

F. GROUNDNUT AND PIGEON PEA MULTIPLICATION PROJECT¹⁴

1. *Funding Levels and Project Goal and Objectives*

The Groundnut and Pigeon Pea Multiplication (GPM) Project No.: 612-G-00-99-00221 was funded by USAID at \$677,350. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) managed the Project over the period August 1, 1999 through January 31, 2002.

Project Goal: To enhance groundnut and pigeon pea productivity for household food security, nutritional improvement, and poverty alleviation.

Objectives:

- ▶ Providing high quality breeder seed and basic seed of high yielding, disease resistant groundnut and pigeon pea varieties to various stakeholders in Malawi;
- ▶ Increasing awareness of the value of improved varieties in enhancing the production of groundnut and pigeon pea among smallholder and commercial farmers through on-farm demonstrations;
- ▶ Strengthening the capacity of the Department of Agricultural Research and Technical Services (DARTS), the Department of Extension and relevant NGOs, in transferring groundnut and pigeon pea production technologies through short-term training courses; and
- ▶ Establishing a sustainable Revolving Fund from sales of basic seeds.

2. *Findings*

The Project can be viewed as a response to a lack of improved groundnut and pigeon pea seeds to fill the need for expanding the area planted to these crops by small farmers. Both crops provide needed protein supplements to maize and cassava, which form the staple food crops for many rural families. Moreover, groundnuts and pigeon peas provide a major source of farm family cash income, especially for women. Prior to the start of the Groundnut/Pigeon Pea Multiplication Project (GPM), the MOAI and various NGOs had initiated community based seed and planting material multiplication programs for food crops. These programs reportedly “improved the availability of cassava and sweet potatoes, while on the other hand the situation for the other major crops had not changed much”¹⁵. Private sector suppliers had not shown an interest in producing improved varieties, in large part because of the inability of small farmers to pay the commercial cost of improved seeds and planting material.

Both pigeon peas and groundnuts are leguminous crops and fit in well in a rotation with maize. Their high protein content can provide an important protein source for rural farm family diets. Groundnuts also provide a partial substitute for cooking oil. While food security considerations are important criteria for planting groundnuts and pigeon peas -- the availability of formal and

¹⁴ The full project name is: “Rural Prosperity is Nation’s Economic Stability” A Partnership Approach to Attain Sustainable Production of Groundnut and Pigeon pea in Smallholder Agriculture for Quality Diet, Household Food Security, and Poverty Alleviation. In this report the shorter title, “Groundnut and Pigeon pea Multiplication” is used for convenience.

¹⁵ Seed Strategy Report, CARE, May 1999, p 10

informal market infrastructure to support commercial sales, availability of improved seed supplies, and susceptibility to pests (primarily pigeon peas) and diseases (primarily groundnuts) are arguably the basis on which farmers make decisions to grow these crops.

Groundnuts are susceptible to groundnut rosette virus, which can severely reduce yields and thereby increase growing risks. Pigeon peas are generally disease free in Malawi, but poor production management practices can make them susceptible to insect and pest damage. Continual cropping of pigeon peas in the same plot (lack of rotation) can also lead to a high incidence of fusarium wilt. Moreover, improper post harvest handling can introduce aflatoxin, making the product unfit for human and animal consumption.

A rapid expansion in area planted occurred in recent years for both of these crops. Nationally, the area planted to groundnuts expanded from some 103,000 ha. in 1996/97 to 207,000 in 2001/02. National pigeon pea area planted increased over the same period from some 113,000 ha. to 140,000 ha. Total groundnut production increased over the period, from 71,000 mt to 158,000 mt, while for pigeon peas the increase was from 73,000 mt to 105,000 mt¹⁶.

Nationally, the area planted to groundnuts is about 14 percent of the area planted to maize, but the central and southern Agricultural Development Divisions (ADDs) of Kasungu, Lilongwe, Machinga and Blantyre account for more than 75 percent of the total area planted. Almost 80 percent of the increased area planted from 1996/97 through 2001/02 occurred in the Kasungu, Lilongwe, and Machinga ADDs. In Kasungu, area planted to groundnuts is about 22 percent of the maize area, while in Lilongwe it is about 17 percent. At the other extreme, groundnut area planted in the Shire Valley is less than four percent of the area planted to maize. Average yields increased from 687 kg per ha in 1997 to 820 kg per ha. in 2001, dropping back again to 760kg per ha. in 2002. Highest average yields of groundnuts occurred in Salima, with 1,017 kg per ha.

