



ELSEVIER

Food Policy 28 (2003) 317–333

**FOOD
POLICY**

www.elsevier.com/locate/foodpol

Looking beyond national boundaries: regional harmonization of seed policies, laws and regulations

D.D. Rohrbach^{a,*}, I.J. Minde^b, J. Howard^c

^a *International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), P.O. Box 776, Bulawayo, Zimbabwe*

^b *Eastern and Central Africa Programme for Agricultural Policy Analysis (ECAPAPA), P.O. Box 765, Entebbe, Uganda*

^c *Department of Agricultural Economics, Michigan State University, East Lansing, MI 48824, USA*

Abstract

Countries in West, Eastern and Southern Africa are pursuing the regional harmonization of their seed laws and regulations. Common regulatory frameworks are expected to reduce the costs of trading seed and encourage scale economies in seed production. As a result, commercial seed production is expected to expand, providing farmers with improved access to new varieties and stimulating productivity growth. The impact of these harmonization efforts will depend on the details of the regulatory agreements. Policy-makers are being asked to consider a complicated series of trade-offs between stricter measures for quality control and the need to encourage the multiplication and distribution of lower-cost seed. They are also being confronted with two possible views of sectoral development. One view entails the pursuit of better linkages between distinct national seed markets. The second involves the development of truly regionalized seed markets, where seed can be readily produced in one country and sold in any other country. This implies greater regional interdependence of seed supply. The paper compares the harmonization agreements being pursued in each of the three African regions and progress in implementing the accords. Efforts to adapt international seed market standards to the contingencies of African markets are discussed and priorities for further policy analysis are identified.

© 2003 Elsevier Ltd. All rights reserved.

Keywords: Seeds; Regulatory framework; Harmonization; Regional markets; Africa

* Corresponding author. Tel.: +263-83-8311; fax: +263-83-8253.

E-mail address: d.rohrbach@cgiar.org (D.D. Rohrbach).

Introduction

Cereal grain yields in Sub-Saharan Africa have increased at an average annual rate of less than 0.2% since 1980 (FAO, 2003). One reason for this dismal record is the limited development of commercial seed markets. Less than 10% of the seed planted in Africa is purchased from the formal market each year (FAO, 1998a; Cromwell, 1997). Most farmers still do not have access to commercially processed seed at a nearby retail outlet. Many released varieties have never been widely disseminated (Rohrbach et al., 2001).

African governments have been encouraged to liberalize their seed markets in order to stimulate private investment in seed supply (Gisselquist and Van der Meer, 2001; Gisselquist and Srivastava, 1997). During the past ten years, many African governments have opened their seed markets to investment by private companies. Barriers to entry are being reduced, and parastatal seed companies are being commercialized (Rusike and Eicher, 1997). In 1998, the Africa Seed Trade Association (AFSTA) was established.

As an additional step in creating an enabling environment for private investment, many African countries are now considering harmonizing their seed laws and regulations with those of neighboring countries. The establishment of common regulatory structures is expected to reduce transactions costs and promote increased germplasm exchange and trade. This paper outlines the rationale for harmonization, describes key regulatory issues, and assesses the progress to date in West, East, and Southern Africa.

These regional discussions of seed policies and regulatory standards are likely to continue for several more years. Priorities for further policy analysis that could significantly contribute to this process are identified.

Why pursue harmonization?

Africa's commercial seed sector is small by global standards. Less than US\$500 million of seed is traded on national and regional markets in the Sub-Saharan region (FAO, 1998b). This is less than two percent of the estimated levels of international seed trade. Approximately one-half of this is traded in the countries of Southern Africa. South Africa alone annually accounts for about US\$150 million of commercial seed sales. Annual seed sales in Kenya and Zimbabwe are respectively estimated at US\$100 million and US\$30 million (International Seed Federation, 2003). Commercial seed trade in most of West Africa is much more limited (Sow, 2002).

Furthermore, most of this trade occurs among a narrow range of seed crops. Most international seed companies concentrate on the development and sale of maize hybrids. In larger markets, such as in South Africa, Kenya and Zimbabwe, retail seed trade exists for cash crops such as sunflower, cotton, soybean, wheat and vegetables. However, commercial trade remains limited for many staple food

crops including sorghum, pearl millet, groundnut, pigeonpea, cowpea, beans and rice.

The low levels of private investment in seed production and marketing result, in part, from historical government controls on the market (Rusike and Eicher, 1997). During the colonial and post-colonial period, seed multiplication and distribution was commonly organized under government auspices. The public sector either took direct responsibility for seed provision, or held a commercial interest in a national seed company. Little competition was allowed. In much of Sub-Saharan Africa, private investment in seed production and sales has only recently begun to expand.

