

OPTIONS FOR NATIONAL GOVERNMENTS TO SUPPORT SMALLHOLDER FARMER SEED SYSTEMS

The cases of Kenya, Tanzania and Uganda

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About Hivos (www.hivos.org)

Hivos is an international organisation that seeks new solutions to persistent global issues. With smart projects in the right places, we oppose discrimination, inequality, abuse of power and the unsustainable use of our planet's resources

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Bioversity International is a global research-for-development organization. Their full focus is on enhancing agricultural biodiversity because of its crucial importance to nourish people and sustain the planet.

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Cover photo: Kenya: custodian farmer of sorghum varieties.

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PREFACE

Hivos and Bioversity International are concerned about the capacity of resource poor farmers to attain food security and respond to climate change. To strengthen that capacity both organizations give high priority to farmers' access to diverse, good quality and ecologically adapted seeds. Without such access farmers will face a major challenge to provide diverse food to people and sustain the planet.

Freedom to use seeds, especially for breeding purposes including by farmer breeders, is becoming an issue of great concern in North and South. Current open source seed initiatives develop and test systems to maintain this freedom.

OPEN SOURCE SEED SYSTEMS

Many countries are moving to establishing exclusive and monopolistic rights over plant genetic resources for food and agriculture and over the associated knowledge about their use. This obstructs farmers' access to seeds. Together with Bioversity International, Hivos expresses concern about this trend and searches for functioning alternatives, one being open source seed systems for diversity and resilience. 'Open source' is a concept developed by the software movement; its aim is to keep innovations accessible. Likewise, current open source seed initiatives aim to develop an expanding pool of genetic resources that are available now and in the future for unrestricted use by scientists, farmers and gardeners. The distinctive feature of 'open source seed' is that its users explicitly commit—based on legal and/or ethical grounds—to maintain the freedom to use the seed and any of its derivatives. This commitment accompanies the seed and its derivatives through any and all transfers and exchanges. 'Open source' seed packages are labelled with open source seed pledges or licenses.

Hivos and Bioversity International are jointly implementing a programme funded by Open Society Foundations and the Benefit Sharing Fund of the Plant Treaty (ITPGRFA) to increase farmers' access to climate smart crops and crop varieties with the help of an open source seed approach. Three types of activities are central in the programme: building viable business cases for open source seed systems; strengthening an emerging global alliance through joint research and learning, and accelerating change in public policy orientation through lobbying and advocacy for open source seed systems.

RECOGNITION, REGULATION AND STIMULATION

This brief, based on a literature review, examines how current seed policies and laws in Kenya, Tanzania and Uganda affect smallholder farmer seed systems. The brief concludes that smallholder farmers are affected by low levels of recognition of and support for their seed management practices. This is contributing to less and more fragile crop diversity in the field and on their plates. The report also suggests that the concrete, field level impact of the most relevant seed related policies and laws for the time being remains modest. What can be done to increase recognition and support of smallholder farmers as seed managers and custodians? Recognizing the potential role of farmers in improving diversity through selection and breeding is crucial. Diversity and resilience can be harnessed by more people selecting and developing new varieties and by ensuring that those new varieties remain accessible for future use.

HIVOS and Bioversity International encourage all readers to join in the current debates on the future of seed management and to explore the possible contribution of open source seeds to more resilient and diverse food systems.

Anne Majani, Willy Douma, Hugo Verkuijl - Hivos

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1. SEED POLICIES AND LAWS IN KENYA, TANZANIA AND UGANDA

This brief examines how current seed policies and laws in Kenya, Tanzania, and Uganda affect smallholder farmers' practices in terms of seed selection, saving, and storage; replanting¹ or multiplication; sharing; improvement; and marketing. The examination is based on three measures: the degree of **recognition** of the roles and rights of smallholder farmers related to seed management; the degree to which policy and legal **regulations** facilitate smallholder-based seed management; and the level of **support** (moral, technical, and financial) such regulations provide for smallholder-based seed management. Together, these measures can be seen as a reflection of the degree of openness of a seed system. The current level of openness, as an approximate value, can then be compared with that of a completely open seed system.²

The brief concludes with some reflections about bottlenecks and opportunities for moving to more open systems. This work builds on other current research on the relation between seed policies and laws and agriculture/agricultural biodiversity/farmers' rights/food security (e.g., Currier and Karasapan 2015; Mahop 2015; Visser 2015)

¹ The (re)planting stage is of crucial importance in an open source seed system which is based on the principle of freedom to access any and all progeny/derivatives of a seed. The concept of open source seed system is discussed below. This paper pays attention to all the stages of the seed management process.

² The three dimensions could be scored in a number of ways. A simple method is to use three values per dimension: high/medium/low. This method will be tested in the paper applied to a number of field studies.

