

# Indigenous seed institutions in fragile communities

M. Misiko\*

Africa Rice Centre (AfricaRice), 01 B.P. 2031, Cotonou, Benin.

## Abstract

This paper reports findings of an ethnographic study on the role and resilience of small-holder seed institutions, and how they can be strengthened for seed security. Data were gathered through historical recounting, key informant interviews, focus group discussions, field observations and informal interviews. Findings show that family seed institutions had better capacity to produce, had critical collaborative links with each other that served to replenish seed stocks, and ensured long-term conservation (i.e. a form of indigenous 'seed bank'). Each family seed institution had centuries of accumulated seed traditions, passed on through successive apprenticeship and inheritance. While saving farm seed was the occupation of family institutions, networking for seed conservation was a communal service. The search for profit from seed quality was not prominent and support from the formal sector almost nonexistent. Intra-communal linkages served to share, develop and conserve expertise, practical knowledge on local social and ecological systems, long-established modes of seed preservation, and distribution. This is one critical means through which local communities endured war, climate change, fires and other threats. This study observed that the development of rural seed security requires seed quality *monetization* (relating quality of seed with price), support from formal seed and input sectors, and a functional seed framework that can guide seed system *maturity*. Whereas indigenous institutions cannot be relied upon exclusively for rice revolution, they are a socially acceptable and trusted starting point to bring immediate support to fragile livelihoods, anchored on their ancestral land and to facilitate locally sustainable rice-based farming systems.

## Introduction

Seed security — that is, the state in which farmers have access to sufficient quantities of seeds of their preferred varieties with adequate physical quality, at the right time of planting (Sperling and Cooper, 2003) — is a pipe dream for rice smallholders in the Democratic Republic of Congo (DRC). Here, the majority are poor and marginalized, most operate minimum input systems, and preserve their best harvest grains to be used as seed for the next season without strong risk mitigation. Farmers have recycled some seed varieties for hundreds of seasons (Misiko, 2010). In much of sub-Saharan Africa (SSA), the informal seed sector plays a dominant role because the formal seed sector is weak (MacRobert, 2009). Estimates indicate that 66–85% of seed used by resource-poor farmers in SSA is derived from informal systems (Monyo *et al.*, 2004; Tripp, 2001). This average may be higher in the DRC, where the formal sector is poorly organized.

The informal seed sector in the DRC receives little or no support from the government or the formal seed sector. Disregard for informal institutions has had detrimental effects on smallholder agricultural productivity and incomes, especially given that the formal sector is weak. When small-scale seed producers are supported and linked to stable foundation seed, they play an efficient role of improving access to seed among the poor, especially where there is limited interest of larger seed sector (Almekinders and Louwaars, 2002). Informal seed systems are better connected to smallholder livelihoods than are formal ones.

Most rice farmers in the DRC are smallholders facing natural, systemic and poverty-related constraints, including: (i) decreasing farm sizes; (ii) location on marginal land, with decreasing soil fertility; (iii) unavailability or inaccessibility of farm inputs including seeds of the varieties of their choice; (iv) nonexistent research and extension support services; and (v) inadequate integration with market structures, or weak market structures that cannot sustain rapid expansion in rice yield. These farmers are reliant on depreciating age-old linkages, and lack necessary organization for improved seed handling and distribution. Penrose-Buckley (2007) indicates that farmer organization and cohesive self-help groups/producer organizations with skilled membership (both female and male) with different productive economic assets (land, farm implements, stock, etc.) and human and/or social capital (skills and social network) are critical in such seed systems. These organizations need support from local extension or large farmers, formal institutions, NGOs and traders (Almekinders and Louwaars, 2002; Jones *et al.*, 2001).

The objective of this study was to investigate the role and resilience of smallholder seed institutions in the DRC, with the goal of strengthening them for smallholder seed security. Using data from Yangambi area in central DRC, this paper illustrates that local seed institutions may be useful platforms to speed farmer access to new rice seed and sustain productivity in the most challenging social environments.

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\* Email: [m.misiko@cgiar.org](mailto:m.misiko@cgiar.org).

## Methodology

In-depth interviewing of 10 key informants and field visits in Yangambi yielded detailed ethnographic data. Five of the 10 key informants were over 60 years old, and provided detailed historical accounts of what happened, especially biotic and abiotic catastrophes, fires, social distress and wars. They had solid recollection of the history of varieties and roles of seed *custodians*.