However, the rate of investment growth continues to be limited by several factors. First, uncertainty persists about levels of consumer demand for seed. This is reinforced by continuing episodes of public intervention in the market (Tripp and Rohrbach, 2001). Governments and non-governmental organizations (NGOs) still commonly purchase and distribute significant quantities of seed for relief and development purposes. Many NGOs are also involved in establishing community seed production projects. Such interventions increase the variability of seed sales, and discourage investments in the development of rural retail markets.

Market uncertainty is heightened by large differences in regulatory standards between countries. For example, all maize seed sold in Zimbabwe or exported from Zimbabwe must be certified. But quality-declared maize seed may be sold in Zambia and Tanzania, and common-grade maize may be sold in Mozambique (Gwarazimba, 2001; Faculty of Agronomy and Forestry Engineering, 2001; AGRICAT Training and Consultancy Services, 2000). Further, these regulations tend to be relaxed in response to the demands of emergency programs. Following the 1991/92 drought in Southern Africa, Zimbabwe, Malawi and Namibia each allowed the sale of seed of unregistered varieties (Friis-Hanson and Rohrbach, 1993).

Commercial interest in the sale of open- and self-pollinated seed varieties is further limited by the belief that farmers will not return to the market to purchase new seed once they have access to a given variety (McCarter, personal communication, 1996). Such access is commonly gained via the concessionary distribution of seed through relief and development programs. Farmers then continue to obtain these varieties by utilizing seed saved from the previous year's harvest.

In this context, the harmonization of seed regulations is viewed as a means to promote economies of scale in seed supply by encouraging more regionalized seed production and sale. In addition, harmonization is expected to reduce market uncertainty. Common market rules and standards are expected to improve the quality, speed and timeliness of both commercial and emergency seed supply. Even incentives to produce open- or self-pollinated seed varieties will improve if specific varieties can be readily sold in several different countries. Greater investment in commercial seed production, and greater competition in seed supply, are expected to lower the cost of seed to farmers.

Progress differs across regions

The harmonization discussions in East, Southern and West Africa each targeted the expansion of seed production and trade, but the scope and orientation of these discussions differed in each region. In East Africa, emphasis has been placed on reducing non-tariff barriers to trade, complementing the reduction of tariffs mandated under the re-established East African Community (EAC) (Ngugi, 2002). In Southern Africa, harmonization has been treated as one component of a wider seed sector development agenda. Emphasis has been placed on strengthening trade in order to improve seed security (Rohrbach et al., 2002). In West Africa, the establishment and clarification of national seed regulations has been as important as harmonization. Such differences in starting points and priorities underlying these discussions have brought varied results.

*Eastern Africa*¹

In 1996, members of the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) expressed concern about the difficulties faced in transferring germplasm across national borders. Such transfers were essential for the successful establishment of regional crop breeding networks. In response, ASARECA applied for a grant from the United States Agency for International Development (USAID) to support a series of meetings and workshops aiming to harmonize seed policies and regulations in the region. The initial focus was Kenya, Tanzania and Uganda.

The three East African countries started with the practical advantage of having a similar set of seed laws and regulations established during the original East African Community (ECAPAPA, 2002). Efforts to harmonize these regulations were reinforced by the political commitment to free trade underlying efforts to re-establish this Community (EAC, 1999).

ASARECA first organized national meetings to review local seed policies with public and private sector representatives, and discuss negotiating positions. Two major regional meetings then provided a forum for working out specific harmonization agreements (ECAPAPA, 2002). The combination of government backing and preparatory work meant that participants (comprising high-level officials in government and private sector) in the regional meetings held a mandate to negotiate a formal regional agreement. Rather than debating the need for harmonization, the regional meetings concentrated on working out technical agreements on specific regulatory procedures and standards.

To date, harmonization agreements have been reached on variety release procedures, plant property rights, certification standards, phytosanitary standards and trade documentation. Some of these agreements are already being implemented.

ASARECA encouraged other countries in Eastern Africa to send representatives to the regional seed meetings of the EAC countries. These “second tier” countries

¹ This section draws heavily on Ngugi (2002).

are now considering acceptance of one or more of the regulatory agreements negotiated among the EAC countries. Similarly, ASARECA has encouraged countries needing to draft new seed legislation to first consider the models offered by their neighbors. Thus, broader harmonization of seed regulations may be achieved over time.

*Southern Africa*²

Harmonization discussions in Southern Africa have had a longer history and broader focus than those in East Africa. The need for harmonization was first proposed in a regional review of seed system development strategies implemented under the auspices of the Food Security Technical and Administrative Unit (FSTAU) of the Southern African Development Coordination Conference (SADCC) in 1987 (Danagro, 1987). Over the next fifteen years, harmonization issues were considered in at least eleven regional meetings and five national workshops. Workshop debates were wide-ranging, often placing greater emphasis on seed production and distribution strategies than regulatory frameworks. One working group might consider regulatory issues of seed certification, phytosanitary standards or property rights while others considered problems of seed security and community seed production.