1.1 SEEDS IN A CHANGING SOCIETY

Estimates suggest that 60–80% of the seeds on which smallholder farmers in developing countries depend is saved on farm or obtained through informal distribution channels, such as exchanges between farmers, community sharing systems, and local markets. The exact volume of such seeds is not known, let alone their economic value, but the latter must run to billions of US dollars a year. What would happen if smallholder farmers stopped being custodians and exchangers of crop diversity? Women farmers, in particular, play key roles in farmer seed systems, although they are often overlooked by researchers and development personnel, policies, and programs.

This high level of seed autonomy among farmers masks the fact that, almost everywhere, local seed systems are under stress. Agricultural intensification and commoditization, privatization of natural resources (land, trees, minerals, water, seeds), and the strong concentration and expansion of corporate power in the life science industries (including the seed industry) are contributing to a decline in collective local management of plant genetic resources for both conservation and sustainable use. Part of this decline is seen in the breakdown of the traditional practices of seed exchange based on kinship and friendship. (For a critical review of developments in Africa, see AFSA and GRAIN 2015.)

Many farming households have become more individualized in terms of decision-making and deployment of knowledge, labour, capital, and seeds. Farming practices are becoming more market-oriented, and this increased involvement in markets has both benefits and costs depending on local context. Large-scale, rural-to-urban migration is contributing to a



decline in farming in many countries or transforming small-scale family farming into contract farming. It is also leading to the feminization of agriculture, increasing the workload and responsibilities of women in many regions. These trends are affecting local seed production, selection, storage, distribution, and exchange practices, as local varieties are replaced with hybrids that can be easily purchased at local markets.

Other important changes in the agricultural sector are also taking place. For example, in many countries, public support for plant breeding is declining. This trend is not helping smallholder farmers, as the effectiveness of public plant breeding in terms of responsiveness to smallholder farmers' needs and interests leaves much to be desired. (For a non-African example, see Song and Vernooy 2010.)

1.2 TOWARD NEW REGULATORY SYSTEMS

In Africa, many national governments and a number of regional organizations are working on initiatives to change policies and laws related to seeds, modeling rules and regulations on the convention of the International Union for the Protection of New Plant Varieties (UPOV 1991), which offers strong protection of breeders' rights. However, under Article 15, farmers may exchange and save seeds of their own crops for propagation on their own holdings and seeds of crops with a history of such seed saving. The regional organizations active in this regard include the African Regional Intellectual Property Organization (ARIPO), the Common Market for Eastern and Southern Africa (COMESA), the Economic Community of West African States, the Organisation Africaine pour la Propriété Intellectuelle, and the Southern African Development Community (SADC).

ARIPO has spearheaded the development of a draft harmonized plant variety protection law, which was approved as compliant with UPOV 1991 by the UPOV Council on 11 April 2014. Civil society organizations have voiced their concern about this development, stating that this initiative is not supportive of smallholder farmers' seed systems (AFSA and Grain 2015). Others argue that countries and regional organizations that plan to become members of UPOV and draft a national plant variety protection law based on the UPOV 1991 convention can still create legal space for smallholder farmers and their traditional seed management practices. One important way to do this is through a "private and non-commercial use exemption," which has not been defined in the UPOV 1991 convention (de Jonge and Munyi 2015); however, these authors do not offer an example of how this could be done.

National seed laws can have a positive or negative impact on smallholder farmers and their seed systems. For example, they can set high standards (with related cost implications) for the registration, quality control, certification, and sale of all types or certain types of seeds, effectively restricting access to and availability of those seeds (Visser 2015). In Kenya, Section 14 of the recently adopted Crops Act, 2013 (Kenya 2013) grants farmers the freedom to register for purposes of economies of scale with a cooperative, factory, outgrower institution, processor, or other association as determined by the Agriculture Fisheries and Food Authority. The same legislation requires dealers, who may include smallholder farmers, to use an obligatory licensing system when they collect, transport, store, buy, or sell certain crops or crop products (the "scheduled crops" listed are beans, finger millet, and sorghum; Section 16(1)). The same act stipulates that the government shall "establish experimental stations and seed farms for the development of varieties suitable to the agro-climatic conditions of the area and markets that will provide greatest added value to scheduled crops" (Section 8(ii)). A recent desk study of 42 national and regional seed regulations from 25 African



countries concluded that African seed laws provide few opportunities to the informal and intermediary seed systems (maintained by smallholder farmers) and only modest recognition of their importance in supplying seeds to smallholder farmers (Mahop 2015).

