ICRISAT Groundnut Successes in Western Africa

ICRISAT cooperators in western Africa brought encouraging news with them to the Second Regional Groundnut Meeting for Western Africa, held 11–14 Sep in Niamey. K.O. Morpho and M.A. Assibi from Nyankpala Agriculture Experimental Station, Ghana, reported that ICGS 114, an ICRISAT breeding line supplied to them from ICRISAT Center in 1985, was released in Ghana in 1989 as Sinkarezei. In a 4-year four-location test, Sinkarezei gave 9% more yield, 2% higher shelling turnover, and 11 g higher 100-seed mass than the local variety F-mix. It also matured 16 days earlier than the latter.

Based on earliness and high and stable yields in research plots, N.B. Tounkara, CRAF, Guinea, selected four varieties (ICGVs 86016, 86053, 86103, and 86117) for multilocational trials in farmers' cooperatives in the Kindia region of Guinea. After a 3-year evaluation, variety ICGV 86013 was found to be the best and will likely be released there soon.

Sait Drammeh, Department of Agricultural Research, Yundum Agricultural Station, Gambia, reported that ICGS(E) 52 is undergoing its 2nd year of evaluation under farmer-sown and farmer-managed multilocational on-farm testing in Gambia.

Pearl Millet Variety ICTP 8203 Released in Punjab, India

ICTP 8203 had been previously released in 1988 by the Central Variety Release Committee of India for cultivation in Maharashtra and Andhra Pradesh. All India Pearl Millet Improvement Project (AICPMIP) data showed that it outyielded WC-C75 by 7–11% in these two states but was poorly adapted in northern India. The Punjab Agricultural University scientists improved its adaptation by selection in the drought-prone Kandi region of the state. In 22 adaptive trials conducted over 2 years (1987–88), the reselected ICTP 8203 outyielded two improved control varieties of Punjab PSB 8 (by 13%) and PCB 15 (by 11%). The reselected ICTP 8203 was released as PCB 138 in Jun 1989 by the Punjab State Variety Approval Committee.

Groundnuts and ICRISAT

Groundnut is an important oil and food crop. Among annual oilseeds, it is globally second only to soybean in cultivated area and in production. More than 100 countries grow groundnut and, for many, the crop plays a significant role in the economy.

Asia ranks first in the world in area and production of groundnut followed by Africa, North-Central America, and South America. Whereas both Asia and North-Central America have shown positive trends in area, production, and productivity in the last two decades, Africa has shown a decline on all three fronts. South America also showed a decline in area and production but an improvement in productivity.

Groundnut seeds are rich in oil (36–54%) and protein (21–36%) and have high energy value. About two-thirds of the total production is crushed to extract oil. The rest is consumed as edible products. In addition to its value as an oil and food crop, its fodder is also highly valued in many countries. Groundnut cake, the residue obtained after oil extraction, is also used in the animal and poultry feed industry and earns foreign exchange for many countries.

The major groundnut-exporting countries in the world are the USA, the People's Republic of China, Argentina, and India.

The USA is the leader in productivity with an average yield of 2.9 t ha^{-1}. Yields in the range of 4-5 t ha^{-1} are not uncommon. In contrast, yields in Asia (1.1 t ha^{-1}) and Africa (0.77 t ha^{-1}) are much lower. In many African countries, groundnut is considered a women's crop, sown and managed by them in and around kitchen gardens. Very high yields of groundnut can be obtained by sowing the right variety and using improved farm management techniques. For example, a record commercial-scale yield of 9.6 t ha^{-1} was reported from Zimbabwe when the crop duration was extended by advancing the sowing date. The crop was irrigated up to the onset of the rainy season and led to maturity during the season without further irrigation.

SAT Afterthoughts

Groundnut yield and production are still dictated by the vagaries of weather, even in countries such as the USA. The main reasons for low productivity in Asia and Africa are diseases and insect pests, unpredictable and unreliable distribution of rainfall, lack of improved agronomic practices, production technology, technology-responsive varieties adapted to local conditions, and financial crunch of the resource-poor farmers.

Groundnut productivity can be further increased by using varieties that are responsive to improved technology, components of which include timely sowing, optimal plant population, use of the raised bed and furrow system in some cases, appropriate disease and pest control measures, timely weed control and proper water management, including need-based application of fertilizers, farmyard manure, and gypsum. To realize the full potential of this technology, the 'seed' still remains the hub of all activities. In large-scale field demonstrations in India during 1987–90 in both the rainy and postrainy seasons, an improved package of agronomic practices resulted in an average 25% increase in yield, while use of improved

