Regulations for Seed and Fertilizer Markets

A Good Practice Guide for Policymakers

David Gisselquist
Cornelis Van Der Meer

A joint effort of the thematic groups on Agricultural Knowledge and Information Systems, Markets and Agribusiness, Policy and Strategy, Sustainable Land Resources Management
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The World Bank
Rural Development Family
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Foreword

This paper comes out of a year-long international dialogue organized by the World Bank to discuss how to design regulations that promote competitive seed and fertilizer markets. An Ad Hoc Inputs Committee guided the work. From mid-1999, experts from private seed companies, donor agencies, regulatory agencies, and others reviewed several drafts of an issues paper. This was followed by an international workshop on "Input Regulations for Seeds and Fertilizers" at the World Bank in Washington DC on 23-24 March, 2000. This paper incorporates many of the issues and concerns that surfaced during that year.
Acknowledgement

The Ad Hoc Inputs Committee is grateful for the support and valuable comments received from participants in the workshop, reviewers of drafts and colleagues in the World Bank. However, the final text is solely the responsibility of the Ad Hoc Committee. It represents expert advice and does not necessarily reflect the official position of World Bank Group.

The members of the Ad Hoc Committee, the participants in the workshop and others who helped with written comments are listed in Annex 4.
### Acronyms and Abbreviations

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<th>Acronym</th>
<th>Description</th>
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<tr>
<td>AFSTA</td>
<td>African Seed Trade Association</td>
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<tr>
<td>AN</td>
<td>ammonium nitrate</td>
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<td>APSA</td>
<td>Asia and Pacific Seed Association</td>
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<tr>
<td>ASARECA</td>
<td>Association for Strengthening Agricultural Research in Eastern and Central Africa</td>
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<tr>
<td>CBD</td>
<td>Convention on Biological Diversity</td>
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<tr>
<td>CG</td>
<td>Consultative Group for International Agricultural Research</td>
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<tr>
<td>CGIAR</td>
<td>(see CG)</td>
</tr>
<tr>
<td>CIMMYT</td>
<td>Centro Internacional de Mejoramiento de Maíz y Trigo</td>
</tr>
<tr>
<td>DAP</td>
<td>diammonium phosphate</td>
</tr>
<tr>
<td>DUS</td>
<td>distinctness, uniformity, and stability</td>
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<tr>
<td>EPPO</td>
<td>European and Mediterranean Plant Protection Organization</td>
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<td>ESW</td>
<td>World Bank economic and sector work</td>
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<td>GATT</td>
<td>General Agreement on Trade and Tariffs</td>
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<td>GMO</td>
<td>genetically modified organism</td>
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<td>HYV</td>
<td>high yielding variety</td>
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<td>IARC</td>
<td>international agricultural research center</td>
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<td>IPPC</td>
<td>International Plant Protection Convention</td>
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<td>IPR</td>
<td>intellectual property rights</td>
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<td>ISTA</td>
<td>International Seed Testing Association</td>
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<td>KR2</td>
<td>Kennedy Round 2</td>
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<tr>
<td>MOA</td>
<td>Ministry of Agriculture</td>
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<tr>
<td>NGO</td>
<td>non-government organization</td>
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<td>OAPI</td>
<td>African Intellectual Property Organization</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Cooperation and Development</td>
</tr>
<tr>
<td>PVP</td>
<td>plant variety protection</td>
</tr>
<tr>
<td>SADC</td>
<td>Southern Africa Development Community</td>
</tr>
<tr>
<td>SME</td>
<td>Small and Medium Enterprises</td>
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<tr>
<td>SPS</td>
<td>Sanitary and Phytosanitary Measures Agreement</td>
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<tr>
<td>TOR</td>
<td>terms of reference</td>
</tr>
<tr>
<td>TRIPS</td>
<td>Trade Related Aspects of Intellectual Property Rights</td>
</tr>
<tr>
<td>UPOV</td>
<td>Union Internationale pour la Protection des Obtentions Vegetales (International Union for the Protection of New Varieties of Plant)</td>
</tr>
<tr>
<td>VCU</td>
<td>value in cultivation and use</td>
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<tr>
<td>WTO</td>
<td>World Trade Organization</td>
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</table>
Executive Summary

Introduction and Background. Competitive markets for agricultural inputs are of crucial importance to agricultural development. They provide farmers with new inputs and better technology. Although the private sector has become an important source for the production and distribution of inputs in international and domestic markets, there are still many developing and transition countries that do not fully utilize these new opportunities. In many countries farmers do not yet have convenient access to seeds and fertilizers. Domestic markets are often not yet competitive and not well linked to international markets and international providers of technology. In many countries, the dominance of government services is so anchored in policies and regulations for seed and fertilizers that private sector development in these fields has been thwarted. As a result, choices for farmers are limited and prices too high. In many countries regulatory reform is needed.

Objective and Purpose. This paper is intended for donor and government staff in countries where improvements in the regulatory framework and its execution are considered. The paper advises how to design better regulations as part of a larger strategy to promote sustainable agricultural growth by developing competitive seed and fertilizer markets. It touches upon the importance of public sector reform and many other factors for promoting competitive markets, but it does not provide good practice recommendations other than for regulation. The purpose is not to provide a blueprint for implementation, but rather some general advice that highlights considerations which can help policy-makers in each country make choices to fit particular circumstances.

Improving the Flow of New Technology to Farmers. A general strategy to get more technology and information to farmers is to focus regulations on externalities, so as to reduce costs for private technology transfer and market entry so that farmers have access to more technology and more competitive markets. At the same time, government research and extension services can give farmers more information about all of the technology available including from public and private research.

Importance of Regulations for Seed and Fertilizer Markets. Inputs are crucial for improving agricultural technology. Farmers should have a choice from a range of the best seeds and fertilizers available in the world at reasonable prices. This is best assured by market access and competition among as many input providers as possible at the international, country and local level.

Diagnosing insufficiencies and developing strategies for seed and fertilizer market development can span many topics, including effectiveness and efficiency of government services, transport costs, credit constraints, business environment, poverty, taxes, etc. However, regulations should be considered at the top of the list for several reasons: (a) in many developing and transition countries seed and fertilizer regulations and the way they are executed are severely restrictive; (b) experiences in a number of countries have shown that markets respond to deregulation; (c) if regulations and lack of transparency in their implementation are an obstacle to new entry then good governance, targeted credit, tax cuts, subsidies and other interventions may have only limited impact, because regulations continue to keep out the development of competitive markets. In other words, regulatory reform is often necessary and desirable. But it may not be sufficient. If, for example, there is poor governance, e.g., no rule of law, good regulations can be futile. And, for areas with little commercialization, regulatory obstacles may not be the (main) reason for lack of market development. It may take a long time before such areas can be successfully connected to national and international markets, though regulatory reform can help to speed up this process.
Regulations for Seed and Fertilizer Markets

Designing seed regulations. New entry is crucial for competitive seed markets. For each crop, farmers need a choice of seed from a number of competing companies if markets are to be competitive. Since companies tend to focus on a limited range of crops, farmers and markets are not well served with a full range of crops and varieties unless there are at least a few dozens of companies. In small and poor countries, many of these may be no more than a trader who acts as an agent for regional or other foreign seed companies. Important for competition is also that new suppliers can easily enter the market. Small and medium enterprises (SME) are necessary to ensure that seed industries cover all crops, including crops such as wheat, rice, cassava and local vegetables with low value non-hybrid seeds. The challenge is to accommodate SME seed companies with workable seed regulations. With reasonable regulations, many seed-producers and traders in what is now known as the “informal sector” can enter the formal sector.

Even though every country may have specific features, and different crops may require different policies in order to arrive at an optimally operational seed supply system, it is crucial that seed regulations allow private companies and entrepreneurs to take initiatives to enter the market, introduce new varieties, and export or import seeds without unnecessary restrictions. In the name of national food security, countries may want to maintain controls over seed quality (minimum standards) and availability for certain major food crops. In rare cases, in order to support a premium export position, countries may want controls over the quality aspects of varieties of major export crops. For most crops, however, governments assure farmers the widest choice of varieties at the lowest seed cost by concentrating on truth-in-labeling regulations (possibly in combination with minimum standards for seed quality). In principle, regulations should allow companies to sell seeds of new varieties without having to obtain approval from ministries of agriculture. There could be some exceptions. Countries intending to join the EU should accept all varieties in the EU Common Catalogues. For a few major crops, companies could be asked to register varieties and to show one-year performance tests before seed can be freely sold, but costs and benefits of such requirements should be carefully considered.

Governments are recommended to allow seed companies and traders to operate without licensing or with near-automatic licensing from the Ministry of Agriculture. In any case, to ensure that small-town stores carry seeds, governments may allow retail seed sales (at least to some maximum annual value) without registration. The Ministry of Agriculture can leave the selection of seed farmers completely to the private sector. Seed export controls can only be justified in rare cases. To protect agricultural production, governments should control seed imports to block introduction of seed-borne pests and diseases that are not found in the country and that are potentially damaging. To protect indigenous biodiversity, governments should regulate the introduction of new plant species and agricultural biotechnology. Governments should not set non-tariff barriers based on quality, quantity, or prices (with rare exceptions).

To facilitate market development, seed laws and regulations should mandate government agencies to provide a number of services to seed companies. These services include: (a) providing for seed certification and other seed quality certificates; (b) phytosanitary certificates for exported seed; (c) intellectual property rights for plant variety protection (PVP) and biotechnology. These services should be available when seed companies ask and pay; they should not be compulsory.

Governments can manage policy and supervision of regulatory tasks through an office in the Ministry of Agriculture along with three regulatory agencies: a seed testing and certification agency, an agency to administer phytosanitary controls, and an agency to administer plant variety protection. These can all be relatively small, and can sub-contract many activities such as seed tests to others, including companies, scientific institutions, etc.

Designing fertilizer regulations. Competition at all levels of the fertilizer trade from importing through retail sales is the key for farmers to have convenient access to a full range of fertilizer products at
reasonable prices. Just as for seeds, competition requires easy new entry, SME traders, and competing retail dealers. In many cases there are major gaps in prices between the retail and international markets, which have to do with macro policies, exchange rate distortions, energy prices, interest rates, inflation, currency devaluation, trade barriers, taxes, subsidies and government distribution schemes. Traders will anticipate these factors and related policy risks. However, in many countries, part of the price gap can be attributed to regulations and related limited competition and lack of economies of scale. Hence, protection of inefficient domestic producers and wholesale traders and regulations that stifle competition or form an obstacle for reaching economies of scale can have an important impact on farm-level prices.

In many developing countries, especially in Africa, national markets are too small to support a competitive fertilizer trade. In such cases, development of regional markets with free cross-border trade is crucial to lower farm-level fertilizer costs. If import and export regulations on cross-border trade take any significant amount of time or money, national markets remain isolated, and smuggling can become widespread.

Just as for seeds, the basic design for fertilizer regulations should be to allow new entry and private initiative. Governments should allow companies to sell all mineral fertilizer products without registration or with automatic registration (as long as only nutrient claims are made on the label). To ensure that farmers get good information, the government should enforce truth-in-labeling.

To ensure competition at all levels of the fertilizer trade, the government should allow market entry without a registration or design the registration process to be simple, inexpensive, and nonrestrictive. Retailers should be able to operate without registration, at least up to some maximum annual turnover. Government should allow companies to import fertilizer without import permits from the Ministry of Agriculture. For countries with small markets, governments can encourage regional fertilizer markets by allowing cross-border trade without pre-shipment inspection, border taxes, and time-consuming tests and inspections, and by agreeing to accept compositions, packaging, and labels approved in other countries in the region.

Contamination of fertilizers may pose a threat to environment and public health. Therefore, governments should set limits on heavy metals and other possible impurities in fertilizers. Wherever fertilizer use threatens environmental damage — such as protected watersheds — additional and local regulations should be designed to control fertilizer application. Restrictions on trade are not suitable for this.

Governments can administer these regulations through a unit (office or agency) of the Ministry of Agriculture that is responsible for enforcing fertilizer truth-in-labeling. The unit can collect and test samples, based on complaints as well as spot inspections. If licensing and registration are required, the unit can also maintain lists of registered products, registered wholesalers, etc.

Implementing regulatory reforms. To tap the new opportunities of competitive markets and private input suppliers requires public sector reform, deregulation and liberalization. Such processes have winners and losers. The winners are the farmers, consumers and new entrants in the market. The losers are protected industries and parastatals that face new competition and loss of privileges and government services that face reduction of authority and funds. Commonly, in all countries, losers often oppose reforms. Therefore, reforms require vision and leadership and sometimes compensation or a transition period for losers to adjust to the new situation. Decisions about the design of inputs regulations are too important to be left to regulators. Countries with successful seed and fertilizer industries have a close linkage between regulators, farmers organizations and seed industry representatives who jointly discuss regulatory options, thus allowing legislators to properly weigh the interests of seed producers and users.
Regulations for Seed and Fertilizer Markets

In many cases, proposed market-friendly seed and fertilizer regulations can be introduced with changes in regulations alone, without adding or amending any laws. If so, the Ministry of Agriculture can make changes with the approval of the executive branch without going through parliament.

Reforming regulations to allow more efficient markets to develop involves two processes: liberalization and harmonization. Each country, acting alone, can reduce barriers to trade and entry. At the same time, countries in a region can get together to harmonize regulations. In particular for small countries regional harmonization may be very important to create larger seed and fertilizer markets. It is important to distinguish between obstacles for competitive markets that can be fixed with country-by-country liberalization and what must be harmonized through regional negotiations. Harmonization without a commitment to liberalize could leave countries and regions even more closed than before.
Introduction

Aim and Background

A few decades ago the role of the private sector in agriculture inputs in developing countries was limited. Intervention by government services was seen as the major vehicle for agricultural development. Many countries created a dominant role for research, extension and other services in developing and introducing new seed and fertilizer technology and in producing and distributing seeds and fertilizers. The success of this type of state intervention has been mixed. In many countries, the dominance of government services is so anchored in policies and regulations for seed and fertilizers that private sector development in these fields has been thwarted. Although the private sector has become an important factor in input production and distribution in many developing and transition countries, there are still many countries that have not yet fully utilized these opportunities.

Competitive markets are of crucial importance to agricultural development. They provide farmers with new inputs and better technology. In many developing and transition countries, farmers do not yet have convenient access to seeds and fertilizers. The domestic markets are often not yet competitive and not well linked to international markets. As a result, technology choices for farmers are limited and prices too high. The use of purchased inputs on commercial and staple crops by small holders is hardly profitable in many countries. Bringing input prices down through competition affects economic viability of input use and thereby productivity, incomes, and food security. In many countries regulatory reform is needed.

This paper is intended for donor and government staff to use in countries, considering improvements in the regulatory framework and its execution. The paper emerged from a project to develop good practice advice for Bank staff and their professional contacts about seed and fertilizer regulations. It advises how to design better regulations as part of a larger strategy to promote sustainable agricultural growth through competitive seed and fertilizer markets. The paper touches on the importance of public sector reform and many other factors for promoting competitive markets, but the good practice recommendations are limited to regulations and related policies.

Markets Deliver Technology Options

One of the challenges in agricultural development is to increase the range of technologies from which farmers can choose. Much new agricultural technology reaches farmers through input markets. If farmers adopt a new crop or variety, they need seeds. Similarly, if farmers are going to use mineral fertilizers, they need convenient and reliable access. Once farmers obtain some seeds of a new variety, they can often grow their own supply for following years. However, if they want to choose among options from year-to-year – including the latest varieties from new local and foreign breeding – they need good access to commercial seed markets.

In many countries, regulations and related policies restrict availability and farmer access to fertilizer and seed. Overly restrictive specifications of fertilizer formulation are common. Bangladesh, for example, for a long time limited farmers to the handful of fertilizer products that government chose to produce and import. Fertilizer trade controls contributed to widespread sulfur deficiency, since the fertilizers that government promoted for many years did not include sulfur. Such policies are technically unjustifiable and raise costs to farmers. In many countries, farmers see no more than 2-5 high yielding seed varieties for each major crop, all of which come from public research, and many of which are over 10 years old. In one Middle East country, for example, only two public wheat varieties are widely grown, both are old,
Regulations for Seed and Fertilizer Markets

and both are losing disease resistance. Not only do farmers have few choices, but also farmers – and the country – risk a fall in yields.

In countries where governments allow free imports of fertilizer, competition stimulates companies to search for the best price and quality mix. Where governments encourage private companies to introduce new crop varieties, the number of new varieties introduced each year easily goes into the dozens. In such countries, farmers not only have more technology options, these options are also the best available in the world. The challenge is to link farmers to competitive markets that deliver a continuous flow of the best available new technology.

Also, it is important that seeds and fertilizers are stocked in competing small-town stores. If local stores do not carry inputs, farmers may not be able to adopt a new technology. Suppose, for example, that an extension agent advises a farmer to use urea, but the farmer is not able to find it in any store within 20 kilometers; technology transfer will probably fail.

Hence, essential elements in the process of agricultural development are to ensure that: (a) seed and fertilizer companies can easily enter the market and introduce new technology and have effective links to foreign markets; and (b) competitive seed and fertilizer markets reach into small towns and villages.

What to Do When Input Markets Are Not Working

An adequate diagnosis of problems and a strategy for solving them depend on a conceptual framework of how the polity and economy work and what sorts of interventions are possible. In the early 21st century, an important part of that frame of reference for most countries is that solutions have to work through markets. In a market economy, development of seed and fertilizer industries and markets depends on private entrepreneurs seeking opportunities and taking initiatives. When markets work, entrepreneurs make their own decisions to establish new companies and stores and to introduce new technologies. Officials in the Ministry of Agriculture do not decide who will do what, do not provide case-by-case guidance to make things happen, and may not even know all the traders or all of the technologies that are available. When markets work, private initiative, not central direction, is the driving force for development. Some suggestions for assessing markets are given in Annex 1.

If the balance of expected profits versus costs to enter a market is not attractive to entrepreneurs, then there is little new entry and the market does not develop. Costs and returns for entrepreneurs depend, among other things, on the business environment, which includes all kinds of regulations and policies, governance, the effectiveness and efficiency of government services, and the availability of infrastructure and business services. One set of options to improve the balance of incentives is to adjust government policies, such as regulations, administrative burdens and taxes. Another set of options is to improve governance and the functioning of government services. A third is to arrange some direct interventions, such as subsidies, targeted credit, etc. or improving infrastructure and business services. These are not alternatives. If policies do not allow entrepreneurs to make profits, then there will be no stream of new market entries no matter how efficient the government services are and how good infrastructure and business services are. On the other hand, once policies are workable, other interventions may accelerate new entry.

