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Pigeon pea seed production and delivery system: Experience from the Lango farming system

J.E.P. Obuo, J.R. Omadi, D. Okwang and H. Okurut-Akol
Serere Agricultural and Animal Production Research Institute, P.O. Sototi, Uganda

Abstract

Seed is one of the most important and crucial input in crop production and yet in most case is neglected or receives less research emphasis in in Uganda, especially on crops such as pigeon pea (*Cajanus cajan)* , cowpeas (*Vigna unguiculata*), finger millet (*Eleusine indica*) . Lack of adequate and affordable seed of improved crop varieties is known to be the major cause hindering adoption of improved crop varieties and subsequently low crop production. The cause of this is mainly due to lack of sustainable seed delivery system and seed production skills. Therefore a study was carried out to test the innovation of home saved seed in which farmers normally use previous seed for next season's planting. The objective of this study was to test the effectiveness of two different seed delivery systems (i.e. individual farmer seed and farmers delivery systems). This study was carried out in two years in the Lira and Apac districts and participatory approach was employed in its implementation. Farmers were directly involved in the study right from the planning process, monitoring, evaluation and data collection. The results of this study indicated that there was higher adoption of new skills (74.3) in cases where farmers operated in a group than where farmers operated as individuals (65.5%). The highest amount of seed (23,941 kg) was produced by 160 individual farmers, while 32 farmer groups produced the lowest (9,896 kg). This study also showed that individual farmers seed delivery system was the most effective (77.7% and 69.9% in first and second year, respectively). Farmers endorsed individual farmer-to-farmer seed delivery system as the best. To have effective informal farmer-to-farmer seed delivery system, it requires capacity building through training on seed production and follow-ups by researchers.

Key words: Adoption, crop production inputs, improved crop varieties, Uganda

Introduction

Pigeon pea, *Cajanus cajan*, is among the principal food crops grown in Northern and North-eastern parts of Uganda. It is most especially used as a source of proteins for the rural poor population who cannot afford expensive animal proteins (Areke *et al.*, 1994, Obuo *et al.*, 1994). Despite its importance, the average yields of pigeon pea at farmers' fields have remained very low. During the participatory needs assessments (Rapid rural appraisal) conducted in the Lango farming system, farmers highlighted lack of seed of improved high yielding early maturing varieties as one of the major causes of low yields obtained (Akwang *et.al.*, 1998).

Seed is one of the critical factors in increasing agricultural productivity of any crop, because it provides the maximum limit of crop yield of all other production inputs (A.A. Temu and K.M., 2002). Non-availability of seed is one of the main constraints to adoption of improved crop varieties. The cause of this is mainly due to lack of efficient and sustainable seed delivery system and seed production skills in Uganda. The private seed companies are not interested in pigeon pea seed production due to low profit margins because it is a self-pollinating crop, once farmers have obtained initial seed stock, it can be recycled for many generations (R.M. Chirwa and Aggarwa, 2002).

This therefore calls for development of a strategy to focus on alternative effective sustainable informal seed production and delivery system. An ideal seed system ought to serve the farmers with adequate supply of quality seeds at affordable prices in time (M. Hossain, 2002) and it needs supportive empowerment of farmers. Therefore this study was designed to test the effectiveness of two informal seed multiplication and delivery systems. The specific objectives of the study were to: train farmers in seed multiplication skills for pigeon pea (improved pigeon pea varieties), and test the effectiveness of two different seed multiplication and delivery systems.

Methodology

Site and farmer/group selection

Purposive sampling was employed during site selection to ensure that all the four sub agro-ecological systems are included in the study. Site selection was done in collaboration with Extension staff and NGOs'/CBO staff, and Chairmen local council III. A list of sub-counties well known for growing pigeon pea was obtained at the district production department and two sub-counties were randomly selected in each district. Two parishes were in turn randomly selected from each sub-county and the parish was considered as study site. The study sites are listed in Table 1. Individual farmers/farmer groups were selected on the basis that they are involved in pigeon pea growing and are willing to participate actively in the project activities and the selection was done by the community. Ten individual farmers were selected in each parish (giving a total number of 80 farmers) and two farmer groups (a total number of 60 farmers) during first year, while in year two twenty individual farmers (160 farmers) and four farmer groups (130 farmers) were selected. At least a half of the farmers selected were women.

