

# Designing bean seed



Photo: Louise Sperling

*Improved cultivars can be a key to increasing production among smallholders in Africa. Besides their higher yield potential, such cultivars are often low-input and can be easily integrated into existing farming systems. However, new varieties can increase food production only if farmers can obtain and keep them. Louise Sperling and her colleagues are experimenting with systems to deliver seed of improved cultivars also to the poorer farmers.*

**Louise Sperling, Urs Scheidegger  
and Robin Buruchara**

**W**omen farmers made researchers at CIAT (Centro Internacional de Agricultura Tropical) and ISAR (Institut des Sciences Agronomiques du Rwanda) aware of the seed issue. During follow-up studies of varietal trials, women indicated problems with keeping new bean cultivars, especially in the first seasons of testing when quantities were limited. Appreciated varieties were lost for agro-environmental reasons such as flood, drought and pest infestation, or socioeconomic reasons

such as family illness which led to plot neglect or hunger, obliging families to eat all the harvest.

The women can restock seed of local varieties fairly easily but find it harder to get seed of new varieties again. The main way of acquiring new varieties - through farmer-to-farmer diffusion - has major hitches. Farmers do not start distributing new cultivars to others until 2-3 seasons after receiving the new seed; they distribute only to best friends, close family and neighbours; and many do not distribute at

all. Poorer farmers were relatively undesired partners in local seed networks (see Sperling & Loevinsohn 1992).

## Limits to formal seed system

There was obviously a need to identify appropriate systems to distribute and produce seed: ones that can handle new varieties on a continual basis and are open to all farmers. Also members of formal seed services recognised major limitations in the official system: eg. production costs 2-6 times the sale price of seed, very limited volumes of seed produced, high disease pressure associated with centralised production (see Sperling 1992).

CIAT/ISAR researchers then asked whether the "informal" seed systems used by farmers for local varieties could serve as a starting point for improved seed delivery and production. This led to "distribution channel research" in three parts: analysis of existing seed channels, design of appropriate seed packaging, and testing of improved seed distribution through local outlets.

## Informal seed channels

Throughout Southern Rwanda farmers representing all wealth classes were interviewed. Most discussions were with women, who know most about bean seed (Sperling, Scheidegger & Ntambovura 1991). It was discovered that:

- The demand for seed was considerable: about 40% of farmers acquired some seed off-farm during the main sowing season. The poor were particularly dependent on seed purchases: 33% of the poor buy 100% of their seed at least one season a year.
- There are already various channels for getting seed: through neighbours, local country stores or open markets. Small quantities of seed of new cultivars were available through state agronomists and development projects, but these channels were used by less than 2% of the farmers.
- In defining "good seed" farmers focused on varietal aspects such as adaptedness to local conditions (42%) and earliness (23%). Physical or plant health qualities such as good general appearance (15%), good germination (2%) and seed treated with pesticides (7%) were considered secondary and more easily obtainable.

In using a seed channel, farmers sought a balance between finding promising genetic material and finding enough of it at affordable prices. Beyond one's own stock, neighbours' seed was preferred: it is a locally-adapted varietal mix and is generally well-sorted (eg. beans are not

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broken, immature, discoloured or ravaged in storage). But this seed is costly and limited in availability. Many farmers therefore go to some sort of market. While they risk buying varieties not adapted to their conditions, seed is available in larger quantities and on a constant basis. Many also buy at local country stores: seed is cheaper than from next door and often has been gathered from nearby farms.

The analysis of informal seed systems offered several principles to guide design of future seed delivery:

- demand for seed is widespread: delivery systems should be decentralised
- local channels function adequately (in seed delivery and timing): build on them
- farmers seek first genetic quality: improved seed systems might do likewise.

## Appropriate seed packaging

Researchers then tried to devise a simple delivery package of interest to both seed merchants and farmers. Small quantities of highly productive varieties were packed in heat-sealed plastic bags along with identifying leaflets. From the merchants' point of view, the pre-measured bags made distribution clean and quick. In such small quantities, seed could also be afforded by smallholders. From the farmers' point of view, such "test" sizes were a low-risk investment, and the finished packets suggested a reliable product (standard quantities of research-proven varieties). The leaflet described basic varietal traits in Kinyarwanda, the local language, so farmers did not need to have direct contact with extension agents.