Not only are seeds regulated by national policies and laws, but, over the last 25–30 years, access to and benefit-sharing of genetic resources (including seeds) have also become subject to international law. Key pieces of legislation are the Convention on Biological Diversity (<https://www.cbd.int/>) and, under it, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (<https://www.cbd.int/abs/>), as well as the International Treaty on Plant Genetic Resources for Food and Agriculture (<http://www.planttreaty.org/>). As countries sign these agreements, they are establishing policies and laws to implement them, not only with respect to genetic resources, but also agricultural biodiversity and seeds. Some countries are taking a long time to do this. Systems also vary in terms of control, compliance, monitoring, and enforcement of rules and regulations, and opinions differ on whether international agreements actually support smallholder seed systems (see Farming Matters 2016).

Access and benefit-sharing apply to seeds, but they also relate to the knowledge that generations of farmers and cultivators have invested in growing, conserving, and improving crops. For many local farming communities around the world, seeds also have religious, ethical, spiritual, and sociocultural meaning and values. For those farming communities, seeds are living entities and intrinsic elements of the environment on which we all depend. Acquisition of seeds, therefore, requires recognition of and respect for the local agricultural practices that have led to the development and improvement of agricultural biodiversity over a long period.

1.3 TOWARD NEW SUPPORTIVE SYSTEMS AND PROGRAMS

Climate change has begun to put additional pressure on farmers' seed and food production systems and on the multiple functions they fulfill. Although, in many areas, farmers continue to maintain crop diversity, a significant reduction in the number of crops and crop varieties as well as area planted with diverse crops and varieties is occurring. Future impacts of climate change are expected to become more pronounced in many parts of the world, forcing farmers to change their practices and causing them to search for information about crops and varieties better adapted to new weather dynamics. It could be argued that giving farmers better access to crops and crop varietal diversity will strengthen their capacity to adapt to climate change (Vernooy et al. 2016), and creating such space for farmers could be made easier by supportive national policies and laws.

Another area where support could play a key role is in the production of quality seed. In a recent study of seed systems in Tanzania, 80% of surveyed farmers mentioned that training in seed production using their own saved seed was a major type of support they would like to receive from government and research organizations; such training would include selection, multiplication, storage, and protection (Tanzania Organic Agriculture Movement 2015). The authors of this study recommended that the government of Tanzania revive its quality declared seed (QDS) program, which seems to have withered in recent years, although in some areas district extension officers contend that they continue to offer training in QDS production to farmers, including seed handling, marketing, and postharvest handling (p. v). Surveyed farmers' main reasons for purchasing seeds (mostly maize and vegetable seeds and, to a small extent, groundnut, rice, sesame, sorghum, and sunflower) from formal sources, in order of importance, were high yield, drought resistance, pest and disease resistance, and early maturity (p. 30). This information might indicate the key challenges in their own seed production practices.

Some projects and programs implemented by national and international research and development organizations are already engaging communities as partners in national conservation efforts.

Examples include

- fostering the collaboration and the exchange of seeds and related knowledge with the national gene bank
- creating biocultural heritage areas that promote the conservation and revival of native crops and crop varieties and related traditional knowledge and practices
- supporting legally protected farmer seed production and commercialization enterprises based on the improvement of local varieties
- establishing formal agreements between farmers and breeders on the distribution of monetary and non-monetary benefits derived from collaborative activities, such as participatory plant breeding (Song et al. 2016)
- setting up community biodiversity management funds to promote the conservation and sustainable use of local varieties (de Boef et al. 2013)
- establishing and supporting community seed banks with multiple functions (Vernooy et al. 2015)
- developing a strategy toward open-source seed systems (Bioversity International 2014; HIVOS and Bioversity International 2015; Open Source Seed Initiative, 2016)

Established in May 2012 and based in the United States, the Open Source Seed Initiative (OSSI), is likely the longest operating organization of its type. It aims to offer a new way to save and exchange seed that ensures it will remain free of patents, licenses, and other restrictions

on freedom of use. This method of accessing seeds involves commitment to a pledge, which reads: "You have the freedom to use these OSSI-Pledged seeds in any way you choose. In return, you pledge not to restrict others' use of these seeds or their derivatives by patents or other means, and to include this Pledge with any transfer of these seeds or their derivatives" (OSSI 2016). Second, OSSI maintains a list of crop varieties that have been pledged as "freed seed" and provides a link to sources of those varieties. Third, OSSI raises awareness of the importance of keeping seeds unencumbered from legal restrictions and free to be used, shared, saved, bred, and sold. How plant breeding is financed and integrated in open-source systems, in the absence of public-sector involvement and/or support, remains a serious challenge (Lammerts van Bueren, personal communication, 5 May 2016). Some innovative ideas are being developed to respond to this challenge, such as an open-source seed licence (Kotschi and Rapf 2016).

1.4 FROM MORE CLOSED TO MORE OPEN SEED SYSTEMS

Many smallholder seed systems encompass the following interrelated components: seed selection, seed saving and storage, seed replanting, seed sharing (through exchanges with family, kin, friends, neighbours, fellow members of organizations or associations), seed improvement, and marketing. Usually, in this cycle, farmers themselves take care of seed quality control in one way or another and to some degree of strictness (unfortunately, this is an area that has not been well researched). However, most often they do not use formal rules, such as those prescribed in seed regulations at international and national levels.



