CHAPTER 3

Seed Policies and Regulatory Reforms

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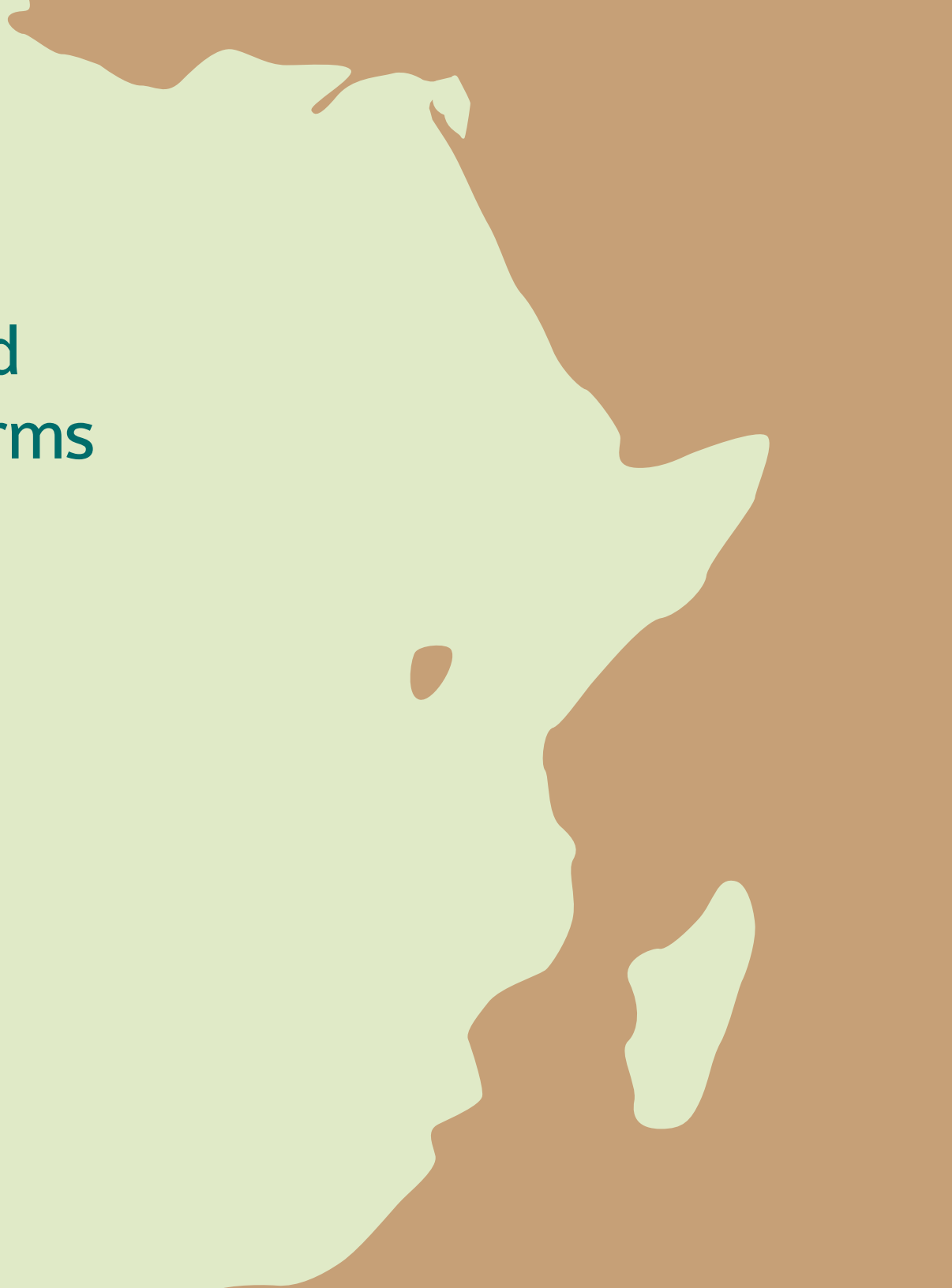

Discussion about agricultural growth and transformation in Africa south of the Sahara often begins with seed—that mechanism of biological wonderment that feeds families, farms, cities, and nations. There is a wealth of evidence indicating that where farmers have adopted new cultivars, the gains to yields and incomes have often been significant, albeit with considerable variation across countries, crops, agroecologies, and markets.

