

STATE OF THE EVIDENCE: SEED POLICY REFORM

INTRODUCTION

High-quality improved seed is essential to achieving the higher yields necessary to feed the world's population and reduce rural poverty. Studies have shown that a one percent increase in agricultural yields can reduce the number of people living in poverty by 0.83 percent, and a one percent increase in per capita agricultural output can increase the incomes of the bottom quintile of the population by 1.61 percent.¹ In addition to increasing yields, improved seed varieties can be adapted to deliver better nutrition and greater resilience to the impacts of climate change. These impacts demonstrate the critical importance of improved seed to achieving the goals of the US Feed the Future initiative.

Accomplishing these objectives requires the development of strong seed systems capable of delivering new high-performing varieties to farmers – not just once but a regular flow of new technologies year after year. While yields per hectare have steadily increased in much of Asia, Latin America, and the Middle East, they have stagnated in Africa. To match the yields found in other developing regions, farmers in Africa will need to adopt new varieties on 10-20 percent of the planted area each year, which equates to an average of three to six new varieties per crop per year.² Across Sub-Saharan Africa, countries currently average less than one new variety released per year across all food crops.³

The domestic policy and institutional environment has a strong impact on the ability of domestic and regional seed trade to meet the needs of farmers for improved seed. A recent survey by the World Bank found that differences in domestic policies account for close to 50 percent of the variation in improved input usage at the household level in Africa, even where biophysical, demographic, and socioeconomic variables within the region are similar.⁴

This paper incorporates findings and lessons learned from cumulative work of the USAID Enabling Agricultural Trade (EAT) project as well as recent evidence from research institutions, international organizations, and think tanks to evaluate the “state of the evidence” on the legal, regulatory, and institutional factors that influence the rate of introduction of new seed varieties. The brief concludes with recommendations for further research into new approaches to seed policy reform.

EVALUATING THE EVIDENCE

The government's role in promoting a strong seed industry includes regulatory functions such as registration of seed companies and retailers, assurance of seed quality, protection against pests and plant diseases, regulation of competition, and control of fraud and deception in the marketplace. Governments may also encourage investment in the industry through infrastructure improvements or granting intellectual property rights to seed breeders.

¹ UK Department for International Development, *Growth and Poverty Reduction: The Role of Agriculture* (December 2005) (citing 2001 and 1997 studies, respectively). {<http://dfid-agriculture-consultation.nri.org/launchpapers/roleofagriculture.pdf>}

² Gisselquist, D., C. Pray, L. Nagarajan, & D. Spielman, “An Obstacle to Africa's Green Revolution: Too Few New Varieties,” SSRN Working Paper (May 2013) (Gisselquist et al. (2013)).

³ Ibid, see tables 3 and 4. Note that South Africa and, to a limited extent, Nigeria are the exceptions.

⁴ Sheahan, M., and Barrett, C.B., “Understanding the Agricultural input Landscape in Sub-Saharan Africa: Recent Plot, Household, and Community-Level Evidence,” World Bank Policy Research Working Paper 7014 (August 2014).

While the broad policy goals of a seed regulatory system are fairly widely accepted, the regulatory mechanisms for achieving these goals can vary substantially. Seed regulatory systems can be robust and serve the farming population well and still have substantial differences. The United States (US) and the European Union (EU), which have the most sophisticated seed industries in the world, follow very different models for regulation of the industry. In practice, most country seed systems fall broadly within either the US or EU model.

Comparing Seed Regulatory Models: United States vs. European Union		
	<u>United States</u>	<u>European Union</u>
Registration of seed companies, contract farmers:	Not required, although individual states may have requirements	Required, but based on minimum criteria
Variety Registration:	Voluntary	Mandatory: 2 years of VCU and DUS tests for field crops; 1 year of DUS for vegetables
Seed Certification:	Voluntary, although the owner of the variety can make certification required	Mandatory for field crops; voluntary for vegetable seed
Developing economies adopting this model:	South Africa, India, Bangladesh, Pakistan, the Philippines, Guatemala, Nepal ⁵	Turkey, Ukraine, much of Sub-Saharan Africa

Sources: USAID-AGP-AMDe Project, *Comparative Analysis of Ethiopia's 2013 Seed Proclamation and Draft Seed Regulations* (October 2013); World Bank, *Enabling the Business of Agriculture 2015: Progress Report (2014)* (World Bank, EBA Progress Report (2014)).

