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 Namay, 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, CRAP, Guinea, selected four varieties (ICGVs 86016, 86083, 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 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-owned and farmer-managed multilocational on-farm testing in Gambia.

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 (21–30%) 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.

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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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-Peyne in
Jamaica; ICGS 9 released as
Jinnyungarung in South Korea; a
composite of ICGSs 44 and 37 released
as BARD 699 in Pakistan; ICGS 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ecome 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.

Zonation 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.