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IFPRI Discussion Paper 00819

November 2008

**Supply of Pigeonpea Genetic Resources in
Local Markets of Eastern Kenya**

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INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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ACKNOWLEDGMENTS

The authors thank Melinda Smale (Oxfam) for her time, careful review and valuable comments; Ade Freeman (International Livestock Research Institute) for helpful suggestions and Hannah Jones for helping in data management of this research paper. The communications division at the International Food Policy Research Institute (IFPRI) is acknowledged for its editorial services. Funding support from the Food and Agriculture Organization of the United Nations, the International Crops Research Institute for the Semi-Arid Tropics and IFPRI is also gratefully acknowledged.

ABSTRACT

Smallholder producers in marginal and semiarid areas of eastern Kenya have not benefited greatly from research investments made in improvement of crops grown in such environments (sorghum, millet, and legumes, including pigeonpea) either by the international community or the national agricultural research system because of poorly developed seed systems. However, informal and local market purchases are the major sources of seed for non-maize cereals and legumes. In the absence of any formalized seed system for dryland crops, more and more farmers rely on local markets to supply seed during normal and disaster periods.

We determined the factors affecting the quantities of pigeonpea traded by vendors during the 2006 short-rains season using simple OLS estimation. We found that the participation of traders and farmers was higher and traded larger quantities of pigeonpea in weekly markets located in areas where seed-based intervention programs in place than in non-intervention areas. Also agro-ecologically, markets located in slightly wetter regions offered more varieties and handled higher sales compared with marketsheds in dry regions. Among the traders, the grain traders dominated through their sheer volume of sales, higher investment, and storage capacity in these markets though the distinction between seeds and grains was poor. Of the vendor characteristics, young, educated vendors traded higher quantities of pigeonpea during the planting season. The amount of time spent selling by different vendors in the village fairs also had a significant influence on the pigeonpea quantity traded. Certain market infrastructure variables such as distance to the local markets and the access to information sources (mobile phones) also significantly influenced the amount of pigeonpea sold among vendors in these markets. The existing pigeonpea value chain in local markets could be improved further, provided proper synergies exist between different actors in the system. This would enhance local crop diversity levels as well as improve access to quality plant materials for farming communities in the marginal environments of eastern Kenya.

Keywords: local markets, village markets, seed systems, drylands, legumes, eastern Kenya

1. INTRODUCTION

Liberalization of agricultural input markets in Kenya since the late 1990s has enabled several international seed companies to enter the Kenyan market and more than 40 local seed companies specializing in seed multiplication and distribution to emerge. However, most are involved in meeting the needs of farmers in high-potential areas and marketing hybrid maize seed for which there is a regular demand and for which intellectual property can be protected biologically. Because of poorly developed seed systems, smallholder producers in arid and semiarid regions of Kenya have not benefited greatly from research investments made in improvement of crops that are grown in such environments (sorghum, millet, and legumes, including pigeonpea) either by the international community or the national agricultural research system.

In recent years, pigeonpea, a dryland legume crop, has provided cash opportunities to farmers in semiarid regions in Kenya through its increased export potential, as well as providing food, fodder, and fuel for local consumption. For non-hybrid crops such as pigeonpea, participation of the formal sector in seed provision is hardly evident. In the absence of any well-developed formal seed systems¹ for dryland crops, village markets play a key role in meeting the seed needs of farmers in these marginal environments (David and Sperling 1999; Tripp 2000; Jones, Audi, and Tripp 2001; Rohrbach et al. 2002; Sperling and Longley 2002; Sperling, Remington, and Haugen 2006). These local village fairs are active and resilient even after disasters, as evidenced in Rwanda and Somalia (Sperling 1997; Longley et al. 2001). There are several positive instances of the dissemination of modern seed varieties through farmers and village markets (Sperling, Loevinsohn, and Ntabomvura 1993; Witcombe et al. 1999; Jones, Audi, and Tripp 2001).