There are several reasons why regulations and the way they are executed should be considered at the top of the list for diagnosis. First, in many developing and transition countries seed and fertilizer regulations and the way they are executed are a major obstacle to the development of competitive markets. Second, experiences in a number of countries – Bangladesh, India, Romania, Turkey, and Zimbabwe – have
shown that markets respond to deregulation. Third, if regulations are an obstacle to new entry, then good governance, targeted credit, tax cuts, subsidies and other interventions may have only limited impact, because regulations continue to keep out companies and technology. Fourth, regulatory reforms can be a relatively cheap contribution to the development of competitive markets. In other words, the changing of regulations is often necessary and desirable, though it may not be sufficient.

Diagnosis of the regulatory framework involves looking at the written rules and talking with people who have to work with them. Most governments have some written regulations in the form of seed or fertilizer laws, regulations, policy orders, and so on that define the regulatory framework. It is useful to find and review these documents to see exactly what they say, and to compare them with what farmer’s organizations, entrepreneurs and government officials know and think. To find out how regulations actually work, one must talk with those involved in seed and fertilizer trade. For example, ask retail dealers what permissions they need to sell seeds and fertilizers. In countries where there are no small-town retailers selling seeds and fertilizers, questions about market entry at retail level can be directed to wholesale dealers – one can ask them how they get their products to farmers, and why there are so few retail outlets. Similarly, one can ask seed companies and fertilizer wholesalers and importers what permissions they need to enter the market. Seed companies can be asked if they have introduced new varieties and whether they need government permission to sell seeds of new varieties. If so, inquire for which crops they need permission for new varieties, how long does it take to get, how much does it cost, and how reliable and transparent is the approval process. For fertilizer companies, ask about steps to introduce a new fertilizer composition or product. Ask both seed and fertilizer companies about the administrative burdens, costs, and delays of the various approval requirements.

Finally, two examples show that some caution is necessary not to blame the regulatory system too readily. First, for areas with little commercialization, regulatory obstacles may not be the (main) reason for lack of market development. It may take a long time before such regions can be successfully connected to national and international markets. However, regulatory reform can help to speed up this process. Second, in many developing and transition economies the regulatory system is – at least on paper – not very dissimilar from that in most OECD countries. But, whereas in the OECD countries the size of markets is large and the execution of regulations is relatively effective and efficient and thus does not damage the industry, this is not the case in many developing and transition economies. If for example, there is poor governance, e.g., no rule of law, good regulations can be futile as well. If markets are small the cost of regulation may be excessive. This indicates that solutions may be found in deregulation as well as in streamlining procedures and improving capacity and performance of executing agencies.

Regulations for Well Functioning Markets

Criteria and Direction

Modern markets depend for their functioning on formal regulations as well as on customs. There are different considerations to be taken into account when designing regulations. First, there are economic criteria indicating when and to what extent regulations are needed. Second, there are the experiences of countries with competitive markets and well-developed input industries. Third, there are many local conditions in the country and the region that have to be taken into consideration. Based on these and other

factors, aspects of seed and fertilizer regulations that are reasonable in one country may not work in another. Governments have to make decisions to suit local situations. This section discusses some basic criteria for assessing input regulations.

Rationale for Market Regulations in a Democratic Market Economy

According to standard economic theory, governments should leave markets alone unless there is reason to suspect that they are giving the wrong signals. Possible reasons to adopt seed and fertilizer regulations include:

- Positive or negative externalities, so that market prices do not reflect real social costs or benefits (e.g., imported seeds might introduce exotic seed-borne pests and diseases);
- Natural monopolies (e.g., one company may own all local phosphate rock deposits);
- Asymmetric information (e.g., seed companies know more about performance of different varieties than do farmers, and farmers may find out when it is too late);
- Food or national security (e.g., a country may not want to be dependent on imported seed for an important food or cash crop such as hybrid maize or cotton);
- Infant industry (government may want to stimulate development of domestic companies).

Arguments about whether or not markets have failed and, if so, about whether and how governments could intervene to improve the situation are basic to regulatory design. These arguments are sometimes clear and decisive, but certainly not always. Therefore, good analysis is needed before a decision can be made about whether and how to intervene. Possible cost effective alternatives should be taken into account.

Cost Effectiveness of Regulations

The challenge is to design effective and cost efficient regulations that avoid losses from over-regulation as well as under-regulation (see Table 1). It is useful to consider the following questions:

- Will regulations achieve the objective?
- Will regulations have other (unwanted) effects?
- Is the value of risk or loss averted significantly less than the total cost of regulation (including not only government costs but also impact on business expenses, new entry, technology transfer, and so on)?
- Are there more cost-effective alternatives for achieving the same aim. For example, funding public research may be a more effective form of infant industry promotion than establishing trade barriers.
**Table 1. Examples of Issues and Risks in Designing Inputs Regulations**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Danger from weak regulation</th>
<th>Danger from excessive and/or unfocused regulation</th>
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<tbody>
<tr>
<td>Fraud</td>
<td>Traders may deliberately mislabel inputs or otherwise provide false or misleading information; and as a result farmers may lose money</td>
<td>Government may interfere with private trade in ways that cut competition or raise trading costs. Officials may use excessive controls and authority to sustain employment in public sector agencies, or even extort bribes. In all of these cases, controls boost farm-level input prices and/or reduce choices available to farmers.</td>
</tr>
<tr>
<td>Externalities</td>
<td>Private decisions about what to trade, plant, or apply on crops may have impacts on neighboring fields, the environment and public health</td>
<td>Government controls on what people import, plant, or apply might go beyond real risks of externalities, and might block farmers’ choices that do not create substantial risks for others</td>
</tr>
<tr>
<td>Asymmetric information</td>
<td>Traders may know that some inputs do not work well (low quality or poor technology) but may nevertheless sell them to unknowing farmers, who may lose money</td>
<td>Government controls on what private traders are allowed to sell can reduce farmer options, hurting farmers as well as traders</td>
</tr>
<tr>
<td>Introduction of new technology</td>
<td>Farmers may lose money when trying (or using) new technology that is not sufficiently tested out</td>
<td>Farmers may lose income (foregone gains) from not being allowed to use productive new technology and/or technology necessary to get products into specialized markets</td>
</tr>
</tbody>
</table>

Source: Authors.

Over-regulation can lead to large foregone gains in terms of the value of production that farmers are not able to realize because regulations block trade in essential inputs. For example, in the early 1980s, within three years after Turkey relaxed controls on private seed trade – including regulations that blocked introduction of private maize hybrids – Turkey’s maize production doubled. Changes in Turkey’s seed regulations – changes which cut government expenses – led to an estimated increase of $97 million in Turkey’s annual net farm income from maize alone.\(^2\) Turkey’s experience is not isolated. Over the past 15-20 years, other countries, including India, Bangladesh, and Romania, have intentionally and successfully revised input regulations to promote private technology transfer, market entry, and inputs trade. Under-regulation may open the door for poorly performing inputs and may result in losses for producers.

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Country-Specific Conditions that Influence Optimal Design of Regulation

There is not one blueprint for seed and fertilizer regulation that will give the best results in all cases. On the one hand, regulations should be designed with close attention to common practices in countries that already have competitive markets and industries in place. But an optimal design will also depend on local conditions. Factors to consider include:

- Size of the market;
- General level of development;
- Potential for reliable law enforcement and judicial decisions (transparency of regulatory agencies and decisions; farmer and trader access to judicial processes; etc.);
- Existence and functioning of trade and industry groups;
- Crops and the ecosystem;
- Existing regulations;
- International agreements that limit regulatory options;
- Regulations in other countries that may be important partners for seed and fertilizer trade (including especially neighboring and other regional countries);
- The potential interest of private companies.

Importance of Regional Input Industries and Markets

Market size has a major impact on what are workable regulations for competitive seed and fertilizer industries and trade. Most developing countries are too small to support competitive seed industries focused on the domestic market alone, and many are too small to support an efficient scale of fertilizer trade on their own. In the EU, India, or the US, seed and fertilizer markets cross national and state borders to create large unified markets that allow competition, economies of scale, and research. Comparably large markets could evolve in Central Asia and Africa, for example, with regulations and other policies that allow seed and fertilizer industries and trade to operate across regions with minimal time and money lost in moving new technology (e.g., new varieties), seeds, or fertilizers from one country to another.

Political risks

Politicians may face political constraints that obstruct adoption of regulations that serve the national interest. These constraints may come from various directions, such as economic conflicts of interest, national security concerns, popular beliefs, and the way the political process works. These constraints may lead to considerable resistance to reform at one or more levels of government. In planning for policy and regulatory reforms, political factors and administrative resistance should be dealt with effectively, otherwise reforms may not work.
Regulations for Seed Market Development

Seed Companies and Competitive Markets

What seed companies do

In countries with competitive seed industries, seed companies compete for market shares by trying to build good reputations among farmers for good varieties and quality seed. From year to year, seed companies test and select new varieties from own breeding or other private or public breeding to add to the assortment of varieties they offer. Their list commonly includes varieties with different features, e.g., short to long day length, resistance to a specific disease, consumer preferences, suitability for irrigated or drought conditions. For major field crops in competitive markets, a successful variety normally stays in the market for no more than five to seven years. For tomatoes and other important vegetables, it may be only two to three years. To expand market share, companies have to find out what consumers, processors and farmers want or value, breed or select for those traits, and then introduce new varieties to farmers.

Most seed companies process and package seed for wholesale distribution, but some may simply buy (often import) packaged seed for wholesale distribution. Seed companies normally grow little or no seed, but rather contract with private farmers and supervise them. Seed companies are also not retailers. They sell most seed wholesale under brand name to independent stores in small towns and villages.

How many companies are required for markets to work?

When governments allow free or easy entry for new varieties and companies, the number of companies that emerge or enter will work out on its own. Even in poor countries with small markets, this number can be substantial, since the seed industry covers a diverse array of products, including vegetable seeds, high value hybrids for maize and sunflower, low value high volume seeds for wheat and potatoes, flowers, ornamentals, medicinal plants, fruits and other tree crops, etc. In small markets, small local seed companies will often act as agents or distributors for seed companies from regional or other foreign countries. For any one crop with high value seeds such as maize or tomatoes, policies allowing free entry can be expected to bring in varieties and seeds from a minimum of 4-6 companies. Since most seed companies focus on selected crops, even in small countries one can expect to see seeds from at least 25-30 local, regional, and other foreign companies as competitive markets develop for all relevant crops. For any country in the world, the number of potential partners from regional and other foreign seed companies is enormous. Even though mergers among major seed companies have been in the headlines in recent years, the world seed industry remains highly competitive, with hundreds of major and minor research-capable seed companies from the US, France, Netherlands, Japan, South Korea, India and many other countries looking for more international partners and markets.

Events in Turkey show what can happen in other countries and regions. Before Turkey liberalized its seed sector in the early 1980s, it had only five seed companies. Within a decade, there were over 80 companies. This growth was enabled by Turkey’s favorable conditions for seed export to the EU. Most companies are 100 percent locally owned with licenses or other contract arrangements to sell seeds from one or more foreign companies. There are also a handful of subsidiaries and joint ventures with foreign companies. Farmers in Turkey have gained access to most of the best private breeding in the world through Turkey’s post-reform seed market.
Regulations for Seed and Fertilizer Markets

Small business participation: A litmus test for regulatory reform

In countries with small markets, small and medium enterprises (SME) are crucial, not only to partner with regional and other foreign seed companies, but also to ensure that seed industries cover all crops, including crops such as wheat, rice, and local vegetables with low value non-hybrid seeds. In developing and transition countries, commercial prices for these seeds are commonly in the range of two to three times the grain price because farmers can also produce their own seed. Foreign companies have trouble producing at such prices because of their high overheads; such companies tend to focus on high-value hybrid seeds for maize, vegetables, sugar beets, etc. Locally owned companies—especially SME—are able to produce and sell seeds with relatively low margins because of their lower overheads.

The involvement of SME in local seed industries emerges naturally with the spread of modern agricultural technology to the farming community. As modern seed technology penetrates a country, farmers get involved in growing seed, testing and evaluating new varieties, selling seed, and even forming small seed companies. Other SME may grow out of the initiatives of retired government breeders and other entrepreneurs. Like other seed companies, new entry SME establish brand names and lists of varieties. They can do this on a low budget without breeding by testing and licensing new varieties from foreign companies and public breeding organizations (including universities and international agricultural research centers [IARCs]).

Seed regulations that work for large seed companies dealing with maize hybrids and other high value seeds may be too onerous to work for a rural SME dealing with low value seeds. For example, companies that expect annual sales of US$ 1,000,000 for seed of a new maize hybrid can afford to invest money and to wait one to three years for the Ministry of Agriculture to arrange official tests, register the variety, and approve seed sales. On the other hand, an SME that expects to sell US$10,000 worth of seed for a new wheat variety may not be able to afford to go through such channels. Similarly, requirements for government officials to visit seed production plots and to test seeds in official laboratories may be possible for large companies with high value seeds, but not for a rural-based SME with a low gross value of seed sales.

Seed regulations must be written to accommodate SME and low value seeds

Farmers and small local companies are the key to seed industry development. Considering whether or not to get involved in seed production and trade, they face many costs and risks to learn about new technology and business situations. If regulations create additional barriers to SME entry, a handful of large companies and public institutions will dominate the seed industry. Competition will be weak, fewer crops will be covered in commercial seed markets, and fewer farmers will be served. Moreover, vested public and private interests may lobby for continued limited market access that serves them best. The challenge is to accommodate SME with workable seed regulations. With reasonable regulations, multiple seed producers and traders in what is now known as the “informal sector,” can enter the formal sector.

Regulations Promoting Competitive Markets

Allow New Varieties

For all countries (except those intending to join the EU). Regulations should allow companies to sell seeds of new varieties with as little restrictions as possible. If the Ministry of Agriculture wants a record of the varieties in the market, this can be satisfied by asking seed companies to simply provide information describing the varieties. However, for many tree crops and plants, such as medicinal plants, flowers, ornamentals, etc., even such registration is overdone and unrealistic.
For a few major crops, some governments may want to maintain official lists of accepted varieties. If so, provision could be made for automatic acceptance for new varieties that are registered in other countries in the region.

For countries intending to join the EU, to help farmers and seed companies get ready for entry into EU markets, countries may want to adopt EU-approved variety lists and introduce other EU seed regulations as soon as possible, so that farmers get access to EU varieties and local seed companies are better able to work with EU seed companies and markets. To do so, countries can: (a) immediately accept all varieties in EU Common Catalogues (listing all varieties of common field crops and vegetables approved in any EU country) without any further in-country tests; (b) for crops in the EU Common Catalogues, arrange for 1-2 years of government tests and approvals for new varieties not yet in the EU Common Catalogues (although tests and approvals may be voluntary until the country actually gets into the EU); and (c) for crops not in EU Common Catalogues, allow companies to introduce new varieties without having to seek or gain approval from the Ministry of Agriculture.

Variety registration means that the government records a description of the variety showing that plants grown from seed of the candidate variety are distinct, uniform, and stable (i.e., so called DUS tests). Value in cultivation and use tests (so called VCU) have as their purpose to get information, usually for different agro-ecological zones, on characteristics such as yield performance, susceptibility to diseases, and product quality. Registering a variety allows the government to later certify – based on inspection of seed-production plots – that that seed is of that variety. Also, with variety registration, different seed companies can not sell the same variety under different names. It can help to define property rights.

There are in practice and in principle many modalities for registration and VCU tests. They can be voluntary or compulsory, related or independent of each other. They can be carried out by the Government or left to the private sector. Requirements for registration and VCU tests can be easy or difficult to fulfill. Many developing and transition countries, as well as the majority of the OECD countries, require variety registration for many of their crops, and often also VCU tests for their main field crops. Sometimes registration and VCU tests for all crops are required. Each modality has particular advantages and disadvantages. Details of these are discussed in Annex 2. Here only main points are discussed.

Compulsory variety registration raises the cost for entering new varieties, but may reduce the cost of protection of property rights. The costs depend on the requirements. Some governments require many years of government testing. In other cases, test data from private companies or tests from abroad are accepted, and tests for one or two years may suffice. Decisions, procedures, and requirements may be transparent or vague. Some countries leave VCU tests to those who want to introduce the varieties, in other cases government services are the gate keepers. Tests can be for one or two years, but sometimes for many years. The requirement for VCU tests can be that test results are published before approval is given to sell seeds, in other cases several standards or criteria must be met for getting approval. VCU-test information can be valuable to farmers and extension services. But there are costs and risks as well.

The main argument for governments to list and control varieties is to save farmers from the risk that private seed companies might try to sell varieties that do not perform or that are highly disease susceptible, and that farmers will not be able to evaluate those varieties. On the other hand, government control of variety introductions involves at least costs and delays, and not rarely also the use of inappropriate criteria, mistakes, and sometimes abuse. Over the last 10-15 years compulsory variety registration and VCU tests, and in particular the way they are carried out, have together been major barriers for entering new varieties in developing and transition countries. In many countries the regulations are too tight, too complicated and too costly and their economic costs outweigh potential
Regulations for Seed and Fertilizer Markets

Gains. The problems are most serious in small and underdeveloped markets and in countries with poor governance.

Experience around the world shows that liberalized systems and systems with simplified controls are preferable. Countries with voluntary variety registration for all crops include India, Malaysia and the US, while others have voluntary registration for all but a few major crops (e.g., all but five crops in Bangladesh, and all but three in Malawi). In such systems, companies demonstrate new varieties in farmer's fields, both to inform farmers and to get a measure of farmer interest to know how much seed of each variety to produce. Although these governments do not decide what varieties private companies can and cannot market, governments may test and list recommended varieties, arrange demonstrations, and otherwise supplement farmer information about variety options and risks. In countries where VCU tests are voluntary, companies often test and demonstrate to establish and estimate market demand. Without seeing farmers' reactions to demonstrations, companies do not know how much seed to produce for each new variety.

