

Seeds for business and business for seeds

Introduction to thematic meeting and call for sharing experiences

PART A - SETTING THE STAGE:

THE CHALLENGE OF LINKING SEED AND COMMODITY VALUE CHAINS

Why improved varieties and quality seeds are so important

In 2050 the world's population will be more than 9 billion people. Population growth is mainly in developing countries. While the rural population remains stable or declines, the urban population will move up from 50 to 70% of the total population. As the acreage of arable land will not increase, the same fields must produce 70% more, not only to feed the growing population, but also to respond to market demand. Consumers - increasingly urban and demanding - ask for a broader diversity of agrifood products, which are of homogeneous quality and appearance, with food safety and traceability ensured. At the same time, the agricultural sector has to adapt to climate change, increased demand for biofuels and animal feed, and agro-logistic challenges related to the storage and transport of food products over longer distances. All these challenges and opportunities require the development, production, storage, marketing and effective farmer uptake of new or improved varieties and quality seeds.



Informal seed systems

In local, informal, farmer seed systems, seed and commodity value chains are close. Grains (for consumption) and seeds (for sowing) are not or hardly differentiated. Farmers keep part of the harvest to serve as seed for planting the next growing season (farmer-saved seed), and share it with relatives, friends and others in the community through exchange, barter, gifts and sales at local markets. In informal systems, farmers may specifically select certain plants, grains or planting materials for seed, but this 'positive selection' is generally not done. Although local varieties (land races) and local seeds are generally well adapted to local agro-ecological conditions and are not necessarily of poor quality, it is observed that officially released varieties and professionally produced seeds may significantly improve production.

Formal seed systems

Informal systems are by far providing the largest part of seeds and planting materials. For most crops, farmers do not perceive seed as a distinct product you pay for. This hampers the adoption of quality seeds and the transition towards the use of quality seeds. Formal seed systems are characterized by specialization and quality control. And seed is perceived as a distinct (commercial) product. The development of improved varieties is the work of specialized breeders, who may work with farmers for participatory variety selection. Breeders produce the pre-basic and basic seed, also referred to as breeder and foundation seed.

The multiplication of registered/released varieties, and the production of certified or quality declared seeds is also the work of specialists: seed farmers, seed producer groups, local and international seed companies. Specialized agencies generally control the variety development process, seed multiplication practices and seed quality.

Farmers combine informal and formal seed systems

In actual practice, informal and formal seed systems are not separated. Often, farmers: (i) have seeds they kept themselves from the previous harvest; (ii) exchange seeds with neighbours or buy at local markets and (iii) buy seeds from seed companies, for instance vegetable seeds and hybrid maize seeds. Local farmer seed systems are very important for the rapid dissemination of new appreciated varieties, which, after introduction and acceptance, may be farmer-saved, bartered and/or locally sold.

The connect between seed suppliers and seed buyers

As said, seed and commodity value chains are close in local, informal, farmer seed systems. Seed providers and seed users are often the same or are close to each other. In the formal system, the distance between specialized seed producers and seed sellers/distributors on the one hand, and seed buyers and users (farmers) on the other hand is larger than in the informal seed system. In practice, it is often observed that the connect between seed supplier and seed buyer is not, or not easily been established. Even though for most crops many good-performing varieties have been released, quality seeds are often still in short supply, too expensive, too far away from - or not adapted to - the production zones where the seeds are needed. For many, if not most crops, farmers still rely on informal, local farmer seed systems. How can that be improved?

Quality seeds: end product of seed value chain and starting point of commodity value chain

Formal seed value chains and commodity value chains are very much linked: where a seed value chain ends with selling the seeds to farmers, the purchase and use of seeds is the start of a commodity value chain. As seed buyers and users, farmers are the 'seed consumers' at the end of the seed value chain. As producers they are at the start of the commodity value chain.