Village markets are locally organized, are conducted once a week, and serve as “exchange markets” where farmer-traders, especially women, bring their produce and carry out transactions to meet immediate cash needs (Nagarajan and Smale 2005; Sperling, Remington, and Haugen 2006; Smale et al. 2008). Apart from farmer-traders, vendors marketing products from distant sources and local grain traders also participate in weekly fairs. The vendors in the village markets are an important source of information about improved crops and varieties and associated agronomic practices, although their capacity is still limited. While some traders treat seed especially, there is not always necessarily a distinction between seed and grain. These markets are not monitored or controlled by government policies or regulations. Rather, they are guided by local technical knowledge and standards and by local social structures and norms. Unless part of a targeted development program, village markets serve large populations, covering a radius of 50 to 100 kilometers, thus facilitating increased exchange and access to genetic resources.

Makueni district is one of the three key pigeonpea-growing regions in eastern Kenya. Two-thirds of the district is categorized agro-ecologically under arid to semiarid regions and is frequently affected by droughts. Farmers grow pigeonpea intercropped with maize and beans. Makueni district benefits mostly from the short rains (October–November and less from the long rains received during February through May. Although the short rains are poorly distributed (less than 400 millimeters, on an average), they are more reliable than the long-rains season. Thus, farmers in Makueni district usually begin sowing major staple crops (maize, beans, sorghum, pigeonpea, and other legumes) during the short-rains season. Farmers, who do not have their own, saved seed from a previous harvest search for seed immediately after the first planting rain, generally during the first week of October.² Most farmers in the region use their own seed stocks for planting. However, because of frequent droughts that occur every three to five years in the district, farmers face chronic food and seed shortages. During such periods, farmers depend on local village markets for their seed and grain purchases. Furthermore, the village weekly fairs complement the existing seed intervention programs in the district. For instance, more than 70 percent of

¹ A seed system is “an interrelated set of components including breeding, management, replacement, and distribution of seed” (Thiele 1999).

² On average, it is estimated that farmers in eastern Kenya require nearly 1,300 tons of good-quality pigeonpea seed for planting during the short-rains season (personal communication with Dr. Paul Omanga, December 2005).

the seed distributed to farmers in “seed fairs,” an emergency seed relief program, were through weekly market vendors or actors.

In this study, we examine the role of village markets as the first node of monetized or commercial exchange of seed or grain that embodies genetic resources. The village markets are thin—that is, the distinction between grain and seed sales is almost absent. Despite the thinness, significant quantities of pigeonpea genetic resources are supplied through different types of vendors in these village fairs. For this purpose, we characterized the village fairs in detail, particularly with regard to different types of vendors and their behavior, transaction details, and the amount of genetic material traded during a major planting season, namely, the 2006 short-rains season.

The research that led to this paper contributes to the existing literature on village markets in two ways. First, we have studied in detail the various actors involved in village fairs and their roles in seed provision during the planting season. Second, by using carefully measured quantities of exchanges through vendors, we have determined the factors affecting the supply of crop genetic resources, especially during the planting season, taking into account the thinness of the markets we dealt with. Although our analysis is based on vendors who sold pigeonpea in the village markets, the results have broader implications with regard to other dryland cereals and legumes in eastern Kenya.

The survey methodology adopted for this study is described in Section 2. The survey findings are described in Section 3. The survey data allowed us to further test several hypotheses using simple, ordinary least squares (OLS) regressions about the factors influencing the exchange of pigeonpea genetic resources through different vendors in the village markets. Conclusions as well as some policy implications based on our findings are given in Section 4.

2. METHODS

The findings presented here are part of a larger research project. In 2004, the Agricultural and Development Economics Division of the Food and Agriculture Organization of the United Nations (FAO) initiated a research program to examine the relationships among farmer participation in local seed markets, utilization of crop genetic resources by farmers, and farmer welfare. The goal of the program is to identify public-sector interventions to support farmers' access to crop genetic resources in local seed markets. Five country case studies (Bolivia, Kenya, India, Mali, and Mexico) have been selected to facilitate comparisons between crops and levels of market development, building on previous research by team members. The overall methodology developed for all country case studies in the FAO project included analyses conducted at the observational scale of farm, market, seed sector, and national policy framework (Lipper et al. 2007). The survey on local markets, referred to here as "village markets," is one of the components carried out for the Kenya case study on pigeonpea. Here we have made use of those components of the methodology that are relevant to the study of local markets in eastern Kenya. These are presented in the following subsections.