Four focus group discussions (FGD) with 51 participants pursued four key themes: definition of indigenous seed institutions; their roles in the past and present in Yangambi; seed quality and *monetization* aspects; and going forward, e.g. training needs, formation of seed federations and linkages. We had several informal interactions that enabled us to gain a detailed and emic understanding of the community (Frankfort-Nachmias and Nachmias, 2005). Notes from informal interviews were written up and organized. The role of indigenous institutions was illustrated using the case of local rice variety R66. Notes from participatory varietal selection (PVS) interactions were also used to show local varietal perceptions and needs. These notes included results from pair-wise ranking of most fundamental varietal characteristics needed for communal survival.

Sampling was done through snowballing: staff of Institut de l'environnement et des recherches agricoles (INERA) provided names of four initial key informants (local seed producers); these producers then identified six others, who were also interviewed (Frankfort-Nachmias and Nachmias, 2005). This study occurred alongside project dissemination activities, a common feature of contemporary adaptive studies (Nagel, 1997).

## Indigenous seed institutions in Yangambi

In 2009, we identified several rice varieties in the DRC that had been planted for many years. The most remarkable was R66 in Yangambi, central DRC. According to the 10 key informants, R66 was introduced into the DRC by Belgian farmers in 1959, before independence. It was conserved through a set of indigenous and institutional arrangements that constantly evolved via indigenous innovation and had minimal linkages with the outside. This variety was conserved through farm-saved seed, especially in normal times. However, it survived numerous catastrophes including flooding, droughts, wars, diseases and fires. It was the mix of varietal vigor and rare local skills and knowledge that ensured that R66 and other varieties escaped these perils and served local humanity throughout.

Those who produced seed of R66 and other local varieties had a greater duty than simply storing and distributing it for monetary gain. They were *custodians* of a community's lifeline. Seed such as R66 was conserved by these custodians — those who had accumulated knowledge and inherited skill to save seed, reproduce it and conserve it. The local skills and knowledge were created, adapted and shared among these seed caretakers for centuries. Sharing of knowledge happened more intensively among seed families. Seed families were those who possessed the most extensive and intensive knowledge on varieties and seed conservation techniques, had effective seed distribution networks, and even indigenous 'breeding'<sup>1</sup> skills. The most knowledgeable person would often be the wife of the man known to be a prominent seed producer. The man was, however, the community-recognized custodian of rice knowledge, and passed the expertise on to his sons through apprenticeship. When a son married, his wife learned most the skills from his mother during the transition time when the young couple established their own family. Rare seed knowledge and skills were therefore family-institutionalized affairs, carried forward through successive apprenticeship and inheritance along family lines. These families had comparatively better capacity to produce and/or share, and commanded trust among local seed recipients. These family-determined seed traditions have persisted to the present, though they are significantly weaker and less well known than in the past.

## Attributes of indigenous seed institutions

The most critical knowledge and skills were required following disasters. Collaboration was critical when seed was destroyed from one custodian's storage by fire, or when widespread flooding, rice disease, drought or any other calamity occurred. This would lead to balanced barter exchange of varieties, or through age-old imbalanced reciprocity. In the latter, those with a sought-after variety were expected to share it, with the expectation of a payment later. This resulted from strong linkages among family institutions (i.e. seed custodians) alongside their other relations or social linkages. Seed custodians within each lineage had therefore formed enduring social seed relations of 5–10 households (i.e. seed family institutions) that served several purposes within local cultures. The principal underlying commitment was collective survival, and a 'social' responsibility as demanded by culture. These tactics were crucial in times of war and social distress.

When the well-suited Jasmine rice was introduced in the 1970s, it was these socially institutionalized relations among seed custodians that distributed it and ensured rice diversity. The success or failure of these

<sup>1</sup> Seed characteristics of R66 variety were observed to change over time as a result of deliberate and inadvertent processes. For example, long-term growth of the variety in distant villages and deliberate exchanges were thought to improve the variety.

seed institutions was defined by factors that were important to the community, and not based on business models. Some of these factors are similar to modern seed enterprises, but differ in fundamentals (Table 1).

**Table 1.** Underlying success attributes of different types of seed institution

Attribute	Formal seed enterprises	Indigenous institutions
Trust	Certification, clean seed	Long-held tradition, surety of seed
Flagship variety	Essential for sustained sales, new markets	Necessary for community survival
Added advantage of varieties	Wide choice of characteristics, e.g. disease, taste. Have access to inputs	Limited due to few varietal choices, poor access to inputs to improve seed
Competition	Open, fierce, dominated by state or companies	Collaboration, reciprocity, ‘serendipity’
Linkages	Social, technical (institutional), local, outside	Social and mostly communal
Reputation	Reliability, based on quality of seed, company brand	Reputation based on guaranteed access to seed, community service
Law	Certification	Custodial community obligations
Proximity	Essential, but can depend on modern distribution networks	Necessary, community access is critical
Adaptiveness	Responsive to client preferences, i.e. adaptive responses, strong company structure	Responsive to community survival, strong social linkages
Advancement level	Product end — from research to customer, seed banks	Custodians of existing seed, little varietal development
Risk mitigation	Financial, technical knowledge, diversification (products, seed types, varieties)	Varietal characteristics, seed conservation, diversification (varietal), collaboration
Marketing	Critical, e.g. media, demonstrations	Word of mouth, visitation
Infrastructure	Elaborate	Rudimentary

Source: FAO–AfricaRice seed enterprises study (AfricaRice and FAO, forthcoming).