Pigeon pea, with a planted area of about nine percent of the area planted to maize is heavily concentrated in the Blantyre, Machinga, and Shire Valley ADDs (96 percent of total area planted). Area planted in Blantyre is about 36 percent of the area planted to maize in that ADD, while in Machinga it is 13 percent, and in Shire Valley, about 9 percent. These three ADDs accounted for approximately 86 percent of the expanded area planted, with Karonga and Salima accounting for an additional 10 percent of the increase. At the other extreme, pigeon peas are not grown in any reportable quantity in Kasungu ADD. Average yield over the period increased from 643 kg. per ha in 1997 to 753 kg per ha. in 2002. Machinga reported the highest yields, with 869 kg per ha.

Market development for pigeon peas is quite advanced in the three above cited districts, where an export industry is developing for processing the crop into mashed pigeon peas, or dhall, to be exported for the Indian market. One of the reasons cited for the limited area planted to pigeon peas in the central and northern regions is the lack of marketing infrastructure. However, pigeon peas are not common in the diet of families outside of the south. This lack of consumer demand may be one of the principal factors explaining the lack of market development.

At least one commercial producer in the Lilongwe area has recently installed new groundnut processing machinery, and is reportedly developing a European export market for the improved

¹⁶ The figures are based on MOAI crop production and yield estimates.

CG 7 variety being promoted by ICRISAT, that could well exceed the current export markets for the Chalimbana variety. This plant was reportedly operating at about 20 percent of capacity in 2002.

Objective a: Providing high quality breeder seed and basic seed of high yielding, disease resistant groundnut and pigeon pea varieties to various stakeholders in Malawi:

The GPM Project produced 26.3 mt of groundnut seeds and 13.5 mt of pigeon pea breeder seed over its two-year lifespan. (Groundnut varieties included CG 7, JL 24, ICGV-SM 90704 and ICG 12991; pigeon pea varieties included ICP 9145, ICEAP 00020 and ICEAP-B00040). This material was used to produce basic (foundation) seed yielding a two-year total of 289.76 mt of groundnuts and 52.84mt of pigeon peas. In the first year of the project, only CG 7 groundnut seed was produced and in the second year, CG 7, ICGV-SM 90704¹⁷ (Nsinjiro) and JL 24 (Kakoma) was produced. ICG 12991 (Baka) was released in 2001.

Pigeon pea varieties produced in both years included ICP 9145 (Sauma) and ICEAP 00040 (Kachanju). ACEAP 00020 was not approved for commercial distribution by the MOAI/DARTS seed certification unit, as it was much more susceptible to fusarium wilt than other available varieties, and its other characteristics were almost identical to those of ICEAP 00040.

Chitala Research Station near Salima and Chitedze Research Station near Lilongwe produced breeder seed, under supervision of ICRISAT Project scientists. The groundnut and pigeon pea seed was purchased by the project and provided to 25 and 15 growers, respectively. These growers were contracted over the life of the project to produce basic groundnut and pigeon pea seed, which was purchased again by the project and prepared for further distribution to growers and NGOs. Growers producing breeder and basic seed were selected by ICRISAT specialists and were required to follow production management practices that met quality standards set up and monitored by the MOAI /DARTS. Project staff coordinated closely with DARTS staff, and provided technical skills training and used Project funds to support field travel by government inspectors. Project staff felt that this coordination between DARTS and ICRISAT staff was an important project component, as DARTS did not have sufficient funding or staff to fully implement their required inspection activities. Moreover, the in-service skills training served to improve the performance of DARTS personnel, especially the younger staff.

As noted in the table below, breeder and basic seed production exceeded targets set for groundnuts; it exceeded the breeder seed target for pigeon peas, but did not meet the basic seed targets for pigeon peas. Pigeon pea yields of basic seeds were low in both years, due to the late arrival of rains, a cold spell during the flowering stage and pod infestation by insects. Groundnut breeder seed yields were also lower than anticipated during the first year, due to the presence of groundnut rosette virus. At planting rates of 80 kg/ha for groundnuts and 10 kg/ha for pigeon peas, the seed material produced by the project was sufficient to plant approximately 3,625 ha. of groundnuts and 5,300 ha of pigeon peas.