But, there are countries with relatively strong seed regulations that are functioning satisfactorily. In the EU, for example, variety registration and other approvals are compulsory for a list of major and minor field and pasture crops and vegetables. Every EU country automatically (with rare exceptions) accepts varieties approved by all other EU countries. Although the EU's system of compulsory variety registration and VCU tests is a barrier to entry for new varieties, the EU seed market is so large that registration costs are relatively small as a percent of sales, and farmers see a steady stream of competing new varieties for major and minor crops. An advantage is that the system provides reliable information and probably reduces the cost of protection of intellectual property rights. However, the costs for such a system are too high for small markets.

Many developing and transition countries have adopted systems with compulsory variety registration that superficially resemble the EU system. However, there are important differences. First, many of these countries maintain single-country lists of allowed varieties, so that costs to introduce a new variety are relatively high as a percent of expected revenues because of the small size of markets. Second, many countries base decisions to allow seed sale on three or more years of DUS and VCU tests for vegetables as well as field crops, whereas the EU approves new vegetable varieties based on one year of DUS tests only. Third, EU variety controls are limited to about 70 field crops and vegetables and do not apply to other species, such as fruit trees, flowers, medicinal plants, minor crops and vegetables, etc. In contrast, many new seed laws in developing and transition countries (e.g., Kyrgyzstan) apply variety controls to all species. Such seed laws are simply unworkable. Finally, in many countries there is also a conflict of interest for public breeders, since they are charged to test the private varieties, competing with their own, for possible release.

While there is broad agreement that at present in many countries farmers lose from excessive controls, many experts and administrators express concern that without some form of official variety controls, private seed companies might introduce varieties that do not perform. Consequently, they worry that farmers could lose profits, food security could be at risk, and the quality of exports might be decreased. Unfortunately, there is not much empirical evidence that assesses these risks unambiguously. Until this is sorted out, if ever, some compromise may be useful as part of the process to liberalize variety controls. For example, the government may continue to control variety introduction for one to five major crops while ending controls on all others. For crops with continuing variety controls, the government can in many cases relax controls in some way and simplify procedures. For newly introduced varieties the government may ask for the results of one season of in-country tests, e.g. for major agro-ecological zones. Regional harmonization and cooperation can be useful as well.
Allow New Company Entry

Governments can allow seed companies and traders to operate without registration (licensing) from the Ministry of Agriculture, or if registration is required, should make it automatic, based on an application and a nominal registration fee. In any case, the Ministry of Agriculture should allow retail seed sales (at least to some maximum annual value) without registration.

Seed companies can select seed farmers without interference from the government.

In many countries, seed laws give the Ministry of Agriculture the authority to register wholesale and retail seed traders. In other countries, such as Malawi, anyone with a general trade license from the Ministry of Commerce can sell seeds. Registration of seed companies and traders with the Ministry of Agriculture or a Seed Board has some advantages as well as pitfalls. The advantages are that such registration enhances government access to information, effective inspection and more rapid action in case of calamities. In case of repeated wrong practices, in principle, registration can be canceled. The possible pitfalls are that registration and licensing systems add to administrative burdens and in some countries they can also result in illegal practices by the registrar.

Whatever registration systems are designed for seed companies and traders, it is important that they work for SME new entry seed companies. If not, the formal market cannot develop naturally in rural areas, as it should, and more seed production and trade stays in the informal sector. Risks that formal seed companies and traders may be incompetent or may try to cheat farmers, can be addressed through truth-in-labeling. Also, free entry leads to more competition which in turn gives farmers more choices, so that problems with seed quality are more likely with excessive entry barriers than with relaxed criteria. To facilitate market entry for SME, any licensing or registration process can be automatic, based on a company’s application with information on simple objective criteria (e.g., tax registration, permanent business address) and with low fees.

Requiring (retail) traders with low turnover to register can be a significant obstacle to the development of trading networks through competing retail stores. Existing retail stores might be willing to put some seeds on the shelf, but this might not happen if it is illegal without a permit. If the ministry does not want to drop all registration, an option is to set a minimum annual seed turnover below which seed traders do not have to register.

In some countries – e.g., Bulgaria, Ethiopia, Kyrgyzstan – seed laws give the Ministry of Agriculture authority to register farmers allowed to grow seed on the basis of criteria such as equipment available, etc. There are hardly any advantages to this and many disadvantages. Such a registration system limits the flexibility of seed companies to engage and drop contract farmers so as to enforce production of good quality seed at the lowest possible price. It also carries a bias towards large mechanized farms, while experience with commercial seed production shows that small farms can compete. If seed is to be certified, companies must tell the government the location of seed-growing plots to be visited. Other than that, government does best to let companies take care of seed plots and farmers independently.

Ensure Good Market Information by Enforcing Truth-in-Labeling

Enforcing truth-in-labeling at the retail level is one of the basic tasks for seed market development, ensuring that farmers get good market information.

In most countries, commercial law mandates truthful labels and allows companies to register trademarks. These laws provide mechanisms for governments to prosecute fraud, and also provide a basis for farmers and competing companies to ask for damages through civil suits. Seed laws and regulations can enhance
the effectiveness of truth-in-labeling by: (i) listing information that must be on the label (company name and address, crop, variety, germination rate, testing date, expiration date, etc.); (ii) assigning some government agency (call it the seed agency) to accept complaints and collect samples, with special attention to retail stores; (iii) equipping the seed agency to test seeds to determine whether or not they are truthfully labeled; and (iv) empowering the seed agency to administer fines (that are subject to court appeal).

The enforcement of truth-in-labeling requires good definitions of violation in the regulations, such as misbranding, adulteration, short weight bags, deficiencies, or unsubstantiated claims. There is also a need to define sampling and inspection techniques, analytical methods and investigation allowances.

Some seed laws give seed inspectors the authority to break and enter and to seize seed samples without a search warrant, and also authorize the seed agency to stop seed sales by a company or store for several weeks on the basis of a suspected infraction, again without a judge’s order. The risk of such unbalanced regulations is that they give seed agencies too much power vis-à-vis seed sellers and can pose a temptation for inspectors to demand bribes.

In practice, those who find false labels are farmers who experience bad seed (most often with low germination or mixed seed) and sometimes companies with good reputations who find others using their bags to sell counterfeit seed. Truth-in-labeling thus depends on workable systems for farmers and companies to bring legal charges against illicit traders and companies. Developing such systems is one of the interesting challenges in building competitive seed markets. What are the options? Depending exclusively on administrative solutions (i.e., seed inspectors fixing fines) is subject to abuse and so does not protect farmers or companies, nor reimburse for losses. In Australia, the seed industry and farmers’ associations have gotten together to organize arbitration to deal with disputes about seeds. Egypt’s seed association has drafted plans to follow Australia’s example. In India, farmers have sued seed companies through special consumer courts. designed for low cost access.

Many experts argue that illiterate farmers may be taken in by fancy packages, or that farmers cannot read and understand labels. Some of these concerns can and should be addressed by not allowing labels to make unproven claims (e.g., resistance to disease). However, for equity and development, the way forward is to empower farmers, to promote competition, and to provide them with more choices, especially through market access. The opposite approach – to limit market choices – preserves ignorance and poverty. Extension and literacy programs can help farmers learn about new technologies and market opportunities. Even illiterate farmers are skilled in their profession, trained from childhood to make technical choices, deal with natural risks, and interact with others and with markets. A system that protects farmers from all mistakes is not realistic.

If regulations are going to be workable for farmers and SME emerging from the informal sector, it is important to allow farmers and even stores to sell unpacked and unlabeled seed. Government can do so by defining a class of “ungraded” or “substandard seed” that can be sold with or without packaging. If all seed must be packaged and labeled, farmers selling seed to neighbors break the law. Seed stores in many countries contract local farmers to produce seed for vegetables and field crops and offer it for sale in open bags. Regulations should allow this because it serves an existing market. Also, in many countries, seed dealers open bags or cans to sell seed in small lots. This too should be legal. Whether bags are open or closed, truth-in-labeling can apply if the seller presents the seed as associated with a label (this applies, for example, to bulk wheat seed that is never packaged as well as vegetable seed from an opened can). For seed sales from open packages, truth-in-labeling can well be combined with minimum standards. In some cases, seed companies can increase confidence in their product by putting seed in smaller packages, so that farmers can choose sealed packages.
Allow Seed Exports and Imports

To facilitate seed exports and imports, controls should preferably be limited to phytosanitary threats of imports (with rare exceptions for specific crops in special cases).

Some countries control seed exports and imports on the basis of concerns about seed self-sufficiency and food security. Blocking exports to protect the domestic seed supply can make sense in some circumstances in the short run (e.g., when a neighboring country has just suffered ruinous floods), but are more likely to be counter-productive in the long term. Companies that are not allowed to export, produce less seed than they would with free export, which means less seed security.

Some governments block seed imports to protect the domestic seed industry. Barriers on seed imports can have high costs at the farm level through higher seed prices and foregone income from varieties that are only available through imported seed – which is common for the best vegetable hybrids. Some governments restrict seed imports to promote seed self-sufficiency, but this can reduce seed security if potential foreign suppliers are discouraged from paying attention to these markets and so they are not ready to respond in an emergency.

Imposing official quality or even phytosanitary controls on seed exports interferes with seed company decisions and adds unnecessary costs and delay. Much of the seed in international trade is intra-company trade, including seed produced and exported by one company under contract to another. Most of the time, companies involved in such trade are willing to depend on their own management to ensure seed quality and are not interested in official tests. Only, if a country has a strong position in exporting seed with several companies involved, then some minimum standard requirements may be desirable.

By the same logic, companies may want to import bulk seed for processing and packaging in-country. Insisting that all imported seed is processed and meets quality criteria (that are not relevant for unprocessed seed) can discourage seed processing in-country. Some countries insist on certification for all imported seed, which is even worse. If enforced, this would block farmer access to the best vegetable seed in the world, much of which is not certified.

Some governments block exports of planting material for specific crops to protect domestic producers from foreign competition and to prevent spillover of benefits from investment in technology. For example, New Zealand banned exports of kiwi seedlings and India bans exports of onion seeds. Situations where seed export bans may be a reasonable and effective strategy are rare.

Regulations Establishing Seed Market Services

To facilitate market development, seed laws and regulations should mandate government agencies to provide a number of specialized services to seed companies. These services include: (a) issuing seed certification and seed quality certificates; (b) issuing phytosanitary certificates for exported seed; (c) awarding and protecting intellectual property rights, including plant variety protection (PVP) and patents for biotechnology. According to best practice, these services should available when seed companies ask and pay, and they need not be compulsory (with some exceptions discussed in the following paragraphs). In other words, seed companies can ignore these agencies and services if they are not interested. Another government service found in several countries is to provide information to farmers, based on independent VCU-testing. This is only practical for major crops.
Seed Certification and Other Seed Quality Certificates

Virtually all governments offer official seed certification (based on inspections of seed production plots to ensure that seed is of the variety stated on the label) as well as official seed quality certificates (based on laboratory tests measuring germination, percent of foreign matter, etc.). To ensure that tests and inspections are truly a service to companies and farmers and are not just costly barriers to trade, governments can offer them on a voluntary basis and for a fee. Governments may also accredit private companies and experts to carry out tests and inspections and to issue official certificates.

Some governments may want to set minimum seed standards (e.g., minimum germination percent) for commercially important seeds.

Some companies (especially those that do not have well-known brand names) might want official seed quality certificates to help them sell their seed. Similarly, some farmers may want to buy seed that has passed official seed certification or laboratory tests. However, when given the choice, most companies and farmers appear not willing to pay extra for seed with official quality certificates. For low value seeds and rural SME, official field checks and laboratory tests may be a burden. Hence, official tests and certificates should be voluntary.

Voluntary seed certification is widely practiced around the world. For example, Bangladesh, India, Malaysia, the US, and many other countries allow companies to sell seeds for all crops based on the company’s own field supervision and laboratory tests. On the other hand, the EU requires seed certification for a list of field crops but not vegetables. Other countries have mixed systems; for example, Malawi requires seed certification for hybrid maize, hybrid sunflower, and tobacco only and official laboratory tests for all crops. Governments can for a fixed time, provide certification and seed testing services below cost to support the development of quality awareness of emerging SME.

In recent years, it has become common for official seed certification and testing agencies to accredit private organizations to carry out official inspections and laboratory tests and to issue seed quality certificates. The International Seed Testing Association (ISTA), for example, has begun to work with private laboratories accredited to issue ISTA certificates. Official seed certification agencies in South Africa, Zambia and Zimbabwe allow private seed associations to test and certify seed. Accreditation should be promoted because it gives companies more options for official inspections and tests. However, accreditation does not solve the problem that small companies have with compulsory seed certification and laboratory tests. If accreditation goes to bigger companies first, it can even work against SME. Hence, some combination of voluntary certification and laboratory tests along with accreditation may be best for all companies – and for farmers.

Many countries set compulsory minimum standards according to species, while others (e.g., the US) allow companies to sell seeds with low germination and purity as long as they are truthfully labeled. Another option is to set minimum standards but to make them voluntary, so that seed not meeting those standards can be sold as sub-standard seed (e.g., Zimbabwe’s seed regulations allow this). Setting minimum standards has little impact on most commercial seed sales, especially for larger companies, which often maintain their own higher standards. However, minimum standards can create problems. For example, if germination of treated seed falls below minimum standards, companies may have to destroy it. On the other hand, if companies are able to sell it as substandard seed – clearly labeled in big red letters – companies save and farmers get some cheap seed.

Phytosanitary Certificates for Exported Seed

To facilitate seed exports, common practice is for governments to arrange for an official agency to carry out phytosanitary tests and inspections and to provide phytosanitary certificates as a service to seed companies.
The agency responsible for phytosanitary certificates may accredit other government and private laboratories and institutions to act on its behalf.

Common practice across major seed exporting countries is that phytosanitary certificates are not be required for exported seed but only offered as a service to seed exporters, who know what phytosanitary conditions seeds must meet in importing countries. The agency should be ready – for a fee – to do whatever tests and inspections companies ask for and to issue an official report that satisfies importing governments. In case a country has a strong export position, minimum quality requirements can be reasonable.

**Intellectual Property Protection: Plant Variety Protection**

To encourage introduction of new private varieties and investments in breeding, governments establish agencies and legal procedures for plant variety protection (PVP), i.e. to recognize and protect intellectual property rights in new varieties.

With the formation of the World Trade Organization (WTO) in the mid-1990s, all WTO member governments are committed through the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement to “[P]rovide for the protection of plant varieties either by patents or by an effective sui generis system or by some combination thereof.” According to common practice, granting of PVP can be a voluntary service, so that companies can introduce new varieties without applying for PVP.

The TRIPS agreement leaves room for countries to choose how to protect property rights in varieties. The most common system is shared and implemented by member governments of the International Union for the Protection of New Varieties of Plants (UPOV), a treaty organization. Increased membership in the last five years suggests growing acceptance of UPOV’s principles. From January 1995 through June 1999, UPOV’s membership increased from 27 to 44 countries. New members include Brazil, China, Kenya, Mexico, and Russia. Although India and most other South Asian and African countries are not yet members, many of them are preparing legislation to establish PVP that at varying levels comply with UPOV guidelines. UPOV circulates a model PVP law and commentary. Countries may find other solutions as well. There is also an important group of developing countries that want to develop systems which recognize rights of local communities on traditional sources of biodiversity, and with more emphasis on “farmers’ privilege” to produce and trade seeds freely. According to UPOV’s 1991 treaty, member governments can allow farmers to multiply seed of proprietary varieties (i.e., varieties for which someone holds PVP rights) for own use – this is the “farmers’ privilege.” However, UPOV member governments cannot allow farmers to sell or exchange seed of proprietary varieties with their neighbors (unless those holding PVP rights do not object). This clause is impossible to enforce in many countries. Some agricultural experts argue that informal farmer-to-farmer seed sales are important to spread new varieties in developing countries, and that PVP threatens such sales. Moreover, farm to farm seed sales are very difficult to control. In any case, even after a country joins UPOV, farmers can continue to sell seeds of varieties from public research (if government as the breeder does not restrict their uses), land races and old varieties.

Source of DUS data. The government office that assigns PVP for a new variety bases its decision on evidence that some collection of seeds (or other planting material) represents a plant grouping that is distinct, uniform, and stable (DUS). When companies sell the same varieties across multinational markets, it is a waste of time and resources for every government – especially governments of small-

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3 TRIPS, Article 27, paragraphs 1, 3.
market countries – to repeat DUS tests. To save time and money, governments can give applicants the option to present DUS data from their own tests, buy and present data from other governments, or pay a testing fee and ask the government to arrange DUS tests. Accepting data from companies and other governments makes sense even in large-market developed countries. For example, the US Plant Variety Protection Office asks PVP applicants to name other similar varieties and to describe how the new one is different, and normally bases decisions to award PVP on information that companies submit from their own tests.

Assigning PVP rights. According to UPOV’s model law, “...the right to protection in a given country belongs to the first person who made ‘his’ variety a matter of common knowledge in any country.” One of the tasks in assigning PVP for a new variety is to determine if it has been described or registered earlier anywhere in the world. UPOV 1991 asks governments to be prepared to grant PVP for all species (including mushrooms, minor crops, etc.), except that new members can begin with a limited list of species. This is a scientific challenge, even for relatively large and wealthy countries. PVP offices in many developing countries may consider establishing formal or informal practices to accept PVP decisions that have been made in specified other countries. This frees resources for better DUS tests for varieties that are not registered in any other country (e.g., varieties coming out of in-country public and private breeding).

Regional IPR systems. One way for countries to cut costs and to strengthen PVP is to create regional systems through multi-country treaties. Cooperating governments may create a regional office to grant PVP for all member countries, or to coordinate legal systems so that PVP granted in any one country is recognized in the others. Examples of regional systems for protecting intellectual property rights include the African Intellectual Property Organization (OAPI) in West Africa (currently only for patents, but considering to extend to PVP), the Andean Community (created by the Cartagena Agreement among Bolivia, Columbia, Ecuador, Peru, and Venezuela), and the European Patent Convention (which exists alongside national PVP systems in EU countries).