Living apart together

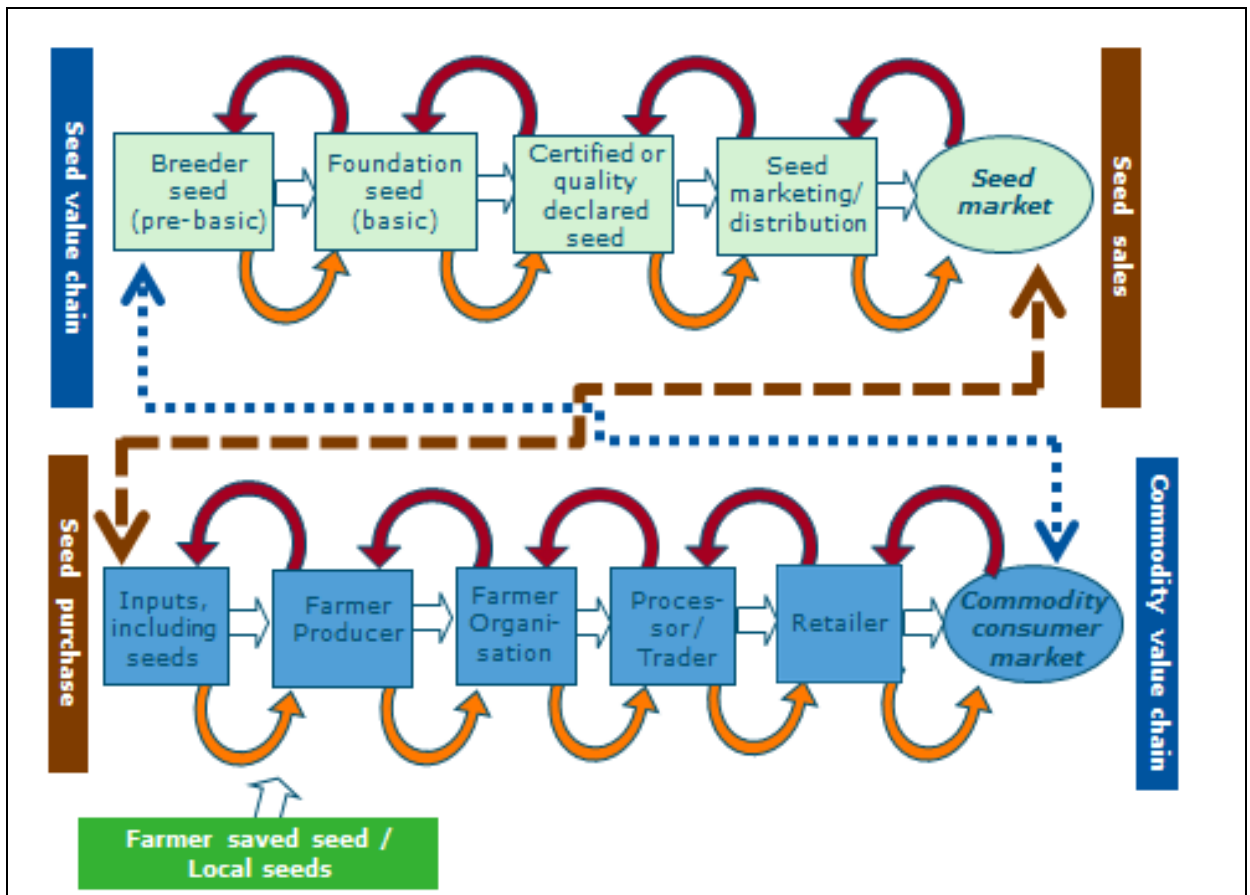
Seed sector development and value chain development efforts are often not sufficiently inter-connected. Seed value development concentrates on the development of improved varieties and the production of certified or quality declared seeds, hoping that commodity farmers will buy/use quality seeds. Value chain development concentrates on consumer demand and market requirement, transactions and value creation and farmers producing for the market, assuming that the seed system avails quality seeds. It is like seed value chain development and commodity value chain development are living apart together in somehow separated worlds.



