crop.** Measurable reduction in quality and/or quantity of crop produce caused by injury due to pests and/or abiotic factors.

**damaged grains.** Those distinctly discolored or damaged by water, insects, heat, or any other means (includes yellow grains).

**damping-off disease.** A disease caused by one or a combination of two or more species of water molds. Evidence of damping-off disease is seen as cottony growths; the hyphae of the parasitic fungi are seen on the seed surface. The hyphae usually grow from a slit in the seedcoat that has been opened or broken during germination or threshing.

"**dapog**". Method of raising rice seedlings on banana leaves, polythene, or a cement slab. Seedlings are raised in the same way as in the wetbed method. Because the seeds are sown thickly (3 kg seeds per square meter), seedlings look like a mat or carpet and can be rolled for transplanting when they are 10-14 days old.

**data.** The collection of facts of experiments, instruments, and surveys and treatments that are calculated statistically to give measured statistical results.

**database.** Facts or information and figures stored for future use.

**Davis inoculator.** A mechanical device developed by Frank Davis, Mississippi State University, USA, used to dispense insect larvae in artificial inoculation of plants.

**daylength (photoperiod).** Duration of the daylight period including twilight during a given day; the number of hours between sunrise and sunset.

**days to heading.** Number of days from seeding to heading.

**dead furrow.** A furrow left in the field that is slightly wider than twice the width of a plow bottom, usually occurring at the completion of a field.

**deadheart.** Dead rice tiller caused by the attack and girdling of the tiller's base by stem borers.

**debris.** Rubbish, vegetable matter, dry weeds, etc.

**decomposition.** The process of resolving into constituent parts.

**decompounded.** Divided several times.

**decumbent.** 1). The stem lying on the ground and tending to rise at the end. 2). Lying flat with the apex ascending.

**deep placement.** A method of applying fertilizers in which the fertilizers are placed directly in the reduced zone of the paddy soil.

**deepwater rice.** A long-duration rice that grows under rainfed, nonflooded conditions for 1-3 months, then is subject to flooding with water depths more than 50 cm for a month or longer. Plants elongate as the flood rises, above the water, in normal flood conditions, but may be submerged in deep flash floods. Maximum water depth varies greatly.

**deepwater rice areas.** Low-lying lands on the river deltas of South and Southeast Asia where water accumulates during the rainy season in depths varying from 50 cm to more than 3 m.

**deficiency.** Any inadequacy or shortage of substances essential to growth and development of plants. Lacking in some quality, faculty, or characteristic necessary for completeness.

**defoliator.** Any chewing insect that feeds on the leaves of plant, or chemical that removes foliage.

**degree of milling.** Percent efficiency of bran removal from brown rice during milling; done visually with well-milled rice as 100% milled (Indonesia, Bangladesh). Thailand classifies milled rice into ordinary, reasonably well-, well-, and extra well milled.

**degrees of freedom.** 1). The number of independent comparisons that can be made in a set of data. 2). The maximum number of quantities whose values are free to vary before the remainder of the quantities are determined.

**dehiscent.** Splitting spontaneously when ripe.

**dehull, dehusk.** To remove the hulls or husk from a grain.

**dehumidify.** The removal of moisture from the air.

**Delphacidae.** Family of plant-sucking insects characterized by the presence of a large movable spur at the apex of the hind tibia. They are usually slow moving and move sideward or backward. They stay at the basal parts of the rice plant. Examples are planthoppers.

**delta.** A fan-shaped alluvial deposit at a river mouth formed by the deposition of successive layers of sediment from upstream areas.

**deltoid.** Triangular.

**delugic.** Derived from deluge. Descriptive of a land type where the water levels stay for more than 2 weeks at a depth greater than 30 cm, which is above the normal height of bunds or dikes, during high-rainfall months.

**demonstration plot.** A plot that shows the characteristics or evidence for the local people to observe; planted specifically as a demonstration at a research station.

**denatured protein.** Protein whose properties have been altered by treatment with physical or chemical agents.

**denitrification.** The biochemical reduction and loss of nitrate or nitrite to gaseous nitrogen, either as N<sub>2</sub> or oxides of nitrogen (N<sub>2</sub>O, NO, NO<sub>2</sub>).

**dense panicle (Dn).** A very crowded arrangement of spikelets on the panicle branches, resulting in a large number of spikelets per unit length of panicle. A panicle that contains many grains close together (a high number of grains per unit area).

**density.** Quantity or number per unit volume or area.

**dentate.** Toothed, usually with the sharp teeth pointed outward.

**depressed palea (Dp).** The palea is underdeveloped and shows a depressed appearance.

**depth.** A measurement from the top to the bottom, e.g. from the surface of the water to the ground or to the bottom of a container.

**descriptors.** Terms used to describe or characterize cultivars or to distinguish plants

or seeds collected in germplasm programs.

**desiccator.** A glass jar, fitted with an airtight cover, containing some desiccating (drying) agent such as calcium chloride at the bottom.

**design of experiment.** The complete sequence of steps taken ahead of time to ensure that the appropriate data will be obtained, which will permit an objective analysis and will lead to valid inferences regarding the stated problem.

**detergent.** A synthetic cleansing agent resembling soap in its ability to emulsify oil and remove hard dirt, and contains surfactants that do not precipitate in hard water.

**determinate.** Said of a condition when the terminal bud ceases to grow, preventing elongation of the main axis and promoting auxiliary growth.

**detritus.** Dead organic matter, mostly from plants and usually in particulate form, including dissolved organic matter, but not inorganic matter and various organisms often associated with it.

**deviation.** Departure of an observation from its expected value.

**DGGE.** Denaturing gradient gel electrophoresis. Method to separate DNA or proteins by altering the pH inside a gel. As the molecules migrate in the electric field, they encounter denaturing conditions, which slow down their mobility. Different molecules respond differently to the denaturation condition and therefore respond at a different severity of denaturant (resulting in a loss of mobility at a different point in the gel).

**diallel.** Intercrossing among a group of parents in all combinations.

**diapause.** A period during which growth or development is suspended.

**dibble.** 1). A small hand implement used to make holes in the soil. 2). To make holes with a long dibble stick.

**dibbling.** Planting seeds in holes made by a pointed implement such as bamboo or wooden stick. It is usually practiced along sloping or hilly areas.

**dichotomous.** Forking regularly into two.

**dicotyledon.** A plant with two cotyledons or seed leaves, netted leaf venation, and branched tap roots. Floral parts occur in groups of 4 or 5.

**differentiate.** To recognize the differences between different plant types or different characters in different varieties of the same species.

**differentiation.** 1). Process of cell and tissue specialization involving differential gene expression. 2). Sum of the processes where unorganized cells attain an organized form and function.

**diffuse.** Widely spread.

**digestibility.** (as applied to organic wastes). The potential degree to which organic matter in waste water or sewage can be broken down into simpler and/or more biologically stable products.

**digitate.** A compound structure whose members arise and diverge from the same point, like the fingers of the hand.

**dihybrid.** A hybrid for two different genes. Heterozygous for two pairs of alleles.

**diluent.** Any gas, liquid, or solid material used to reduce the concentration of an active ingredient in a formulation.

**dioecious.** Having male and female flowers on separate plants of the same species.

**diopsis fly.** An insect producing larva which causes deadheart in young rice tillers.

**diploid (2n).** An organism having two chromosomes of each kind.

**diplospory.** A form of apomixis in which the embryo develops from unreduced egg cell.

**direct counts.** In soil microbiology, any one of several methods of estimating the total number of microorganisms in a given mass of soil by direct microscopic examination.

**direct damage (Entomology).** Plant damage caused by the feeding of an insect through the removal of plant sap or plant parts (compare with indirect damage caused by a disease transmitted by an insect which causes delayed symptoms).

**direct DNA uptake (direct gene transfer).** A transformation procedure in which naked DNA is added to a suspension of protoplasts. The protoplasts are then rendered naked by disrupting the cell membrane through chemical treatment (i.e., PEG) or through electroporation allowing DNA to pass into the cell.

**direct seeding.** A system of planting rice in which seeds, either pregerminated or dry, are broadcast or sown directly in the field, with either dryland or wetland preparation; no transplanting process is involved.

**dirty panicle.** Term commonly used in relation to the disease syndrome of grain discoloration of rice.

**disc floret.** One of the central tubular flowers of a composite flower head.

**disciplinary research.** Research conducted by specialists of a particular discipline.

**discoloration.** The changing of color of grains, leaves, or stems due to disease, weather, water stress, insect damage, or lack of nutrients.

**discrepancy.** Disagreement or inconsistency as in data of an experiment

**discrete data.** Observations made by categorizing subjects so that there is a distinct interval between any two possible values (c.f. continuous data).

**discrete random variable.** A random variable with a finite set of possible values.

**disease.** A harmful deviation from the normal functioning of physiological and biochemical processes caused by plant pathogens (fungi, viruses, bacteria, parasites).

**disease control.** The use of chemicals or resistant varieties to control or eradicate the disease present.

**disease cycle.** The sequence of events that occurs between the time of infection and the final expression of the disease.

**disease incidence.** 1). The frequency of occurrence of a disease; commonly, the proportion of plants affected in a given population. 2). The number of plant units infected expressed as % of the total number of plant units assessed.

**disease resistance.** Ability of the plant to survive and grow without symptoms of the disease that has infected it.

**disease severity.** The degree of infection of disease in an individual plant; refers to the area of plant tissue affected by the disease expressed as % of the total area assessed.

**disomic.** Having one or more chromosomes duplicated but not an entire genome duplicated. An organism with euploid chromosome complement.

**dispensing.** Giving out or distributing through a container in convenient units.

**dissect.** To separate and expose the parts of an organism for examination.



**dissemination.** The distribution of germplasm, information, etc.

**dissimilation.** The decomposition or transformation of an organic substrate to yield energy for use by the organism or organisms.

**dissolve.** To cause to pass into solution, such as to dissolve sugar in water.

**distribution (statistics).** The set of possible values for a random variable together with a probability measure defining the likelihood of those values.

**diverse.** Having various forms or qualities.

**diversity.** The condition of being different or having differences.

**DNA.** Deoxyribonucleic acid. The molecule that is the repository of genetic information in all cellular organisms and many viruses. The information coded in DNA determines the structure and function of the organism.

**DNA cloning.** Amplification of specific sequences of DNA utilizing biological vectors.

**DNA polymerase.** An enzyme that catalyzes the polymerization of successive nucleotides during replication of DNA.

**DNA polymorphism.** Difference in DNA sequence among individuals or lines that permits genetic linkage analysis or DNA marker-aided selection.

**dominance.** Inter-allelic/intragenic interaction with complete suppression of one allele by another.

**dominant.** Form of expression of a gene, in which the phenotype of the dominant form is expressed over the recessive form.

**dominant allele.** One of a pair of alleles that is expressed and that suppresses the expression of the other member of the pair when both are present.

**dominant gene.** A gene that is fully expressed in a heterozygote. A dominant gene may partially or entirely suppress the expression of another allelic gene (recessive gene).

**donor.** In plant breeding, a variety that serves as a source of characteristic such as insect resistance.

**donor parent.** A target parent in the crossing program expected to contribute the desired characteristics, e.g. donor for resistance, quality, etc.

**dormancy.** A physical or physiological condition of a viable seed that suspends or prevents germination even in the presence of otherwise favorable germination conditions.

**dosage effect.** The effect of quantitative differential frequencies of alleles (or genes) on the phenotypic expression of the trait.

**dorsal.** On or relating to the back or outer surface of an organ (See ventral).

**double cropping.** Two crops grown in sequence on the same land in a production cycle.

**double cross.** A cross between first generation hybrids of four separate inbred lines.

**double awn (da).** Spikelets have awns developing on both lemma and palea. The awns may have unequal length.

**double transplanting.** Used when seedlings once transplanted are uprooted again some 2-4 weeks after the first transplanting and planted in the final field.

**doubled haploid plants.** Homozygous diploid plants produced from anther or microspore culture.

**dough stage.** The stage in rice development which occurs during the ripening phase when the milky caryopsis inside the developing grain turns into soft dough and later into hard dough.

**drench.** To wet thoroughly by covering with water or another liquid.

**dress.** To apply a chemical such as an insecticide or fungicide to seeds before planting or storage.

**drift.** The movement of airborne spray or dust particles outside the intended contact area.

**drilling.** Sowing seeds in furrows or holes by hand or machine.

**droopy leaves.** Leaves that hang down and are not erect.

**drought.** An insufficient supply of moisture from precipitation or soil for optimum plant growth.

**drought escape.** That which enables the plant to complete its life cycle before serious moisture stress can cause damage to crop growth and yield.

**drought recovery.** The ability of plant to resume normal growth upon alleviation of drought.

**drought stress.** Limitation on maximal plant performance imposed by water limitation.

**drought tolerance.** A total expression of the plant's ability to stay alive, grow, and ultimately produce grain, with part of its life cycle under water stress.

**dry.** To reduce or remove the moisture content

**dryland.** 1). Pertaining to soils rarely or never flooded, or to crops grown in such soils. 2). land that, except for limited periods, does not hold moisture in the rooting zone in excess of that held at field capacity.

**dryland rice.** Direct-sown rice grown in a manner similar to wheat, and which depends on rainfall for moisture.

**dry matter partitioning.** The distribution of dry matter to various plant organs.

**dry season.** The season when no rain is expected.

**dry weight.** The weight of any plant part after its water content has been removed by drying.

**drybed method.** Raising seedlings on a dry seedbed. It is usually practiced in rainfed areas or where irrigation water is not adequate.

**drying rice.** To remove or reduce the moisture content of rice to a safe level (below 14%) for storage, by placing the rice in the sun or using hot air machines.

**dryland crop.** Crop grown where there is free water drainage of the soil and the crop depends mainly on the rains.

**dryland farming.** The practice of crop production in low-rainfall areas without irrigation.

**dryland preparation.** Plowing and harrowing the field when the soil is dry or not saturated with water.

**dry seeding or dry (DSR).** A method of rice establishment where rice seeds are broadcast on dry soil (unpuddled). The technique is more popular in upland unbanded areas, where the soils are light-textured and easily drained. It can also be practiced in wetland areas, when the field is prepared at the time of early germinating rain.

**duplicate genes.** Two independent genes that produce the same phenotypic effect when present individually or when present together.

**duplicate samples.** Collected samples from different sources which belong to the same variety as indicated by name, site of collection or origin, and morpho-agronomic characters.

**duplication.** Occurrence of a segment of a chromosome twice in the haploid set.

**durable resistance.** Any resistance which remains effective in a cultivar that is widely grown for a long period of time in an environment favorable to disease or insect pests. This definition emphasizes the need to observe what happens to crops when they are widely grown over a period of crop seasons.

**dust.** A powderlike formulation which may consist of (1) only toxic agents, such as sulfur, (2) toxic agents plus an active diluent which serves as a carrier, or (3) toxic agent plus an inert diluent which may be in the form of talc or clay.

**dusting.** The process of applying insecticide or pesticide in dust formulation.

**dwarf disease.** A disease caused by rice dwarf virus (RDV). The disease is transmitted by leafhoppers and is characterized by pronounced stunting, reduced tillering, and irregular chlorotic specks on leaves and leaf sheaths. These specks may fuse to form broken streaks that run parallel to leaf veins. Rice dwarf disease occurs in Japan, China, Nepal, and Korea.

**dwarf variety.** A rice variety that is short in stature (with a plant height of  $85 \pm 5$  cm).

**dwarfing genes.** Genes that make plants short in stature. The genes controlling the dwarf height in a plant variety.

**dynamic model.** A collection of regression models that together represent an entire dynamic system.

**dynamic system.** A part of the real world that can be quantified with state and rate variables and parameters. The environment affects the system through rate variables. System behavior is the dynamic pattern of all state variables of a system.

## E Terms

**ear.** A common name for the panicle of rice.

**ear-to-row selection.** A method in which selection is carried out on progenies derived from individual ears.

**early-generation materials.** Rice plants derived from hybridization that are in early filial generations such as F2 and F3.

**early-maturing variety.** A variety that matures early; variety that matures at least 10 days earlier than common types. In rice, varieties that mature in 100 days are called very early.

**early yield testing.** Testing of breeding lines at early filial generations which may have some amount of segregation.

**ecology.** The study of the interactions of organisms with their physical environment and with one another.

**economic injury or threshold level.** The pest population density at which the loss caused by the pest is greater than the cost of controlling the pest. The pest density at which artificial control measures are economically justified.

**eco-strains.** Strains within a variety that have developed physiological differences in response to long-time growth, repeated planting, and selection in distinct environments.

**ecosystem.** 1). A major interacting system that involves both living organisms and their physical environment. 2). A system of ecological relationships in a local environment, including relationships between organisms and the environment itself.

**ecotype.** A population within a species that has developed distinct physiological characteristics (e.g., herbicide resistance) in response to a specific environment which persist even if individuals are moved to a different environment.

**ectoparasite.** A parasite feeding on the host from the exterior.

**ectotrophic mycorrhiza/ectomycorrhiza.** A mycorrhizal association in which the fungal hyphae form a compact mantle on the surface of the roots. Mycelial strands extend inward between cortical cells and outward from the mantle to the surrounding soil.

**edaphic .** Influenced by the soil rather than by climate.

**edaphic factors.** Soil conditions such as alkalinity, extreme acidity, iron toxicity, salinity, and zinc deficiency, which adversely affect plant growth.

**edaphology.** The science that deals with the influence of soils on living things, particularly plants, including people's use of land for plant growth.

**effect.** The influence of an external factor on the plant, e.g., drought, fertilizer, flooding. In statistics, that which is measured and analyzed as in treatment effect.

**effective accumulated temperature (EAT).** The total effective temperature in °C received by the plant in a certain growth period (stage). It is used to predict flowering.  $EAT = \text{mean daily temp } ^\circ\text{C} - \text{temp higher than } 27 ^\circ\text{C} - \text{temp of the lower limit } (12 ^\circ\text{C})$ .

**effective precipitation.** That portion of total precipitation that becomes available for plant growth.

**effective rainfall.** That portion of rainfall that can be stored within the rooting depth of the crop and on the paddy surface and can be subsequently utilized by the

plants.

**egg.** 1). In insects, the reproductive body in which the embryo develops and from which the nymph or larva hatches. 2). In plants, the female ovum, pertaining to reproductive cells.

**egg mass.** A group of eggs deposited by the female insect which are adjacent to each other (as in rice bug) or overlapping (as in the yellow stem borer) as opposed to eggs laid singly.

**egg plug.** A gelatinous fluid which the rice weevil places over the egg, located in the egg cavity in the plant.

**electrical conductivity.** A measure of the amount of salts in a solution expressed as deciSiemen per meter (dS/m).

**electrophoresis.** Method used to separate protein or nucleic acid molecules in an electric field extending across a physical medium such as agarose gel or polyacrylamide.

**electroporation.** Introduction of DNA or RNA into plant cells or protoplasts by the disruption of the cell membrane through exposure to an intense electric field.

**elicitors.** Molecules produced by the host (or pathogen) that induce a response from the pathogen (or host).

**ELISA.** Enzyme-linked immunosorbent assay. A serological test in which one antibody carried within an enzyme releases a colored compound.

**elite germplasm.** Germplasm that is agronomically acceptable or has the preferred traits.

**elite lines.** Breeding lines that possess most of the characteristics being sought for a particular environment or plant.

**ellipsoid.** An elliptical solid.

**elliptic.** Oval in outline, having narrowed to rounded ends and being widest at or near the middle.

**elliptical.** Oval-shaped.

**elongation ability.** 1). Deepwater rice: The ability of the internodes, leaves, and leaf sheath to elongate during the vegetative growth phase, thereby escaping submergence by rapidly rising floodwater. Floating rice can elongate as fast as 20 cm per day. 2). Grain: The ability of the rice kernel to stretch lengthwise upon cooking to sometimes twice its original length or more in some high quality Basmati rice varieties.

**elongation genes.** The genes controlling the elongation of the plant parts, especially the stem and leaf sheath.

**elongation ratio.** Ratio of grain length of 10 cooked rice grains to that of raw rice grains, preferably presoaked in water 30 min before cooking for 10 min.

**emarginate.** Having a shallow notch at the extremity.

**emasculation.** The systemic removal of all of the male sex organ from an organism; in rice, the removal of the stamen of the floret.

**embryo.** The generative part of a seed that develops from the fertilized (diploid) egg called zygote, which upon germination gives rise to a young seedling. It is located on the ventral side of the seed. It is easily detached and removed in the milling process as part of the bran.

**embryo rescue.** An in vitro technique used to culture the hybrid embryos which otherwise abort in vivo.

**embryonic.** Rudimentary, in an early stage.

**embryogenic callus.** An undifferentiated cell mass that produces somatic embryos.

**embryonic shoot.** The early leaves coming from the seed or the plumule.

**emergence.** Coming out or rising of seedlings from the ground; coming out of panicles from the boot (panicle exertion); coming out of adult insect from cocoon or pupa.

**emergent (plant).** A plant growing in standing water with the terminal part above the water.

**empty glumes.** Sterile rudimentary lemmas at the lowest section of the spikelet.

**empty spikelet.** A spikelet that is not filled at maturity.

**emulsifiable concentrate. (EC).** A concentrated solution and an emulsifying agent in an organic solvent which will form an emulsion when added to water.

**emulsifier.** A substance that promotes the suspension of one liquid in another.

**emulsion.** One liquid suspended as minute globules in another liquid, e.g., oil dispersed in water.

**enation.** Tissue malformation or overgrowth induced by certain virus infections.

**endemic.** Native to a country, geographical region, or area.

**endoparasite.** A parasite that enters the host and feeds from within.

**endophyte.** A plant growing within a plant. The association may be symbiotic or parasitic.

**endosperm.** The nutritive tissues of the ripened ovary, consisting of the aleurone layer and the starchy endosperm. It serves as food for the germinating embryo; triploid in chromosome number.

**endotrophic.** Nourished or receiving nourishment from within, e.g., fungi or their hyphae receiving nourishment from plant roots in a mycorrhizal association.

**enrichment culture.** A technique in which environmental (including nutritional) conditions are controlled to favor the development of a specific organism or group of organisms.

**entry.** A test variety or a breeding line under evaluation.

**environment.** The total external conditions and surrounding organisms, physical and biological factors which affect the growth and development of an organism.

**enzyme.** Any of the numerous proteins or conjugated proteins produced by living organisms that function as biochemical catalysts within the organism's body. Some RNA enzymes were recently discovered (see ribozyme).

**epicotyl.** The part of the stem of a seedling or embryo just above the cotyledons.

**epidemic.** An extensive development of a pest or disease in a geographical area or community, in a given time and space.

**epidermis.** The outer layer of cells. A layer of primary tissue in higher plants that is commonly one cell thick, often cutinized on its outer surface, and continuous in young plants except over the stomata. The epidermis provides protection to the underlying parts against mechanical injury and desiccation and is largely replaced in older plants except on leaves and herbaceous stems.

**epiphyte.** A plant attached usually to another plant solely for support; not a parasite.

**epiphytotic.** An unarrested spread of plant disease, an old term which means epidemic.

**epistasis.** Interaction between genes in which one gene suppresses the action of another gene located at a different locus.

**equilibrium moisture content.** The condition wherein the moisture-retaining tendency of the grain is the same as the moisture-withdrawing tendency of the air.

**erect growth habit.** A tendency of the plant to grow upright without spreading. The culms are erect and closely grouped. Erect growth is recessive to the spreading or procumbent habit.

**erect leaves.** Upright leaves.

**ergonomics.** An applied science which considers human characteristics in designing machinery and arranging things for effective interaction, comfort, and safety; also called human engineering.

**Erlenmeyer flask.** A thin glass flask, flat-bottomed and cone-shaped allowing its contents to be shaken laterally without danger of spilling.

**erosion.** The loss of soil particles and nutrients when the surface soil is carried away by wind, water, or other agents.

**erosion index.** A measure of the erosive potential of a specific rainfall event.

**error, experimental.** The deviation of a randomly occurring observation from its true or expected value. The difference between experimental plots or experimental units receiving the same treatments. This error comes from the inherent variability which exists in the experimental materials and the variation resulting from any nonuniformity in the physical conduct of the experiment. Experimental error is always present. A good experiment is one in which experimental error is kept at the minimum level. Its measurement is essential for use in detecting real differences between treatments.

**error control.** Procedures such as blocking, proper selection of experimental design, measurement techniques, and field plot techniques applied to reduce experimental error.

**error variance.** A measure of experimental error. Variance arising from unrecognized or uncontrolled factors in an experiment with which the variance of unrecognized factors is compared in tests of significance.

**erythema meter (erythema ultraviolet intensity meter).** An indicator of the sunburning effect of radiation with wavelengths as short as 270 nm.

**escape.** To avoid undesirable growing conditions, environmental factors, pests or diseases, e.g., through early or late sowing, to avoid grain losses is a drought escape mechanism.

***Escherichia coli (E. coli)*.** A common gut bacterium used as a model genetic organism. *E. coli* has about 3,000 genes and a genome of around 4 million basepairs.

**essential amino acids.** Those amino acids that are not made by the human body but must be taken in as part of the diet. Examples are lysine, tryptophan, and valine.

**essential elements.** Those elements such as N, P, and, K that are required for plant growth.

**establish.** To begin; to become embedded and grow in the soil; to plant the crop; to

be a part of a certain practice, functioning group, society, or organization.

**estuary.** The mouth of a river where the salty ocean tide meets the current of a stream.

**ethidium bromide.** Chemical used to visualize DNA by fluorescence. It interposes itself into the DNA groove and alters buoyancy.

**etiolation.** Growth of plants from seeds in darkness. A yellowing condition of the plants due to light deficiency characterized by an elongated stem, small leaves, and lack of chlorophyll.

**etiology.** The science dealing with the causes of diseases.

**euchromatin.** The portion of genomic DNA that remains relatively unstained and is transcriptionally active.

**eukaryote.** Organism characterized by the presence of a nucleus. Also other organelles such as mitochondria and/or chloroplasts may be present in eukaryotes. Includes all plants, animals, green algae, and fungi.

**euploid.** Having a chromosome number that is a whole multiple of the monoploid number.

**eutrophic.** Having optimal concentrations of nutrients (or nearly so) for plant or animal growth.

**eutrophication.** The process of becoming rich in nutrients.

**evaluate.** To examine and estimate the amount and degree of a character and to express it numerically.

**evaluation.** Process of quantification or qualitative grading of agronomic traits of interest in cultivars.

**evaporation.** In rice cultivation, the moisture lost in vapor form from the free water surface. It is one of the important factors that determine the effectivity of rainfall, particularly in arid or semiarid areas.

**evaporites.** The class of materials including gypsum and all more soluble species, precipitated by evaporation.

**evapotranspiration.** The loss of water from a given area and during a specified period of time by evaporation from the soil surface and by transpiration from plants.

**excise.** To remove by cutting.

**ex situ.** Away from the natural or original position/place.

**exchange capacity.** The total charge of the adsorption complex active in the adsorption of ions.

**exchangeable ion.** Electrically charged form of an element that is adsorbed by soil particles.

**exchangeable sodium fraction.** The ratio of exchangeable sodium to the remaining exchangeable cations in soil.

**exon.** Expressed region of a gene. Transcribed and translated.

**exotic.** An organism or a plant introduced from one country to another.

**expansive growth.** Increase in height, length, or area of cells or tissues.

**experiment.** A planned inquiry to obtain new facts or to confirm or refute results of previous work. Such an inquiry will aid in decision making, recommending of new processes, procedures, plant varieties, and so on. This type of research sets the



circumstances and is controlled by the researcher.

**experimental design.** The plan of an experiment. It involves the assignment of treatments to the experimental units.

**experimental error.** The difference in results between experimental plots treated alike; uncontrollable random error.

**experimental farms.** Government or institute-controlled farms where experiments are conducted.

**experimental plot.** The area used in a field experiments.

**experimental site.** A specific location where field experiments are conducted.

**experimental station.** A place with land and buildings where various facilities and trained staff are available for scientific experiments on rice and other agricultural products.

**experimental units.** A unit to which one treatment is assigned or applied.

**explant.** Living tissue removed from a plant and placed in an artificial medium for tissue culture.

**exploration.** Plant-collecting expeditions.

**expressivity.** The degree of manifestation of a certain character in the offspring. The degree of **expression of a given gene.** Genes that always produce the same phenotype have 100 percent expressivity.

**exserted panicle.** Panicle that emerges fully from the flag leaf sheath.

**exsertion.** 1). When the spikelets of the rice plant become distinguishable and the panicle extends upward inside the flag leaf sheath. 2). Degree of emergence of the panicle from the flag leaf sheath; maybe positive or negative depending on whether the neck node is above or below the collar of the flag leaf. 3). Ability of the panicles to arise from the boot.

**extended family.** Several generation of basic family units, related by descent, marriage or adoption and living together; a household group which includes kin outside of the nuclear family.

**extension.** Dissemination of agricultural technology from scientific research organization to the farming community to improve their farming practices.

**extrachromosomal inheritance.** The transmission of hereditary characters through components in the cytoplasm rather than by chromosomes. Known as extrachromosomal inheritance, plastid inheritance and non-Mendelian inheritance.

**extra lemma (Imx).** Spikelets have an extra glume between the fertile lemma and the sterile lemma; synonymous with polyhusk.

**extrapolation area.** The domain of possible adaptation of a cropping pattern. It is composed of land types and other physical factors, to which the cropping pattern is adapted.

## F Terms

**FI.** Abbreviation for the first filial generation, usually the hybrid between two homozygous types.

**FCC.** fertility capability classification; a classification based on quantitative topsoil and subsoil parameters directly relevant to plant growth; various soil condition 'modifiers' define specific types of soil adversity or complexes of edaphic problems.

**F layer.** A soil layer of partially decomposed litter with portions of plant structures still recognizable. Occurs below the L layer (O11 horizon) on the forest floor in forest soils.

**F test.** A test of statistical significance consisting of the ratio of two independent variances of normally distributed variables.

**FI hybrid.** Denotes the first generation offspring from the mating of two parents.

**F2.** The second filial generation obtained by self-fertilization of F1 individuals.

**F2 population.** Population of individuals present in the F2 generation of a cross.

**F2 ratio.** The segregation pattern of a character or characters in F2 generation.

**F2 seed.** The second generation progeny from the mating of two parents.

**F3.** Progeny obtained by self-fertilizing F2 individuals.

**factorial.** Where two or more treatments of an experiment produce different interactions.

**factorial experiment.** An experiment where treatments are combinations of two or more factors. The treatments can be either complete factorial combinations or incomplete factorial combinations.

**facultative saprophyte.** An organism living on another living organism during part of its life cycle or living on the dead tissues of its host.

**fadama.** Naturally flooded plains in Nigeria where rice grows.

**Fahrenheit (oF)** A temperature scale in which the freezing point of water is taken as 32 °F and the boiling point of water as 212 °F (or 100 °C) under standard atmospheric pressure.

**fallow.** Land that is ordinarily used for crops but allowed to lie idle between crops.

**false smut.** A disease caused by *Ustilaginoidea virens*. The fungus transforms individual grains of the panicle into greenish spore balls that have a velvety appearance. The spore balls are small at first and enclose the floral parts. They are covered with a membrane which bursts as a result of further growth and the color of the ball becomes orange and later yellowish green or greenish black. (Also known as grain smut)

**farming system.** 1). The manner in which a particular set of farm resources is assembled within its environment, by means of technology, for the production of primary agricultural products. 2). A collection of distinct functional units, where crops, livestock, and marketing activities interact because of the joint inputs received from the environment and management personnel. 3). A unique and reasonably stable arrangement of farming enterprises that a household manages according to well-defined practices in response to the physical, biological, and socioeconomic environment and resources. These factors combine to influence output and production methods.

**feeding lesion.** A damaged area on a plant part resulting from the feeding of an

insect.

**female flower.** A flower with functional ovary but no stamens.

**female parent.** The parent which contributes its egg in a cross. The plant with the ovary, style, and stigma that may produce fruits or seeds.

**fermentation.** Any of the chemical reactions induced by living or nonliving agents that split complex organic compounds into relatively simple substances, e.g., the anaerobic conversion of sugar to carbon dioxide and alcohol by yeast.

**ferrolysis.** A soil-forming process resulting in acidification and clay destruction due to alternating reduction and oxidation in practically flooded soils.

**fertile** 1). Land that has enough nutrients to support abundant plant growth. 2). Plants that are reproductive and can produce fruits, seeds, spores or pollen grains.

**fertility (genetics).** The ability to produce viable offspring.

**fertility (soil).** The status of a soil with respect to its ability to supply nutrients essential to plant growth.

**fertilization (genetics).** Fusion of the nuclei of male and female gametes. The union of the pollen (male) and the egg (female) initiating reproduction.

**fertilization (soil).** Making soil fertile with the application of fertilizer.

**fertilizer.** Any substance added to the soil to supplement elements required in the nutrition of plants.

**fertilizer, complete.** Used formerly to denote a fertilizer containing appreciable amounts of N, P, and K; it now includes secondary and micronutrients essential to plant growth.

**fertilizer response function.** A function that relates yield (output per hectare) to the amount of fertilizer used (input per hectare), holding all other inputs constant.

**fertilizer, starter.** A relatively small application of fertilizer applied with or near the seed for accelerating early growth of the crop.

**fertilizer grade.** The guaranteed minimum analysis of the major plant nutrient elements contained in a fertilizer material. It is expressed in percentage of N, P<sub>2</sub>O<sub>5</sub>, and K<sub>2</sub>O.

**fertilizer ration.** The relative amount of N, P<sub>2</sub>O<sub>5</sub>, and K<sub>2</sub>O in a fertilizer grade.

**fertilizer requirement.** The quantity of certain plant nutrient elements needed, in addition to the amount supplied by the soil, to increase plant growth to a designated level.