Challenges to PVP assignments. Governments should make arrangements for companies to challenge PVP decisions so that mistakes – e.g., incorrect assignment of PVP to someone for an old variety or to the wrong breeder – can be corrected at minimal cost to farmers and to the industry. Challenges are always possible through the courts, but that can take time and money. The agency that awards PVP can also accept challenges for a modest set fee. In the US, for example, anyone can challenge a PVP assignment within five years with a complaint to the US Plant Variety Protection Office along with a $300 fee. In making challenges, companies present evidence to show that varieties for which someone else claims PVP are not new, or that the real breeder has not been recognized.

Compulsory registration. Most if not all PVP systems give government the authority – under certain conditions – to register someone other than the owner of PVP rights to produce the variety without the owner agreeing. This provision should be included in all PVP laws (see, for example, UPOV’s model law, p 67). Compulsory registration can be useful in unusual situations (e.g., when war breaks commercial relations with foreign seed companies), but most of the time it will not be used. In countries with monopolies and oligopolies in major seed markets, governments are often at the root of the problem through excessive controls on company entry and variety introduction. Governments can usually solve such problems by promoting market access and competition through reducing interference in seed markets instead of waving the threat of compulsory registration (which is an additional interference).

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5 Ibid, p. 102.
Respecting physical control. Private seed companies protect a significant share of intellectual property through physical control of germplasm, including parent lines for hybrids. This can be especially important in small-market developing countries with weak legal systems. Governments threaten this control when they demand samples. Governments that demand samples drive away companies that might otherwise establish seed production in-country, including contract production of high value vegetable seed for export. This problem is most serious in countries with poor governance and weak PVP. With some high value hybrid vegetable seed costing over $10,000 per kg, companies are understandably loath to go into countries where they must give up physical control of parent seed – with a much higher value.

Farmers’ Rights and undeveloped germplasm. Under the TRIPS agreement, intellectual property rights apply only to new varieties and biotechnology inventions. Land races, traditional varieties, wild relatives of cultivated crops, and other wild germplasm are not new, so that WTO and PVP systems that satisfy UPOV, do not ask governments to arrange for the protection of intellectual property on them. To date, most countries that have established PVP have made arrangements for Farmers’ Rights in separate legislation. However, efforts are under way through several international organizations and in many countries to design laws that would allow governments to assign someone or some group some bundle of rights – Farmers’ Rights – associated with land races, traditional varieties, etc. Many governments have also made steps to control market access to wild germplasm. Some argue that PVP, Farmers’ Rights, and wild germplasm should be addressed in one law. Ideas about what is best practice are still developing in this area.

Intellectual Property Protection: Patents for Biotechnology in Plants

Farmer access to agricultural biotechnology depends – among other factors – on governments making arrangements to award patents for agricultural biotechnology.

All member governments of the WTO are committed through the TRIPS agreement to make patents “available for any inventions, whether products or processes, in all fields of technology” with some exceptions, including “plants and animals other than microorganisms and essentially biological processes for the production of plants or animals...” In other words, governments joining the WTO agree to provide patents for biotechnology, but not necessarily for all applications.

Aside from regulatory hurdles to deal with environmental and public health concerns, any country with a competitive seed industry can have access to a broad array of private biotechnology through company-to-company licensing arrangements as long as some system of patents to protect intellectual property is in place.

Regulations Controlling Negative Externalities

Phytosanitary Risks with Imported Seed

To protect agricultural production and indigenous biodiversity, best practice among is to demand that imported seed meets conditions designed to prevent the introduction of seed-borne pests and diseases that are not present in the country and that are economically or environmentally significant.

The common design for phytosanitary control is to put all seeds (planting material) on the import control list, authorizing an agency to establish rules to control phytosanitary risks, to issue seed import permits,
and to inspect and control seeds at the point of entry. The agency decides what seed-borne pests and diseases must be controlled, and how imported seed must be treated, etc. Since seed-borne pests and diseases are easily introduced by seed smuggling, governments should also consider revising all policies and regulations that create incentives for seed smuggling (e.g., burdensome variety controls, excessive import duties, excessive administrative requirements on imports).

In some cases, governments misuse phytosanitary controls to protect domestic seed producers from imported competition. The International Plant Protection Convention addresses this issue by asking phytosanitary controls to focus on quarantinable pests and diseases, i.e., pests and diseases that are not already present in the country, or not present in some parts of the country and are under internal quarantine control, and that could have significant economic or environmental impact. A number of intergovernmental organizations, including FAO’s Interim Commission on Phytosanitary Measures (which supervises implementation of the International Plant Protection Convention [IPPC]), the European and Mediterranean Plant Protection Organization (EPPO), and other regional organizations are part of ongoing efforts to improve the definition of science-based risks. Along with these organizations and agreements that focus on seeds, the Agreement on Sanitary and Phytosanitary Measures (SPS) provides a framework for countries to adopt science-based phytosanitary controls for all goods, including seed.

Countries with extensive and porous land borders can cut the cost and inconvenience of phytosanitary controls and at the same time improve phytosanitary protection by cooperating to harmonize and enforce controls along natural boundaries (oceans, mountains, and other natural barriers). Rationalization of phytosanitary controls is an important aspect of regional efforts to create larger and more efficient seed markets (e.g., across Central and Eastern Europe, across sub-Saharan Africa). Often, organizations such as the Southern Africa Development Community (SADC) are already in place and could play an important role to rationalize regional phytosanitary controls.

Biotechnology Risks with New Species and Transgenics

To protect indigenous biodiversity, governments control introduction of new plant species and agricultural biotechnology.

One of the classic challenges in regulating the import of planting material is to block plants that might become weeds. Water hyacinth in India and Africa is an example of a species – imported and introduced as an ornamental plant – that escaped and expanded in the wild to become a damaging weed. The common design for regulations to block such introductions is to put all seeds (planting material) on the import control list (as above), and to authorize one or more government offices to decide what species can be imported. Species not already in the country require special attention before issuing import permits. Nurseries and botanical gardens may ask for permission to import and introduce a new ornamental plant or forest species. In deciding whether or not to approve such requests, one of the most important questions is whether or not the proposed introduction threatens indigenous ecosystems.

Applications of some types of biotechnology will require special regulations to deal with environmental and public health risks. The Cartagena Protocol on Biosafety to the Convention on Biological Diversity, which was concluded in February 2000, enters into force 90 days after the fiftieth instrument of ratification has been deposited. It governs the trans-border movement of living modified organisms, including genetically modified seeds. Multilateral agreements are needed as a base for national and trade-related regulations. These matters are left for other fora and are not discussed here. A national or regional authority will have to scrutinize applications for the introduction of GMO's based on environmental, human, and food safety standards. This requirement interferes to some extent with the voluntary registration principle.
Government Organizations to Regulate Seeds

The Ministry of Agriculture needs an office responsible for policy making and for supervising the execution of policies for which the Ministry is responsible. With regulations as discussed above, governments can manage regulatory tasks with three agencies:

(a) A seed inspection, testing, and certification agency, which has one or more laboratories along with several offices distributed around the country to visit seed stores to monitor truth-in-labeling and to visit seed production plots for certification. The size of this agency depends on whether or not seed certification is required and on how much the agency is willing to accredit private companies and experts to test seeds and inspect fields. With voluntary certification, the percent of all commercial seed certified may be low.

(b) A quarantine agency to administer phytosanitary controls on imported seed and to issue phytosanitary certificates on exported seed. This agency is normally responsible for quarantine controls on all goods, not only seeds. The quarantine agency is normally not attached to the Ministry of Agriculture's seed office, and may even be attached to another ministry, such as a ministry of environment.

(c) A small office or agency to administer plant variety protection (PVP), i.e., to evaluate claims that someone has developed a new variety and then to award PVP rights. While PVP agencies may want to maintain a small staff and facilities to manage their own DUS tests, the work could be left to public and private organizations with specialized scientific expertise.

If the Ministry of Agriculture continues to list and control allowed varieties, the seed office in the Ministry may be responsible for maintaining variety lists. The office may also maintain lists of recommended varieties. In some countries, governments have already invested resources into variety testing agencies. When such an agency is already in place, and operates efficiently, it may be tasked to manage DUS tests for PVP as well as VCU tests for lists of recommended varieties. Obviously some of these tasks and agencies could be shared in regional cooperation.

One of the basic institutions for promoting and maintaining a competitive seed industry are independent private seed associations. Seed associations provide information and services to members and also act as a spokesperson for seed companies in dealings with regulators, legislators, and other government bodies.

The public and private sectors often have complementary expertise and overlapping interest in good regulations and effective implementation. This offers scope for public-private cooperation. Governments that are ready to work with the private sector will have an open door to farmers' organizations as well as seed associations to talk about the full range of common concerns, including research, seed regulation, seed export promotion, and so on. A Seed Board may provide an effective advisory role in policy preparation and implementation. The government should create a framework for the Board. It should make sure that all parties, including producers organizations, are involved, and that the Board does not reduce market access for newcomers. If properly organized, the government may delegate some tasks to the Board. However, close supervision remains necessary.

In many countries public agencies have not only played important roles in breeding, seed production and distribution, but also in policy making and implementation. Experts from these agencies often dominate in committees that decide on approvals and controls. When markets are opened for the private sector there is often a tendency for government agencies to use their authority and experts to control market entry of seeds and private companies. It is important for the government at that stage to separate policy making from policy execution. In addition, the government should set guidance for competition between public
Regulations for Seed and Fertilizer Markets

agencies and private companies. Production of private goods should be left to the private sector, and public agencies should start to work on full cost recovery principles. This means that they should work on a full-costing base and that they cannot use public funds to compete for market share with private companies.

In many countries the regulatory system is working poorly because of insufficient funding. Since the regulatory functions have public goods aspects some basic funding from the regular budget will be necessary, but since farmers and businesses are profiting from the services of a good regulatory system, operational expenses can be funded through registration fees, certification fees and inspection and/or tonnage fees.
Regulations for Fertilizer Market Development

Fertilizer Traders and Competitive Markets

Competition at all levels of fertilizer trade from importing through retail sales is the key for farmers to have convenient access to a broad range of useful fertilizer products at low prices (i.e., unsubsidized, but with a minimum mark-up above world market prices). Just as for seeds, competition requires SME traders, easy new entry, and competing retail dealers. In Bangladesh, for example, the International Fertilizer Development Center (IFDC) estimates a total of 100,000 retail fertilizer retailers, which works out to an average of more than one per village or about one per 150 farm families. When markets are working well, retail dealers and other small traders contribute a significant share of the capital required for the fertilizer trade by buying and holding fertilizer stocks, so that major importers are able to sell fertilizer quickly, reducing their financing requirements.

Regulatory issues for fertilizer marketing and trade are easier than for seeds. Options for regulating technology transfer and quality are relatively few and simple. In many cases there are major gaps in prices between the retail and international markets. Important reasons for the gaps are macro policies, exchange rate distortions, energy prices, interest rates, inflation, currency devaluation, trade barriers, taxes, subsidies and government distribution schemes. Traders will anticipate these factors and related policy risks. However, part of the price gaps can be attributed to regulations and related limited competition and lack of economies of scale. A frequent cause of high prices is border protection of high-cost domestic production. The amount of money involved in fertilizers is much larger than for seeds, and in competitive markets profit margins for fertilizers are much lower. This means that problems with macro policies, fertilizer policies and regulations can have an exaggerated impact on the efficiency of the fertilizer trade and hence on competition, costs, mark-up, and farm-level price.

In many developing countries, and especially in Africa, national markets are too small on their own to support a competitive fertilizer trade. When national markets are small, cross-border trade is crucial to lower farm-level fertilizer costs. In Malawi, for example, total annual fertilizer sales are only about 180,000 tons of product. At the same time, an efficient minimum order for importing (through a port) is about 15,000 tons and takes about two months to arrive in the country. For smaller imports, transport costs per ton are higher. If there is to be a competitive market, there should be many potential importers. Traders must anticipate demand. If rains are good and demand increases, then market shortages emerge. On the other hand, if trade is less than expected, traders face losses to hold fertilizers until the next year. If Malawi’s fertilizer dealers can manage stocks with an eye to sales throughout the region, then trade volumes increase and the risks and costs of market shortages or excesses are much less. If import and/or export regulations on cross-border trade take any significant amount of time and money, national markets remain isolated. On the other hand, if regulations allow, regional trade can be expected to develop to reach an efficient scale.
Regulations for Seed and Fertilizer Markets

Regulations Promoting Competitive Markets

Allow New Products

When governments allow companies to introduce new nutrients, grades, compositions, or mixtures on their own initiative, this not only accelerates the introduction of useful products for all crops and soil conditions, but also allows companies to shop the world for the best price per unit nutrient. As long as only nutrient claims are made, registration can be optional or automatic. If companies are making other claims, e.g., slow release claims, then the government may require registration based on a review of company or official efficacy tests.

Some countries (such as Zimbabwe) list fertilizer compositions that traders are allowed to sell based on official ideas about plant response to different nutrients. In other countries (e.g., Zambia) governments allow traders to sell any composition, as long as the bag is truthfully labeled. A third option is to register fertilizer compositions allowed for trade, but to do so without any delay or question. For example, if a seller prepares custom mixtures for a customer based on soil tests, the seller may register them after they are already mixed, sold, and applied. Registration in such cases is effectively a reporting procedure.

To allow farmers to obtain fertilizers that fit their conditions, governments should leave choices to farmers and companies. Arguments for mandating or restricting fertilizer composition are based on the assumption that government experts are better able to make good decisions about what farmers need than the market. However, government experts do not have the best market information and are not able to look at each field and situation, so that official recommendations about what is useful are often too general or just simply wrong. Hence, farmers should be encouraged to find out themselves what fits best to their situation. Governments can help farmers to find good matches between soil deficiencies and fertilizer application by offering soil test evaluations and fertilizer recommendations through extension and public research organizations. Also private companies will help. In countries with competitive fertilizer markets, anything that companies can do to increase fertilizer response will also increase sales. To separate themselves from the competition, companies will offer soil tests, micro-nutrients, made-to-order bulk blending based on soil tests, and other technology-based products and services.

A major argument against restrictions of fertilizer composition is also that they easily result in higher prices. Competition should induce companies to provide the best available price/quality mix.

Allow New Company Entry

Governments can promote competition at all levels of the fertilizer trade by either allowing market entry without registration, or by designing the registration process to be simple, inexpensive, and nonrestrictive. In any case, retail dealers should be allowed to sell without registration up to some annual turnover or to sell under the authority of the registration held by wholesale suppliers.

Fertilizer traders must in any case register their businesses with other government offices for tax purposes and so forth. Additional registration with the Ministry of Agriculture may provide some benefits, but has many pitfalls as well. Registering with the Ministry of Agriculture can form a legal bond between the regulatory authority and the trader, ensuring that the trader respects truth-in-labeling. Registration also enhances the Ministry of Agriculture's ability to identify all sellers, so that staff enforcing truth-in-labeling know where to go to collect samples. In case of repeated bad practices a registration may be withdrawn. On the other hand, registration increases the administrative burden, and it may also be used to limit entry in a way that – deliberately or inadvertently – protects oligopolies or monopolies, e.g., for
importing or for fertilizer sales in specific regions of the country. If registration is required, registration should be based on simple and low-cost objective criteria, not on discretionary judgment.

A paucity of retail outlets is a weak point in the fertilizer distribution systems in many developing and transition countries. Fertilizer trade is seasonal. In many developing countries, the volume of trade even in season is not large at the local level. If local stores need approval from the Ministry of Agriculture to put bags of fertilizers on their shelves, there may be no legal fertilizer trade at the retail level. Hence, it is important to allow retail sales without registration or to allow retailers to sell under the authority of their registered wholesale suppliers.

Allow Imports and Exports

To facilitate competition at the national level, governments should allow companies to import fertilizer without import permits from the Ministry of Agriculture.

Governments can encourage regional fertilizer markets by allowing cross-border trade without pre-shipment inspection, border taxes, and time-consuming tests and inspections, and by agreeing to accept compositions, packaging, and labels from neighboring countries.

Many countries (e.g., Zimbabwe) allow the Ministry of Agriculture to continue to control private fertilizer imports through import permits. This practice constitutes a non-tariff barrier. One reason that is sometimes given for the Ministry of Agriculture to issue fertilizer import permits is that this allows the ministry to know how much fertilizer is imported. However, the ministry can collect that information from customs records.

Regional trade does not have to wait for governments in a region to harmonize fertilizer regulations. Each government, acting alone and in the interests of its farmers, can reduce as far as possible barriers to import, including cross-border trade. This is not a situation where bilateral or multilateral agreements are necessary, though they may help—e.g., to establish mutually agreeable standards. It is important that each country allow, as far as possible, fertilizer bags and labels acceptable in other regional countries, so that fertilizers do not have to be repackaged or re-labeled when they cross borders, or are rejected on grounds of other standards.

Ensure Good Market Information: Enforce Truth-in-Labeling

Governments can promote and regulate fertilizer quality in the market by mandating what information must be on labels (address of the dealer responsible for the label, percent of each nutrient, etc.) and making arrangements to monitor and to enforce truth-in-labeling. Violations and inspection methods also need to be defined in laws or regulations. Governments can also make arrangements to assist farmers and companies to pursue civil suits to recover damages (e.g., when labels are not truthful or someone sells counterfeit fertilizer in another company's bags).

The enforcement of truth-in-labeling requires good definitions of violation in the regulations, such as misbranding, adulteration, short weight bags, nutrient deficiencies, or unsubstantiated claims. There is also a need to define sampling and inspection techniques, analytical methods and investigation allowances.

Truth-in-labeling pretty much takes care of quality control. To encourage maximum new entry, competition, and low prices, governments should avoid detailed and stringent quality standards that limit trade to premium products. If there are questions about what percents of nitrogen or sulfur there should be in various products, truth-in-labeling requires that minimum percentages are accurately reported on the
Regulations for Seed and Fertilizer Markets

label. This allows importers and farmers to buy products offering the most nutrients per unit cost, which may not be the best quality in purely analytical terms.

There must be a government agency to respond to complaints, monitor quality of fertilizer in stores, and test fertilizer on request. Farmers and companies must also have access to legal processes in some way to recover damages (e.g., farmers may sue companies that mislabel products) and to ensure that regulators are fair. Courts, for example, may be required to issue search warrants to regulators and should be accessible to companies to challenge fines and other regulatory decisions.

