WHAT TO DO WITH THE SEED FOR SMALL-SCALE FARMERS AFTER ALL?

Questions on seed supply strategies for the formal sector, considering PPB successes

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INTRODUCTION

Changing strategies in supporting seed sector

On-farm saved seeds have been and still are the dominant seed source for the majority of farmers who grow food and subsistence crops like maize, rice, wheat, and potato. Over the last decades, views on feasible seed-sector approaches have evolved and different strategies have been tried. After the Green Revolution, it has become clear that the commercial seed sector could well take care of seed supply to high-input agriculture. The public seed sector, however, has difficulties in effectively addressing the rest of seed supply, i.e. that for the small-scale farmers in more marginal areas. The large-scale programs that were implemented in the 60-70's were not very successful, despite the significant support from FAO, UNDP and World Bank. In reaction to this, projects were implemented in the 80's to support farmers' seed production. This shift was based on the recognition of the values of farmers' capacities in producing and diffusing seed (1, 2). These efforts focused on improving farmers' own individual practices of seed production and saving and on the formation of small-scale seed enterprises. In addition, it was recognised that particular farmers could have the potential and capacity to specialise and form small or medium-sized local seed enterprises. However, there are few cases that indicate this was a successful strategy: most of the initiatives left few traces.

A current promoted strategy – to link and integrate the formal and informal farmer-based seed system - is based on the same recognition of the value of local seed system but also draws attention to its limitations. The integration of both systems takes into account the complementarity of strengths and weaknesses of both systems (3) (Table I). However, whereas also this approach looks promising on the drawing board, there is little to show for so far. In the following we elaborate on a key constraint: the actual purchase and investment of small-scale farmers in quality seed.

Table I. Characteristics of seed sources and its general suitability (*) in relation to the demand for seed as planting material and as source of new varieties (3)

Seed sources	Characteristics	Source for planting material	Source for new varieties
On farm	Known quality, cheap, readily available	+++	- - -
Neighbours, friends & relatives (in the community)	No cash involved, readily available	++	+
Others in the community	No cash involved, readily available, not necessarily easily accesible (social differentiation)	+	++
Local market	Unreliable quality, last seed resource	--	- - -
Middle men	Non cash arrangements/loans, unreliable quality	+, -	-, +
Neighbours, friends & relatives (outside the community)	Non cash arrangement, resources needed for traveling	+	+++
Stores & comercial enterprises	Cash for seed and traveling	+	++
Seed agencies public seed sector	Unreliable availability and quality unknown	-	+++

(*) ranging from +++ (generally very suitable) to +, – (reasonably suitable, depending on the situation) and --- (generally unsuitable)

Alternatives that only look promising on the drawing table

Recent experiences that fit the approach of integration of the formal and informal seed sector tend to pay less attention to farmers' individual seed saving practices, but emphasise the specialisation of key-seed producers as providers of quality seed to small-scale farmers (3, 4). These key-seed producers can be NGOs, farmers or other individuals or groups who have the capacity to become seed providers for a group of farmers in one or more communities, on commercial basis or otherwise. The activities that fall into this approach involve seed fairs, community seed banks, village- or community-based seed production, and small-scale seed enterprises. However logical the approach looks, especially in relation to improving local availability and quality of seed, there is still little impact claimed so far. Efforts are successful on a pilot project-scale, but seem to wither away in the phase of up-scaling or after the ending of the project. Farmers seem reluctant to buy quality seed and few continue to

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apply improved practices of seed selection and storage after projects finish – despite the fact that cost/benefit analysis or surveys among farmers may show significant benefit for farmers to invest in and use quality seed. Although multiplication of quality seed of cross pollinators like maize is more demanding – and thus may provide more opportunity for specialisation-, also in these crops there is little successful local specialisation. Either it is a fairly productive agriculture with farmers buying seed from the larger, often multi-national enterprises, or it is an agriculture with few recognised farmers that specialise in seed production (see for example recent study of L. Badstue, CIMMYT, on the local maize seed system, Oaxaca, Mexico).

Is PPB hitting the wall?

The lack of effective strategies to improve seed supply for small-scale farmers is especially threatening successful Participatory Plant Breeding (PPB) initiatives, like those in Latin America (eg. FP-MA, H. Preduza[1]) and South Asia (eg. Li-Bird[2]). These initiatives show that indeed farmers are effective collaborators in plant breeding programs and PPB programs produce highly-adapted quality materials. As it was anticipated, in these PPB programs the range of materials identified and selected is wider than in conventional breeding programs. Whereas conventional programs usually come up´with one or two varieties, farmers in different communities identify one or two, sometimes even more 'winners'. This means that even with only a limited number of key communities involved, PPB easily results in four or six or more candidates for variety release. With a higher number of materials developed than in conventional breeding programs, PPB programs are therefore important tools in sustainable use and conservation of agrobiodiversity. However, it also implies that for impact beyond the directly participating farmers, effective seed multiplication and diffusion strategies have to be brought in place.