**fertilizer responsiveness.** The ability of the plant to utilize the applied fertilizer.

**fibrous.** Thread-like.

**fibrous root system.** Adventitious roots from the base or stem of the rice plant that form the mat roots.

**field capacity.** The amount of water remaining in a field soil that has been thoroughly wetted and drained until free drainage has practically ceased. The soil can no longer absorb additional moisture.

**field.** Cultivated open land area; land used for raising crops or for conducting experiments.

**field collecting.** The collection of samples from the field.

**field resistance.** Resistance observed in the field as distinguished from resistance

observed in the laboratory or greenhouse. It may involve seedling resistance as well as adult plant resistance and often involves resistance to all locally occurring biotypes.

**field sampling.** 1). Fields may be chosen randomly for sampling from a map locating the coordinates and the cultivator interviewed. Samples are then taken according to the plan. 2). A field is divided into particular proportions and a grid is used for even sampling of different sections of the field.

**field screening.** Evaluating varieties for resistance in the field in contrast to greenhouse and screenhouse evaluations.

**filament.** In a flower, the slender stalk of the stamen.

**filial generations.** Generation after making a cross. Refer to offsprings resulting from a cross of parents, as in F1 (first filial generation), F2 (second filial generation), etc.

**filled grain.** A seed with a fully developed endosperm.

**filler.** 1). A material that does not contain any fertilizer element but is added to obtain the desired weight of a mixed fertilizer. 2). Rice variety used to fill vacant areas of an experimental plot.

**filter paper.** Porous paper used for filtering liquids.

**film water.** A layer of water surrounding soil particles and varying in thickness from 1 or 2 to perhaps 100 or more molecular layers. Usually considered as that water remaining after drainage has occurred because it is not distinguishable in saturated soil in rice production (puddled soils).

**fine stripe (fs).** Seedlings show fine greenish white longitudinal stripes at tip and margin of leaf blade. Stripes often disappear in the tillering stage.

**fine texture.** Consisting of or containing large quantities of fine fractions, particularly of silt and clay.

**fire, ground.** A fire that consumes organic material and burns into the underlying soil itself, for example, a peat fire. Applies in some deepwater rice areas of southern Vietnam.

**firm.** A term describing the consistency of a moist soil that offers distinctly noticeable resistance to crushing but can be crushed with moderate pressure between the thumb and forefinger.

**fixation.** The process by which certain nutrient elements in a soil are converted from available form to unavailable form essential for plant growth, being converted from a soluble or exchangeable form to a much less soluble or to a nonexchangeable form. Examples are potassium, ammonium, and phosphorus fixation.

**fixation, nitrogen.** Conversion of available nitrogen to insoluble or unavailable nitrogen.

**fixative.** A preservative or chemical used to keep plants for subsequent study.

**fixed ammonium.** The ammonium in soil that cannot be replaced by a neutral potassium salt solution.

**fixed line.** A breeding line that continues to breed true to type and does not segregate.

**fixed phosphorus.** That phosphorus which has been changed to an unavailable form as a result of reaction with the soil.

**flaccid.** Limp and flabby.

**flag leaf.** The uppermost leaf originating just below the panicle base.

**flagellum.** A thread-, hair-, or whiplike structure that serves to propel a motile cell.

**flat planting.** A method of planting in which the seed is planted on harrowed, dragged, or plowed flat land with a planter that causes minimum disturbance to the smooth surface.

**flash flood.** A rapid surge of flooding that subsides after several days and lasts no longer than 10-12 days.

**flat land.** Low-lying flat areas or a plain where rice grows.

**fleshy.** Thick and soft.

**flavor.** The taste and smell of particular rice varieties.

**floating rice.** Rice that can maintain their canopies above the water in slowly rising flood as deep as several meters. It can take gradually increasing water level up to several meters at a maximum rate of 15 cm per day, provided there is adequate growth at the seedling stage approximately six weeks before the onset of flooding. Examples are floating rice varieties grown where maximum water depth ranges between 1 and 6 m for more than half of the growth duration. In densely populated areas, floating rice is grown as a subsistence crop because no other crop will grow.

**flood plain.** The land bordering a stream or river, built up of sediments from the overflow of the stream or river and subject to inundation at the peak of the flood period.

**flooding.** 1). The normal process that floods the plains where deepwater rice is grown. 2). To apply water to the field for the benefit of saturating the soil for land preparation. 3). Establishing and maintaining an irrigated rice crop.

**floret.** A small flower, generally one of a dense cluster but an individual flower in members of families Poacea and Asteracea.

**flowable (F).** A formulation which consists of a pesticide plus dust diluent that is blended in a small quantity of water.

**flower.** The reproductive part of the angiosperms. In rice, it consists of two lodicules, six stamens, and the pistil.

**flowering.** The stage when the anthers of the terminal spikelets protrude and shed pollen.

**flowering date.** The date recorded when the panicles emerge from the boot.

**fluctuation.** A wavering, unsteady, irresolute, or undetermined movement or pattern; irregular rising and falling.

**fluorescence.** The property of emitting electromagnetic radiation usually as visible light resulting from external stimulation with another light (or energy) source and occurring only during the absorption of radiation from some other source.

**flush.** A short, quick watering period; a sudden growth burst.

**flux.** Rate of transfer of a quantity (water, heat, etc.) across a surface.

**fluxial.** Pertaining to flooding by surface water conveyed from elsewhere.

**flux density.** Flux across a unit cross-sectional area.

**fluxic.** Derived from the flux or passing through. Descriptive of a wet land type where free water remains in the field when the soil has been puddled, but the depletion rate of free water, including evapotranspiration losses, is more than 10 mm/day.

**foliar.** Referring to leaves of a plant; application of chemicals to the leaves.

**foliar diagnosis.** An estimation of mineral nutrient deficiencies (excesses) of plants based on examination of the chemical composition of leaves and the color and growth characteristics of the foliage of the plants.

**formulation.** Mixture of a pesticide with diluents, solvents, wetting agents, or other inert ingredients which can be used in pest control.

**foundation seed.** Seed stock produced from breeder seed by or under the direct control of an agricultural experiment station. Foundation seed is the source of certified seed, either directly or through registered seed organizations.

**FPLI (Functional Plant Loss Index).** A formula based on the plant weight loss and damaged ratings due to insect feeding which is used in determining levels of tolerance when identifying components of resistance.

**fracture.** Random breakage that results in fragments of unpredictable shape.

**fritted trace elements.** Sintered silicates having total guaranteed analyses of micronutrients with controlled (relatively slow) release characteristics.

**fruit.** The ripened (mature) ovary containing one or more seeds.

**full sibs.** Individuals derived from the same parents.

**fumigant.** Highly volatile chemical that kills mice, insect, weeds, and other living organisms.

**fumigation.** The process used to destroy bacteria, insects, or pests by smoke or exposure to poisonous gas.

**fungicide.** A chemical agent that kills or inhibits fungal spores or mycelium. A pesticide used to treat or prevent diseases caused by pathogenic fungi.

**fungus.** 1). An organism with no chlorophyll, reproducing by sexual or asexual spores, usually having mycelia with well-marked nuclei. 2). Heterotrophic microorganisms chiefly saprophytic or parasitic, that constitute the kingdom fungi.

**furrow.** A trench or long narrow cut in the soil after a plow passes through it, a trench or ditch dug by hand.

**furrow slice.** The ribbon of soil cut, lifted, pulverized, thrown, or turned to one side by the plow bottom.

**fusion.** Union of two broken fragments.

**fuzzy hull (Hg or Lh).** Long, smooth, dense hairs on the hull resulting in a fuzzy appearance; probably synonymous with shaggy hull.

## G Terms

**gall.** An abnormal plant growth, swelling or tumor induced by another organism such as an insect.

**gall midge.** An insect pest (*Orseolia oryzae*) that causes the youngest leaf or the shoot in a tiller to appear as light-colored tubular gall resembling an onion leaf. Tillers with gall midge do not produce panicles.

**gamete.** A mature reproductive male or female germ cell (sperm or egg) specialized for fertilization.

**gametic (tissue or generation).** Having  $n$  number of chromosomes (haploid) in contrast to zygotic tissue with  $2n$  (diploid).

**gametocide.** Organic or inorganic chemicals used for killing the functional sexual parts (pollen, ovule) of the plant. These may be selective for male or female parts.

**gametophytic.** In this system, the sterility/fertility reaction is imparted to the pollen by the genetic constitution of the pollen itself and is controlled by a single gene which may have large numbers of allelic forms.

**gel consistency.** Degree of rice gel firmness measured as the length of cold milled rice gelatinized in 2 ml of dilute potassium hydroxide in a 13- x 100-mm test tube, placed horizontally for 30 minutes or 1 hour. Gel consistency may be classified as hard (27 to 40 mm), medium (41 to 60 mm), or soft (61 to 100 mm). It is correlated with hardness of cooked rice.

**gel electrophoresis.** A technique where nucleic acids or proteins are separated according to size and charge by subjecting them to an electric current in a suitable gel and buffer system.

**gelatinization temperature.** Temperature at which about 90% of the starch granules have swelled irreversibly in hot water. Final gelatinization temperature may be classified as low ( $<70$  °C), intermediate (70 to 74 °C), and high ( $>74$  °C). Instead of hot water, 1.7% potassium hydroxide solution may be used to gelatinize the starch. The digestibility of the milled rice starch, as indicated by the degree of spreading and clearing, is inversely related to gelatinization temperature.

**gender analysis.** The systematic effort to document and understand the roles of women and men within a given context.

**gender blindness.** The inability to perceive that different gender roles and responsibilities are held by men and women, leading to different effects on men and women of development policies, programs, and projects.

**gender neutral.** Having equal impact on both men and women, giving them equal access to resources and benefits of a development initiative.

**gender roles.** Learned behaviors that condition activities, tasks, and responsibilities viewed within a given society as "masculine" or "feminine."

**Gene.** 1). A functional hereditary unit that occupies a fixed location in a chromosome, has a specific influence on the phenotype (usually) through encoding a single polypeptide chain or molecule), and is capable of mutation to various allelic forms. 2). DNA segment that performs a specific function and is a unit of inheritance.

**gene action.** The expression of genes by their control on the specificity and rate of biosynthetic processes or on the regulated action of other genes.

**gene bank.** An institution that serves as a center of exchange and preservation for a large number of varieties.

**gene conversion.** The asymmetrical segregation of genes during replication that leads to an apparent conversion of one gene into another.

**gene deployment.** A system of assigning specific resistance genes to a specific geographic area to control pests.

**gene dosage.** The number of times that a particular gene occurs in the nucleus of a cell.

**gene expression.** The process by which the polypeptide encoded by a gene is synthesized at the appropriate time, place, and rate. When a gene is "decoded" by the cell and a new protein is produced, the gene is said to be "expressed" by the plant.

**gene-for-gene resistance.** See Vertical Resistance.

**gene frequency.** The proportion in which alternative alleles of a gene occur in a population.

**gene interaction.** Modification of a gene action by a nonallelic gene or genes.

**gene library.** A clone library which contains a large number of representative nucleotide sequences from all sections of the DNA of a given genome; a random collection of DNA fragments from a single organism, linked to vectors, and cloned in a suitable host.

**gene locus.** A place or a position occupied by a gene on a chromosome.

**gene mapping (genome mapping).** The assigning/locating of a specific gene to particular region of a chromosome; the determination of the sequence of specific genes and their relative distances from each other on a given chromosome.

**gene pair.** The identical or nonidentical alleles of a specific gene at a given locus on homologous chromosomes in a diploid cell.

**gene pool.** The sum total of genetic variability present in a crop species.

**gene-pools.** Desired genes or gene-complexes in genetically diverse populations.

**gene symbols.** A system of nomenclature for designating genes or a species.

**genealogy.** The noted history of the genetic ancestry of a variety.

**general combining ability.** The average performance of a parent in a series of crosses.

**generation.** Offspring having a common parent or parents and constituting a single stage of descent.

**genetic.** Resulting from, or produced by, soil-forming processes; for example, a genetic soil profile or a genetic horizon.

**genetic advance.** Progress in shifting the genotypic mean and gene frequencies of a trait in the population toward the desired direction as a result of selection.

**genetic base.** The genotypic background of a breeding line or population. Cultivars with a broad genetic base can adopt more readily to changing environments or selection efforts than can a narrowly based one.

**genetic code.** The conversion table which allows the interpretation of triplet codons to their matching amino acids and carries the information for protein synthesis.

**genetic composition.** The genetic makeup of a plant.

**genetic conservation.** Collection, maintenance, and preservation of all segments of germplasm in a crop species and its wild relatives.



**genetic diversity.** The genetic variability present in a population or in a species.

**genetic drift.** Changes in the gene frequencies of a population when the size of sample chosen for rejuvenation is small. Genetic drift leads to a loss of certain genotypes in the population.

**genetic engineering.** Technologies used to isolate genes from an organism, manipulate them in the laboratory, and insert them stably into another organism. It refers to all of the techniques used to manipulate DNA, including gene isolation and cloning, gene splicing, plasmid construction, and transformation.

**genetic equilibrium.** The condition in which successive generations of a population contain the same genotypes in the same proportions with respect to particular genes or combinations of genes.

**genetic evaluation and utilization (GEU).** An interdisciplinary and problem-oriented approach to improve rice varieties by testing, research, and breeding.

**genetic linkage.** Any association of genes in inheritance that exceeds what is expected from the independent assortment due to their being located on the same chromosome. Linkage is assessed by the tendency of genes to remain together during recombination.

**genetic map.** The linear arrangement of genes on a chromosome.

**genetic marker.** Any gene whose presence can be readily detected by its phenotypic expression and which is used to locate other genes. Also detectable RFLP used to identify a specific linked gene or an individual carrying a gene of interest.

**genetic material.** The chromosome nucleic acid, predominantly DNA but at times RNA, that carries the information for the synthesis of proteins and other nucleic acids.

**genetic potential.** The likelihood that the genetic material is capable of producing many new genotypic combinations.

**genetic purity.** Trueness to type; seeds or plants genetic potential. The likelihood that the genetic material (improved or primitive) is capable of producing many new genotypic combinations from stored variousness by hybridization and subsequent segregation, recombination, and selection under varying pressures conforming to the characteristics of the variety, line, or hybrids.

**genetic recombination.** The production of progeny that derives some of its genes from one parent and some from another genetically different parent; as a result, the combination of genes in the progeny is different from that of either of the parents. In higher organisms, recombination occurs by way of independent assortment or crossing over; in lower organisms, it occurs by way of transformation, conjugation, or transduction.

**genetic resources.** Germplasm that includes the entire array of cultivars in the crop species, related wild species in the genus, and hybrids between the wild and cultivated species.

**genetic resources center.** An institution concerned with the collection, conservation, and utilization of germplasm.

**genetics.** The science of heredity and variation.

**genetic shift.** Change in the genetic makeup of the line, variety, or hybrid if grown over a long period particularly in areas outside their adaptation.

**genetic stock.** A cultivar/line possessing specific genetic trait(s).

**genetic tester.** 1). A cultivar/line used for testing the presence/absence of a gene

in a given line/cultivar. 2). A pure line or hybrid known to carry one or more genes that distinctly express themselves in morphological or physiological features. The mode of inheritance of such traits is known by prior genetic experiments.

**genetic variability.** The state of being genetically variable, i.e. having more than one genetic state or allele at each gene locus. Such genetically variable populations are referred to as polymorphic.

**genetic vulnerability.** The status of crops that have a narrow genetic base, which could lead to increased threat of attack from pests and pathogens. Genetically vulnerable crops have a limited number of varieties and a narrow range of genetic resistance to pests and diseases. Modern breeding has narrowed the genetic base of crops, compared with what farmers grow in traditional systems. These systems are often characterized by many different varieties, often expressing different levels of susceptibility to a given pest or disease. This heterogeneity, as opposed to homogeneity in modern varieties, reduces risk of attack by pests and pathogens.

**genic male sterility.** A type of male sterility conditioned by nuclear genes.

**genome.** A complete single set of the genetic material of a cell or organism; the complete set of genes in a gamete, the single DNA/RNA molecule of bacteria, phages, and most animal and plant viruses. In plants, composed of the nuclear genome, the mitochondrial genome, and the chloroplast genome.

**genome analysis.** Procedure which helps to identify the chromosomes corresponding to the haploid set of species which contributed to the evolution of an allopolyploid species.

**genotype.** The genetic constitution of an organism.

**genus.** A class, kind, or group marked by common characteristics or by one common characteristic; a category or biological classification ranking between the family and the species, comprising of structurally or phylogenetically related species or an isolated species exhibiting unusual differentiation, and being designated by a Latin or latinized capitalized singular noun.

**geomorphology.** Study of the origin of landforms; largely replaces the term 'physiography'.

**germ.** The embryo of a seed; pathogenic or harmful microorganism.

**germination.** The resumption of active growth of the embryo in the seed and the process by which a seed sprouts to development into a seedling when a favorable environment exists, culminating in the development of a plant from the seed.

**germination to emergence.** The period which is signified by the emergence (coming out) of the radicle or coleoptile from the germinating embryo in the seed.

**germinator.** A piece of equipment used for germinating seed which provides the necessary conditions needed for germination.

**germplasm.** 1). The sum total of genetic material in a species. 2). The material basis of heredity. 3). The potential hereditary materials within a species, taken collectively.

**germplasm bank.** A facility to store plant genetic resources for custody, conservation, exchange, and use by present and future generations.

**germplasm collection.** A collection of genotypes of a particular species, from different sources and geographic sites, used as source materials in plant breeding.

**gibberellins.** Plant growth regulators responsible for cell elongation.

**Glaberrima rice.** A species of rice cultivated in Africa.

**glabrous.** Having a smooth even surface, hairless condition. Hairs are scarce or absent on the hull and/or the leaf blade. In a glabrous strain, few hairs may be found on the margins of the blade.

**glassine envelope or bag.** Material used in covering the panicle of the female parent after emasculation or pollination.

**gley.** Pertaining to grayish, greenish, and bluish soil colors resulting from waterlogging and reduction of the soil material.

**globose.** Spherical or rounded.

**globular.** Nearly spherical.

**glossy.** Leaf blades have a glossy surface to which water easily adheres in large droplets.

**glume.** The two chaffy structures in the inflorescence of grasses. It is made up of the lemma and palea which usually cover the floret before blooming and often remain attached to the ripened "fruit" or grain of some cereals, such as rice.

**glume discoloration.** Synonymous with grain discoloration. Rice grains maybe infected with various organisms causing discoloration ranging from black dots to brown or blackish blotches which may cover the entire glume.

**glutinous rice.** Refers to waxy rice with only 0-2% amylose or mainly amylopectin in its endosperm and pollen starch. Raw glutinous endosperm is opaque and becomes moist, sticky, and glossy when cooked.

**glycophytes.** Nonhalophytic plants or plants that do not grow well when the osmotic pressure of the soil solution rises above two bars.

**glycoside.** Any of a large class of natural or synthetic compounds such as anthocyanin that are acetal derivatives of sugars and that on hydrolysis yield one or more molecules of a sugar, often a noncarbohydrate.

**gold hull (gh).** The hulls show a golden yellow color at maturity.

**goodness of fit.** A measure of how well observed data conform to a specified, expected, or theoretical probability distribution.

**grade.** To separate milled grain according to size and quality--whole grain, broken grain, short grain, or long grain.

**grain (syn. rough rice, paddy, padi, caryopsis, seed).** 1). A fruit in which the pericarp is fused with the seed. 2). The ripened ovary and its associated structures such as the lemma, palea, rachilla, sterile lemmas, and the awn if present.

**grain characteristics.** The different character and dimensions of the rice grain, e.g. length and shape and cooking qualities.

**grain chemical quality.** The chemical analysis of the grain's content or nutritional value.

**grain dormancy.** Physiologically, the inactive growth phase of the grain.

**grain length.** The distance from the base of the sterile lemma to the tip or spiculus of the lemma or palea.

**grain milling quality.** Physical and chemical characteristics of the grain after milling.

**grain number.** The number of grains per panicle. This varies with the different varieties.

**grain shape.** The physical shape of the rice grain--round or slender, etc.

**grain size.** The dimensions and weight of the grain.

**grain smut.** A disease of the rice grain caused by *Ustilaginoidea virens*. The grain becomes yellow-greenish or greenish-black velvety spore balls. Also called false smut.

**grain translucency.** Refers to the ability of light to pass through the endosperm, after milling.

**grain weight.** The weight of the grain often recorded as grams per 1,000 grains.

**grain width.** The measurement of the grain across the broadest section.

**grain yield.** Weight of harvested grain expressed as tons/ha with a moisture content of 14%.

**grain-straw ratio.** Ratio of grain weight to the remaining aboveground dry weight or straw weight at harvest.

**gramineous.** Belonging to the grass family.

**granular.** Small grains or pellets. An aggregate similar in size to a crumb but more dense.

**granules.** Chemical formulations in small pellets, formed from various inert clays or sand impregnated with pesticide or fertilizer.

**grasses.** Plants of the family Gramineae (Poaceae) which range from small, twisted, erect, or creeping annuals to perennials. Stems are called culms with well-defined nodes and internodes. Leaves arise alternately in two rows from the nodes. The leaf is composed of two parts, the leaf sheath which clasps the stem, the margins overlapping to form the tube, and the leaf blade which is usually thin, narrow, and linear with parallel venation; a large member among the monocotyledonous plants (monocots).

**grassy stunt.** A viral disease caused by rice grassy stunt virus (RGSV). The disease is transmitted by the brown planthopper *Nilaparvata lugens*. Grassy stunt is widely distributed in South and Southeast Asia and is characterized by pronounced stunting, proliferation of tillers, and short and narrow pale green to yellow leaves.

**gravid.** An insect containing fertilized eggs.

**green leafhopper.** A rice pest, *Nephotettix spp.*, prevalent in Asia that can cause hopperburn and also pronounced yellowing and stunting, by transmitting the yellow dwarf virus and tungro diseases in rice.

**green manure.** Plant material incorporated into the soil while green or soon after maturity to improve the soil.

**green revolution.** A term used to describe the success in increased crop production throughout Asia, commencing in the 1960s as a result of high-yielding rice varieties developed by IRRI and wheat varieties by CIMMYT.

**greenhouse.** A large construction, usually made from glass, where plants are grown under controlled environmental conditions.

**greenhouse effect.** The process whereby short-wave radiation passes readily through the earth's atmosphere to surface areas, whereas the longer-wave outgoing radiation is absorbed and reradiated by water vapor, droplets and carbon dioxide, thus retaining heat in the atmosphere.

**greenhouse screening.** The process of evaluating varieties for resistance in the greenhouse, in contrast to field and greenhouse screening.

**ground fire,** A fire that consumes all organic material and burns into the underlying

soil itself, as, for example, a peat fire in the marshlands. This applies to some deepwater rice areas of South Vietnam.

**ground hog.** An animal in West Africa that causes serious damage to rice crops by chewing the stems.

**groundwater.** That portion of the water below the surface of the ground whose pressure is greater than atmospheric pressure.

**groundwater run-off.** Water from a catchment area that moves freely under the influence of gravity and enters the soil.

**growing point.** Mass of meristematic tissue at the stem or root tip where growth in length of the stem or root occurs.

**growing season.** The period of a year when the environment enables farmers to produce a crop of economic value.

**growth.** 1). The change in the size of a plant, resulting in increased volume, increased dry weight, and protein content. 2). The increased population or colony of a culture of microorganisms.

**growth analysis.** A method of taking samples at defined intervals and determining the development patterns.

**growth curve.** A graph which plots the plant's weight, height, and leaf area against time and age.

**growth duration.** Length of time the crop takes to mature (seeding to harvest).

**growth habit.** The usual sequences of the vegetative and reproductive phases of the plant.

**growth inhibitors.** Suppressants of plant growth such as hormones or chemicals that inhibit the plant's ability to grow or develop.

**growth regulators.** Chemicals that are used to control the plant's growth.

**growth retardants.** Chemicals that delay or slow down growth.

**growth stages.** The defined periods or cycles of the plant's growth, such as the seedling, tillering, and reproductive stages.

**growth stimulators.** Chemicals or hormones that are used to accelerate or promote the rate of growth in plants.

**guard cell.** One of two crescent-shaped epidermal cells united at the ends whose changes in turgidity determine the opening and closing of the stomata.

## H Terms

**habit.** The characteristics of growth and general appearance of a plant.

**habitat.** The physical location or type of environment in which a plant or an organism is found.

**hair.** A uni- or multi-cellular epidermal outgrowth.

**half sibs.** Individuals derived from crosses in which one of the two parents is common.

**handpicking.** Removing by hand.

**hand tractor.** Walk-behind, two-wheel tractor commonly used for land preparation in wetland rice. Also called power tiller.

**hand weeding.** A practical and efficient method used to manually remove weeds within rows and hills; used in areas where a cultivating implement cannot be used.

**haploid (n).** A cell or an organism with the gametic (n) chromosome number.

**haploid plant.** Plant regenerated from anther or microspore culture with half the number of chromosomes of the diploid (symbol : n).

**hard dough stage.** Stage when the rice grain is almost fully ripe.

**hardpan.** A physically compacted soil layer restricting root growth and water movement through it.

**hardy.** A plant that can withstand and grow under severe adverse climatic conditions.

**harrow.** A cultivating implement usually with spikes or teeth used for secondary tillage to pulverize and smoothen the soil, mulching, covering, or removing weeds-- e.g., comb-tooth or spike-tooth harrow and wooden plank.

**harrowing.** A secondary tillage operation which pulverizes, smoothen and firms the soil in seedbed preparation. It controls weeds or incorporates material spread on the surface into the soil.

**harvest index (HI).** The ratio of grain weight to total aboveground plant dry weight.

**harvest.** To cut and collect by hand or machine the grain or product of the plant.

**harvester.** A person or machine that cuts and collects the product of a plant.

**harvesting.** The process of gathering in a crop; in the case of rice, the gathering in of mature rice panicles from the field.

**hatch.** In the nymph or larva of insects, to come out of the egg after the embryo has completed development.

**hastate.** Arrowhead-shaped.

**head.** 1). A dense cluster of sessile or nearly sessile flowers. 2). The inflorescence or panicles of cereals such as rice and sorghum.

**head rice.** The whole grains of milled rice that can be obtained from a given quantity of clean rough rice (paddy). It is usually expressed as a percentage of rough rice. Broken rice larger than 3/4 of a grain is also considered as head rice. Head rice may vary from as low as 25% to as high as 65%.

**head-to-row.** A process of growing seeds of individual plants to determine or maintain seed purity of a variety.

**heading** . Growth stage of the rice plant marked by emergence of the panicle from the boot.

**headland pattern**. A plowing technique that makes a dead or back furrow plowing pattern. This technique is used in many plowing operations but especially in large operations using large tillage equipment.

**healthy tiller**. A tiller that is free of pest damage.

**heat treatment**. High temperature conditions used to sterilize seeds or to break dormancy.

**heavy metals**. Those metals which have densities greater than five.

**heavy soil**. A soil with a high clay content.

**hectare**. A measurement of land area in the metric system equivalent to 10,000 m<sup>2</sup>.

**hemimetabolic**. Having incomplete metamorphosis especially in insects with aquatic larvae in which the young does not resemble the old.

**herbaceous**. Non-woody plants.

**herbicide**. A chemical used for killing or inhibiting the growth of certain plants or weeds.

**heredity**. The genetic transmission of characteristics from parents to their offspring.

**heritability**. In the broad sense, the proportion of the total phenotypic variance which is inherited, the remainder being due to environmental effects. In the narrow sense, the proportion of variance due to additive effects of genes.

**heritable**. The characteristics of parents transmitted to their progeny.

**hermaphrodite**. Flower which possesses both male and female organs; bisexual.

**heterobeltiosis**. Refers to the phenomenon in which the F<sub>1</sub> hybrid obtained by crossing two genetically dissimilar parents shows superiority over the better parent in one or a combination of characters.

**heterocaryopsis**. The condition in which there are two or more genetically different nuclei in a single cell of a fungal mycelium.

**heterochromatin**. Portion of genomic DNA which is highly stained because of high condensation. The heterochromatin is transcriptionally inactive and often contains large amounts of highly repeated DNA (satellite DNA).

**heterocyst**. A thick-walled, usually translucent cell of some blue-green algae known to be the site of nitrogen fixation.

**heterogeneous**. Having different genotypes in a population.

**heterologous gene transfer**. Type of alien gene transfer where there is a transfer of traits from species possessing different genome(s).

**heterosis (standard)**. Refers to the phenomenon in which the F<sub>1</sub> hybrid obtained by the crossing of two genetically dissimilar parents shows superiority over the best standard check prevailing at that time in one or a combination of characters.

**heterosis breeding**. A method of breeding to develop F<sub>1</sub> hybrids which exploit the phenomenon of hybrid vigor to increase yield potential and yield stability.

**heterotrophic**. Obtaining nourishment from outside sources, specifically requiring complex organic compounds of nitrogen and carbon for metabolic synthesis.

**heterotrophic nitrification**. Biochemical oxidation of reduced forms of nitrogen to nitrate by heterotrophic microorganisms.

**heterozygote.** An individual having different alleles for any gene pair and producing two kinds of gametes.

**heterozygous.** Hybrid for any gene pair, with different alleles for the gene being considered, usually one dominant or recessive.

**hexaploid.** A plant that has six sets of chromosomes.

**HI.** harvest index; the ratio between the economic yield (grain) and the total dry matter produced.

**hibernation.** The inactive or dormant state of insects during winter.

**high density grain.** Grains having specific gravity greater than 1.20. The specific gravity of a grain indicates the degree to which the cavity of the hull is filled and the density of carbohydrate deposition in the grain. Hence, high density grains are filled to their potential size and weight.

**high-yielding varieties (HYVs).** Rice varieties developed through a breeding program that possess desirable agronomic characteristics, resistance to insects and diseases, and tolerance for environmental stresses like soil problems, temperature, and drought; nearly all HYVs are short-statured or semidwarf.

**hill.** A group of rice plants directly adjacent to each other because the seeds or seedlings were planted together. A hill may also consist of only one plant.

**hill rice.** Rice grown in the uplands on the steep slopes of hills usually with high rainfall.

**hilum.** The scar at the point of attachment of the seed of the plant.

**hirsute.** With rough or coarse hairs.

**hispa.** Common name for insects of the species *Dicladispa (Hispa) armigera*.

**histosol.** Soils that have organic materials in more than half of the upper 80 cm.

**hitch.** An attachment on a tractor or machinery used for connecting it to another piece of machinery or equipment.

**hoeing.** A technique used with a hoe to loosen the soil, to remove weeds between the rows of rice or other plants.

**hoja blanca.** A viral disease caused by rice hoja blanca virus transmitted by the planthopper *Sogatodes oryzicola* and the leafhopper *Hortensia similis*. The disease is known to occur only in the Western Hemisphere and common only in Central and South America, and the Caribbean. The disease is characterized by stunting; leaves may have yellowish stripes or are mottled; the panicle may be incompletely exerted, and flowers are sterile or absent.

**homogeneous.** Uniform in appearance and similar in genetic composition due to descent from a common ancestor.

**homologous.** Pertaining to DNA molecules that have identical or nearly identical base sequences.

**homologous chromosomes.** A pair of essentially identical chromosomes.

**homologous gene transfer.** Type of alien gene transfer where there is a transfer of traits from species having the same genome.

**homozygosis.** The union of gametes identical for one or more pairs of genes.

**homozygote.** A zygote derived from the union of genetically identical gametes. An individual with both alleles alike for any given gene; these are therefore pure for any given trait.



**homozygous.** Having one type of allele in both chromosomes for a given gene or genes. Having the same members of the allelic gene pair, either dominant or recessive on both chromosomes, and producing only one kind of gamete.

**honeydew.** A sugary liquid excretion of plant-sucking hoppers which consists of a mixture of undigested plant material and excretory products.

**hopperburn.** The complete drying up of rice plants caused by the extensive feeding by large number of planthoppers which suck plant sap (e.g., brown planthoppers *Nilaparvata lugens*).

**horizontal resistance.** Resistance governed by many genes of minor effects which provide resistance (usually moderate) to any (or all) diseases or insect biotype of a given species, but can be easily affected by the environment (e.g., a variety may be susceptible in the greenhouse but may be resistant in the field or vice versa). A type of resistance expressed equally against all biotypes of a pest species. It does not involve a gene-for-gene relationship.

**hormone.** Regulatory substance that controls metabolism and development, acts at low concentrations (e.g., less than one ppm, micromolar) and at a distance from its site of synthesis.

**host.** The organism on which a parasite lives or the plant on which a pest feeds.

**host evasion.** A type of pseudoresistance where the plant evades insect injury by passing through the susceptible stage quickly or when insect numbers are low. An example is an early-maturing variety which is harvested before the insects reach damaging levels.

**host plant.** A plant that provides nourishment and protection to a parasitic organism, living plant, or animal.

**host plant resistance.** The relative genetic ability of a cultivar to produce a larger or higher quality crop compared with other cultivars exposed to the same infestation level.

**host range.** The various kinds of plants that may be attacked by a pathogen or insect.

**host resistance.** A plant that is resistant to or tolerant of attacks of parasites or pathogens by evolving morphological or physiological modifications.

**hot air emasculation.** The use of hot air to open and force the floret to remove or kill the anther.

**hot spot.** Site where the natural field infestation of a particular insect or disease is high, providing sufficient pressure for reliable results in varietal resistance tests.

**hot start.** PCR modification with the reaction tube kept at 95 °C prior to addition of primer and polymerase.

**hot water emasculation.** The use of hot water to open and force the floret to remove the anther. Emerging the panicle in hot water to kill the pollen grains.

