

Most countries of the world have some kind of seed law or seed regulatory system in place. In the countries of the South, these have been largely patterned on the US or European models. Niels Louwaars offers some background to how these systems work, discusses the implications of imposing such models on developing countries, and points out the complexities of developing seed laws in an arena of such diversified seed production.

Biases and bottlenecks

Time to reform the South's inherited seed laws?

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Seed laws aim to promote varietal and seed quality, thereby 'protecting' farmers from planting sub-standard seed. At the same time, they set the rules of the market for different seed suppliers thus intending to create a 'level playing field'. Seed laws therefore establish the institutional framework of national seed councils and certification agencies and regulate the procedures and standards for:

- **Variety release systems** aim to make only those varieties of proven value available to farmers through the formal seed system.¹
- **Seed certification** aims to control the varietal identity and purity throughout the seed chain.
- **Seed quality control** checks on other seed characteristics such as viability, purity and seed health.² Seed quality control also aims at protecting *bona fide* seed producers from competition by less scrupulous colleagues.

Different national systems

The regulatory frameworks that have been developed in various countries reflect different levels of state involvement. In North America, for example, certification is often a voluntary service, and variety release is fully the responsibility of the company. This reflects a general confidence in the regulatory effects of the market. The idea is that suppliers of poor quality seed will be punished by customers through declining demand for their products, and customers will demand a certification seal if that seal has proven its value. In various European countries, on the other hand, public institutions have developed a significant mandate and legal backing for 'policing' seed quality, i.e. for checking all seed in the market and banning sub-standard seed lots. In some countries, such as the Netherlands, certification agencies have developed as independent foundations managed by farmers', seed producers' and breeders' organisations,

¹ NP Louwaars (2002), "Variety Controls", in: NP Louwaars (Ed), *Seed Policy, Legislation and Law; widening a narrow focus*. Binghamton NY, Food Products Press, The Haworth Press, pp 131-153.

² R Tripp (1997), *New seeds and old laws*. London: Intermediate Technology Publications.



but these operate strictly within a national legal framework just like the public agencies in other countries. A trend is visible in different countries to certify the internal quality control procedures rather than checking each seed lot.

In most developing countries, formal seed production has developed as part of a top-down strategic paradigm for agricultural development in which plant breeding is believed to increase the potential yield of crops, and seed production is considered a necessary vehicle for technology transfer. Under the 'Green Revolution' approach, seeds and other inputs are subsidised in order to facilitate adoption of new varieties and associated technologies. Within this paradigm, centralised seed production units have been built in many countries as public institutions or enterprises to resemble the private European and North American seed industries. These formal seed systems subsequently developed specialised seed quality control institutions to create a quality-awareness with both seed producers and customers, and to safeguard the interests of farmers, similar to the official seed certification agencies in the North. In the era of privatisation of public institutions at the end of the 1980s, following structural adjustment policies, these seed quality control institutions became the driving force behind the development of seed legislation in the South.³ Such legislation was meant to provide these institutions with a legal backing, which was thought necessary to perform its police tasks especially with the new, private seed producers. As a result, many seed laws in the South strongly resemble those in the North. However, whereas in the North, the farmers' interest was often represented by a strong voice in the seed quality control systems, in several countries in the South this was not the case.⁴ The seed regulations were tacked onto existing bureaucratic structures and imposed upon both seed producers and users.

Registration and testing: typical biases

A variety release system commonly incorporates the following steps⁵:

- Application with a formal variety release committee and variety registration, including a variety description;
- Testing for the Value for Cultivation and Use (VCU) of the variety, involving a prescribed number of sites and seasons;
- Testing for Distinctiveness, Uniformity and Stability (DUS);
- Analysis of test results by the committee, leading to approval or rejection for formal release.