Between 2000 and 2001, these efforts were more narrowly focused under the World Bank's Sub-Saharan Africa Seed Initiative (SSASI). Similar to the strategy used in East Africa, the harmonization of seed laws and regulations was initially targeted in four countries—Malawi, Mozambique, Zambia and Zimbabwe. A review of national seed policies was followed by a discussion of opportunities to pursue common regulatory strategies. It was expected that this initiative would be expanded over time to the remaining SADC³ countries (Zulu and Lemonius, 2000).

As a result of the SSASI project, and the groundwork laid by previous regional discussions, broad agreements were reached by key regional stakeholders from the public and private sectors on more than 30 recommendations for regulatory reform (Lemonius, 2001). In effect, commitments were made to pursue more specific harmonization efforts relating to variety release procedures, variety registration, seed certification, phytosanitary regulations, and trade documentation. However, the means by which such agreements would be crafted was uncertain.

In 2002, regional stakeholders agreed that the newly established SADC Seed Security Network would organize three sets of technical meetings to draft specific agreements relating to (a) variety release and registration procedures, (b) phytosanitary standards and procedures and (c) seed certification requirements (Zulu, personal communication, 2003). Stakeholders across the full set of 14 SADC countries will be asked to comment on these proposals. The technical agreements will then be presented to the SADC Council of Ministers of Agriculture for formal endorsement.

² This section draws heavily on Rohrbach et al. (2002).

³ SADCC transformed itself into the Southern African Development Community (SADC) in 1992.

West Africa⁴

In West Africa, the seed harmonization debate has a more recent, though diffuse, history. Interest in seed policy issues was stimulated by a 1998 FAO-sponsored conference in Abidjan targeting a generic review of seed policies and programs for Sub-Saharan Africa. The meeting recommended the establishment of an African Seed Network to coordinate programs for strengthening seed systems in the region (FAO, 1998b). The meeting also proposed the establishment of a continent-wide Working Group on Harmonization of Seed Rules and Regulations, though this never met.

Issues of West African seed policy and harmonization were next discussed in a March 2001 meeting organized by the *Institut du Sahel* (INSAH) of the *Comité Permanent Inter Etats de Lutte Contre la Sécheresse dans le Sahel* (CILSS). CILSS was particularly interested in encouraging easier movement of new varieties for testing across borders. The discussions resulted in an agreement to establish a regional catalog of West African varieties, and develop common criteria for variety registration across the nine CILSS countries (FAO, 2002). CILSS has also agreed to pursue the harmonization of phytosanitary standards.

The harmonization of national seed regulations was specifically proposed to facilitate the movement of rice seed from Senegal to Mauritania (Sow, 2002). In the past, single seed lots were often subjected to overlapping inspections by both countries. A joint association of seed professionals was created in 2001 to harmonize the two countries' quality control regulations. These negotiations are still underway.

Two additional initiatives are also studying harmonization opportunities in the region. FAO convened a meeting on the status of harmonization of seed rules and regulations in West Africa in March 2002 (FAO, 2002). A commissioned report found that only four of nine countries had enacted seed laws, though a few other countries had seed regulations (FAO, 2002). As a next step, the meeting agreed to analyze the prospects for harmonizing seed regulations across three countries: Senegal, Nigeria and Cameroon.

In November 2002, a related workshop was organized by AFSTA, the International Fertilizer Development Center, and the United States Department of Agriculture to discuss the harmonization of seed and fertilizer regulations in a different set of six West African countries: Nigeria, Togo, Benin, Ghana, Mali and Burkina Faso (ATRIP, 2002). This grouping also agreed to start by reviewing seed regulations in the six target countries.

Regulatory issues

A starting point of many of these discussions has been the need to meet internationally accepted standards for commercial seed trade (Condon, 1997).

⁴ This section draws heavily on Sow (2002).

Correspondingly, African countries have been called upon to adopt plant variety protection consistent with the International Union for the Protection of New Varieties of Plants (UPOV) conventions, and to bring national legislation into conformity with the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement. African countries are also encouraged to join the International Seed Testing Association (ISTA) certification programs, and the International Plant Protection Convention (IPPC). Countries would correspondingly be expected to adopt internationally accepted certification, phytosanitary and plant quarantine standards.

Most African stakeholders seem to agree with the objectives of establishing clear plant property rights, phytosanitary standards and seed quality standards. But a key question is whether the international standards set by UPOV, ISTA and the IPPC, which are viewed as ideal guidelines for trade on the formal, commercial market, are practical to implement across Sub-Saharan Africa. This is a critical issue because the capacity of regulatory institutes to implement stricter standards remains limited, and because the growth of regional seed markets depends on keeping seed costs relatively low. Cheaper seed of adequate quality may be more marketable than costly seed of high quality. Relaxed standards are also more practical for supporting emergency seed supply programs.