¹⁷ This variety reportedly has some of the outward characteristics of the Chalimbana variety and some buyers believe that it can be sold into niche markets for which Chalimbana is now being supplied. However, researchers note that while appearances may be similar to Chalimbana, the Nsinjiro variety has a completely different genetic makeup than Chalimbana. While recognizing the positive aspects of Nsinjiro other buyers indicated that the major weakness of this new variety is that is more difficult to shell than the CG 7 or the other varieties.

TABLE 7
GPM Project Breeder and Basic Seed Production, 1999/00 and 2000/01

Type of Seed	Planned Target (mt)	Actual Achieved (mt)	Difference (percent)
Groundnut			
Breeder Seed	18	26	+44
Basic Seed	150	290	+93
Pigeon Pea			
Breeder Seed	4	14	+250
Basic Seed	100	53	-47

As of the Project completion date, over 40 percent of the basic seed produced by the project had been sold, primarily to NGOs, other donor projects and to GOM small-farmer development programs (See table below). It is noted that some 10 percent of the basic seed produced by the project was sold to NGOs and others in Zambia and Mozambique in order to partially meet their lack of improved seed. Typically, NGOs would distribute the purchased seed to their beneficiaries on loan, with the requirement that each beneficiary provide double the amount of seed that they received to another farmer the following season. Farm family beneficiaries would usually be provided with sufficient seed to plant about .05 ha. After harvest they would keep sufficient seed for themselves and sufficient to enable two other farm families to plant .05 ha. each in the following year¹⁸.

TABLE 8
GPM Project Sales of Improved Seeds 2001

Purchaser	Groundnuts Purchased (mt)	Groundnuts Purchased (percent)	Pigeon peas Purchased (mt)	Pigeon peas Purchased (percent)
NGOs, Donor Projects	51.2	70.6	24.5	80.7
GOM Small- Farmer Projects				
Farmers and other Private Sector Buyers	21.4	29.4	5.9	19.3
Total	72,6	100	30,4	100

Discussions with donor projects using the seeds provided by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) indicated that the prices charged for basic seed were higher than for seed available from other sources. At the same time, they noted that CG 7, while a high yielding variety, is not as easily marketable as fresh product as is the traditional Chalimbana variety. They would, as a result, like to have available either, improved Chalimbana seed or a more direct substitute available for use by their growers. One donor also indicated that

¹⁸ .05 ha of groundnuts requires 4 kg of seed while .5 kg seed is sufficient for planting .05 ha. of pigeon peas.

ICRISAT should begin working with a broader base of small-scale farmers in expanding its seed multiplication activities.

In response to the above statements it is noted that seed purchased from ICRISAT is of the higher purity “basic” standard, while seed purchased from other sources is the lower standard “certified” seed.¹⁹ In addition, one buyer noted that CG 7 with an average of 40–45 kernels per ounce, while on average not as large as the “ideal” Chalimbana (28–32 kernels per ounce), provides a more marketable product for processing than does Chalimbana. Moreover, with the continued loss of varietal purity, it is possible that only about 10 to 20 percent of the current Chalimbana crop now falls into the “ideal” size range²⁰.

The loan approach to basic seed distribution used by NGOs is an effective way for farm families with limited cash resources to pay for improved seed, but two points of caution must be raised. First, the approach will not work with hybrid varieties, which require the purchase of new seeds each year. Pigeon pea seed from a farmer’s crop also should not be carried over for use the next season. Second, although farmers can use their own seed for open pollinated varieties, including groundnuts, new seed should be purchased after several years of replanting of farmer seeds. For groundnut, carry over seed should not be planted for more than three successive cropping seasons.

Objective b: Increasing awareness of the value of improved varieties in enhancing the production of groundnut and pigeon pea among smallholder and commercial farmers through on-farm demonstrations:

Project staff developed close working relations with the various NGOs and other donor stakeholders. The stated targets for this objective were exceeded in most cases. The results are a good indicator of the high degree of commitment of the donor community to expanding the production of these two crops. The need to train farmers in proper groundnut cultural practices is especially important, as poor cultural practices result in a high incidence of aflatoxin contamination, which seriously affects the commercial quality of groundnuts.

Project technology transfer activities included the use of farm field demonstrations and field days to increase the awareness of farmers of the advantages in the use of improved groundnut and pigeon pea varieties. A target of 2,000 total field demonstrations was exceeded by 185, with the completion of 1,186 groundnut and 999 pigeon pea demonstrations. The demonstrations for the six improved varieties were conducted by the Extension Service and NGO and donor project personnel from CARE, Land O’ Lakes, NASFAM, Plan International, World Vision International (WVI), OXFAM, Catholic Relief Services (CRS) and the Integrated Food Security Project (IFSP) managed by the German Technical Assistance Agency (GTZ).