2.1. Site Selection

The choice of the Makueni marketshed and the crop *pigeonpea* were based on reconnaissance surveys conducted in eastern Kenya during October–December 2005. Here we define "marketshed" as a real or potential trading network composed of a market center and interlinked market outlets, with an associated population living in a geographical area (Lipper et al. 2007). Specific sites or village fairs within the Makueni marketshed were selected based on agro-ecological characteristics and on the existence of village fairs (or village-level local markets) where seed and grain of both traditional and modern varieties of pigeonpea were traded on a regular basis. The selected sites represent zones 4 (semiarid, moderate) and 5 (semiarid, severe) based on the amount of rainfall received. In addition, village communities located around the study sites have benefited directly or indirectly from two major seed-based intervention programs over the last five years. In the first, the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) led the creation of producer marketing groups to promote improved cultivars of pigeonpea and chickpea, increase production, and stimulate marketing through farmer cooperation. In the second, the community-based seed production program of the Makueni Agricultural Project encouraged farmer groups to produce high-quality seeds, either for their own use or for exchange with other farmers in the community.

A total of seven village markets or sites were selected based on the above criteria. The selected village markets are located in Kalawa, Wote, Kathonzweni, Emali, Mulala, Sultan Hamud, and Kasikeu. These village fairs were conducted once a week, on a particular day of the week, namely, market day.³ The selected village fairs within the Makueni marketshed are summarized in Table 1. All were important sources of pigeonpea grain or seed during the planting period of the short-rains season in 2006. A detailed map showing various village markets located in Makueni district, which includes the selected 7 markets could be found in Figure 1.

³ Each village market has a specific day of the week that is considered "market day." We interviewed the vendors on that specific market day, just before planting season, during the 2006 short-rains season.

2.2. Vendor Typology

A detailed key informant survey was conducted among major village fairs in eastern Kenya during the 2005 short-rains season. During the survey we found six different types of vendors operating in the weekly fairs: local shopkeepers, farmer-traders (onetime traders and local farmer-traders), mobile traders, grain traders, and agro-vets. Agro-vets are the only formalized seed vendor type found in the village fairs, and they traded mostly agro-chemicals and seeds of proprietary origin for maize and vegetables. However, because they were not involved in pigeonpea sales, either as grain or seed, we did not include them in our analysis. The local shopkeepers and grain vendors traded all year round, making use of permanent infrastructure, whereas farmer-traders (onetime and part-time) and mobile traders traded only once a week during market days, under the open air, with no fixed infrastructure. Detailed descriptions of the vendor types follow.

Farmer-traders are those who brought small quantities of grain for sale as “seed” in village markets during the planting season. Farmer-traders are further classified as onetime traders, who participate only during the planting season, bringing their own farm produce to sell as seed. Farmer-traders especially use the cash they earn to buy other consumption and production items at the market. Usually during the planting season, there is a sudden increase in the prices of all crop grains in these markets as more farmers search for seeds/planting materials. The higher price is not related to quality or the type sold. Few of the farmer-traders who participated in these village fairs specialized in both farming and trading activities. However, they participated regularly in village fairs, during market days, for selling different produce from their farms or from neighbors in their communities. Almost 90 percent of the farmer-traders in these weekly fairs are female, as historically in the Kamba region women control the petty trading activities, especially in weekly village markets. The farmer-traders have a fair amount of varietal knowledge (if not by name), but in many instances, the physical quality of the products (both grain/seed) sold was very poor.

Mobile traders (market hoppers) are full-time traders, traveling to different weekly markets in the communities to sell grain and seed. They cover three to four village markets (small and large) within a 100-kilometer radius of their residence during and after planting season. They source mainly from other vendors in the weekly fairs and from farmers in and around their own communities. Mobile traders are not as knowledgeable as farmer-traders in terms of crops and varieties. As they travel across markets, they buy various kinds of seed or grain from different locations and disseminate them periodically in other markets. The major drawback of such exchanges is that, in many cases, the seed brought in from other markets might not be adaptable for the particular agro-ecology of the region. Hence, in most cases farmers were suspicious of the suitability of seed sold by mobile traders. However, during prolonged drought or stress periods, when seed is particularly scarce in farming communities, farmers depend mostly on mobile traders as they are the only alternative sources of supply.