Variety release and registration

In many African countries, a variety cannot be commercially marketed unless it first appears on a national registration list. To get on the list, the variety must be unique and offer acceptable performance under local agricultural conditions.

Seed companies most commonly complain about the slow speed and lack of transparency of variety release. Some countries require at least three years of data from on-farm trials run by the national research service, even if this variety has already been released in a neighboring country with a similar agro-ecology. Even then, the criteria used by the Variety Release Committee to assess a variety for release may be uncertain or subjectively applied.

The harmonization discussions have considered a wide range of proposals for making the process of variety release more transparent, including proposals for greater uniformity in release committee membership and procedure, and for including greater participation by public and private stakeholders in the release process, such as considering privately generated data in addition to data from public research trials.

Seed companies are also interested in pursuing multi-country variety releases. East and West Africa have started compiling regional variety lists. The EAC countries have agreed to encourage multi-country release by mandating that national release committees consider only one additional year of national performance trial data if a variety has already been released in another country. The regional discussions in Southern Africa have gone a step further by agreeing to consider the option of multi-country release based on regional crop performance data (Zulu, personal communication, December, 2002).

Few debate the need to establish a legal framework for plant breeders' rights as required under the World Trade Organization. The UPOV standards are acknowledged to be appropriate. The main point of discussion is how to recognize farmers' rights to varieties. The Model Law of the Organization of African Unity (OAU, 2000) has been widely discussed as a framework for recognizing farmers' rights. But uncertainty about the boundaries for such rights limits their codification and application.

Phytosanitary controls

The lists of quarantinable pests and diseases vary substantially across neighboring countries, partly because pest risk assessments are expensive and infrequently conducted. Few countries monitor changes in pest incidence over time. As a result, national phytosanitary lists include pests and diseases that are either regionally endemic, or of little economic significance.

Agreements have been reached to harmonize phytosanitary standards in each of the three regions. This includes the development of common lists of quarantinable pests and diseases. A key question is how much data is required to make decisions about pest risks. The implementation of new risk assessments in each country would be both expensive and time consuming. This problem has been resolved in East Africa by gathering national plant protection scientists together with a few international experts on phytosanitary controls. This led to a quick agreement to reduce the number of quarantinable pests on a common regional list from 33 to 3.

The second problem area is concern about inconsistent inspection procedures. Stakeholders have agreed to establish common inspection and quarantine procedures, but development funding may be required to build national capacities to implement these agreements. The government of South Africa has agreed to review phytosanitary facilities and procedures for Southern African countries and provide comparative reference testing across laboratories in the region.

Seed certification

Regulatory authorities view one of their main missions as the protection of the quality of seed supplies being sold or distributed to small-scale farmers. Certification regulations provide minimum standards of genetic purity, physical purity and germination. These are expensive, and therefore difficult to implement. If large quantities of seed are being produced in a small area, inspection costs are manageable. But if seed production is dispersed across widely distributed groups of small-scale farmers, inspection costs quickly become prohibitive. The more seed crops and varieties that need to be certified, the more expensive the inspection process. Countries have responded to these difficulties by relaxing their inspection requirements. Stricter certification standards are demanded for a few more commercialized seed crops. Countries have also adopted multiple seed classes, complementing the standards for certified seed with those for quality-declared seed (FAO, 1993), or common-grade seed. This reduces the burden of inspections. But the growing

complexity of standards increases uncertainty about what standards should be (or have been) applied to any given seed lot.

The harmonization discussions in East and Southern Africa resulted in agreement to pursue a common seed nomenclature and single set of definitions of different seed classes. This includes the identification of common field and laboratory standards for inspection. Agreement has also been reached in East Africa requiring internationally traded seed of a few major commercial crops to be certified.

Genetically Modified Organisms (GMOs)

Regional discussions of regulatory harmonization have not debated the advantages and disadvantages of GMOs. Most scientists seem to accept GMOs as an inevitable product of advances in biotechnology. Instead, the regional discussions have called for the establishment of common sets of biosafety regulations.

Marketing rules⁵

Establishing and registering a seed company is now a relatively simple process in most countries. Since market liberalization began in the late 1980s, the number of seed companies operating in both East and Southern Africa has increased. Parastatal seed companies have been commercialized, a number of international seed companies have opened offices in several countries, and many smaller, local companies have been formed.

Similarly, tariff barriers no longer pose a significant constraint to trade. Seed is traded free of charge under the SADC Free Trade Agreement, the COMESA agreement, the East African Community Treaty, and in the Union Economique et Monetaire Ouest Africaine (UEMOA) region of West Africa.