**hot water treatment.** A water treatment at high temperature applied to seed samples to make them aseptic, used particularly for international shipments.

**household.** Composed of the farmer and his family. Considered both the production and consumption unit of the social organization. The household can be managed by one person or operated collectively, as family members live, sleep, eat, share the same place, and divide household duties and general farm management and work.

**hull.** The outermost covering of the rice grain which provides protection to the rice caryopsis composed of lemma and palea. It ranges from 17 to 24% of the rough rice

content.

**hull colors (Hm, Hi, Hg, Hf).** Non-anthocyanin colors which appear on the lemma and palea only when the straw hull gene, Gh, is present.

**hull spot (hsp).** Small tissue areas on the lemma and palea which are thin and transparent and appear discolored.

**hulling.** The removal of the husks or hulls from the rice grain; converting rough rice or paddy into milled rice.

**humidity.** Dampness, the amount of water or water vapor in the air.

**husk.** Synonymous with hull.

**hybrid.** The product of a cross between genetically dissimilar parents.

**hyaline.** Translucent or transparent.

**hybrid rice.** The FI seed used as commercial variety.

**hybrid variety.** 1). A variety of rice developed from crossing and selection to gain higher yields. 2). FI offspring of two genetically dissimilar parents.

**hybrid vigor.** The increase in vigor of hybrids over their parental inbred types; also known as heterosis.

**hybridization.** A breeding method in which two varieties are crossed to generate new variability and to produce desired recombinants. The hybrids are allowed to self-pollinate and the segregating populations are handled by an appropriate method.

**hybridization block.** A specific piece of land set aside for research in making specific crosses in breeding particular varieties of rice.

**hydathode.** Water-excreting gland or pore occurring on the edges or tips of the leaves of many plants.

**hydration.** The process where a compound combines with water in a definite ratio.

**hydrograph.** A flooding pattern shown as a continuous curve of water depth based on daily depth values.

**hydrophilic.** Water-loving.

**hydro tiller.** Engine-powered, rotary, walk-behind tiller or puddler of the floating type.

**hydrogen ion concentration.** (1) A measure of acidity/alkalinity of a solution. (2) Mathematically is equal to the negative logarithm of the molar concentration of hydrogen ion; measurement of acidity/alkalinity of a solution; pH less than 7 = acidic; above 7 = basic.

**hydrology.** The science dealing with the distribution and movement of water.

**hydrolysis.** Decomposition or alteration of a chemical substance by water.

**hydromorphic.** 1). Pertaining to a soil showing characteristics associated with permanent or periodic excess water, e.g. gley phenomena. 2. Derived from hydro (water) and morph (form). Descriptive of soil developed in the presence of permanent or periodic excess of moisture.

**hydromorphic rice.** Rice that is grown where the water table is very close to the surface.

**hydroponics.** The growing of plants in nutrient solutions with or without an inert medium to provide mechanical support.

**hygroscopicity.** The ability to readily take up and retain moisture.

**hypersensitivity.** Extreme sensitivity.

**hypertrophy.** An abnormal increase in size of cells.

**hypha.** One of the individual threads that make up the mycelium of a fungus; hyphae increase by lateral branching.

**hypocotyl.** The part of the stem of a seedling or embryo below the cotyledons.

**hypodermis.** The tissue immediately beneath the epidermis of a plant especially when lignified, suberized, or otherwise modified to serve as a supporting and protecting layer.

**hypostatic.** In a gene, one that is suppressed by a nonallelic dominant gene.

**hypothesis.** An assumption, supposition, or postulate drawn before all the facts have been discovered or investigated and adopted for the time being as a guide for further investigation. Something not yet proven or assumed to be true for the sake of testing its soundness or in order to bring out new evidence.

## I Terms

**I1, I2, I3**, etc. Symbol used to designate the first, second, third inbred generations, etc.

**ideotype**. An ideal plant type used as a model for selective breeding to develop specific plant characteristics desired or required in particular ecosystems.

**illite**. A 2:1 layered clay in which a negative charge caused by ion substitution is neutralized by potassium ions.

**imbibition**. The process of absorbing or taking in water as in drinking.

**immature grains**. Grains with still greenish caryopsis or brown rice.

**immobilization**. The conversion of an element from inorganic form to organic form in microbial tissues so that the element is not readily available to plants.

**immune**. Completely resistant to pest or disease of the plant.

**imperfect flower**. Lacking a pistil or stamen.

**impervious**. Incapable of being penetrated. Resistant to penetration by fluids or by roots.

**import permit**. A document allowing a person to order and receive a thing from another country. Used in seed exchange.

**improved cultivar**. A rice variety that has been bred to increase production.

**improved plant type**. Specific morphological and physiological features of the rice plant that make it more efficient and higher yielding.

**in situ**. Latin: meaning, in the natural or original location.

**in situ hybridization**. A technique used for hybridization of cytological (chromosome) preparations with the labeled DNA probes. The method couples molecular biology, biochemistry, and cytology. Usually the expression of a gene (as RNA) or the location of target DNA (for example, in a chromosome) is detected by a molecular probe. The probe can be labeled by a variety of biochemical methods.

**in vitro**. Latin: meaning, outside the living cell. In a test tube or other artificial medium. Denotes the growth of explants in glass or other artificial environment.

**in vitro selection**. Selection for phenotypes (traits) expressed at the cellular or callus level which usually possess genetic changes that control the trait.

**in vivo**. Latin: meaning, in real life; in the living cell.

**inbred**. An individual resulting from the mating of closely related parents or selfing.

**inbred line**. A nearly homozygous breeding line produced by continued self-fertilization.

**inbreeding**. The interbreeding of closely related individuals occurring naturally (as in a closed population), or as a deliberately chosen system of breeding and serving especially to preserve and fix desirable characters of and to eliminate unfavorable characters from a suitably selected stock but tending to effect an unwanted decline (as in size, vigor, or fertility) through the fixation of undesirable and often recessive characters when the initial stock is any way defective.

**inbreeding depression**. Continuous breeding of genetically related individuals resulting in decrease in reproductive capacity.

**incompatible**. A plant that is unable to set seed or units when selfed, crossed, or

grafted because of structural, physiological, or ontogenic reasons.

**incomplete dominance.** Two different alleles (e.g., dominant and recessive gene) producing an intermediate effect compared with effect of the dominant alleles.

**incomplete fertilizer.** A classification of fertilizers that contains only 1 or 2 of the major fertilizer elements N, P, and K.

**incomplete tillage.** The result of omitting one or more of the elements of a complete tillage system.

**incorporate.** To mix foreign materials, such as pesticides, fertilizers, or plant residues into the soil.

**incubate.** To provide (for seeds, embryos of animals, or bacteria) prescribed and usually controlled conditions (as temperature and moisture) favorable for development or hatching.

**incubation period.** Time after inoculation required for the symptoms of a disease to appear.

**indehiscent.** 1. Does not split open when ripe. 2. Does not open at maturity to discharge seeds.

**independent assortment.** Random assortment in which segregation for one type has no effect on any other alleles. Meiotic behavior of genes located on nonhomologous chromosomes.

**independent variable.** Variable that is not affected or influenced by other variables or factors.

**indeterminate.** When no flower bud growth ends the axis of the flower cluster on the inflorescence.

**indica rice.** One of the two major ecogeographical races of *Oryza sativa* (see also japonica). The major type of rice grown in the tropics and subtropics. It has broad to narrow, light green leaves and tall to intermediate plant stature (except for the semidwarf). Indica plants tiller profusely. Grains are long to short, slender, somewhat flat, and awnless. Indica grains shatter easily and have 23-31% amylose content. They grow mostly in the Philippines, India, Pakistan, Java, Sri Lanka, Indonesia, central and southern China, African countries, and other tropical regions.

**indicator plants.** Plants showing particular characteristics in response to specific soil or site conditions.

**indigenous.** Native to a particular area.

**induced resistance.** A type of pseudoresistance in which a plant temporarily acquires increased resistance from some conditions of plant or environment, such as change in soil fertility.

**infest.** To attack externally, e.g. by insect pests; attack on a part of a plant such as grain of rice. Also to contain the parasite.

**inedible.** Unpleasant, bad tasting, not possible to eat.

**ineffective tillers.** Tillers that do not bear panicles.

**inert ingredient.** Any ingredient in a formulation which has no pesticidal activity.

**infect.** To introduce or contaminate the plant with a pathogen or disease-producing substance. To invade and establish a parasitic relationship with the host plant.

**infection.** A stage in a disease cycle when the pathogen penetrates and establishes a parasitic relationship with the host.

**infective insect.** An insect that actually transmits a viral disease.

**infestation.** The presence of insects on a plant or on grain.

**infiltration.** The downward entry of water into the soil.

**inflationary.** Of, relating to, tending to cause inflation. Substantial and continuing rise in the general price level of commodities.

**inflorescence.** The flowering part of a plant including the bracts, flower stalks, and flowers.

**influence.** To modify the growth and development of a plant in any way by natural selection or research.

**inherit.** To receive a specific set of genes from the parents with particular traits; to transfer characteristics from parent to offspring.

**inheritance.** The process of genetic transmission of characters or characteristics.

**inhibitory gene.** A gene that inhibits the expression of other genes either in dominant or recessive form.

**initial evaluation period.** The first trial conducted in a program of testing to identify varieties or lines that could be retained for future trials.

**inland valley swamps.** Small to moderate sized valley bottoms in rainforest not associated with streams, which flood perennially or intermittently with stagnant water.

**inoculate.** To introduce microorganisms into another organism or medium.

**inoculation.** The introduction of an explant (any plant part) into a suitable medium for callus formation and ultimately plant production.

**inoculum.** Material (as spores, bacteria, or contaminated fluids) used in or suitable for use in inoculating or inoculation, e.g., portion of a pathogen (spores, mycelium, hypha in the case of fungi) or insect (eggs, young larvae) capable of being disseminated and causing infection/infestation.

**inorganic.** Of mineral origin.

**inorganic fertilizer.** Fertilizer materials derived from minerals, atmospheric gases, water, and inert materials. Can be natural or synthetic products of chemical reactions.

**input.** Money or other cost of production. Products added to the soil to improve plant production. Data into a computer. Personal contribution.

**insect.** Members of the phylum Arthropoda ("jointed legs"); they have six legs, three distinct body regions (head, thorax, and abdomen), one pair of antennae, and usually wings.

**insecticide.** A chemical used for killing insects.

**instar.** The stage of an insect between successive molts, the first instar being the stage between hatching and the first molt.

**integrated pest management (IPM).** A strategy that utilizes various tactics or control methods (cultural, biological, and chemical) in a harmonious way in which control actions are based on frequent monitoring of the pest. IPM depends on multidisciplinary ecological strategies to weigh the effect of each tactic, as part of the agroecosystem, in producing the least disturbance and yield loss in the long run.

**integument.** Something that covers or encloses, e.g., skin, husk, rind, outer layer of an insect.

**interaction.** The differential response of two or more factors which is more than can be attributed to chance.

**interallelic.** Between two different alleles of a gene, e.g. interallelic action is one which is influenced by two different alleles.

**interbreeding.** The use of plants capable of gene exchange by hybridization.

**intercropping.** Growing two or more crops simultaneously in alternating rows or sets of rows in the same plot (See also Mixed intercropping)

**interflow.** Shallow and often ephemeral and perched groundwater moving laterally.

**internode.** The portion of a stem between two nodes.

**interfluve.** An area of higher ground between two rivers flowing into the same drainage system.

**intermediate.** 1). The characters or traits of the plant between two different levels. 2). A substance which is in a metabolic pathway between two other substances.

**intermittent irrigation.** A method of applying irrigation water by which the field is alternately watered and drained. The soil surface is allowed to dry prior to the next application of water.

**internode.** The portion of the stem between two nodes. Smooth and solid (when young) or hollow; (when mature) part of the culm.

**interspecific cross.** A cross between two different species of a genus.

**introduction.** Cultivar of rice taken from one place to another.

**introgression.** Incorporation of genes of one species into the gene pool of another species by hybridization and backcrossing.

**intron.** Intervening sequence in genes. Transcribed but not translated.

**inundate.** To be completely submerged, e.g.. by floodwater.

**inundation.** The time of onset or arrival of the floods.

**invasion.** When an infectious agent attacks the host plant causing a disease.

**inversion.** A rearrangement of a chromosome segment so that its genes are in reversed linear order. Reverse order, e.g. warm air near the ground, cool air above.

**involucre.** A ring of bracts subtending a flower head.

**iron toxicity.** Disorder that occurs when the iron concentration in the soil solution is high. The symptoms of iron toxicity are many tiny brown spots on the green leaves which start from the tips and develop into a general browning of the leaf blades followed by the death of lower leaves.

**irradiance.** Radiant flux density on a given surface usually expressed in watts per square centimeter or square meter.

**irradiation (genetics and plant breeding).** Exposure of plants or plant parts to radiation to increase mutation rates.

**irrigated rice.** Rice which is supplementary or fully supported with water supplied by artificial means.

**irrigated riceland.** Rice areas that have assured irrigation for one or more crops per year. Some areas are served only by supplemental irrigation in the wet season.

**irrigation.** The artificial supply of water to areas by ditches, pipes, etc. by pumping or gravitation to the soil for the purpose of growing crops.

**irrigation efficiency.** The ratio of the water actually consumed by crops on an

irrigated area to the amount of water diverted from the source onto the area.

**irrigation methods.** The manner in which water is controlled and applied to an area.

**isogenic.** Having the same genic constitution.

**isogenic lines.** Lines (families) which differ by one gene only.

**isolate.** 1). A single spore or culture and the subculture derived from it. Also used to indicate collections of a pathogen made at different times and/or space. 2). To remove or separate an individual sample from a given sample population.

**isolation (barrier).** 1). The growing into pure culture in artificial/synthetic medium of pathogenic microorganisms. 2). The separation of one group of plants from another so that fertilization between or among groups is prevented. Separation between two hybrid seed production plots can be provided by topographic surface features or artificial/natural barriers, to the height of at least 2.5 m., in the case of rice.

**isolation (time)** The separation can also be provided by growing two groups at different times of the crop season so that one group is already mature (stopped providing pollen) when the other group comes to flowering. Generally a 21-day difference in flowering is sufficient in the case of rice.

**isoplasmic.** CMS or restorer lines differing in nuclear genetic constitution but having a common cytoplasm.

**isozyme.** Also called allozyme. An enzyme which exists in multiple electrophoretic forms either because of allelic variation within one polypeptide or multimeric associations of variant forms. Similar or identical catalytic activities occur within the same organism.

**ITCZ** . intertropical convergence zone, or ITD, intertropical discontinuity; a broad trough of low pressure at the confluence of the trade winds which moves north and south roughly parallel to the equator with the seasonal change in the winds.

**itinerary of techniques.** The logical and well-ordered combination of techniques applied to a crop by the farmer to achieve a given production objective in a given environment.



## J Terms

**japonica rice.** One of the two major ecogeographical races of *O. sativa* (see also *indica*). A group of rice varieties from northern and eastern China grown extensively in some areas of the world. It has narrow, dark green leaves, medium-height tillers and short to intermediate plant stature. It is found in the cooler zones of the subtropics and in the temperate zones. Grains are short, roundish, spikelets awnless to long-awned, panicles low-shattering, and have 0-20% amylose content.

**jarosite.** An ochre-yellow or brown mineral consisting of basic sulfate of potassium and iron and occurring in minute rhombohedral crystals or in masses. Found in acid sulfate soils.

**javanica rice.** Designation for the bulu and gundil varieties of Indonesia and many upland rices. They belong to the japonica race of *O. sativa*. Rice varieties with broad, stiff, light green leaves. It is low-tillering and has a tall plant stature. Grains are long, broad, and thick, awned or awnless. Javanica grains are low-shattering and have 0-25% amylose content.

**jointed.** Constricted at intervals.

**juvenile stage.** The immature or young growth period.

## K Terms

**kairomone.** The kind of allelochemicals that gives an adaptive advantage to the insect.

**karyotype.** The image of the entire chromosome set of an organism.

**keel.** The middle nerve of the lemma. The two lower united petals of a legume flower.

**keeled.** 1). With a ridge along the middle; with a ridge like the bottom of a boat.

**kernel.** The grain or seed of cereal or grass enclosed in a hard husk.

**kernel moisture.** The moisture of the dehusked grain.

**kernel smut.** A fungal disease that affects the kernels of rice and caused by *Tilletia barclayana*.

**kilobase or kilo base pairs .** A unit of size of DNA which is equal to either 1000 bases in a single-stranded nucleic acid (kb) or 1000 base pairs in a double-stranded nucleic acid (kbp).

**kilogram.** A metric measurement of weight equal to 1000 grams or the mass of one liter of water at 4 °C.

**kneeing.** The ability of the upper stem of deepwater or floating rice plants to bend upward after water has receded.

**kresek.** The Indonesian term for the systemic phase of the disease called bacterial blight at the seedling stage.

## L Terms

**label.** Attachment used for identification purposes in field trials. Can also refer to incorporated radioactive marker.

**labile.** A substance that readily undergoes transformation or is readily available to plants.

**labile genes.** Genes that are always mutating.

**labor market.** The availability of people for work, e.g. in the ricefields.

**lag phase.** First stage of the sigmoidal growth curve where growth declines within a brief span of time.

**lag phase (vegetative).** That portion of the vegetative phase affected by the photoperiod to which the plant is exposed. The period from end of basic vegetative phase to panicle initiation; also called photoperiod-sensitive phase.

**LAI.** leaf area index; the sum of leaf area of all leaves divided by the ground area covered by the leaves.

**lamina.** The leaf blade.

**lanceolate.** 1). Lance-shaped, several times longer than wide; widest towards the base and tapering at both ends. 2). Lance shaped, much longer than broad, widening above the base, and tapering to the apex.

**landform.** The morphology and specific character of the land surface resulting from the interaction of physical processes and the earth's crustal movements with the geology of the surface layers.

**land equivalent ratio (LER).** The area needed under sole cropping to produce the same amount as 1 ha of intercropping or mixed cropping.

**land preparation.** The process of preparing the soil for planting, to provide a soil environment favorable for plant germination and/or growth.

**land race.** A traditional variety of rice endemic to a given location.

**landscape.** The overall surface form of an area including both natural and man-made features; it includes various landforms among its properties.

**land utilization index (LUI).** The number of days during which crops occupy the land during a year, divided by 365.

**land water requirement.** The net seepage and percolation requirement of the soil.

**landholdings.** Land owned or occupied or used by farmers or tenant farmers.

**larva.** The immature, wingless, and often vermiform (wormlike) feeding form that hatches from the egg of many insects, alters chiefly in size while passing through several molts, and is finally transformed into a pupa or chrysalis from which the adult emerges.

**laser leveling.** Land leveling technique wherein the leveling device, normally tractor-drawn, is controlled by a laser beam set at a certain bench mark or level.

**latent infection.** The state in which a host is infected with a pathogen but does not show any symptoms.

**latent period.** 1). In epidemiology, latent period refers to the time elapsed from arrival of a dispersal unit at a susceptible plant surface until the formation of the next generation of dispersal units. 2). Incubation period of a virus in an insect. The time between acquisition of the virus and the time when it becomes infective.

**latent.** Something, e.g., a gene or disease that is present in a plant but is unexpressed.

**lateral.** On the side.

**latin square design.** Experimental design used when there are two sources of variation among experimental units, as in the presence of a bidirectional fertility gradient in field experiments.

**lattice designs.** Incomplete block designs used in single-factor experiments having a large number of treatments.

**lattice energy.** The energy required to separate the ions of a crystal to an infinite distance from each other.

**lax panicle.** A panicle that is loose or open with a few lateral branches and sparsely distributed spikelets.

**layout.** Plan showing the allocation of treatments among experimental units. A detailed plan showing the arrangement of replications and treatments in an experiment.

**lazy (la).** Plants grow prostrate rather than upright because of an ageotropic growth habit. In rice literature, some extreme spreading forms have been mis-termed lazy.

**LD50 (lethal dosage).** The dose that is lethal to 50% of the test animals or micro organisms in a given time period. It is usually expressed in milligrams of insecticides per kilogram of body weight in mammals, and micrograms of insecticides per gram of body weight in insects. The lower the LD value, the higher the toxicity.

**leaching.** The removal or loss of nutrient elements in soil solution due to the downward movement of water.

**leaf.** An outgrowth from the stem of a vascular plant, usually green. It consists of a leaf-base, petiole and flattened lamina, which is usually conspicuously veined.

**leaf angle.** The angle of the leaf blade from the stem. The descriptive terms often used are erect (angle of 0-30°), intermediate (31-60°), horizontal (61-90°), and descending (more than 90°). The angle of the flag leaf on the rice plant is important in photosynthesis.

**leaf area index.** The sum of the leaf area of all green leaves divided by the ground area above which the leaves were growing.

**leaf blade.** The thin, elongated, flat portion of the leaf.

**leaf blast.** A rice disease caused by the fungus *Pyricularia oryzae*. Symptoms consist of elliptical spots with pointed ends, with gray or whitish center, and with brown or reddish brown margin.

**leaf curling or rolling.** Rolling of the leaves to control water loss affected by lack of atmospheric or soil moisture. Also the bending or twisting of the leaves due to viral disease (as in rice ragged stunt) or to other harmful agents.

**leaf mesophyll cells.** Cells within a leaf that produce carbohydrates in photosynthesis.

**leaf scald.** A rice disease caused by the fungus *Gerlachia oryzae* with symptoms consisting of zonate lesions starting from leaf tips or edges; the symptoms are usually observed in mature leaves.

**leaf scraping.** The removal of the epidermal portion of a leaf by the feeding of an insect.

**leaf senescence.** Change in color from green to yellow or brown due to a reduction

of metabolic activities in the plant preceding the death of the plant. Natural drying of the leaves due to crop maturity.

**leaf sheath.** The lower part of the leaf enclosing the stem, originating from a node and wrapping around the culm above the node.

**leaf veins.** The vascular bundles of the leaf. In monocotyledonous plants such as rice, leaf veins are seen as longitudinal ridges.

**leaf folder.** The insect *Cnaphalocrocis medinalis* which causes damage by making a leafy tube and feeds within the tube consuming the leaf tissues except the epidermis.

**leafhopper.** Insect of the order Homoptera, family Cicadellidae, which feeds by sucking sap from leaf veins of the rice plant. They have more slender bodies and move more quickly than planthoppers.

**leaflet.** A segment of a compound leaf.

**leghemoglobin.** An iron-containing, red pigment produced in root nodules during the symbiotic association between *Rhizobium* and leguminous plants.

**legume.** Plant belonging to the family Leguminosae. Most legumes form a symbiosis with nitrogen-fixing rhizobia bacteria in specialized nodule structures that fix nitrogen.

**lemma (syn. outer glume).** One of the two bracts enclosing the flower or spikelet of rice. It becomes the covering of two-thirds of the rice seed surface and has five vertical ridges, formed along the surface, from the vascular bundles.

**lepidoptera.** An order of insects with two pairs of scaly wings and spirally coiled haustellate (formed for sucking) mouth structure, which undergoes complete metamorphosis. The larva has a chewing type of mouth parts and is always pestiferous.

**lepidopterous.** Pertaining to the insects in the order Lepidoptera.

**lesion.** A localized spot of diseased tissue on a plant.

**lethal gene.** A gene whose effect is sufficiently drastic to kill the bearer of certain genotypes.

**levee** (also called bund or dike). An embankment of soil for retaining water inside the ricefield. A dike made of soil to retain water in rice fields.

**level.** A flat surface of a ricefield, a horizontal line, or an index of altitude.

**leveling.** Land preparation involving moving soil from high to low spots in the field to achieve a flat horizontal surface so that irrigation water will be evenly distributed throughout the field.

**library** (biotechnology). A collection of cloned DNA fragments.

**life cycle.** The stages in the growth and development of an organism that occur between the appearance of the individual and its reproduction or death.

**ligation.** Joining of DNA fragments to produce a single DNA molecule. Ligases are enzymes which perform this reaction. Fragments of plant DNA are ligated into bacterial plasmids during the cloning of probes for use for RFLP analysis.

**light soil.** A coarse-textured soil such as sandy soil.

**light transmission ratio.** Light intensity at the ground level of a population divided by the light intensity at the top of the population.

**light trap.** A device for collecting insects, consisting of a light source which attracts

insects at night and a mechanism that traps the insects.

**ligule.** A thin, upright, membranous appendage at the top of the leaf sheath. It is attached to the base on the inside of the leaf collar of the rice plant and some grasses.

**liguleless (lg).** Said of leaves that lack collar, ligule, and auricles; synonymous with juncturaless. The blade stands upright at base.

**lime.** A compound containing carbonates, oxides and/or hydroxides or calcium and/or magnesium used to neutralize soil acidity.

**line.** In plant breeding, plants originating from common parents or a common cross that is undergoing selection or improvement and which may become identified as a variety.

**linear.** Long and narrow with nearly parallel edges.

**linear regression.** A type of statistical analysis where a straight line or linear relationship characterizes the amount of change in a dependent variable which is associated with a unit change in the independent variable.

**line breeding.** A system of breeding in which a number of genotypes which have been progeny-tested with respect to some character or group of characters are composited to form a variety.

**line sowing.** To sow the seed in lines with a drill or by hand.

**linkage.** The association between two or more genes located on the same chromosome that tend to be inherited together.

**linkage group.** A set of genes that assort together and that assort independently of other genes.

**linkage map.** A scale representation of a chromosome that shows the relative positions of all its known genes or DNA sequences.

**lister planting.** A method of planting in which the seed is planted in the bottom of lister furrows, usually simultaneously with the opening of these furrows. A lister is a type of plow.

**listing (middlebreaking).** A tillage and land-forming operation using a tool which turns two furrows laterally in opposite directions, thereby producing beds or ridges.

**liter.** Unit of volume in the metric system equal to 1000 ml or 1000 cc.

**literature.** The body (accumulation) of written work produced by scholars or researchers in a given field.

**lithao.** A Philippine farm implement used for making small parallel furrows.

**lobed.** Partially divided into usually rounded or obtuse segments but not deeply enough to form separate entities.

**local check** or control. Farmer's variety or method. Used in experiments as a check in a specific place or community, in rice production.

**locule.** A cell.

**locus.** The position of a gene on a chromosome.

**lodge, lodging.** The falling down of rice plants in the field due to wind, rain, flooding, pest damage, or because the stems are too tall or too weak to stand erect during the grain-filling stage, usually causing yield loss.

**lodicules.** The two scalelike structures adjoining to the base of the palea which control the opening of the lemma and palea during anthesis.

**long glume (g).** The sterile lemmas ("outer glumes") exceed one-third the length of the lemma and palea. Another dominant gene, Gm, controls the sterile lemmas which are longer than the lemma and palea. The two sterile lemmas may have unequal length.

**long smut.** A common name for *Tolyposporium erhenbergii*.

**long-duration varieties.** Varieties that mature in 150 days or more.

**long-term conservation.** Long-term storage for maintenance of viability and purity of germplasm for up to 25 years for annual crops.

**long twisted kernel (tk).** A long caryopsis with a slight twist in the middle portion.

**loose.** 1). An uncompacted soil. 2). Spreading panicles.

**loose smut.** A fungal disease.

**loosen, loosening.** To break up, to not be compacted. Decreasing soil bulk density and increasing porosity due to the application of mechanical forces to the soil.

**lowland field.** A land area surrounded with dikes or levees to impound rain or irrigated water. An irrigated field surrounded by levees.

**lowland rice.** Rice grown on fields where water is held by bunds. About 30% of the world's rice is grown as rainfed lowland; about 45% as irrigated lowland. Some areas are flooded lowlands.

**lowland vs upland soils.** Terms commonly used in connection with rice culture to denote flooded (paddy) vs unflooded conditions.

**lutescent (lu).** Said of seedlings that are normally green at first, but in which the chlorophyll gradually disappears and the plant ultimately dies.

**luxury uptake.** The absorption by plants of nutrients in excess of their need for growth.

**lysine.** An essential amino acid in seed protein.

## M Terms

**M1, M2, M3.** First, second, and third generations following exposure to a mutagenic agent.

**MAAP (multiple arbitrary amplicon profiling).** A collective term used to describe the RAPD, AP-PCR, and DAF reactions.

**macronutrient.** A nutrient element absorbed by the plant in large amounts, often more than 0.1 % of its dry weight. The following are considered macroelements: carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur.

**macrophytes.** Large plants, as opposed to microphytes such as algae and fungi.

**maggot.** Larval stage of the order Diptera (fly).

**maintainer line.** A pollinator variety used to pollinate the male sterile line and produce progenies which still retain male sterility. If there is no maintainer line, the male sterile line cannot be maintained and multiplied generation after generation.

**maintenance application.** Application of fertilizer materials in amounts and at intervals to ensure a certain minimum level of an available nutrient.

**major gene.** A gene that determines major characteristics.

**major gene resistance.** Resistance in which genes show clear-cut and discrete segregation in the F<sub>2</sub> or later generations of crosses between resistant and susceptible parents. Effects are thus qualitative.

**major pests.** Unwanted organisms, such as insects, pathogens, weeds, small animals, etc. that compete with people for food and shelter, threaten their health, comfort, and welfare and cause serious problems.

**male flower.** A flower with functional stamens but no ovary.

**male parent.** The plant which is the source of pollen used in hybridization.

**male sterile.** A plant having no pollen grains or nonfunctional pollen grains and therefore is unable to fertilize the embryo.

**mangrove.** Tropical or subtropical vegetation (mainly trees) typical of tidal swamps.

**mangrove rice cultivation.** Use of the cleared mangrove forest land for rice production.

**mangrove swamps.** Low-lying coastal swamps where mangrove trees grow.

**manure.** Material used as fertilizer (e.g., organic material and excreta).

**map.** Diagrams showing physical features, roads, town, etc. The ordered arrangement of genes or molecular markers of an organism, indicating the position and distance between the markers and loci.

**marginal cost.** The increase in variable cost which occurs in changing from one production alternative to another; it is often measured relative to adding a marginal unit of input.

**marginal net benefit.** The increase in net benefit which can be obtained by changing from one production alternative to another; it is often measured relative to adding a marginal unit of input.

**marginate.** With a distinct margin.

**marker gene.** A gene with a clear-cut phenotype (and often a known location on a



chromosome) that is used as a point of reference when mapping or selecting another gene at a nearby locus.

**mass rearing.** Rearing large numbers of insects, which serve as test organisms in varietal resistance studies.

**mass screening.** Screening a large number of varieties in preliminary studies. Varieties selected as resistant in the mass screening trial are retested to confirm their resistance.

**mass selection.** A breeding method wherein a large number of plants having the desirable traits are harvested individually from a standing crop. The seeds from all selections are then bulked. From the bulk, a seed sample is taken and used to plant a population from which desirable plants are selected at maturity. The procedure is repeated for several cycles until the population becomes uniform and homogeneous. A variety developed by mass selection is fairly uniform and contains fewer genotypes than the original population.

**mature grain.** The stage when the rice grains in the panicle are yellow, fully developed, hard, and capable of sprouting.

**maximum cropping.** Cropping to attain the greatest possible production per unit area in a given time without regard for the cost involved.

**mean.** The average of a series of observations or measurements. The expected value of a statistical distribution.

**meander.** A loop-like bend in a river with a cliff or bluff on the outer curve and a gently shelving slope on the inner side of the bend. One of a series of approximately sinuous curves or windings in the course of a river or creek.

**mean square.** The sum of the squares divided by the corresponding degrees of freedom.

**mechanical weeding.** Removing weeds with the use of a mechanized interrow cultivator or other machines.

**mechanisms of resistance.** Processes involved in the resistance of a plant to an insect, including nonpreference, antibiosis, and tolerance.

**median.** The middle observation in a set of data such that half of the observations are larger and half smaller than it.

**medium.** Substrate used for culture of fungi, calli, etc.

**megabase.** Mb; one million basepairs of DNA.

**megasporangia.** The receptacle in which macrospores (female spores) are developed.

**meiocyte.** Any cell in which the nucleus divides by meiosis.

**meiosis.** Specialized cell division associated with gamete production. It consists of two divisions, one of which is reductional in terms of chromosome number and the other, equational. Meiosis produces genetically different gametes in a heterozygote having one-half of the genetic material of the original cell.

**membranous.** Thin, soft and pliable, often partly transparent.

**Mendel's laws.** 1). Law of independent segregation: Hereditary traits are determined by discrete factors (now known as genes) that appear in pairs, one of each pair being inherited from each parent. During meiosis, the pairs of factors are separated or segregated. Hence, each gamete that is produced by an offspring at maturity contains only one member of each pair that the offspring produces. 2). Law

of independent assortment: When two pairs of alleles are brought together in a hybrid combination, they will segregate independently from each other in the F<sub>2</sub> itself.

**Mendelian character.** The expressed character (defined) due to one or some pairs of genes that have a major effect which can be dominant, recessive or intermediate.

**meristem.** Cells at the growing tips of stems or roots that are dividing and are undifferentiated but later become different parts of the plant. Region of actively dividing cells in plants.

**mesh size.** The size of the openings in a sieve, expressed as the number of such openings per linear inch.

**mesocotyl.** The internode between the coleoptile node and the point of union of the culm and the root in the young seedling. The mesocotyl pushes the coleoptile above the soil surface.

**mesophyll tissues.** The soft tissue of a leaf between the top and bottom epidermis (outermost layer of cells or protective covering of a plant or plant part).

**messenger RNA (mRNA).** A chain of single-stranded ribonucleotides that codes for a specific protein. Product from DNA by transcription which serves as the information carrier for translation into proteins in the ribosomes..