Full-time resident retailers/traders own their own shops at the weekly market premises and engage in year-round seed and grain trading. They can be further classified as *local shopkeepers*, or retailers, who sell grain and seed along with other general groceries, and wholesale *grain traders*, who specialize in grain trading only. Most of the resident traders sold food grains year-round and specialized in seed sales during or before the planting season. They all have permanent shops either rented or owned inside the weekly market premises. The resident traders do not move across markets.

2.3. Sampling

The key informant survey conducted during the 2005 short-rains season served as the basis for final sample selection in the selected weekly fairs. Different sampling protocols were employed for traders with permanent structures who trade year-round and open-air traders who trade on a temporary basis with no fixed infrastructure. Just before the 2006 short-rains season (in August–September), we prepared a detailed inventory of the number of resident traders—namely, local shops and grain stores—located in all the seven selected village fairs who stocked and traded pigeonpea. There were a total of 100 vendors who stocked pigeonpea (either grain or seed) just before the planting season. We therefore adopted a census

sampling (100 percent) and included all the local shopkeepers and grain traders found in the seven fairs in the sample.

In the case of open-air traders, we adopted two types of sampling procedures—a census method and a probabilistic, random sampling method—to select the vendors in each fair surveyed on the weekly market day during the 2006 short-rains season. We conducted this procedure for two market days (spanning two weeks) in a row at the same market to capture the trends in seed purchases for the particular planting season. The survey was conducted at the onset of planting during the 2006 short-rains season.

On any specific market day, we counted all the open-air traders who brought pigeonpea either alone or with other crops for sale. We counted open-air traders between 11:30 a.m. and 12 p.m. during the peak time of trading in order to represent trader and buyer participation as completely as possible. In market locations where there were less than 15 participants per day we interviewed all traders (a census).

In markets where we counted more than 15 or more open-air traders who sold pigeonpea on the market day, we followed a simple procedure to select 50 percent of the total number of open-air traders participating on that market day. On a typical market day, all the open-air vendors, mostly women, are seated next to each other in one or two rows in specific areas allocated for open-air trading inside the market premises. For instance, if there were 30 open-air traders who participated and sold pigeonpea on a particular market day, we counted all of them and assigned numbers from T1 to T30. We then instructed the investigators to select the odd-numbered traders for the first 10 vendors (i.e., from T1 to T10), and in the next round, say from T11 to T20, to select the even-numbered traders. This procedure was adopted to create randomness in our sample. As most of the investigators could not understand the definition of random numbers or how to generate them instantly, we adopted the above sampling process.

A total sample of 167 vendors across seven village markets was surveyed during the 2006 short-rains season. In the final sample, we had a greater number of open-air traders and grain traders sampled from the Kasikeu, Emali, and Kathonzweni village fairs. The village markets of Wote, Kalawa, and Mulala had the least number of open-air trader participants. The Wote village market is also the headquarters town of the Makueni district and was governed by certain specific rules that restricted the participation of open-air traders. Kalawa and Mulala are smaller fairs in comparison with the other weekly fairs selected in the marketshed.

2.4. Instruments

The vendor surveys were conducted in October–November 2006—the months when the short-rains season typically begins. Each village fair was visited twice—that is, two market days in the two weeks immediately after the first rains. Cross-checking with local shopkeepers and grain traders was done during the subsequent weeks as they were available all year round in the markets. We implemented three sets of survey instruments among local shopkeepers and grain traders and open-air vendors in order to characterize vendors and vendor lots found in these weekly fairs. The vendor instruments were intended to capture information on the characteristics of exchange (where, with whom, price, quantity, timing), characteristics of the market (number of other buyers and sellers, products, location, varieties sold), frequency of transactions, and the physical and informational cost details.

At the second stage of our vendor survey, we collected samples of pigeonpea types (vendor lots) sold by vendors in the weekly markets. During the survey, the ability of traders to distinguish varieties affected the sampling strategy. Although traders reported some differences by color and grain size, visual examination of the grain (peas) in the sacks showed no appreciable differences. Among those who sold in the open air or the grain stores, the names were reported for farmer varieties only when sold by a farmer-trader or by a vendor who learned it from the farmer from whom it was obtained. This was also important in determining the sampling strategy for the seed lots.