Since fertilizer that is truthfully labeled at the import or wholesale level can always be diluted or otherwise falsely labeled after it is checked, there is no way to be sure that fertilizer sold to farmers is truthfully labeled without checking at the retail level. Hence, efforts to monitor truth-in-labeling should focus on retail sales. Although some spot checks on fertilizer imports and the wholesale trade may be arranged, it makes little sense to put too much emphasis on what happens at that level. One West African government, for example, held fertilizer imports at the border for days while sending samples for laboratory tests. This imposes high costs to immobilize trucks or to unload, store, and reload fertilizers. Risks of fraud are in the first instance matters for private importers to control - importers do not want to be cheated by foreign suppliers. Furthermore, companies may import fertilizer in an unfinished form, so that testing at the border is next to meaningless. If fraud is the intent, it does not make sense for companies to import fake or mislabeled fertilizer when it is much easier - and saves transport costs - to import full-strength fertilizer and then dilute it in-country.

Since there is often demand from farmers for small quantities of fertilizers, it is important to allow sale from opened bags. Similarly there may be trade in bulk in larger quantities. Regulations should allow this since it serves markets efficiently. However, whether bags are open or closed, truth-in-labeling should apply. Sellers should present the product with a label. If it is an issue, sellers can increase the confidence in their product by putting seed in smaller packages, so that farmers can choose sealed packages.

Regulations Controlling Negative Externalities

Governments should set limits on heavy metals and other possible impurities in fertilizers that could damage public health, crop production and the environment.

Wherever fertilizer use threatens environmental damage - such as protected watersheds - additional and local regulations should be designed to control fertilizer application, not trade.

In most developing and transition countries, rates of fertilizer use are too low to present an environmental threat except in special situations. However, regulations are required to ensure that contaminants do not create problem. Practically all fertilizers have some level of heavy metals or other contaminants. These are not a problem as long as levels are sufficiently low. Since absolute prohibition of some of these contaminants is not realistic, regulations should set safe maximum levels for specific heavy metals. Regulations may also include a general clause that fertilizers be safe for the environment (which allows government to respond to an unexpected but damaging contamination).

Overuse of fertilizers and related environmental effects may occur in intensive farming systems. Some developed countries with high rates of fertilizer use regulate applications across all fields. This is unreasonable for countries with low average rates. Except for protected watersheds and other localities with other special concerns, the accepted challenge in most developing and transition countries is to encourage more fertilizer use, not less. Restrictions on trade are not a useful instrument for environmental protection.
Government Organizations to Regulate Fertilizers

The policy making and regulatory issues discussed above can be administered through an office or agency in the ministry of agriculture. As described, regulators monitor truth in labeling – taking and testing samples – based on complaints as well as inspections. Agencies can arrange for other organizations – e.g., private companies or universities – to help with laboratory tests. Most agencies have at least one official laboratory. Depending on the regulations, the agency may also maintain lists of registered importers, dealers, and registered products. The agency will normally have the authority to administer fines, which are subject to court review. In some countries, the agency has the authority to seize products and stop trade. However, it may be safer all around if the agency does not have such strong power, but rather must work through court orders, subpoenas, etc. A regulatory agency with government experts and results from laboratory tests has strong advantages in legal proceedings.

One of the basic institutions for promoting and maintaining a competitive fertilizer market in a country is a private fertilizer trade association. As for seed associations, fertilizer trade associations provide information and services to members and also act as a spokesperson for the industry in dealings with regulators, legislators, and other government bodies.

The public and private sector often have complementary expertise and overlapping interest in good regulations and effective implementation. This offers scope for public-private cooperation. Governments that are ready to work with the private sector will have an open door to farmers' organizations as well as seed associations to talk about the full range of common concerns, including research, seed regulation, seed export promotion, and so on. A Fertilizer Board may provide an effective contribution to these ends. The government should create a framework for the Board. It should make sure that all parties, including producer organizations, are involved, and that the Board does not reduce market access for newcomers. If properly organized, the government may delegate some tasks to the Board. However, close supervision remains necessary.

In many countries, the regulatory system is working poorly because of insufficient funding. Since the regulatory functions have public goods aspects, some basic funding from the regular budget will be necessary, but since farmers and businesses are profiting from the services of a good regulatory system, operational expenses can be funded through registration fees and inspection and/or tonnage fees.
Implementing Regulatory Reform

Political Considerations: Leaders, Beneficiaries, Opponents

Although the private sector has become an important source for production and distribution of inputs in many countries, there are still many developing and transition countries that have not yet fully utilized these opportunities. To tap these opportunities requires public sector reform, deregulation and liberalization. Such processes have winners and losers. The winners are the farmers, consumers and new entrants in the market. The losers could be protected industries and parastatals that face new competition and loss of privileges. Government services face reduction of authority and funds, so some staff and regulators may see a threat to their jobs. Commonly, in all countries losers oppose reforms. Therefore reforms require vision and leadership and sometimes some compensation or a transition period for losers to adjust to the new situation.

Discussions about the design of input regulations are too important to be left to regulators and government scientists. If the interests of farmers and consumers are to be given proper weight, it is important to involve politicians and senior government officials. The importance of the contribution of political leadership to assist in the introduction of foreign agricultural technology has been demonstrated many times over in the last 40 years. During the 1960s, India delayed introduction of wheat varieties from CIMMYT despite years of tests showing good results. Eventually, Indira Gandhi pushed approval through, despite domestic opposition. In Turkey, the same thing happened with government scientists opposing CIMMYT wheat. Eventually, a farmer planted a field of CIMMYT wheat from seed smuggled into the country. Over 100 influential farmers in the region asked to import wheat seed from Mexico. A senior official in the Ministry of Agriculture visited the field, Parliament got involved, and government soon allowed imports and then large-scale introduction of CIMMYT varieties. In Romania in 1997, the Minister of Agriculture decided that Romania would move from its single-country list of allowed varieties to accept all varieties in the EU Common Catalogue. Despite opposition from private and public interests who did not want to lose market share, the Minister and government were able to get an amendment to the seed law through Parliament within a year.

Changing Laws or Regulations?

In many cases, proposed market-friendly seed and fertilizer regulations can be introduced with changes in regulations alone, without adding or amending any law. If so, the Ministry of Agriculture can make changes with the approval of the executive branch without going through parliament. However, this is not always possible, and even if it is, existing law(s) may be awkward or inadequate for market-friendly regulations, so that a new law or amendment is required sooner or later.

Liberalization vs. Harmonization

When a country's seed and fertilizer regulations are an obstacle to regional and other international trade, reforming regulations to allow more efficient markets to develop involves two processes: liberalization and harmonization. Each country, acting alone, can liberalize its seed and fertilizer regulations, reducing barriers to trade and entry for new companies and technology as already described. At the same time, or whenever it can be organized, countries in a region can get together to harmonize regulations that remain after liberalization, such as phytosanitary controls and fertilizer labeling rules. Harmonization can help companies to shift from national to regional strategies. In particular for small countries, regional harmonization may be very important to create larger seed and fertilizer markets.
It is important to distinguish between obstacles for competitive markets that can be fixed with country-by-country liberalization and what must be harmonized through regional negotiations. Harmonization without a strong commitment to liberalize could leave countries and regions even more closed than before. Hence, it is important to get high-level government attention for the harmonization process to prevent this.

Regional seed and fertilizer associations can play an important role in detecting obstacles for trade and market development. They can play important roles in regional harmonization.

Getting More Technology and Information to Farmers

The purpose of many programs for agricultural development – public research and extension programs in particular – is to give farmers access to more technology and to protect farmers because of asymmetry in information compared with private companies. Protection is desirable, but it usually comes with cost and undesirable side-effects. It can easily result in overshooting, with less competition as a result, less supply of technology and less empowerment of farmers. A pitfall of protection through regulation may be that farmers are treated as not able to choose wisely among more options. What is needed is countervailing power by learning by farmers and by competition. The concern that farmers may not know how to evaluate and use new technology can be addressed by government programs to give farmers more information, not by limiting access to new technology. In other words, governments can empower farmers by giving them more technology choices, more information, and competitive markets.

For example, in countries with an emerging inputs trade, government extension agencies can design standard procedures to share demonstration programs (costs and management) with inputs companies. Eventually, it is reasonable to expect that private companies will be responsible for most new technology for most crops and will independently pay for and manage most on-farm demonstrations. When that happens, government extension agencies become one of many complementary sources of information for farmers.

If recommended variety lists do not exist, government may organize voluntary VCU tests using companies and public research or extension organizations to prepare such lists. In the EU, for example, some governments, farmer’s organizations and food processing organizations maintain lists of recommended varieties based on in-country VCU tests, but seeds of all other varieties approved and sold in other EU countries are also legally available.

During the transition to private inputs trade, farmers will learn about how to choose inputs from competing companies and what to look out for when buying from different sources. Ministries of agriculture can help farmers adjust with advertising campaigns and other advice that point out whatever risks exist. For example, newspapers warned farmers in Thailand in the mid-1970s to be aware that false fertilizer from itinerant traders was being sold from trucks along the road. With all of the tools that government has to get messages across, risks of fraud and confusion with new inputs or companies can be minimized with aggressive advice and special efforts to check truth-in-labeling at the retail level.
Annex 1. Assessing a Country's Seed and Fertilizer Markets

The way to assess seed and fertilizer markets is to look for what must be there if farmers are to have good access to technology options. The necessary information is not hard to find. These markets can only work well when farmers know what is available and where. Hence, farmers are an important source of information. Small-town dealers, farmers organizations, and large city-based seed and fertilizer companies can also help to explain how well things are working. Data, publications, and government seed experts provide background and perspective.

Talk to farmers

The purpose of these talks is to find out what options farmers see. Ask them where they can find stores that sell seeds and fertilizers. For a major field crop with commercial seeds, ask farmers about how many seed companies are in the market, and ask for the names of the companies. For one or more crops, ask farmers how many new varieties they have seen in the last several years and who has introduced them. Have farmers seen any field demonstrations? Who arranged them? For fertilizers, ask how many different kinds and brands of fertilizers are sold.

Talk to small-town private retail dealers

If input markets are working, there will be many small-town private stores selling seeds and fertilizers. Stop in several towns and ask people on the street which stores sell seeds and fertilizers. If no stores sell seeds and fertilizers, that is important information. If there are stores, visit several. For stores that sell seeds, ask how many seed companies are in the market, how many new varieties they have seen for several major crops and vegetables, etc. Ask what seed companies and seed stores do to introduce new varieties (demonstrations, small-scale sales in the first year, samples, etc.). If the store sells fertilizers, ask how many suppliers they buy from and how many other stores and suppliers there are in the local market.

Talk to seed and fertilizer companies

If inputs markets are working, there will be at least several seed companies. Farmers and retail dealers may have already given names for many companies. One straightforward way to find out what is available is to look in the telephone directory in a major city. Visit several. Most seed companies specialize in a range of crops. Ask about how long the company has been in the business. How many other seed companies there are for specific crops and what are their market shares. Ask how many new varieties the company has introduced in recent years, where those varieties have come from, and what the company does to get information about new varieties to farmers.

If fertilizer is produced in the country, there will usually be only a small number of producers due to economies of scale in production. Often domestic producers are protected against foreign competitors. However, if markets are working, with or without in-country fertilizer production, there will be competing importers and wholesalers. As for seeds, it should be possible to find out the names of some major companies from traders and even farmers. Visit several major traders to talk with the manager or sales manager about their activities. How long have they been in the market? Who are their competitors, and what are rough market shares for the different companies. Have any new products such as micro-nutrient fertilizers entered the market in recent years. If so, who identified the need for the product, and how do companies get information to farmers. Does the company do anything to promote soil tests?
**Talk to (independent) farmer's organizations (if available)**

In some countries, cooperatives or other independent farmers' organizations trade inputs and/or take part in policy discussions at the national level. If there are such organizations, ask representative(s) about seed and fertilizer supply, markets, and competition what they think about current seed and fertilizer regulations and whether they are involved in policy making processes and implementation.

**Prices and competition**

The world prices for fertilizers refer to spot prices in bulk. There can be huge gaps between world prices and domestic retail prices. For example, in early 2000, farmers in Malawi paid over US$ 300 per ton for urea fertilizer when the estimated cost to import fertilizer (FOB price of only $ 90 per ton plus transport, etc.) was about US$ 220 per ton, including dealer's profit. In many cases major gaps have to do with macro policies, exchange rate distortions, energy prices, interest rates, inflation, currency devaluation, trade barriers, taxes, subsidies and government distribution schemes. Traders will anticipate these factors and related policy risks. However, some of the price gaps can be attributed to regulations and related limited competition and lack of economies of scale. Important simple indicators of the overall functioning of the market are the ratio of retail prices and world prices for major products (e.g., urea, ammonium nitrate [AN], or diammonium phosphate [DAP]). The price ratio between nitrogen and grain is a very important variable to predict whether farmers can profitably utilize fertilizers. The ratio of N to grain prices should be smaller than 5.

On the other hand, for seeds simple price comparisons are often not so easy to interpret. Companies may charge more or less depending on how well the variety performs, i.e., its value to farmers. For seeds, the best single indicator of a working market is competition – the number of companies and varieties in the market. If there are enough importers and companies, competition takes care of prices. If not, then farmers risk not only high prices, but also lack of new technology, poor quality seeds, etc. Also the ratio of seed price to grain price may be meaningful both in the case of self pollinated and hybrid varieties.

It is important to be aware of possible animosity between public breeders and private companies after opening-up of markets. There may be complaints from public breeders that private companies do not multiply public varieties for sale. However, lack of interest on the part of private companies may reflect lack of interest among farmers. If farmers wanted seed of those varieties, there should be some evidence of effective market demand – e.g., high prices for whatever seed is available in formal or even informal markets. Also, for crops such as wheat and rice, farmers can produce their own seed. Abstract calculations about how much seed farmers “need” for public varieties are often out of touch with commercial reality. Hence, to find out how seed markets are working, it is best to focus most of the attention on availability of private varieties and seeds.
Annex 2. Selected Issues in Seed Law and Regulation

Around the world, the flow of new private seed technology has been expanding faster than public research and seed technology, and at the same time private research is increasingly aimed at multinational markets. If farmers in developing countries are going to have reliable access to the flow of new varieties and other seed technology from public and private research around the world, it is important to promote the development of competitive private seed industries with multiple links (imports, contracts, investments) to the world seed industry.

If seed markets are going to work – i.e., if farmers are going to be able to buy good seed for all crops – farmers need to see competitive seed markets with many small and medium companies, including local low-budget companies that produce seed for low value non-hybrid crops. The importance of small and medium local companies (many of which will have licenses with regional and other international companies) forces attention to liberal – vs. restrictive – regulations. If regulations do not set low barriers for small and medium local companies to enter and compete, then the seed market does not work. Competition will be weak, many crops will not be covered in commercial seed markets, many farmers will not be served. Small local companies are the key to competition. What works for small companies sets parameters on the task to design workable seed regulations.

Legislation dealing with seeds is normally packaged into (a) phytosanitary laws and subordinate regulations, (b) seed laws and subordinate regulations that address variety and seed quality and supply, and (c) laws establishing plant variety protection.

Section 1 discusses seed regulations to control environmental externalities and public health risks. Section 2 considers seed quality, varieties, supply, and other issues commonly addressed in a country’s seed law. Since property rights in varieties and agricultural biotechnology are normally dealt with in separate legislation, and since there are other public and private authorities active in debating and advising on the best regulatory approach in these areas, this paper omits further discussion of intellectual property rights. Similarly, the paper says little about biotechnology regulation.

Limiting Externalities and Public Health Risks

Limiting Phytosanitary Risks with Imported Seed

This is an area of seed regulation that is uncontroversial in basic design; problems come in implementation. According to common practice, laws empower some branch of the government – generally a part of Ministry of Agriculture (MOA) – to control seed imports so as to block import and introduction of plant pests and diseases. Some of the issues are:

Phytosanitary risks. In many countries, the law that allows an agency in the MOA to control seed imports for phytosanitary reasons also allows that agency to control seed imports for other reasons, including import of varieties, seed quality, and protecting domestic seed producers. Often, importers have no rights since the MOA has authority to make arbitrary decisions.

To develop rule of law and to ensure the most effective phytosanitary regime, it is important that controls on seed imports be focused as much as possible on phytosanitary issues. When there are too many controls (see discussion below on seed quality), seed companies, traders, and farmers will often smuggle seeds, evading phytosanitary as well as other controls.
Phytosanitary controls on quarantinable pests and diseases. Even when governments formally focus import controls on phytosanitary risks, implementation sometimes goes awry. In some cases, governments misuse phytosanitary controls to protect domestic seed producers against competition from imports (e.g., by raising objections to seed imports based on pests and diseases that are already present and/or do not pose any threat to the economy or biodiversity). The international seed industry addresses this issue by pressing for science-based controls, i.e., by asking phytosanitary officials to focus on quarantinable pests and diseases. The International Plant Protection Convention defines these as pests and diseases that are not already present in the country – or if present are not present in some parts of the country and are under internal quarantine control – and that could have significant economic or environmental impact. A number of inter-governmental organizations, including FAO's Interim Commission on Phytosanitary Measures (which supervises implementation of the International Plant Protection Convention [IPPC]), European and Mediterranean Plant Protection Organization (EPPO), and other regional organizations are part of ongoing efforts to improve the definition of science-based risks and to increase pressures for governments to limit import controls to identified risks. Along with these organizations and agreements that focus on seeds, the Sanitary and Phytosanitary Measures Agreement (SPS) provides a framework for countries to adopt science-based phytosanitary controls for all goods, including seed.

Regional cooperation. Countries with extensive and porous land borders can cut cost and inconvenience of phytosanitary controls and at the same time improve phytosanitary protection by cooperating to harmonize and enforce controls along natural external borders (oceans, mountains, and other natural barriers). This too calls for governments to work with and through international organizations. Rationalization of phytosanitary controls is an important aspect of regional efforts to create larger and more efficient seed markets (e.g., across Central and Eastern Europe, across sub-Saharan Africa). Often, organizations such as Southern Africa Development Community (SADC) are already in place and could play a role to rationalize regional phytosanitary controls, though they may not have done so to date.