For most smallholder farmers around the world, availability, affordability, and reliability are important criteria when it comes to seed selection. Other factors include potential yield (considering local conditions), pest and disease resistance, and “good taste” as defined by the household in the first place and local consumers when produce is marketed.

The activities of smallholder farmers are mirrored in the formal seed system where seeds flow from gene banks (*ex situ* storage), to breeders, to seed producers, to quality-control agencies, to distribution channels, to end-users (farmers). Smallholder farmers all over the world depend on access to and availability of diverse seeds in quantities that satisfy their needs and are of good quality. In some countries in recent years, “fake” seeds have made strong inroads, and farmers have been duped as a result.

International agreements and national policies and laws influence, at least in theory, one or more of these components of smallholder farmer seed systems. From the point of view of the viability of those seed systems, this influence can be categorized and measured in three ways: from more to less recognition of the roles and rights of smallholder farmers in relation to seed management; from more to less restrictive regulations concerning the cycle of smallholder-based seed management; and from more to less support for the smallholder-based seed management cycle. The degree of openness can be defined as a composite of these three measures.

Based on this analytical construct, how do our countries of interest score on each of the three measures: recognition, regulation, and support? How do current seed policies and laws, *in practice*, in Kenya, Tanzania, and Uganda affect smallholder farmer seed selection, saving and storage, replanting, sharing, improvement, and marketing practices? If the degree of openness is limited, what is needed to move to more open systems? Based on a limited number of references, the current situation in these three countries, which are members of the African Union³ and the East African Community,⁴ is described below.

³ The African Union has developed model legislation for the protection of the rights of local communities, farmers, and breeders and for the regulation of access to biological resources (OAU 2000).

⁴ The East African Community is developing a harmonized seed policy and a protocol on sanitary and phytosanitary measures for seeds.

2. KENYA: A NEW INSTITUTIONAL FRAMEWORK IN PROGRESS

Kenya's National Seed Policy is dated 2010. An important piece of related legislation is the Seeds and Plant Varieties Act of 2012 (with a 2015 amendment underway) and earlier versions. The 2012 amendment brought the legislation in line with UPOV 1991.

Kenya acceded to UPOV 1991 in spring 2016. According to Braunschweig et al. (2014), this resulted in broadening of the scope of protection of breeders' rights, but further restriction of the rights of farmers to freely use, sell, and exchange seeds. The amended act allows farmers to propagate the products of their harvest on their own farm, including protected varieties. It has specific provisions for variety registration and seed certification. International and national breeders have made ample use of the act and have obtained over 800 plant breeders' certificates, mostly for ornamental crops and, to some extent, for maize and wheat (Braunschweig et al. 2014: 23). Otherwise, the act does nothing to recognize or support smallholder farmers as seed producers and traders (Mahop 2015). Kenya is a member of COMESA and that organization's binding Seed Trade Harmonized Regulations (adopted in 2014) will likely lead to a revision of Kenya's Seeds and Plant Varieties Act to align it with the regional framework.

Kenya's constitution (Kenya 2010) also has two relevant provisions:

- Article 11(3)(b) — "Parliament shall enact legislation to... recognise and protect the ownership of indigenous seed and plant varieties, their genetic and diverse characteristics and their use by the communities of Kenya."
- Article 69(1)(a) — "The state shall ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits."

Kenyan smallholder farmers rely heavily on the informal seed sector to obtain 75–100% of seeds of their major crops, except for maize and rice. Although not formally registered as seed producers, farmers produce seed of most open-pollinated varieties of cereals and grain legumes, and they reproduce crops vegetatively. Farmers procure hybrid maize from private and public companies and rice from public companies (e.g., Braunschweig et al. 2014: 25). Other important ways in which farmers' seed systems are connected to the formal system are through a number of participatory crop improvement projects and through the acquisition by farmers of improved varieties from government demonstration and experimentation fields (Braunschweig et al. 2014: 29). Although participatory crop improvement could be seen as formalized collaboration, obtaining seeds from fields appears to be ad hoc and informal. Braunschweig and colleagues do not clarify whether there is effective implementation, monitoring, and reinforcement of seed-related policies and laws.