To measure diversity within markets, samples were collected from each of the vendors that were surveyed in the market. Each sample is a “unique” variety as identified and sold by the vendor in the market on that particular day of interview. The unique samples, or lots, collected for diversity analysis

were based on the vendor characterization and not imposed by the investigator's perception. We also asked questions about varietal identity of pigeonpea sold by different types of vendors in the markets. This was followed by a detailed description of "product characteristics" describing each lot the vendors sold or stored in their shop. If, for example, during the interview, the trader says, "I have three bags with three different 'types' of pigeonpeas, namely, Kionzo, a farmer variety, Katoli, an improved variety, and a third variety whose name I am not aware of but I think is a mixture of unknown varieties," then the trader would be asked to describe the characteristics of all the three lots that he or she had kept for sale. Then, for the purpose of agro-morphological characterization trials, 250 to 500 grams of each of the three lots was bought from the vendor. Details of each sampled lot, such as name of the market, type of vendor, date of collection, variety name (as identified by the trader), and any other significant details regarding the lot were also recorded.

The seed samples collected from different types of vendors were subjected further to agro-morphological characterization by ICRISAT in two different experimental locations in Makueni district—namely, Kampi ya Mawe and Kiboco. However, for the purpose of this paper, we report findings with respect to trader-named varieties or types, as stated by vendors during market surveys.

3. FINDINGS

Here we present the results from the market and trader surveys conducted in October–December 2006 across seven weekly fairs in Makueni marketshed.

3.1. Institutional Characteristics

The village markets surveyed in Makueni marketshed are governed by several institutional factors that have contributed to the accessibility of crop genetic resources. Except for maize and in rare cases for sorghum, no other certified seeds were available in these markets. Although there are instances of sales of modern varieties of pigeonpea by vendors in the village markets, they were not certified.⁴ There are no provisions in the existing Kenyan seed laws to allow the sale of “truthfully labeled” or “quality-declared seeds” of open-pollinated varieties. However, there are no laws to prevent the informal sale of improved varieties by vendors in local markets. The operation of village markets is administered by a village committee, headed by the village chief, as well as traders and representatives from government departments. The functioning of village markets is governed by permits (i.e., market fees) for the conduct of sales inside the market premises (Table 2).

Table 2. Market fees and permits among vendor types in village fairs, Makueni marketshed

	Shops and grain stores			Open-air traders			All vendors	
	Shop-keeper	Grain store trader	All	Local farmer-trader	Onetime farmer-trader	Mobile trader		
n	64	36	100	30	23	14	67	167
Percentage of vendors								
Requiring a permit	98.4	100.0	98.9	90.0	86.9	100.0	91.0	95.8*
Having paid a fine after inspection	10.0	3.3	7.5	0.0	33.3	20.0	13.3	8.4
Mean								
Permit fee (Ksh)	3,318.8	3,433.3	3,360.0	294.4	28.0	27.9	145.9	2,142.2*
Fine amount (Ksh)	686.0	300.0	621.7	n/a	500.0	800.0	650.0	628.8

Source: Authors' survey, October–December 2006 from 7 markets, 167 vendors.

* Denotes statistical significance between two aggregated vendor types—namely, shopkeepers and grain stores versus open-air traders—by parametric (chi-squared/t-) and nonparametric (Kruskal-Wallis) tests at 5%.

Payment of a market fee is mandatory for all traders who participate in weekly markets. The amounts collected through market fees are used for the maintenance of market premises. The fee structure is based on sales volume and vendor type. Apart from this traders with permanent structures (local shopkeepers and grain traders) were required to pay licensing fee also to the local market authorities. Nearly all of the traders (96 percent) who participated in the weekly markets paid market fees, and amounts ranged from 10 to 40 Kenyan shillings (Ksh) per day, depending on the market. Eighty-five percent of the traders expressed that the official procedures were favorable for obtaining a license for trading in the village markets. Although inspection of sales during the market days and in other parts of the year is required by law, implementation is as low as 10 percent by the market administration. In rare cases, fines were imposed on vendors. Amounts charged ranged between 300 and 1,000 Ksh for irregularities in trading.⁵

⁴ Currently few improved legumes and cereals are sold by local market vendors, who source improved materials through either farm research trials or development programs implemented in their village communities.