Dependency on new varieties for seed sales to small-scale farmers

Seed diffusion of attractive new varieties often carries quite fast and far via the informal contacts from farmer-to-farmer, as is confirmed by recent PPB-work with rice in SE Asia (5). Swapping, loaning, gifts or other bartering mechanisms are a common local practice in the diffusion of seed. However, with these mechanisms seeds or other planting materials may not be reaching all farmers within acceptable time-spans: research on the effectiveness of informal exchange channels show that the social stratification and geographic distance form barriers in the system that should not be underestimated. They can considerably slow down seed diffusion or even halt it. More worrysome is the informal seed exchange when considering the spreading of improved varieties of a cross-pollinating crop like maize. These varieties genetically degenerate and finally gains made by breeding may not come to expression in farmers' fields. Also improved varieties of potato can lose potential when due to accumulation of (virus) diseases and other pathogens, seed quality decreases.

In relation to the above a distinction should be made between diffusion of seed of new varieties and diffusion of quality seed of varieties that are already more commonly planted by farmers. In the last case, it is the use of higher sanitary and physiological quality of seed that can improve farmers' crop production. Such higher quality can be achieved by improving the practices of on farm produced seed. For example, farmers may start to select seed from healthy plants only, or harvest seed from plants in the field that were marked because of their desirable characteristics (positive mass selection). Storage of seed under more favorable conditions is often having significant impact on seed quality as well, in particular in areas with humid, high-temperature storage seasons and in crops like potato, bean and wheat. Another possibility to obtain higher quality seed is to purchase seed from a reliable source, i.e. a project, a local seed-agent, farmer-cooperative or a farmer that has seed reputation. Experiences so far have shown that although on paper these improved on-farm seed production practices or seed purchases are often economical, in practice farmers are very reluctant to invest in quality seed in time or money: apparently in their reality the investments are not attractive. There exists a range of explanations for this: seed is expensive, it may arrive too late for planting; it often does not have the claimed seed quality; farmers do not dispose of sufficient cash; the risk of investment is too high; or the highest seed quality does not come to expression under low-input conditions. Many projects that aimed at improving on-farm seed production practices may therefore have left no trace after finishing: farmers seem to return to the earlier practices.

The situation looks different when dealing with new, improved varieties. Farmers tend to be quite willing to buy small volumes of such 'novelty' seeds. However, efforts to develop local seed production initiatives into small-scale seed enterprises on the basis of new varieties seem to have failed in the majority of the cases as well. Most of these failures are not analysed or documented, but it is possible that they failed because they depended almost exclusively on seed sales to farmers who look for a starter-seed lot of the new varieties, which they thereafter could reproduce on farm. Only when after a number of seasons seed is degenerated or when crop yields have been too low to be able to save seed for next season, farmers' demand for seed is of a more significant volume (if the farmers dispose of cash). With such variable and relatively low and variable amounts of seed sales, it is difficult for a seed enterprise to be economically sustainable.

The above-described reluctance of farmers to invest in quality seed despite the benefits – as perceived by the

[1] www.programa-fpma.org.ni; www.hpreduza.org

[2] www.panasia.org.sg/nepalnet/libird/

researchers - presents a serious obstacle in defining strategies to improve seed supply for small-scale farmers and up-scaling the benefits of breeding, more in particular for participatory plant breeding.

Up-scaling of benefits of participatory plant breeding

It can be understood in different ways. Increasing participatory breeding activities is one way of up-scaling, the diffusion of seeds of the varieties that result from such activities is another.

Increasing the participatory breeding activities is most logically done by the breeder through more collaborative activities over time with a number of collaborating individual farmers or farmer groups. The idea that all farmers would engage in participatory breeding activities, each developing his or her own unique variety is unfeasible and ineffective. One argument is that a breeder has limited available time, breeding materials and other resources. Another phenomen on that influences the definition of the number of farmer-collaborators or collaborating groups is the genotype-environment interaction (G x E). It is because of this G x E that PPB potentially results in varieties that are more specifically adapted to farmers' conditions. It is based on the observation that the best material in one field is not necessarily the best material in another field, another location or another year. Acknowledging that environmental conditions and farmer preferences vary significantly, and that a centralised breeding program can not cover all situations, does not mean that the 'ranking' of all evaluated materials varies between each field and between each community. Therefore, it can be assumed that (groups of) farmers may select for a certain region and number of farmers. The size of that region and number of farmer-clients thus depends on the G x E, which varies between crops and type of varieties.

