

Asian Region Groundnut Scientists' Meeting

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The meeting was organized by International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in cooperation with the Indonesian Agency for Agricultural Research and Development (AARD), at the Malang Research Institute for Food Crops (MARIF), Malang, Indonesia, from 14 to 17 November 1988. The Australian Centre for International Agricultural Research (ACIAR) and the Peanut Collaborative Research Support Program (Peanut CRSP) supported the Meeting by the participation of their staff and by bringing to Malang scientists involved in groundnut research in other countries of the region. The meeting was organized to bring together scientists from national, regional and international research institutions concerned with groundnut production in Asia in order to:

- (i) Discuss problems affecting groundnut production in the various parts of the region and exchange research information
- (ii) Identify the most important problems, and indicate their extent and where they are most serious
- (iii) Recommend priorities for research at national and international levels, and suggest collaborative research activities
- (iv) Discuss training needs in relation to agreed priority research areas, and
- (v) Facilitate interactions among groundnut scientists in the region and encourage cooperation at all levels.

Fifty-two scientists, from Australia, India, Indonesia, Korea, Malaysia, Nepal, People's Republic of China, Philippines, Thailand, USA, and Vietnam, and representatives of ACIAR, FAO, the Dutch ATA

Project, IDRC, Peanut CRSP, Winrock International, and from ICRISAT attended. Problems of groundnut production in the Asian region, and ways to overcome constraints to production through collaborative efforts were discussed in different group sessions. The priorities for research that were indicated and the recommendations to the group for research collaboration, training, and related aspects are summarized below:

Diseases:

Priority should be given to research on foliar fungal diseases (rust, late leaf spot, early leaf spot); virus diseases, especially peanut stripe virus (PStV) and bud necrosis disease (BND) caused by tomato spotted wilt virus; bacterial wilt; and the aflatoxin contamination problem.

- (i) The influence of cropping systems and seasonal variations in weather on diseases should receive more attention, particularly in respect of foliar fungal diseases and bacterial wilt
- (ii) More use should be made of the sources of resistance to rust and late leaf spot currently available from ICRISAT
- (iii) The economic importance of PStV should be established by surveys and crop loss assessments within the region
- (iv) The isolates of PStV from various parts of the region should be compared and studied in a country where groundnuts are not grown
- (v) Screening of groundnut and interspecific hybrid derivatives for resistance to PStV should continue as an international cooperative project, and resistance breeding should be done by the involved international agencies
- (vi) The distribution and economic importance of BND should be established for the region

- (vii) Information on control of BNI by modification of cultural practices should be made available, as well as information on other virus diseases
- (viii) Information on the occurrence of bacterial wilt, the spread, and on diagnosis of the disease should be made available through existing newsletters. ACIAR Bacterial Wilt and ICRISAT International Arachis Newsletters should exchange relevant articles
- (ix) An international cooperative project along the lines of the Peanut Stripe Virus Project should also be initiated by ACIAR for Bacterial wilt in order to coordinate research, exchange resistant germplasm, and investigate *P. solanacearum* isolates from different parts of the world
- (x) National institutes should examine their groundnut produce and produce to determine the importance of aflatoxin contamination in their countries
- (xi) Both preharvest and postharvest infection of groundnuts by the toxigenic *A. flavus* should be examined in order to give appropriate crop management recommendations to growers
- (xii) Resistance to preharvest seed infection by *A. flavus* exists and should be utilized to reduce the aflatoxin contamination both before and after harvest
- (xiii) soil/seed and seedling disease interaction should receive further attention. The benefits of seed protectants should be evaluated
- (xiv) The importance of diseases caused by *Sclerotium rolfsii* may be exaggerated and should be investigated. Cultural control measures should be developed rather than giving undue emphasis to resistance breeding

- (xv) Training should be provided on survey and crop loss assessment methods, on diagnosis of diseases, on resistance screening techniques, and on disease management practices.