Despite these differences, effective regulatory regimes share certain common characteristics, such as widespread private sector participation in the industry, efficient and predictable government regulation, and strong quality control mechanisms.⁵ By contrast, seed regulatory regimes in many developing countries, particularly in Sub-Saharan Africa, are much more restrictive and have been slow to cede regulatory oversight and commercial activities to the private sector, despite a lack of monetary and human resource capacity to implement the regulatory regime effectively. Meanwhile, resources for market inspection, public research, and infrastructure investments such as seed testing laboratories suffer. In effect, some of the most restrictive policies in the world are being maintained by governments with the fewest resources to implement them. These policies generate higher transaction costs for seed companies, thus lowering incentives to invest. Shortages in seed supply and poor quality control further threaten the viability of the domestic seed industry. For example, in Mali, the cost of producing good quality improved seed outweighs the purchasing power of small farmers.⁶

The following sections explore several key themes in seed policy reform that emerged over the course of EAT project assignments across the globe. Each section examines a different component of the seed

⁵ See, e.g., Kuhlmann, K., *Planning for Scale Brief #6: Enabling Environment*, AgPartnerXChange (2013).

⁶ USAID-EAT project, *VcCLIR Mali* (2011).

system and evaluates evidence of the impact of various policy options on the rate of introduction of new varieties, farmer incomes, yields, and other factors.⁷

Easing requirements for the introduction of new varieties

Many governments require some degree of testing and approval of new seed varieties before they can be sold to farmers. These policies aim to ensure that the seed on the market is suitable to local conditions and to provide information to farmers regarding variety characteristics. Proponents argue that farmers face information asymmetries as they cannot observe seed quality and other characteristics until after planting, or perhaps not until crops are in storage, at which point it can be difficult to ascribe blame for poor performance among many production variables.⁸ Some form of variety testing is also a prerequisite to the granting plant breeders' rights.

In the EU, new varieties of field crops must undergo two years of testing for Distinctness, Uniformity, and Stability (DUS) and Value for Cultivation and Use (VCU), while vegetable varieties are subject to one year of DUS testing only.⁹ A technical review committee evaluates the testing data for compliance with fixed minimum criteria for the classification of a unique variety and the protection of human, animal, and environmental health. Upon approval, the variety is listed in the national variety register as well as the EU Common Catalogue and can be marketed throughout the 28 EU member states. In total, for field crops such as wheat in the Netherlands, this process takes an average of two years from start to finish and costs the applicant approximately US \$10,011.¹⁰

In many developing countries, these regimes can quickly become a costly restriction on the introduction of new varieties. Excessive testing requirements, discretionary approval criteria, and institutional weaknesses all contribute to long delays and uncertainty in the variety registration process. Many of these countries require two to three seasons of DUS and VCU testing by a government agency for all types of crops, each season of which averages US \$2,000.¹¹ Although companies are rarely permitted to submit their own test results in lieu of government testing, they are often required to submit an additional two to three seasons of their own test data as well.¹² The variety release committee may not be operational or may employ discretionary criteria for approval, such that the breeder can experience long delays or have its application denied altogether. For example, the lack of regular meetings by the national seed committee adds an average of one year to the variety registration process in Ghana, whereas the same process in the Netherlands takes only five days. In Nepal, of the 257 applications for

⁷ This brief focuses on the impact of a subset of seed regulatory functions in promoting a private seed industry capable of providing a steady supply of improved seed varieties to farmers. The impact of these systems, and in particular intellectual property rights for plant breeders, on biodiversity and the rights of farmers to save and share seeds is a matter of substantial debate and is outside the scope of this paper. For a nuanced discussion of the role of intellectual property rights in promoting seed sector development, see Kuhlmann (2013).