CASE STUDY: EAST AND COAST SMALLHOLDER FARMERS' SEED SYSTEMS IN PRACTICE (BASED ON MCGUIRE AND SPERLING 2016)

This study, which is based on the work of McGuire and Sperling (2016), presents findings of a comprehensive seed system security assessment in six countries including Kenya, where selected sites were in the east and on the coast. Completed in 2011, the assessment focused on seed availability, accessibility, and quality. In Kenya, interviewed farmers had acquired seed in recent years from the following sources (despite several decades of investment in strengthening the formal seed supply sector): local market 40.1%, own stock 36.2%, agro-dealer 11.6%, friend/neighbour/relative 5.7%, and government 5.1%. In both regions, farmers were found to invest relatively large amounts of household money in seed purchases, especially maize, green grams, and cowpeas. New varieties had been acquired from government 39.6%, agro-dealer 17.8% (note that agro-dealer networks in Kenya are well developed), local market 15.6%, nongovernmental organization (NGO)/Food and Agriculture Organization (FAO) 14.2%, friend/neighbour/relative 9.3%.

According to McGuire and Sperling (2016), this shows that new varieties will not spread fast or far, as the releases are mostly one-off and carried out as free aid interventions coordinated by government, NGOs, or the FAO. In terms of the policy environment, the authors conclude that across all six countries, there is a need to redress the imbalance and shift focus and support from the formal sector to smallholders for a more integrated seed system. One of the measures the authors suggest is investment in improved seed storage.

Assessment **East and Coastal Kenya smallholder farmers' seed systems**

COGNITION OF RIGHTS AND ROLES OF FARMERS	REGULATIONS BENEFIT FARMERS	SUPPORT FOR FARMERS
low	low	low
	<p>Farmers rely heavily on the informal sector, obtaining a high proportion of their seeds from local markets.</p> <p>Farm-saved seed reproduction not mentioned as an issue.</p> <p>Patents not mentioned as an issue.</p>	<p>Limited to one-off aid interventions.</p> <p>Farmers could benefit from improving seed storage capability.</p>

3. TANZANIA: FROM STATE TO PRIVATE SECTOR SEED DEVELOPMENT

During the last 25 years, Tanzania has moved from state-controlled agriculture and seed sectors to private-sector development in these areas. The 1989 National Seed Industry Development Programme marked the beginning of this change, as it allowed private seed companies to operate in the country. Currently, the private sector operates mainly in maize seed production and trade, importing hybrid maize seed and some sorghum hybrids (70% of all certified seed) (ASARECA/KIT 2014). Small local seed companies deal in sorghum, rice, legumes, and some open-pollinated maize varieties. The private sector is taking on seed quality services; the Société Générale de Surveillance (SGS), the world's leading inspection, verification, testing, and certification company, has established an office in Dar es Salaam (ASARECA/KIT 2014).

The Seeds Act No. 18 of 2003 (Tanzania 2003) and a 2014 amendment (under revision) focus on commercial farmers, but create space for smallholder farmers to produce and market QDS. The act is otherwise silent on farmers' rights to use, exchange, and sell farm-saved seed (Mahop 2015). There is some concern that the amendment under revision will make it hard for smallholder farmers to benefit from improved seeds while, at the same time, curtailing their right to reuse farm-saved seeds (Tanzania Organic Agriculture Movement 2015).

In 2012, Tanzania enacted a new Plant Breeders' Rights Act, which is in harmony with UPOV 1991 to which the country acceded in 2015. Currently, both the Tanzanian Seeds Act of 2003 and the Seeds Regulations of 2007 are under review to accommodate related legislation, such as the Plant Breeders' Rights Act, regional and international agreements, and the legal and institutional framework of the seed industry in Tanzania.

The review of the Seeds Act may have both a positive and negative impact on smallholder farmers' seed systems. Among the proposed amendments are stricter control of formal seed-sector quality ("fake" seeds are a very serious problem) and some modification of QDS regulations regarding production and marketing. What seems to be lacking is a proposal to exempt smallholder seed producers from the strict seed production regulations, as has been done in Ethiopia's Seed Law (Seed Proclamation No. 782/2013) (African Centre for Biodiversity 2016).

Unlike Kenya and Uganda, Tanzania is not a member of COMESA, but is a member of SADC. In 2008, SADC adopted Technical Agreements on Harmonization of Seed Regulations in the SADC Region (SADC 2008) — which covers seed variety release, seed certification and quality assurance, and quarantine and phytosanitary measures for seeds — but does not oblige its members to harmonize national legislation with regional decisions. It remains to be seen how the government of Tanzania will respond to these regulations. The SADC framework allows for registration of landraces and other local varieties in its variety database (thus implicitly recognizing that these varieties cannot be evaluated based on "distinctness, uniformity, and stability" [DUS] and "value for use and cultivation" [VCU] criteria), but not in the regional variety catalogue. The latter only allows varieties tested for DUS and VCU to be produced and marketed according to the regulations.

Tanzania has had a long-term, on-farm seed program supported by the government of Denmark. Under it, the formal seed sector initially supplies high-quality seed to smallholder farmers, who then multiply it on their own farms; the resulting seed is labelled "quality declared." The seed producers themselves are responsible for quality control (Monyo et al. 2004).