Protecting Biodiversity

Limiting Damage from New Species. One of the classical challenges in regulating import of planting material is to block introduction of plants that might become damaging weeds. Water hyacinth in India and Africa is an example of a species – imported and introduced as an ornamental plant – that escaped and expanded in the wild to become a damaging weed. The common design for regulations to block such introductions is put all seeds (planting material) on the import control list and authorize one or more government offices to issue import permits. These offices can then list species and treatments allowed for import (with phytosanitary certificates), and require special permission for all other species not listed. Nurseries and botanical gardens may ask for permission to import and introduce a new ornamental plant or forest species. In deciding whether or not to approve such requests, one of the most important questions is whether or not the proposed introduction threatens indigenous species in the wild.

Risks with Gene Modified Organisms (GMOs, i.e., plants with genes from other species inserted through non-biological processes). According to many agricultural experts, GMOs have the ability to benefit people in developing and transition countries by boosting farm incomes, improving quantity and quality of food supplies, and reducing environmental and health problems by cutting pesticide use. However, many people – experts and others – are concerned about the risks associated with agricultural GMOs. Debate continues among others about the threat that GMOs may have for other plants, including especially wild relatives of species with bioengineered genes. Much of the scientific research on biotechnology's threat to the environment is driven by debates in OECD countries, which are also taking the lead in developing regulatory processes to deal with those risks. Debates are ongoing and a review of regulatory design options for GMOs goes beyond this paper.
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Limiting Public Health Risks from GMO Agricultural Products

This is a new area for regulation, driven by research developing bioengineered crops as well as public concerns that foods from those crops will contain new chemicals, such as allergens, that threaten public health. As above, regulatory options in this area are beyond the scope of this paper.

Promoting Seed Quality and Supply

The purpose of most seed laws (as distinct from seed-related phytosanitary, environmental, public health, and IPR regulations) is to promote seed quality and supply. Those who design seed laws address a variety of risks or worries about seed quality and supply and do so in different ways. A basic and non-controversial task for regulating seed quality is to enforce truth-in-labeling, which protects farmers from fraud. Aside from truth-in-labeling, there is no standard and agreed consensus design for other government regulations addressing seed quality – e.g., variety approval, certification, minimum standards, laboratory tests, etc. This is an area where discussion and debate may clarify good and bad points of different options. Design of regulations to protect domestic seed supply calls for critical thinking.

Limiting Fraud: Truth-in-Labeling at the Retail Level

In most market economies, commercial law mandates truthful labels and allows companies to register trademarks. Even without special seed legislation, these laws provide mechanisms for governments to prosecute fraud, and also provide a basis for customers and competing companies to ask for damages through civil suits. Seed laws and regulations can enhance the effectiveness of truth-in-labeling by: (i) listing information that must be on the label (company name and address, crop, variety, germination rate, testing date, expiration date, etc); (ii) assigning some agency of the MOA (call it the seed agency) to test seeds to determine whether or not they are truthfully labeled; and (iii) empowering the seed agency to administer fines (that are subject to court appeal).

In situations where truth-in-labeling is difficult to enforce and/or farmers are suspected to be slow learners, the option to back off from liberalization has its own problems. Current strategies for agricultural development for even the poorest countries depend heavily on technological change at the farm level. Current strategies also depend heavily on privatization of inputs delivery. In other words, our strategies depend on farmers getting more technological options and information and having more interaction with inputs markets. Considered in this context, if farmers have trouble getting and evaluating information about marketed inputs, they need help for this and we cannot really put a market oriented approach off by saying farmers don’t read labels, etc.

The enforcement of truth-in-labeling requires good definitions of violation in the regulations, such as misbranding, adulteration, short weight bags, deficiencies, or unsubstantiated claims. There is also a need to define sampling and inspection techniques, analytical methods and investigation allowances. Farmers need to have the opportunity to sue to recover losses (from false labeling or fraud). Important in each situation is what can be done to make the judicial process more accessible and efficient. Promoting competition is also very important, so that farmers can discipline bad companies by shifting their business to others.

Truth-in-labeling design issues

Should the seed agencies have the authority to break and enter or to interrupt seed trade? Some seed laws give the MOA’s seed inspectors authority to break and enter and to seize seed samples without a search warrant, and also give legal authority to the seed agency to force a company to stop seed sales on the basis of a suspected infraction, again without a judge’s order. Such authority may be excessive.
Giving an inspector authority to stop seed sales for several weeks on suspicion of an infraction gives him or her too much power vis-à-vis seed sellers. With such unbalanced regulations, there may be temptations for inspectors to demand bribes.

Should registering companies be responsible for packaged seeds? In some countries, the MOA’s seed agency registers seed companies (i.e., those responsible for seed labels). However, truth-in-labeling can operate without MOA registering companies, since one of the items of information demanded on the package may be the name and address of the individual or company responsible for packaging the seed and for the information on the label. Also, all companies (which are legal persons) would already be registered with other branches of the government, so that MOA and anyone else can in principle find any legitimate seed packager. And MOA’s registration provides no additional protection against the risk that anyone will package seed with a fraudulent name or address.

If MOA nevertheless wants to register seed companies, truth-in-labeling is satisfied by making the registration process low-cost and automatic, based on simple objective criteria (i.e., registration for tax purposes, permanent address) without expensive pre-conditions (e.g., ownership of seed processing and packaging equipment) and no room for any MOA official to make any subjective judgements about the fitness or capability of the company to produce seed. Complicated, subjective, or expensive criteria can be barriers to company entry.

Will it work when farmers are illiterate, uneducated, not experienced with competitive seed markets, etc? Many experts argue that illiterate farmers may be taken in by fancy packages, or that farmers cannot read and understand labels. Some of these concerns can be addressed by labeling rules, that do not allow claims that have not been proved (e.g., resistance to disease). Some risks remain, but alternatives that are putting trust in direct control by government officers, may be even more risky. The basic trust should be the skills of farmers and their ability to learn as individuals and as a group. Public efforts should focus on empowering them rather than taking decisions away from them.

Even in the poorest countries, illiterate farmers are skilled in their profession, trained from childhood to deal with natural risks as well as interpersonal agreements and negotiations. They may make mistakes, but to protect someone from a mistake – after giving them good information on a label – you have to second-guess them, assuming that you know better than they do what is in their best interest. For poor farmers who have strong incentives to make good decisions, we should be careful about recommendations to take choices away from them and to put those choices in the hands of someone who has no financial incentive to make good choices.

There are different ideas and attitudes about farmer judgement and ability to learn. Some studies show farmers not knowing things that we think they should. On the other hand, we often also find farmers doing things that experts advise against but which turn out to be sound when someone takes a close look. For example, farmers in Bangladesh have often used less phosphate and potash than advised; they know that yield response is low. Hence, assessing farmer knowledge, judgement and ability to learn may not be a straightforward matter.

Is a weak legal system an argument against relying on truth-in-labeling to ensure seed quality? In many developing countries, small farmers and small businesses have little or no access to the legal system. Many seed experts argue that under such conditions truth-in-labeling does not work, and that governments of such countries should therefore directly enforce additional explicit quality controls on seeds during production and/or trade. There are several weaknesses in these arguments:

a) When and if truth-in-labeling cannot be enforced at the retail level, there is no assurance that any additional seed quality controls will improve quality at the retail level. For example, government may
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demand that traders submit all commercial seed for tests in government laboratories before packaging to ensure that seeds meet standards stated on labels. However, if government cannot enforce truth-in-labeling, a company can package and market additional untested seeds (with or without lower quality). Government may enforce minimum quality standards on imported seed. This may keep low quality seed out, but it does not ensure a good final product since a seed company can mix good imported seed with lower quality domestic seed, allow quality to deteriorate before sale, etc. If truth-in-labeling cannot be enforced at the retail level government effort on quality control at any other level can be a waste.

b) Truth-in-labeling protects established companies (and farmers) from those who would fraudulently try to sell low quality under the name of an established seed company (in counterfeit packages). While farmers may not be able to initiate legal challenges, seed companies presumably can. Seed associations can be helpful to protect the interests of honest traders.

c) Seed companies -- and especially large companies -- are highly vulnerable to poor publicity, so that farmers that have evidence of mislabeled or poor seed do not have to go through courts to get attention and often compensation.

*Is it acceptable to sell unpackaged and unlabeled seed?* If regulations are going to be at all realistic, it is important not to ban all sale of unpacked and unlabeled seed, but some restrictions might be considered. If all seed had to be packaged and labeled, farmers would break the law selling seed to neighbors. Many seeds are not packaged (e.g., wheat or rice) but are rather sold in bulk. Truth-in-labeling regulations can ask that labels accompany such seed. Commercial seed dealers in developing and transition countries may collect seed for local vegetables, etc., from local seed-growers (under contract) and offer it in open bags. Regulations should allow this because it serves an existing market, farmers are familiar with risks over time, and the SME seed companies that do it are the backbone of the national seed industry. One option is to allow seed dealers to sell unlabeled seed for all but (a few) listed species. In many countries, seed dealers open bags or cans to sell seed in small lots. This too should be legal. Whether bags are open or closed, truth-in-labeling can apply if the seller presents the seed as associated with a label, and this applies to bulk wheat seed as well as vegetable seed from an opened can. Seed companies may increase confidence in their product by putting seed in smaller packages, so that farmers can choose sealed packages. Governments can also prohibit dealers from selling from opened packages, but this can be hard to enforce in practice, so that is becomes a pious wish that does not more than make existing and continuing trade illegal.

**Variety Controls**

Variety registration means that government records a description of the variety. The basic purpose of variety registration is to fix one name to one variety, so that farmers can be sure about what they are buying. Registration allows experts from a seed certification agency to identify the variety in the field and to certify the seed. The meaning of seed certification is that some licensed inspector certifies that seeds are of the variety that is named on the label. This is only possible if the variety is known and registered someplace.

It is not necessary for each country to process data to register a variety in order for the MOA to certify seed of that variety. A variety’s registration and description in other countries can be used, e.g. the EU Common Catalogue or OECD Seed Lists. Both of these lists provide information about where any MOA could get a description and even sample seeds for any listed variety, and that is sufficient for an MOA to be able to inspect seed plots and to certify that seeds are of the specified variety. It is common practice among countries that participate in OECD Seed Schemes to produce and certify seeds for export to another country where the variety is registered.
Many countries import expensive hybrid vegetable seed for varieties for which seed is never going to be produced in-country. For many such varieties, registration in producing countries, has no meaning for seed production and seed certification in those countries. Such high value vegetable hybrids are normally sold in the EU or anywhere else without certification.

Even though the logical and original sense of variety registration is to list varieties for which a seed agency is prepared to offer seed certification and to enforce truthful labeling, the practice of variety registration has in many countries gone beyond its link to seed certification and is widely associated with official decisions about whether or not seed of the variety is approved for sale. This in turn is often linked to official decisions about its performance or value in cultivation and use (VCU).

In many countries, governments list varieties for which seed sale is allowed. In most countries the list of registered varieties is the same as the list of allowed varieties. Some of these countries have additional minor lists of varieties allowed for seed or commodity production for export, but not domestic sale, etc. In other countries (e.g., Netherlands), variety registration alone does not allow seed sale, but is a precondition for government to make a separate decision about whether or not to allow seed for sale.

The subsequent discussion here focuses on whether or not variety registration should be compulsory. However, in cases where variety registration is compulsory, there are secondary decisions to make about what is necessary for registration, and if another decision is necessary for seed sale, what are the factors involved in that decision. When variety registration is compulsory, these secondary decisions can have an important impact on the liberal or illiberal character of seed regulations. Some of these secondary considerations are discussed as well.

Some seed experts use the term “variety release” to mean government approval of a variety for seed sale. This term introduces confusion into the discussion. According to common usage, variety release is a decision on the part of any breeding organization — private company, university, national research institute, etc. — to make a variety available for commercial production and sale. This has nothing to do with government decisions about whether or not to allow seed for sale, variety registration, PBR registration, etc.

In the US, India, Malaysia, and some other countries, variety registration is voluntary for all crops, which means that farmers look at new varieties in dozens or even hundreds of seed company test and demonstration plots and then company experts decide on the basis of expected farmer interest how much seed of what varieties to produce. In the US, government has no role in deciding what varieties are allowed to reach the market. In the EU, variety registration is compulsory for a list of major and minor field and pasture crops and vegetables. However, every EU country automatically accepts varieties registered by every other EU country (with rare exceptions). What this means is that even though an EU government (e.g., Spain) might go through the motions of testing and evaluating varieties, it nevertheless allows companies to sell seeds of all varieties approved throughout the EU, including even varieties that are not at all reasonable for the country. Seed companies, of course, are not going to offer the same varieties in Spain as they do in Sweden (even though laws allow them to do so), since a company could lose its reputation and market share if farmers see poor demonstrations or buy seed that does not perform.

Among developing countries, India’s and Zimbabwe’s seed laws, dating from 1966 and 1965, respectively, are designed for voluntary variety registration (though Zimbabwe shifted to compulsory variety registration for 11 species in 1993). However, during the 1990s, a large number of developing and transition countries (e.g., Albania, Bulgaria, Croatia, Ethiopia, Kyrgyzstan, Romania, Slovenia, Uganda, and many others) approved new seed laws with compulsory variety registration, often for all species. Some of these countries — e.g., Albania, Bulgaria, Romania — later amended these new but ill-designed laws to establish more open systems.
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In many developing and transition countries, recent debates about variety registration have focused on whether or not compulsory variety registration is desirable. Below attention will be given to advantages of voluntary and compulsory variety registration. However, this comparison may blur some of the most important questions. Tripp and Louwaars (1997: 106)\(^1\) argue that the choice between both may not be the most important one of the issues. Much will depend on how policies are implemented. Compulsory registration can be done in a transparent and efficient way or with high costs and biased against the private sector. In many cases compulsory registration is done through time consuming and expensive official in-country DUS and VCU tests. However, registration may be managed much differently. In Jordan, variety registration is compulsory for vegetables, but seed companies can do so by simply filling out a form and submitting it with a seed sample that is put in the freezer in case there is a later complaint that seed sold is not as described. The challenge in regulatory design is to work out a system that meets concerns and does so at least cost.

Drafting New Seed Regulations: Three Design Considerations For Variety Registration

1. Whether to allow voluntary variety registration for some or all species, i.e., whether to allow companies to sell seeds that are not of any registered variety (e.g., unregistered variety, landrace, mixed varieties or crops).

Advocates for voluntary variety registration make the following arguments:

(a) Voluntary variety registration minimizes barriers to entry for new varieties and companies, so that farmers have a wider choice of new varieties and a more competitive seed market. In countries with voluntary variety registration, companies do not have to spend time and money to seek registration. For small countries, minor crops, and low value non-hybrid seed, partnering and/or licensing through small and medium local companies is often the only way private foreign varieties are going to get into the country. Without this channel – which voluntary variety registration allows to operate – farmers may see only a small fraction of the varieties from national and international private and public breeding that could be useful.

Even when variety registration decisions are managed fairly and transparently, time and expense to put new varieties through official registration processes cuts potential profits and are likely to reduce the supply of varieties. For seed markets to be competitive and to cover all crops, field situations, and market opportunities, farmers across a country need access to a broad and deep flow of new varieties. Normally, each competing company offers multiple varieties (new, old, for different markets and farming situations, etc) for one or more crops. Many of these competing varieties will get no more than 1-3 percent of planted area, and will stay in the market for several years only before being replaced by newer and better varieties. For a relatively large seed market, e.g., hybrid maize in Zimbabwe, 1-3 percent of annual seed sales comes to about $300,000 – $900,000. For such markets seed companies have strong incentives to register new varieties. However, for minor crops – such as wheat in Zambia, for which 2-5 percent of seed sales comes to $2,500-$7,500 only – expected sales provide little incentive for private companies to pay fees and take time to register new varieties. Hence, registration processes and fees can very easily be obstacles to the supply of new varieties and crops and the development of competitive markets.

Voluntary variety registration allows companies to sell seeds for small markets, including varieties that suit specific processing or fresh market demands, varieties for minor agroclimatic zones, and

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varieties from participatory breeding programs. Farmers are not all interested in the same varieties. For example, organic farmers may want special varieties (e.g., old or new varieties selected with more emphasis on pest and disease resistance and less on fertilizer response and maximum possible yields). Other farmers may want special varieties for high value markets (e.g., tomato varieties for drying, potato varieties for chips). Also, some farmers may have peculiar agro-climatic conditions or cropping rotations that demand special varieties. If these special varieties are not available – and they may not be if planted area under any of these special crops is too small to interest any seed company to pay for variety registration – farmers may not be able to grow for special markets or to take advantage of local climate and cropping opportunities. Finally, voluntary variety registration allows farmers in participatory breeding programs (where farmers work with public breeders to guide breeding and to select lines for seed production) to produce seeds for sale without waiting until government officials have approved the variety, which undermines the logic of participatory breeding.

(b) Voluntary variety registration assists maintenance of genetic diversity by allowing companies to sell seeds of land races and antique and traditional varieties: If compulsory variety registration implies that all seed sold must be from some registered variety, landraces will disappear. Most land races are too heterogeneous (have too much genetic diversity) to meet conventional DUS criteria. Compulsory registration, therefore, may harm maintenance of biodiversity in situ, unless the Government prepares an exception for land races.

(c) Compulsory variety registration is often misused by public breeders to keep competing private varieties out. In countries with compulsory variety registration, government breeders can and do misuse compulsory variety registration to block introduction of competing private varieties. In Kenya, for example, the MOA dragged out trials and decisions for approving private maize hybrids for years to protect Kenyan Seed Company’s near-monopoly in hybrid maize seed. Something similar appears to be happening in Uganda. In many East and Central European transition countries, government breeders take advantage of compulsory variety registration to block introduction of EU varieties for wheat, sunflower, and other crops to protect seed sales for cash-strapped public research organizations. In Bangladesh, government scientists from 1990 have used compulsory variety registration to block introduction of varieties from non-Bangladesh sources, such as preferred jute varieties from India (which Bangladeshi farmers nevertheless plant on well over half of all jute area) and some early maturing rice varieties (that are widely evident in border districts with India, where farmers can get seeds). For many years, compulsory variety registration for hybrid maize in Malawi protected a near-monopoly for a formerly public but later private company by blocking or slowing introduction of hybrids from several excellent public and private breeding programs in Zambia and Zimbabwe.