⁸ Tripp, R., "How to Cultivate a Commercial Seed Sector," Overseas Development Institute, paper prepared for the symposium "Sustainable Agriculture in the Sahel," Bamako (December 1-5, 2003).

⁹ The law also provides exemptions for "niche markets" such as heirloom varieties and organic seeds.

¹⁰ This amount is equivalent to 20 percent of per capita Gross Domestic Product (GDP). USAID-EAT project, *Agribusiness Regulation and Institutions Index* (2015) (USAID-EAT project, *AGRI Index Report* (2015)).

¹¹ USAID-EAT project, *AGRI Index Report* (2015). Other studies have reported costs as high as \$13,000 for one season of soybean trials in Malawi. See Keyser, J., "Opening up the markets for seed trade in Africa," World Bank Africa Trade Practice Working Paper Series No. 2 (2013). {<http://documents.worldbank.org/curated/en/2013/10/18444842/opening-up-markets-seed-trade-africa>}

¹² One exception is Guatemala, where the law allows breeder data to serve as the basis for variety release decisions. See World Bank, *EBA Progress Report* (2014).

new vegetable varieties submitted in 2013, only 34 were approved.¹³ Further delays in gazette publication slow variety registration by an additional year in Nepal. The total time for variety registration in Nepal and Ghana averages nearly 3.5 years and 361 percent and 482 percent of GDP per capita, respectively. Companies must also typically wait for variety approval before beginning the two to three seasons of multiplication required to achieve sufficient volumes for commercial distribution. Cumulatively, the seed may not reach the market for a minimum of five to seven years after the breeding process has ended and at great cost to the breeder.

As a result, companies release fewer varieties and those less well-adapted to the local agro-ecological conditions.¹⁴ These costs are particularly detrimental to small and medium-sized seed businesses, which operate on thin margins and lack the resources to submit a regular stream of new varieties through these systems. Results from the USAID Agribusiness Regulation and Institutions (AGRI) Index show that countries with the highest time and cost for variety registration tend to lack private sector investment in new varieties. In Senegal, the private sector is not allowed to introduce new varieties, and only two new rice varieties have reached the market in the past 20 years. In Bangladesh, where variety registration is 30 percent faster and 68 percent less expensive than in Nepal, seed companies introduce triple the number of new varieties each year, and farmers in Bangladesh have experienced higher yield increases over time.¹⁵

The Impact of Seed Sector Reform on Yields and Farmer Income

Bangladesh: In the early 1990s, the Government of Bangladesh began a series of reforms aimed at opening the seed industry to the private sector, including simplified business registration requirements, automatic and free variety registration, and truth-in-labeling rules in lieu of seed certification.

Turkey: Although variety testing and registration are still mandatory in Turkey, as of 1982, the government accepts VCU test results submitted by the seed company and removed discretionary rejection of submitted varieties post-testing. The government also lifted price controls and restrictions on company and dealer registration.

As a result of these reforms, the number of seed companies ballooned in both countries, with substantial gains in farmer yields and income (see Table 2).¹ The agrodealer network in Bangladesh today averages one retail shop per 1,000 farmers, plus an additional 50,000 mobile vendors. By contrast, countries in Sub-Saharan Africa with more restrictive policies have a mean of only 3 agrodealers per 10,000 farms.²

Table 2: When governments allow more varieties, what happens to yields and incomes?

Country	yields (tons/hectare)		Estimated impact on farm income (\$/year)
	Pre-reform	Post-reform	
Bangladesh	1 t/ha (1990)	>6 t/ha (2007-10)	\$125 million (2010)
Turkey	2.18 t/ha (1980-82)	4.13 t/ha (1990-92)	\$97 million (1990-92)

Source: USAID-AGP-AMDe Project (2013).

¹ USAID-AGP-AMDe Project (2013).

² World Bank, *Agribusiness Indicators: Synthesis Report*, Agriculture Global Practice Discussion Paper 01 (2014).