## Testing local distribution

Two channels were used as test outlets for seed distribution: local country stores and regional open markets. Four types of packages were made available for comparison:

- 250 g of a single bush variety
- 250 g of a single climber
- set of 4 bush varieties (50 g each)
- set of 3 climbers and a sample of *Sesbania magranta* (50 g each)

As for production costs: bags, labour for packing, and labels amounted to US\$ 0.02 per unit (single variety) and US\$ 0.05 per unit (set); and seed (at market price) US\$ 0.10 and 0.08, respectively. Packages were sold to vendors at US\$ 0.12 per unit.

In September 1991, ten country store owners (all those contacted) readily took about one hundred of these packages on commission. These shops typically serve a range of 1000-3000 farms and sell 1-3 tons of seed of local mixtures per season. Merchants sold the packages to farmers at US\$ 0.16-0.24 per unit. Farmers thus paid

on average US\$ 0.80 (single variety) and US\$ 1.00 (set) per kg of bean seed of new varieties. The going rate for local cultivars was around US\$ 0.40 per kg. Demand was greatest for packages of single varieties, with bush preferred to climbers. Merchants sold the most preferred packets within 2-3 days and were greatly interested in continuing the experiment.

Market sales created some difficulty, as the handy plastic packages were easily stolen (as opposed to local mixtures normally sold in bulk). As more farmers can be reached through markets, the traditional sprawling merchandise display may need to be modified if vendors continue with the sales. The one market merchant contacted disposed of 140 packages in two hours.

It thus appears that farmers readily pay for new varieties at 2-3 times the open market price of local seed. Merchants find profit in handling the sales, and the country store seems to be an effective channel for reaching large numbers of farmers.

## From on-farm to on-station

The sustainability of decentralised seed supply also hinges on how seed multiplication is organised and what techniques are used. Research together with development projects revealed that local seed experts and farmer cooperatives are already producing seed for sale. The key issue is seed health. Is noncertified, farmer-produced bean seed more risky to circulate than seed from the formal system? To address this issue, researchers brought an on-farm technology on-station: farmers' seed was examined under controlled conditions and compared with more formally-produced seed.

Samples of G2333 (an improved climbing variety) were bought from several sources: the Rwandan Central Seed Service, a local prison working with extension authorities, two farmers multiplying under the auspices of a development project and seven farmers who had grown the variety for at least four seasons. They were planted in four replicates. Breeders' seed from the national institute was used as the check.

No statistical differences were found in terms of vigour, emergence and yield. Seed health parameters differed significantly only for *Ascochyta*. Incidence of common bacterial blight was generally low. A high mean incidence of angular leafspot probably reflects more air-borne than seed-borne disease. In brief, there were no consistent differences among farmers' and more formally-produced seed. The breeders' seed had a lower initial vigour but slightly above-average health parameters (Scheidegger, CIAT 1991).

Laboratory tests were carried out on 126 grains of each sample. Seeds were germinated on wet filter paper in Petri dishes. Infected seed was then counted using a stereo binocular microscope. Overall infection rate was low, and farmers' seed did not differ importantly from seed produced in formal settings (Buruchara & Scheidegger, CIAT 1991).

## Benefits of decentralisation

Important research elements remain to be clarified before an improved seed system strategy for smallholders can be fully identified. In these initial phases, farmer concerns are brought to the fore, existing ("informal") systems form the basis of experimentation, and on-station research is geared to evaluate farmer management methods.

While the road to a revised national seed delivery system will be difficult, with political as well as technical hurdles, the benefits of a decentralised system seem worth pursuing. Decentralisation can mean that:

- A greater diversity of varieties can be offered to farmers, thus promoting genetic stability. Centralised production can accommodate only a few cultivars at a time.
- The varieties multiplied can be better targeted to specific regions. While large-scale seed production seeks widely adapted varieties, smaller-scale multipliers can afford to produce for special niches.
- More farmers - whatever their class, gender or ethnic group - get access to new cultivars as the distribution is integrated into known, widespread and functioning networks.

## References

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Louise Sperling, Urs Scheidegger & Robin

Buruchara

CIAT Great Lakes Regional Programme, BP 259, Butare, Rwanda

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