(d) Voluntary variety registration allows competitive seed sale for public varieties: With voluntary variety registration, any company can multiply and sell seed of a public variety – old or new public variety from domestic or international breeding – without anyone’s approval. This allows multiple companies to compete in selling seed of the same public lines, which ensures that farmers get them at close to cost, with no monopoly mark-up. On the other hand, countries with compulsory variety registration usually do not allow seed sale – even for public varieties – unless someone pays for variety registration, and that company is then recognized as the maintainer (this is the practice in the EU and other countries). Unless the Government creates an exception the maintainer becomes de facto monopolist. In such cases, other companies and especially farmers may lose.

Advocates for compulsory variety make the following arguments:

a) **Compulsory registration provides transparency.** It prevents that different seed companies sell the same variety under different names. This may reduce some spurious choices that farmers face. With...
compulsory variety registration, farmers know that seeds with different variety names are different. They know what they are buying and in case they got mixed inferior seed it is easier and less costly for them to make legal claims for compensation. (The counter-argument is that if farmers value registration for this reason, this will create a market demand for registered seed, to which seed companies will respond by registering some seed voluntarily, while not restricting farmers’ choices to only registered seed.)

There are also objections against registration. Compulsory variety registration forces companies to not only describe their varieties to regulators, but also to disclose parentage, parent lines (for hybrids), etc. Companies may not be willing to disclose the parental lines for their hybrids, or the foreign source of their seed.

b) Compulsory variety registration make it easier for the Government to remove inappropriate varieties from the list: This argument supposes that public and private interests are not always the same. There may be reasons to block certain varieties (public as well as private) that appear to have undesirable characteristics in terms of quality or susceptibility to diseases.

2. If variety registration is compulsory for some species, what are those species?

The following paragraphs list and discuss major options in use:

a) A few of the most important species: In Bangladesh, seed regulatory reforms in 1990 reduced compulsory variety registration to five species only – rice, wheat, jute, sugarcane, and potatoes. 1996 reforms in Malawi left compulsory variety registration for hybrid maize and tobacco. In these two cases, reforms allow seed companies to operate freely in most crops, while regulating seed markets for several major crops.

b) All commercially significant agricultural seeds, including all field and pasture crops and all important vegetables. This is the pattern adopted in the EU. This allows companies to sell only seeds for flowers, fruit trees, and minor species without having to register varieties. Although the EU has compulsory variety registration for all important crops, there are three saving features: (1) the EU market is large, so that expected sales are sufficient to allow companies to deal with registration fees; (2) the EU has the financial and human resources to do the registration in a competent and efficient way, and (3) seeds can be registered in any of 15 countries, so that companies are not at the mercy of one government office in any one country that holds all the cards.

c) All species. This approach – which is found in some 1990s-vintage seed laws in transition and developing countries – is unworkable. For fruit trees, growing out trees for official evaluations may take many years, while markets opportunities depend on consumer demands for specific varieties. For many minor crops – e.g., flowers, shrubs, medicinal plants – value of production is low, so there is little risk of economic loss from low-performing varieties. Many of the varieties potentially interesting or useful for a country’s farmers and gardeners may not be registered anywhere in the world, and no one would be willing to pay the fees for official DUS and VCU tests to do so – or even fees for automatic registration without any official tests. Consumer satisfaction depends on factors that experts might not appreciate. When controls block legal seed trade, smuggling often emerges for high-value, low-volume flower and vegetable seeds. This not only undermines legal seed trade, but also weakens phytosanitary controls. Hence, government protection for fruit trees, flowers, ornamental shrubs, and other minor species is likely to do more harm than good.
3. On what basis does the government register a new variety?

Time and cost for a company to register a new variety varies according to regulations, as explained in the following paragraphs. Easy (near-automatic, fast, and low-cost) registration processes can be designed that will allow seed companies to introduce new varieties even with compulsory variety registration. This can solve most of the problems with compulsory variety registration even though perhaps the balance of costs and benefits remain subject to debate. Following are some options for registration processes, ranked generally from easier to harder:

a) Some countries allow automatic registration based on a company’s declaration or presentation of its own DUS data only (which could be from other countries). This approach makes sense when registration is associated exclusively with certification: the company tells the certification agency how to recognize the cultivar, which is what they need to know. There is no need for official DUS tests, since the company is the one that is hurt if the information is wrong (its seed cannot be certified).

Compulsory declaration, fits in well with truth-in-labeling. Any company that wants to introduce a new variety (often from imported seed), registers the variety with a description of its characteristics, and this declaration can be compared against the plants that farmers are able to grow.

b) Some countries allow automatic registration based on registration in other countries, without any further in-country DUS or VCU tests. This is the practice among EU countries. In 1997 Romania and in 1999 Bulgaria accepted automatic registration for all EU cultivars.

c) Detailed testing requirements and lengthy testing procedures may significantly increase the cost of compulsory registration and can easily become a burden for introduction of new varieties. The burden may be exacerbated by poor performance of the executing agencies. Many governments demand data from 1-3 years of in-country VCU tests -- and/or DUS tests and/or tests for disease resistance -- and then make a judgement to allow or not on the basis of those tests. In Turkey government accepts data from one year of VCU tests, allows companies to submit data from own tests, and registers about 90 percent of all candidate varieties. EU governments register new vegetable varieties (i.e., varieties that are not in the EU Common Catalogue) based on one year of official DUS tests only, without attention to VCU. For listed annual field crops, including pasture and forage crops, the EU asks for two years of DUS and VCU tests. In many other countries, the government requires 1-3 years of data from its own multi-location VCU tests (with companies asked to pay testing fees), and the approval process is non-transparent and unreliable, with a high percent of rejections. Commonly, governments ask a candidate variety to out-yield a popular variety. In evaluating candidate varieties, government officials may not value disease-resistance, performance in specific agroecological conditions, and special market characteristics (e.g., consumers may like cherry tomatoes, but if yields are lower than tomatoes for processing, government officials may not register them), and test plots may be too few and/or too poorly managed to be reliable.

Finally, in most if not all cases, registration involves payment of a fee that ranges from zero or a nominal amount for each variety in some countries to thousands of dollars per variety in other countries. This can be a significant barrier in itself if fees are high and if expected seed sales are not large (more likely with small seed companies, minor crops, small and poor countries, and non-hybrid seeds).

Laboratory Tests and Field Checks for Seed Quality

Another set of design issues for seed laws and regulations deals with quality of traded seed (e.g., percent germination, percent noxious weed seeds, percent other seeds, etc). There are several issues here: (a) Does government set minimum standards for germination and other laboratory criteria of seed quality? (b) Are official laboratory tests voluntary for all crops, compulsory for some crops only, or compulsory for all crops?
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(c) Is seed certification voluntary for all crops, compulsory for some crops only, or compulsory for all crops?
(d) Does government accredit (or license) private companies and experts to offer official laboratory tests and seed certification? and (e) Does government allow seed imports without repeating official laboratory tests and without certification from country of origin? The following paragraphs discuss arguments for and against these options.

Does government set minimum standards for seed quality from laboratory tests (e.g., rate of germination, percent of seeds of other species, percent of non-seed matter)?

Many if not most countries set compulsory minimum standards according to species, while others (e.g., US) allow companies to sell seeds with low germination and purity as long as they are truthfully labeled. Another option is to set minimum standards, but to make them voluntary, so that seed not meeting those standards can be clearly labeled and sold as sub-standard seed (e.g., Zimbabwe's seed regulations allow this practice).

Setting compulsory minimum standards does not affect most commercial seed sales, especially for larger companies, which often maintain their own higher standards in any case. However, minimum standards can create problems. For example, minimum germination standards may block introduction of an otherwise attractive variety with genetically-based low germination (e.g., super sweet maize); when such seed is truthfully-labeled for low germination, farmers can compensate with a higher seed rate. Another difficulty with compulsory minimum standards is that companies have trouble unloading treated seed for which germination has fallen below the minimum limit. If it cannot be sold as seed (truthfully labeled as sub-standard seed), and if it cannot be used for food or feed (because it has been treated), the company must destroy it. When companies are forced to absorb unnecessary losses on old seed, they adjust by producing less seed (increasing risks of shortages) and/or raising prices to cover losses. Finally, allowing sale of clearly labeled – substandard seed allows government to set somewhat higher standards without creating unnecessary problems for farmers and seed traders.

On the other hand, an argument for minimum standards is that farmers may buy seed without understanding truthfully labeled substandard seed.

Are official laboratory tests voluntary for all crops, compulsory for some crops, or compulsory for all?

In many countries, governments allow companies to sell seeds based on (unofficial) company laboratory tests, but offer official tests as a service that seed companies can buy. In others, governments demand that seed companies send samples of all seed lots (for some or all species) along with testing fees to official laboratories. Results from official lab tests determine whether or not seeds can be sold, and also determine information that goes on the label. Advocates for voluntary official tests point out that: (i) compulsory testing takes time and money which boosts seed prices; (ii) farmers might not value official tests, but there is no way to know whether that is the case if tests are compulsory; (iii) seed companies in competitive markets have strong market incentives to sell good quality seed and do their own tests to meet their own internal standards; (iv) systems with compulsory tests are subject to corruption and abuse, and may end up approving bad seed for a bribe or rejecting good seed for want of a bribe; (v) even good results from official tests provide no security that seed will be good at the retail level, since seed quality can be damaged through mixing, mishandling, time delay, bad storage, and other deliberate or accidental processes before seed reaches farmers.

On the other hand, advocates for compulsory official laboratory tests argue that legal systems may be too weak to enforce truth-in-labeling, so that process controls are necessary. As already argued, process controls are next to useless if truth-in-labeling cannot be enforced, since there are many opportunities for fraud and mishandling between compulsory laboratory tests and retail sales.
In countries that impose compulsory official laboratory tests, this is often limited to the same crops for which seed certification is compulsory. However, there are exceptions. For example, Malawi demands official laboratory tests for all commercial seeds produced in Malawi. Economic arguments for compulsory official tests weaken for crops with limited economic importance.

Is seed certification voluntary for all crops or compulsory for some crops, and if so, for what crops?

Seed certification is an assertion by an official agency that a specific lot of seed is of the variety that it claims to be. (Most official certification schemes also demand official laboratory tests for other quality indicators such as germination, but those issues, strictly speaking, go beyond certification). Seed certification requires that the variety be registered first, so there is a known variety against which to certify the seed (hence, compulsory seed certification for a crop depends on compulsory variety registration). To certify seed, an official field inspector must visit seed plots several times throughout the growing season. Just as for official laboratory tests, seed companies are normally required to pay a fee for seed certification. In many countries (e.g., US, India) seed certification is voluntary for all crops. In many other countries (e.g., EU, Malawi) seed certification is compulsory for some crops and voluntary for others. In the EU, for example, seed certification is compulsory for most field and pasture crops (species listed in EU Common Catalogues) but voluntary for all vegetables (including species in EU Common Catalogues) and other species. In Malawi, seed certification is compulsory for hybrid maize and tobacco only, and voluntary for all other crops.

Arguments for voluntary seed certification include all of the above arguments for voluntary variety registration (since compulsory seed certification makes it illegal to sell seed of unregistered varieties, including antique varieties, land races, etc, as already discussed). Other arguments for voluntary seed certification are similar to those for voluntary official laboratory tests:

(i) companies can do their own field checks and report varietal purity on labels;
(ii) companies in competitive markets have incentives to maintain high standards;
(iii) compulsory certification tempts officials to collect bribes;
(iv) farmers and companies might or might not value official seed certification, but there is no way to know that if it is compulsory;
(v) ensuring seed quality in production does not ensure seed quality at the retail level, since deliberate and accidental events can damage seed along the way.

Whatever arguments there may be for compulsory seed certification, the case rests on the assumption or assertion that compulsory certification for one or more crops improves seed quality, and that farmers are better off not having an option to choose uncertified seed.

Experience across countries shows that compulsory certification for a list of (major) crops is feasible, but as already discussed may have more drawbacks than benefits. Some countries demand seed certification for all species, which does not make any sense, since it entails compulsory variety registration for all species, which is unreasonable, and also demands government observation of seed plots for all species, including ornamental flower, etc. Also, most of the best vegetable seeds in the world are not available as certified seed, and companies that own the varieties would not cooperate in certification schemes, at least in part because parent lines are so valuable.
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**Does government accredit (license) private companies and inspectors to do official laboratory tests and seed certification?**

Whether official laboratory tests and seed certification are voluntary or compulsory, government can in either case insist on doing all official tests and field checks itself or accredit (license) private experts or companies to do some or all of them. In recent years, accreditation is becoming more common. ISTA, for example, has begun to work with private laboratories issuing ISTA certificates. Official certification agencies in South Africa and Zimbabwe allow private seed associations to test and certify seed.

Accreditation can facilitate competitive markets – allowing accredited seed companies to sell seed on the basis of their own quality assurances. However, with the wrong design it can also undermine competitive markets. For example, if the seed law requires official tests for seed sale, the government may shift responsibility for such tests to a private seed organization and suspends its own tests. This will only work satisfactorily if the empowered private seed organization has the obligation to do the tests for every interested party and cannot limit those tests to its members only. Otherwise this would create an oligopoly. Along the same lines, if government requires certification and/or official tests and accredits large companies to do their own field inspections and tests, but does not accredit small companies, who must continue to work with time-consuming and inefficient government agencies, accreditation can favor bigger companies over small ones.

Accreditation is gaining adherents in the seed industry. Furthermore, it is something to be encouraged, because it can give companies more options for necessary tests. However, for those who are interested in promoting a competitive private seed industry with small and medium local companies along with the big ones, accreditation should not be seen as an alternative to good regulations. Specifically, accreditation does not solve the problem that small companies have with compulsory seed certification and official laboratory tests. Some combination of accreditation and shift to voluntary certification and tests may be best for all companies – and for farmers.

**Does government demand in-country laboratory tests and/or seed certification from country of origin for all imported seed?**

A large share of the world's international seed trade is intra-company trade. In some cases, companies import unprocessed and unpacked seed, in other cases, packaged and labeled seeds. While phytosanitary controls are important for all international seed trade, developed countries commonly allow import of otherwise untested and unpacked seed and – for packaged seed – accept certification and/or laboratory tests from selected countries. Two treaty organizations – International Seed Testing Association (ISTA) and OECD Seed Schemes – have been established to set standards, respectively, for seed testing and seed certification for seed exports from member countries. Developed countries accept seeds with ISTA and OECD certificates without question. On the other hand, many developing countries limit seed import (except small quantities for research and tests) to certified seed and/or repeat laboratory tests in-country before allowing seed sale (even for seed with ISTA and OECD certificates).

While there are quality risks with imported seed, stringent and mandatory tests and controls on all seed imports may not be the best way to address them. Regulations and practices that allow companies to operate and at the same time allow governments to control phytosanitary risks and fraud include: (i) allowing seed import with phytosanitary controls only, without insisting that imported seeds meet any other quality standards; (ii) whenever official tests or certification are required for local seed sale, accepting ISTA laboratory tests and OECD seed certification as equivalent to in-country official tests and certification, so that imported seeds can move expeditiously into wholesale and retail trade, and (iii) negotiating bilateral and multilateral arrangements with regional or other partner countries for mutual reductions in seed trade barriers.
Whatever governments do to control seed trade at the border, truth-in-labeling at the retail level is necessary to ensure that problems do not develop between import and retail sales. Finally, most of the problems reported for imported seed in developing countries are associated with donor, government, and NGO seed import and distribution. In the short run, governments can address these problems through better administrative controls over public sector and NGO seed programs. In the long run, the solution is to encourage expansion of a competitive private seed industry, so that there are no longer opportunities or incentives for governments, donors, and NGOs to import and distribute second-class seed.

Whether or Not to License Seed Growers, Processors, and Traders

As part of efforts to ensure quality seed, many governments -- particularly those with a legacy of socialist management -- regulate who can be involved in seed production, processing, and trade. This approach to seed quality does not recognize or appreciate seed companies as the primary agents organizing and managing seed production and trade. In competitive markets, seed companies sell on the basis of a reputation earned over years for delivering good seed and product information. To do so, companies supervise contract farmers and wholesale and retail traders to ensure that they take good care of the company's seed.

In some countries -- e.g., Ethiopia, Bulgaria, Kyrgyzstan -- seed laws give MOA authority to register farmers allowed to grow seed on the basis of criteria such as equipment available, etc. Registering farmers allowed to grow seed limits the flexibility of seed companies to hire and fire contract farmers so as to enforce production of good quality seed at the lowest possible price. Government interference also carries a bias towards large mechanized farms, when experience with commercial seed production in India and other developing countries shows that small farms can compete. Government interference in deciding who is allowed to grow seed threatens to undermine production of quality seed, boost seed prices, and bias seed production toward large farms. If seed is to be certified, companies must tell the government the location of plots to be certified. Other than that, government does best to leave choice of seed growers to companies.

As already discussed, registering seed companies -- compiling a list of local companies responsible for labeling seeds -- may or may not be part of arrangements to enforce truth-in-labeling. To facilitate entry by small and medium local companies for maximum competition across all crops -- including non-hybrids with low potential for mark-up -- any licensing or registration process can set simple objective criteria (e.g., tax registration, permanent business address) and low fees.

In many countries, seed laws give MOA authority to register wholesale and retail seed traders. In other countries, such as Malawi, anyone with a general trade license from the Ministry of Commerce can handle seeds. Requiring all seed traders -- especially retail traders with low turnover -- to register with MOA is a barrier to entry that can be a significant obstacle to development of articulated trading networks that are able to give farmers convenient access to seed at competitive prices. In countries with emerging seed markets, existing retail stores might be willing to put some seeds on the shelf, but this might not be possible if it is illegal to sell any seed without applying and paying for an MOA permit. If seed companies are going to enforce good handling of their seed, they need to be able to hire and fire distributors and to pull their seed out of some retail stores and put it in others. All of this is constrained if they can only sell seed through traders with MOA permits. Also, new small and medium seed companies may have trouble establishing trading arrangements if they have to work through established traders, many of which may be tied up with larger established companies. Hence, MOA licensing of seed traders tends to reduce competition, threaten seed quality, and favor large and established seed companies.