¹³ USAID-EAT project, *Regional Trade in Seed, Fertilizer, and Strategic Grains: A Review of the Legal, Regulatory, and Institutional Constraints to Growth across South Asia* (2014) (USAID-EAT project, *South Asia Regional Study* (2014)).

¹⁴ See Keyser (2013) (finding that “many seed companies say they only bother to register a few varieties in each country that are generally suited for each market even though other seeds in their portfolio may be even better adapted to certain locations and/or offer better value for some end users”). See also World Bank, *EBA Progress Report* (2014).

¹⁵ USAID-EAT project, *AGRI Index Report* (2015).

As an alternative, countries can opt to make variety registration either voluntary (as in the US) or automatic upon the submission of testing data by the breeder (as in India). These approaches assume that farmers are better situated to readily assess the suitability of a variety's characteristics to their own conditions through demonstration plots or observation of their neighbors' fields. Indeed, where governments have eased variety registration requirements, there have been no reports by farmers of a decrease in seed quality.¹⁶ On the contrary, where these restrictions have been lifted, the impact on investment, yields, and farmer income have been rapid and dramatic (see box "The Impact of Seed Sector Reform on Yields and Farmer Income").

Reducing restrictions on cross-border trade in seed

Agro-ecological conditions do not follow national boundaries. A seed well-suited to a particular region of one country may be similarly suited for the territory just across the border in the neighboring country. If a seed company can readily trade the seed in both countries, the overall size of the market for the seed increases and the per unit cost of variety registration, multiplication, distribution, and sale decreases. While governments have a role to play in protecting against pests and plant diseases, they can encourage investment in breeding and the introduction of new varieties by ensuring simple, low-cost procedures for engaging in the import and export of seed across national borders.

In practice, many governments have established lengthy and expensive permitting procedures, testing protocols, and quarantine measures for cross-border trade in seed. For example, in Senegal, it takes on average 30 days to complete all requirements for importing a shipment of hybrid seed, 21 days of which is attributable to the import permit, which requires approval from three separate government offices.¹⁷ By contrast, in the Netherlands, all relevant border agencies participate in one coordinated physical inspection of the goods, reducing overall processing time to less than one week.¹⁸ Lack of recognition of varieties registered in neighboring countries also deters intraregional seed trade.

Regional harmonization of seed policies is the most often cited solution to easing access to cross-border markets. Regional agreements can cover a variety of seed regulatory functions, such as seed certification, phytosanitary requirements, common pest lists, plant variety protection, and variety registration. The benefits of harmonization are hard to deny. In Central America, implementation of harmonized regional seed procedures led to a 23 percent increase in regional seed trade in two years.¹⁹ In the EU, varieties registered in any member country become part of the EU Common Catalogue and are automatically registered in all other member countries. Today, the EU Common Catalogue lists more than 40,000 varieties across vegetable and field crops and seed trade volumes are on par with that of the US.²⁰

Nonetheless, policy harmonization is a complex political and institutional undertaking that can be held up by a variety of stakeholder groups at the national and regional level. Seed harmonization efforts across Africa and Asia have been in process for many years, sometimes even decades, and have yet to achieve more than partial implementation in any of these regions.²¹ In practice, progress is often driven

¹⁶ Gisselquist et al. (2013).

¹⁷ USAID-EAT project, *AGRI Index Report* (2015).

¹⁸ Ibid.

¹⁹ USAID-EAT project, "Building an Enabling Environment for Seed Sector Growth," Policy Brief No. 1 (2011).

²⁰ USAID-AGP-AMDe Project (2013).

²¹ That is not to say these efforts have not achieved results. In Eastern and Central Africa from 2002 to 2008, during a period when substantial progress was made in harmonizing seed policies in COMESA, SADC, and the EAC, the region experienced a tripling of seed production and intraregional seed trade and an increase in seed price stability. See ASARECA, *Impacts of an Improved Seed Policy Environment in Eastern and Central Africa* (2011). In Asia, the ASEAN Economic Community is evaluating member country seed policy frameworks for a future harmonization effort, and harmonization of seed policies among the

by whichever government is least willing to participate, and many harmonization efforts have stalled due to a failure of member country governments to implement the agreements domestically.