**metabolism.** The physical, chemical or biochemical processes in living organisms for maintaining growth, development, and reproduction. A collective term for all chemical changes in living cells.

**metering device (seed).** The part of a seeder or planter that controls the amount (volume or number) of seeds to be deposited along the row or in a hill.

**methylation.** Enzymatic addition of methyl (CH<sub>3</sub>) group to DNA which causes inactivation of that region. Usually CpG nucleotide pairs are target for this addition.

**microbe.** Synonymous with microorganism. Very small living organism.

**microbiota.** Microflora and microfauna.

**microclimate.** The climatic condition of a small area, such as a ricefield, resulting from the modification of the general climatic conditions by local differences in elevation or exposure. Also the environmental conditions below the crop canopy.

**microelement, micronutrient.** A nutrient element needed by the plant in very small amounts. Considered as microelements are iron, manganese, boron, molybdenum, copper, zinc, and chlorine.

**microfauna.** Protozoa and smaller nematodes.

**microflora.** Bacteria, including actinomycetes; viruses, and fungi.

**microorganism.** A living entity which is visible only with the aid of a microscope.

**microplot.** Small plot 1-2 m<sup>2</sup> covered with a cage, used to simulate large field plot conditions.

**microsporangia.** The receptacle in which microspores (male spores) are developed.

**microspore.** In seed plants, it gives rise to the pollen grain, the male gametophyte.

**midrib.** The prominent ridge in the middle of the underside of the leaf blade. Central vein of the leaf.

**migration.** Moving from one country, place, or locality to another.

**milk grain stage.** Stage in the ripening phase of rice growth and development when the contents of the caryopsis (starch portion of the grain) is at first watery, but later

turns milky in consistency.

**Milled rice.** Rice from which the hull and bran have been removed.

**milling.** The process of separating the hull or husk and bran from the paddy or rough rice into milled rice and bran-and-chaff.

**milling yield / recovery.** The estimate of the quantity of head rice (whole rice or nearly whole kernels) and of total milled rice that can be produced from a unit of rough rice. It is generally expressed as a percentage.

**milling recovery rate.** Total milled rice yield as a percentage of rough rice yield.

**mineralization.** The conversion of an element from an organic form to an inorganic state as a result of microbial decomposition.

**minerals.** Solid particles other than organic matter which act as major components of soils and sources of nutrient elements.

**minikit trial.** An extremely small trial with a small number of varieties tested in farmers' fields.

**minimum tillage.** The least amount possible of cultivation or soil disturbance done to prepare a suitable seedbed. The main purposes of minimum tillage are to reduce tillage energy consumption, to conserve moisture, and to retain plant cover to minimize erosion.

**minor genes.** Genes which individually produce very little effect, but may produce marked effect in combination.

**mismatching.** Error during annealing of primer to template or probe to target, caused by low stringency.

**missing hill.** The place where transplanted seedlings were damaged, are non-existing, or died before maturing.

**mist chamber.** An enclosure containing a device that produces a fine mist of water on plants, facilitating the hatching of gall midge eggs and the movement of first-instar larvae.

**mite.** Small arachnid of the order Acarina.

**mitochondrion.** Organelle found in all eukaryotes. Site of respiration (ATP synthesis). Contains its own DNA.

**mitosis.** A process of somatic cell division which produces daughter nuclei which are identical genetically to one another and to the parent nucleus. They contain the same number of chromosomes. Mitosis produces genetically equivalent cells in the growing somatic region of organisms. It is a process by which the diploid stage of a cell is maintained, i.e., there is no reduction in chromosome number. The five main stages are prophase, prometaphase, metaphase, anaphase, and telophase.

**mixed cropping.** A cropping system that uses more than one type of crop, growing simultaneously, on the same piece of land at the same time.

**mixed farming.** Raising of crops, animals (livestock), and/or trees simultaneously in the same piece of land.

**mixed fertilizers.** Fertilizers containing two or more of the major fertilizer elements.

**mixed intercropping.** Simultaneously growing two or more crops intermingled in the same plot, with no distinct row arrangement.

**mixed-row cropping.** Growing two or more crops simultaneously intermingled

within a distinct row arrangement.

**mode.** The most frequent values considered from observation or data.

**model.** Mathematical use of data to project experimental results. A small imitation of the real thing; a system of postulates, data, and inferences presented as a mathematical description of an entity or state of affairs.

**moderate resistance.** Intermediate levels of resistance, between resistant and susceptible.

**modern varieties (cultivars).** Dwarf, semidwarf, stiff-stemmed, high-tillering, nitrogen-responsive, photoperiod-insensitive, high-yielding varieties. Their characteristics are different from those of traditional varieties.

**modifying gene.** A gene that alters the expression of another gene which is non-allelic. The effect of the modifying gene (modifier) is relatively small compared to that of the non-allelic gene being affected.

**modulated lamp system.** A system that provides a realistic simulation of anticipated ozone depletion. It modulates lamp output in accordance with actual levels of incoming solar UV radiation.

**moisture content.** The amount of water measured in the soil or plant. Expressed as percentage moisture based on total fresh weight of the substance.

**moisture stress.** Occurs when the plant suffers from a lack of water to support good growth and development.

**moisture tester.** Experimental equipment and instruments used to test the moisture (water) content of the soil, plant or seeds.

**mold.** (1) A cavity where a molten metal is shaped, as in casting. (2) A downy or furry growth on the damp surface of organic matter, generally caused by saprophytic fungi with conspicuous mycelia or spore masses.

**molecular marker.** A molecular signpost used in eukaryotic gene isolation. Usually a RFLP probe or a primer site for DNA amplification.

**molecular weight.** The sum of the atomic weights of a molecule's constituent atoms.

**mollic epipedon.** Thick, dark surface soil horizon, highly saturated by bivalent cations ( $\text{Ca}^{++}$  and  $\text{Mg}^{++}$ ) (USDA, 1975).

**molluscicide.** A pesticide that kills molluscs (such as snails).

**molt.** To shed or cast off hair, feathers, shell, horns, or an outer layer of skin (insects or snakes) in a process of growth or periodic renewal. The cast-off parts are replaced by new growth.

**monitoring.** Observing and noting specific details, e.g., particular aspects of the growth of plant's in an experiment; the farmer's use of specific varieties or types of cultivation in specific areas.

**monocotyledonous.** An embryo having a single cotyledon.

**monocropping.** When only one type of crop is grown on the land.

**monocot.** A plant with one cotyledon or seed leaf, parallel leaf venation, and fibrous roots. Floral parts occur in groups of 3.

**monoculture.** Growing the same crop on the same piece of land year after year.

**monocyclic.** Having one cycle per season.

**monoecious.** Having male and female flowers on the same plant of the same

species.

**monogenic resistance.** Resistance governed by one gene. Major gene resistance.

**monohybrid.** Heterozygous for one pair of alleles.

**monohybrid cross.** A cross between two parents differing in one gene.

**monomodal rainfall distribution.** Only one peak, compared with bimodal which has two peaks in the season.

**monoploid (haploid).** A plant or organism having only one set of chromosomes.

**monosomic alien addition line (MAAL).** An individual having one extra chromosome from the genome of another species.

**monosomic.** A plant that lacks one of a pair of homologous chromosomes.

**monotonous swamps.** Freshwater swamps inland of and overlapping with the tidal swamps.

**monsoon.** The cyclic surface winds blowing in tropical and subtropical latitudes for several months from the southwest, switching for several months from the northeast, and the rains that accompany them.

**morphogenesis.** The combined processes of cell division, differentiation, organ initiation, and organ development.

**morphology.** A branch of biology that deals with the physical form and structure of plants and animals. A study of the forms, relations, metamorphoses, and phylogenetic development of organs apart from their functions.

**mortar and pestle.** A device for grinding, consisting of a vessel (mortar) in which substances are ground with a club-shaped implement (pestle).

**mosaic.** The mottled patchy pattern on leaves caused by a virus. The arrangement of leaves on the upper stem to avoid shading.

**moth.** An adult of the insect order Lepidoptera, suborder Heterocera.

**moldboard.** The curved part of a plow which lifts the soil, turns it to the side.

**mow.** To cut the standing grass or grain or similar produce with a scythe, sickle, or machine. To cut close to the ground short standing grass with a lawn mower.

**muck.** Highly decomposed organic material in which the original plant parts are not recognizable.

**muck soil.** An organic soil in which the organic matter is well decomposed.

**mulch.** Organic material that is used to protect the soil. Any material, such as straw, sawdust, leaves, plastic film, loose soil, etc., that is spread upon the surface of the soil to protect it and plant roots from the effects of raindrops, soil crusting, freezing, evaporation, etc.

**multicellular.** Composed of many cells attached to one another in a characteristic fashion that determines the gross external form of the organism.

**multicropping.** The growing of more than one crop together in one field or sequentially.

**multidisciplinary.** A combination of many disciplines in an assignment, not necessarily working in an integrated or coordinated manner.

**multidisciplinary approach.** Approach that uses many experts from different disciplines working together on a research program to solve a problem.

**multigenic, polygenic.** Characteristic controlled by many genes.

**multiline.** Mixing seeds of several resistant lines which differ only in the resistance genes they carry.

**multilines.** Breeding lines composed of a number of backcross derivatives of a recurrent parent, each carrying a different resistant gene.

**multiline variety.** A variety composed by mixing several isogenic or near-isogenic lines.

**multilocation trials.** The same experiment is conducted in a number of different locations or sites across a geographic area.

**multiphase sampling.** Collecting information from different categories and from different subsamples.

**multiple alleles.** A series of more than two mutational forms at a given locus.

**multiple cropping.** Growing more than one crop in the same plot in 1 year.

**multiple cropping index (MCI).** The sum of the areas planted to different crops harvested during the year, divided by the total cultivated area.

**multiple cross.** A cross involving more than two parents.

**multiple-range test.** A sequential test used to make pairwise comparisons among several means which provide the least significant ranges.

**multiple resistance.** Resistance to several stresses such as insects, nematodes, diseases, drought, and nutritional deficiencies.

**multiplication.** The growing of seed for sale or wide distribution as a planting material in a given community or for specific research.

**mutagen.** A physical or chemical agent capable of producing a heritable change in the DNA sequence of an organism.

**mutant.** A variant from the normal or wild type that is inherited; the product of mutation.

**mutation.** A sudden heritable change in an organism other than that due to the incorporation of genetic material from other sources. Most mutations are within the limit of a single gene.

**muton.** The smallest length of DNA capable of a mutational change.

**mycelium.** The hypha or mass of hyphae that make up the body of the fungus.

**mycoplasma.** A polymorphic microorganism that is nonmotile and that can be cultivated with difficulty on special media, and that lacks cell wall, being bound only by a unit membrane. The internal components of a mycoplasma are ribosome and DNA strands.

**mycorrhiza.** The symbiotic association of the mycelium of a fungus with the roots of a seed plant. This symbiosis helps to extend the effective root surface area and promotes uptake of phosphorus.

**mylar film.** Trade name for a stiff, plastic-like film used in making insect cages.

**mylar filter.** Clear polyester film that absorbs almost all radiation below 320 nm.

## N Terms

**n, 2n.** The notations for the genetic and zygotic (diploid) or somatic chromosome number of a plant, e.g.,  $2n = 24$  in rice.

**narrow brown leaf spot.** A disease of rice caused by the fungus *Cercospora janseana* and *Sphaerulina oryzina*, which produces short, linear, brown lesions, most commonly on the leaves.

**narrow cross.** A cross between parents that have many genes in common and only differ in a few.

**narrow row planting.** A method of planting in which the seed is planted in uncommonly narrow rows, closer than normal, for the given crop.

**natural cross pollination.** Pollination of the plant by insects, wind, or floral parts without human intervention.

**natural selection.** The growing and survival of the best adapted plants in a given location, with selection occurring naturally without human intervention.

**neck blast.** A form of blast disease where the rice panicle base becomes dark thereby called "rotten neck"; the panicles may fall over; the symptoms appear also on panicle branches.

**neckleaf (nl).** The panicle is enclosed by a spathe-like leaf or leaf sheath arising at the panicle base. Occasionally, additional bracts may arise at the base of the panicle branches.

**neck node (panicle base).** The nearly solid node between the uppermost internode of the culm and the panicle axis.

**necrotic mosaic.** A viral disease caused by the rice necrotic mosaic virus (RNMV). *Polymyxa graminis* is considered to be the vector of the RNMV. The disease occurs in central and southern Japan. Infected plants have elongate or spindle-shaped, yellow flecks and streaks on the basal portions of stems and sheaths. Plants may be moderately stunted with reduced tiller number and spreading growth habit. It can be transmitted by mechanical means and through the soil. There has been no evidence that insects or seeds transmit the disease.

**necrotrophs.** Parasitic fungi that do not need a living host to be able to reproduce.

**nekton.** swimming animals capable of navigation.

**nematicide.** A chemical compound or physical agent that kills or inhibits nematodes.

**nematode.** Any of the class or phylum Nematoda of elongated cylindrical worms parasitic in animals or plants free-living in soil or water. Generally microscopic, wormlike animals that live saprophytically in water or soil.

**net assimilation rate.** The rate of plant weight increase per unit leaf area.

**net income.** Gross farm income minus total farm costs.

**network.** A group of people or institutes located in different places but working together for a common goal.

**neuston.** Organisms in contact with the surface layer of a water body.

**neutral soil.** Specifically, a soil in which the surface layer, at least down to normal plow depth, is neither acid nor alkaline in reaction. Practically, a soil in which the pH of the surface soil ranges between 6.6 and 7.4.

**niche.** Role and function of an organism specific in its habitat.

**ninhydrin.** A chemical for the colorimetric determination of amino acids, which becomes violet to red when in contact with honeydew on filter paper. It is used to determine the feeding activity of the brown planthopper.

**nitrate assimilation.** Uptake of nitrate by living organisms and conversion to cell substances.

**nitrification.** The biochemical oxidation of ammonium ( $\text{NH}_4^+$ ) to nitrate ( $\text{NO}_3^-$ ).

**nitrogen assimilation.** The incorporation of nitrogen into organic cell substances by living organisms.

**nitrogen cycle.** The series of chemical and biochemical changes of nitrogen and nitrogenous compounds taking place in the soil - plant - atmosphere continuum.

**nitrogen deficiency symptoms.** Characteristics of a plant at suboptimal N supply usually indicated by yellowing leaves, reduced tillering, and stunted growth.

**nitrogen fixation.** This process occurs in some free-living microorganisms, e.g., blue-green algae and in bacterial-induced nodules of legumes. The conversion of elemental nitrogen into organic nitrogen or to forms readily utilized in biological processes.

**nitrogen response.** Increase in grain yield (and other growth parameters) after N fertilizer application.

**no-tillage system.** A procedure whereby a crop is planted directly into a seedbed, not tilled since the harvest of the previous crop.

**noctuids.** Any night-flying moth of the family Noctuidae, the larvae of which are destructive pests.

**nocturnal.** A term applied to organisms that move or are active at night.

**nodal roots.** Roots developing from the upper nodes when deepwater rice varieties are flooded.

**nodal tillers.** Tillers arising from the upper nodes in elongated deepwater rice stems while the field is flooded.

**node.** 1). The joint of a stem from which leaves or branches arise. 2). The solid portion of the culm, panicle axis, and panicle branches. Leaves, tillers, and adventitious roots arise from nodes on the culm.

**node blast.** Form of blast disease where the node becomes infected. The node rots with dark discoloration and breaks apart, remaining connected only by the nodal septum.

**nodules.** Swelling caused by bacteria *Rhizobium spp.* which live on the roots or stems of leguminous plants.

**nonallelic interaction.** Interaction between different genes.

**nonglutinous (nonwaxy) rice.** Common nonwaxy rice grain that contains >2% amylose in the starch, with translucent endosperm.

**noninfectious disease.** A disease that is caused by an environmental factor, not by a pathogen.

**nonpersistent virus.** A virus that has short transmission time, is not recoverable from the hemolymph, is not transmitted following a molt of the vector, and when purified and inoculated into the hemocoel, does not make the vector infective.

**nonpreference (avoidance).** A type of plant resistance to pests wherein insects do not like to feed upon, oviposit in, or use the plant for shelter.



**nonprobability sampling.** A method where the probability of a particular individual being included in the sample is not known.

**nonrecurrent parent.** A donor parent used only once in a backcross program.

**nonselective herbicide.** A herbicide that kills all vegetation with which it comes in contact.

**nonsymbiotic nitrogen fixation.** Biological nitrogen fixation performed by a group of autotrophic bacteria living free in the soil either aerobically or anaerobically and not dependent on plants.

**nonwaxy endosperm (rice).** The endosperm that contains both amylose and amylopectin as in most common nonglutinous rices. Amylose content ranges from very low to high.

**noodles.** A product of rice flour. A food paste made from rice flour, with egg, and shaped into long strands (ribbon form).

**normal distribution.** The spread of data on a graph showing the normal bell-shaped curve which is assumed to be a continuous frequency distribution of infinite range.

**northern hybridization.** Method to detect RNA by use of a probe (c.f., southern hybridization).

**notched kernel (nk).** A small wedge-shaped depression which occurs at the middle portion of the abdominal side of brown rice.

**nozzle delivery.** The rate of water discharged from a nozzle during operation, usually expressed in liters per minute.

**nucleic acid hybridization.** A procedure in which single-stranded nucleic acid segments are combined to form double-stranded segments through complementarity of base sequences; a technique to assess the extent of sequence homology among the nucleic acid segments.

**nucleoproteins.** Any of a class of conjugated proteins that are combinations of a protein and a nucleic acid, that occur in all living cells in the nuclei or the cytoplasm, and may constitute either the whole or the essential portion of genes and viruses (e.g. tobacco mosaic virus).

**nucleotide.** The building block of nucleic acids which consists of a phosphate group linked to a five-carbon-atom sugar which in turn is joined to a nitrogen-containing base (either cytosine, guanine, adenine, thymine, or uracil).

**nucleus.** The distinctive component of eukaryotic cells. It is surrounded by a double membrane, and in which the majority of the genetic material of the cell is organized as chromosomes.

**nucleus seed.** The seed derived by a plant breeder from selected core plants to produce breeder seed.

**null hypothesis.** The statistical hypothesis that states there is no measurable difference between the observed information and measured data, i.e., it assumes that the treatments have no effect.

**nulliplex.** When a polyploid is recessive with all chromosomes in respect to a particular gene.

**nullisomic.** When a pair of chromosomes is absent resulting in a chromosome number of  $2n-2$ .

**nursery.** A piece of prepared land where crop seedlings are raised for a short time

pending their planting in permanent sites. A place where a large number of introduced or breeding varieties or lines are first looked at or screened under field conditions.,

**nut.** A fruit having a hard woody coat developed from a pistil with more than one carpel.

**nutrient.** A chemical element essential for the growth and development of an organism.

**nutrient antagonism.** A reciprocal relationship among concentrations of two or more nutrients in plants.

**nutrient balance.** An as yet undefined ratio among concentrations of nutrients essential for plant growth which permits maximum growth rate and yield.

**nutrient interaction.** A statistical term used to denote departure from additive responses to two or more nutrients applied separately, and together.

**nutrient medium.** Mixture of substances on or in which cells, tissues, or organs can grow, with or without agar.

**nutrient stress.** A condition of plant growth when inadequate nutrient supply restricts growth.

**nutritional disorder.** Any abnormality of the rice plant caused by a deficiency of any essential element; or toxicity caused by a high level of any substance or ion in the soil; or any retarded growth due to a high osmotic pressure of the soil solution.

**nymph.** 1). Any of various hemimetabolic insects in an immature stage. 2). In certain insects, the stage of development immediately after hatching wherein the individual resembles the adult but lacks fully developed wings and sexual organs.

## O Terms

**obcordate.** An inverted heart shape.

**objective.** Goal or purpose. In research, it is usually testing of hypothesis within the experimental framework.

**oblanceolate.** Lanceolate, but with the widest part toward the apex.

**obligate.** An organism that can sustain life only when thriving in another living organism.

**obligate parasite.** A parasite that in nature can grow and multiply only under specific conditions such as on or in living organisms.

**oblique.** Sloping, having unequal sides (leaves).

**oblong.** Longer than broad with almost-parallel sides.

**obovate.** Ovate, but the widest part toward the apex.

**obovoid.** An inverted egg shape.

**observation.** Record of the facts and information in a sequence of events exactly, during the research program.

**observation well.** A perforated pipe inserted into the soil to record the level of the water table in relation to the soil surface.

**observation yield trial.** A preliminary yield trial with small plots, often unreplicated.

**obsolete types.** Varieties of rice that are considered of no importance at present or no longer popular and used by the community.

**obtuse.** Blunt or rounded at the end.

**off-season crop.** A crop that is planted after the main planting season has been completed.

**off-shoot.** A lateral branch of the plant that may not be propagated.

**off-types.** Plant that differ in morpho-agronomic characters from the majority or representative plants of a variety; admixtures in a field; obvious contaminants such as tall plants in a semidwarf cultivar or vice versa.

**oligogene.** A gene controlling the inheritance of a qualitative character or one showing typical Mendelian distribution.

**oligogenic resistance.** Resistance governed by a few genes. Major gene resistance.

**oligonucleotide.** A polymer of nucleotides usually 5-30 base pairs long.

**oligophagous.** Eating only a few specific kinds of food - used especially for an insect subsisting on a few usually related plants.

**on-farm trial/on-farm research.** Experiment conducted in farmers' fields.

**once-over tillage.** An operation whereby land is tilled and planted in the same operation.

**ontogeny.** The sum of individual morphogenic processes and event, that describe plant development from seed germination through maturity.

**open hull.** The lemma and hull cannot close after opening at blooming time.

**opaque.** Impervious to the rays of visible light: not transparent or translucent, e.g., the glutinous endosperm of the rice grain.

**open pollination.** The natural process of pollinating grains in a plant (not controlled).

**operon.** A cluster of functionally related genes regulated and transcribed as a unit.

**optimum tillage.** The combination of tillage operations which maximizes growth of crop plants.

**optimum photoperiod.** The day length at which growth duration is at a minimum.

**orange leaf.** A disease caused by a mycoplasma-like organism. The causal agent is restricted in the cells of the phloem sieve tubes and is vectored by leafhoppers. The disease is characterized by short, malformed leaves, the edges of leaves are serrated and chlorotic, and the leaf tips are twisted. At the later stage, the leaves turn yellow-orange beginning at the tip. Leaves may become entirely orange, roll inward and dry out.

**orbicular.** Almost circular.

**organ.** A functionally distinct part of an organism consisting of several kinds of tissues such as leaf, root, flower, seed, etc.

**organelle.** Membrane-bound cellular compartment (e.g., nucleus, chloroplast, mitochondrion, Golgi apparatus).

**organic.** Of, relating to, or derived from living organisms. Being composed of or containing matter of plant and animal origin.

**organic fertilizers.** Fertilizer materials derived from plant and animal parts or residues.

**organic matter.** The fraction of the soil that includes plant and animal residues at various stages of decomposition and substances synthesized by the soil populations of various organisms.

**organic phosphorus.** Phosphorus present as a constituent of an organic compound, or a group of organic compounds such as glycerophosphoric acid, inositol phosphoric acid, cytidylic acid, etc.

**organic soil.** A soil which contains a high percentage (> 15 or 20%) of organic matter.

**organic solvent.** A chemical compound (usually liquid) containing carbon to dissolve another substance (the solute).

**organogenesis.** Development of individual plant organs such as leaves, tillers, floral organs, or roots.

**origin.** In referring to accessions in the germplasm collection, the site where the accession was collected.

**Oryza glaberrima.** A cultivated rice species in West Africa.

**Oryza nivara.** An annual wild species of rice from South and Southeast Asia which is the only known source of resistance for the grassy stunt virus biotype one.

**Oryza sativa L.** The most important cultivated rice species, indigenous to Asia.

**osmosis.** The passage of water or another solvent through a semipermeable membrane from a region of low solute concentration to a region of high solute concentration.

**outbreeding.** A system of breeding that involves crossing unrelated parents.

**outcrossing.** A cross of different genotypes usually under natural conditions. This may also refer to cross-pollination.

**outbreak.** A sudden increase in pest population resulting in economic damage to the rice crop.

**oval.** Broadly elliptical.

**ovary.** The bulbous, basal portion of the pistil which contains one ovule.

**ovate.** Egg-shaped, widest toward the base.

**overdominance.** An effect in the heterozygote,  $A/a$ , which is greater than that in the homozygous dominant,  $A/A$ .

**oviposit.** In insects, to lay or deposit eggs.

**oviposition.** The way in which an insect deposits eggs.

**oviposition cage.** A cage where an insect lays eggs on plants or other materials.

**ovoid.** Ovate or oval solid.

**ovule.** A minute structure which, after fertilization, becomes a plant seed. The immature seeds before fertilization.

**ovum.** Female reproductive cell.

**ozone depletion.** Reduction of the ozone layer in the atmosphere. Influenced by aerosols and other gaseous pollutants.

## P Terms

**P.** The parents of a cross. Used also to designate phosphorus.

**PAB.** Photosynthetic aquatic biomass; the mass of plants and algae which photosynthesize in the water.

**paddy.** 1). Wetland rice. 2). Bunded and leveled field used for cultivation of rice. The original meaning of paddy (Malay padis) is threshed, unhulled rice.

**palea.** 1). The inner of the two bracts enclosing the floret in grasses. 2). The hardened 3-nerved bract of the floret, which fits closely to the lemma. It is narrower than the lemma. 3). The upper bract that, with the lemma, encloses the flower in grasses.

**pandemic.** Occurring over a wide geographic area and affecting an exceptionally high proportion of the population.

**panicle.** 1). An inflorescence with a main axis and at least primary and secondary branching. 2). The terminal shoot of a rice plant that produces grain.

**panicle axis.** The main axis of the panicle from the base to the apex.

**panicle base.** The solid node between the uppermost internode of the culm and the panicle.

**panicle development.** The growth stage of the rice plant in which the spikelets become distinguishable and the panicle extends upward inside the flag leaf sheath.

**panicle exertion.** 1). Degree of emergence of the panicle from the flag leaf sheath. 2). Growth stage of the rice plant marked by the emergence of the panicle from the boot.

**panicle initiation.** The growth stage of the rice plant which starts when the primordium of the panicle has differentiated and becomes visible, changing from the vegetative primordium to a reproductive primordium. Used to predict the flowering date of the rice plant.

**panicle length.** The length of the panicle from its base to the apex.

**panicle primordium.** The panicle at its rudimentary (earliest) stage of development.

**panicle pulvini.** The swellings in the axis of the primary panicle branches.

**panicle shattering.** When the rice grains fall from the panicle before harvesting.

**panicle threshability.** Descriptive term for how easily the grain is removed from the panicle during threshing. These qualities vary with different varieties.

**panicle type.** Term used to classify the angle of the primary branches and spikelet density of the rice panicle, as compact, intermediate, or lax.

**papillose.** Bearing minute, nipple-shaped projections.

**pappus.** A ring of hairs or scales around the top of the fruit of the composites.

**parameter.** The true value of an attribute or characteristic of a population.

**paraphysis.** A sterile hypha present in some fruiting bodies of fungi.

**parasite.** An organism living in or on another living organism, obtaining from it part or all of its organic nutrients, and commonly exhibiting some degree of adaptive structural modification.

**parasitism.** A relationship wherein an organism of one kind lives in, on, or in

intimate association with an organism of another kind at the expense of which it obtains food and usually other benefits, causing some degree of overt damage but not usually killing directly and immediately.

**parboiled rice.** Rough rice soaked overnight or longer in water at ambient temperature, followed by boiling or steaming the steeped rice at 100 °C to gelatinize the starch. The rice is then cooled and dried before storage or milling. In this way part of the vitamins and minerals of the bran permeate the endosperm and are thus retained in the polished rice.

**parenchyma.** A tissue of higher plants consisting of thin-walled living cells that remain capable of cell division even when mature. These cells are agents of photosynthesis and storage and make up much of the substance of leaves and roots and the pulp of fruits as well as parts of stems and supporting structures.

**parthenocarpy.** The development of fruit without seeds or fertilization.

**partial dominance.** Incomplete dominance.

**partial factor productivity (PFP).** The average productivity of a single factor, measured by grain output divided by the quantity of the factor applied. This measure is sometimes referred to as input use efficiency.

**partial resistance.** An incomplete resistance in the plant type that has some ability to grow when attacked by disease or pests.

**partial restorer.** A pollinator variety used to pollinate a male sterile line to produce F1 male fertile progenies which produce partial seed set upon selfing.

**partial sterilization.** The elimination of a portion of a population of microorganisms, usually by treatment with heat or chemicals.

**particle density.** Dry weight per unit volume of soil solids, normally expressed in grams per cubic centimeter or megagram per cubic meter.

**particle gun.** The apparatus to accelerate DNA-coated particles in order to introduce the DNA into the target cells.

**pathogen.** An organism that incites a disease. Examples are pathogenic viruses, fungi, bacteria, and nematodes.

**pathogenicity.** The capacity of a pathogen to incite a disease. The quality or characteristic of being able to cause disease.

**pathogen races.** Organisms that are morphologically identical but attack different varieties, differentially and physiologically different; synonymous with physiologic races.

**pathology.** The study of the etiology (causes) and nature of diseases.

**pathovar.** In bacteria, a subspecies or group of strains that can infect only plants within a certain genus or species.

**peat soil.** An organic soil consisting largely of undecomposed or only slightly decomposed organic matter accumulated under conditions of excessive moisture.

**pedicel.** The stalk supporting a spikelet on the panicle branch.

**pedigree.** The ancestral history of an individual or family.

**pedigree method (breeding).** A system of breeding in which individual plants are selected in the segregating generations from a cross on the basis of their desirability judged individually and on the basis of a pedigree record.

**pedigree record.** Record of the relationships of the varieties or family lines grown

and their distinguishing characteristics.

**peduncle.** 1). The stalk bearing the entire inflorescence or a solitary flower. 2). Main stalk of the panicle

**penepplain.** Land surface worn down by erosion to a nearly flat or broadly undulating plain.

**penetrance.** The frequency with which a gene produces a recognizable effect in individuals which carry it.

**pentaploid.** A plant that has five sets of chromosomes.

**peptide bond or peptide linkage.** The C-N bond between consecutive amino acids in a protein. A covalent bond formed between the carboxyl group of one amino acid and the  $\alpha$ -amino group of the next amino acid with the release of a molecule of water.

**perianth.** 1). A single term for calyx and corolla, usually used when these are not clearly differentiated. 2). The outer envelope of a flower, including the calyx (grouping of sepals) and corolla (grouping of petals).

**pericarp.** The wall of the ripened ovary.

**percolation.** The downward movement of excess water through the soil.

**perennial.** Said of plants or weeds that live for many years, usually flowering each year.

**perfect flower.** A flower that has both stamens and pistils.

**perfect stage.** The sexual stage in the life cycle of a fungus. The teleomorph.

**pericarp layer.** The wall of the ripened ovary and the outermost layer of cells covering the caryopsis (seed).

**perimeter.** Around the edge, outside border.

**perisperm.** Distinguished from endosperm as the nutritive tissue of a seed derived from nucellus and deposited external to the embryo sac.

**permanent drought.** Occurs in desert regions where precipitation is less than potential evapotranspiration during all seasons and agriculture is not possible without irrigation.

**permanent hybrid.** A hybrid that breeds true to type and does not segregate.

**permanent wilting.** Wilting from which a plant will not recover even if soil water content increases.

**permanent wilting percentage.** The water content of a soil at which crop plants wilt and fail to recover after soil water content is increased. It is often estimated by the amount of water at  $-1.5$  mega Pascals soil matric potential.

**permeability, soil.** The ease with which gases, liquids, or plant roots penetrate or pass through a bulk mass of soil or a layer of soil.

**permeate.** To pass through.

**perennation.** The survival of plants from year to year by vegetative means.

**periphyton.** Plants and animals attached or clinging to submerged plants, the bottom of a water body or other submerged surfaces.

**persistent pesticides.** Pesticides that remain unchanged in the environment for long periods and are not readily degraded by microorganisms, enzymes, heat, or ultraviolet light.



**perudic.** Pertaining to a soil moisture regime where rainfall exceeds evapotranspiration throughout the year and where the soil never dries completely (USDA, 1975).

**persistent virus.** A virus that has a long transmission time, is recoverable from the hemolymph of a vector, is transmitted following the molt of a vector, and when purified and inoculated into hemocoel, makes the vector infective.

**pest.** An organism which competes with other organisms for food and shelter, or threatens their health, comfort, or welfare.

**pest control.** The control of pests in the ricefield by selective cultivation methods influencing natural factors or predators or by using chemical/physical control methods to reduce pest damage to rice plants.

**pest outbreak.** A sudden increase in a pest population resulting in economic damage to the rice crop; epidemic or epiphytotic.

**pesticide.** Any substance used to control pests. It is a broad term that covers insecticide, herbicide, fungicide, bactericide, rodenticide, nematocide, etc.

**PET.** potential evapotranspiration; the loss of moisture by direct evaporation and transpiration from vegetation; a pressure measured in mm.

**petal.** One of the divisions of the corolla, usually colored.

**petiole.** Leaf stalk.

**petri dish.** A shallow dish consisting of a cover and a bottom made of Pyrex glass (can withstand dry heat sterilization) used to culture microorganisms; also called culture dish. May be disposable and made of polystyrene.

**pH.** A measure of the degree of acidity or alkalinity of a soil or solution. A pH of 7.0 is neutral, below 7.0 is acidic, and above 7.0 is alkaline or basic. It is the negative logarithm of the hydrogen ion concentration of a soil or solution.