In each of these stages there can be a bias favouring particular types of varieties.⁶

Application for variety release commonly includes payment of a fee. The global trend of reducing public spending has meant that in most countries today, the applicant has to fund the testing system through fees. The result is that both public and private breeders limit the number of varieties submitted for official release to those that are likely to perform well in all test locations. Varieties with specific adaptation to particular agro-ecological niches or uses are less likely to be presented. This tends to contribute to a shift in breeding priorities to widely adapted varieties instead of varieties that suit the diverse characteristics of most small-scale farmers' conditions.⁷

The management of many variety testing systems further reduces the number of approved varieties. High input levels are often used to improve the trial from a statistical point of view. Sometimes this is also a deliberate policy to represent the conditions of the 'better farmers' and motivate other farmers to follow their example. Also, high input levels give 'beautiful crops' that make a trial presentable to visitors. But the liberal application of fertilisers and pesticides conceal environmental variations in the trial, thus reducing residual variance that could otherwise delay release or obstruct it altogether. However, high input levels are a major reason for poor relevance of trial results for farmers, and thus for the application of the results of public breeding. For example, it is unlikely that the official sorghum trial results in India are valuable for the majority of farmers where average yields in the 1989/1990 trials were three times the farmers' average yields.⁸

The evaluation of trials using simple statistical analysis methods leads to a bias in favour of breeding approaches for wide adaptation. Since trials are pooled in one calculation, the variety having the highest average yield is considered the best. However, this may not be the best variety in any of the testing sites. Standard variety release procedures rarely accept a variety that is specifically adapted to particular conditions, even though national variety lists may contain regional recommendations. The trial system is also biased against breeding for partial (horizontal) resistance, which is in most cases polygenic and more durable. Such varieties are resistant, but not immune to disease and thus they commonly carry disease symptoms, and for this reason are liable to be rejected in a release system, even if uniform. Additionally, the small size of the research plots make it difficult to identify horizontal resistance.

³ NP Louwaars and GAM van Marrewijk, 1996. *Seed Supply Systems in Developing Countries*. Wageningen: CTA.

⁴ R Tripp (1997), *New seeds and old laws*. London: Intermediate Technology Publications

⁵ NP Louwaars (2002), "Variety Controls", in: NP Louwaars (Ed), *Seed Policy, Legislation and Law; widening a narrow focus*. Binghamton NY, Food Products Press, The Haworth Press, pp 131-153.

⁶ NP Louwaars (1997), "Regulatory aspects of breeding for field resistance in crops", *Biotechnology and Development Monitor* 33, pp 6-8.

⁷ S Ceccarelli (1989), "Wide adaptation: how wide?" *Euphytica* 40, pp 197-205.

⁸ DS Virk et al (1996), *Varietal Testing and Popularisation and Research Linkages*. Discussion papers series. Centre for Arid Zone Studies, Bangor, UK.



Evaluation of variety trials by release committees is usually totally fixated on numbers, with the result that only yield becomes the decisive characteristic. Important characteristics for smaller scale farmers may not be taken into account. These include, for example, aptitude to intercropping, shattering (e.g. soya bean), lodging when harvesting is delayed (e.g. maize), cooking time of the produce (e.g. beans), and the yield and quality of secondary products (straw for construction or fodder). Breeding thus tends to concentrate on yield alone, without considering the diverse needs of farmers.

Variety release committees commonly consider the appropriateness for the production of certified seed as an important criterion. A variety needs to be morphologically identifiable and thus 'distinct' from existing varieties and 'stable'. Both factors contribute to the need of a certain level of genetic uniformity. The uniformity standards of seed certification systems are commonly very high, allowing only one or few dozens off-type plants per hectare. Releasing varieties to a seed certification system thus implies breeding for uniformity, even where this has no agronomic advantage.

Finally, lack of participation and transparency in the closed system of formal variety release leads to conservative trial designs and management. Parallel demonstration trials by the extension service, non governmental organisations (NGOs) or private seed companies have been taken into account in the release decision in many countries only recently. Official on-farm variety trials are becoming increasingly popular with variety release systems. But this development hardly ever contributes to

releasing more adapted varieties because such on-farm trials are either completely researcher-managed, and thus similar to station trials, or the results cannot be easily analysed statistically, often leading to a denial of their results. The non-quantitative observations of farmers can certainly be taken into account, but are difficult to include in statistical reports. In developing countries, farmers are rarely well-represented in variety release committees or in the evaluation of varieties.