Informal seed multiplication and delivery systems

Two systems were compared:

A system whereby seed was given to individual farmer who then multiplied it as an individual and passed some to fellow farmers. A system in which seed was given to a group of farmers, who then multiplied it as a group and passed some to other farmers and group members.

Individual farmers and farmer groups were given the same amount of foundation seed, which they multiplied as individual farmers and as a group, respectively.

Process of the study:

(i) Making and signing memorandum of understanding

Workshops were organized in which the selected farmers, local leaders, opinion leaders and project implementers came together and discussed the objectives of the study and developed methodology to be followed in implementing study activities. In addition, roles and responsibilities for each stakeholder were discussed and agreed upon during these meetings. At the end of these meetings, a memorandum of understanding was made and signed by all the stakeholders. It was also agreed that farmers/farmer groups give back five (5%) of total seed produced back to the project for further distribution to other farmers (for scaling up the project activities in the second year). It was also agreed that participating farmers who received the seed were to sell/give the surplus seed to other farmers, NGOs and seed stockists, who in turn would loan/sell to other farmers. In this way, adequate and affordable seed of SEPI I and II would be made available to pigeon pea farmers and subsequently a farmer to farmer seed delivery system established. This was to be done in informal way.

(ii) Training of farmers on basic skills of seed multiplications and mode of seed delivery

Sets of training workshops were conducted in each site and farmers were trained on basic skills of seed production: field selection, spacing, planting, weed management, seed purity (rouging, field isolation and seed sorting), insect pest management (insect pest identification, spray regimes, safe use of chemicals and spray equipment maintenance), post harvest handling, farmer group dynamics and management (conflict resolution). Farmers were also trained on record keeping and data collection. The data sheet was designed with farmers and translated into the local language (Luo). Part of the data/information collected was analyzed together with farmers; the rest was then analyzed by the researchers and then presented to the farmers. In addition, farmers were fully involved in monitoring and evaluation of the project.

Trained individual farmers and farmer groups were requested to keep record on the quantity of seed they have sold to stockists or non-trained farmers or NGOs or public. They will also be asked to keep record of the number of fellow farmers they have avail seed to. This will help in tracing the quantity of seed which passed through the two different seed delivery system (i.e. individual farmers and farmer groups' channels) and the number of non-participating farmers who obtained seed of SEPI I or SEPI II from these two channels.

(iii) Demonstrations and field days

The demonstrations were set on the following areas:

(a) Seed multiplication skills/techniques

Varietal differentiation

Agronomic practices

Pest control

The demonstrations were set at strategic places (along main roads, near sub-county headquarters, market place, schools) where they could be exposed to many farmers. The farmers themselves then managed these demonstrations. These demonstrations were training sites and also served the purpose of dissemination of the skills to other farmers. Field days were then organized in each site to enable many farmers from the community have opportunity to see these demonstrations and this acted as one of the ways for disseminating the new skills of seed production of improve pigeon pea varieties to other farmers. The farmers who participated in setting and running these demonstrations would explain to fellow farmers what was done. This was also time for farmers to share their experiences and give their suggestions for the way forward. It was also the opportunity for Researchers – FEWs – NGOs/CBO - Farmers to exchange their views regarding the project

progress (i.e. project evaluation) and what should be done. Participating farmers would also utilize this time to advertise or publicize the availability of seed of improved pigeon pea with them.

Results and discussions

Seed production by farmers

In year one a total of 2130.5 kg (from 2.8 ha) of clean pure seed were realized from the farmers. This was a good achievement despite the fact that planting was done late and in addition there was a prolonged heavy rain from pod setting to maturity. This resulted in poor pod filling and high pest incidence. Comparing farmer groups and individual farmers, individual farmers produced 1,656 kg in total, while only 474kg of seed was obtained from farmers groups (Table 2). Crop yields were very good in year two; 23,941 kg (from 12.9 ha) from individual farmers and 9,896 kg (from 8.8 ha) from farmer groups (Table 3), possibly because most farmers had adopted the new skills and rains were generally well distributed.

