past five years, researchers at the University of Florida, Gainesville, Florida, USA (K J Boote and J W Jones); Savanna Agricultural Research Institute (SARI), Tamale, Ghana (J B Naab); and Institut National des Recherches Agricoles du Benin (INRAB), Cotonou, Benin (M Adomou) have worked in a collaborative research support program. Initially host country experiments focused on observing and measuring growth of two groundnut cultivars sown at 3 or 4 sowing dates under typical local management conditions. After collecting data for 2 years at both Tamale, Ghana and Ina, Benin, the two researchers traveled to the University of Florida (to work with Boote and Jones), and learned to use the CROPGRO-groundnut model to evaluate constraints on groundnut growth and yield. Both researchers quickly learned, assisted by the model analyses, that soil water was relatively non-limiting in the years tested, and that fertility was reasonably good, but late season diseases particularly leaf spot caused most of the leaves to be abscised by maturity. As the CROPGRO-groundnut model was developed for good leaf spot control in USA, the crop in the model did not lose leaves, while the real crop did. As a result, the model overpredicted growth during the last half of the season and predicted much higher potential pod yield, up to 4 t $ha^{-1}$. However, the model correctly predicted pod yield and late season biomass when the observed percent defoliation was input (as a pest coupling point) along with approximated percent necrosis from leaf spot.

This led to a new round of experimentation for the next 2 years, with use of split-plot fungicide treatments. This turned out to be highly successful, at least for the site in Ghana where Folicure® was used (by Naab and pathologist Francis Tsigbey) in a high frequency schedule (weekly). Groundnut pod yields in the fungicide-treated plots were doubled compared to the no-fungicide treatments. More importantly, pod yields well over 4 t $ha^{-1}$ were obtained even for late sowing dates, as suggested by previous model simulations. For the Ina site, a less effective fungicide, chlorothalonil, was used in a 15-day schedule starting at 45 days after sowing, and yield enhancement from this treatment was much less.

Having found this potential that high groundnut yield was feasible, Benin and Ghanian researchers in the next 5-year project are planning on-farm trials of fungicide treatment and other practices to improve groundnut yields. Before this, they will do economic feasibility studies to determine whether the twofold yield enhancement from fungicide is enough to cover the costs of treatment. In both countries, collaborative efforts are underway for on-farm trials with farmer and extension groups and in Benin, collaborations are planned with a French development assistance team [Programme d'Appui à la Diversification des Systèmes d'Exploitation (PADSE)] that is attempting to reestablish groundnut production as an export crop, particularly the marketing, collection, and export aspects. The group also has farmer advisory teams. There is a high level of excitement about potential improvement in groundnut production in both countries.

## SP-IPM Pilot Site Activities Facilitate Farmers in Southwestern Kenya to Experiment with Rosette Resistant Groundnut

Groundnut cultivation is widespread in western and southwestern areas of Kenya in the Lake Victoria zone. The main production constraints according to the farmers include the lack of seed of improved high-yielding varieties, diseases (particularly rosette virus complex and leaf spots), insect pests (termites, aphids, grubs, defoliators), and unpredictable weather conditions. Groundnut rosette is a major constraint to groundnut production in eastern Africa. The disease is transmitted by aphids (*Aphis craccivora*).

Most farmers in western Kenya grow the medium- and long-duration genotypes that in recent years have greatly suffered from terminal drought due to unreliable

**A woman farmer in Kenya testing rosette resistant groundnut genotypes ICG 12991 and ICG 12988.**
[She stated: "These two groundnut varieties are free from SWAO (local Luo name for chlorotic rosette), grow so fast, are very tasty, and provide food for our children very early in the season."]

seasonal rains. This is in addition to frequent aphid infestations that occur as a result of frequent dry spells during the season. Aphids multiply fast during the dry spells and these facilitate the spread of the viruses. In 1997, the Kenya Agricultural Research Institute (KARI) at Kakamega in Western Province became aware of the short-duration rosette resistant materials developed through the ICRISAT/SADC regional project at Chitedze in Malawi and requested for trial materials of the promising lines. ICGs 12991 and 12988 were tested on-station at KARI-Kakamega and KARI-Kisii during 1998 cropping season. The performance was excellent and KARI agronomists requested the SADC project to facilitate on-farm testing. However, such support was beyond the regional mandate of the project.

E Minja, ICRISAT-Nairobi participated in a stakeholder workshop held in January 2000 for the Systemwide Program on IPM (SP-IPM Pilot Site in western Kenya) strategy testing on *Striga* management in cereals in Western Kenya. During the workshop farmers from Suba District (location of the Pilot Site) where participatory technology testing has been in progress between farmers, KARI, CIMMYT, ICIPE, IITA, CABI, ICRAF, and NGOs [CARE-Kenya and the Catholic Relief Services (CRS)] and the KARI-Kakamega agronomist requested that the two groundnut lines be incorporated as one of the strategies for *Striga* management. Some of the participating farmer groups have project activities with the two local NGOs (CARE-Kenya and CRS) and CARE accepted the responsibility of promoting seed increase for the short-duration rosette resistant lines in Suba district through farmer groups.

In mid-2000, Richard B Jones, ICRISAT-Nairobi organized the availability of about 6 kg unshelled pods of each of ICGs 12991 and 12988 to CARE office in Homa Bay as part of seed systems and technology exchange activity. CARE gave the seed to two of their participating farmers. The two farmers are to be trained by CARE to produce seed for their respective communities. The first crop was planted during October to January 2000/01 short rainy season and the second planting was done in March 2001. Seed plots have doubled in size despite theft and small amounts for family use. Farmers are impressed by the cleanliness of the two lines from rosette (less than 1% of plants showed chlorotic rosette at full podding stage), earliness, plant type, kernel size and color, and taste. *Striga* weed suppression (though at a very small scale) was visualized by farmers during recent field days organized by IITA/ICIPE/KARI and Suba extension services. CRS on the other hand, went a step ahead and took the responsibility of multiplying breeder seed of ICG 12988 and the medium-duration rosette resistant genotype ICGV-SM 90704 through a private seed company in 2000 and the seed was distributed to farmers in Suba and Homa Bay districts for the 2001 cropping season.

## Groundnut Workshop in Zambia

A workshop on constraints and opportunities to groundnut marketing in Malawi, Zambia, and Mozambique was held in Chipata, Zambia, 26–27 June 2001. It was the first workshop in the region, focusing on groundnut marketing. The meeting was sponsored by ICRISAT through the SADC/ICRISAT Groundnut Project, Malawi in collaboration with the Ministry of Agriculture in Zambia. Thirty-seven participants from Malawi, Mozambique, South Africa, and Zambia participated.

Established and improved groundnut varieties for the region as well as new postharvest technologies of groundnuts were demonstrated by P J A van der Merwe (ICRISAT). The new technologies and improved varieties attracted substantial interest from participants.

Participants included researchers, producers, traders, processors, NGOs, donors, COMESA, and Chamber of Commerce and Industries. Groundnut trade partnerships across country borders were established and important market opportunities were identified. It was decided that another regional marketing workshop will be organized in Malawi next year. Strategies to improve marketing in the region were developed and responsibilities for future activities were identified.

## Training Courses on Groundnut Production Technologies in Malawi

Two training courses on groundnut production technologies were conducted by ICRISAT-Malawi for research, extension, community volunteers, and non-governmental organizations (NGOs). The first course was held at the Natural Resources College (NRC), Lilongwe from 7 to 9 March 2001 while the second was held at Kasungu Inn, Kasungu from 12 to 14 March 2001. The objectives of the courses were: (1) to develop