Variety release may become a goal in itself when regulatory systems are too rigid. Release is the yardstick on which the effectiveness of public plant breeding programmes are measured. The reward system for breeders is commonly based on the number of varieties released, not on their widespread use by farmers. So the objectives of plant breeders are likely to be adapted to the variety release procedure rather than to farmers' needs.

In short, standard variety release procedures commonly result in the approval of few uniform and widely adapted varieties that do not respond to the diverse needs of farmers.

Seed certification and quality control

Seed certification and quality control are meant to help farmers who purchase seed, since both the variety and the quality of the seed can rarely be observed from a visual inspection of the seed itself. Seed certification follows a kind of chain-control system, where the variety's identity and purity are checked from the very first generation (commonly called 'breeder's seed') through a prescribed number of generations to arrive at sufficient quantities of final seed that can be distributed to farmers. Every generation of seed has its own procedures and standards, which are monitored through checks, documents and seed production fields. Standards include, for instance, the distance to neighbouring fields with the same crop or to weeds that may cross with the seed crop, the number of allowable off-types, and so on. Certification also involves strict procedures for labelling and sealing seed packs. Seed certification thus requires a very organised formal system, and is normally reserved for well-described and stable varieties.

Certification goes hand in hand with seed quality control in which the most important seed qualities - viability, purity and health - are tested in a laboratory, commonly using internationally harmonised procedures of the Organisation for Economic Cooperation and Development (OECD) or International Seed Testing Association .



In Afghanistan, farmers' seeds that are not sold commercially are exempted from registration and certification

All of this has a marked effect on breeding strategies. According to the certification rules, varieties have to be stable in order to ascertain their varietal identity. Only uniform varieties can provide that level of stability. Seed certification and quality control are also quite expensive and time consuming. Both the level of administration required and the cost involved make it very difficult for countries to control all the seed that is produced and used. In developing countries, very often not more than 10% of the seed used is actually certified, while the bulk is produced by farmers themselves.

Seed laws

Seed laws, at the apex of all these activities, regulate the procedures and standards for variety release, seed certification and quality control. Many of them are meant to organise the formal seed system but have effects that go well beyond. Many seed laws of the former Soviet Republics, for example, prescribe that all seed (that is used for planting) has to be certified, which in fact outlaws the saving of seed on-farm.

More common, however, is the rule that only seed that is commercialised has to be registered and certified. This is the case in the seed laws of Cameroon, Niger, Senegal and many others. In most of these laws, however, the term 'commercialised' is not defined. The seed laws of South Africa and Malawi do specify that exchange and barter are included under the term 'sell'. This means that even the informal exchange of seed among farmers is illegal there.

In most of the more far-reaching seed laws, such as those cited above, the term 'seed' is used in a broad way, meaning any part of any plant species. Yet not all these countries have operational facilities for variety testing and release, seed certification and controls. Some countries therefore further regulate that the rules only apply to a certain number of crops and/or varieties which they call 'prescribed' (Zambia, Malawi), 'notified' (India, Bangladesh) or 'regulated' (Indonesia). In practice, this means that the seed laws only apply to certain crops in these countries. However, since all major food crops are commonly listed, significant problems are bound to arise with grassroots seed initiatives using local varieties or non-certified seed.

In some cases, however, the formal seed sector is regulated while avoiding interference with farmers' seed systems. Indonesia has a specific exemption for farm-produced seed that is marketed within the village, providing at least an opening for local seed production and dissemination. In some countries,

the laws applies to packed and certified seed only, leaving the farmers' seed system untouched. They basically protect the seed label and reserve it to truly controlled seed: seed should not be sold as 'government-certified seed' (Korea) or 'government-tested seed' (Botswana). In fact, the Morocco law reserves the word 'seed' for controlled seed only.