In light of the challenges to regional harmonization, countries can employ alternative or interim solutions while regional negotiations continue. For example, countries can opt to unilaterally accept varieties registered in a neighboring country even before any regional harmonization effort has been fully implemented. In the late 1990s, the Romanian government introduced automatic approval for any variety listed in the EU Common Catalogue. As a result, European seed companies rapidly entered the Romanian market and generated a sharp increase in Romanian seed exports back to the EU.²²

Opening the market to private seed companies

Formal seed system development typically begins with heavy government involvement in seed research, production, and distribution. As the market grows, however, government breeding programs simply cannot supply the rate of new varieties farmers need. Opening the market to private seed companies allows for the necessary expansion of seed production. The most successful seed systems have all transferred responsibility for commercial seed production and sale as well as some regulatory oversight of the industry to the private sector.

In many developing countries, governments continue to exhibit a distinct mistrust of the private sector and attempt to suppress market entry and competition as well as to control the source of breeder and foundation seed. In East Africa, these restrictions commonly take the form of onerous seed company registration regulations, including high fees and resource requirements. In Kenya, for example, a seed business license costs 109 percent of GDP per capita and the applicant must meet minimum requirements for technical expertise, financial resources, and equipment.²³ In Liberia, two registered companies and the national agricultural research institute dominate the seed market, and a lack of transparency in licensing procedures and costs prevents new market entrants.²⁴ Governments may also restrict private sector access to breeder and foundation seed. In Ethiopia and Tanzania, for example, public seed companies retain sole responsibility for the provision of basic seed of certain crops. These tendencies are particularly acute with respect to field crops considered more critical for the country's food security.

The high cost of entry has implications for the ability of small and medium-sized companies to operate legally and may contribute to a higher degree of fake seed in the market.²⁵ High entry costs are

countries of the SAARC is in only the very initial stages. See USAID-EAT project, *South Asia Regional Study* (2014), USAID-EAT project, *Assessment of the Enabling Environment for Cross-Border Trade of Agricultural Inputs: Thailand, Vietnam, and Cambodia* (2014), World Bank, *EBA Progress Report* (2014), and Kuhlmann (2013) for more information on the current status of various regional harmonization efforts.

²² See Gisselquist, D., "Harmonization of Seed Legislation and Regulation in CEEC, CIS, and Other Countries in Transition," in *Seed Policy and Programmes for the Central and Eastern European Countries, Commonwealth of Independent States, and Other Countries in Transition*, Proceedings of the Regional Technical Meeting on Seed Policy and Programmes for the CEEC, CIS, and Other Countries in Transition, FAO: Budapest (March 6-10, 2001). {<http://www.fao.org/docrep/005/y2722e/y2722e1c.htm>}

²³ USAID-EAT project, *AGRI Index Report* (2015). Registration requirements differ distinctly by region. In East Africa, the cost of registration is nearly 100 percent of GDP per capita, whereas in West Africa, the cost of registration is only 15 percent of GDP per capita.

²⁴ USAID-EAT project, *AgCLIR Liberia* (2014).

²⁵ USAID-EAT project, *AGRI Index Report* (2015). That is not to say that a country could not have low entry costs and still have a high incidence of fake seed. For example, Uganda has lower entry costs than many countries and yet 40 percent of seed in the market is still estimated to be fake. "Fake seed" includes seed that is adulterated, of poor quality (low germination), or sold in false packaging or without proper registration. USAID-EAT project, *SeedCLIR Tanzania* (2013). Fake seed is a complex problem involving aspects of supply and demand in the formal market as well as government oversight of the marketplace (see section on "Transitioning seed quality assurance to the private sector" below).

particularly detrimental to women entrepreneurs, who may lack the education and assets necessary to register a seed business under these requirements. In addition, restricting private sector activity typically results in a seed system incapable of meeting farmer demand. In Ethiopia, farmer demand for hybrid maize seed consistently outpaced government supply from 2006-2010.²⁶ In Tanzania, seed companies report that the public Agricultural Seed Agency (ASA) supplies an insufficient quantity and quality of basic seed.²⁷ Uncompetitive markets may also contribute to higher seed prices for farmers.²⁸