The underlying goal of modern seed enterprises is to thrive, while indigenous seed establishments are designed for survival (Table 1).

With the entry of research institutions, indigenous seed institutions seem to be retreating or taking up a different role, but struggling to monetarize their products like modern enterprises do. Indigenous seed custodians felt underprivileged in the face of research and formal institutions, and were ceding their role to ‘pretenders’ who traded seed for profit. The new cadre of local seed producers replacing indigenous ones are not well entrenched in culture and social systems, and are weak in community survival instincts and technical skills, yet there is more variability in the seasons and increased seed production risks than in the past. Emerging seed producers need to invest in different capacities. They need to take measures to have healthy asset–liability ratios, to control credit sales, to sustain good levels of liquidity, to maintain buffer stocks of seed to counter catastrophic weather conditions, and to take advantage of unexpected upturns in sales. They need to undertake personnel risks in the event of the departure or loss of employees. These fundamentals work on the converse logic among indigenous seed institutions. For instance, farmers relied on indigenous mechanisms to determine the probability of drought or catastrophe, and so knowledge was the key insurance against risk. These indigenous seed custodians knew when it was likely that the loss from drought would be greater. They therefore relied on two or three varieties not likely to have their flowering period at the same time as drought, and other mechanisms — preferred varieties whose seed was usually easier to conserve using traditional equipment or would withstand moist warm environments. These varieties were usually competitive against weeds and were low-fertility tolerant. Custodians had deep knowledge about preferred varieties, and the community trusted them to preserve seed. Preferred varieties were those that ‘yielded something’ in the most difficult circumstances.

### Beyond resilience

The basic instinct in the Yangambi resilient seed system was to survive challenges. For instance, they ensured low-fertility-tolerant rice was available in situations where mineral fertilizer was unavailable. There is a need to move beyond basic survival, which targets preservation or evolution of systems. For instance, the most important post-harvest characteristic of rice was seed conservation, while color, aroma, etc., mattered less.

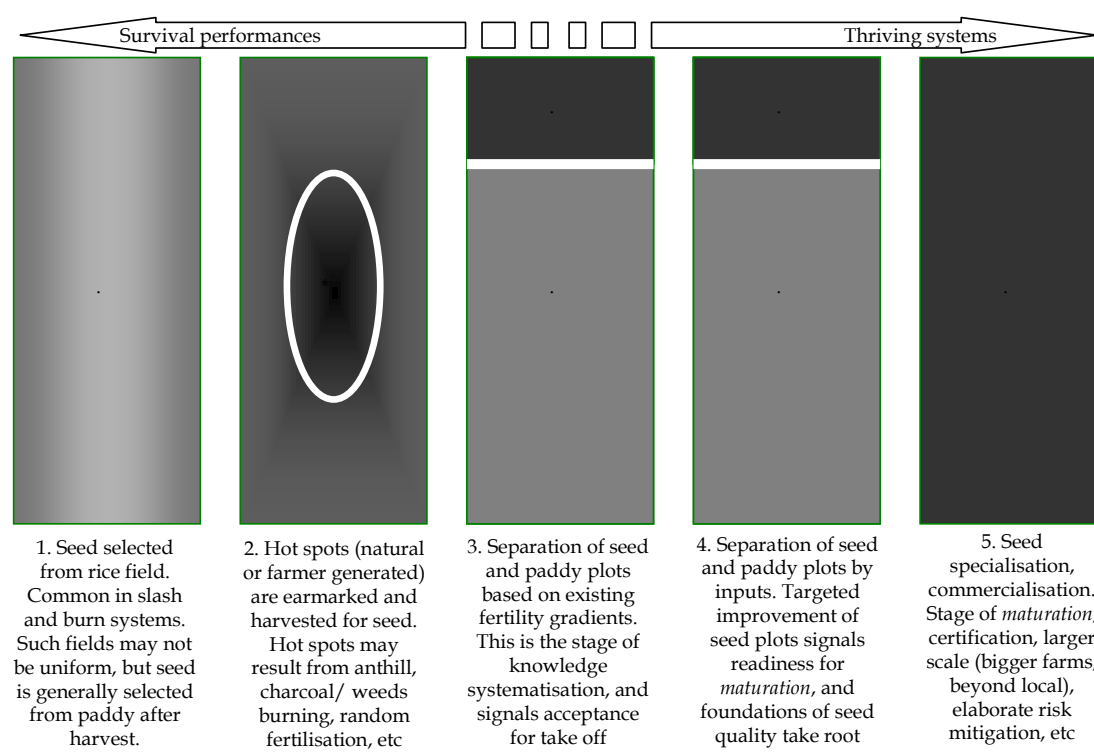
*The rice varieties we inherited from our fathers were limited, and so the skills to grow them were focused on preserving them. In the past, promotion of new varieties was limited, far and in between. Seeds that were left behind were sustained depending on their traits. However, as indigenous seed institutions were weakened, R66 was mixed with other varieties, which influenced its characteristics to*