The Seeds Regulations 2007 set strict standards for seed quality, making it difficult for farmers to market their seeds. For example, for beans the requirement is 98% purity and 80% germination; maize 95% purity and 80% germination; rice 95% purity and 70% germination (Tanzania Organic Agriculture Movement 2015: 46).

The Plant Breeders' Rights Act, which replaces the Protection of New Plant Varieties Act No. 22 of 2002, complies with UPOV 1991 and does not support smallholder breeding efforts. Its aim is to promote plant breeding activities and stimulate and promote agricultural development. It accords strong rights to breeders in terms of saving, reusing, and exchanging the propagating material of protected varieties, whether these emanate from the private or public sectors. It does not restrict the rights of farmers, because the law provides for activities that are conducted privately and for non-commercial purposes, under Section 31(1)(a). Under Section 31(2), breeders' rights do not extend to farmers who propagate a protected variety on their own holding.

According to the African Centre for Biodiversity (ACB), the country's current institutional framework does not do enough to recognize farmers' rights and support flexible and adaptive seed quality control processes. ACB argues that exemptions are needed in the seed law for all uses of farm-saved seeds, that proprietary ownership should be removed from all seed once it enters the farmers' seed system, and that government programs and budgets should support farmers' experimentation and the improvement and development of farmers' varieties (African Centre for Biodiversity 2016: 20).

The National Agricultural Policy of 2013 encourages farmers to use improved seeds and provides support to purchase inputs. However, this policy recognizes that at present only about 10% of all seeds used are improved. It does little to recognize or support smallholder seed systems. QDS are allowed but can only be marketed at the local level, and producers and varieties must be registered.

Overall, Tanzania has a tight regulatory framework, at least on paper, with a focus on the commercial sector and little recognition or support for smallholder seed systems (ASARECA/KIT 2014).

CASE STUDY: MANGAE VILLAGE IN MOROGORO DISTRICT AND LAIKALA VILLAGE IN DODOMA DISTRICT (BASED ON WESTENGEN AND BRYSTING 2014)

This study by Westengen and Brysting (2014) on genetic resources, seed systems, and adaptation to climate change was carried out in two villages where maize and sorghum are the major agricultural crops and are expected to be under future climate stress, as agriculture in general is being affected by changing climate. Findings reveal that the local seed systems are made up of informal and formal elements and that most farmers obtain maize and sorghum seed mainly from informal sources: their own harvest and local markets being the most important ones. Formal sources supply only 24% of maize seed and 8% of sorghum.

Sorghum crops are mostly local farmer varieties; whereas improved varieties of maize, which enter through the formal system, are more commonly grown than local varieties. On-farm seed selection and recycling of improved open-pollinated maize seeds are common practices. Farmers combine local and improved maize varieties to cope with climate stress (drought in particular), while for sorghum they mainly use local varieties. The study does not mention the impact of policies and laws.

Assessment Mangae village in Morogoro district and Laikala village in Dodoma district Tanzania

RECOGNITION OF RIGHTS AND ROLES OF FARMERS	REGULATIONS BENEFIT FARMERS	SUPPORT FOR FARMERS
low	medium	low
	Farmers do not seem to be restricted in their seed activities. Patents not mentioned as an issue.	

CASE STUDY: SEED SYSTEMS STUDY IN EIGHT AGRO-ECOLOGICAL ZONES (BASED ON TOAM 2015)

This study by the Tanzania Organic Agriculture Movement (2015) reveals that smallholder farmers rely on the farmer-managed seed system as their main source of rice, groundnut, beans, and sunflower seeds, but, for maize and vegetables, they also turn to the commercial sector. Surveyed farmers mentioned that their reliance on their own seeds is driven by cost

and availability. However, they were not convinced of the quality of their own saved seeds. Although farmers reported being satisfied with farmer-saved seeds, they mentioned a number of challenges including seeds becoming affected by pests and diseases in the field and in storage and the shortage of seeds when crops fail.

Farmer-saved seeds receive little or no support from the extension service; on the contrary, extension agents encourage farmers to buy improved seeds instead. The study argues that such disregard of the importance of farmer-saved seeds is reinforced by the lack of recognition or support for smallholders in legislation and policy: the Seeds Act No. 18 of 2003 and the 2014 amendment, the Seeds Regulations of 2007, and the National Agricultural Policy of 2013. Farmers feel that they could benefit from training in seed production and more support from government and research organizations.

Assessment Eight agro-ecological zones in Tanzania

RECOGNITION OF RIGHTS AND ROLES OF FARMERS	REGULATIONS BENEFIT FARMERS	SUPPORT FOR FARMERS
low	medium	low
	Farmers appear to be under some pressure to purchase modern varieties. Patents not mentioned as an issue.	Farmers are interested to receive training in seed production.