Simplified registration requirements, such as those in force in the Netherlands, require minimal information from the applicant, low fees, and no discretion in approval.²⁹ Rather than applying education and capital requirements as proxies for seed quality at the time of registration, the quality of the seed produced by the company is regulated through spot checks of fields, storage areas, and markets. While some governments voice concerns over “seed sovereignty” and the potential takeover of the domestic seed market by foreign companies, reducing restrictions on market entry has in fact been shown to increase the number of small domestic seed companies. In Bangladesh, after widespread market liberalization policies were adopted in the early 1990s, the number of private seed companies swelled to 280, almost all of which are small, locally owned businesses.³⁰ In the US, ready access to source seed from public universities drove the rapid expansion of small-scale seed companies in the 1930s.³¹

Transitioning seed quality assurance to the private sector

“Seed quality” includes a number of variables, such as rate of germination, genetic purity, vigor, and freedom from disease, most of which are not visible to the consumer. Yet ensuring the quality of seed marketed to farmers is critical: Farmers will not invest in new varieties if they do not see the results promised on the package or by the seed dealer. Moreover, the sale of fake seed is a very real problem, particularly in Africa. Studies estimate fake seed levels to be as high as 25-30 percent in Tanzania and 40 percent in Uganda.³²

The quality of seed on the market can be controlled *ex ante*, through field testing and seed certification procedures prior to sale, and *ex post*, through market inspections and providing remedies to consumers in case of fraud or adulteration. Regardless of the approach or combination of approaches employed, the regulatory regime should be capable of providing timely quality assurance without unduly adding to the cost of the final product.

Many developing countries require mandatory seed certification for 100 percent of seed sold on the domestic market. Yet EAT project studies from Mali to Nepal found that seed certification agencies typically lack the physical, budgetary, and human resource capacity to effectively inspect all seed. Seed certification routinely creates a bottleneck to the timely delivery of seed to meet farmer demand. Seed

²⁶ World Bank, *EBA Progress Report* (2014).

²⁷ USAID-EAT project, *SeedCLIR Tanzania* (2013).

²⁸ USAID-EAT project, *South Asia Regional Study* (2014) (noting that “restrictions [in Nepal] on introduction of varieties can protect monopolies or oligopolies for companies with approved varieties. This was notable—the private sector, not MoA staff, were warning about excessive profits from high prices, and were reasonably pointing out that allowing competition would reduce the risk.”).

²⁹ USAID-EAT project, *AGRI Index Report* (2015).

³⁰ USAID-AGP-AMDe Project (2013).

³¹ The history of the more recent consolidation of the seed market in the United States suggests that the structure of the seed market derives far more from the regulation of competition and intellectual property rights for plant breeders than from simple private sector entry. See Tripp (2003).

³² See USAID-EAT project, *SeedCLIR Tanzania* (2013); Joughlin, J., “The Political Economy of Seed Reform in Uganda: Promoting a Regional Seed Trade Market,” *Africa Trade Practice Working Paper Series No. 3* (January 2014).

producers regularly report being required to pay the costs and per diems for inspectors or providing bribes to avoid inspection altogether. In Tanzania, the seed certification institute employs only 25 inspectors to cover 10,000 hectares of seed production each year.³³ In Mali, the geographic distance and terrain between Bamako and Timbuktu delay seed sampling and test results.³⁴ Ironically, strong certification systems established in response to fears of fake seed may put farmers at greater risk as unregulated informal seed producers rush to fill the demand gap left by delays in the formal system.

To relieve these constraints, responsibility for *ex ante* quality assurance can be shifted to the private sector through a variety of methods, such as the accreditation of third-party seed certification providers. In Peru, regulatory reforms that permitted third-party certification by newly established public-private seed service centers throughout the country led to a dramatic increase in the number of seed companies and improved access to high quality seed for farmers.³⁵ Third-party accreditation is prevalent in South America and Europe. In Africa, Morocco, South Africa, and Zambia allow accreditation, and the Southern African Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA), and the Economic Community of West African States (ECOWAS) have developed regional seed agreements that approve this practice in concept, although not yet in practice.