Seed companies involved in trade between countries complain most about the complexity of documentation required for seed exports and imports. Phytosanitary inspections may be required by both the exporting and the importing country. Some countries require export permits, and most also require import permits. Bank documents confirming the transaction value and payments need to be linked with customs paperwork and certification papers. The collection of all this documentation can take substantial time and effort. One Zimbabwean trader reported that it took up to six months to complete an individual trade transaction (Kelley, personal communication, 2002).

Some argue that the main problem is the inefficiency of regulatory and customs authorities, rather than the strictness of procedures per se. This has led to calls for the establishment of “one-stop shops” to facilitate seed trade paperwork. Negotiators in East Africa have agreed to standardize the documentation for seed export and import across the three countries of the EAC.

⁵ This section draws from the results of ICRISAT surveys of seed companies conducted in 2002. Most interviews took place in Southern Africa.

Finally, seed companies have expressed concern about political decisions to restrict seed exports in order to protect domestic seed security. In 2002, Zimbabwe issued a temporary ban on seed exports in response to the previous season's drought. This threatened the sales of several companies that had used this country as a seed production base. While such export bans do not appear to be common in Africa, the prospect of trade restrictions highlights a key risk underlying dependence on international trade for national seed stocks.

Harmonization and seed sector development

Agreements to pursue the harmonization of seed laws and regulations have been relatively easy to reach in all three regions of Sub-Saharan Africa. A brief outline of the agreements reached by the end of 2002 is provided in Table 1. East Africa has made the greatest progress in implementing these agreements. The countries of Southern Africa have committed themselves to developing more specific protocols for variety release, phytosanitary controls and quality standards in 2003. Less progress has been made in West Africa.

It is too early to judge the impacts of harmonization, even in East Africa. However, it is possible to hypothesize that the future development of seed markets in each region may depend on how two key sets of regulatory issues are resolved. First, the degree to which national seed markets in each region will be coordinated remains unclear. Second, there are likely to be lingering questions about market development for open- and self-pollinated seed crops of lesser interest to the commercial sector.

Regionalized markets

Recent analyses of the impacts of seed market liberalization by Pray et al. (2001), Gisselquist and Grether (2000), and Gisselquist and Pray (1997), suggest that the reduction of barriers to entry can stimulate growth in the number of seed companies, the number of varieties released and the quantities of seed being sold. Complementary improvements are estimated in the productivity of crop production. These gains are readily apparent in larger national markets, but can still only be hypothesized for regional markets.

Regional gains depend on whether harmonization allows companies to treat regional markets as a unit. This in turn depends critically on the prospects for multi-country or regionalized variety release. If the harmonization of release procedures still allows national constituencies to maintain barriers to the release and sale of competing varieties, the regional market will remain fragmented. If harmonization encourages a shift toward a regionalized release process, then scale economies will be readily available. Negotiators in East Africa have moved a step toward regionalized release by calling for only one additional year of national data to justify release in a second country. Stakeholders in Southern Africa are still debating the merits of harmonized release procedures versus a common regional release process.

Table 1
Summary of recommended changes in seed regulations

Regulation	East Africa ^a	Southern Africa ^b	West Africa ^c
Variety release	Release committee should consider only one additional year of national data for release of a variety already released in a neighboring country. Establish standardized variety performance trials procedures.	Compulsory registration only required for grain crops. Clear guidelines on data requirements. Consider variety information from any source. Technical committee to develop guidelines for a harmonized system of variety registration. Data from another country should be considered.	n/a
Variety registration and plant property rights	Develop regional variety catalog. All countries should have plant breeders rights legislation. Farmers rights to be considered.	All countries should have plant breeders rights legislation. Farmers rights may be considered.	Develop regional variety catalog.
Genetically modified organisms	Establish harmonized bio-safety regulations.	Develop guidelines for the introduction of GMOs including biosafety regulations.	
Phytosanitary standards	Adopt FAO pest risk analysis procedures and complete assessments in all countries. Establish a common regional list of quarantinable pests. Reduce the number of quarantinable pests for regional seed movement from 33 to 3. All countries should join International Pest Protection Convention.	Harmonize and simplify plant quarantine regulations. Participate in International Plant Protection Convention. Conduct pest assessments in each country.	Harmonize, simplify phytosanitary procedures and regulations.

(continued on next page)

Table 1 (continued)

Regulation	East Africa ^a	Southern Africa ^b	West Africa ^c
Seed certification	Accredit private agencies and institutions to carry out certification on behalf of National Seed Certification Agencies. Identify limited set of crops for compulsory certification. Establish common field and laboratory standards. Establish three seed classes. Establish common accreditation procedures and criteria.	Seed certification should be recommended for most crops, required only for a few. Maintain minimum quality and labeling standards. Further develop, recognize non-certified seed class. Introduce common terminology, procedures and standards for various classes of certified and non-certified seed. All countries should be ISTA members and participate in relevant OECD seed schemes. Simplify import procedures by establishing a one-stop shop for clearances. Rationalize trade procedures to speed the process. Establish common quality criteria for traded seed.	n/a
Import and export procedures	Standardize documentation required in accordance with IPPC model. Develop common documentation to govern import and experimentation with living modified organisms. Streamline processing and issuing of trade seed documentation including import, phytosanitary permits.		n/a
Market entry for seed companies	Not considered a barrier.	NGOs should report their activities to the national seed service.	
Other regulatory issues	Establish uniform tariff as per EAC treaty.	National seed center should monitor, not restrict, seed trade and strengthen databases. Public sector should multiply varieties of limited interest to the private sector.	