This is understandable as both seed sector development and commodity sector development are huge undertakings in itself, justifying dedicated programs. There are however important missed opportunities, both for seed sector development (limited sales of quality seeds) and for value chain development (lower yield and quality).

Making the link: two major challenges

The seed value chain is shown in the top part of the figure below, and the commodity value in the lower part. The brown dashed line represents the first challenge of seed producers/sellers reaching and convincing farmers to buy and use quality seeds. The blue dotted line shows the second challenge of reasoning all the way back from consumer demand and market requirements to variety development and seed multiplication.



PART B - ENHANCING FARMERS' ADOPTION OF QUALITY SEEDS

Key question

The central question of this event is the following:
“What are the challenges and opportunities to bring actors from the worlds of seed sector development and commodity value chain development closer together, with the aim to enhance the farmers’ adoption (i.e. purchase and use) of quality seeds”.



Specific questions: 4 A's of adoption of quality seeds

The basic assumption is that the use of (formal) quality seeds leads to higher yields per land unit and lower costs of production per quantity produced. Quality seeds are therefore assumed to be instrumental for better ensuring food and nutrition security, promoting and fostering seed business and agribusiness, and improving (seed and commodity) farmers’ income.

To answer the central question presented above, it is suggested to look at it from six different angles, and associated sub-questions. The first two relate to the acceptability of seeds for farmer-buyers. The next two angles/questions (3 and 4) relate to the accessibility and affordability of quality seeds for farmer-buyers. The fifth angle relates to the attractiveness of selling and buying quality seeds.

Determinants for adoption	Angles	Sub-questions
Acceptability	1. Variety development	1. How to ensure that developed / improved varieties are those that farmers and markets need?
	2. Seed quality	2. How to ensure that farmers/seed buyers have trust in the seed quality?
Accessibility and Affordability	3. Marketing and sales	3. What are good strategies for seed producers and seed companies to market and sell their seeds?
	4. Facilitating farmers’ seed purchase	4. What role for farmers’ organisations, companies, financial institutions and others in facilitating/financing farmers’ purchase of quality seeds?
Attractiveness	5. Rate of return of quality seed	5. What is the yield and income effect of quality seed?

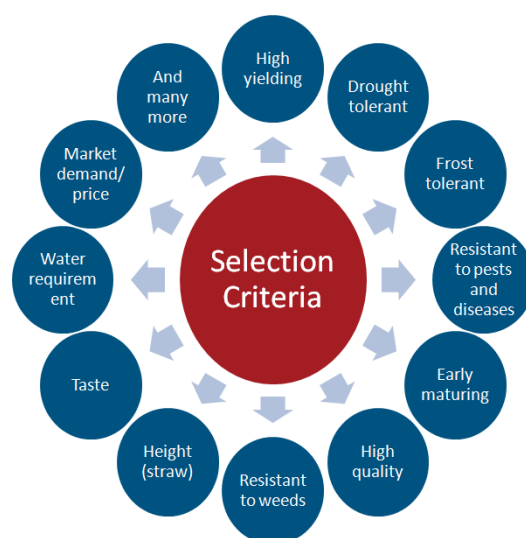
These different angles are further developed in the paragraphs below. During the seminar, it is proposed to specifically look at the 4A's and to explore what can be done to improve the acceptability, accessibility, affordability and attractiveness of quality seeds.

These different angles can come together when making an analysis of specific commodities or sub-sectors. In addition to the angles related to the 4A's of adoption, we would like to foster the sharing of experiences by having crop-specific perspectives :

6. Crop specific perspectives	For specific crops or sub-sectors and based on the 4A's of adoption and different analytical angles: <i>What is the likelihood of seed marketing (business for seeds) and profitable use of quality seeds for improving production, quality and income for commodity farmers (seeds for business)?</i>
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1. Variety development

What is a good/improved variety? At the production side, for some it is the yield potential, for others the resistance to pests and diseases. At the market/consumer demand side, it may be the appropriateness for storage, processing, transport, the taste or the appearance. The figure to the right shows some possible criteria for varietal selection, though there are many more (Roner 2014:2). For improving the link between seed and commodity value chains, it seems important to translate farmer and market demands better in variety selection criteria and to associate farmers, processors, traders and consumers in a participatory variety selection process.