**phage.** A virus that attacks bacteria.

**phenology.** Periodic developmental processes and events which include processes stimulated by annual environmental fluctuations.

**phenotype.** The appearance of an individual or population produced by the genotype in interaction with a given environment.

**phenotypic acceptability.** Breeder's classification of his observations on overall acceptability of breeding lines or populations, usually in acceptability scores from 1 to 9. For example: 1 = excellent plant type and absence of diseases, 3 = very good appearance, 5 = fair appearance, but has a few essential shortcomings (too early maturity, etc.), 7 = poor appearance, but has a few important traits that make it suitable as a donor, 9 = poor.

**physiography.** In one sense, an outmoded term for the study of landforms now replaced by the term 'geomorphology'; in another sense it means the combined study of geomorphology, pedology (naturally occurring soils) and biogeography (plant and animal distributions and geographical relationships with their environments over time).

**phloem.** A complex tissue in the vascular system of higher plants consisting mainly of sieve tubes and companion cells; chiefly for translocation, structural support, and storage.

**phosphorus (P).** Essential element for plant growth and development.

**phosphorus-efficient plants.** Plants that are able to absorb, translocate, and

utilize P more efficiently than other genotypes.

**phosphorylation.** Biological process by which proteins are 'decorated' with phosphate groups derived from ATP. The process alters the biological activity of the protein, thereby facilitating a form of physiological regulation.

**photocooperation.** An association of mutual benefit to two or more species but without the cooperation being obligatory for the existence or the performance of some function.

**photoperiod.** The duration of the light period during a given day, which fluctuates during the year and according to latitude.

**photoperiod sensitivity.** The degree or extent to which the rice plant responds to a short photoperiod (e.g., daylength for flowering.)

**photoperiod-sensitive cultivars.** Cultivars that do not flower unless exposed to daylength longer or shorter than a critical period.

**photoperiod-sensitive genic male sterile line (PGMS).** Genic male sterile plants which respond to photoperiod or duration of daylength in terms of pollen fertility and sterility behavior.

**photoperiodism.** The response (e.g., flowering, germination) of organisms to the relative length of daily periods of light and darkness.

**photosynthesis.** A complex process by which the energy of sunlight is absorbed and set to drive chemical reactions. In plants, the major role of photosynthesis is to reduce CO<sub>2</sub> to the level of carbohydrate in the presence of chlorophyll and light and release oxygen as a by-product.

**photosynthesis production.** The flag leaf produces the photosynthesis necessary for the rice plant and the growth of the panicles.

**photosynthetic unit.** The group of pigment molecules necessary for photochemical action.

**phototropic.** Moving toward (positively) or away from (negative) a light source.

**phreatic.** Pertaining to groundwater. To indicate groundwater that periodically rises to the rooting zone of cultivated plants.

**physical environment.** The climatic factors, the soil, and free water surrounding the rice plant.

**physical map.** A genetic map in which the apparent distances between the genes have been determined by methods other than genetic recombination.

**physiological diseases.** Diseases that are a result of nutritional disorders caused by the imbalance of the essential elements.

**physiological leaf spots (bl).** Nonpathogenic physiological diseases showing dark brown or blackish mottled discoloration of leaf sheaths and blades.

**physiological maturity.** When a seed reaches its maximum dry weight. This usually occurs before harvest.

**physiological races.** Pathogens that are morphologically inseparable but differ in their ability to attack and develop on their hosts.

**physiology.** The processes, activities, and phenomena incidental to and characteristic of life or of living organisms. A branch of biology dealing with the study of the functions and activities of living matter (as of organs, tissues, or cells) as such and of the physical and chemical phenomena involved.

**phytoalexin.** A substance that inhibits the development of a fungus on hypersensitive tissues, formed when plant host cells come in contact with the parasite.

**phytometer.** A plant or plants used to measure the physical factors of the habitat by its response in terms of physiological activities.

**phytosanitary regulations.** Sanitary conditions and regulations imposed on export and imports of plant materials and seed.

**phytotoxicity.** Plant injury caused by chemicals or some other agent. Common symptoms are spotting, wilting, stunting, tiller spreading, and twisting of leaves.

**phytotoxin.** A substance toxic to plants.

**picogram.** A unit of mass that is 10<sup>-12</sup> of a gram. Commonly used to express the DNA content per cell or per nuclear genome in a plant.

**piedmont plain.** A broad slope composed of alluvial or colluvial sediments, or both, extending along and from the base of a mountain range.

**piezometer.** An open-ended tube placed vertically in the soil for measurement of the hydrostatic pressure level of groundwater.

**pink stem borer.** *Sesamia inferens*, a major pest in double-cropped areas because it has many host plants. The larva has an orange-red head capsule. The body is purplish-pink dorsally and white ventrally. The pupa is dark brown with a tinge of purple in the head region. The adult is fawn-colored with dark brown markings. The hindwings are white.

**pinnate.** 1). A compound leaf having the leaflets or segments arranged on either side of a common axis. 2). Resembling a feather's construction. Leaflets are arranged on each side of a common axis.

**pistil.** The female reproductive organ of a flower consisting of the ovary, style, and stigma.

**pith.** A usually continuous central core of predominantly parenchymatous tissue that occurs in the stem of most vascular plants and some roots as part of the primary tissue system. Typically surrounded by vascular tissue, probably functions chiefly in storage, and may disappear leaving a void in some plants.

**plankton.** Mostly small, floating organisms (flora and fauna) drifting passively, whose movements largely depend on water currents.

**plant anatomy.** The study of the structure of plants.

**plant density.** Number of plants per unit area.

**plant growth regulator.** Broad class of chemicals that control the growth of plants. Many are also natural compounds found within plants, where they may act as hormones.

**plant growth substances.** Natural and synthetic compounds that elicit growth, developmental or metabolic responses. These substances are usually not metabolites in the sense that they are not intermediates or products of the pathways they control, and they are active at very low concentrations.

**plant height.** The distance from the base of the plant at ground level to the top of the highest leaf or the panicle of a mature plant, measured in centimeters.

**plant nutrient.** A substance which is absorbed by plants and is necessary for completion of the life cycle.

**plant physiology.** The study of the plant's processes, functions, and responses to

the environment.

**plant population.** Number of plants in a particular area or the number of different plant types in a particular area.

**plant quarantine.** A restrictive measure imposed by a government to prevent the entry of injurious pathogens and pests by regulating the movements of plants, fruits, seeds, or other plant parts.

**plant residue.** The stubble or remains of a plant left after harvest.

**plant resistance.** Resistance of plants to pests and diseases.

**plant tissue culture.** The culture of protoplasts, cells, tissues, organs, embryos, or seed in vitro.

**plant type.** A set of plant characters (e.g., tillering, leaf and panicle characteristics, plant height) that give a variety its peculiar architecture and geometry.

**plant variety right (PVR).** Legislation that allows a copyright to be obtained for a specific plant.

**planthopper.** An insect of the order Homoptera, family Delphacidae, which feeds by sucking sap from leaf veins along the lower portion of the rice plant; usually more stout and slow-moving than leafhoppers. Planthoppers have a mobile spur called a "calcar" at the tip of the tibia of the hind leg.

**planting board.** A board with holes for dropping seeds into the soil at given distances or for marking distances when sowing or transplanting in the field or plots.

**planting ratio.** The ratio in which the male and female parental lines are planted in hybrid seed production or maintenance of the cytoplasmic male sterile line.

**plasmid.** Nonchromosomal, self-replicating (circular) DNA in bacteria. A principal tool for inserting new genetic information into microorganisms or plants.

**plasticity.** The capacity of organisms with the same genotype to vary in developmental pattern, in phenotype, or in behavior according to varying environmental conditions.

**plastid.** Generic name for all chloroplastlike organelles found in different plant cells.

**plate count.** A count of the number of colonies formed on a culture medium which has been inoculated with a small amount of organisms.

**pleiotropy.** Mode of gene expression where the expression of one gene has multiple phenotypes. The effect of a single gene on two or more characters is due to a single biochemical pathway among the characters. Distinguished from linkage by the absence of recombinants in the segregating population.

**plot.** A measured piece of land within a given larger area. It is the unit on which experimental treatments are assigned at random in replicated trials.

**plot plan.** A diagram showing the arrangement of plots in an experiment.

**plow.** A moldboard type or dish type implement used for primary tillage. It is either animal-drawn or tractor-pulled.

**plow layer.** The top 15-20 cm of soil normally plowed or disturbed with tillage operations.

**plow pan (hard pan).** A hard layer of soil at 15-20 cm depth developed through continuous plowing at the same depth. It reduces downward water loss during flooding and prevents penetration of roots.

**plow-planting.** The plowing and planting of land in a single trip over the field by

drawing both plowing and planting tools with the same power sources.

**plowless farming.** Tilling soil without plowing so that the crop residue will be left on the surface.

**plumule.** The embryonic leaves of the young plant in the embryo. It is enclosed by the coleoptile.

**pluvial.** Pertaining to rain,; also pertaining to land that receives water almost wholly directly from rain.

**pluvial rice.** Upland rice that depends only on rainfall for water supply.

**pluvic.** Derived from pluvia of rain; descriptive of a land type where water contributed by rain or irrigation does not stay for more than 3 hours on the soil even if the soil has been worked wet (See dryland).

**pneumatophore.** A specialized root that grows vertically into the air from roots embedded in the mud.

**pod.** A dry, usually elongated fruit.

**point bar.** A deposit of sand and gravel accumulating on the inside of a river meander and usually separated from the river bank by a rough or swale.

**polder.** Land enclosed by an embankment.

**pollen.** A mature reproductive male germ cell, microscopocyte, specialized for fertilization.

**pollen fertility.** The viability of pollen usually tested by the stainability of the rice pollen with 1% IKI solution.

**pollen grain.** The minute spores (spheroidal structures) in the anthers of a floret.

**pollen load.** The amount of airborne pollen/liter per hour at peak anthesis on a specified day.

**pollen shedding.** The falling of pollen grains from the anthers to the pistil.

**pollination.** The transfer of pollen from the anther to stigma (the female organs) of a flower.

**polycaryoptic (mp).** Several pistils with multiple ovaries are present in the spikelet.

**polycloning site.** A short segment in a DNA vector that has been engineered to contain a number of cleavage sites for different restriction enzymes to enhance the versatility of the vector.

**polycross.** Intercrossing of a group of cultivars or clones in isolation so as to allow random pollination.

**polycross nursery.** Plants specifically arranged to facilitate random outcrossing to develop an improved line or variety.

**polycyclic.** Completes many cycles in one year.

**polyembryonic (me).** Multiple embryos are present in one caryopsis.

**polyethylene glycol (PEG).** A chemical which promotes the fusion between protoplasts and plasmid.

**polygenes.** Numerous genes contributing equally toward a given phenotypic effect as found in the continuous variation of many quantitative traits, each having small and equal effects; mainly additive and subject to environmental influence.

**polygenic resistance.** Resistance governed by many genes. Minor gene resistance.

**polymer.** A natural or synthetic chemical compound of high molecular weight consisting of long chain of repeating structural units of smaller molecular weight which may be identical or different.

**polymerase chain reaction (PCR).** A method of amplifying specific DNA segments in vitro.

**polymorphism.** The occurrence together in the same breeding population of two or more distinct forms at frequencies too great to be explained by recurrent mutation. Occurrence of two or more types of variants.

**polyphagous.** Feeding on or utilizing many kinds of food or parasitizing a number of different hosts; specifically feeding on various plants or animals.

**polyploid.** An organism with more than two sets of chromosomes. Polyploids can be autopolyploid (duplication of the same set) or allopolyploid (combinations of different sets). More than diploid by multiples of the haploid number.

**polysaccharide.** Polymer molecule of sugars (e.g., starch, glycogen).

**pomology.** That branch of science that studies fruits.

**ponlai.** Rice cultivars developed in Taiwan from the crosses between japonicas or japonica and local cultivars.

**popped.** Said of rice kernels that have burst open due to exposure to heat.

**population.** 1). In genetics, a community of individuals which share a common gene pool at a given site. In statistics, a hypothetical and infinitely large series of potential observations among which actual observations constitute a sample. 2). A group of individuals (plants) within a species or a variety that are found at one site or field. Plants in the population may or may not be genetically alike.

**population density.** The number of plants per unit area.

**population growth.** Increase in numbers of a population over a given period due to reproduction.

**population peak.** When a given population is at its highest level.

**pore space.** The space in soils not occupied by solid particles.

**positional cloning.** Experimental approach used to locate and isolate gene sequences for which the gene product is not known. Instead the phenotype is mapped and large fragments are isolated in the region of informative molecular markers known to segregate closely with the gene of interest.

**post emergence.** Factors that are relevant after the emergence of the seedling or weed from the soil.

**postemergence herbicide.** An herbicide applied after the crop and or weeds have emerged from the soil.

**potassium.** A reactive alkali metal element essential for plant growth and proper development.

**potassium fixation.** The process of converting exchangeable or water-soluble potassium to moderately soluble potassium.

**potassium-supplying power of soils.** The capacity of the soil to supply potassium to growing plants in both the exchangeable and the moderately available forms.

**potential, soil water.** The potential energy of a unit quantity of water produced by the interaction of the water with such forces as capillary (matric), ion hydration

(osmotic), and gravity, expressed relative to an arbitrarily selected reference potential. In practical application, potentials are used to predict the direction and rate of water flow through soils, or between the soil and some other system, such as plants or the outer atmosphere.

**potential yield.** The maximum yield of a cultivar in the absence of any abiotic or biotic stress. e.g., yield obtained in the absence of yield-limiting factors such as water, fertilizer, proper cropping practices and in the absence of yield-reducing factors such as pests and natural calamities.

**pounded.** Reduced to small particles by beating or striking heavily and repeatedly.

**pre-emergence.** The period after sowing before the germination of the seed.

**pre-(post) emergence tillage.** Tillage operations which when placed in a time frame of reference based on the date of crop emergence occur before (after) crop emergence.

**pre-(post) harvest.** Tillage operations which when placed in a time frame of reference based on the date of crop harvest occur before (after) crop harvest.

**pre-(post) planting tillage.** Tillage operations which when placed in a time frame of reference based on the date of crop planting occur before (after) the crop is planted.

**pre-emergence herbicide.** A herbicide applied after the crop has been planted but before the crop and or weeds emerge.

**precipitation.** 1). Formation of a solid from a solution as a result of a physical or chemical change. 2). A deposit on the earth of hail, mist, rain, sleet or snow. 3). The quantity of water deposited.

**precipitation interception.** The stopping, interrupting, and temporary holding of precipitation in any form by a vegetative canopy or vegetation residue.

**predation.** A direct attack and feeding of one organism on a second organism, the predator typically being larger than its prey.

**predator.** An animal that attacks and feeds on the other animals, such as a bird or spider which feeds on many different species of insects and attacks a number of prey by quickly eating or sucking their body fluids.

**preference.** An insect's choice to feed on, oviposit in, or use as shelter a resistant variety.

**pregerminate.** To germinate seed before sowing by exposing it to moist conditions.

**pregerminated seeds.** Seeds soaked in water for 24 hours and incubated for 24-48 hours until sprouting is visible.

**pregermination.** The process of making the seed sprout before sowing or direct seeding. Soaking and incubating the seed hasten sprouting.

**preliminary trial or experiment.** A test or trial to gain initial information that can be used in more detailed and critical experiments later.

**preplant herbicide.** A herbicide applied before the crop is planted.

**prepotency.** Capacity of a parent to impress characteristics on its offspring so that they are more alike.

**preventative measures.** Actions taken in advance to prevent any undesirable effects from lack of nutrients or pests and diseases.

**primary.** 1). Essential or related to first principles, the first objectives 2). The first

plant parts such as the root, leaf and tillers (e.g. primary leaf, primary tillers).

**primary growth.** Growth initiated by the stem and root meristems.

**primary infection.** First infection by a pathogen after going through a resting or dormant period.

**primary inoculum.** Pathogen or a part such as spores, fragments of mycelium, etc. that can cause primary infection in a life cycle.

**primary leaf.** The first seedling leaf, without a blade.

**primary panicle branches.** The structures arising from the panicle axis. They bear the secondary branches and primary spikelets.

**primary root system.** The first root and its branches.

**primary tillage.** Initial cutting of soil where a crop has been grown or harvested. It is commonly referred to as plowing.

**primary tillers.** Tillers arising from the lowermost nodes of the main culm.

**primary trisomic.** A trisomic in which the extra chromosome is one of the normal chromosomes of the complement.

**primer.** Short sequence of DNA (or RNA) used to initiate DNA replication.

**primitive forms.** Unimproved plants having features or traits that are akin to wild rice relatives. Plants having primitive features such as pigmented plant parts, long awns, lax panicles, extreme shattering, and perennial growth habit.

**probability.** The proportion of times in which an event occurs in an infinitely large and hypothetical series of cases, each capable of producing an event.

**probe.** 1). In epidemiological studies, a trap plant used to determine the conduciveness of a given environment to disease development. 2). A DNA or RNA fragment labeled with a radioactive or nonradioactive marker and used in nucleic acid hybridization experiments to detect specific DNA and RNA sequences.

**procumbent.** Trailing or lying flat but not rooting.

**production function.** A statistically estimated function that relates the output of a production system (e.g., rice) to the inputs used in its production (e.g., labor, capital, fertilizer, pesticides).

**productive activity.** Task that provides the household and community with economic benefits, such as crop and livestock production, handicraft, marketing, and wage employment.

**productivity decline.** A decline in total factor productivity (TFP) over time, where total factor productivity is the productivity of all inputs taken together.

**productive tiller.** A tiller that produces a panicle.

**productive soil.** A soil in which the chemical, physical, and biological conditions are very favorable for the production of crops.

**progeny test.** Determines the genetic characteristics and evaluates the genotype of a variety or parent based on the performance of its progeny.

**progeny.** Offspring; individuals resulting from mating.

**program evaluation and review technique (PERT).** A management tool for defining and integrating events and processes that must be accomplished in time to assure completion of project objectives on schedule.

**prokaryote.** Organisms characterized by the absence of major organelles such as



nucleus and plastids.

**promoter.** A region on a DNA or RNA strand which is recognized by RNA polymerase in order to initiate transcription.

**propagate.** Produce an identical organism from a given organism. To multiply by sexual or asexual reproduction through seeds or cuttings.

**propagule.** Part of an organism that may be disseminated.

**prophyllum.** The first two-keeled bract and bladeless rudimentary leaf at the base of the main culm. A membranous structure between the shoot and stem in grasses. Morphologically it is the first leaf of the developing shoot.

**prostate.** Lying flat on the ground.

**protein.** A biopolymer consisting of many different amino acids linked by peptide bonds. Proteins can be more than 100 amino acids long and are very complex in structure.

**protein content.** The amount of protein in a living organism based on the analysis for total N. The percent protein is computed by multiplying the percent N by 6.25.

**prothorax.** The anterior division of the thorax of an insect, bearing the first pair of legs.

**protogyny.** Maturation of the pistils (female part) before the stamen (male part).

**protoplasm.** That portion of cellular tissue active in life processes.

**protoplast.** Plant cell from which the cell wall has been removed, usually by enzymatic process.

**protoplast culture.** The isolation and culture of these protoplasts in nutrient medium to form callus and to regenerate plants.

**protoplast fusion.** An in vitro technique of producing somatic hybrids between two cultivars, species, or genera. Protoplast fusion provides the unique opportunity to exploit cytoplasmic variability in two parental lines.

**prune.** To cut off what is not needed, such as to prune tillers so that the number of tillers in each entry is uniform.

**psammophytes.** Plants which prefer or tolerate sand, particularly fine to medium sand, as a habitat.

**PSP.** photoperiod-sensitive phase; the growth stage when a plant becomes sensitive to photoperiod.

**pseudoresistance.** Apparent resistance which results from transitory characters in potentially susceptible host plants. Types of pseudoresistance are host evasion, induced resistance, and escape.

**puberulent.** Slightly pubescent.

**pubescent.** Having a fuzzy surface; specifically, covered with fine soft short hairs.

**puddle.** To stir up; make muddy or turbid.

**puddled soil.** A soil whose structure has been mechanically destroyed, allowing the soil to run together when saturated with water. A soil that has been puddled is usually in a massive nonstructural state.

**puddling.** Turning the soil into a muddy or watertight paste through secondary tillage.

**pulley.** A small wheel that turns by a belt to transmit or apply power.

**pulse (crop)**. The dried edible seeds of cultivated legumes; applied especially to leguminous crops grown in tropical and subtropical Asia.

**pulse field gel electrophoresis (PFGE)**. A variation on the electrophoresis procedure where a computer flips the electric field in preset pulses in different directions and defined strengths.

**punctiform**. With a depression in the center.

**pupa (pl. pupae)**. A non-feeding and usually inactive stage in insect development which occurs between the larval and adult stages.

**pure culture**. The growth of a single species or strain of an organism in the absence of any other living species or strain.

**pure line**. 1). A line that has been made almost completely homozygous by repeated self-pollination and selection of a specific type (or by the removal of off-types) over generations. 2). A group of identical individuals that always produce offsprings of the same phenotype when intercrossed.

**pure line selection**. A method of selecting the best progeny for breeding from individual plants of a variety or cultivar.

**pure seed**. Has a high level of purity with little or no contamination of other varieties or species. Seeds give rise to genetically similar plants.

**pyramiding genes**. Combining into one genotype several major genes that control a trait.

**Pyricularia oryzae**. The fungus that causes blast disease of rice.

**pyroclastic**. Pertaining to broken fragments of volcanic origin -- ash and rock material.

## Q Terms

**qualitative character.** A character in which variation is discontinuous. A discrete, heritable character that is transmitted with well-defined limits and in a simple alternate manner.

**quality.** Distinguishing character, the degree of excellence which is possessed.

**quantitative.** The amount of a substance; measurable by assigning numerical value to indicate how many or how much.

**quantitative character.** A heritable character that has continuous variation and is readily affected by the environment. Thus, classification into discrete categories is not possible.

**quantitative photoperiod reaction.** The degree of the plant's responses to daylength.

**quantitative trait locus (QTL).** A genomic region which governs a phenotype by interaction with other genes.

**quantitative variation.** Variation for characters caused by multiple genes or polygenes.

**quarantine.** A control or restraint upon the import, export or transportation of plants, animals or produce goods such as seeds and soil, designed to prevent the spread of disease or pest.

**questionnaire.** Tool used to obtain information on any given subject from a survey.

## R Terms

**race.** A genetically and often geographically distinct mating group within a species; or a group of pathogens that infect a given set of plant varieties.

**race non-specific resistance.** Resistance to all races of a pathogen. Synonymous with horizontal resistance. This form of resistance is commonly, but not necessarily, polygenic.

**race-specific resistance.** Resistance to some races of the pathogen but not to others. Synonymous with vertical resistance.

**raceme.** A more or less conical inflorescence within flowers arising alternately from a common axis, the youngest towards the tip.

**rachilla.** The small axis below the lemma and palea, bearing the single floret.

**rachis.** 1). The axis of a spike or raceme, or of a compound leaf. 2). The elongated axis of a panicle.

**rad.** A unit of measure of absorbed doses of ionizing radiation, which represents absorption equal to 100 ergs of energy per gram of irradiated material. (A rad is an acronym for radiation absorbed dose and is a unit of absorbed dose.)

**radiating.** Spreading from the center.

**radicle.** The embryonic primary root unsheathed by the coleorhiza and the root cap, persisting only for a short time after germination.

**ragged stunt.** A viral disease of rice transmitted by the brown planthopper *Nilaparvata lugens*. The diseased plants are characterized by the presence of ragged and twisted leaves, vein swellings, and nodal branches. There is delay in flowering and incomplete emergence of panicles; the panicles bear mostly unfilled grains.

**rainfed field.** An unirrigated field surrounded by levees and depending on rainfall for moisture supply.

**rainfed lowland.** Bunded fields where water depth does not exceed 50 cm for more than 10 consecutive days and the fields are inundated for at least part of the season. Such fields have no access to an irrigation system, but may have on-farm rainwater conservation facilities.

**rainfed rice.** Rice grown on leveled bunded fields to allow an accumulation of flood water on the surface during heavy rains. Grown in areas that depend entirely on rain for moisture for its water supply.

**random.** Arrived at by chance without the exercise of any choice.

**random amplified polymorphic DNA (RAPD).** DNA amplification method which uses single primers. Method is restricted to primers 9 nucleotides and larger, and amplification products are generally visualized using agarose electrophoresis and ethidium bromide fluorescence.

**random sample.** A sample selected according to some chance mechanism such that every unit in the population has a known probability of being in the sample. These samples are obtained by using a random mechanism such as drawing of lots or using a table of random numbers.

**randomization.** A process of allocating treatments to the experimental units so that each experimental unit has an equal chance of receiving any of the treatments. It is a necessary condition for obtaining a valid estimate of the experimental error. Location of treatments by chance so as to provide unbiased estimates of treatment

means and experimental error.

**randomized complete block design.** An experimental design in which the experimental area is divided into blocks and all of the treatments are randomly arranged within each block.

**range.** The variation of data from highest to the lowest value.

**raphe.** 1). The ridge connecting the two ends of an anatropous ovule. 2). A seamlike joining of the two lateral halves of an organ, as in the ridge of tissue along the side of an ovule, which indicates the position of the vascular bundles supplying the developing seed.

**rapid generation advance (RGA).** A part of a breeding procedure wherein the segregating populations are grown at very close spacing, high temperature, and short days to shorten growth duration, thus making possible several generations per year. The duration from F<sub>2</sub> to F<sub>5</sub> which generally takes about 4 years can be shortened to 2 years.

**rating.** Classifying test entries based on degree of plant damage, number of insects, etc., by expressing on a numerical scale, usually 0-9. It is relative estimate.

**ratoon.** New tillers that grow from the stubble of harvested plants and may bear grains. These new tillers constitute the ratoon crop.

**ratoon cropping.** Cultivation of growth from stubble after a crop has been harvested to develop another crop. Conducted in level banded fields where water is readily available for irrigation.

**raw rice.** Dehulled and milled rice not subjected to steaming or parboiling.

**ray floret.** One of the outer tubular flowers of a composite flower head when different from those of the center.

**rear.** To raise or multiply organisms such as insects.

**receptive.** When the plant's physiological or physical status allows the entrance or growth of a foreign body.

**receptor.** Protein molecule, usually on the cell surface, that is able to receive and interpret an external signal.

**recession.** Complete draining of flood water from the land.

**recessive gene (recessive allele).** A gene the expression of which is either partially or entirely suppressed when a dominant allelic gene is present. Recessive gene is the alternate form of the dominant gene.

**reciprocal cross.** A set of crosses between two parents where either is used as male or female, or where the source of male and female gametes are reversed e.g., A x B and B x A.

**reclamation.** The act or process of restoring land for cultivation or use.

**recombinant.** One of the progeny formed as a result of genetic recombination.

**recombinant DNA.** DNA molecule composed of segments from different individuals or species and formed by a combination of in vitro and in vivo manipulations, typically in bacteria. Genetically engineered DNA brings together new combinations of genes not found in nature.

**recombinant DNA technology** (syn. gene cloning, plasmid engineering, genetic engineering, biotechnology, gene therapy). The techniques by which genetic recombination is carried out in vitro and in vivo. It entails the breakage and rejoining of DNA molecules from different organisms and the production and isolation of the

modified DNA or fragments thereof.

**recombinant inbred lines (RIL).** Used for mapping purposes. They are the product of an initial cross between two parent lines and the subsequent selfing to produce homozygous lines.

**recombination.** Formation of new combinations of genes by genetic exchange as a result of crossing over in the heterozygous genotypes. The natural process of exchanging DNA fragments between different DNA molecules. Occurs in both prokaryotes and eukaryotes, but by slightly different process. Eukaryotic recombination occurs predominantly during meiosis and gives rise to gametes of nonparental gene combinations.

**recombination frequency.** Number of recombinants in the total progeny, computed as a measure of the distance between loci on a genetic map that is equal to the number of recombinants out of the total number of progeny.

**recommendation (crop production).** Advice in terms of operations, times, equipment, and materials for crop production, presented as worthy of acceptance.

**recommended rate.** The amount of fertilizer materials required for application to a field expressed in kilograms nitrogen (N), phosphoric acid (P<sub>2</sub>O<sub>5</sub>) and potash (K<sub>2</sub>O) per hectare or number of bags of FM per hectare.

**recommended variety.** The variety that has the desirable traits and attributes for a particular environment and can be expected to produce and grow well in that environment, recommended by competent authority/agency for cultivation in that environment.

**recovery.** Plants that have the ability to grow after being exposed to unfavorable seasonal conditions or after being attacked by pest or disease.

**recurrent parent.** The parent to which successive backcrosses are made in backcross breeding.

**recurrent selection.** A method of breeding designed to concentrate favorable genes scattered among a number of individuals.

**recurved.** Bent backward.

**red rice.** A rice kernel that has a red seed coat frequently found in African rice *Oryza glaberrima* or some *Oryza sativa* cultivars.

**redistribution (water).** The process of soil water movement to achieve an equilibrium energy state throughout the soil profile.

**reduced tillage.** A tillage sequence in which the primary operation is performed in conjunction with planting procedures in order to reduce or eliminate secondary tillage operations.

**reduced zone.** A portion of a flooded soil devoid of free oxygen.

**reduction division.** A nuclear division where the chromosomes are reduced from the diploid to the haploid number.

**reflux.** To cause to flow back or return; especially: to heat (as under a reflux condenser) so that the vapors formed condense to a liquid that flows back to be heated again.

**regeneration.** The growth of whole plants from cultured cells or calli.

**regional conservation center.** A national or international center located in a broad geographic area that assumes the responsibility for conserving germplasm in that area through collection, rejuvenation, and storage. The regional center also handles

the distribution of conserved stocks. It cooperates with the genetic resources center in overall preservation of a crop or crops.

**registered seed.** The progeny of foundation seeds normally grown to produce certified seed.

**registration.** An official record of an existing line or variety, clone, or seed stock in a given area with its specific characters and qualities fully noted.

**RGR.** Relative growth rate; the increase in plant material per unit of material in a specified time.

**regression.** The dependence of one variable on one or more other variables.

**regression, coefficient of.** A numerical measure of the rate of change of the dependent on the independent variable.

**regression line.** A straight or curved line that indicates the nature of a regression on a graph with the dependent variable on the y axis and the independent variable on the X axis.

**rejuvenate.** To regrow a variety or stock of seed when the supply has been exhausted, lost, or destroyed.

**relative humidity.** The ratio of the amount of water vapor in the air at a specific temperature to the maximum moisture-holding capacity of the air at that temperature.

**relative plating efficiency.** Percentage of inoculated cells which give rise to colonies, relative to a control.

**relay cropping.** Growing two or more crops in sequence, planting the succeeding one after the flowering but before the harvest of the former.

**relief.** The difference in elevation between the high and low points of the field.

**remnant seed.** Seed that is in excess and remains after sowing for a given test.

**repeated DNA sequence.** A sequence of nucleotides that occurs more than once in a genome. Repeated sequences may be present in a few to many millions of copies. The individual repeated sequence may be only a few nucleotides in length up to several kilobases.

**repellants.** Chemicals that prevent pest damage to living organisms or materials by rendering them unattractive, unpalatable, or offensive.

**replicate/replication.** 1). The assignment of a treatment to more than one experimental unit. It provides a means by which to measure experimental error, which is necessary for detecting real differences between treatments. 2). The process of producing complete copies of the genetic material (DNA or RNA) of a cell or virus.

**replicated trial.** A trial where treatments are repeated more than once in the experiment.

**reporter gene/marker gene.** A gene, often derived from bacteria, which does not in itself provide a useful change in transgenic plants but serves to identify and/or recover transformed plants.

**reproduction.** The sexual or asexual process or mechanism by which the species multiplies and is maintained.

**reproductive phase.** The period of crop growth from panicle initiation to panicle maturation.

**reproductive system.** All the organs and structures involved in the production and delivery of gametes or reproductive cells.

**research.** A planned inquiry into the nature of, reason for, and consequences of any particular set of circumstances; whether these circumstances are experimentally controlled or recorded as they occur. The purposes of research are a) to discover new facts, b) to revise, verify, or modify accepted conclusions in the light of newly discovered facts, c) to find practical application of such new facts, and d) to gather benchmark data and information.

**residual.** The remainder of a chemical or a quality after the original application, or in statistical analysis of variance, the remainder when all true values are subtracted from observed or calculated values or values due to known sources of variation.

**residual effect.** The effect of chemical fertilizers, herbicides, insecticides, or fungicides that remains in the following crop season without fresh application of the chemical.

**residue.** The plant part left after the economically useful part has been harvested.

**residue processing.** Operations that cut, crush, or otherwise break (fracture) residues in a step preparatory to tillage, harvesting, or planting operation.

**resistance.** The inherent ability of an animal or plant body to resist (oppose, counteract) untoward circumstances such as insect attack, diseases, toxic agents, or infection.

**resistance to pesticides.** The ability of populations of pests to survive doses of a pesticide which are normally lethal.

**resistant.** Possessing the ability to resist or counteract.

**resistant check.** See Standard check.

**resistant variety.** A variety which has genetic resistance to an adverse factor or pest. It is genetically able to suppress or retard the activity of a pathogen or insect. A variety which has genetic resistance to or tolerance for all adverse factors or pests.

**respiration.** 1). The process by which living organisms obtain energy through oxidation of carbohydrates to produce carbon dioxide. 2). The metabolic process by which a plant (or animal) oxidizes its food and provides energy for assimilation of breakdown products. 3). The process by which cells or tissues obtain oxygen.

**response.** The reaction of a plant or group of plants to a treatment, e.g., application of fertilizer, stimulus, or water loss.