⁵ The most common irregularities were poor sanitation in the trading premises—mice infestation—and presence of grain impurities (physical).

3.2. Vendors

The characteristics of the vendors are reported in Table 3. Statistical tests indicate that vendor characteristics vary significantly among vendor types, across markets. Almost two-thirds of all vendors were female. The proportion of women traders among open-air traders (96 percent) was higher than among shopkeepers and grain traders (58 percent). Historically in the Kamba region (eastern Kenya) women control the petty trading activities, especially in village markets. Open-air traders traveled an average distance of 5.8 kilometers to participate in these weekly village fairs. They traveled either by foot (56 percent of traders) or used public transport to reach markets.

The overall literacy rate among the vendors was 88 percent. Educational attainment was higher among shopkeepers and grain traders (10.3 years) than open-air traders (6.6 years). Almost all traders (98 percent) in the markets surveyed belonged to the *Kamba* tribe—the dominant tribe of eastern Kenya—and they spoke and conducted the trading mostly in their maternal language (Kikamba). Ninety percent of the traders also had working knowledge of Kiswahili, the official language of Kenya. The average age of the open-air traders was 44.2 years, compared with an average age of 39 years among shopkeepers and grain traders. Almost all traders (87 percent) who participated in these markets were residents of the community hosting the village fair. The rest belong to neighboring communities and are mostly grain traders, owners of local shops, and mobile traders. The resident traders either rented (56 percent) or owned shops inside the market premises.

Table 3. Vendor characteristics in village fairs, Makueni district, eastern Kenya

Vendor characteristics	Local shops and grain traders			Open-air traders			All vendors	
	Local shop-keeper	Grain trader	All	Local farmer-trader	Onetime farmer-trader	Mobile trader		
n	64	36	100	30	23	14	67	167
Mean								
Age	38.0	40.7	39.0	43.7	46.4	41.9	44.2	41.1*
Years in school	10.3	10.1	10.3	6.9	5.3	7.9	6.6	8.8*
Years selling in market	7.8	6.1	7.2	9.2	6.5	9.8	8.4	7.7
Number of pigeonpea varieties stocked	1.2	1.3	1.2	1.2	1.1	1.1	1.1	1.2
Number of crops sold	4.3	4.8	4.5	3.6	2.7	3.6	3.3	4.0*
Percentage of vendors								
Female	60.9	52.8	58.0	96.7	95.7	92.9	95.5	73.1*
Primary occupation								
Trader	68.8	80.6	73	36.7	17.4	50.0	32.8	56.9*
Farming	28.1	16.7	24.0	63.3	82.6	50.0	67.2	41.3
Others (teachers, service)	3.1	2.8	3.0	0.0	0.0	0.0	0.0	1.8
Ownership of assets (percentage)								
Bicycle ownership	29.7	22.2	27.0	25.0	44.4	12.5	27.3	27.1
Mobile phone ownership	43.8	55.6	48.0	43.8	0.0	25.0	28.1	43.2*
Radio ownership	9.4	11.1	10.0	18.8	0.0	25.0	15.6	11.4

Source: Authors' survey, October–December 2006, from 7 markets, 167 vendors.

* Denotes statistical significance between two aggregated vendor types—namely, local shopkeepers and grain traders versus open-air traders by parametric (chi-squared/t-) or nonparametric (Kruskal-Wallis) tests at 5%.

Open-air traders had more years of experience (8.4 years) selling in weekly markets than did shopkeepers and grain traders (7.2 years). The shopkeepers and grain traders needed more time to establish the minimum infrastructure for trading, which also depended on their financial status. The ownership of assets (radio, mobile phone, and bicycle) was higher among shopkeepers and grain traders compared with open-air traders. For instance, out of the 43 percent of the vendors who owned mobile phones in the total sample, the ownership by shopkeepers and grain traders was highly significant (nearly 44% of total sample owned). In recent years, given the absence of fixed landlines in many countries in Sub-Saharan Africa, the use of mobile phones has gained prominence among traders and farm households as a means of exchanging information within and outside communities (Aker, 2008). In their study of the impact of mobile phones in Sub-Saharan Africa, Waverman, Meschi, and Fuss (2005) found that mobile phones in remote, rural communities are increasingly viewed as community amenities that improve social networking by enhancing contacts, relationships with family and friends, and trading activities.