The policy environment in Africa greatly influences the production and use of improved cultivars and quality seed,[1] and the associated improvements in productivity, incomes, and livelihoods. During the past decade, many countries have pursued wide-ranging policy and regulatory reforms to strengthen the systems and markets though which cultivars and seed are ultimately delivered to farmers.

But are these policy reforms giving sufficient attention to the complexities and nuances that are required to build robust and sustainable seed systems in Africa? And are these reforms sufficiently cognizant of the needs of the small-scale, resource-poor farmers who represent the vast majority of agricultural producers in Africa south of the Sahara, and who often cultivate a diverse mix of crops on their farms?

Until recently, there was relatively little data to systematically track the flow of new cultivars from breeding programs and research stations to farmers' fields, or to monitor seed sector development and performance (Spielman and Kennedy 2016). Only in the last several years have governments, donors, and researchers made efforts to improve the metrics, data, and analysis on these issues. This shift has led to a number of innovative measurement tools and better evidence on the prevalence and impact of new cultivars and quality seed in farmers' fields and lives.

For example, several recent initiatives brought new data from surveys of farm households and experts to motivate greater analysis of the patterns, trends, correlates, and determinants of cultivar adoption. The Living Standards Measurement Survey–Integrated Surveys on Agriculture (LSMS-ISA) by the World Bank and Food and Agriculture Organization of the United Nations, and CGIAR's Diffusion and Impact of Improved Varieties in Africa (DIIVA) highlight this growth in new data sources, as do the analyses that make intensive use of their content (for example, Sheahan and Barrett 2017; Walker and Alwang 2015). Other studies assemble more bespoke data for similar analytical purposes (Rutsaert and Donovan 2020; Abate et al. 2017) or introduce new empirical methods—most notably the use of randomized controlled trials (Glennerster and Suri 2015)—to improve understanding of the impact of seed system development and improved cultivar adoption.

In the broadest terms, findings from these datasets and studies indicate that national research systems are releasing new cultivars more rapidly than in the 2000s, seed companies are playing a larger role in marketing new cultivars for selected crops, and awareness and adoption among farm households are often higher than conventionally suggested. While these generalizations mask important crop and country variations, they do highlight the fact that seed systems are evolving rapidly in Africa. That said, the policy, investment, and regulatory dimensions of seed system development remain an important and often overlooked topic in this growing body of work.

In this chapter, we explore how policies, programs, and regulations related to seed and genetic resources are evolving across Africa, and whether these changes have the potential to improve farmers' access to improved cultivars and quality seed. We highlight several signs of progress in seed system development and identify challenges that still lie ahead. We also caution against a one-size-fits-all approach to seed system development and encourage a more thoughtful discourse on the myriad issues influencing the public policies that shape Africa's seed systems, including the sensitive political economy issues that influence policies and practices in the seed systems and market development.

Seed Policies and Policy Regimes

Nowhere in the world does there exist a single, explicit policy that covers every aspect of a seed system. Rather, seed system policy is a tangle of laws, regulations, guidelines, programs, schemes, conventions, and investment choices that together shape the acquisition, production, and distribution of materials used for propagation purposes. And while we typically think of seed system policy primarily in terms of food or cash crop reproduction, these policies also pertain to the propagation of livestock, fisheries, and forestry.

1 For simplicity, we use the term "seed" in this chapter to describe any biological material used for the propagation of a cultivated species. This includes true biological seed of plants; asexually, clonally, or vegetatively propagated materials such as plant cuttings, buddings, or tubers; and even propagation materials used in poultry, livestock, and fish production.

And at the heart of most seed systems in Africa is, in fact, the *absence* of policy. By this we mean that farmers' traditional practices of selecting, storing, sharing, and planting seed from their own fields exist irrespective of the principles and actions of government. For certain crops and countries, these traditional practices may describe more than 95 percent of the seed system, including many of the root, tuber, and banana crops cultivated throughout Africa for both own consumption and sale in local markets. For other crops and countries, traditional practices may be absent, as in the case of high-value floriculture and horticulture production systems that signify the industrialization of agricultural systems. And for other crops and countries, traditional practices may be transitioning toward more market-oriented seed purchasing strategies, as is the case for many African countries where hybrid maize seed purchased each season provides farmers with substantial yield advantages over saved seed.