Pests

Major pests in the region are thrips and aphids, leaf miners, hairy caterpillars, *Spodoptera*, *Helicoverpa*, ants, white grubs, termites, spider mites and millipedes. Rats and wild pigs are serious pests in Indonesia and Pakistan. Nematodes are also capable of causing serious damage, but very little is known about the diseases they cause and their economic importance.

- (i) Pest surveys and crop loss assessments should be undertaken to establish the economic significance of groundnut pests
- (ii) Pest control research should be coordinated across crops to establish effective systems
- (iii) More use should be made of the source of resistance to pests currently available in the USA, at ICRISAT, and in national programs. Host plant resistance is an important component of integrated pest management (IPM) schemes
- (iv) The possibility of forecasting virus epidemics by detection of virus particles in trapped insect vectors should be investigated
- (v) The relationship between thrips populations and yellow spot virus in Thailand should be studied
- (vi) More attention should be given to the use of insect pathogens for biological control of pests
- (vii) Training should be provided on pest survey and crop loss assessment methods, on identification of insect pests, particularly thrips, and on IPM systems.

Photoperiod and temperature:

Photoperiod and low temperature could be important factors in groundnut production in some parts of groundnut cultivating countries. In limited studies at ICRISAT Center interactions between photoperiod and diseases (rust and late leaf spot) were indicated. It was strongly felt that photoperiod could be an important factor in adaptation breeding.

- (i) Research on the mechanisms of photoperiod effects and their interaction with other environmental factors should be continued. This research was considered to be a more appropriate field for ICRISAT and ACIAR than for national programs
- (ii) ICRISAT and ACIAR should cooperate to further investigate the effects of photoperiod and irradiance on yield of groundnuts and so enhance the understanding of cultivar adaptation in environments with different photoperiods
- (iii) National programs within India should be encouraged to address the low temperature problem.

Drought:

Intermittent drought in upland rainfed cropping systems and terminal drought in lowland post-rice cropping systems were identified as major problems. Water logging in semi-arid tropical regions was also identified as a problem. Drought tolerant germplasm lines identified at ICRISAT and tested for their yield performance under a range of intermittent and terminal drought regimes could be used in breeding programs.

- (i) The carbon isotope discrimination technique developed by the Australian National University, Canberra, gives a close correlation with groundnut water-use efficiency, and further development should be encouraged as it has excellent potential for use in selection of drought-tolerant genotypes
- (ii) International organizations should cooperate in investigating the physiological processes involved in improved drought tolerance in order to provide information to national programs on suitable drought-tolerance traits for selection purposes
- (iii) A number of drought-tolerant genotypes are available from ICRISAT Center; it is vital that data on their performance under a range of drought conditions throughout the region be relayed back to ICRISAT
- (iv) As the ICRISAT genotypes derive their drought tolerance from superior rooting and water extraction capabilities, and as these abilities may be adversely influenced by acid soil conditions, it is suggested that in regions where both drought and acid soil problems occur, the priority for research by national programs should be in the area of acid soil tolerance
- (v) National programs should examine management options aimed at escaping the effects of drought, e.g., by intercropping groundnut genotypes of different maturities, and by varying plant populations. Results of such work should be given priority for publication in appropriate national and international newsletters.

Nutrient Stresses:

It was apparent that information on nutritional problems in groundnut in the region was sketchy and poorly reported. However, groundnut is robust, e.g., in its ability to extract P from soil, and most cultivars are tolerant of a wide range of pH from moderately acid to moderately alkaline.

- (i) A detailed inventory of nutrient disorders in groundnut across the Asia region should be compiled
- (ii) Adequate diagnostic or predictive tests for determining the occurrence and severity of individual nutrient disorders should be developed. Criteria for P fertilizer inputs are particularly important
- (iii) Priority should be given to research on extremely acid soils (pH<5) to

determine interactions with nutrient disorders. The AARD/ACIAR project, which has links with the Philippines through Peanut CRSP, should be supported

- (iv) Screening of germplasm for tolerance of acid soils in the Philippines should be encouraged and supported
- (v) ICRISAT should provide a catalog of cultivars sensitive to alkalinity-induced iron chlorosis
- (vi) Nitrogen fixation by groundnuts should be quantified
- (vii) Research on soil processes should be expanded to provide a better understanding of the problems involved in acid soils, waterlogging, nodulation, seedling establishment, and diseases, and the diagnostic procedures for identifying nutrient disorders.