Expectations of economically sustainable seed production efforts

When a participatory plant breeding initiative has produced promising materials, the farmers or farmer-groups who collaborated in the selection of material are the logical seed producers and distributors of seeds of these new materials. Experiences from Nicaragua have learned that a part of the farmers may have the expectation that they can make some profits on the selling of seeds of the varieties they developed, as a return on their investment in the participatory plant breeding in the form of time and land. While the selling of seed may well be achievable when there is sufficient attention for the quality of seed production, the promotion of variety and appropriate linkages with potential markets and clients, it remains an open question as to what extent such a seed-production initiative can be sustained once the novelty-aspect of the purchases has gone. Will sufficient farmers continue to buy at a justified price? And will farmer-seed producers be able to maintain the variety and the quality of seed? Or will these farmers and farmer-groups depend on a continuous flow of new improved varieties they may select from materials provided by the breeder? And will their breeding-selection efforts be a justified investment when mirrored against the profits from their seed sales?.

In a crop like maize, where genetic degeneration of OPVs and hybrids easily reduce yields, there seems to be more opportunity for sustainable quality seed production and selling - and thus less dependence on a continuous flow of new varieties - than for example in the case of barley or bean. However, instead of dependence on a flow of new varieties, there is a dependence of the formal sector for quality foundation seed. On the other hand, release of improved varieties with increased productivity can make it more attractive for farmers to invest in improved seed quality (see Figure 1). Several recent reports indicate that small-scale initiatives in rice seed can be profitable and sustainable (6, 7). But for most initiatives 'the proof of the pudding will be in the eating'. At the time of writing this paper, farmers in Cajamarca, Peru, who associated to produce quality tuber seed production, are facing full seed tuber stores while planting time has arrived: their colleague farmers did not want to pay the price for quality seed (Minchán, personal communication).

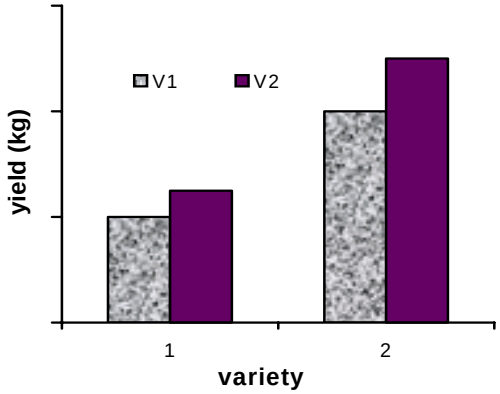

Figure 1. Investing in seed quality can be more economical in improved varieties (V2); when the effect on production is larger in absolute terms than in common varieties (V1). In this figure the improved quality, in the case of a common variety, increases the yield with 25 kg, in the case of an improved variety with 50 kg

Problem statement

Financial resources for public agricultural activities are low and most donors are reluctant to allocate funds for seed multiplication activities. The general view is that seed production and diffusion has to be financially sustainable, i.e. farmers have to pay at least the cost price of seed reproduction. Where this may be a realistic for commercial farmers dealing with high input and high value crops, experiences show that small-scale farmers whose main agricultural income comes for (low value) food crops may not be able or willing to do this. Small-scale farmers do not easily buy seed when it is not a new variety for reasons mentioned earlier. In addition, earlier negative experiences with seed of low quality or unadapted varieties

do not help to convince farmers that this time the seed really fits their situation and preference. And the continuation of decreasing market prices for the food crops that those small-scale farmers plant are further disincentives to invest in crop production. Before trying out approaches in seed provision for small-scale farmers that failed before, we should therefore ask ourselves what is different this time. Are the currently developed varieties better and give more yield gains than before and does that make improved seeds more attractive to farmers? Are production costs of local small-scale seed production indeed lower? Do farmers' calculations of costs and benefits correspond with our outcomes?.

In short, despite several decades of efforts to improve seed supply to small-scale farmers, we see ourselves faced with the situation we have to recognise, we lack a good understanding of the local seed system, of the considerations that farmers have in taking decisions, on the use of seeds and cost/benefit ratios of improved seed in less favourable conditions. That being said, we feel there is an obligation for researchers to demand and design studies in this field, before making the same mistakes, of which the farmers who are willing to participate in our adventures are the ones who really lose out.

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