In an effort to treat seed "policy" more coherently, we define the term as the finite set of government principles and actions related to public research and development (R&D) investment priorities, varietal registration and release procedures, seed quality assurance regulations, taxes and subsidies on seed production and use, biodiversity conservation laws, international and regional trade agreements, and genetic resource policies. Taken together, these policies—coupled with the actors, relationships, and institutions that influence and are influenced by their execution—constitute what we might refer to as the comprehensive seed policy regime in a given country. We highlight some of the more important patterns, trends, and outlooks in selected seed policy regimes in Africa.

From Breeding to Cultivation: New Varieties, New Modalities

Public R&D spending represents one of the most important means of feeding a seed system with a continuous pipeline of products that farmers can experiment with and eventually adopt (or not). Since 2000, R&D spending in Africa has been recovering from a two-decade period of stagnation. Between 2000 and 2014, public research expenditures increased from $1.7 billion to $2.5 billion (measured in constant [2011] US dollars at purchasing power parity) in Africa south of the Sahara. But three-quarters of this growth was largely driven by just five countries—Ethiopia, Ghana, Nigeria, South Africa, and Uganda—where the size of the country's agricultural sector and the emphasis that the country places on agricultural R&D spending are both significant in comparison to other countries (Beintema and Stads 2017). For most other countries in Africa, the signs indicate slow growth or stagnation in spending. These figures, alongside studies of research systems reforms across the region, suggest that many countries are not allocating sufficient resources to breeding programs or are not organizing and managing their research and extension systems in a way that ensures a steady flow of new cultivars to drive seed system development.

And for many African countries, efforts to improve public research systems mean more than just securing greater levels of public funding. They also mean strengthening the organization and management of their research systems. Here, at least three priorities emerge: (1) improving countries' ability to access the genetic material needed for breeding programs to identify and introduce traits adapted for new and emerging abiotic and biotic stresses, or for attributes preferred by consumers, processors, and other market actors; (2) investing in breeding methods and tools that shorten the time it takes to develop new cultivars embodying these traits; and (3) reducing the regulatory hurdles required to test, register, and release new cultivars (Atlin, Cairns, and Das 2017; Spielman and Smale 2017; Buruchara et al. 2011).

But increasing the flow of new cultivars from breeding programs and national research systems does not necessarily imply that farmers will have new and better choices. Many new studies on seed systems in recent years have highlighted the importance of investigating seed supply chain dynamics, encouraged by popular concerns about low-quality seed proliferating in local markets and allegations of counterfeit seed purveyed by unscrupulous traders. Uganda has been a lightning rod for this issue, resulting in several influential studies that, indeed, suggest the need for better management of the country's seed system (Barriga and Fiala 2020; Bold et al. 2017; see also ISSD Uganda 2019). When coupled with the expressed need of governments and donors to better evaluate the impact of their investments in plant breeding, these supply chain issues have given rise to the use of increasingly low-cost genetic fingerprinting techniques to track adoption in farmers' fields and at other points in the supply chain. Notable examples of this approach are studies by Wineman et al. (2020) on maize in Tanzania, Wossen et al. (2019) on cassava in Nigeria, Yirga et al. (2016) on maize and wheat in Ethiopia, and Maredia et al. (2016) on beans in Zambia and cassava in Ghana. All point to significant problems in supply chain management, beginning in research centers charged with maintaining breeder seed and continuing all the way down to the warehouses and shop floors of input dealers.

Partly in response to these emerging concerns and partly as a reflection of static seed policy regimes, strict regulations for assuring seed quality remain on the books throughout much of Africa. The regulations may vary from country to country, but there is no dearth of strict zero-tolerance thresholds for pests and disease, inspections of production fields and bagging facilities, and penalties for noncompliance that include fines and/or imprisonment. Laws in 23 African countries forbid trade in "unregulated" seed, setting a tone that is at odds with widespread de facto farmer practice for many crops (Herpers et al. 2017).