If MOA does not want to drop all licensing for seed traders, an option is to set a minimum annual seed turnover below which seed traders do not have to register for MOA. This would allow competitive retail trade to expand with less difficulty into new markets.
Regulations for Seed and Fertilizer Markets

Regulating Seed Exports and Imports

This is another area where there are substantial differences among countries, based at least in part on prior socialist patterns in economic management. Seed security is the reason often given for seed export and import controls. For example, India controls seed exports for major cereal crops based on government decisions about whether or not there is enough seed for the domestic market. India also blocks onion seed exports to protect foreign markets for India's fresh onions, illustrating another reason sometimes used to block seed exports. Government of Zimbabwe, a major seed exporter in SADC, undermined its own seed industry several times in the 1990s by blocking seed exports (once to punish the industry for one company's fraud, and another time to ensure low cost seed for a government tender). Zimbabwe also demands that all seed exports have Orange International Certificates from official laboratory tests of seed analytic quality, even though the importer may not ask for such quality and proof. This demonstrates another reason sometimes given for export controls – to maintain a national reputation for quality seed. One of the most common government interventions in international seed trade is to block seed imports to protect domestic producers, and a major excuse for doing so is to maintain seed security.

One set of regulatory options to promote seed industry development and at the same time maintain or improve seed security is as follows: (a) allow seed exports without controls; (b) enforce science-based phytosanitary controls on seed imports; and (c) do away with all other non-tariff barriers on seed imports, leaving tariffs alone to deal with other concerns about domestic seed production, self-sufficiency, etc. The following arguments support this approach:

a) Seed export controls do not improve seed security. If a country is a consistent seed exporter for a crop, markets will automatically respond to any shortfall in domestic production at least in part by curbing exports, so domestic seed demand can be met even in bad years. Hence, promoting seed exports is one path to seed security.

b) Seed self-sufficiency is not reasonable for high value vegetable and other horticultural seed and is not important for non-hybrid seed that farmers can reproduce themselves if an external supply were to disappear overnight. Hence, for a large share of seeds, import controls do not reasonably contribute to seed and food security.

c) For many field crops, seed import controls are not necessary for most countries to maintain near-self-sufficiency in any case. Transport costs and costs to deal with phytosanitary controls encourage companies to produce seed in the country where it will be sold, and this is especially true for bulky and low-value seed (such as rice, wheat, potatoes, and cassava).

d) Where and when governments feel it is important to foster in-country seed production for seeds of important crops – e.g., hybrid maize, cotton, tobacco – it is better for farmers if the government does this through tariffs rather than through non-tariff barriers.

e) Promoting regional seed trade can also improve seed security for each country by getting more companies involved in each market. If one sub-region, country, company, or set of companies suffers setbacks from weather or wars, other companies are familiar with the market and may be able to make up any shortfall in seeds.

f) Non-tariff import and export barriers boost market prices for seeds by not allowing companies to shift surpluses between countries. In normal operations, companies sometimes overproduce and find themselves with excess seeds, while at the same time a sister company in a neighboring country might be in short supply. Export and import controls can make it difficult for seed companies to cut costs through
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regional coordination to balance production and sales. When companies cannot cut costs, farmers face higher seed prices.

Finally, some sensitivity is necessary to deal with seed import and export controls. A categorical approach for all countries and crops is not reasonable considering the potential for wars and other man-made and natural disasters to upset trading relations at short notice. Nevertheless, where government officials do not want to trust market signals driving private seed trade, they can be encouraged to break down their concerns on a crop-by-crop basis and to consider alternate strategies -- other than non-tariff barriers -- to meet their real concerns.

Overview of Choices for Seed Regulation

In design of new seed laws and regulations during the 1980s and 1990s, the major design features affecting farmer access to seeds and new seed technology at competitive prices have to do with decisions about whether or not to give farmers choices. One general strategy or design allows farmers to choose varieties and to choose the level of seed quality, emphasizing truth-in-labeling to ensure farmers get accurate information. Another general strategy or design limits farmers to only those varieties that government experts approve and only high quality seed – without any market mechanism to find out if those are the varieties and levels of seed quality that farmers really want to buy. There are also many midpoints and choices to be made about which crops are subject to which controls.

Over the last 15 years, FAO has promoted Quality Declared Seed through some of its publications and discussions as an option for developing countries that are not able to “introduce and sustain satisfactory seed quality control schemes.” In this scheme, governments observe a sample of seed-producing fields and test a sample of seed lots for a selected companies and a limited list of varieties for major crops. The scheme focuses on activities rather than regulations, proposing a program for MOA and seed certification agencies to work with seed companies. Taken in that vein, FAO’s scheme for Quality Declared Seed could work with voluntary variety registration, voluntary seed certification, and truth-in-labeling (but could also work with other regulations). In countries with a mix of multinational and local seed companies, a program for Quality Declared Seed could work with local seed companies that want some support to enhance seed quality and farmer confidence.

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Annex 3. Harmonization Issues and Options

Seed supply is better and more secure across a region when companies are (a) able to introduce the same varieties in multiple countries without barriers; and (b) able to move seeds from one country to another. Bigger markets allow them to introduce more varieties and to cut production costs along with storage volumes and costs. With more varieties and larger markets, competing companies can better compensate for short-term upsets in one country – from floods, droughts, etc – by moving seed from other regional markets. This can be done with little or no government direction as companies respond to market shortages and opportunities.

Larger Markets Improve Farmer Access to Technology and Seeds

Total population – not rural population or planted area – is a good indicator of the potential value of a national or regional seed market (see Table A3.1). Within the large markets listed in Table A3.1, varieties move freely. No officials decide whether or not a variety planted in one part of the market can be sold in another and seeds can also move freely, except for some relatively rare intra-market phytosanitary controls.

Larger markets allow more seed companies to spend more to breed, test, and introduce new varieties. Some high value seeds such as hybrid maize generate sufficient profits to attract and support competing seed companies even in small markets. For example, Malawi, with a hybrid maize market of roughly 5,000-8,000 tons worth about $6-10 million, has hybrids from four competing companies – Monsanto, Zamseed, Seed Co, and Pannar – as well as public research.

However, for relatively low value non-hybrid seeds for millet, rice, sugar beans, and other secondary crops, small markets severely limit what seed companies can afford to spend to test and introduce new varieties (which are often available at low cost from public or private breeding in another country with similar latitude and agro-ecological conditions). For example, farmers in Malawi plant 40,000 hectares of rice. With a seed rate of 40 kg/ha, a seed price of $ 600 per ton, and farmers buying new seed every five years, annual sales could reach 300 tons worth $180,000. If a new rice variety is very successful and reaches 10 percent of Malawi’s market for five years, total sales over five years would come to $ 90,000 only – most of which pays for seed production, so that only a small amount is available to pay for testing, demonstrating, and dealing with government regulations. If a variety for a crop with low value seeds such as rice can be sold in a larger regional market without additional national regulatory barriers and related costs, more seed companies can enter, and they can also afford to breed, test, and introduce more new varieties.

While large seed markets give farmers access to competition and choice, farmers in many countries with small seed markets see no more than a handful of companies bringing seeds to the market. Often, there may be only one company for a major crop such as maize, while for minor crops or non-hybrid seeds, farmers may not be able to find any commercial seed. However, farmers in small countries do not have to settle for lack of competition and choice in seed markets. Around the world, we can see many small countries with seed regulations and policies that join their relatively small national seed markets into larger markets.
Table A3.1. Large Unified Seed Markets in the World

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Annual seed sales($m)</th>
<th>Population ($m)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU</td>
<td>6,500</td>
<td>350</td>
<td>The EU controls variety introduction with 1-2 years of official tests for about 70 species of field, pasture, and vegetable crops. The harm caused by this barrier to variety entry is off-set by large sales and profits possible in the huge unified EU seed market.</td>
</tr>
<tr>
<td>US</td>
<td>4,500</td>
<td>250</td>
<td>The US does not control variety introduction. Varieties can move freely into the US from any other country. Phytosanitary rules focus on pests not found in the US that present an economic threat.</td>
</tr>
<tr>
<td>China</td>
<td>2,500</td>
<td>1,100</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>2,500</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>1,200</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>900</td>
<td>1,000</td>
<td>India allows seed sale without attention to varieties for all crops. Companies import and introduce foreign varieties for vegetables, maize, sunflower, and coarse grains without official tests and approvals. However, import controls block foreign seeds and germplasm for many other crops. Phytosanitary and other controls often obstruct seed imports.</td>
</tr>
<tr>
<td>All others</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>23,500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Annual seed sales are from Cultivar, May 1998, with a few additions and adjustments.

* Liberalization vs Harmonization to Gain Access to a Larger Seed Market *

One way to move from a small national to a much larger regional or international seed market is to simply reduce barriers to varieties and seeds moving into the country from anywhere. With this strategy, a government allows companies to introduce varieties without regulatory interference (i.e., without requiring official approval) and to import seeds with science-based phytosanitary controls only. Examples:

- Australia links into the world seed market by allowing variety introduction from anywhere without government control. Phytosanitary controls on seed imports are science-based (but in practice may be excessive at times). Australia has a large and competitive seed industry that is well-linked to the world seed industry and thereby gives farmers access to the best seed technology in the world;
Regulations for Seed and Fertilizer Markets

- Romania (from 1997) and Bulgaria (from 1999) revised seed laws and regulations to allow automatic approval for all varieties in EU Common Catalogues. In the short time since Romania adopted this new policy, major European-based seed companies have established a presence in the market, companies have introduced many new varieties for a wide range of crops, and Romania’s seed exports to the EU have boomed. Closer links to the EU seed industry helped to achieve this;

- Other former socialist countries including Albania and Croatia are considering proposals to adjust national regulations to give their farmers access to EU varieties and seeds as well as varieties and seeds from other regional countries.

A related strategy is to create new unified but still limited markets through reciprocal agreements among multiple countries. With harmonization, countries focus on reducing barriers to movement of varieties and seeds among countries in a region. Examples (see table A3.2):

- The EU is the oldest and best example of countries harmonizing seed regulations to allow variety and seed movement. Varieties and seeds move across the EU with little regard for borders. Within the EU, we can see some specialization among countries in seed production. For example, France produces about 80 percent of EU maize seed, while the Netherlands produces over two-thirds of EU potato seed. However, across all crops, national seed production tends to follow national seed sales. For example, French seed imports are less than 20 percent of total seed sales (domestic and exports), while seed exports account for about 25 percent of total sales;

- From early 2000, agriculture ministers from six Central American countries – Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama – agreed to adjust regulations to create a regional seed market for five crops – rice, field beans, soy beans, maize, and sorghum. Ministers agreed: (a) to accept common certification standards; (b) to streamline phytosanitary controls to focus on science-based concerns; (c) to introduce PVP (plant variety production); and (d) to cooperate to approve new varieties for seed sale in all five countries based on regional tests;

- A number of seed harmonization schemes are under discussion, including six countries in Mercosur, four SADC countries, and three ASARECA countries.

Countries that reduce barriers to variety and seed movement across a region may or may not maintain barriers with other world markets. For example, before allowing seed sale for about 70 species of field, pasture, and vegetable crops, the EU asks for two years of DUS (distinctiveness, uniformity, and stability) and VCU (value in cultivation and use) tests for listed field and pasture crops, and one year of DUS tests for listed vegetable species. On the other hand, the six countries in Central America ask for information on performance from one year of breeder’s own data before official decisions to allow seed sale for new varieties, and this control applies to a short list of field crops only.

The impact of harmonization on seed trade depends heavily on the cumulative size of the harmonized market relative to the pre-harmonization situation. The larger the new unified market, the bigger will be the impact in favor of new entry for companies and varieties. Table A3.2 gives some rough figures about post-harmonization market size in five harmonization initiatives. A unified Mercosur seed market jumps to third in the world behind the US and EU markets. On the other hand, the Central American market – with estimated annual seed sales of $5 million only – is small even after harmonization. Current initiatives in ASARECA and SADC fall in the middle.
Table A3.2 Existing and Prospective Harmonized Seed Markets

<table>
<thead>
<tr>
<th>Countries/Region</th>
<th>Annual seed sales ($m)</th>
<th>Pop'n ($m)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU (15 countries)</td>
<td>$ 7,000</td>
<td>350</td>
<td>The unified seed market is several decades old.</td>
</tr>
<tr>
<td>Central America (Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama)</td>
<td>$ 5</td>
<td></td>
<td>New from early 2000</td>
</tr>
<tr>
<td>Mercosur (Argentina, Bolivia, Brazil, Chile, Paraguay, Uruguay)</td>
<td>$ 2,500</td>
<td>400</td>
<td>Under discussion from 1999</td>
</tr>
<tr>
<td>SADC (Malawi, Mozambique, Zambia, Zimbabwe)</td>
<td>$ 85</td>
<td>60</td>
<td>Under discussion from 1999</td>
</tr>
<tr>
<td>ASARECA (Kenya, Tanzania, Uganda)</td>
<td>$ 35</td>
<td>80</td>
<td>Under discussion from 1999</td>
</tr>
</tbody>
</table>

Source: Author’s estimates.

If harmonization alone does not create a large enough unified market for a competitive modern seed industry with dozens of competing companies, liberalization either alone or in conjunction with harmonization may be necessary for farmers to realize the gains -- more varieties, better seed, and lower prices -- from a large and competitive seed market.

What Seed Regulations to Harmonize and Options to Do So

Variety registration and/or approval (i.e., allowing seed sale for a variety)

Many governments control variety introduction for one or more species. Often, countries in a region that are considering to harmonize regulations to facilitate larger regional seed markets will have big differences in variety controls. Some may not control varieties for any crop, while others may control varieties for all crops or for 10 crops, etc. Time for testing and difficulty of getting a variety through the approval process may also vary greatly across neighboring countries.

One of the basic tasks to create a regional market is to make it easier for varieties sold in one country to be sold also in others. Some options that have been proposed are:

- If a country has been operating without variety controls for the crop (e.g., Malawi does not control groundnut varieties) shifting to a regional list could be a step away from liberalization if it means that Malawi no longer accepts all groundnut varieties. One way to avoid this outcome is for countries that do not initially list varieties for a crop to continue to accept all varieties, whether or not other countries in the region limit themselves to listed varieties.

- How do varieties enter the common list? In the EU, any variety approved by any government (with a few rare exceptions) goes on the common list and is legal in all other EU countries without further tests. Among Kenya, Uganda, and Tanzania, the rule that seems to be evolving from recent discussions is that varieties must be separately approved by all three governments to go on a common
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list. This means that the cost and effort to enter the common list may still be high. Another option is to arrange for a multi-country official organization (e.g., SADC) to test and/or approve varieties for a common list.

- If countries are going to accept varieties that have gone through official tests and approval processes in other countries, then there is some logic for countries to agree on what is involved. For example, the EU might want to know how Poland tests and approves varieties before accepting them into the EU Common Catalogues.

- An option under discussion for a regional list is to approve varieties according to agro-ecological zones. While this may seem at first glance to make some sense, such controls are rare. Most countries – even those that control variety introduction – allow companies and farmers to choose where to sell and plant them. Hence, the option seems to be to approve or not, without trying to tie them to specific agro-ecological zones. A recommended list, however, may indicate for which agro-ecological conditions varieties are well-performing.

- Among all of the options, the best is to allow companies to sell seeds of new varieties based on their own tests and evaluations, with possibly the requirement to make test results publicly available. A second best option is for countries to agree on regional lists for a few major crops only, and for those crops to accept into the list all varieties approved in any one regional country (as in the EU). When regional markets are small (e.g., seed sales in Central America’s regional market are only $5 million, compared to $7 billion in the EU), it is important to limit variety controls and lists, even regional lists, to as few crops as possible.

Phytosanitary controls

Unlike variety controls, this is an area where farmers and seed companies clearly have something to gain from governments getting together. For companies trading seeds, one of the common problems with phytosanitary controls is that governments use them to block seed imports when seed-borne pests and diseases either: (i) are already present and uncontrolled on seeds in the importing country, so that importing infected seeds adds no threat; or (ii) do not pose an economic or environmental threat. When companies cannot supply seed from the lowest-cost source and cannot move seed from surplus to short markets, companies face higher costs and farmers pay more for seed.

Through regional meetings, phytosanitary officials can pare the list of pests and diseases to control on seeds in regional trade to those that: (i) exist in some of the countries but not in others; and (ii) represent an economic threat. When this is done, seeds for many crops can be moved from one to another country without phytosanitary certificates, while seeds for other crops may be traded with phytosanitary controls for a reduced list of realistic threats.

Another aspect of harmonizing phytosanitary barriers can and should be to strengthen barriers in regional countries to a minimum standard, which protects all farmers in the region. Considering the porosity of many land borders in the developing world, for example, governments cannot realistically protect farmers from seed-borne pests and diseases that get into neighboring countries. It is in the interests of all that extra-regional seed-borne pests and diseases do not get into any regional country, because from that point it may be only a matter of time before they spread throughout the region.
Seed quality controls

According to the World Trade Organization, imports must be accorded equal treatment to locally produced goods. In other words, imported seed cannot be subjected to more stringent quality controls than locally produced seeds.

Options to harmonize seed quality controls to facilitate seed trade are as follows:

- The easiest solution is for regional countries to agree to allow commercial sale of truthfully labeled seed for most if not all crops, without compulsory minimum standards and with voluntary certification. This would allow companies to produce for multiple markets at once and to move excess stocks without any difficulties. Voluntary certification is unavoidable for vegetable seeds if countries want access to the best seeds in the world (certification is voluntary for EU vegetable seeds).

- The next easiest solution would be to agree to allow commercial sale of truthfully labeled seeds that meet minimum laboratory standards (germination and purity), allowing companies to do their own tests. Standards could be set according to existing ISTA and/or OECD rules, for crops where those rules exist.

- Many countries in the region have mandatory certification for one or more crops. Even where certification is voluntary, certification may be linked to credit, NGO tenders, etc., so seed companies may be interested to certify seeds for some regional markets. If so, seed markets would be larger (and seeds would tend to be cheaper) if countries would accept each other’s certified seed. For several major crops, including hybrid maize, more than 50 countries around the world already agree on certification standards through OECD Seed Schemes. Hence, those are the obvious standards for regional countries to endorse.

The best solution may be to agree on: (i) information that must be on the seed package, so that truth-in-labeling is uniform across the region; (ii) certification standards, but leave open the question of whether or not certification is required for commercial seed; (iii) seed quality standards (i.e., germination, purity), but leave open the question of whether or not these standards are compulsory and whether or not official tests are required; and (iv) unrestricted movement of seeds among regional countries based on phytosanitary controls only, so that seed companies can grow, process, and package seeds across the region without attention to borders.
### Annex 4. Contributors to the Study

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