CASE STUDY: THE NON-ADOPTION OF IMPROVED CROP VARIETIES (BASED ON HAUG ET AL. 2015)

This in-depth study (Haug et al. 2015), carried out in 10 regions and 15 districts, explores why relatively few farmers in Tanzania are using the improved crop varieties promoted by government and international donor agencies. The main reason mentioned by interviewed farmers was affordability in terms of both low profit and high risk. Another reason was lack of access to the agro-dealers who sell improved crop varieties. In addition, QDS are currently only available in a few places and in small quantities; farmers expressed interest in QDS because their cost is lower than that of hybrid varieties and their quality is acceptable.

The study points out that availability of farmer-preferred varieties is another limiting factor. The private sector is only interested in hybrid maize and neglects all other crops, thus seriously limiting farmers' options. Analyzing some of the underlying issues related to non-adoption, the authors argue that apart from high seed prices, lack of human and financial resources for policy implementation is a major factor. This includes insufficient support for integrating the formal and informal seed sectors, for example, through the outscaling of QDS production and the promotion of open-pollinated varieties (of maize in particular).

Assessment Seed system in 10 regions and 15 districts in Tanzania

RECOGNITION OF RIGHTS AND ROLES OF FARMERS	REGULATIONS BENEFIT FARMERS	SSUPPORT FOR FARMERS
low	medium	low
	Farmers are under some pressure to purchase modern varieties, but cannot afford/find them in most cases. Patents not mentioned as an issue.	QDS production remains marginal.

4. UGANDA: MORE ATTENTION TO FARMERS' SEED SYSTEMS

According to Dr. Karyeija Robert, the commissioner for crop inspection and certification, Ministry of Agriculture, Animal Industry and Fisheries, "The limited number of farmers or communities multiplying quality seed is a major constraint to agriculture in Uganda. At the moment, about 30 000 metric tons of seed are required annually for planting, yet only 10 000 metric tons of improved seed is produced. Dealers in poor quality and fake seed have taken advantage of this deficit. Multipliers of quality seed should use this opportunity" (ISSD Uganda 2015a: 5).

The Seeds and Plant Act, 2006 (Uganda 2007) and the draft National Seed Policy (Uganda 2014a) do not address the right of farmers to use, exchange, and sell their saved seeds. The draft policy aims to create a well-regulated national seed sector that ensures access and availability of seeds of high quality and planting materials produced in diverse seed systems. It is accompanied by the National Seed Strategy that defines tasks and activities and allocates budgets (IISD Uganda 2015a). The draft policy addresses the informal seed sector in a supportive sense: Objective 3 aims to enhance the production of quality seeds within the informal seed system (Mahop 2015). Uganda is a member of COMESA and, in the context of recent policy development, the government is expected to align the Seeds and Plant Act, 2006 with COMESA regulations.

The draft National Seed Policy includes a section about the recognition and promotion of QDS, which are not mentioned in the 2006 act. The Integrated Seed Sector Development (ISSD) Uganda program is supporting 30 local seed businesses that are producing QDS in 25 districts; these will have legal recognition by virtue of a provision in the draft policy that adds QDS as the sixth class of seed to be included in the Seeds and Plant Act, 2006. About 900 farmers in the northern, southwestern, and West Nile regions are members of the local seed businesses. In the first growing season of 2015, more than 1000 t of seed was produced and sold after certification by the national seed laboratory in Kawanda as meeting the minimum national standards for variety purity and germination rate (IISD Uganda 2015b).

Adopted in 2014, the Plant Variety Protection Act, 2014 was aimed at increasing the productivity, profitability, and sustainability of cropping systems (Uganda 2014b). The act recognizes and protects the rights of breeders to varieties that they develop and promotes the supply of good quality seed and planting materials; however, it does not recognize farmers' rights. Further, it is notable that the Industrial Property Act, 2014, Section 13, excludes plant varieties from "patentable inventions."

CASE STUDY: COMMUNITY SEED BANKING TO INCREASE THE RESILIENCE OF FARMERS THROUGH ENHANCED USE OF CROP VARIETAL DIVERSITY: LESSONS, CHALLENGES, AND OPPORTUNITIES

The following study is based on a presentation by Rose Nankya, Bioversity International Uganda.

The common bean (*Phaseolus vulgaris*) is an important crop in Uganda, where there is a richness of varieties. Studies of seed systems in Rubaya and Kabwohe indicate that most seed (average 86% in 2013) is obtained through exchange among farmers. The seed comes from multiple informal sources, in particular farmer-saved seeds, neighbours, and local markets. However, access to good-quality seeds is constrained by high costs, and lesser quality seeds lose vigour when replanted season after season.