Kenya offers a useful case in point. Its seed policy regime dates back to the 1972 Seeds and Plant Varieties Act, augmented by a raft of associated regulations, guidelines, amendments, and revisions, the latest of which dates to 2016. The law states that seed certification is compulsory and the sale of uncertified seed is illegal. Specific standards are prescribed for key plant species and seed classes, and the regulation is implemented by a semiautonomous government agency, the Kenya Plant Health Inspectorate Service (KEPHIS). The seed policy regime, combined with KEPHIS's proactive approach to quality assurance, has helped create a robust market for hybrid maize seed in the country. But the moment we step away from hybrid maize and consider quality control systems for other crops such as potato and sweet potato, the reality is far less vibrant and more highly dependent on farmer-saved seed, farmer-to-farmer exchanges of seed, and nongovernmental projects to train farmers in "clean" (but inherently illegal) seed production and distribution (Okello et al. 2017; Muthoni, Shimelis, and Melis 2013; Schulte-Geldermann, Gildemacher, and Struik 2012; Gildemacher et al. 2011). There is little evidence to suggest that a stricter or more effective regulatory regime would necessarily encourage seed sector growth for crops other than maize, given the geographically dispersed, localized, and fragmented nature of these seed markets, and the bulky and perishable nature of the seed.

Uganda has taken a slightly different policy approach to encouraging seed sector growth for crops apart from maize. Although the country's regulatory starting point was similar to Kenya's, it deviated from a similar path by introducing a new "quality declared seed" (QDS) standard in 2018 (Uganda, Ministry of Agriculture, Animal Husbandry and Fisheries 2018). In Kenya, this standard does not exist: only "certified" seed can be legally produced for sale to farmers. Yet a QDS standard is, effectively, a more pragmatic quality assurance system that caters to the technical and financial capabilities of small-scale seed entrepreneurs, farmer-based organizations, and other similar seed producers who are generally informal, small-scale, and quasi-commercial in nature (FAO 2006). QDS standards reduce barriers to entry in local seed markets and impose less-demanding quality thresholds, inspection procedures, and costs in a way that can promote a transition from fully informal systems to more integrated and professional farmer-led seed enterprises. QDS standards can be useful in increasing the number of seed providers available in otherwise fragmented markets, increasing the overall supply of quality seed, encouraging rural entrepreneurship in the seed sector, and ultimately creating the basis for a vibrant seed market where a more comprehensive seed certification system is too costly. While QDS standards favor certain types of crop reproductive biology (open/self-pollinating or vegetatively propagated crops rather than hybrids) and specific farming systems (smallholder systems characterized by highly localized and fragmented markets), they can create the basis for a vibrant seed market.

Projects are using QDS to promote women-led farmer organizations specialized in bean seed production (see ISSD Uganda 2019). Neighboring Rwanda has a similar QDS standard that actually predates Uganda's, but the country has yet to leverage it to encourage farmer participation and enterprise development in the seed system. In other countries such as Ghana and Nigeria, QDS approaches are implicit in projects designed to improve the quality of farmer-produced seed for crops such as cassava and yam, for which the costs of a formal seed certification system with armies of seed inspectors and low tolerance thresholds for diseases are prohibitive.

Unfortunately, QDS standards and similar farmer-focused approaches to quality assurance are still relatively rare in Africa. Moreover, there is an implicit tendency among breeders, regulators, and administrators to prefer stricter quality assurance systems—often reflecting a strong sense of paternalism over farmers or an aversion to risk at any level—irrespective of their impact on availability and price. Taken together, Africa's regulatory experiences to date suggest the need for a fundamental rethink on seed quality assurance systems, not only at the national level but also within regional economic communities.

There is scope for more sensible approaches to regulation through alternative quality assurance systems that can be pursued in parallel or in combination with stricter regimes (see, for example, ISSD Uganda 2019; Joughin 2014Scoones and Thompson 2011). This may be the case, for example, when the crop and reproductive biology in question are not hybrid maize, but rather cassava stem cuttings, sweet potato vines, or banana suckers.

Input Subsidy Programs: In Need of Refinement?

Subsidy programs have long been used to produce and distribute improved cultivars and seed to farmers in many African countries. Farmer-targeted subsidies include an array of schemes, from free seed packs, to discount vouchers redeemable at an input dealer's shop, to rebates on the purchase of large seed consignments, to free seed distribution through social protection programs and emergency relief. Similarly, subsidies targeted to seed producers include special concessions on credit, transport, warehousing, land leasing, and equipment imports. All are popular ways of encouraging the acceleration of output and yield growth in agriculture, but not all are necessarily appropriate to building a vibrant and sustainable seed system and market.