<p>1. Variety development</p>	<p>Sub-questions related to the development of improved varieties that farmers and markets need</p> <p>a) What are your experiences with integrating farmer and market/consumer selection criteria and associating different stakeholders in the selection process?</p> <p>b) What have been the effects on the acceptability of the variety, seed sales and farmer uptake and what are your lessons learned and recommendations?</p>
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2. Seed quality

Seed quality refers to physical purity, physiological vigour, genetic potential and the health of seed (FAO 2010: 7-12; Roner 2014). Good quality seeds:

- Are free of damaged seeds, dirt, stones and other crop seeds and are also uniform in seed size (physical purity);
- Show high germination and growth vigour (physiological vigour)
- Are genetically pure, show high genetic potential for desired criteria (see above) and are well-adapted to local conditions (genetic potential)
- Are free of pests and diseases (seed health).

Quality seed can be of local varieties (land races), locally-recycled improved varieties and newly-released varieties.

Certified seed and standard seed both have to meet the same quality standards: the difference is that certified seed is produced when formal varietal release has occurred while standard seed is produced when the regulatory agency recognises that there is demand for the seed but formal varietal release has not occurred. Standard seed is also used in emergency situations so that the most appropriate types of seed can be supplied, even if varietal release has not occurred.

Quality declared seed (QDS) is an alternative system for seed quality assurance, developed by the Food and Agriculture Organisation of the United Nations (FAO) in 1993 for countries with limited resources. It is less demanding and less expensive than full seed certification systems yet promotes a satisfactory level of seed quality. Not all countries permit QDS though.

Countries/Governments have seed legislations for ensuring processes for seed quality control and certification. There are quality assurance processes and standards for international seed trade. These legal and regulatory frameworks and processes are demanding in time, human and financial resources and raise the costs of seeds. As indicated above FAO has developed a (lighter, less demanding) seed quality control system called Quality Declared Seeds (QDS), mainly for countries that do not yet have their own seed legislation and/or for commodities that are less commercially interesting for seed business (see also point 6 below).



<p>2.</p> <p>Seed quality</p>	<p>Sub-questions related to having/creating trust in seed quality:</p> <p>a) What are your experiences with seed quality control processes? Note that these may come in many different shapes and sizes:</p> <ul style="list-style-type: none"> o Internal and external o Formal certification processes? o ‘Lighter’ QDS process ? How does it compare to more formal certification? <p>b) How to ensure that commodity farmers (the potential buyers of the seed) trust the purity, vigour, genetic potential and health of the seeds?</p> <p>c) How to communicate seed quality control procedures to the potential seed buyers? What role for government institutions in ensuring seed quality? What is the importance of storage and packaging?</p> <p>d) Have you experienced cases of bad/insufficient seed quality that eroded farmers’ trust in the seed quality control?</p> <p>e) Have you experienced cases of farmers’ insufficient application of required agricultural practices, leading to sub-optimal yields, which affected the farmers’ trust in the yield potential of the seeds? Have you experiences with ensuring that farmers have the information and skills to take as best as possible advantage of the (new or improved) seed variety?</p>
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3. Marketing and sales

Ultimately, seed enterprises (seed farmers, seed producer groups, small, medium and large private seed companies and public agencies or public seed enterprises) are only successful if they are able to establish business relations with farmers. This is only possible if they have the right varieties, are selling seeds of good quality, at right time, in the right quantities and at affordable price. Furthermore, seed enterprises have to overcome the cash flow challenges related to seed business



(seed has to be stored until the next season). Seed enterprises are only truly successful they manage to stay in business for several years, e.g. by keeping customers and/or finding new ones by offering consistent high quality seeds and by creating new products and services. Providing information and training on seed use and best agricultural practices and associated products to optimize the positive effect of quality seeds may be important for getting and keeping clients. Only then the seed enterprises are self-reliant and can invest in further innovation.