**restorer gene.** The gene that restores fertility to an otherwise sterile plant.

**restorer line.** A pollinator variety used to pollinate a male sterile line to produce F<sub>1</sub> progeny which are male fertile and thus produce seeds on selfing. An inbred line that permits restoration of fertility to the progeny of male sterile lines to which it is crossed.

**restriction endonuclease.** An enzyme that is able to cleave DNA at or near the point where a specific base sequence occurs.

**restriction fragment length polymorphism (RFLP).** A difference in sequence between samples of DNA detected as differing fragment sizes produced after treatment of the DNAs with a specific restriction endonuclease.

**restriction map.** A diagrammatic representation of a linear or circular DNA molecule which shows the positions at which one or more restriction enzymes would make cuts.



**restriction site.** A DNA base sequence recognized by a restriction endonuclease.

**resurgence.** The occurrence of significantly more damage or more insects in an insecticide-treated crop after insecticide application.

**retest.** In screening for resistance, re-evaluating in subsequent tests an entry selected in the mass screening test.

**retestcross.** A cross made between a cytoplasmic male sterile line and a test variety (identified to be a restorer in the testcross) to recheck the potentialities of the FI to give normal seed set upon selfing.

**retestcross nursery.** Breeding nursery to evaluate the retestcross FIs and corresponding male parents.

**reticulate.** In the form of a network; net-veined.

**reverse mutation.** The process whereby the original state is restored for an inherited or mutant gene or chromosome.

**reverse transcriptase.** Enzyme that is able to synthesize DNA from RNA. Often found in tumor viruses.

**reversible mutation.** A mutation that can be restored to the original state.

**reversion.** The changing of essential plant nutrient elements from soluble to less soluble forms as a result of interaction with, or reactions in, the soil.

**revolute.** Rolled backward from margin or apex.

**rhizobia.** Bacteria capable of living symbiotically in roots of legumes from which they receive energy and often utilize molecular nitrogen.

**rhizocylinder.** The plant root plus the adjacent soil that is influenced by the root.

**rhizome.** An underground stem--distinguished from a root by the presence of buds and scales--which is capable of creeping and producing new shoots.

**rhizoplane.** The external surface of plant roots.

**rhizosphere.** The zone of soil where the microbial population is altered both quantitatively and qualitatively by the presence of plant roots.

**rib.** The ridge of a fruit.

**ribbed.** Having prominent ribs.

**ribonucleic acid (RNA).** 1). Occurs in three major forms -- as messenger RNA, transfer RNA, and ribosomal RNA. Some RNA molecules are the genetic molecules of viruses (e.g., tobacco mosaic virus and HIV) and viroids. Some RNA molecules may have enzymatic activity (see ribozymes). 2). Any of various nucleic acids that yield ribose as one product of hydrolysis, that are found in the cytoplasm and sometimes in the nucleus. 3). Required for the synthesis of proteins in all living systems. It consists of a linear array of the nucleotides cytidine-, guanosine-, adenosine-, and uridine-s'-monophosphates.

**ribozyme.** Enzyme made entirely of RNA.

**rice.** A common name for the genus *Oryza*, an extremely important crop grown in the Asian arc and other parts of the world as the staple diet of the people.

**rice blast.** A fungus disease of rice which is characterized by the presence of spindle-shaped lesions. The lesion develops a grayish center and a brownish margin. The disease can have different forms: leaf blast, node blast, or neck blast.

**rice bug.** An insect that sucks the sap of the developing grains, causing serious rice crop losses. The species of rice bugs of major economic significance are *Leptocorisa*

*acuta*, *L. oratorius*, and *L. chinensis*. The nymphs and adults are difficult to recognize in the rice field because of their color. The freshly hatched nymphs are tiny and green but become brownish as they grow. Both nymphs and adults feed on rice plants.

**rice gall midge.** The Asian rice gall midge, *Orseolia oryzae*, is a serious pest of rice in South and Southeast Asia. The adult gall midge is about the size of a mosquito. Gall midge attack starts in the seedbed and continues until the booting stage, but most of the damage is limited to the vegetative growth stages. The damage changes rice tillers into tubular galls, which dry without bearing panicles. New tillers are initiated as the older ones are infested, causing profuse tillering and stunting of the plants. A related species, *O. oryzinova*, is prominent in Africa.

**rice leaf folder.** This insect, *Cnaphalocrocis medinalis* Guenee, is known to occur in all rice-growing countries of Asia. The full grown larva is yellowish green with a dark brown head. The damage is caused by the larvae which fold the leaf blades into a tubular shape and feed on green leaf tissue within the tubular structures.

**rice paddy.** 1). The prepared irrigated ricefield with the bund that is puddled for wet rice growing. 2). Rough brown rice (*caryopsis*) is called paddy.

**rice plant.** An annual grass in the genus *Oryza* with round, hollow, jointed culms, rather flat, sessile leaf blades, and a terminal panicle.

**rice processing.** The milling, polishing, and grading of rough rice. The processing of rice by parboiling.

**rice stalk.** The stem or culm portion of the plant.

**rice transplanter.** 1). A person transplanting rice. 2). A machine used for transplanting rice.

**rice whorl maggot.** Dull gray in color, *Hydrellia* sp. is widespread in the Philippines. The maggots feed on the unopened whorl of the leaf by remaining in the center of the whorl and nibbling the innermost margin of the leaf. The symptoms manifest as small chewed discolored areas on the innermost margin of the central whorl. Severe infestation stunts the plant and reduces tillers in a given hill. The infestation and damage are limited to vegetative stages of the crop.

**ridge.** The relatively higher part of floodplain landscapes (in contrast to basins and channels). Raised strips of plowed ground, rows of soil lying between furrows.

**ridge planting.** A method of planting crops on ridges formed through tillage operations or banked by hand tools.

**riffle.** A deposit of sand or gravel on the channel floor of a river.

**risk.** The occurrence in various parameters which can be qualified on the basis of probability analysis.

**ripening phase.** (syn. maturity phase, grain-filling phase). The period from milky stage of the grain to maturity.

**riverrain grasslands.** Extensive, flat grassy floodplains which flood deeply during the rainy season, owing to congestion near the river mouth.

**rod weeding.** Control or eradication of weeds by means of pulling a longitudinally rotating rod below the soil surface.

**rodents.** Rats, mice, and guinea pigs.

**rogue.** A plant that is different from the standard variation or strain.

**rogueing.** Judicious removal of infected and undesirable individuals from a pure

population (variety) to prevent spread of disease and to purify the stock.

**rolled leaf ( rl )**. A condition in which the leaf blade margins are incurved, forming a half cylinder; sometimes as a result of underdeveloped midrib or absence of midrib or blade.

**rolling**. A secondary tillage operation which crushes clods and compacts or firms and smoothes the soil by the action of ground-driven, rotating cylinders.

**root**. The underground part of a seed plant body that originates usually from the hypocotyl, and functions as an organ of absorption, aeration, and food storage or as a means of anchorage and support. Types: a) primary. the root developing from the radicle that first appear from the seed; b) secondary. developing from the primary root; branch roots; c) tap. a primary root that enlarges and grows downward.

**root bed**. The soil profile modified by tillage or amendments for more effective use by plant roots.

**root gall**. Abnormal enlargement of the roots caused by root-knot nematode.

**root hair**. Small hairs that grow from a main root. The tubular or filamentous outgrowth of epidermal cell or root that has immediate contact with soil particles assisting in the absorption of water and minerals on the surface of the root. The root hair is short-lived and replaced.

**root nodules**. The small enlargement or swelling on roots of legumes produced as a result of infection by nitrogen-fixing bacteria.

**root pressure**. The pressure in the xylem as a result of metabolic activity in the root.

**rootlets**. The lateral roots that grow indigenously from the mature roots.

**rosette**. A cluster of radiating leaves, usually arising at or close to the ground.

**rotary hoeing**. A tillage operation employing ground-driven rotary motion of the tillage tool to shatter and mix soil and control small weed seedlings.

**rotary tiller**. 1). An implement that accomplishes primary and secondary tillage in one operation. 2). A tillage operation employing power-driven rotary motion of the tillage tool to loosen, shatter, and mix the soil.

**rotate**. To move around, to grow crops in succession or in a regular sequence.

**rotation**. A cropping system using the rotation of different plant species on the same plot of land.

**rough broken land**. Land with very steep topography and numerous intermittent drainage channels but usually covered with vegetation.

**rough rice**. (syn. paddy rice) Called paddy, threshed, unmilled or whole rice grain, or caryopsis.

**row**. The lines along which a number of plants are planted or arranged.

**row marker**. A marker or device used for seeding in rows or aerial seeding of large areas using satellite marking.

**row ratio**. The proportion of seed parent and pollen parent rows planted to maintain cytoplasmic male sterile line or to produce FI hybrid seed in a seed production plot.

**row seeding or sowing**. To be sown in rows and not broadcast by hand.

**rudimentary**. A development that is arrested at an early stage or imperfectly developed.

**rudimentary auricles.(au)** Auricles reduced to protuberances with 1 or 2 cilia or

without cilia.

**rudimentary glumes.** The laterally enlarged cuplike apex of the pedicel; they are beneath the sterile lemmas.

**rugose.** Wrinkled.

**run-off.** The overflow of water from a field carrying with it dissolved nutrient or nutrient-containing soil particles.

**runner.** A slender, trailing stem rooting at the nodes.

**rupture.** To burst open along irregular lines.

**rust.** A disease caused by a fungus. Called rust because it releases reddish-brown powdery masses of uredospores.

## S Terms

**S0.** Symbol used to designate the original selfed plant.

**S1, S2,** etc. Symbols designating first-selfed generation (progeny of S0 plant), second-selfed generation (progeny of S1 plant), etc.

**Sahel.** an east-west zone of semidesert along the southern fringes of the Sahara, frequently drought-stricken, with an erratic annual rainfall ranging from 150 to 500 mm; also a vegetation zone in which the savanna tropical grasslands grade first into scrubland and then desert.

**sagittate.** Like an arrowhead; triangular, with basal lobes pointing down toward the earth.

**saline.** Containing salt.

**saline soil.** A soil that contains sufficient salt in the root zone to impair plant growth. Its electrical conductivity is greater than 4 dS/m and exchangeable sodium percentage is less than 15.

**saline-sodic soil.** A soil containing soluble salts with sufficient exchangeable sodium to interfere with the growth of most crop plants. Soil whose saturation extract has an electrical conductivity greater than 4 dS/m, sodium adsorption ratio greater than 15, and pH less than 8.5 (See saline soil and sodic or alkali soil).

**salinity.** The state of consisting of or containing salt.

**salinity symptoms in rice.** Leaves usually become whitish or chlorotic, growth is stunted and uneven, tillering is reduced.

**salinization.** The process whereby soluble salts accumulate in the soil.

**salt balance.** The relation between the quantity of dissolved salts carried to an area by irrigation water and the quantity of dissolved salts removed by drainage water.

**salt tolerance.** Ability of a plant to maintain productivity as salinity increases beyond and EC of 4 dS/m.

**salt-affected soil.** Soil that has been adversely modified for the growth of most crop plants by the presence of soluble salts, exchangeable sodium, or both.

**sample.** A finite series of observations taken from a population; a portion of a population. Individuals taken from a population to represent it.

**sample size.** The number of sampling units to be measured per plot, e.g., number of plants to be measured per unit area.

**sampling error.** Deviation of a sample value from the true value owing to the limited size of sample or wrong sampling.

**sampling frame.** A list of the numbers of a population from whom a sample will be taken. A frame placed over a section of crop to define the area sampled.

**sampling unit.** The unit designated within the experimental plot for the measurement of a character to be made. A good sampling unit must be uniform, easy to identify, and easy to measure.

**sand bar.** A bank or ridge of sand deposited in a river channel.

**saprophyte.** An organism that subsists on dead organic matter and inorganic materials; nonpathogenic.

**saturate.** 1). To be totally wet, to fill all the voids between soil particles with a liquid. 2). To fill completely or load to capacity.

**saturation extract.** An increment of solution obtained from a saturated soil paste.

**scabrous.** Rough.

**scald.** A leaf disease in rice incited by a fungus known as *Rhynchosporium oryzae*. The lesion occurs very often at the margin or tip of the leaf. The typical lesions form characteristic zonations or bands as they spread and enlarge on leaves of susceptible varieties. Rice varieties with broad leaves appear to be more susceptible to leaf scald.

**scale.** 1). A highly modified leaf, usually sessile and dry. 2). The range of damage ratings, based on a numerical system, usually 0-9 where 0 = no plant damage and 9 = severe damage (all plants killed).

**scanning electron microscope (SEM).** An electron microscope in which a beam of focused electrons moves across the object and the electrons scattered by the object being collected to form a three-dimensional image on a cathode-ray tube.

**scarification.** Treatment to rupture the seed coat sufficiently to permit entry of water to initiate germination.

**scarify.** To loosen the topsoil aggregates by means of raking the soil surface with a set of sharp teeth harrows or other instrument.

**scarious.** Applied to leaves or leaflike parts that are not green, but thin, dry, membranous, and often more or less translucent.

**scented kernel.** Grains containing aromatic substances in the endosperm which give a strong aroma when the polished rice is cooked.

**sclerotium.** A compact mass of fungal hyphae with or without host tissue, usually with a darkened rind, and capable of surviving under unfavorable environmental conditions.

**screen.** Process of accepting or rejecting rice cultivars or breeding lines for future use. (See evaluation.)

**screenhouse.** A structure consisting of wire mesh (screen) walls and roof in which plants are grown for varietal resistance studies. The materials used prevent the entrance of birds, rats, and insects.

**screening.** Evaluation of varieties or breeding lines for resistance where the resistant ones are selected for further studies and possible use as donors in the breeding program and the susceptible are eliminated.

**scurfy.** Scaly or a scaly coating.

**scutellum.** A shield-shaped organ of the embryo of grass. It is often viewed as a highly modified cotyledon in monocotyledons.

**second leaf (of a seedling).** The first differentiated leaf, with a blade and sheath.

**secondary adventitious roots.** Roots arising from the nodes at the base of the plant.

**secondary infection.** An infection resulting from inoculum arising from a primary infection.

**secondary panicle branches.** The branches that bear the spikelets arising from the primary branch of the panicle.

**secondary pests.** Pests which because of natural control agents normally have low populations and do not require chemical applications for control.

**secondary tillage.** The cultivation that follows primary tillage; it breaks clods,

incorporates plant materials into the soil, and levels the soil. It is often called harrowing or hoeing.

**secondary tillers.** Tillers that arise from the primary tillers.

**secondary trisomic.** A trisomic in which the extra chromosome is the isochromosome for one of the chromosome arms of the complement.

**sedges.** Members of the family Cyperaceae. They bear a close resemblance to the grasses and can be distinguished by a thin triangular stem, the absence of ligules, and the fusion of leaf sheaths forming a tube around the stem.

**sediment.** Solid particles transported and deposited by water, glaciers and wind.

**seed.** The fertilized and ripened ovule of a seed plant, comprising a miniature plant usually accompanied by a supply of food (endosperm) enclosed in a protective seed coat, often accompanied by auxiliary structures, and capable, under suitable conditions, of independent development into a plant similar to the one that produced it. In rice, the grain is the common form of seed; the caryopsis is the true seed.

**seed box.** A rectangular box specially constructed with the open top filled with good soil for germinating seeds.

**seedbox screening.** A term used primarily for leafhopper and planthopper screening where test entries are screened as seedlings in seedboxes in the greenhouse.

**seed coat.** In rice, the seed coat or testa is firmly adhered to the maternal pericarp as one of the protective layers of the seed kernel.

**seed distribution.** Dispatch of seed to other users. The way in which seed is distributed on the soil.

**seed dormancy.** A physical or physiological condition of a viable seed that prevents germination even under favorable germination conditions.

**seed dressing.** An application of chemicals or fungicides to cover and protect seeds from parasites, pathogens, or adverse environmental conditions that cause damage to the seed or seedling.

**seed health.** Refers primarily to conditions of the seeds or seedlots as planting materials which may be affected by the presence of pathogens, insects and contaminants such as weeds.

**seed incubation.** Process by which moisture, temperature, and/or light is provided to ensure optimum conditions for seed germination.

**seed multiplication.** Growing the seed of a particular variety on a large scale for sale to farmers or for use in experiments.

**seed physiology.** The study of processes involved with seed development, in germination and its control, and in the utilization of seed reserves during the early stages of seedling growth.

**seed purity.** The seed being free of contamination from other genotypes, dirt, or foreign matter.

**seed quality.** 1). The properties of the seed such as cleanliness, germination percentage, moisture content, shape, purity, and desirable characters for research. 2). The export qualities of the seed, the size, shape, moisture content, protein content, color, chalkiness, and other properties as desired by the millers or traders.

**seed setting.** The production of seeds after pollination.

**seed treatment.** The process of coating or impregnating seeds with a chemical.

**seed viability.** The ability of seeds to germinate under favorable conditions and develop normal seedlings.

**seed vigor.** Seed property that determines its potential for rapid uniform emergence and development under a wide range of field conditions.

**seed-borne.** Carried within, by, or through the seed.

**seedbed.** The bed on which rice seeds are sown, consisting of soil (wetbed method) or banana leaves, plastic sheets or concrete floor (dapog method).

**seeder.** A machine that plants the seed in the field. Small seeders are used for small experiments; very large seeders are used on large farms.

**seeding.** Planting of the seed with machine or by hand.

**seeding rate.** The amount of seed planted per unit area of land.

**seedling.** The stage of the plant after seed germination until the development of the fifth leaf.

**seedling blight.** A rice disease caused by *Sclerotium rolfsii* or *Drechslera oryzae* and characterized by yellowing, wilting, and finally, drying of seedlings in seedbeds. White mycelia and/or sclerotia are sometimes observed at the base of infected seedlings or germinating seeds.

**seedling emergence.** Coming up of the seedling from the surface of the soil or water.

**seedling height.** The height of a seedling from the base of the shoot to the tip of the tallest leaf blade.

**seedling rate.** The number of seedlings planted per unit area of land.

**seedling resistance.** The characteristically vertical resistance of plants in the seedling stage.

**seedling stage.** The period when approximately the first five leaves and tillers begin to develop.

**seedling vigor.** Seedling properties which determine the potential for rapid growth and development of uniform plants under a wide range of environmental conditions.

**seepage.** The lateral flow of water into or from a soil, as from a body of water into neighboring soil, or the reverse.

**segregant.** Any plant from a segregating population (F<sub>2</sub> or F<sub>4</sub> generations).

**segregation.** The separation of alleles that occurs typically during meiosis.

**selected entries.** Varieties or breeding lines that are resistant in initial screening tests and are selected for further screening in replicated tests to confirm the resistance.

**selection.** 1). In genetics, discrimination among individuals in the number of offspring contributed to the next generation with a defined target. 2). In plant breeding, the process that favors or induces the survival and perpetuation of one kind of organism in competition with others.

**selection advancement.** The changes from one generation to another in the value of the character being selected for.

**selection differential.** A measurement of selection intensity taking the difference between the average value of a character as compared with the value of the selection in a population.

**selection pressure.** The proportion or ratio of plants selected to the total number of



plants, the process is used to measure the effectiveness of natural selection in altering the genetic composition of a population.

**selective herbicide.** An herbicide that kills or stunts some plant species but causes little or no injury to others.

**selective marker.** A marker that permits the selection of recombinants over the parental types.

**selective pesticide.** A pesticide that kills a certain pest or group of pests and causes little or no injury to others.

**selectivity.** The quality of being able to select, to take what you want.

**self.** Self-pollination by natural or artificial means.

**self-incompatibility.** The genetic or physiological reason that fruit cannot be formed by selfing (fertilization).

**self-pollination.** Pollination between the pollen and stigma within the same flower of the same plant.

**self-fertilization.** Fusion of male and female gametes from the same plant.

**semi-annual.** Refers to plants whose life cycle is completed twice a year.

**seminal root.** A root that develops from the radicle. Sparsely branched roots that replace the radicle and are later replaced by secondary adventitious roots.

**senescence.** The phase of plant growth that extends from full maturity to actual death; characterized by an accumulation of metabolic products, increase in respiratory rate, and a loss in dry weight especially in leaves and fruits.

**sensitive period.** The plant's growing period when it is most affected by the prevailing environmental factors such as daylength and disease or insect attack.

**sensory test/evaluation.** Method for the assessment of cooked rice 1 hour after cooking by judges or panel members. The characteristics assessed are aroma, flavor or taste, tenderness or hardness, cohesiveness or stickiness, appearance, and color using a six-point scoring scale.

**sepal.** A segment of the calyx, usually green.

**septate.** Having cross walls. Divided into cells or segments by partitions.

**septum.** 1). A cross wall in a fungal hypha or spore. 2). The cross-sectional layer inside the node which separates adjoining internodes.

**sequence (biotechnology).** Linear order of the 4 nucleotide bases along a DNA or RNA molecule.

**sequence-characterized amplified region (SCAR).** A useful molecular marker which may be generated by the partial sequencing of AP-PCR, DAF, or RAPD band or an RFLP clone. Resultant PCR primers that provide specificity.

**sequence-tagged site (STS).** Region of DNA on a chromosome with known sequences used as a signpost for molecular gene mapping approaches.

**sequencing.** The determination of the order of amino acids in a peptide, polypeptide chain, or protein, or the determination of bases (nucleotides) in a nucleotide, polynucleotide strand, or nucleic acid.

**sequential cropping.** Growing two crops in rapid sequence, planting one immediately after the harvest of the first, on the same piece of land.

**sequential varietal release.** A breeding technique that aims at incorporating different resistance gene(s) into similar improved varietal backgrounds and releasing

them sequentially, enabling farmers to choose the variety on the basis of biotype/race identified. As the biotype/pathogen population shifts and the variety becomes susceptible, a new variety with a different gene is released.

**serrate.** Saw-toothed.

**sessile.** Resting on a main stem or branch without an intervening stalk.

**sex ratio.** The number of males in relation to the number of females.

**sexual dimorphism.** A condition wherein the male and female adult insects differ in appearance, as in yellow stem borers.

**sexual reproduction.** Reproduction involving the union of two compatible gametes.

**Shattering.** Separation of grains from the panicle. Grain shattering or easy threshing are partly correlated with the degree of development of the abscission layer between the spikelet and the facet of the pedicel.

**sheath.** The lower part of the leaf enclosing the stem, originating from the node and wrapping around the culm above the node.

**sheath blight.** A disease caused by the fungus *Rhizoctonia solani* / *Thanatephorus cucumeris*. The disease is characterized by ellipsoidal, necrotic lesions occurring initially at the leaf sheaths near the water line. Lesions may enlarge and spread on leaves and ultimately on panicles.

**sheath blotch.** A disease incited by *Pyrenochaeta oryzae*, symptoms are brown blotches on the leaf sheath, leaf blade, and glumes.

**sheath pulvinus.** The swelling at the base of the leaf sheath just above the node, often mis-termed as the node.

**sheath rot.** A fungal disease caused by *Acrocyllindrium oryzae*. Rotting occurs on the uppermost leaf sheaths enclosing the young panicles. The lesions start as oblong or somewhat irregular spots, 0.5-1.5 cm long, with brown margins and gray centers, or they may be grayish brown throughout. Powdery growths may be found inside affected sheaths.

**shed.** 1). To drop or disperse pollen grains or the falling of unharvested rice grains from the panicles. 2). A structure used for storage.

**shifting cultivation.** A farming system in which crops are planted on a piece of land for 2-3 years and the land is left fallow for several years to regain soil fertility while farming is continued on another piece of land at a different location.

**shoot.** The vegetative parts (leaves, stem) of a plant above the ground level.

**shooting.** Significant stem elongation preceding flowering

**short-term crops.** Crops that grow for three months or less.

**short-day plant.** A plant that needs shorter daylight to flower.

**short-duration varieties.** Varieties that mature within 105 days or less.

**shrub.** A small perennial tree with no main trunk. A woody plant with spreading branches arising from the base.

**shuttle breeding.** Any breeding system where generations undergo sequential evaluations at different locations.

**sib-crossing.** Crossing lines derived from the same two parents.

**sibs.** The offsprings related by descent. Progeny of the same parents.

**side dressing.** Fertilizer usually applied near, beside, or in between the plants.

**sieve tube.** A tube consisting of an end to end series of thin-walled living cells characteristic of the phloem, having no nucleus when mature, and believed to function chiefly in translocation of organic solutes.

**sieve.** A meshed device through which material is strained to separate particles of different sizes.

**significance, test of.** A statistical procedure designed to distinguish real treatment difference from that due to chance (i.e., random variation). To distinguish differences due to sampling error from differences due to discrepancy between observations and hypothesis.

**significance.** The clear difference between that observed and that expected.

**significant difference.** A statistical reality used to determine the differences among plant comparisons; usually expressed to have a certain level of probability of being wrong due to chance.

**silt.** A soil separate consisting of particles between 0.05 and 0.002 mm in diameter.

**silvershoot.** A symptom of gall midge infestation, the growing points and tillers elongate and form like a white tube.

**silver staining.** A procedure by which DNA, proteins, or polysaccharides are visualized using silver complexes.

**simulation.** The statistical process or act of resembling or having the characteristics of something.

**single cropping.** The growing of only one crop in a given place in one year.

**single cross.** A cross between two genotypes, usually two inbred lines.

**single fertilizers.** Fertilizers that contain only one of the major fertilizer elements.

**single-seed descent.** A method of breeding sometimes used in autogamous (self-fertilizing) species to ensure that the range of genotypes in the F<sub>2</sub> population will also be present in the future generations. This method aims to maintain the broadest possible representation of genotypes in the base population until selection is practiced, and to retain genetic variation in advanced generation progenies.

**single sequence repeat (SSR).** Also called microsatellite. These are repeats of two or three nucleotides, sometimes found repeated up to 30 times. External PCR primers may detect length variation, which can be mapped.

**single-copy sequence.** A sequence of nucleotides that occurs only once in a genome.

**sinica (japonica) race.** Rice grown in temperate zones and subtropics.

**sinuous neck (sn).** The portion of the uppermost internode of the culm below the panicle base which is curved and wavy; opposed to straight neck.

**sister cell.** A cell formed from an original or preexisting cell.

**site.** In ecology, an area described or defined by its biotic, climatic, and soil conditions as related to its capacity to produce vegetation.

**slow-release fertilizer.** Fertilizer that releases the wanted element at a slow rate. A term used interchangeably with delayed release, controlled release, controlled availability, slow acting, and metered release to designate a rate of dissolution (usually in water) much less than is obtained for completely water-soluble compounds.

**smut.** A disease caused by fungi of the order Ustilaginales; in rice smut, the grains

turn into black masses of spores which can be disseminated by wind, rain, and contact.

**soak.** To be completely covered by water for a determined length of time or until the object is saturated.

**sod planting.** A method of planting in sod with little or no tillage.

**sodication.** The process whereby the exchangeable sodium content of a soil is increased.

**sodicity.** The quality or degree of having sodium as a component.

**sodium adsorption ratio (SAR).** A relation between soluble sodium and soluble divalent cations which can be used to predict the exchangeable sodium percentage of soil equilibrated with a given solution.

**soil.** The unconsolidated mineral matter on the surface of the earth that serves as a natural medium for growth of land plants. This has been subjected to and influenced by genetic environmental factors of parent material, climate (including moisture and temperature), macro- and microorganisms, and topography, all acting over a period of time and producing a product--soil--that differs from the material from which it is derived in many physical, chemical, biological, and morphological properties.

**soil auger.** A tool for taking soil samples.

**soil fertility.** The ability of the soil to supply nutrient elements in the amounts, forms, and proportions needed for maximum plant growth.

**soil fumigation.** A method of soil treatment using chemicals wherein the pesticide, in gaseous form, is introduced into the soil by a soil injector; the soil or field position to be treated is first covered with a plastic sheet to prevent volatilization of the chemicals; the soil fumigant is highly toxic as it kills all forms of life--fungi, bacteria, nematodes, snails, and weeds.

**soil heterogeneity.** The case where soil in a relatively small area varies greatly in texture, fertility, topography, moisture content, and drainage. Lowers the precision of results in ricefield experiments.

**soil horizon.** A soil layer with clear and relatively uniform character running roughly parallel to the soil surface.

**soil microbiology.** A subspecialization of soil science concerned with soil-inhabiting microorganisms and their relation to agriculture, including both plant and animal growth.

**soil moisture.** Water contained in the soil, expressed as a percentage of weight of water per unit weight of dry soil or the percentage of volume of water per unit volume of bulk soil.

**soil pH.** A measure of the degree of acidity or alkalinity of a soil. A pH of 7.0 is neutral; below 7.0 is acidic, and above 7.0 is alkaline.

**soil population.** All organisms living in the soil, including plants and animals.

**soil productivity.** The capacity of the soil, in its normal environment, to produce a specified plant or sequence of plants under a specified system of management. It emphasizes the capacity of the soil to produce crops and is expressed in terms of yield.

**soil profile.** A vertical section of the soil cutting through all its horizons and extending into the parent material.

**soil saturation extract.** The solution obtained through suction of soil saturated with

water.

**soil science.** The science dealing with soils as a natural source on the surface of the earth including soil formation, classification and mapping, and the physical, chemical, biological, and fertility properties of soils per se and these properties in relation to their management for crop production.

**soil separates.** Groups of mineral particles separated on the basis of range in size. The principal separates are sand, silt, and clay.

**soil structure.** The combination or arrangement of individual soil particles into definable aggregates or peds which are characterized and classified according to size, shape, and degree of distinctness.

**soil test.** A chemical, physical, or microbiological operation which estimates the properties of the soil pertinent to the suitability of the soil to support plant growth.

**soil texture.** The relative proportions of sand, silt, and clay particles in a soil.

**soil tilth.** The quality of soil, keeps it from packing together.

**solar radiation.** The energy given off by the sun. The sun exerts an energy level of about 2 cal/cm<sup>2</sup> per minute on the earth's surface.

**sole cropping.** Growing one crop alone or in pure stand, either as a single crop or as a sequence of single crops within the year.

**soluble ion.** The electrically charged form of an atom or group of atoms that exists in solution.

**solution.** A homogeneous mixture formed by mixing a solid, liquid, or gaseous substance with a liquid or sometimes with a gas or solid.

**somaclonal variation.** Increase in genetic variability in plants regenerated from tissue culture.

**somatic.** Relating to or affecting the cell body.

**somatic cell.** 1). A cell that is not destined to become a gamete, a "body cell" whose genes will not be passed on to future generations. 2). The somatic cell divides to form tissues, etc. It is a body cell that has full chromosome content.

**somatic cell hybridization.** 1). The fusion of non-germ cells in cell culture under certain treatments and the formation of viable hybrid cells. 2). A breeding method that uses protoplast fusion to produce somatic hybrids between otherwise sexually compatible species.

**sori.** The plural of sorus--a cluster of fruit dots in ferns.

**source nursery.** Breeding nursery where all genetic material including sources imparting cytoplasmic male sterility, genotypes with specific traits useful for hybrid breeding program, and elite rice lines showing high general and specific combining ability are maintained for use in a hybrid breeding program.

**sources of resistance.** 1). Varieties of resistance. 2). Varieties or breeding lines that have genes for resistance.

**southern blot/southern transfer.** A technique for the transfer of (denatured) DNA from an electrophoretic gel to a nitrocellulose membrane on which the DNA can be bound and hybridized to a single-stranded DNA probe.

**southern hybridization.** Method employing gel separation of restricted DNA fragments, their blotting onto a membrane support, dissociation into single stranded DNA, and hybridization (reassociation) with a radio-labeled probe.

**sowing guide.** A structure consisting of intersecting strips of wood which form a network of square compartments. It is placed over the soil in a seedbox and seeds of test entries are placed in the compartments.

**spacing.** Distance of planting between hills and between rows.

**spathe.** A large bract partially or wholly enclosing a group of flowers.

**special rice varieties.** Essential for socio-religious functions; mostly local or traditional varieties.

**species.** The unit of taxonomic classification into which genera are subdivided. A group of similar individuals different from other similar arrays of individuals. The main characteristic is reproductive isolation.

**specific combining ability.** Deviation in the performance of a cross from the performance predicted on the basis of general combining ability of its parents.

**specific gravity.** The ratio of the density of a substance to the density of another substance (usually water at 4 °C) taken as a standard when both densities are obtained by weighing in air.

**specific resistance.** See Vertical resistance.

**specific leaf area.** Leaf area per unit dry weight (cm<sup>2</sup>/g).

**specific leaf weight.** Weight per unit leaf area (g/cm<sup>2</sup>).

**specimen.** The sample and reference material.

**spectroradiometer.** An instrument used for high-accuracy, automated spectral measurements over the UV to the infrared range.

**spike.** An unbranched elongated inflorescence with sessile (without a stalk )or almost-sessile flowers.

**spike-tooth harrow.** A tillage implement used to cover seeds that are broadcast or drilled in furrows.

**spikelet.** 1). The basic unit of the rice inflorescence consisting of two sterile lemmas, the rachilla, and the floret. 2). The unit of the grass flower that includes the two basal glumes subtending one to several florets.

**spikelet abortion.** Spikelet development checked due to some stress factor.

**spikelet sterility.** A situation in which there is no grain within the glumes of the rice plant.

**spiracles.** Breathing pores; any of several tracheal openings in the exoskeleton of an insect.

**spiroplasma.** Pleomorphic, wall-less microorganisms that are present in the phloem of diseased plants. They are often helical in culture and are thought to be a kind of mycoplasma.

**split application.** Application of chemical or fertilizer divided into two or more parts and applied at given intervals.

**split-plot design.** An experimental design that can be used only for factorial experiments. It divides factors into two groups, one assigned to main plots and another to subplots. The precision of the measurement of effects related to the main plot factors is sacrificed to improve that of the subplot factors.