^a Ngugi, 2002.^b Lemonijs, 2001.^c Sow, 2002.

While this debate continues, seed companies are already moving to promote multi-country release of their varieties. The Seed Company of Zimbabwe has a number of maize varieties that have been released in two or more countries. Many of the open- and self-pollinated varieties developed collaboratively by national research institutes and international agricultural research centers are being released in more than one country. The sorghum variety *Macia*, for example, has been released in five countries in Southern Africa, but at least 10 additional years of research trials were necessary between the first and latest release (Maredia et al., 2003). Long lags between releases of the same variety in neighboring countries inhibit commercial multiplication and slow adoption.

The value of regionalized markets is also apparent in the pattern of national and regional dependence on seed trade following seasons of significant flooding or drought. Generally, the sudden demand for seed stocks to be allocated to relief programs far out-strips national supplies. Companies and countries turn to the regional market in search of seed of acceptable quality. Competition for these stocks drives up prices, and leads to the introduction of seed of uncertain origin. Harmonized seed markets and liberalized trade between countries can encourage the maintenance of larger stocks in anticipation of regional sale. If linked with a program of regional variety release, the likelihood increases that varieties adapted to the drought or flood affected area will be found. Ultimately, a regional seed information system can link national seed stocks with commercial and relief related trade opportunities across a given region. Countries must remain willing, however, to compete for regional seed stocks when supplies are limited.

Thus, the biological justification for regionalized release is apparent in the growing evidence of variety spillovers between various countries. The economic justification is apparent in the opportunity to reduce research costs and speed rates of adoption. The political question is whether countries are willing to (a) allow open competition between national crop breeding programs, (b) trust one another's data justifying any given release, and (c) accept the risks of interdependent seed markets. This includes the willingness to compete for regional seed stocks when supplies are limited by flooding or drought.

Stimulating trade in open-pollinated varieties

Questions also remain about the possible impacts of harmonization on the breadth of seed system development. Will the existence of economies of scale obtainable from regionalizing seed markets encourage greater commercial interest in the multiplication and sale of seed for many open- and self-pollinated varieties? And will the opportunity to sell seed more easily on a regional basis bias investment away from the extension of retail trading channels in the rural market?

In recent years, the market for seed of open- and self-pollinated varieties has been strongest in relief programs. The consistency of these relief programs in East and Southern Africa has encouraged a few larger seed companies to sell open-pollinated varieties of crops common to relief programs such as sorghum, pearl millet,

groundnut and cowpea. Some smaller seed companies have also been established in pursuit of this lucrative trade.

A large advantage of the regionalized market is that it allows companies dealing in open- and self-pollinated varieties to sell seed in a shifting array of markets. The same varieties of sorghum or pearl millet seed may be sold to different countries each year depending on the distribution of drought. If this market is consistent enough, investment in the distribution of new varieties may expand.

However, historical sales to relief programs have not contributed to the development of retail markets for seed. Retailers hold little incentive to stock improved seed if, in any given year, governments or NGOs are distributing this free of charge in nearby villages. Farmers, similarly, face limited incentive to purchase seed if they expect to obtain this through a relief or development program.

Public investment in promoting the development of retail trade in rural markets may ultimately prove necessary to strengthen commercial sales of open- and self-pollinated varieties. Rather than periodically buying up most seed stocks and handing seed out for free, research and extension services can use demonstration trials to encourage sales in rural markets. Just as information about farmer preferences for alternative varieties is now commonly collected when considering varieties for release, preference data may be presented to seed companies to encourage investments in expanding seed trade.

Regulatory authorities similarly need to consider how their standards and procedures may affect the costs of seed. Zambia and Tanzania have adopted quality-declared seed standards in order to allow cheaper production of seed. Mozambique allows the sale of common-grade seed. However, the countries of the East African Community have been reluctant to support trade of non-certified seed. Ultimately, truth in labeling may contribute more to the development of rural markets than insistence on stricter quality standards. But greater public investment will then be necessary to monitor the quality of seed sold on the retail market.

Conclusions

On-going efforts to regionally harmonize seed laws and regulations may profoundly affect seed sector development in Sub-Saharan Africa. Up to now, the region's seed markets have remained small and highly fragmented. Varieties are separately released in each country, and international sales are inhibited by variable sets of phytosanitary controls, quality standards, and requirements for trade documentation.