All subsidy programs incur some cost to government that must be weighed against the social and economic benefits of improved cultivars and seed, but only rarely do subsidy programs take sufficient account of these costs and benefits. Findings from studies on input subsidy programs in Malawi and Zambia demonstrate the importance of such analysis (Chirwa and Dorward 2013; Mason and Ricker-Gilbert 2013; Mason and Smale 2013; Kassie et al. 2013; Holden and Fisher 2015). Taken together, these studies suggest very mixed outcomes at best, indicating that more up-front design thinking and better formative evaluation are required to ensure that input subsidies have favorable impacts on cultivar adoption and varietal turnover. And assuming that subsidy programs will remain a feature of the agricultural development landscape in Africa for the next decade, there is a need for in-depth analysis of the sources and types of cultivars included in these subsidy schemes, the spatial and temporal diversification of their use, and the role and impact of alternative subsidy mechanisms (Spielman and Smale 2017).

The Narrowing Space for Global Exchanges of Genetic Resources

Add to this complex situation the challenges facing African countries in navigating the rapidly changing landscape relating to the conservation, use, and exchange of genetic resources—specifically genetic resources for food and agriculture. Many African countries struggle to balance their biodiversity conservation goals, as shaped by national policies aligned with the 1993 Convention on Biological Diversity, with their commitments to share and exchange genetic resources for the common good under the 2004 International Treaty on Plant Genetic Resources for Food and Agriculture. Implicitly, this means ensuring that a country has policies in place to conserve genetic resources—natural capital in the form of biodiversity as well as improved cultivars resulting from farmer selection over centuries—while also ensuring that it respects the rules and guidelines that govern how genetic resources are exchanged between countries to support genebanks and breeding programs.

In 2014, these twin goals gained considerable attention as countries began reshaping their biodiversity conservation and genetic resource policies in line with the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity. The protocol establishes a mechanism for countries—especially countries in the Global South that are centers of genetic diversity—to be monetarily rewarded for their historic and continued conservation of genetic resources, although the changes also require the introduction of new and potentially more complex guidelines on international exchanges of genetic materials for use by genebanks and breeding programs.

As African countries reshape their policies in response to these global conventions and agreements, they must also contend with the continued extension of intellectual property rights into the agricultural space. This extension is largely governed by national policies that aim for compliance with the International Union for the Protection of New Varieties of Plants, which provides the architecture for national laws and regulations that are consistent with the 1995 Trade-Related Aspects of Intellectual Property Rights agreement administered by the World Trade Organization. While intellectual property rights are central to the success of a rules-based global trading system, they can come into conflict within the gray area between the ownership of naturally occurring biodiversity or farmer-selected cultivars, on the one hand, and private breeding investments, on the other hand.

Not surprisingly, a growing body of evidence suggests that these policy and regulatory thickets may constrain scientific advancement through reductions in the global exchange of plant genetic resources (Jinnah and Jungcurt 2009; Welch, Shin, and Long 2013) or overly restrictive intellectual property rights regimes (De Jonge and Munyi 2017), forcing us to rethink the pathway from plant breeding in research centers to genetic gains in farmers' fields (Spielman and Ma 2016) and

the associated incentives for investment in improved cultivars and seed system development (Naseem, Spielman, and Omamo 2010).

Regional Seed Trade

This international dimension to seed systems development also spills over into trade policy, most notably regional trade and economic blocs. Seed trade figures significantly in the language of Africa's regional trade agreements, conventions, and communities such as the Common Market for Eastern and Southern Africa (COMESA), Economic Community of West African States (ECOWAS), and Southern African Development Community. Mechanisms for integrating regional seed trade include provisions that allow for the free and unfettered movement of seed; mutual recognition of approved varieties; and the harmonization of variety registration, seed certification, and other regulations between and among member states (Keyser et al. 2015). Progress in incorporating these trade provisions into national legislation has been slow in many countries, and in countries where the provisions exist, uneven implementation and enforcement is not common.

Biosafety Policies: A Continuing Source of Uncertainty

In far too many countries, there are still gaps in seed policy regimes. Too few countries have taken a definitive science-based approach to biosafety regulation that would allow for a more comprehensive assessment of the opportunities and risks associated with advanced technologies such as genetic modification, gene editing, and synthetic biology. To date, only three African countries south of the Sahara—South Africa Sudan, and Eswatini (also known as Swaziland)—are commercially cultivating genetically modified crops under credible and coherent biosafety legislation. At least ten other countries—Burkina Faso,[2] Cameroon, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Nigeria, Tanzania, and Uganda—are conducting confined field trials or laboratory research, or are moving toward commercial release (ISAAA 2018). But many countries, including several of those just listed, are suspended in political, legislative, or regulatory stasis, suggesting uncertainty in the way forward.