3. Marketing and sales	Sub-questions related to seed marketing and sales a) What are your experiences with seed companies, seed producer groups and seed farmers doing seed needs assessment among farmer-clients? b) What are your experiences with seed producers storing seed for next season? Do they keep the seed quality? Do they manage the cash flow challenges? c) What are your experiences with seed producers / seed marketers packaging and repackaging seeds for customers? How do they adapt to the quantities that different types of farmers need? d) How are seed producers/sellers doing their marketing? Do they invite potential customers? Do they give free samples? e) Do seed sellers provide information about seed treatment and best agricultural practices (soil management, water need, pest and disease management)? f) Any other experiences with good and bad practices?
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4. Facilitating farmers' access to quality seeds

Even if farmers are convinced of the usefulness of quality seeds or certified seeds, they may not be in a position to purchase the seeds. The reasons are among others: the distance of the seed retailer to the farmers, the cost of the seeds, the inconvenient moment of purchasing the seeds (before the agricultural season when farmers are often cash-short), the difficulties to get loans from banks or MFI's, and others.

Farmers' organisations can play an important role by: (i) organising seed producer groups within the organisation, who deliver to members; (ii) collective procurement of quality seeds; (iii) being an outlet for seeds of certain seed companies; (iv) having an input shop with seed retail to members, and others.



Also companies, especially those that source products from farmers and their organisations, can play an important role. They might provide quality seeds to outgrower farmers at the start of the season. This is in the interest of the company (good homogeneous quality of the commodity, in line with market demand), and it is a kind of advance payment or loan for the farmer, who repays in cash or in kind, after the delivery of the commodity to the company.

Financial institutions providing agricultural loans should know the best varieties and their effect on yield and quality improvement, the cost of quality-declared or certified seeds, the additional agricultural practices that are required to optimize the yield (...), in short: they should know the commodity value chain, the risks and likely return on investment for farmers using quality seeds.

4. Facilitating farmers' seed purchase	Sub-questions related to the facilitation of farmers' purchase of quality seeds a) What are your experiences with the role of farmers' organisations in facilitating farmers' access to quality seeds? b) What are your experiences with chain-embedded services of companies, e.g. companies providing quality seeds to farmers/outgrowers, who reimburse later in one way or another? c) What are your experiences with the role of financial institutions: do they understand the value chain, the importance and possible rate of return of quality seeds, is the cost of seeds part of the calculation of the amount of input credit that could/should be provided to farmers?
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5. Rate of return of quality seeds

Field experience and farmers' feedback suggest that seed quality is central to crop productivity and can - in itself, even without changing other agricultural practices - have a significant impact on production. It is however difficult to provide a general overview of the marginal rate of yield, resulting from the use of improved varieties or higher quality seeds. The reasons are the limited availability of studies that isolate the effect of improved varieties and quality seeds on yield (EPAR 2015: 6) and the important variance in data from one case study to another, suggesting that local conditions play a huge role.



Yield improvement studies generally consider the effect of a combination of practices. A common heuristic though is that 'experts attribute up to 50% of the yield gap in Sub-Saharan Africa to the limited use of quality seed and improved varieties' (World Bank 2007). In a study commissioned by the Bill and Melinda Gates foundation, the Evans School of Public Affairs (University of Washington) found strong evidence of gains in yield from improved variety and quality seeds for cereal crops such as sorghum, millet, maize and rice. Evidence for roots and tubers and other crops was more limited and requires further research.