**spore (fungi).** A single- to many-celled reproductive structure of a fungus.

**sporocarps.** 1). The spore-containing structures. 2). The fruit cases of certain ferns containing sporangia or spores.

**sporophytic.** A condition in which sterility/fertility is imparted to the pollen by the plant upon which the pollen is borne and the genotype of the pollen has no bearing per se. It may be controlled by more than one gene with multiple alleles.

**spreader.** An agricultural implement used to disperse seed or fertilizer in the field.

**spreading panicle branches (spr).** The primary panicle branches extend obliquely outward so that they appear spreading and lax.

**sprout.** A germinated seed; to grow from the seed or to grow from another part of the plant.

**stable line.** A breeding line that does not change its characteristics.

**stable resistance.** A resistance that is stable across time and space.

**stable transformation.** Gene transfer that leads to the integration of introduced sequences into the chromosomes of the recipient plant and remains stable.

**stages of flowering.** The four phases of a flower's development--floral initiation, floral organization, floral maturation, and anthesis.

**staggered planting.** Planting different fields in a community or on a farm over a period of several weeks, in contrast with simultaneous planting wherein all fields are planted over a period of a week or less.

**stained grain.** The discolored grain usually due to fungal disease or infection.

**stamen.** The part of the flower bearing the male reproductive cells; composed of the anthers on the filament (stalk).

**stand.** A group of plants or trees growing together in a given area.

**standard check.** A rice variety or breeding line whose response to a treatment is known and which is repeatedly included in tests as basis for comparing the reactions of tests entries. A resistant and a susceptible check are usually included.

**standard deviation.** The measure of variability given in mathematical terms of how much an observation differs from the mean set of observations. The positive square root of the average squared deviations of the observations from the mean.

**standard error.** The measure of the average chance departure of a statistic from its expected value. It is sometimes known as the standard deviation of the means. The standard deviation of the sampling distribution of a statistic.

**standard evaluation system for rice.** An international system of classifying responses of rice to biological, chemical, and physical stresses, developed through cooperative efforts of rice scientists and published by IRRI in a booklet.

**staple crop.** The crop grown as the basic diet of the population of a particular country or area.

**starch.** 1). The major storage carbohydrate of plants; a polymer composed of D-glucose units occurring as amylopectin and amylose and found in chloroplasts, amyloplasts, and endosperm. 2). Major carbohydrate source for animals.

**statistic.** A single datum or term in a collection of statistics. It is an estimate of a parameter made from a sample, with the quantity computed from a sample.

**statistics.** 1). An analysis and interpretation of numerical data used to define scientific experiments. 2). An orderly arrangement of facts collected for study in general information--e.g., production of a crop or a country.

**stem.** The main support structure of the aboveground part of a plant from which leaves, tillers or branches, flowers, and fruits develop.

**stem borer.** An insect belonging to the order Lepidoptera that infects stems of rice. The adults of most stem borer species are nocturnal and are attracted to light, especially ultraviolet light. Deadhearts and whiteheads are two visible symptoms caused by stem borer larva infestation.

**stem dissection.** Cutting open the stem to study its structures or evaluate internal damage.

**stem elongation.** 1). Increase in length of the upper stem internodes which begins before panicle initiation. This process is associated with exertion of the panicles from the sheath to allow flowering and pollination. 2). Increase in length of internodes of deepwater rice in response to flooding.

**stem lumen.** The hollow, tubular section of the plant internode, also called the internodal lacuna, and pith or medullary cavity.

**stem rot.** A fungal disease caused by *Magnaporthe salvinii* (*Nakataea sigmoidea*) and *Helminthosporium sigmoideum* var *irregulare*. The disease starts with a small, blackish, irregular lesion on the outer leaf sheath near the water line. The lesion enlarges as the disease progresses, with the fungus penetrating into the inner leaf sheath. Finally, the leaf sheath is partially or entirely rotted.

**sterile.** Failing to produce or incapable of producing offspring.

**sterile glumes.** Glumes at the base of the spikelet of the rice plant which do not produce a flower.

**sterile lemmas.** The two flowerless bracts at the base of the spikelet.

**sticky.** Grains that stick together when cooked. A characteristic of glutinous rice.

**stigma.** The terminal part of the pistil to which pollen grains adhere.

**stigma receptivity.** The characteristic of a stigma that facilitates germination and penetration of pollen upon deposition on its surface.

**stipule.** Leaf-like appendage at the base of the leaf stalk.

**stock.** Purified seed in storage for future multiplication; the available amount of seed.

**stock culture.** An insect culture which serves as a source of insects for beginning a rearing program.

**stock seed.** Seed stored for multiplication.

**stolon.** A modified aboveground stem creeping and rooting at the nodes.

**stomata.** Small openings in the epidermis of the leaf or other plant parts which control exchange of gases and water vapor; controlled by the guard cells.

**straggling.** Spreading out irregularly.

**strain.** A group of plants within a variety that share common, recognizable features in morpho-agronomic characters, physiological differences, or reactions to specific disease pathogens or insect pests. A strain, may include several lines with similar features.

**stratification.** The process of dividing a population into relative homogeneous subgroups to increase sampling efficiency.

**straw.** The dry stems and leaves of a rice plant that have been harvested and discarded from threshing.

**stress.** The state or condition of injury caused by detrimental effects of environmental factors such as drought, excess water, temperature, and others.



**striate.** Marked with fine longitudinal lines or ridges.

**stringency.** Term used to define the accuracy of nucleic acid interactions in southern or northern hybridization experiments.

**strip cropping.** Growing two or more crops simultaneously in strips that can be alternate; strips can be independently cultivated.

**strip tillage.** Tillage operations performed in alternate strips of tilled and untilled soil.

**striped stem borer.** The adult lays its eggs on the basal half of the leaves. The eggs hatch in about 5 days. The larva has three dorsal and two brownish abdominal stripes. The moth emerges after 5 days of pupation. The moth is straw-colored to light brown with silvery scales and several black dots at the tip of the forewing. The hindwing is yellowish-white. The moth lives for about 5 days. This stem borer has a life cycle of about 40 days. Scientific name: *Chilo suppressalis*.

**stripper harvesting.** A method of harvesting seed or leaf material where the seed or leaf is mechanically removed from plant in situ, usually by a comblike device.

**stubble.** The lower portion of the stems remaining in the field after the rice has been harvested.

**stubble mulch.** The stubble of crops or crop residues left on the soil as a surface cover before and during the preparation of the seedbed and at least partly during the growing of a succeeding crop.

**stunting.** Dwarfing due to disease or physiological disorder .

**style.** The elongated stalk of the pistil connecting the stigma and the ovary.

**stylet.** A long, slender, hollow feeding structure of nematodes and some insects.

**stylet sheath.** A sheath formed in the plant from the saliva released by the stylets of hoppers during feeding.

**subculture.** Cells transferred from one nutrient medium to another.

**sub-erect.** Erect at the base, bending downward at the top.

**submerge.** To place or plunge under water or other liquid.

**submergence (of plant).** A plant standing in water with at least part of the terminal above the water (partial submergence); or completely covered with water (complete submergence).

**submergence tolerance.** Ability of a rice plant to survive after being completely under water from a flash flood.

**substrate.** The material or substance on which a microorganism feeds and develops; also a substance acted upon by an enzyme.

**subsurface tillage.** Tillage with a special sweeplike plow or blade which is drawn beneath the surface at depths of several inches and cuts plant roots and loosens the soil without inverting it or without incorporating the surface cover.

**subtend.** Situated at the base of.

**succulent.** Soft, juicy, and fleshy.

**sucker.** A shoot of the plant arising from below the ground; a parasite from a host plant.

**sulfur-coated urea.** Urea fertilizer with a thin layer of sulfur on the surface to slow down nitrogen release, making it available to the plant for a longer time.

**sum of squares.** The sum or addition of the squares of the differences between the mean of a set of observations and individual observations.

**summer fallow.** A special case of fallowing in which all vegetative growth is prevented by shallow cultivation during the summer months in order to conserve moisture.

**superimposed trials.** Experiments composed of a small set of treatments that evaluate the performance of alternative component technology for a cropping pattern. The treatments are added, generally without replication, on four or more similar cropping pattern trial fields.

**supernatant.** Liquid left above a pellet after centrifuging.

**supplementary pollination.** The increase in pollination of the CMS spikelets done artificially by shaking the male parent at anthesis time particularly when wind velocity is less than optimum (2-3 m/s).

**suppressive soils.** Soils in which certain diseases are prevented because of the presence in the soil of microorganisms antagonistic to the pathogen.

**suppressor (inhibitor) (genetics).** A gene that prevents the expression of another gene.

**surface area.** The surface area of soil is usually expressed as square meters per gram.

**surface hydrology.** Study that deals with dynamic status of surface flooding and the subsurface water table in an agricultural field.

**surface runoff.** Water from a catchment area that is discharged or lost without entering the soil.

**survey.** Collection of data about a given factor. Interviews to provide quantitative data for analysis.

**survival.** The act of remaining alive or in existence.

**susceptible.** Having little or no resistance to a specific infectious disease, insect pest, or other biological and physical stresses. When the host plant is unable to suppress or retard an injurious insect.

**susceptible check.** See Standard check.

**suspended load.** Finer particles of silts and clays carried long distances by rivers; as opposed to bed load (stones and coarse sand) and dissolved load (compounds in solution).

**suspension culture.** A type of culture in which cells grow and multiply while suspended in liquid medium.

**suspension.** A relatively coarse, noncolloidal dispersion of solid particles in a liquid.

**surrounding.** 1). Enclosing with a fence, bund, or barricade. 2). The outside plants around a field. 3). The land outside the field in the same vicinity. 4). Adjacent fields in the same vicinity.

**sustained.** Maintained regularly, ongoing over a period of time.

**swale.** An elongated trough or depression between a point bar and a river bank; usually seasonally wet or marshy and sometimes covered with dense vegetation.

**swamp.** An area saturated with water throughout much of the year but with the surface of the soil usually not deeply submerged.

**swamp rice.** Rice that usually grows in low-lying swampy conditions without water

control or with little water control.

**symbiosis.** The living together in intimate association of two dissimilar organisms, the cohabitation being mutually beneficial.

**symptom.** A visible or otherwise detectable change in the plant or associated parts arising from disease.

**synapsis.** Pairing of homologous chromosomes during pachytene or zygotene.

**syngamy.** Union of gametes or sex cells to form a zygote.

**synthetic detergent.** A manufactured liquid or solid material able to dissolve oily materials and disperse them in water.

**systemic.** Common to a plant system, generally distributed throughout an organism.

**systemic fungicide.** A chemical substance absorbed by the plant; it remains in the developing tissues and protects the plant from fungal attack for a length of time.

**systemic herbicide.** Chemical absorbed into the plant parts which inhibits growth. It is toxic to particular plants only and designed to affect unwanted plants or weeds.

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**systemic infection.** Occurs when a pathogen is translocated throughout the plant tissues, causing extreme damage to the plant.

**systemic insecticides.** A chemical substance absorbed by the plant tissues that affords protection for a reasonable amount of time against insect pests without harming the plant.

## T Terms

**T. Aman.** This rice is used in Bangladesh and eastern India for transplanted lowland rice, grown in the wet season when water depth does not exceed 0.5 m, approximately from July to September.

**t-test.** A statistical test criterion in comparing two samples of data believed to be normally distributed.

**tag.** A small marker usually tied to a plant, bag, or packet and used for identification and classification of samples.

**talc.** A silicate mineral that is extremely soft and has a soapy or greasy feel; used as talc powder.

**target crop.** One that has the potential to be a major crop, increasing the farmer's production and income.

**tegmen.** A covering or integument, such as the tough, leathery forewing of certain insects or the inner coat of a seed.

**tegmen layer.** Two layers of cells next to the pericarp of a seed which represent the inner cell layers of the inner integuments of the ovule. The tegmen is often mis-termed as testa which is derived from the outer integuments in the ovule and which is destroyed before the caryopsis ripens.

**telomere.** Terminal region of chromosomes characterized by repeated DNA sequences.

**telotrisomic.** A trisomic in which the extra chromosome has only one arm.

**tempering.** This means drying the grain on a drying pad for a number of hours or in a grain dryer, then tempering the grain by allowing it to cool for a number of hours in a bin or bag. This process should be repeated at least twice until the moisture is consistently at 14%.

**tendrill.** A slender, clasping or climbing organ of a stem or leaf.

**tensiometer.** An instrument for measuring the amount of energy needed to extract water from the soil (usually expressed in kPa or cbars).

**terrace.** 1). Bench-like portions of a former flat river floodplain left at higher levels by the downcutting action of a river; alluvial terraces and river terraces are generally considered as synonymous. 2). An artificially leveled field or series of fields made on sloping land.

**terete.** 1). Cylindrical or tapering, circular in cross-section. 2). Circular in cross-section.

**terminal.** At the end of branch or a stem.

**tertiary tillers.** Arise from secondary tillers and are the third group of tillers to grow during the plant's development.

**test entries.** Varieties or breeding lines being evaluated.

**test insect.** The insect species and biotype against which a test entry is being evaluated.

**testa.** Hard external coating or integument of a seed.

**testcross.** A cross made between cytoplasmic male sterile line and a test variety to identify maintainers and restorers.

**testcross nursery.** Breeding nursery where F1 progenies of cytoplasmic male sterile

lines and test varieties are screened for pollen sterility/fertility and spikelet fertility to identify maintainers and restorers.

**tester.** A cross between a selection, line, or clone and a common pollen parent which may be a variety, inbred line, or a single cross. The common pollen parent is called the top cross or tester parent.

**tester strain.** A common parent, generally male, used in crosses with a series of lines in order to analyze the combining ability of lines.

**tetraploid.** An organism with four basic (n) sets of chromosomes.

**thallus.** A plantlike organism not divided into leaves, stem, and root. Mushrooms and lichen are examples of thalli.

**thermocycler.** An apparatus which changes temperatures according to precise programming. Usually used with PCR, RAPD, AP-PCR, and DAF.

**thermosensitive genic male sterile line (TGMS).** The genic male sterile plant which responds to temperature for expression of its pollen sterility/fertility.

**Thermus aquaticus.** *Thermophilic bacterium* found in hot springs. Its DNA polymerase enzyme is thermostable and is used in PCR, RAPD, and DAF.

**thinning.** Removal of some plants to attain the desired population density.

**three-line breeding.** Breeding methodology where three lines--cytoplasmic male sterile, maintainer, and restorer--are used to produce F1 hybrids.

**three-way cross.** When an F1 hybrid is crossed to a third variety or breeding line.

**threshability.** Ease by which the grains are removed from the panicle.

**threshing.** Operation of detaching or separating the rice grains from the panicle by hand or mechanical means.

**threshold.** 1). A phenomenon that can obscure the gene-character relationship. 2). A safe level of economic viability.

**threshold moisture content. (biology)** The minimum moisture condition, expressed either in terms of moisture content or moisture stress, at which biological activity just becomes measurable.

**tibia.** The fourth division of the insect's leg between the femur (thigh) and the tarsus or the foot.

**tidal flats.** Areas of nearly flat, barren mud periodically covered by tidal waters. Normally these places have an excess of soluble salt.

**tidal wetlands.** Areas where water levels in the ricefields fluctuate under the influence of tides.

**till.** To plow and prepare for seeding; to seed or cultivate the soil.

**tiller.** A vegetative branch of the rice plant composed of roots, culm, and leaves which may or may not develop a panicle. Shoot arising from the main culm (stem).

**tillage.** 1). The mechanical alteration of some physical properties of the soil to provide a condition appropriate for crop growth. 2). To cultivate the land, to gain moisture in the soil.

**tiller blades.** The soil-engaging part of a rotary tiller or tillage tool that cuts and turns the soil over.

**tiller number.** Number of tillers present in a rice plant.

**tillering ability/capacity.** The genetic potential of a given variety to produce a

certain number of tillers.

**tillering stage.** Growth stage of the rice plant that extends from the appearance of the first tiller until the maximum tiller number is reached.

**tilth.** The physical condition of the soil as related to its ease of tillage, fitness as a seedbed, and its impedance to seeding emergence and root penetration.

**tipburn yellow.** A condition in which the yellowish seedlings die after the second foliage leaf is formed. The leaf apexes wither and die.

**tissue culture.** A technique of growing large pieces of tissue (explant) from different parts of a plant in semisolid or liquid medium under aseptic conditions. After the culture, masses of undifferentiated tissue are produced or plants are regenerated.

**tolerance.** Ability of a plant to withstand stress without yield reduction or injury.

**topcross.** A cross between a selection, line, or clone, and a common pollen parent which may be a variety, inbred line, or a single cross. The common pollen parent is called the topcross or tester parent.

**toposequence.** A sequence of soils in the landscape, from the crest to the valley bottom.

**topdressing.** The application of fertilizer materials after seeding or transplanting or after the crop has been established.

**topsoil (surface soil).** The uppermost part of the soil ordinarily moved in tillage, or its equivalent in uncultivated soils. Topsoil ranges from 8-10 cm to 20-25 cm in depth. It is frequently designated as the plow layer.

**total factor productivity.** The productivity of all inputs taken together.

**total milled rice.** Quantity of whole plus broken grains of milled rice that can be obtained from a given quantity of clean rough rice.

**totipotency.** Potential of cells or tissues to form all cell types and/or to regenerate a plant.

**toxic.** Of, relating to, or caused by a poison or toxin, poisonous, causes illness, reduces plant growth.

**toxicity.** The quality of being poisonous.

**toxin.** Any of the various poisonous substances produced by certain plants and animal cells including bacterial toxins, phytotoxins, and zootoxins.

**traditional cultivars.** Tall, weak-stemmed, long-duration, low-yielding cultivars grown by farmers for many years.

**traffic pan (handpan).** A 5- to 10-cm thick compacted subsurface horizon between the 10- to 40-cm depths; common in paddies.

**trait.** A distinguishing quality or character of a plant.

**transcription.** 1). Copying of a gene into RNA. Also, copying of a viral RNA into a cRNA. 2). The process by which DNA is copied into RNA. As the nucleic acid "language" stays the same (see genetic code), the process is called transcription.

**transduction.** Transfer of genetic material from one bacteria to another by means of a bacteriophage.

**transfer RNA (tRNA).** The RNA that becomes attached to an amino acid and guides it to the correct position on the ribosome for protein synthesis; there is at least one

tRNA molecule for each amino acid.

**transformant.** A bacterial cell that has undergone transformation.

**transformation.** The genetic modification induced by the incorporation of "foreign" DNA into a cell.

**transgenic.** Descriptive of an organism that contains some genetic material that has been experimentally transferred into it from some other source.

**transgressive segregation.** A segregation pattern in which the segregants exceed the limits of the parents.

**transient expression.** Expression of a transforming gene by recipient cells over a relatively brief time span; does not necessarily indicate integration of the gene into the plant chromosome.

**transitory yellowing.** A virus disease of rice transmitted by green leafhoppers (*Nephotettix nigropictus*, *N. cincticeps*, and *N. virescens*). The characteristic symptoms are yellowing of leaves, reduced tillering, and stunting. The disease is similar to tungro since it is transmitted by the same insect.

**translation (genetic).** The process by which the genetic information of RNA is used to specify and direct the synthesis of proteins. Occurs in ribosomes.

**translocation.** 1). Genetic. Change in position of a segment of a chromosome to another location in the same or a different chromosome. 2). Physiological. The movement of assimilates (carbohydrates or nutrients) from one plant organ to another in response to stress or ontogeny. 3). Breakage and reunion of chromatid at a different point of the chromosome.

**translucency.** The opposite of chalkiness; measured with a Riken-Sanno Rice Meter which measures transmitted light through a fixed volume of rice grains, one model for brown rice, another for milled rice.

**translucent.** Transmitting light but causing sufficient diffusion to eliminate perception of distinct images; intermediate between clear and opaque.

**transmitted nutrients.** Nutrients moved to growing points during seed germination.

**transovarial passage.** Transmission of virus in the insect from one generation to the next through the egg.

**transpiration.** The process by which plants release water vapor to the atmosphere through surface pores (stomatal openings) in the plant foliage in response to atmospheric demand. The water of transpiration usually reaches a maximum value in the afternoon and a minimum value just before sunrise. Soil moisture content and plant characters, such as location and distribution of stomata, reduction of transpiration surface (leaf rolling), and plant age, affect transpiration rate.

**transplant.** To remove seedlings from the nursery (seedbed) and plant them in the field either by hand or machine.

**transposon.** Transposable element in either prokaryote or eukaryote. May contain its own transposase enzyme gene. Usually is flanked by direct or indirect repeat sequences.

**transverse.** Across the long axis.

**trap crop.** A crop that is planted specifically to attract pests, rodents, or birds away from the main crop.

**treatment.** A general term denoting different effects which are to be compared or

the effects or factors that are to be measured. (e.g., variety, fertilizer rates) or procedures (e.g., method of nitrogen application).

**trial.** An experiment to determine or test the quality or performance of a specific variety, system, or crop rotation and its usefulness in increasing farmers' production.

**triangular hull (tri).** The spikelet appears triangular because the lemma is so shaped.

**trifoliate.** Having three leaflets.

**trigonous.** Three-angled

**trihybrid.** A hybrid rice from a cross between parents differing in three specific genes.

**trim.** See Clip leaves.

**triple crossing.** Sequential crossing of three cultivars, (e.g., for A, B and C, A x B, AB x C, ABC x A, ABCA x B, and so on.

**triplex.** A polyploid recessive at all loci except three with respect to a particular gene.

**triploid.** An organism with three basic (n) sets of chromosomes.

**trisomic.** An organism diploid except for one kind of chromosome which is present in triplicate, hence, having  $2n + 1$  chromosomes.

**truncate.** Cut-off somewhat squarely at the end.

**tuber.** A short thickened underground stem.

**tubercle.** Any small, rounded projection.

**tuberous.** Bearing a tuber.

**tufted.** Having many short, crowded branches all arising from about the same point.

**tungro.** A viral disease transmitted by green (*Nephotettix spp.*) and zigzag leafhoppers (*Recilia dorsalis*). The diseased plants are characterized by stunting and reduced tillering. The leaf color ranges from light yellow to orange-yellow. Yellowing usually starts from the tips of the leaves. The panicles are often not fully exerted. The grains are usually covered with dark brown blotches.

**tunneling.** Making a passage through plant material by the feeding of larvae.

**turnaround time.** The time interval between harvesting of the existing crop and planting of the next crop in a cropping sequence.

**turnrow (turn strip, head land).** The land at the margin of a field on which the plow or other equipment may be turned.

**two-line breeding.** Hybrid rice breeding methodology where only two lines, a male sterile (either photosensitive, thermosensitive, or chemically induced) and a pollen parent are used for the production of F1 hybrids.



## U Terms

**udbatta disease.** A rice disease caused by *Balansia oryzae-sativae* (*Ephelis pallida* Pat). The panicles emerge as small cylinders covered with white mycelium.

**udic.** Pertaining to a soil moisture regime where the soil is not dry for as long as 90 cumulative days (USDA, 1975).

**umbel.** An inflorescence in which a number of divergent flowers arises from the same point.

**undulate.** With a wavy surface.

**undulate rachis (Ur).** The primary panicle branches, especially the lower ones, have undulating secondary axes. This condition is caused by mechanical compression exerted on the branches owing to the premature extension of the axes while they are inside the flag leaf sheath.

**unfilled spikelet.** Grain that has not filled and matured due to adverse environmental conditions or other factors affecting its development.

**uniform.** Even; not varying; every factor has the same treatment.

**uniformity trial (blank test).** A trial or experiment where all the operations and treatments are the same except that samples of different sizes are used to evaluate heterogeneity.

**unimproved plant type.** A traditional plant type; tall, leafy, and susceptible to lodging.

**univalent.** An unpaired chromosome in meiosis.

**upland field.** A rainfed land area with no levees or dikes surrounding it to impound water; sowing is by direct seeding.

**upland rice (dryland rice).** Rice grown on both level and sloping fields that are not banded, that are prepared and seeded under dry conditions, and that depend on rainfall for moisture (without surface water accumulation).

**upland.** In general, land lying above the flood plain.

**uproot.** To pull up by the roots.

**ustic.** Pertaining to a soil moisture regime characterized by limited moisture during most of the year but with at least 1 rainy season of 3 months or more (e.g., in a monsoon climate) during which the soil is moist (USDA, 1975).

**utricle.** A small, bladderlike, one-seed fruit or any small bladderlike structure.

**UV-biometer.** A broadband meter for UVB monitoring. It measures the biological effect of ultraviolet radiation.

**UVA radiation.** The longest waveband in the UV region that includes radiation from 320-400 nm range and is less hazardous.

**UVB lamps.** Fluorescent lamps used for simulating the damage caused by sunlight especially in the UVB region.

**UVB radiation.** The middle UV region containing radiation between 280 and 320 nm and which affects plants and humans.

**UVBBE.** Biologically effective UVB radiation, which is the product of the action spectrum and the spectral irradiance at each wavelength in the UVB region.

**UVC radiation.** The shortest waveband in the UV region, between 200 and 280 nm

and is extremely hazardous.

**UVX radiometer.** A broadband UV sensor used for the measurement of UV intensities.

## V Terms

**V-belt.** Belt for transmitting power, commonly used in agricultural equipment.

**V-belt seeder.** A seeding device where seeds are metered by the size of the hole in a belt.

**variability (plant breeding).** Genotypic differences.

**variables.** Data or some characteristics that show variability. The characteristic may be numerical (quantitative) or non-numerical (qualitative).

**variance.** A measure of dispersion which is the mean of the squares of deviations of the observations from the population mean. Estimated as the ratio of a sum of squares to the corresponding number of degrees of freedom.

**variant.** A plant that is different from the majority or from normal plants.

**variate.** A single observation or measurement.

**variation.** The occurrence of differences among cultivars due to differences in their genetic composition and/or the environment in which they were cultivated.

**varietal diversity.** The measurable differences among varieties grown in a particular area or the genetic diversity among varieties of the rice plant.

**varietal improvement.** The process of improving varieties to meet the standards required.

**varietal release.** The procedure for releasing varieties from breeding stations to farmers for commercial cultivation.

**variety.** 1). A group of cultivated plants within a species which is distinguished from another variety (group) by any characters (morphologic, physiological, biochemical, or other) of significance to agriculture and which, when reproduced, retains its distinguishing characters. A variety may be derived from several pure lines which have many common features and are reasonably uniform in appearance (but not necessarily genetically pure). 2). A group of similar plants which, by structural features and performance, may be identified from other varieties (groups) in the same species. It differs from a breeding line in that it has been named and made commercially available to farmers. 3). A subdivision of a species; a group of individuals within a species which are distinct in form or function from other similar arrays of individuals in commercial production. Variety is synonymous with cultivar.

**variety group.** The classification of accessions into groups based mainly on the morphological features of the adult rice plant and on grain appearance.

**variety trial.** A trial in which treatments are different in the varieties that are grown and all other factors are treated equally and in a uniform system.

**vascular.** Pertaining to, or having vessels that convey, fluids.

**vector.** 1). An organism that carries pathogens from one host to another. 2). An insect that transmits a disease. 3). A self-replicating DNA molecule that serves to transfer a DNA segment into a host cell in recombinant DNA technology.

**vegetable.** A herbaceous plant grown for eating, usually eaten as part of a meal.

**vegetative.** Referring to asexual (stem, leaf, root) development in plants in contrast to sexual (flower, seed) development.

**vegetative phase/stage.** The period from seed germination to the panicle initiation stage.

**ventral.** Pertaining to the under surface of the abdomen. On the anterior or inner surface of an organ (See dorsal).

**vernalization.** Exposure of germinated seedlings to low temperatures to promote flowering.

**verrucose.** Covered with wartlike protrusions.

**vertical genes.** See Major gene resistance.

**vertical resistance.** Resistance controlled by one or a few major genes, in which varieties with this type of resistance are usually highly resistant to one or several pathogen races or several disease races or insect biotypes of a given species but are susceptible to others. A type of resistance which is expressed against only some biotypes of a pest species and is governed by one or more genes in the host plant, each of which corresponds to a matching gene for parasitic ability in the pest species, sometimes called gene-for-gene resistance (See also Horizontal resistance).

**vesicular arbuscular (VA) mycorrhiza.** A common endomycorrhizal association produced by phycomycetous fungi of the genus *Endogone*. Host range includes many agricultural and horticultural crops.

**viability.** The ability to grow and develop into an adult.

**viable.** Said of spore or seed that is able to germinate or grow under favorable conditions.

**vigor.** 1). Plants. To have active, healthy, well-balanced growth. 2). Seeds. The capacity for natural growth and survival.

**virescent.** Young seedlings that are nearly white or slightly yellow as a result of delayed development of chloroplasts. Later the plant gradually turns green.

**virgin land.** Land that has not been used for agricultural purposes or disturbed by humans at all.

**virgin soil.** Soil that has never been cultivated or disturbed for crop production or any other purpose.

**viroids.** Small, low-molecular weight ribonucleic acid that can infect plant cells, replicate themselves, and cause disease.

**virion.** A virus particle.

**virulence.** Capacity of a pathogen or insect to incite a disease or injury to the host. Degree or measure of pathogenicity.

**virulent.** Strongly pathogenic.

**virulent gene.** A gene in pest which is able to break down the gene for pest resistance in the plant and thus allows the pest to use the plant as a host.

**viruliferous.** A term used to describe a virus-carrying insect. It denotes an insect that has been given access to a virus source.

**virus.** A submicroscopic infectious agent consisting of particles made up of DNA or RNA which are usually covered by protein and reproduce only in living cells; cannot be separated by filters.

**volunteer plant.** A plant that is growing from an unintentionally included seed, a seed that is shed or dropped by a previous crop. Also called a rogue.

## W Terms

**wart.** A small, blunt-tipped, rounded outgrowth.

**water control.** To control the amount and depth of water in the ricefield during the required time necessary for crop growth.

**waterlogged field.** A field which continuously has standing water and cannot be drained. The water level may not be deep.

**waterlogging.** Impeded drainage; or soil saturated with water but not necessarily with standing water.

**watershed.** The total area from which a single river collects surface water runoff; the catchment or drainage area of a river system.

**watershed degradation.** A marked deterioration in the hydrological behavior of a river system which reduces the potential of land and water by causing a water flow of inferior quality, quantity and timing.

**water table.** The upper surface of ground water and the level below it where the soil is saturated with water.

**water use efficiency.** 1). Expressed in terms of dry matter or harvested portion of the crop produced per unit of water consumed. 2). Ratio of the water used for evapotranspiration, seepage, and percolation to the sum of rainfall and irrigation supply.

**waxy (glutinous) rice.** Milled rice with negligible or no amylose in the grain.

**waxy endosperm.** Glutinous or waxy type of starchy endosperm, in which the starch fraction is composed of nearly 100 % amylopectin, 0-2% amylose, stains reddish brown with weak potassium iodide-iodine solution.

**weed control.** Prevention or eradication of weeds by physical removal (hand weeding) or limiting their growth by mechanical or chemical means.

**weed.** Any unwanted plant that is injurious to the crop.

**weedicide.** A term used for chemicals that control weeds.

**weeding.** Removing unwanted plants by hand from a crop, or tillage action which lightly cultivates the soil for the purpose of destroying the weeds.

**weevil.** The adult form of a certain coleopterous species.

**well puddled.** Said of muddy, very wet ricefield ready for sowing.

**western hybridization.** Also called western blotting. Method to detect protein by use of an antibody directed against it.

**wetbed method.** Raising seedlings on a seedbed where land is prepared and puddled.

**wetbed seeding.** Planting of pregerminated seed or small seedlings into a wet seedbed.

**wetland.** 1). Pertaining to soils flooded for at least several weeks each year, or to crops growing in such soils. 2). Land of which the rooting zone can be kept saturated for a substantial part of the growing season, where necessary, by encouraging accumulation of water on the soil through puddling and the use of bunds or levees.

**wettable powder (WP).** A pesticide formulation consisting of talc or clay and a wetting agent mixed with the pesticide. When water is mixed with the formulation, a suspension is formed and is used to spray on the target pest.

**wetland tillage.** Preparing the soil by plowing of lowland fields and harrowing the soil in a saturated or flooded condition.

**wetting agent.** A substance that renders a surface non-repellent to a wetting liquid.

**wheel track planting.** A practice of planting in which the seed is planted in tracks formed by wheels rolling immediately ahead of the planter.

**white belly.** A chalky white spot in the lateral part of the endosperm.

**white center.** The chalky area in the center of the endosperm of the milled nonglutinous rice.

**white stem borer.** It lays its eggs in batches of about 100 which are covered with silky grayish hairs. Incubation period is about 8 days. The larva is similar to yellow borer larva, except that it is white and reaches full growth in about 30 days. Pupation is completed in about 8 days. The adult lives for about 7 days. It is white and slender. It resembles the yellow rice borer, but does not have a black spot on the forewing. The abdominal tip of the female is pink. The life cycle of the white stem borer is completed in about 53 days. Scientific name: *Scirpophaga innotata*.

**white tip.** A disease of rice caused by the nematode *Aphelencoides besseyi*, with symptoms consisting of chlorosis of the leaf tips which become brownish and tattered. The infected plants are stunted and produce a few, small spikelets/panicles.

**whitehead.** White, empty panicles resulting from the attack of stem borers that cut the lower portion of the stem. Whitehead can also be caused by drought, dry wind, or desiccation.