Postharvest Technology and Aflatoxin:

Drying and storage of groundnut products are important aspects of postharvest technology that may be affected by rainfall during field drying, poor drying procedures, poor storage facilities, etc. These factors increase the likelihood of seed invasion by *Aspergillus flavus* and subsequent aflatoxin contamination, which is a serious problem in many countries of the regions. Lines with resistance to seed invasion by *A. flavus* are available from ICRISAT.

- (i) A standard should be established for inspection of seed for aflatoxin contamination
- (ii) Technology for groundnut production by small-scale farmers to reduce risk of aflatoxin contamination should be worked out for different agroecological zones.
- (iii) International cooperative research into the aflatoxin problem should be encouraged
- (iv) ICRISAT should take a leading role in making available *A. flavus* resistant cultivars, in collating and distributing research findings, and in arranging training courses.

Germplasm Collection and Adaptation:

Although most national programs are involved in germplasm collection, maintenance and evaluation, cooperation between them in germplasm exchange is limited, mostly due to lack of information on material available. Participants were informed that germplasm lines, specific crosses, segregating material, and homozygous breeding lines are available from ICRISAT. Breeding lines include early maturing lines, rust and late leafspot resistant lines, confectionery lines, thrips and jassid-resistant lines, drought-tolerant lines, and medium to late-maturing lines. These are available as observation nurseries, or as replicated international nurseries

- (i) All countries and international organizations should cooperate in collecting landraces. These should be added to the world collection maintained at ICRISAT Center

- (ii) ICRISAT should continue to provide both segregating and advanced breeding lines to national programs who, in turn, should supply ICRISAT with information on the performance of this
- (iii) Germplasm in their countries specific subject matter working groups should be organized to address such constraints as drought, foliar diseases, virus diseases, bacterial wilt, insect pests, acid soils, and shade problems
- (iv) Attempts should be made to resolve problems encountered in seed production

Crop Production:

Although many problems regarding crop production and agronomy were identified as being common throughout the region, it was considered appropriate that research on production and agronomy be conducted within national programs owing to their location specific nature. However, the role of international/regional organisations in supporting this work through physiological research was also considered important.

- (i) Attention should be given to the many agronomic problems occurring in the region, and this research, because of the location specific nature of many

of the problems, should be carried out within national programs

- (ii) National research activities in groundnut agronomy, including development of machinery, should be reported in the International Arachis Newsletter and other newsletters as well as in appropriate journals
- (iii) National programs should collect and document data on occurrence and importance of the various agronomic constraints within existing production systems.

International Cooperation and Training:

a. Germplasm exchange and quarantine

- (i) The importation of multiple samples of identical seed material into a country should be avoided, thus reducing the chances of importing diseases and pests
- (ii) Germplasm and other lines with identified stress resistances or other favorable characters should be maintained within countries to reduce the need for fresh importations

b. Networking

The Asian Grain Legumes Network (AGLN) was considered to be an effective network, and the ACIAR and Peanut CRSI projects, although country specific, are collaborating effectively with it to support groundnut research in the region. The development of 'working groups' to promote collaborative research was strongly supported, and the following areas were identified: virus diseases, bacterial wilt, aflatoxin contamination and postharvest technology, integrated pest management and agronomy and crop physiology.

c. Training

It was emphasized that in addition to looking toward IARCs for technical information and assistance, countries in the region need to interact to improve their capability to identify problems and conduct research.

All the above recommendations were presented and approved in the plenary session. ICRISAT was asked to consider including other legumes (mungbean and soybean) in the AGLN, and to collate information on groundnut from different sources for dissemination to groundnut scientists.