From Policy Design to Implementation

It is also important to point out that even with a comprehensive policy regime in place, many African countries struggle to translate policy design into implementation. This is partly due to the lack of clear implementation strategies and steps (for example, national seed plans) for the policies that have been enacted. Implementation failures can also be attributed to a lack of awareness of the trade-offs inherent in any policy change, for instance, between stricter seed quality assurance regulations and seed market growth; between an extension system focused on seed replacement and one focused on varietal turnover; or between a more open trade regime and domestic seed enterprise development (Spielman and Kennedy 2016). That said, new efforts have emerged to monitor the enabling policy environment across countries and over time, providing seed system actors—especially private entrepreneurs and investors—with a better sense of the opportunities offered by Africa's emerging markets. Most notable are the reports and indices from the World Bank Group's Enabling the Business of Agriculture initiative and The African Seed Access Index (TASAI).

Contested Narratives and the Political Economy of Seed Policy Change Processes

Finally, it is important to recognize that Africa's progress and pitfalls in seed system development are not the result of only benign or peripheral forces (Scoones and Thompson 2011). Actors and coalitions of actors with competing perspectives, interests, and resources are shaping seed policy change processes in each country and for each crop (for example, see Hassena, Hospes, and De Jonge [2016] and Alemu [2011] on Ethiopia). Political elites may leverage commercial seed sector development for political or financial gain regardless of its effect on the development of vibrant and competitive markets. Alternatively, these same elites may simply disregard the sector because there is no observable opportunity for such gains, leading to public underinvestment in the necessary enabling environment (for example, see Joughin [2014] on Uganda). Government ministries and agencies charged with boosting food production and private investment in the agriculture sector may be pitted against those mandated to protect biodiversity and the environment. International development organizations, bilateral

2 Burkina Faso commercialized GM cotton in 2008, but ceased cultivation in 2016. The country is currently testing new GM cotton varieties and traits, as well as other GM crops.

donors, charitable foundations, and their implementation partners may support specific narratives with project funding, commercial ventures, and heavy rhetoric depending on the interests of their own constituencies or leadership. Civil society and private industry similarly advance their preferred narratives and undertake projects to promote competing visions of African agriculture (for example, see Amanor [2012] on Ghana and Odame and Muange [2011] on Kenya). While competition in ideas is central to the development process, the inequality in resources that translate ideas into action should be of concern for African self-determination in this particular space.

Another political economy concern in these processes is the frequent absence of a key stakeholder: the farmer, especially the small-scale, resource-poor farmer. Among other factors, farmers' voices are limited by their exclusion from formal decision-making bodies and processes on legal and regulatory issues; weak representation by farmer and peasant associations that are captured by political elites; the absence of market intelligence mechanisms to identify the heterogeneous needs of farmers; and a lack of open and transparent consultations that provide a vehicle for conveying the distinct and heterogeneous needs of farmers to both public and private decision-makers.

Conclusion

Seed systems and markets are central to national and regional efforts to accelerate agricultural productivity growth, promote transformative structural change, and improve livelihoods in Africa south of the Sahara. Recent seed policy reforms have introduced new regulations, programs, and opportunities for a diverse set of seed system actors: private companies, farmer-based organizations, regulators, and researchers. Yet many complex challenges remain. There is a need to continuously redefine the roles of the public and private sectors as they jostle for space in emerging seed markets. There is much to be done to better integrate informal and formal seed systems, thereby ensuring that farmers benefit from improved cultivars emerging from breeding programs, providing industry with new opportunities for market growth, and allowing government to extend its regulatory reach in support of farmers and rural entrepreneurs. There is a further need to consider "seed" on a very crop- and context-specific basis, recognizing that a single policy and regulatory system covering all commodities is insufficiently responsive to the uniqueness of each crop's reproductive biology. Most of all, as African countries deepen their policy reform initiatives, greater effort is needed to ensure that policy change processes engender trust and cooperation between farmers, seed companies, regulatory agencies, and other stakeholders, and that national policies are harmonized with regional and global agreements that aim to benefit these same stakeholders.