For three countries (Ethiopia, Ghana and Tanzania), CDI modelled the Return on Investment (RoI) of the use of quality seeds of improved varieties for several crops. It was generally found that the RoI in quality seeds oscillates between 20% and 70% (unpublished document; personal communication ISSD Team at CDI). This seems high at first sight, but experience has learned that farmers, especially if they have to borrow money and if production and market risks are significant, will only make investments in agro-inputs if the rate of return is at least 50%, that is, when an investment of 1000 shillings or rupiahs brings 1500. In addition to yield improvement, other benefits such as risk mitigation (for instance drought tolerance) and quality improvement (homogeneous colour, seed size, ...) should also be taken into account when analysing the rate of return of farmer investments in quality seeds.

<p>5. Rate of return of quality seed</p>	<p>Sub-questions related to the rate of return of using quality seeds</p> <p>a) <i>When promoting the use of quality seeds as part of the adoption of good agricultural practices, what are your impressions (and if possible your research results) of farmers' gains? In terms of yield gains, quality improvement, risk reduction and other benefits?</i></p> <p>b) <i>What is the value of the additional production and quality? What were the costs of purchasing quality seeds? Hence, what is the Return on Investment for farmers investing in the purchase of improved varieties and quality seeds?</i></p>
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6. Crop-specific experiences, challenges and opportunities

The crop a farmer plants influences how often and how determined he/she is to seek/purchase new seed. Determinants for commercial interest for seed producers and for commodity farmers are developed in the table in annex 1 (which is not complete).

- Four crop types with distinct breeding systems are distinguished: open-pollinated, self-pollinated, legumes and vegetative reproduction.
- The planting/sowing rate is the amount of seeds that is required. This is the basis for the volume of seeds that farmers demand.

- The multiplication factor is somehow related to the planting/sowing rate. It is an important consideration for seed multipliers. Crops with high seeding rates and low multiplication rates, especially when the crop has a low market value, are mostly unattractive to seed companies.
- The rate and type of deterioration determines the need to renew the seeds from outside the farm, among others by the purchase of seeds.
- The marginal rate of yield that is likely to be obtained by the use of quality seeds (generally in combination with other recommended practices).
- In addition to breeding and seed characteristics, the likelihood of return on investment (yield and/or quality improvement) are important determinants for farmers to purchase quality seeds or not.

Farmers, as buyers of seeds respond to the breeding and seed characteristics of the crops they grow, and they respond to commodity market demand. When making their decisions to buy or not to buy quality seeds, they consider the trustfulness of the seed suppliers and are considering the likely return on investment.

For seed producers, sellers and companies, the commercial interest is highest for crops with the following characteristics, or any combination of these characteristics.

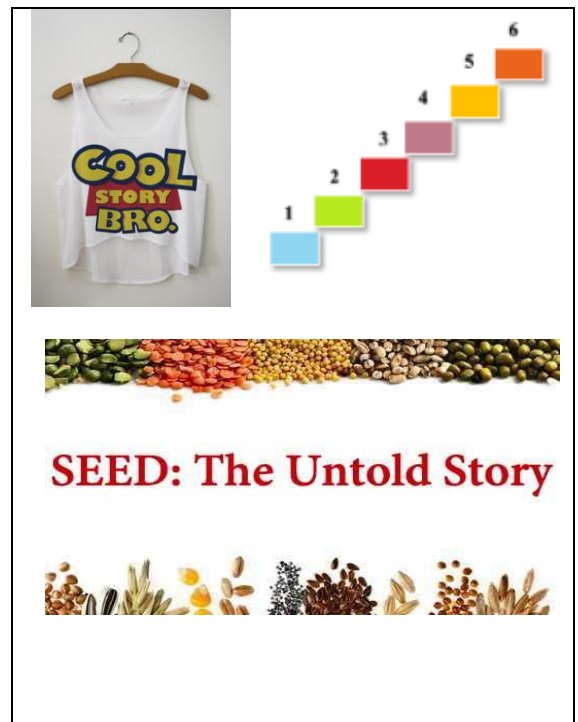
- Crops for which quality seeds are difficult to produce, mainly for vegetables and hybrid maize.
- Cross-pollinating crops, as these easily get genes from other varieties
- Crops with high deterioration of seed quality / hence frequent new to get/purchase new seed of good quality
- Crops for which seed has a high impact on yield and quality improvement
- Cash crops and/or crops with high market value