The same NGOs and donor groups held 130 field days with some 13,000 farmers participating. Ninety-eight were held for groundnuts and 32 for pigeon peas. A total of 6,840 men and 6,476 women attended. Three thousand posters, printed in English, Chechewa, and Tumbuku, highlighting the important groundnut varieties and cultural practices needed to increase production, were produced and distributed to support the technology transfer activities.

¹⁹ In November 2002 the approximate value of breeder seed was 160 MK/kg; with basic seed at 80MK/kg; and certified seed at 40 MK/kg. The exchange rate at the time was approximately 80MK /US \$1.

²⁰ Based on discussions with Douglas Mc Pherson, co-owner of Kanonga Estates.

Objective c: Strengthening the capacity of the Department of Research and Technical Services (DARTS) the Department of Extension and the relevant NGOs in transferring groundnut and pigeon pea production technologies through short-term training courses.

DARTS technicians are responsible for administering the seed certification program, with the Extension Service and NGOs sharing responsibilities for carrying out field level farm demonstrations and field days. GPM staff provided four production-oriented training courses – two for groundnuts and two for pigeon pea. In total, 85 men and 109 women attended these training sessions, with almost 70 percent of all trainees from the MOAI. Courses held in 2000 included topics on varietal development, general crop management practices, and disease and pest management strategies. Participants also visited pigeon pea processing plants in Blantyre and observed farmer field production sites at the GTZ Integrated Food Security Project (IFSP) and OXFAM impact areas.

Objective d: Establishing a sustainable Revolving Fund from sales of basic seeds.

Basic seed contract growers were provided with breeder seed on loan at the start of the season, and its value was then deducted from the net amount of seed delivered to the ICRISAT site. The project paid growers \$787 per mt for basic groundnut seed delivered to the Chitedze Research Station and \$500 per mt for pigeon peas. Prices were based on international price levels and sufficiently covered the seed producers' production costs. A revolving fund was set up by ICRISAT, in which moneys received from the sale of basic seeds were deposited for use in further seed multiplication after the end of project completion date.

Basic seed was sold by the Project to NGOs and others at \$1,000 per mt for groundnuts and \$750 per mt for pigeon peas. The increase over prices paid to growers covered handling and packaging costs. As of the project completion date (January 31, 2002), 140 mt of groundnut seeds and 34 mt of pigeon pea seeds had been sold with a return of \$164,240. At Project closure, the Revolving Fund contained \$162,484.

Remaining in storage was 150 mt of groundnut seed (valued at \$150,000) and 19 mt of pigeon pea seed (valued at \$14,240). Money generated from previous seed sales were used to plant an additional 45 ha of groundnut and 10 ha of pigeon pea for basic seed production for harvest in 2002. These plantings yielded 42.6 mt of new basic groundnut and 16 mt of pigeon pea seed. The carryover seed from the 2000/01 season, plus the new seed available from the 2001/02 season (150 mt of groundnut and 89 mt of pigeon pea seed) have all been sold for the upcoming 2002/03 planting season. With the addition of money from the current sales, the revolving fund balance will be approximately \$300,000.

3. Conclusions

The GPM Project was designed to meet the expanding need for improved quality groundnut and pigeon pea seed for use by small farmers to supplement dietary protein intake and to increase cash income. It marked the initial effort by the MOAI and the donor community to systematically support the use of improved seeds to increase the production of these two crops. Conclusions from this two-year project are summarized as follows:

- ▶ The area planted to groundnuts and pigeon peas has increased significantly in recent years (area planted to groundnuts doubled between 1997 and 2002 and increased by about 24 percent for pigeon peas);
- ▶ The improved basic seed provided by the project was sufficient to plant some 3,650 ha. of groundnuts and some 5,300 ha. of pigeon peas;
- ▶ Ninety five percent of Malawi's pigeon pea production is concentrated in the three southern ADDs of Machinga, Blantyre, and Shire Valley, where this product is consumed in the local diet and where the food industry is processing pigeon peas into dhall for export markets;
- ▶ Seventy five percent of Malawi's groundnut production is concentrated in the central and southern ADDs of Kasungu, Lilongwe, Machinga, and Blantyre;
- ▶ Seventy one percent of the groundnut seed produced by the project was purchased by NGOs to support their small farmer food security and income generation activities;
- ▶ Eighty one percent of the pigeon pea seed produced by the project was purchased by NGOs to support their small farmer food security and income generation activities;
- ▶ The project exceeded its production of groundnut basic seed by 97 percent, but met only 53 percent of targeted pigeon pea basic seed production;
- ▶ About 10 percent of the basic seed produced by the project was sold to NGOs and donors in the neighboring states of Zambia and Mozambique, in order to meet pressing shortages for improved seed in those countries;
- ▶ The project effectively provided technology transfer activities to more than 13,000 farmers, by holding 100 field days and 2,185 on-farm demonstrations in collaboration with the Extension Department and with eight NGO or donor projects. Almost one half of the field day attendees were women;
- ▶ Four training courses were provided for some 200 MOAI (DARTS, Extension Service) and NGO staff to update and augment the technical skills for conducting seed production quality inspections and to provide training to farmers in groundnut and pigeon peas cultivation; and,
- ▶ USAID received a direct and indirect return on their investment in the expanded multiplication of groundnut and pigeon pea seed production of approximately 1:1.3 over the three-year project period. That is, for each dollar spent by USAID on this project, the returns from sales of basic seed and from increased yields obtained by farmers who planted these seeds were about \$1.31. This figure does not include the added value from future production of basic seed from the revolving fund, nor the added value from the use of own groundnut seed by farmers for the next three years.

4. Recommendations

The GPM Project successfully filled an existing void in the production of improved groundnut and pigeon pea seed for use by small-scale growers. Further USAID and other donor support for this type of work is warranted.

Recommendation 1

ICRISAT should carefully project the expected increased need for improved groundnut and pigeon pea seed over the next three years, for both food security and commercial sales, providing a margin of error of at least 15 percent on the high side. USAID should consider providing additional funds for topping up the Revolving Fund to meet this level of seed production.

Recommendation 2

ICRISAT and other donor funding to meet salary and basic operating needs of research and seed multiplication staff should be continued into the future. The costs of maintaining the existing qualified and effective team of specialists is a minimal expense by most donor funding standards, but provides the institutional framework necessary to lead the effort to provide farmers with improved seeds.

Recommendation 3

Small farmer marketing organizations, such as NASFAM, along with NGOs that facilitate the development of rural savings and loan associations, should be provided with initial funding to further promote the commercial expansion of groundnuts. Cooperative marketing of groundnuts and groundnut products and marketing of groundnuts through village level female-managed savings and loan associations should be promoted, using appropriate education and awareness programs that introduce cultural practices to improve yields and reduce aflatoxin contamination that can seriously affect the commercial quality and product value.

Recommendation 4

Small-scale farmers that work with NGO supported development projects and have demonstrated capability for commercial production should be given priority to participate in the ICRISAT basic seed production program.

Recommendation 5

NGOs promoting the development of groundnuts for improving food security and for expanding marketable surplus should consider using commercial small-scale farmers for the production of “certified” seed for further distribution to their beneficiaries. This could almost cut in half the NGO cost of buying new planting materials, as the price of certified seed is about one half the price of basic seed.

5. *Lessons Learned*

The recent rapid increase in groundnut and pigeon pea production in selected areas of Malawi indicates that farmers see value in producing these crops for both sale and for home consumption.

- ▶ The use of groundnut and pigeon pea as part of household diets varies across Malawi. This is especially true for pigeon pea for which there is little history of home consumption outside of the southern ADDs of Machinga, Blantyre, and Shire Valley. These local demand characteristics, along with realistic estimates for meeting expanded commercial demand, should govern GOM, donor, and NGO decisions, when providing technical and financial support for the expansion of these crops.
- ▶ This project has demonstrated the need for a continued and expanded source of high quality seeds for use by farmers. Although a relatively large amount of basic seed was undistributed after the 2001/02 season, demand for the upcoming 2002/03 season has

completely depleted carryover seed stocks, plus the new seeds that were produced using Revolving Fund moneys in 2002. Since unused seeds can be safely stored for use in the next season, the existence of a surplus in any given year should not be the basis for reducing GOM or donor support for the continued production of basic seed.

- ▶ Maintaining a quality breeder and basic seed multiplication capability, such as that developed by the GPM Project, requires the long-term employment of a small number of highly trained and qualified employees who compete for jobs in the international marketplace. Given the budgetary constraints of the GOM, it is imperative that this core group of trained and experienced staff be maintained by the donor community at competitive salaries to ensure the continued availability of a high quality seed supply.