*the extent that many seed custodians do not remember its original state.* (Kizenga, key informant from Yangambi).

The conditions under which these institutions functioned have changed. Current indigenous seed institutions will not ensure a thriving rice sector that meets new challenges. Social seed institutions will need to revolutionize their trade. First, there is a need for the monetarization of the local seed sector, a concept that is broad but necessary for successful rice development in DRC. Second, there is a need for strong support for these local institutions.

### Seed monetarization

One of the most obvious characteristics of indigenous seed institutions in Yangambi was their lack of incentive to invest in quality. Small-holders emerging from conflict and social distress prioritized survival. This is still the case in much of the DRC. Their immediate concern was seed that was tolerant to the difficult local conditions, one that they were sure about. The fundamentals of indigenous seed institutions are therefore not about thriving, but rather about resilience — to survive war, fire disasters or natural calamities such as drought or inundation. Pairwise ranking in FGD showed weed competitiveness, tolerance to low soil fertility, seed conservation and pests as critical for local systems (similar exercises in Guinea gave similar results). Besides the role of varietal traits, local rice production in Yangambi was characterized by the balance of ecological conditions and indigenous skills, unlike in mature seed systems that rely on specialized production processes and value chains (Fig. 1).



**Figure 1. An estimation of system maturation based on seed origins**

Source: Field data and Table 1.

Notes: Darker color = good crop; situations 1–5 are not necessarily linear progressions; Situation 3 is a manifestation of transition — a coexistence of informal and formal systems.

For the seed situation in Yangambi to mature, there is a need to focus on productivity conditions. There must be deliberate reduction of the effects of crop pests and diseases, soil fertility, improved storage skills and facilities, etc. Indigenous seed institutions need to seek fertilizer and invest in labor to weed so as to achieve meaningful seed quality improvements. This is where it becomes complicated. Meaningful rice production in the DRC cannot be achieved by having ‘perfect’ varieties, but rather by investing in seed quality to ensure the system matures (Fig. 1).

Quality is not entrenched among seed clients, and so seed producers or/and custodians were more concerned about surety of yield (43 of 51 respondents), and least about stability of sale price (4 respondents) or best price (4 respondents). Varieties like R66 fit in this category well, while NERICAs were unknown according to the

key informants. This means there is a need to develop better demand among small-holder populations, to ensure that seed quality is associated with a difference, so as to convince small-holders to pay for it as was beginning to happen in another site called Gimbi.

When farmers understood the efficiency of relying on good seed, they were prepared to pay for the difference in quality (Table 2).

**Table 2.** Prices of farm-saved and research foundation seed

Description	Source	
	Local small-holders	PNR fields
Local variety, e.g. Jasmine, Hubei (1 kg)	CDF 300 (\$0.4)	1200 (\$1)
NERICA 4 (1 kg)	CDF 300 (\$0.4)	1200 (\$1)
Seed-harvest ratio (NERICA 4)	1:12†	1:36

‘Local’ may mean any variety that is not newly introduced.

† Ratio is only an illustration, farmers generally use more than 80 kg of seed per ha.

As production grows, social seed institutions will need to move from seed selection as done by the majority (42 informants) to seed production as attempted by few (9 informants). Quality of seed selected from a paddy field is not guaranteed because of poor agronomic management, while those attempting recommended seed practices are struggling due to unavailability of, or limited access to, inputs. With increased capacity, seed producers will be more concerned with producing what is wanted rather than selling what they have. There is a need to develop demand (markets) for quality seed of local and new varieties, new food products and other rice products targeting urban as well as rural clients to enhance incomes for seed custodians. Seed market growth is determined by, and dependent on, the ability to produce seed and the preferences of the local populations.