Governments have also established alternatives to seed certification such as the Food and Agriculture Organization's Quality Declared Seed (QDS) process. QDS seed adheres to less rigorous standards than certified seed and requires fewer inspections. For example, new QDS regulations adopted in Ethiopia in 2013 have the potential to substantially reduce the burden on government inspection as only 10 percent of QDS seed will need to be inspected prior to sale.³⁶ In Mali, an EAT study found that farmers could not afford seed certified through lengthy government procedures and therefore the introduction of QDS would allow farmers better access to well-suited indigenous varieties at a reasonable cost.³⁷

Countries that follow the US model of seed regulation, including Bangladesh, Pakistan, Guatemala, South Africa, and the Philippines, rely on the private sector to self-police through truth-in-labeling requirements that are enforced *ex post* through regular market inspections. Truth-in-labeling laws specify certain information that must be included on seed packaging and exact harsh penalties for violation. Proponents of these approaches argue that the private sector is best situated and most highly motivated to control the quality of the product that it puts on to the market. If the product is poor quality, at best the price it commands will decrease; at worst, the company will lose market share due to its reputation.

Transitioning seed certification to accredited third-parties, allowing QDS, or adopting a truth-in-labeling regime reduces the burden on public resources, allowing a reallocation of those limited resources to combatting fake seed in the marketplace, supporting consumer education, and promoting public research into crop varieties of lesser interest to the private seed industry.³⁸ Moreover, delegating seed

³³ See USAID-EAT project, *SeedCLIR Tanzania* (2013).

³⁴ USAID-EAT project, *VcCLIR Mali* (2011).

³⁵ USAID-EAT project, "Building an Enabling Environment for Seed Sector Growth," Policy Brief No. 1 (2011).

³⁶ World Bank, *EBA Progress Report* (2014).

³⁷ USAID-EAT project, *VcCLIR Mali* (2011). For further discussion of QDS efforts in Africa, see Kuhlmann (2013).

³⁸ It should be noted that there is little data on the comparative cost of enforcing truth-in-labeling laws. See Kuhlmann (2013). Nonetheless, *ex ante* seed certification does not relieve the need for *ex post* government monitoring of quality in the market. Rather systems that employ both strategies must expend resources on both. For example, in Tanzania, the 25 inspectors employed by the seed certification institute must not only inspect seed for certification but are also responsible for monitoring seed sales by agrodealers and other seed retailers throughout the country. USAID-EAT project, *SeedCLIR Tanzania* (2013).

quality control makes the private sector a partner in combatting fake seed rather than an adversary. Where companies are not required to trade on their reputation or can place the blame for quality adulteration elsewhere, there are no repercussions for cheating the system. For example, in Uganda, industry representatives have suggested that respected formal seed companies may be willfully packaging counterfeit seed.³⁹

RECOMMENDATIONS FOR FUTURE RESEARCH

This brief has compiled recent data and research from the EAT project, World Bank, other donors, and leading seed experts to evaluate the impact of seed policy reforms on seed system development around the world. Although the data is new, the policy options presented in this brief are well known. Yet despite the wealth of academic and field research in this area, seed reforms have been slow to take root, particularly in Sub-Saharan Africa. Charting an effective path forward requires moving beyond calls for the known solutions to focus on the root causes of the continued lack of progress. The findings presented in this brief offer an essential first step and suggest the following avenues for future research:

Where institutional capacity is low, adopting a less restrictive approach to seed regulation may prove more effective. The hallmarks of a successful regulatory system include distinct institutional components, i.e., the resources, staff, and infrastructure necessary to carry out the law. In substance, many developing countries have adopted the EU approach to seed regulation, which includes a more heavy-handed role for government. As the research above shows, these systems routinely suffer from long bureaucratic delays, high formal and informal payments, and highly discretionary decisions by government officials, all of which reduces the incentives of the private sector to invest.