Stakeholders in each of the three Sub-Saharan regions appear committed to harmonization. However, the ultimate extent of market integration is still being negotiated. Important trade-offs appear between harmonizing national procedures for variety release and the option of regionalized variety release. Agreements are easier to reach about the need for common quality standards, than about what these standards should be. Similarly, in two of the three regions, commitments to establish common phytosanitary lists still need to be translated into practice. And

agreements to establish common bio-safety regulations mask significant disagreements about the risks of GMOs.

Seed quality standards commonly applied in the industrialized world are being adapted to meet local market requirements. More liberal standards are being considered in order to stimulate broader multiplication and dissemination of new varieties. But policymakers remain concerned about the risks of liberalized standards. Larger complementary investments are sought in order to strengthen national regulatory capacities, if only to improve confidence in the implementation of agreed-upon standards.

The East African countries are farthest ahead in achieving harmonization agreements and implementing them. This process has benefited from the coordination of discussions by a respected regional organization, ASARECA, and on-going engagement with the private sector. Perhaps more importantly, the heads of the EAC endorsed the need for harmonization at an early stage of these discussions. The level of political support for harmonizing seed laws and regulations has been less certain in West and Southern Africa. These initiatives have also been more dependent on a shifting array of donor initiatives.

Regional visions of seed market development are still evolving. Efforts to reduce non-tariff barriers to seed trade are viewed as a means to reduce trading costs, and improve regional seed security. But larger benefits may still be derived from the pursuit of greater regional interdependence in seed supply and sale. Seed companies have expressed strong interest in the prospect of regional variety release, or registration without a formal release. In addition, it may prove cost-effective to regionalize certain research and regulatory functions that are currently carried out by individual countries. These include the monitoring of pests and diseases, and perhaps the development of GMOs. Ultimately, most crop breeding research may be more efficiently pursued on a regional, rather than a national basis. But questions remain about the degree to which countries will accept such interdependence. Will they accept the prospect of competition for regional seed stocks? Will they accept market risks associated with political disagreements or conflict?

In many respects, this process of harmonization represents a series of policy experiments. Numerous questions persist about the likely impacts of these reforms. Will harmonization and regionalized seed markets open the door to domination by a few international seed companies? Will multi-country or regionalized release narrow the germplasm base, reducing agro-biodiversity and increasing risks of catastrophic losses due to insect pests and diseases? Will economies of scale truly be found for open- and self-pollinated seed crops? Will seed trade expand in the rural market? Will farmers face a higher risk of receiving poor quality seed packaged in countries with weaker regulatory authorities? Will greater openness in seed trade enhance or reduce seed security? Monitoring systems need to be set into place in order to gather the data necessary to answer such questions and characterize the performance of these evolving markets.