Farmers who had had access to seed produced by the Agriculture Sector Support and Rehabilitation Programme (PARSAR) or the Food and Agriculture Organization of the United Nations (FAO) were willing to pay more (at least a dollar, Table 2) because they appreciated the value of quality. However, this needs to be entrenched in the other communities.

This seemingly obvious concept is not clear to or entrenched among small-holders. It is the role of researchers to illustrate clarity of connections between harvest and seed quality, especially through hands-on interactive learning (Misiko and Ramisch, 2007).

### **Building on age-old seed institutions**

Social seed institutions in the DRC operate with minimal formal support. They have survived many vagaries, including those that ravaged formal systems. It is obvious that formal systems have more to learn from these institutions, despite their weaknesses. Formal systems require continuous and robust support, linkages and space just to exist (even when dysfunctional), while indigenous social seed institutions function without elaborate investments, tax holidays, formal education, international value chains, etc. The underlying notion is that indigenous institutions address livelihood needs, not wants. However, small-holder needs are changing and so must these institutions.

### **Supporting indigenous seed institutions**

Small-holders in the DRC need new, appropriate genetic diversity and skills. These are being introduced through PVS, training and seed multiplication of varieties that are earlier maturing or withstand emerging challenges such as diseases, climate change, low soil fertility (David and Sperling, 1999; Jones *et al.*, 2001). However, there is a need to reduce the costs of both fertilizers and improved production technologies to ensure their availability and affordability to farmers. High-yielding varieties are needed to meet the demands of a post-war increase in population. This not only calls for new varieties, but leaves room for enhancing the performance of existing varieties. Such assistance should be extended to improving post-harvest handling.

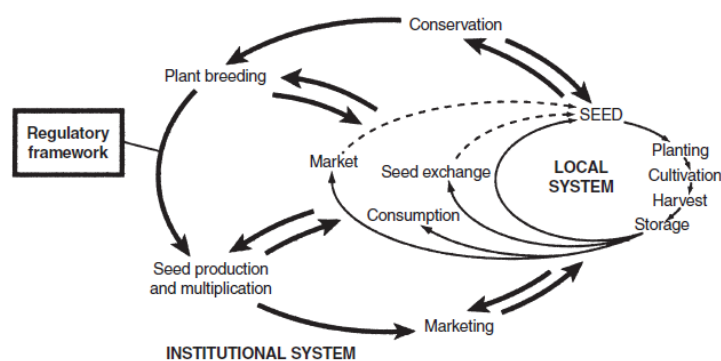
### **Community seed federations**

Community seed federations may be formed from existing or newly formed seed groups. These groups need to be helped to play advanced roles of self-regulation and distribution of rice seed. The seed custodial role of indigenous seed institutions needs to evolve into, or be supported through, community-based seed banks, to be implemented and sustained after training. Seed banks work on the same principle as indigenous custodial seed preservation. They need collaboration of key players similar to indigenous custodial seed networking, communal obligation, skills and knowledge sharing.

### Reverse benefits

Linking indigenous institutions to formal seed systems may indeed be more beneficial to the latter. In the DRC, formal institutions will benefit from indigenous institutions by learning how to re-introduce materials lost by farmers, benefiting from local knowledge in evaluation and selection of materials that interact with local environments better. Stronger local institutions can reduce the time it takes to develop efficient production and distribution of rice seed, which appears uninteresting to the private sector in the DRC.

'Formal seed system' in the DRC is, however, a vague reference. It is not based on seed certification, but rather on distinctions of educated players versus marginalized actors. The existing seed policy and lack of implementable regulatory framework and mechanisms mean that it should be feasible to integrate of what are perceived as formal and informal system (Fig. 2). Informal systems do not have strict regulations and so small-holders do not need huge investments to able to participate.



**Figure 2. An ideal arrangement that integrates local and the broader seed sectors**

Source: Almekinders and Louwaars (2002).

Most of the stakeholders referred to in Fig. 3 are nonexistent or weak in DRC, and so the entire seed system needs to be developed.

### Conclusion

The role of indigenous seed institutions in the DRC was (i) custodial — conservation and sharing of seed and skills, conserving and advancing varietal diversity; (ii) preserving vital knowledge, through apprenticeship, inheritance, innovation and infusion of outside knowledge; (iii) seed saving and distribution, especially through social networks. These ensured that communities survived social vagaries, war, natural disasters and accidents such as fires. However, the current agricultural needs call for the maturation of the local seed sector. This partly requires the monetarization of seed quality, the creation of new seed demand, stronger links between local institutions and research, and functional and accessible input sectors.

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