One solution to the dilemma of controlling marketed seed while allowing farmers' seed systems to thrive is to adopt a voluntary system of variety and seed controls instead of compulsory variety release and seed certification and testing. The voluntary system can support the private sector while leaving room for local initiatives. In this way, seed producers have the choice to have their varieties officially recommended and their seed lots certified and tested or not, while farmers have the choice to buy seed with or without an official certification label. This system operates in several parts of the United States, where the seed laws merely regulate the labelling requirements in the seed trade ('truth-in-labelling'), whereas in other areas seed association rules 'de facto' introduce a kind of compulsory quality control system. Farmers may rely on branded seed and thus on the information and trustworthiness of the seed company. Opponents of this approach point to the lack of competition in the seed market in most developing countries. This leads to a lack of incentive to provide quality seed. Also, illiterate farmers may not be able to understand the information on the label and be misled. Voluntary seed controls may thus facilitate fly-by-night seed suppliers.

An alternative is to include non-certified seed classes in an otherwise compulsory system. For example, the UN Food and Agriculture Organisation (FAO) tries to facilitate this through the concept of 'quality-declared seed', which requires less burdensome controls. Also, some countries establish different lists or categories of marketable seed, with lower requirements and controls for certain kinds of varieties.

The impact of these seed laws

The conventional seed regulatory frameworks that currently operate in many developing countries have a range of effects on different actors in the seed sector. These include farmers who produce and exchange seed of both local and so-called improved varieties, and public and private actors in different stages of the whole formal seed chain.

Several commonplace activities in diversified seed systems become illegal under strict conventional seed laws, such as:



Problems with how registered varieties are chosen

Variety release systems select, through field testing, those varieties of proven value. However, the field tests usually mean that farmers will not get suitable varieties:

- 1 - A **fee** tends to select varieties which will do well across many agro-ecological environments
- 2 - **High inputs** (fertiliser and pesticide) are used to provide perfect conditions, which are unrealistic. Also used as wish to encourage farmers to adopt such high input use
- 3 - **Simple statistical analysis** leads to average high yield across many environments, even though might not be the best
- 4 - Varieties with **partial resistance** to pests and disease which is often more sustainable are commonly not identified in such trials.
- 5 - Only **yield** is used for selecting the best varieties and not the multiple criteria that farmers' needs.
- 6 - Varieties are chosen for being **uniform**, even where this has no agronomic advantage
- 7 - **Lack of participation by farmers** and transparency and therefore varieties chosen by researchers, not farmers.
- 8 - Breeders are rewarded based on the **number** of new varieties, not on their success with farmers (area planted to them)

- Farmers' seed systems, when they involve the production and local exchange of non-tested seed of, in many cases, non-released varieties
- The restocking of genetic diversity after a disaster
- Participatory plant breeding, which relies on informal dissemination of new (non-released) selections
- The organisation of seed fairs, which aim at sharing locally adapted or selected materials.

Few cases have been documented where the seed law has actually been used to stop traditional practices in farmers' seed systems or seed-related initiatives among civil society organisations. One is in Zimbabwe, where an NGO was forced to cease production of a non-hybrid maize seed for emergency use in war-struck Mozambique. Zimbabwean farmers started to appreciate the maize, but the Zimbabwean seed law prohibits the marketing of open-pollinated maize seed. So the NGO was forced by the government to cease the operation. Another is in Indonesia. During the Suharto regime, Indonesian farmers in Java were obliged under the seed law to plant only 'high-yielding varieties' of rice of very particular classes. The argument was to reduce the level of brown

plant hopper incidence through the management of resistance genes. Development workers have reported that government officials went and burned down or uprooted fields where farmers persisted in planting their traditional varieties.

Quite often, it is the implementation rather than the letter of the law that causes problems. The most important factor may be the inefficiency of the institutions. Their procedures can lead to excessive delays in the release of varieties or seed lots. For example, no varieties have been released in Yemen for several years because the members of the variety release committee cannot agree on their agenda. In Indonesia, the production of certified soybean seed is hardly possible because the time required for sampling, testing and reporting is such that seed quality deteriorates beyond acceptable limits.