References

- AGRICAT Training and Consultancy Services, 2000. Seed Compendium of Zambia. Consultancy report prepared for Ministry of Agriculture Food and Fisheries. Mimeo.
- ATRIP, 2002. <http://www.afamin.net/regionalenglish/atripsymp.htm>.
- Condon, M., 1997. Recommendations to increase the flow of new seed technology to farmers in developing countries. In *Easing barriers to movement of plant varieties for agricultural development*. World Bank Discussion Paper No. 367. Edited by Gisselquist and Srivastava, 1997, pp. 23–25.
- Cromwell, E., 1997. Local-level seed activities: opportunities and challenges for regulatory frameworks. In: Tripp, R. (Ed.), *New Seed and Old Laws: Regulatory Reform and the Diversification of National Seed Systems*. Intermediate Technology Publications, London, pp. 214–230.
- Danagro, 1987. Southern African Development Coordination Conference (SADCC) Regional Seed Production and Supply Project. Main Report Vol 1B. Unpublished report. SADCC, Gaborone, Botswana.
- East African Community, 1999. The Treaty. OAU Treaty Registration No. 001/2000. East African Community, Arusha, Tanzania.
- ECAPAPA (Eastern and Central Africa Programme for Agricultural Policy Analysis), 2002. Harmonization of Seed Policies and Regulations in Eastern Africa: Results and Agreements. ECAPAPA Monograph Series 4. Entebbe, Uganda.
- Faculty of Agronomy and Forestry Engineering, 2001. Characterization of the Present Situation of the Seed Sector in Mozambique. First Draft for Evaluation and Comments. Unpublished report. Eduardo Mondlane University, Maputo, Mozambique.
- FAO (Food and Agriculture Organization of the United Nations), 1993. Quality-declared Seed: Technical guidelines for standards and procedures. FAO Plant Production and Protection Paper 117. FAO, Rome.
- FAO, 1998a. Proceedings of Regional Technical Meeting on Promotion of Regional Network for On-Farm Seed Production and Seed Security in SADC Countries. Maseru, Lesotho. 23–26 September, 1997. Vol. 1: Technical and Administrative Arrangements, Meeting Sessions and Recommendations. Food and Agriculture Organization of the United Nations, Rome.
- FAO, 1998b. Seed policy and programmes for Sub-Saharan Africa: proceedings of the Regional Technical Meeting on Seed Policy and Programmes for Sub-Saharan Africa, Abidjan, Côte d'Ivoire, 23–27 November 1998. Unpublished report. Food and Agriculture Organization of the United Nations Rome.
- FAO, 2002. African seed network: Regional workshop on the harmonization of seed rules and regulations in West and Central Africa. Dakar, Senegal, 25–26 March 2002. Unpublished report. Food and Agriculture Organization of the United Nations, Rome.
- FAO, 2003. FAOSTAT. <http://apps.fao.org/>.
- Friis-Hansen, E., Rohrbach, D., 1993. Impact assessment of the SADC/ICRISAT drought relief emergency production of sorghum and pearl millet seed. ICRISAT Southern and Eastern Africa Program, Working Paper Number 1. ICRISAT, Bulawayo.
- Gisselquist, D., Pray, C. 1997. The Impact of Turkey's 1980s Seed Regulatory Reform. In *Easing barriers to movement of plant varieties for agricultural development*. World Bank Discussion Paper No. 367. Edited by Gisselquist and Srivastava (1997), 113–131.
- Gisselquist, D., Srivastava, J. (Eds.), 1997. *Easing Barriers to Movement of Plant Varieties for Agricultural Development*. World Bank Discussion Paper 367. The World Bank, Washington, D.C.
- Gisselquist, D., Grether, J., 2000. An argument for deregulating the transfer of agricultural technologies to developing countries. *The World Bank Economic Review* 14 (1), 111–127.
- Gisselquist, D., Van der Meer, C., 2001. Regulations for Seed and Fertilizer Markets: A Good Practice Guide for Policymakers. Rural Development Working Paper. The World Bank, Washington, D.C.
- Gwarazimba, V.E., 2001. Status of Seed Industry: Zimbabwe. Preliminary report 2. Unpublished report. SSASI, Washington, DC.
- International Seed Federation, 2003. <http://www.worldseed.org>

- Lemonius, M., 2001. Sub-Saharan Africa Seed Initiative: Sub-Regional Action Plan in Southern Africa. Regional Strategy Document, First Revision: Malawi, Mozambique, Zambia, Zimbabwe. Unpublished report. SSASI, Washington, D.C.
- Maredia, M., Rohrbach, D., Mgonja, M., 2003. Justification for Regionalized Breeding and Variety Registration. Paper prepared for a Workshop on Impacts of Seed Trade Liberalization on Access to and Exchange of Agro-Biodiversity, 5–6 December 2002. ICRISAT, Bulawayo, Zimbabwe.
- Ngugi, D., 2002. Harmonization of Seed Policies and Regulations in Eastern Africa. Unpublished report. ICRISAT, Bulawayo, Zimbabwe.
- OAU (Organization of African Unity), 2000. African Model Legislation for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resource. http://www.bradford.ac.uk/~acad/sbtwc/btwc/nat_imp/model_laws/oau-model-law.pdf.
- Pray, C.E., Ramaswami, B., Kelley, T., 2001. The impact of economic reforms on R&D by the Indian seed industry. *Food Policy* 26, 587–598.
- Rohrbach, D.D., Howard, J., Zulu, E., 2002. Harmonization of seed laws and regulations in Southern Africa. Unpublished report. ICRISAT, Bulawayo, Zimbabwe.
- Rohrbach, D. D., Low, J., Cucu, A., Massingue, J., Boughton, D., Rafael, G., Paulo, A., Jocene, D., 2001. Investment priorities for the development of Mozambique's seed system. Research Report No 44E. Directorate of Economics Research Paper Series. Maputo: Ministry of Agriculture and Rural Development, Mozambique.
- Rusike, J., Eicher, C.K., 1997. Institutional innovations in the maize seed industry. In: Byerlee, D., Eicher, C.K. (Eds.), *Africa's Emerging Maize Revolution*. Lynne Rienner, Boulder, Colorado, pp. 173–192.
- Sow, M., 2002. Status report on the processes of liberalization and harmonization of seed legislation and regulations in West and Central Africa. Unpublished report ICRISAT, Bulawayo, Zimbabwe.
- Tripp, R., Rohrbach, D.D., 2001. Policies for African seed enterprise development. *Food Policy* 26, 147–161.
- Zulu, E., Lemonius, M., 2000. Initiative for Sustainable Seed Supply Systems in Africa: Sub-Regional Action Plan in Southern Africa. Joint SCCI/COWI Follow-up Mission, 19 July–3 August 2000. Unpublished mission report. Sub-Saharan Africa Seed Initiative (SSASI), Washington, DC.