To overcome some of these constraints Bioversity International and the National Agricultural Research Organization introduced community seed banks to Uganda. Seed banks can provide many benefits including securing diversity by bringing rare, traditional varieties back to the community; empowering farmers by building their capacity in seed quality management and production practices; creating networks among farmers, national gene banks, and breeders; and promoting farmers' rights through the sharing of seeds, technologies, traditional knowledge, monetary benefits, and their participation in decision-making.

For example, documenting seed supplies and exchanges at the Kiziba seed bank, which was established in 2010, demonstrates its importance as a source of seed diversity, especially following poor harvests. A study on angular leafspot disease demonstrated that growing a mixture of bean varieties increases protection from disease damage and results in higher yields.

The Kiziba seed bank is seen as a success story, and it has gained recognition in other communities and some interest from local government. Despite this, it faces technical, financial, and legal challenges. Through the work of Bioversity International and partners, recognition of community seed banks has been incorporated into new draft policies on seeds and other plant genetic resources; however, there is currently little financial support from governments and no mechanism for registering landraces or farmer-improved varieties. This favours the marketing of improved registered varieties discouraging farmers from using, conserving, and adding value (through seed production and marketing) to seed diversity in local communities.

Assessment Seed system including community seed bank in Rubaya and Kabwohe, Uganda

RECOGNITION OF RIGHTS AND ROLES OF FARMERS	REGULATIONS BENEFIT FARMERS	SUPPORT FOR FARMERS
low (but growing)	medium	low (but growing)
Some recognition in new policies related to plant genetic resources for food and agriculture.	Farmers are not able/ allowed to register farmer varieties. Patents are not mentioned as an issue.	Kiziba receives some support from the National Agricultural Research Organization



CASE STUDY: WEST NILE REGION (BASED ON ISSD UGANDA DATA PUBLISHED IN 2015)

A 2015 study of seed system security in Uganda’s West Nile region, an area affected by the influx of refugees, indicates that for seeds, farmers rely heavily on their own sources and local markets rather than agro-dealers, social networks, community-based systems, or seed aid organizations (ISSD Uganda 2015a). Surveyed farmers said that price, timely access, and sufficient quantity are important factors that determine their choice of seeds. They expressed concern about the quality of seeds obtained at local markets and the high price of seeds sold by agro-dealers. Poor storage facilities, pests, and diseases were also mentioned as problems. Overall, farmers were satisfied with available varieties, including new varieties of cassava, maize, beans, and rice, but said they sometimes lack sufficient information about them; in other cases, they would like to be involved in selecting new germplasm. In terms of environmental stresses, farmers seemed to make good use of mixes of local and improved varieties; however, they faced challenges because of variable weather.

Assessment **Seed system in Uganda’s West Nile region**

RECOGNITION OF RIGHTS AND ROLES OF FARMERS	REGULATIONS BENEFIT FARMERS	SUPPORT FOR FARMERS
low	low	low to medium
	Farmers do not seem to be restricted in their seed activities. Patents not mentioned as an issue.	Farmers like to be more involved in crop improvement activities.

5. CONCLUSIONS

A cautious assessment of the brief fieldwork included in this paper suggests that, although in all three countries governments are strengthening seed regulatory systems, mainly toward the more restrictive end of the scale, smallholder farmers are far more affected by low levels of recognition and support for their seed management practices than by restrictive policies and laws. This may be a result of a combination of factors. The relevant policies and laws do not directly affect farmers' current practices; although they appear to affect these practices on paper, there is no effective implementation let alone enforcement. Supportive policies and legal measures have been suggested recently (e.g., in Uganda) and QDS has gained ground in Tanzania and Uganda, but a strong supportive policy and legal environment is missing.

From a farmer's perspective, the field studies clearly demonstrate that the top priority is timely availability, affordability, and improved access to good-quality seed of a portfolio of crops and crop varieties, including novel crops and varieties that are better adapted to the climate changes that are occurring. The field studies seem to suggest that such portfolios could include both farmer-improved and modern varieties. The studies also point to farmers' interest in taking part in crop/seed improvement activities at all stages of the seed management process from selection to marketing. Such involvement seems to be lacking in all three countries. None of the studies mention the patenting of seeds and the implications of this for smallholder farmers. At this time, smallholder farmers appear not to be hampered by patenting, but this could change over time.

Some of the studies suggest that both crops and conservation practices could be improved. Farmers in many areas are interested in participating in variety selection and plant breeding.

Tentatively, it seems that to create more open seed systems, efforts should not only be aimed at stopping the trend toward stricter regulatory measures, but also at designing and lobbying for the adoption of measures that lead to more recognition of and support for the seed systems of smallholder farmers. Such measures could also stipulate that civil society organizations with an interest and expertise in the subject of seeds, including farmer associations, cooperatives, and community seed banks, could play a key role in implementation of policies and laws.

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