Another problem can be found with the setting of seed standards. High seed quality standards may result in high rejection levels that are sometimes suspended at will in order to meet the requirements of government development projects.

Finally, transparency is lacking in many national seed control systems. Mandatory seed certification may invite rent-seeking, especially where inspections have to be done by under-paid public servants.

Seed regulatory reform?

Diversified seed systems call for a re-examination of seed regulatory frameworks in developing countries. From a government perspective, these have to accommodate different and at times conflicting national policies, such as:

- Promoting investments by the private sector⁹, including a push towards international harmonisation;
- Promoting the active participation of NGOs and farmer groups¹⁰;
- Reducing on-farm loss of genetic diversity¹¹;
- Reducing public expenditure in breeding, seed production and control, and marketing¹²;
- Maintaining minimum levels of consumer protection.

But reforms can be quite difficult. Seed certification services or authorities may find it hard to deal with different ways of producing seed or of managing seed quality. Even though seed regulations are meant to assure the quality of seed, many inspectors see it as their role to 'police' seed producers and traders in order to keep certain seeds off the market. In some countries however, the certification agencies

⁹ W Jaffé and J Srivastava (1994), "The roles of the private and public sectors in enhancing the performance of seed systems", *The World Bank Research Observer* 9, pp 97-117.

¹⁰ S Wiggins and E Cromwell (1995), "NGOs and seed provision to smallholders in developing countries", *World Development* 23, pp 413-422.

¹¹ W de Boef et al (Eds, 1993), *Cultivating Knowledge: Genetic diversity, farmer experimentation and crop research*. London, Intermediate Technology Publications.

¹² C Thirtle and R Echeverria (1994), "Privatisation and the roles of public and private institutions in agricultural research in sub-Saharan Africa". *Food Policy* 19, pp 31-44.



take a stand that their role to promote seed quality prevails over their control functions. The Seed Certification and Control Institute in Zambia, for instance, promoted the introduction of 'quality declared seed' in its regulations. This allows them to relax the certification procedures and interpret the seed quality standards more flexibly. Unfortunately many countries stick to the rules they have been given and do not promote new initiatives, but the Zambian example has been followed in other countries, such as Sri Lanka and Thailand.


At the variety release level, the committees are mandated to choose appropriate varieties to plant within the frame of national food security and agricultural modernisation policies. They are often dominated by senior officials from research institutes and government agencies, and are commonly guided by strict procedures and standards, including the results of variety trials. Problems may arise when small seed initiatives try to produce seed of varieties that are adapted to specific conditions and tastes of a particular village or region. Such varieties may not outperform the standard 'check' varieties in nationwide trials or they may be developed for characteristics that the committee is not instructed to account for.

At the broader policy level, more and more countries are acknowledging the importance of the farmers' seed systems. However, the international pressures to introduce intellectual property rights (IPR) may counteract the impact of more open seed laws. IPR laws, such as patents or plant breeder's rights (usually based on one of the UPOV Conventions) intend to stop farmers from sharing

seed of protected varieties, even where open seed laws designed to support farmers' seed systems, provide farmers with some liberty to do this.

Conclusion

Farmers' seed systems and formal seed systems have complementary tasks in supporting agricultural development and the management of plant genetic resources. Seed regulatory frameworks provide legal boundaries in which both systems operate even though in most countries these have been designed to regulate the formal system only.

The scope of these laws determines, to a large extent, the degree of freedom farmers have in handling their own seed, i.e. the crops for which the laws apply and the types of seed that are regulated. In addition, the level of implementation of the laws differs significantly between countries, sometimes providing NGOs, and even official institutions (such as those which certify seed), the space to support diverse ways to produce seeds. However, reforms of formal institutions can be cumbersome and will meet with opposition from within. Furthermore, the push to implement new international policies, such as those promoting the introduction of intellectual property rights, will also impact any reform of these seed laws. 

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