For crops with high commercial interest, the challenge is to link farmers and their organisations to seed companies. For crops with less commercial interest, farmers can take up the role of professional seed producers and sell quality seeds to their fellow (commodity-growing) farmers (local seed business). For these commodities, farmers can thus be present on both the seed and commodity value chain.

6. CROP-SPECIFIC CASE STUDIES

-> **Sharing crop-specific experiences, challenges, opportunities and recommendations for seed marketing and uptake of quality seeds for value chain development**

- When you are working in a certain commodity sub-sector, or breeding/producing/selling seeds for a particular sub-sector or commodity, can you share your CROP-specific story, with focus on making the link between the production of quality seeds along the seed value chain and the purchase/use of these seeds by farmers?
- For these cases, it is most interesting if you can focus the factors that promoted or hampered the effective adoption of quality seeds by farmers.
- The sub-questions mentioned under 1 to 5 (preceding paragraphs) can be taken up in your case study, which in fact is a practical, crop-oriented story on 'Seeds for business and Business for Seeds'



Annex 1 - Features of some crops (different sources used/to be completed/corrected)

	Breeding system	Planting/sowing rate (kg/ ha)/ Multiplication factor (MF)	Rate and type of deterioration	Frequency of purchase	Yield improvement¹	Commercial interest
Vegetables						
Tomato		2				
Melon		7				
Other vegetables		9				
Hybrid maize	Forced out-pollination	20-35 kg/ha - High MF	Very rapid Genetic (increased homozygosity)	Annual		Very high
OP maize	Aggressive cross-pollination	20-35 kg/ha - High MF : 80	Potentially rapid Acquires genes from other varieties unless field is isolated	2-3 years	30%	High
Sorghum/ millet	Cross-pollination	10-20 kg/ha - High MF : 200/100	Medium Acquires genes from other varieties unless field is isolated	3 years	20%	Moderate
Wheat (rain fed)	Self-pollination	150-200 kg/ha - Low MF : 20	Slow - Pollination within the plant, creating genetic stability	4 years	30%	Limited
Rice	Self-pollination	70-150 kg/ha - Medium MF: 80	Slow	4 years		Limited
Pulses and beans ²	Self-pollination	50-100 kg/ha Medium MF :	Very slow	Variable		
Groundnut	Self-pollination	125 kg/ha - Very low MF: 8	Very slow	Variable	40%	
Irish potato	Vegetative	800-2000 kg/ha - Very low MF :	Rapid at low altitude where disease loads build up faster in seed	Variable		Potentially high
Banana / plantain	Vegetative				50%	
Cassava	Vegetative				50%	
Sweet potato					50%	
Yam					50%	
Sunflower		50				
Oil crops		22 kg/ha -				
Sesame		3-5 kg/ha -			45%	
Cotton		61 kg/ha -				
		50				
Barley					30%	
.....						

¹ ISSD data for Ethiopia, Ghana and Tanzania (CDI - non published report)

² Pulses and beans: Common bean, chickpea, Fava bean, Field pea, Grass pea, Lentil

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Read more

Several ISSD Africa papers touch upon the topics for discussion presented in this paper. These highly informative papers are all available at: <http://www.issdseed.org/issd-africa>

- Making business out of low profit seed
- Effective seed quality assurance
- Financing Seed Business
- Access to foundation seed of varieties in the public domain
- Access to information on varieties in the public domain
- Public variety use agreements
- Creating space for 'informal' seed systems in a plant variety protection system that is based on UPOV 1991
- Access and benefit-sharing policies for climate-resilient seed systems
- The support for farmer-led seed systems in African seed laws