In all the sites and years, individual farmers produced more seed than farmer groups, implying that multiplication of seed by individual farmers was the most effective (77.7% and 69.9% in year 1 and year 2, respectively). There was 7.8% increase in farmer groups performance due to the training workshops on farmer group management and dynamics which were conducted in the subsequent year. It therefore means that for the farmers groups to become effective, there is need to train the group members on group management and dynamics.

Adoption of skills by farmers

The project trained over 400 farmers on seed production skills of improved pigeon pea varieties. Percentages indicated in Table 4 were obtained by dividing the number of the farmers interviewed who had put the practice in practiced by the total number of farmers interviewed and multiplied by 100. In addition to interview, the fields of the interviewed farmers were visited and observation made on the adoption of the practice/skill farmers were trained on. On average over 60% of farmers trained put in practice skills they had obtained during training (Table 4). From informal impact assessment survey on the adoption of seed production skills conducted indicated good percentage of adoption as shown in the Table 4.

Table 1. Sites that were used for the study

District	Sub-county	Parish
Lira	Kangai	Adwila
		Angwenya
	Aloi	Alal
		Alebtong
Apac	Aduku	Anginyi
		Akwon
	Nambieso	Acaba
		Anwangi

Table 2. Amount of seed produced in 2001(year 1)

Site	Yield (kg)			
	Farmer Groups	Area (Ha)	Individual farmers	Area (Ha)
Kangai	105	0.3	492	0.4
Aloi	20	0.3	75	0.4
Aduku	89	0.3	116	0.4
Nambieso	260	0.3	973	0.4
Total	474	1.2	1,656	1.4
Effectiveness	22.3 %		77.7%	

Table 3. Amount of seed produced in 2002

Site	Yield (kg)			
	Farmer groups	Area (Ha)	Individual farmers	Area (Ha)
Kangai	1,500	1.9	5,193	3.0
Aloi	986	2.1	4,606	3.1
Aduku	2,450	2.3	5,765	3.3
Nambieso	3,960	2.5	8,377	3.5
Total	9,896	8.8	23,941	12.9
Effectiveness	30.1%		69.9%	

Table 4. Adoption of the skills or practice obtained during training

Practice (skill)	% of farmers adopted the skill							
	Kangai		Aloi		Aduku		Nambieso	
	FG**	Indiv*	FG	Indiv	FG	Indiv	FG	Indiv
Planting in rows	95	55	76	60	75	65	85	75
Weed control	80	82	80	90	88	96	90	100
Roguing	70	60	66	60	70	64	65	67
Spraying	68	64	64	70	60	82	62	64
Field inspection	61	41	52	52	58	50	64	50
Proper record keeping	74	54	66	54	70	64	67	63
Seed sorting & purity	72	72	70	68	66	64	75	75
Mean	74.3	61.1	67.7	64.9	69.6	69.3	72.6	70.6

* Farmer groups; ** Individual farmers; Nb. The total number of individual farmers was almost the same as that of the farmer groups.

Table 5: Seed recovered from farmers.

Year one

Site	*Seed recovered (kg)*		*Total*
	Farmer groups	Individual farmers	
Kangai	10	26	*36*
Aloi	0	0	*0*
Aduku	5	21	*26*
Nambieso	15	26	*41*
Total	30	73	103
% effectiveness	29.1	70.9	

Year two

Site	*Seed recovered (kg)*		*Total*
	Farmer groups	Individual farmers	
Kangai	25	55	*80*
Aloi	30	69	*99*
Aduku	75	89	*164*
Nambieso	123	206	*329*
Total	253	419	*670*
% effectiveness	37.8	62.2	

Table 6. (a) Seed given out by individual farmers and farmer groups to other farmers in 1st year