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SAT *Afterthoughts*

Groundnuts and ICRISAT

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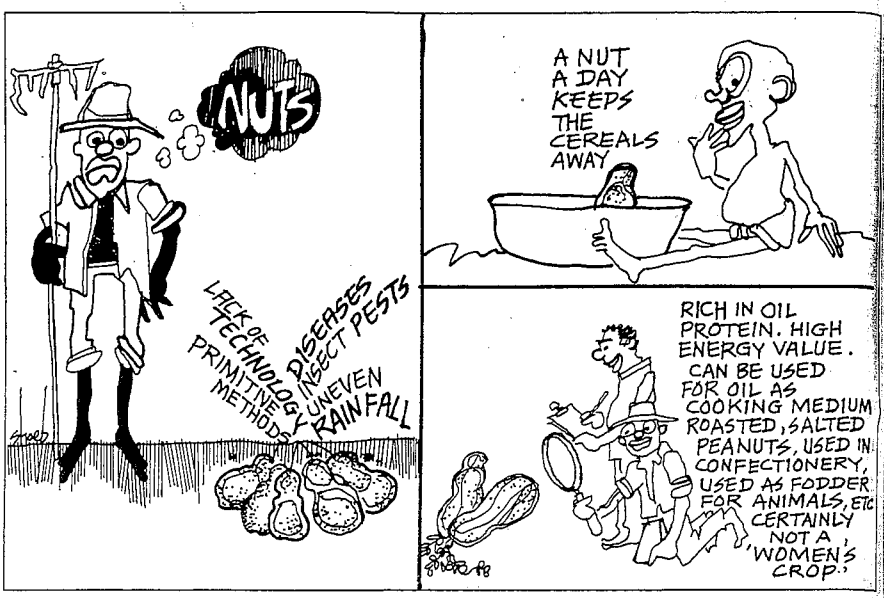
varieties contributed to an increase in yield of 32%. The improved package and improved varieties together resulted in 65% higher production at the cost of a 22% increase in production inputs. The groundnut research team at ICRISAT Center and its Regional Programs are engaged in developing advanced generation breeding lines or germplasm populations that will cater not only to high-input situations but will also be adapted to low-input conditions. Incorporation in improved varieties of varying degrees of resistance to stress factors remains our main strategy to sustain and improve groundnut production in the semi-arid tropics.

From ICRISAT's Genetic Resources Unit collection of over 12000 germplasm accessions of cultivated and wild *Arachis* species, sources of resistance to many diseases and insect pests have been identified. Appropriate screening and gene transfer techniques were developed. These sources of resistance and screening techniques have been adopted by national agricultural research systems in their groundnut-improvement endeavors. This has been the single most important contribution of ICRISAT to the improvement of global groundnut production. Integrated pest and disease management technologies are being developed, which will go a long way to increasing and sustaining production and improving the rate of return while keeping the environment safe and pollution-free. Varieties that are resistant to or tolerant of insect pests and diseases will be an important component of these technologies. Several germplasm and advanced breeding lines identified by ICRISAT as having desirable traits have been released to farmers in many countries. These include ICG 7886, a germplasm line resistant to foliar diseases, released as Cardi-Payne in Jamaica; ICGS 35 released as Jinpungtangkong in South Korea; a composite of ICGSs 44 and 37 released as BARD 699 in Pakistan; ICGSs 1, 5,



11, 37, 44, 76, and ICG(FDRS) 10 released in India; ICGS 114 released as Sinkarzei in Ghana; and ICG 7794 in Ethiopia. Others await release in Cyprus, the Gambia, Guinea, Malawi, Zambia, and Zimbabwe.

Confectionery groundnuts have many end uses. Large-seeded virginia groundnuts receive a premium price in the export market. Scientist at ICRISAT Center and the SADCC/ICRISAT Regional Project in Malawi are engaged in developing such material. We intend to increase our activities in developing better "boiling types" for Southeast Asia. In future, improvement of nutritional quality and flavor of groundnut will also receive our attention because present-day international trade is very quality conscious.

In addition to concern for high quality, aflatoxin contamination remains a major issue in international trade. A 'package' approach may help reduce this problem significantly. However, to produce aflatoxin-free groundnut, as required by many importing countries, newer approaches of genetic engineering may be required.

In the absence of a strong seed industry, fruits of research are confined to research stations. Unfortunately, a groundnut seed industry is almost nonexistent in many countries. To realize the full impact of technological development in groundnut, research findings will have to be supported by both a strong seed production system and governmental support.

As ICRISAT's main clientele consists of scientists in national agricultural research systems, the success of joint ventures depends on the strength of these scientists. ICRISAT's success in improving groundnut production in India is evident. In collaboration with Indian Council of Agricultural Research (ICAR), seven new varieties have been released in India. ICGS 11 and ICGS 44 have become extremely popular with the farmers' seed demand outstripping the seed supply. Successful joint demonstrations of improved production technology by ICRISAT's Legumes On-Farm Testing and Nursery (LEGOFTEN) Unit, various Indian State Departments of Agriculture, and ICAR have led to the spread of this technology and improved varieties in many thousands of hectares in India. Future plans are to carry out a similar exercise in other Asian countries with the assistance of the United Nations Development Programme.

Zonalization of groundnut-growing environments based on soil type, length of growing season, temperature, photoperiod, and the prevalence and incidence of diseases and pests, is in progress. This will help to focus breeding efforts more effectively.

In its endeavor to improve quality and production of groundnut in the world—particularly in the semi-arid tropics (SAT)—the ICRISAT groundnut group interacts closely with other international programs. Together we see a new hope for the small farmer of the SAT and a bright future for groundnut.

—S.N. Nigam
Principal Groundnut Breeder,
ICRISAT Center.

Articles by ICRISAT staff published this quarter are listed in an accompanying sheet.

Editor: **J.J. Abraham**
Cartoon: **Shoeb**
Photographs: ICRISAT Photography Unit.
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