**whiteness.** Measured with a Kett Whiteness Meter Model C-3 (Malaysia, IRRI).

**whole kernel (white rice).** The unbroken kernel of rice that has been milled.

**whorl.** 1). A ring of similar organs arising from a node. 2). The arrangement of leaves in a circle.

**whorl maggot.** *Hydrellia philippina*, the larva of which feeds on leaves in the whorl.

**wide cross.** Cross between two distantly related species.

**wide hybridization.** Hybridization between plants belonging to different species or genera. It is also referred to as interspecific, intergeneric, remote or distant hybridization.

**wild rice.** Species of *Oryza* that are not cultivated.

**wilt.** A characteristic of the plant indicated by drooping, folding, rolling, or collapsing leaves due to an unfavorable water balance.

**wilting.** The loss of turgidity in plant tissue where the intake of water is insufficient to replace that lost by transpiration or other means, causing a deflation of the plant cells.

**wilting coefficient.** The percentage of water necessary for a plant that has begun to wilt to recover, if that water is supplied.

**wilting point.** Reached when the soil cannot supply enough water to balance the plant's losses by transpiration.

**windbreak.** A planting of trees, shrubs, or other vegetation, usually perpendicular or nearly so, to the principal wind direction, to protect soil, crops, homesteads, roads, etc., against the effects of winds, such as wind erosion and the drifting of soil and snow.

**woody.** Hard in texture.

**working collection.** A sizable number of evaluated accessions that is stored, documented, and frequently used in breeding research.

**world collection.** A comprehensive collection of samples from different geographic areas of the world which is documented and stored. These are kept in storage as a genetic stock, and available to all for breeding purposes or reestablishment of a variety in a given location. Only segments of the world collection are of immediate practical value and thus find their way into the working collection.

## X Terms

**xantha.** A condition wherein seedlings have pale yellow leaves and perish shortly after germination.

**xerophytes.** Plants that grow in or on extremely dry soils or soil materials.

**xylem.** The supporting and water-conducting tissue of vascular plants; plant tissue consisting primarily of tracheids and vessels; woody tissue.



## Y Terms

**yellow dwarf.** A viral disease transmitted by green leafhoppers (*Nephotettix sp.*). The first symptom of yellow dwarf is general chlorosis, especially on the newly emerged and young leaves. The color varies from yellowish to green. As the disease progresses, the infected plants become severely stunted, tillering increases markedly, and leaves become soft and droopy. The infected plants produce either no panicles or a few small panicles, which bear mostly unfilled spikelets.

**yellow leaf (y).** Seedlings which have pale yellow leaves, but this condition is non-lethal.

**yellow mottle.** A disease caused by rice yellow mottle virus. The virus disease can be transmitted by mechanical inoculation or vectored by the adult beetle *Sesselia pusilla*. It is characterized by stunting and reduced tillering of the infected rice plant; crinkling, mottling, and yellowish streaking of the leaves; malformation and partial emergence of the panicles and sterility.

**yellow stem borer.** The borer which attacks rice throughout its growth period. It lays its eggs near the tip of the leaf blade in oval masses of 50-200 eggs each, which hatch in 8 days. The larva is cream-colored and the head capsule is reddish brown. The pupa is yellowish white with a tinge of green, but turns dark brown just before emergence. The male moth is light brown with numerous small brownish dots along the subterminal area and near the tip of the forewing. The female adult is yellow, the color deepening toward the tip, and there is a very distinct black spot in the center of each forewing. The hindwings are pale and straw-colored. Scientific name: *Scirpophaga incertulas*.

**yield.** The amount of a specified substance produced.

**yield components.** The factors that contribute to grain yield--number of panicles per square meter, spikelets per panicle, percentage of fertile spikelets, and weight of each single grain.

**yield decline.** A decrease in grain yields over a period of at least several years.

**yield growth rate decline.** A slowdown in the (percentage) rate of increase of grain yield over time.

**yield potential.** The maximum grain yield of a given variety in a given environment without constraints involving water, nutrients, competition, pests, diseases, or climatic conditions.

**yield, sustained.** A continual annual or periodic yield of plants or plant material from a given area. This implies that the management practices are such, that they will maintain the productive capacity of the land.

**yield trials.** Trials in which the main objective is to determine and compare the yields of a cultivar against a check.

**yielding ability.** The expected capacity of the plant to produce a certain quantity of grain.

## Z Terms

**zebra stripe.** Transverse, alternating chlorotic bands on seedling leaves which later disappear.

**zero tillage.** A practice where planting or seeding is directly done in untilled land.

**zinc deficiency.** Insufficient zinc in the plant tissue causes the midribs of the young rice leaves to become chlorotic especially at the base, brown blotches and streaks occur in the lower leaves, growth is stunted, tillering is reduced, leaf blade size is reduced, and uneven growth occurs.

**zygote.** Cell formed by the union of two gametes and the individual developing from this cell.

**zymogenous rice blast.** A fungal disease of rice which is characterized by the presence of spindle-shaped lesions. The lesion develops a grayish center and a brownish margin.

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BEST Bicol Experiment Station .....	10
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BLB Bacterial .....	10
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BLS Bacterial .....	10
BMZ/GTZ Bundesminister .....	10
BN Blast.....	10
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BNF Biological .....	10
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BPI Bank.....	10
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BRRI .....	10
BS .....	10
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BSFR Broadcast .....	10
BShR Brown.....	10
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CA22 Plunger .....	13
CAAMS Chinese Academy .....	13
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CACMI Comite Africain .....	13
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CARI Central Agricultural Research Institute	13
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CATIE Centro Agronomico Tropical	13
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CAZRI Central Arid Zone Research Institute	13
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CBD Convention on Biological Diversity	13
CC Chlorophyll	13
CCIC Canadian Council	13
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CCRIA Cooperative Central Research Institute	13
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CDNA Complementary DNA	13
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CEAT College	13
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CEDO Centre	13
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AACC American Association .....	6
CERES Crop .....	13
CERI Centre .....	13
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CF Crude .....	13
CFA Cercle France Afrique .....	13
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CFTC Commonwealth Fund .....	13
Technical Cooperation .....	13
CFTRI Central Food Technological Research Institute .....	13
CFTU/CIIFAD Conservation Farming .....	13
CFU Colony-forming unit/s .....	13
CGFPI Consultative .....	13
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CGIAR Consultative .....	13
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CIAP Cambodian-IRRI-Australian Project .....	13
CIARCO Centro .....	13
CIAT Centro Internacional .....	13
CIBC Commonwealth Institute .....	13
Biological Control .....	13
CIC Cassava Information Centre.....	13
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CICP Consortium.....	13
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CID Consortium on International Development .....	13
CIDA Canadian International Development Agency .....	13
CIDAGRO Centro .....	13
CIE Commonwealth Institute.....	13
Entomology .....	13
CIEI Center .....	13
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CIET Centro Internacional .....	13
CIFE Central Institute .....	13
Fisheries Education .....	13
CIFOR Center .....	13
International Forestry Research .....	13
CIFRI Central Inland Fisheries Research Institute .....	13
CII .....	81
CIIFAD Cornell International Institute .....	13
Food .....	13
CIMDER Centro .....	13
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CIMMYT Centro Internacional .....	13
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CIO Comite Inter Organismes .....	13
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CIRAD Centre .....	13
CIRAD-CA Annual Crops Department .....	13
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CIREC Centre International .....	13
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CL4 Confinement .....	13
Cladistic .....	81
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CLG Chemiluminigram .....	13
CLK Chalkiness .....	13
CLRRI Cuu Long Delta Rice Research Institute .....	13
CLSU Central Luzon State University .....	13
Clw .....	81
CM .....	13, 81
CM centiMorgan/s .....	13
CM Commercial .....	13
Cm <sup>2</sup> /g .....	173
CMA/IIM Centre .....	13
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CMS Cytoplasmic .....	13
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CMU Chiang Mai University .....	13
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CNIA Centro Nacional .....	13
CNPAF Centro Nacional .....	13
CNRRRI China National Rice Research Institute .....	13
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SACCAR Southern African Centre.....	51
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<b>CRIFC Central Research Institute</b> .....	13
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<b>CRIG Cocoa Research Institute</b> .....	13
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<b>CRRN Caribbean Rice Research Network</b> .....	13
<b>CRSP Collaborative Research Support Program</b> .....	13
<b>CRURRS Central Rainfed</b> .....	13
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<b>CSEAS Center</b> .....	13
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CSIR Council	13
Scientific	13
CSIRO Commonwealth Scientific	13
CSN Cropping Systems Network	13
CSRRI Central Soil Salinity Research Institute	13
CSTD United Nations Center	13
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CT Cold	13
CTAB Cetyltrimethylammonium	13
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DSI Disease	18
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DSS Decision	18
DSSAT Decision Support System	18
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EADI European Association	21
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EAG Electroantennogram	21
EAP Ecoregional	21
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ECA Economic Commission	21
Latin America	21
ECART European Consortium	21
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ECC Employee Compensation Commission	21
ECE Economic Commission	21
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EE Ether.....	21
EEC European Economic Community .....	21
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EPAMIG Empresa.....	21
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EPC Engineered.....	21
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ESCAP Economic.....	21
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FAME Fatty.....	23
FAO.....	6, 13, 23
FAO Food.....	23
FARMI-VISCA Farm.....	23
FAVD Favorable rainfed.....	23
FB Flat.....	23
Fb Followed.....	23
FC Forage.....	23
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FCCT.....	13
FCCT See CFTC.....	23
FCRI Field Crops Research Institute.....	23
FCS Free.....	23
FCSSP Federation.....	23
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FDC Spikelet.....	23
FDD Farm.....	23
FDP Fructose 1 6-diphosphatase.....	23
FE Field.....	23
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FEBTC Far East Bank.....	23
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FED Fonds Europeen.....	23
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FFHC Freedom From Hunger Campaign.....	23
FFSM Federation des Fondations.....	23
FFTRI Fruit.....	23
FIDA Fonds International.....	23
FIEWS Food Information.....	23
FIFABE Fikambanana Fampanandrosoana ny Lemak'i Betsiboka.....	23
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FINIDA Finnish International Development Assistance.....	23
FIPA Federation Internationale des Producteurs Agricoles.....	23
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<b>FNRI Food</b> .....	23
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<b>FOFIFA Foibe Fikarohana Ampiharina amin-ny Fampandrosoana ny Ambanivohitra</b> .....	23
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<b>BORIF Bogor Research Institute</b> .....	10
<b>CRIFC Central Research Institute</b> .....	13
<b>MARIF Malang Research Institute</b> .....	38
<b>MORIF Maros Research Institute</b> .....	38
<b>Research Institute</b> .....	10
<b>RIFSA Research Institute</b> .....	48
<b>SARIF Sukarami Research Institute</b> .....	51
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<b>IFDP Institute</b> .....	28
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<b>Food Production</b> .....	13
<b>Food Research</b> .....	28
<b>IFRPD Institute</b> .....	28
<b>Food Science</b> .....	6
<b>AIFST Australian Institute</b> .....	6
<b>Food Technology Research Institute</b> .....	23
<b>FOPPS Farm Operations</b> .....	23
<b>Ford Foundation</b> .....	23
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<b>FP Flood-Prone Rice Program</b> .....	23
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<b>FPRDI Forest Products Research</b> .....	23
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<b>FRT Floating rototiller</b> .....	23
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<b>GAAS Guangdong Academy</b> .....	25
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<b>GAIM Global</b> .....	25
<b>Gall</b> .....	25, 28, 111, 136, 164, 173
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<b>Gametophytic</b> .....	111
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<b>GAWI German Corporation</b> .....	25
<b>Technical Assistance</b> .....	25
<b>GB</b> .....	25
<b>GBIRET Germplasm Bank Information Retrieval</b> .....	25
<b>GBPU G.B.</b> .....	25



GC Gel.....	25
GC7 Portable.....	25
GCA General.....	25
GCDE Germplasm.....	25
GCM General.....	25
GCTE Global.....	25
GD Growth.....	25
GDP Gross.....	25
GEF Global.....	25
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GELCON Gel.....	25
GELTEMP Gel.....	25
GEMS Global Environmental Monitoring System.....	25
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CENARGEN National Centre.....	13
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GEU Genetic.....	25
GF Grain.....	25
GFD Grain.....	25
GFR Grain.....	25
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GH Greenhouse.....	25
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CRIG Cocoa Research Institute.....	13
GHC Green.....	25
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<b>GMo Moderate</b> .....	25
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<b>GSV Grassy</b> .....	25
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<b>GTZ Deutsche Gesellschaft</b> .....	25

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HA Humic .....	27
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HAU Haryana Agricultural University .....	27
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UH University .....	56
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HCES Honam Crop Experiment Station .....	27
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HDI High .....	27
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IIHR Indian Institute .....	28
HPLC High .....	27
HR Highly .....	27
HRD Human .....	27
HRR Head rice .....	27
HS Highly .....	27
Hsp .....	118
HT .....	27
HT1 Hydro .....	27
HT2 Hydro .....	27
HT3 Mini hydro .....	27
HU Centrifugal .....	27
Human Ecology .....	13
CHE College .....	13
Humic .....	13
HW Hand .....	27
HWR Hull .....	27
HWT Hot water .....	27
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I/J Indica/japonica	28
I1	124
I2	124
I3	124
IAA Indoleacetic	28
IAAE International Association	28
Agricultural Economics	28
IAAP Intensive Agricultural Area Program	28
IAC	28
IACOD International Agency	28
Cooperation	28
IADP Intensive Agricultural District Program	28
IADS International Agricultural Development Service	28
IAE Institute	28
Agricultural Engineering	28
IAEA International Atomic Energy Agency	28
IARC/s International Agricultural Research Center/s	28
IARI Indian Agricultural Research Institute	28
IARI-WTC Indian Agricultural Research International	28
IARPCB International Association	28
Research	28
IAS Institute	28
Agricultural Sciences	28
IASRI Indian Agricultural Statistics Research Institute	28
IB Inclusion	28
IBCP IRRI-Burma-CIDA Project	28
IBGE Instituto Brasileiro	28
IBPGR	28
IBPGR International Board	28
Plant Genetic Resources	28
IBRD	13, 21
IBRD International Bank	28
Reconstruction	28
IBSNAT International Benchmark Sites Network	28
Agrotechnology Transfer	28
IBSRAM International Board	28
Soil Research	28
ICA	28
ICAR Indian Council	28
Agricultural Research	28
ICARDA International Centre	28
Agricultural Research	28
ICASA International Consortium	28
Application	28
ICASALS International Center	28
Arid	28
ICDUP International Council	28
Development	28
ICGEB International Center	28
Genetic Engineering	28
ICID International Commission on Irrigation	28
ICIMOD International Centre	28
Integrated Mountain Development	28

ICRIP International Centre .....	28
Insect Physiology .....	28
ICLARM International Center.....	28
Living Aquatic Resources Management.....	28
ICP Intercountry Program on Integrated Pest Control .....	28
ICRAF International Centre.....	28
Research .....	28
ICRISAT International Crops Research Institute.....	28
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ICS Institute.....	28
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ICSU .....	13, 28, 51
ICSU International Council .....	28
Scientific Unions .....	28
ICTA Instituto .....	28
ICWG-GR Inter-Center Working .....	28
IDA International Development Association.....	28
Ideotype .....	124
IDESSA Institut des Savanes .....	28
IDH Isocitric dehydrogenase.....	28
IDIAP Instituto .....	28
IDPS IRRI Discussion Paper Series .....	28
IDRC International Development Research Centre.....	28
IDRON International Rainfed Lowland Rice Observational Nursery .....	28
IDRYN International.....	28
IEA Initial .....	28
IEF Isoelectric .....	28
IESAM Institute .....	28
Environmental Science .....	28
IFAD International Fund.....	28
Agricultural Development .....	28
IFAIN Instituto .....	28
IFAP.....	23
IFCC Institut Francais .....	28
IFDC International Fertilizer Development Center .....	28
IFDP Institute.....	28
Food Development Policy .....	28
IFPRI International Food Policy .....	28
IFRI Inland Fisheries Research Institute .....	28
IFRON International Floating Rice Observational Nursery .....	28
IFRPD Institute .....	28
Food Research .....	28
IFS International Foundation.....	28
Science.....	28
IGAC Intenational Global Atmospheric Chemistry Project .....	28
IGAU Indira Gandhi Agricultural University.....	28
IGBP International Geosphere-Biosphere Programme .....	28
IGBP-DIS IGBP Data .....	28
IGCCBD Inter-Governmental Committee .....	28
Convention .....	28
IGF International Genetics Federation .....	28
IgG Specific immunoglobulin.....	28
IGLIC International Grain Legume Information Centre.....	28
IGUAT Indira Gandhi University.....	28
Agriculture .....	28
IHPR Insect.....	28

<b>IIASA International Institute</b> .....	28
<b>Applied Systems Analysis</b> .....	28
<b>IIBC International Institute</b> .....	28
<b>Biological Control</b> .....	28
<b>IIE Imperial Institute</b> .....	28
<b>Entomology</b> .....	28
<b>IIHR Indian Institute</b> .....	28
<b>Horticultural Research</b> .....	28
<b>IIMI International Irrigation Management Institute</b> .....	28
<b>IIRON International Irrigated Rice Observational Nursery</b> .....	28
<b>IIRR International Institute</b> .....	28
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<b>IIRYN-M International Irrigated</b> .....	28
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<b>INIAP Instituto Nacional</b> .....	28
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<b>INTA Instituto Nacional Tecnologia Agropecuaria</b> .....	28
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NORAGRIC Norwegian Centre.....	40
International Agricultural Research .....	6, 13
ACIAR Australian Centre.....	6
International Center.....	13
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CCIC Canadian Council.....	13
Center.....	13
NUFFIC Netherlands Universities Foundation.....	40
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NORAD Norwegian Agency .....	40
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USAID United States Agency.....	56
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CIEI Center.....	13
International Federation.....	23
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CIFOR Center.....	13
International Fund .....	23
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NBI National Bureau .....	40
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IORD International Organization .....	28
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IPB Institute .....	28
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IPGRI .....	28
IPGRI International Plant Genetic Resources Institute .....	28
IPM .....	28, 124
IPM Integrated Pest Management .....	28
IPMN Integrated Pest Management Network .....	28
IPMRN Integrated Pest Management Research Network .....	28
IPPC International Plant Protection Center .....	28
IPR Intellectual .....	28
IR .....	28
IRA Institute .....	28
Agronomic Research .....	28
IRAEN International Rice Agro-Economic Network .....	28
IRAF Institut .....	28
IRALON International Rice Acid Lowland Soils Observational Nursery .....	28
IRALSN International Rice Acid Lowland Soil Nursery .....	28
IRAM .....	28
Iran .....	6
IRAT Institut .....	28
IRAUSN International Rice Acid Upland Soil Nursery .....	28
IRBBN International Rice Bacterial Blight Nursery .....	28
IRBN International Rice Blast Nursery .....	28
IRBN-L International Rice Blast Nursery--Lowland .....	28
IRBN-U International Rice Blast Nursery--Upland .....	28
IRBON International .....	28
IRBPHN International Rice Brown Planthopper Nursery .....	28
IRC .....	28
IRCTN International Rice Cold Tolerance Nursery .....	28
IRDP Integrated Rural Development Programme .....	28
IRDSN International Rice Drought Screening Nursery .....	28
IRDTN .....	28
IRDTN International Rice Drought Tolerance Nursery .....	28
IRDWON International Rice Deep Water Observational Nursery .....	28
IRDWYN International Rice Deep .....	28
IRFAON International Rice Finegrain Aromatic Observational Nursery .....	28
IRGA Instituto Rio Grandense .....	28
IRGC International .....	28
IRGD Irrigated .....	28
IRGMN International .....	28

<b>IRHON International Rice Hybrid Observational Nursery</b> .....	28
<b>IRIS Inarihan River Irrigation System</b> .....	28
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<b>IRLON International Rainfed Lowland Rice Observational Nursery</b> .....	28
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<b>IRRSWON</b> .....	28
<b>IRRSWON International</b> .....	28
<b>IRRSWON-E International</b> .....	28
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<b>IRRSWYN-E</b> .....	28
<b>IRRSWYN-E International</b> .....	28
<b>IRRSWYN-M International</b> .....	28
<b>IRS Internationally</b> .....	28
<b>IRSATON International Rice Salinity</b> .....	28
<b>IRSN International</b> .....	28
<b>IRSGON International Rice Slender Grain Observational Nursery</b> .....	28
<b>IRSSTN</b> .....	28
<b>IRSSTN International Rice Soil Stress Nursery</b> .....	28
<b>IRSTON International Rice Salinity Tolerance Observational Nursery</b> .....	28
<b>IRTIP International Rice Testing</b> .....	28
<b>IRTN International</b> .....	28
<b>IRTON International Rice Temperate Observational Nursery</b> .....	28
<b>IRTP</b> .....	28
<b>IRUN International Rice Ufra Nursery</b> .....	28
<b>IRUSS International Rice Ufra Screening Set</b> .....	28
<b>IRWBPHN International Rice Whitebacked Planthopper Nursery</b> .....	28
<b>IRWIT International Rice-Wheat Integrated Trial</b> .....	28
<b>IRYN International</b> .....	28
<b>IRYN-E International</b> .....	28
<b>IRYN-M International</b> .....	28
<b>IRYN-VE International</b> .....	28
<b>ISABU Institut des Sciences Agronomiques</b> .....	28
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<b>ISAR Institut des Sciences Agronomiques</b> .....	28
<b>ISBN International</b> .....	28
<b>ISDEF International Soil Data Exchange File</b> .....	28
<b>ISFEIP International Soil Fertility Evaluation</b> .....	28
<b>ISMARC Irrigation System Management Research Committee</b> .....	28
<b>ISNAR International Service</b> .....	28
<b>National Agricultural Research</b> .....	28

ISO International Standardization Organization.....	28
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ISRA Institut Senegal.....	28
ISRIC International Soil Reference.....	28
ISSN International.....	28
ISSS International Soil Science Society.....	28
ISTA International Seed Testing Association.....	28
ISWRN International Spring Wheat Rust Nursery.....	28
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ITCZ.....	124
ITD.....	124
ITPRON International Tide-Prone Rice Observational Nursery.....	28
ITRON International Tidal Wetland Rice Observational Nursery.....	28
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IUCN.....	28
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IURON International Upland Rice Observational Nursery.....	28
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IURON-M International Upland Rice Observational Nursery--Medium.....	28
IURYN International Upland.....	28
IURYN-E International Upland.....	28
IURYN-M International Upland.....	28
IVB Inner.....	28
IVOMD In.....	28
IVRI Indian Veterinary Research Institute.....	28
IVTDMD In.....	28

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JACODEC Japan Agricultural Chemicals Overseas Development Commission.....	35
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JARI Jute Agricultural Research Institute.....	35
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JAU Jiangxi Agricultural University.....	35
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JCAD Joint Committee on Agricultural Research.....	35
JICA Japan International Cooperation Agency.....	35
JICT Japan Information Center.....	35
Science.....	35
JIRCAS.....	54
JIRCAS Japan International Research Center.....	35
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JNAU Jawaharlal Nehru Agricultural University.....	35
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KAU Kerala Agricultural University .....	36
Kb .....	130
KB Kilobase .....	36
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KG KG .....	36
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KSU Kansas State University .....	36
KU Kasetsart University .....	36

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DOLE Department .....	18
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LAC Latin America .....	37
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LAI .....	37, 131
LAI Leaf .....	37
Lake Alaotra .....	13
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LAR Leaf .....	37
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LCP Light.....	37
LCR Ligase chain.....	37
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LD50 Duration .....	37
LDG Lodging .....	37
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LEW Leaf epicuticular .....	37
LF Leaffolder .....	37
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LIRRTP Lao-IRRI Rice Research .....	37
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Lister planting .....	131
Lithao .....	131
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ICLARM International Center .....	28
LMPCR Ligase .....	37
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Lr Leaf .....	37
LRDC Land Resources Development Centre .....	37
LRP Less .....	37
LSc Leaf .....	37
LSD Least .....	37
LSS Literature Search System .....	37
LTCCE Long-term .....	37
Lte .....	51
LTFE Long-term .....	37
LT-IBDS Low .....	37
LTR Light .....	37
Lu .....	131
LUCC Land-use/cover .....	37
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LWD Leaf water .....	37
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MAALS Monosomic .....	38
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MAAP Multiple .....	38
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MACROS Modules .....	38

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MADA Muda Agricultural Development Authority .....	38
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MAFF Ministry .....	38
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MAFI Ministry .....	38
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CMA/IIM Centre .....	13
MARC Machine .....	38
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MARDI Malaysian Agricultural Research .....	38
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MARI Maros Agricultural Research Institute .....	38
MARIF .....	10, 48
MARIF Malang Research Institute .....	38
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MAS Myanmar Agricultural Service .....	38
MAT Maturity .....	38
Matric .....	38, 150
Mb .....	38
MBPS Modified .....	38
MBRC Marginal .....	38
MC .....	38
MCA Monoclonal .....	38
McClelland .....	64
MCD Multiple cropping .....	38
MCI .....	136
M-d Man-days .....	38
MDS Minimum .....	38
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MGR Magnoporthe grissa	38
MH Major pedological	38
MHA Mobile humic	38
MHE Ministry	38
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MIFS Myanmar-IRRI Farming Systems	38
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MITS Multicrop inverted-T .....	38
Mixed intercropping .....	124
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MMPU Multimode .....	38
MMSU Mariano Marcos State University .....	38
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MOA Ministry .....	38
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MP Matric .....	38
MPTO Motor .....	38
MPTS Multipurpose .....	38
MR .....	38
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MRNA Messenger RNA .....	38

MRRTC Maligaya Rice Research.....	38
MS .....	38
MSc Master .....	38
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MSU Michigan State University.....	38
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MTA Material .....	38
MTCB Minimum.....	38
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NAFC National Agriculture .....	40
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NAL National Agricultural Library.....	40
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NARP National Agricultural Research Project .....	40
NARS/s National Agricultural Research System/s .....	40
NAS National Academy.....	40
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ISNAR International Service .....	28
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ODNRI Overseas Development.....	43
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NAU Nanjing Agricultural University .....	40
NBI National Bureau .....	40
Investigation .....	40
NBLS Narrow.....	40
NBPGR National Bureau .....	40
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NBS Narrow .....	40
NC No-choice .....	40
NCAER National Council .....	40
Applied Economic Research .....	40
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NCPC National Crop Protection Center .....	40
NCRE National Cereals Research .....	40
NCRI National Cereals Research Institute .....	40
NCRW National Commission.....	40
Role .....	40
NCSO National Census .....	40
NCSU North Carolina State University .....	40
Ndfa Contribution .....	40
NDUAT Narendra Deva University .....	40
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NEC National Executive Council.....	40
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NEDECO Netherlands Development Co .....	40
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NFDC National Fertilizer Development Center .....	40

NFE Nitrogen-free .....	40
NFNC National Food .....	40
NFS Nitrogen .....	40
NFTAL Nitrogen .....	40
NGA National Grains Authority .....	40
NGO Nongovernmental Organization .....	40
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NHI Nitrogen .....	40
NIA National Irrigation Administration .....	40
NIAB Nuclear Institute .....	40
Agriculture .....	40
NIAE National Institute .....	40
Agricultural Engineering .....	40
NIAR National Institute .....	40
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NIG National Institute .....	40
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NIRD National Institute .....	40
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NIRS National Irrigation Research Station .....	40
NIST National Institute .....	40
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NLB Neem .....	40
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Nm3 Normal .....	40
NMC Nonmorphogenic calli .....	40
NMR Nuclear .....	40
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NPGRLL National Plant Genetic Resources Laboratory.....	40
NPR Nominal.....	40
NPT New.....	40
NRI Natural Research Institute.....	40
NRIP National Rice Improvement Programme.....	40
NRS Nationally.....	40
NRSMC National Research.....	40
NSB Neem.....	40
NSC Nonstructural.....	40
NSDB National Science Development Board.....	40
NSERC National Sciences.....	40
NSKE Neem.....	40
NSN National Screening Nursery.....	40
NSSL National Seed Storage Laboratory.....	40
NSTDA National Science.....	40
NT Nontilled.....	40
NTP Nucleoside 5'triphosphate.....	40
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NUE Nitrogen use.....	40
NUFFIC Netherlands Universities Foundation.....	40
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<b>ODA Overseas Development Administration</b>		43
<b>ODAI Operation</b>		43
<b>ODASE Operation</b>		43
<b>ODC Overseas Development Council</b>		43
<b>ODEMO Operation</b>		43
<b>ODEPA Oficina</b>		43
<b>ODI Overseas Development Institute</b>		43
<b>ODM Overseas Development Ministry</b>		43
<b>ODNRI Overseas Development</b>		43
<b>Natural Resources Institute</b>		43
<b>ODR Operation</b>		43
<b>OECD</b>		43
<b>OEDF Overseas Economic Development Fund</b>		43
<b>OEEC</b>		13
<b>OEEC Organization</b>		43
<b>Economic Cooperation</b>		43
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<b>OFCF Overseas Farmers</b>		43
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<b>OM Organic</b>		43
<b>OMS Organic</b>		43
<b>ON Observational</b>		43
<b>ONADER Operation Nationale</b>		43
<b>ONB Office National des Barrages</b>		43
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OUAT Orissa University .....	43
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PA Prune .....	45
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PAR Photosynthetic .....	45
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PARC Pakistan Agricultural Research Council .....	45
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PAU Punjab Agricultural University .....	45
PB Primary .....	45
PBH Plowing .....	45
PCARRD Philippine Council .....	45
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PCR Polymerase chain .....	45
Pd Domestic .....	45
PDA Potato .....	45
PDSS Phosphorus .....	45
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PEt Potential evapotranspiration .....	45
Petri .....	150
PF Partially .....	45
PFGE .....	45, 150
PFGE Pulse .....	45
PFP .....	45, 150
Pg .....	45
<b>PGM Phosphoglucomutase</b> .....	45
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<b>PHTRC Postharvest Horticulture Training</b> .....	45
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PI Isoelectric.....	45
PI Panicle.....	45
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PIDE Pakistan Institute .....	45
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NBPGR National Bureau .....	40
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BPI Bureau.....	10
Plant Pathology Division .....	21
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ASPP American Society .....	6
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PN Pedigree.....	45
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PNUE Photosynthetic.....	45
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Ppm.....	81, 118
PPP Purchasing.....	45
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PRA Participatory.....	45
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RAU Rajendra Agricultural University.....	48
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RLR Rainfed .....	48
RLREP Rainfed Lowland Rice Ecosystems Program.....	48
RLRRC Rainfed Lowland Rice Research Consortium .....	48
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RRSV Rice .....	48
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RSV Ragged .....	48
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AIRD Asian Institute .....	6
BARD Bangladesh Academy .....	10
IORD International Organization .....	28
National Research Center .....	13
NIRD National Institute .....	40
PTCRD Philippine Training Center.....	45
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IIRR International Institute .....	28
RVDB Rice.....	48
RVIG Rice .....	48
R-W Rice-wheat.....	48
Rwanda .....	28
RWIC Rice-Blast International Collaboration .....	48
RWM Rice .....	48
RYMV Rice.....	48
RYT Replicated yield .....	48

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SADC Southern African Development Coordination Conference .....	51
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SARIF Sukarami Research Institute .....	51
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SBD Soil.....	51
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CSTD United Nations Center .....	13
DOST Department .....	18
IFS International Foundation .....	28
JICT Japan Information Center.....	35
LIPI Indonesian Institute .....	37
MSc Master .....	38
NAS National Academy .....	40
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CSIR Council .....	13
TISTR Thailand Institute.....	54
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ASCA Association .....	6
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SCU Sulfur-coated .....	51
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SD Standard .....	51
SDC Swiss Development Cooperation.....	51

SDI Stress.....	51
SDM Shoot.....	51
SDS Sodium dodecyl .....	51
SDS-PAGE Sodium dodecyl sulfate-polyacrylamide.....	51
SDW Seedling .....	51
SEA Estado .....	51
SEADAG Southeast Asian Development Advisory Group.....	51
SEAFDEC Southeast Asian Fisheries Development Centre .....	51
SEAPPO.....	51
SEARCA Southeast Asian Regional Center .....	51
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ICRISAT International Crops Research Institute .....	28
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SFR Small-farm.....	51
SFRIS San Fabian River Irrigation System.....	51
SG Stripper.....	51
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ShB Sheath.....	51
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SLW Specific.....	51
SMB Soil.....	51
SMIC Sorghum.....	51
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SN Source.....	51
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SS Systematic sampling .....	51
SSB Striped stem .....	51
SSC Sodium chloride/Sodium .....	51
SSCP Single .....	51
SSD Single .....	51
SSFM Small-scale .....	51
SSR .....	51, 173
SSR Single Sequence Repeat .....	51
SSSA Soil Science Society .....	51
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SSST Standard seedbox .....	51
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<b>TARO Tanzania Agricultural Research Institute</b> .....	54



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TC Thresher/Cleaner .....	54
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TDRI .....	54
TE .....	54
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TPE-WAU Theoretical Production Ecology-Wageningen Agricultural University .....	54
TPR Transplanted rice .....	54
TPRI Tropical Pesticides Research Institute .....	54
TPT Treadle .....	54
TR Transplanter .....	54
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TUAT Tokyo University .....	54
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UES Urea-elemental .....	56
UG Unfilled .....	56
UH University .....	56
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UICN Union Internationale .....	56
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UMMB Urea-molasses .....	56
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UNESCO United Nations Educational .....	56
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UNFSSTD United Nations Financing System .....	56
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UNICEF United Nations International Children's Emergency Fund .....	56
UNIDO United Nations Industrial Development Organization .....	56
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URARTIP Unified Rice Applied Research .....	56
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UREAP Ratio .....	56

UREAP Ratio .....	56
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URRC Ubon Rice Research Center .....	56
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URYT Upland .....	56
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VB Vascular .....	58
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