Site	Amount of seed given (kg)		No. of farmers given seed by	
	Iindividual	Group	Individual farmers	Group
Kangai	88	3.5	151	36
Aloi	0	0	0	0
Aduku	37.5	2	45	2
Nambieso	41	0	51	0
Total	166.5	5.5	247	36

(b) Seed given out by individual farmers and farmer groups to other farmers in 2nd year

Site	Amount of seed given (kg)		No. of farmers given seed by	
	Individual	Group	Individual farmers	Group
Kangai	158	86	90	46
Aloi	67	52	10	15
Aduku	146	68	61	29
Nambieso	241	120	115	45
Total	612	326	276	135

There was higher adoption of skills in farmer groups than in individual farmers, possibly as a result of consultation between group members. This implies that to increase adoption rate of the technologies or skills, one could use farmer group approach.

Seed recovery and delivery

In first year recovery of seed was generally poor since most farmers had not yet fully understood the objectives of the project and possibly due to limited amount of seed obtained. However, in second year the recovery rate had increased (Table 5) and most farmers were selling/giving some seed to fellow farmers (Table 6a &b). Individual farmers gave back more seed to the pool than farmer groups. Generally farmer who multiplied seed as a group did not perform very well due to lack of commitment by some group members, most especially in first year. However, adoption of practices and skills learnt from the workshops was higher in members of farmer groups. The reason given for high adoption of skills in farmer groups was that there was high sharing of experience and knowledge by the group members. This is a very useful benefit of farmer groups.A number of farmers within the project sites were able to access seed of the new improved pigeon pea (SEPI 1 and 2) at relatively lower price due to availability of seed with other farmers (the cost of plastic cup was 250=). This meant that the seed of these improved varieties was now available and affordable

Economic impact

Farmers who received seed of improved pigeon pea varieties were able to increase their production (higher yields were obtained) and therefore had surplus seed, which they sold for cash. The income from these sales was utilized in various ways ranging from paying school fees, buying goats; household items, dressings and paying graduated tax. Most farmers reported that surplus pigeon pea was used as food (sauce) and this reduced food shortage at the hard times before the local pigeon pea varieties and beans matured. This was a positive impact of the project to these farmers' livelihoods. The seed of SEPI 1 and 2 was sold at a price of 500/- per kg as compared to 200/- per kg of local varieties. Table 7 shows the income obtained by farmers. Increased pigeon pea production as a result of adoption of the high yielding improved varieties (SEPI I and II), pigeon pea farmers gained from improved incomes obtained from sales of surpluses (for instance in 2002, farmers got 7,061,000= from sale of pigeon pea seed). In testing the effectiveness of the two informal seed multiplication and delivery systems, farmers got some income that accrued from the sale of surplus seed.

Conclusions and recommendations

To have effective multiplication and distribution of pure seed of improved pigeon pea varieties with farmers it requires adequate time of training and follow up. And if rapid multiplication of pigeon pea varieties is the aim, dealing with individual farmers is better, however, if farmer groups have to be used, then dealing with existing groups that are operating without key internal problems is the best. There is need to train farmer group members on group dynamics and management. Individual farmer (farmer to farmer) seed delivery system was more effective than the farmer group seed delivery system. Through farmers' participation in the project activities right from the initial stages, it made the project achieve its outputs within a short time and sustainable. However, this approach is quite expensive since it involves empowering the farmers on project monitoring and evaluation skills. Initially Researchers have to spend much time with the community in order to win cordial working relationship. Training farmers on seed production skills and facilitating the initial seed distribution can establish sustainable informal seed delivery system established in the farming community. This could increase the adoption rate of improved crop varieties.

Table 7. Income from sale of improved pigeon pea seed in 2002

Site	Amount bought (kg)	Earnings from SEPI 1 & 2 price = 500/= per kg
Kangai	4520	1,760,000
Aloi	795	397,500
Aduku	4957	1,978,500
Nambieso	5850	2,925,000
Total	13,122	7,061,000

With adoption of improved crop varieties and other NARO technologies, increased crop yields can be realized and this will subsequently improve on food security and reduce poverty in the rural areas.

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