This data suggests that seed reform efforts should include a pragmatic evaluation of government capacity for implementation before adopting domestic legal reforms or regional harmonization agreements. For example, a national seed committee with no budget cannot be expected to hold regular meetings. Governments with low institutional capacity for the implementation of certain seed regulatory functions, such as variety testing and seed certification, may need to adopt a less restrictive approach more in line with the US model, at least in the short run as regulatory capacity and GDP per capita increase.⁴⁰

More research is needed to determine whether there exists a clear order for the sequencing of seed policy reforms. The EAT project developed the Seed Commercial, Legal, and Institutional Reform (SeedCLIR) diagnostic, a methodology for assessing the maturity of the enabling environment for seed. The SeedCLIR maturity model builds on prior academic research that strongly supports the theory that seed systems pass through certain stages of development as government and private sector roles in the seed market evolve over time. SeedCLIR is premised on the belief that a strong legal framework must develop in tandem with the institutional capacity for its implementation. Future development of the SeedCLIR maturity model should continue to adapt this model to address new research questions and findings from the field.

For example, Loch and Boyce (2003) suggest that in many countries, transitioning seed production and sale to the private sector would be premature or even counterproductive, as the private sector may

³⁹ Joughlin (2014).

⁴⁰ International seed certification standards and variety testing protocols have a cost – not all of which scales up or down in line with per capita GDP. For example, the 20 percent of per capita GDP required to register a new variety in the Netherlands is, in absolute terms, 32 percent more expensive than the 482 percent GDP per capita average cost recorded in Ghana. More research is needed to determine whether the fixed costs of these regulatory functions can realistically be reduced to a level that is affordable to developing country government budgets and/or for seed companies and farmers to absorb.

have no more skills and resources than the government entity it would replace.⁴¹ Arguments that the private sector has better incentives to ensure seed quality raise the question of whether the necessary market forces work properly in the absence of an enabling environment that ensures competition, promotes access to market information, and protects brand ownership. Further research may reveal certain prerequisites to the successful adoption of truth-in-labeling laws, such as effective market inspection, intellectual property rights, and dispute resolution.

Reform approaches must address the social and political aspects of seed reform. While some factors unrelated to policy certainly account for certain aspects of the different development trajectories of agricultural sectors in developing countries, there are distinct challenges to regulatory reform rooted in historical, political, and nationalistic forces at play. Addressing these challenges demands a more complete understanding of the political economy of seed policy and how to make the case to policymakers and other stakeholders to build support for genuine reform. For example, the liberalization of the seed market in Bangladesh in the 1990s included exceptions for five “notified” crops (rice, wheat, jute, sugarcane, and potatoes) in response to strong opposition from government researchers.⁴² In other countries, governments have overcome similar opposition by adopting licensing regimes for public varieties in which the national research organization (NARO) that developed the variety retains the fees collected. Licensing gives the NARO a source of independent income for its budget and facilitates multiplication and distribution to farmers. For example, the Brazilian Corporation of Agricultural Research (EMBRAPA) and the National Agricultural Technology Institute (INTA) in Argentina have well-developed licensing systems for the commercialization of public varieties.⁴³

CONCLUSION

Increasing the rate of introduction of new seed varieties is essential to achieving the Feed the Future goals of inclusive agricultural sector growth and improved nutrition outcomes. Regulations governing seed company registration, variety release, and seed certification can add unnecessary time and cost to the production and sale of improved seed. While specific country models may differ, the evidence set forth in this brief makes the case for the adoption of a streamlined, efficient regulatory system that promotes the development of a robust private-sector-driven seed industry able to readily meet the needs of farmers at home and abroad.

⁴¹ Loch, D.S., and K.G. Boyce, “Balancing Public and Private Sector Roles in an Effective Seed Supply System,” *Field Crops Research*, 84(1-2) (2003).

⁴² USAID-EAT project, *South Asia Regional Study* (2014).

⁴³ USAID-EAT project, “Building an Enabling Environment for Seed Sector Growth,” Policy Brief No. 1 (2011).