Increased investment in time and infrastructure further facilitated the shopkeepers and grain traders toward specialization in trading activities. Out of the total 100 shopkeepers and grain traders surveyed, 73 vendors specialized in trading and considered it to be their primary occupation. They also handled a greater number of crops for sale (an average of five crops) through their shops. All the local shopkeepers surveyed sold grain/seed along with other consumption goods (such as toiletries, vegetables, oil, and matches). The open-air traders handled fewer crops (two on average). Only 33 percent (of the total 67 open-air vendors) considered trading as their primary occupation, and the rest were engaged in farming.

The average number of hours conducting sales per week varied significantly among the trader types. The open-air traders spent less time (28.5 hours) compared with shopkeepers and grain traders (71.2 hours), especially during the planting season. The reasons are manifold. First, open-air traders, mostly farmers, have small quantities for disposal and participate only during market days. Second, most of the dryland farming operations are family labor based and farmers would like to take advantage of the soil moisture available immediately after the rains. The time spent on the farm is much more valuable than in the market; hence, farmers would like to dispose of their produce quickly in the markets.

3.3. Vendor Lots

We use the term “vendor lot” to refer to the physical unit of seed or grain sold by a vendor. A vendor may sell several lots corresponding to different types or varieties, each in its own receptacle. Table 4 summarizes characteristics of seed or grain lots sold by vendors in the Makueni district marketshed. A total of 198 pigeonpea lots were sold in these village markets during the 2006 short-rains season.

Of the total pigeonpea lots sold, local shopkeepers and grain traders stocked more lots (122) than did open-air traders (76). Vendors in the weekly village fairs reported selling the same “type of pigeonpea” for more than five years on average. The open-air traders had sold “named” types for longer time periods (5.5 years) than local shopkeepers and grain traders had (4.8 years). This should be interpreted with caution because the “named” lots sold by shopkeepers and grain traders were less authentic; in many cases, the grain traders did not know the identity of the lots they sold. Mixtures were also more common among the lots sold by shopkeepers and grain traders, as compared with open-air traders.

The total amount of pigeonpea sold across lots during the planting season varied significantly among vendor types in the village fairs. It is evident that local shopkeepers and grain traders sold more than open-air traders. For instance, during the normal season, the open-air traders sold only one-fourth of the amount sold by local shopkeepers and grain traders (130 kilograms versus 620 kilograms). The open-air traders are small-scale traders, conducting trading only on market days, compared with shopkeepers and grain traders, who trade all week and all year round. Among the open-air traders, the mobile traders sold larger quantities on average than farmer-traders. Although mobile traders participate only during market days, on any particular week, each mobile trader participates in more than one village market within the community, which translates into more market days than farmer-traders, who tend to

participate in only one weekly fair. However, during the peak season, all the vendor types sold an average of 16 kilograms per day, and there was no significant difference in the quantities sold among them. Traditionally, in dryland environments, farmers or farmer-traders participate in large numbers immediately after the first rains, and the transactions are always high among all trader types.

The average price of pigeonpea lots sold across seven village fairs over the last three years (i.e., 2004–2006) was about 29 Ksh/kilogram. The average lowest price of pigeonpea lots sold was 22 Ksh/kilogram (versus an average high of 40 Ksh/kilogram) and varied significantly among vendor types. The average low price obtained by open-air traders was lower (3 Ksh difference) than shopkeepers and grain traders in these markets (23 Ksh/kilogram). Often, during the planting season, open-air vendors dispose of their produce early in the day—that is, they settle for lower prices in order to get back to their farming operations. Among the vendor types, open-air traders mostly brought their own farm produce (74 percent) for sale to village fairs. Other vendor types procured pigeonpea from other farmers in their own communities and brought it for sale in the fairs. In the case of local shopkeepers and grain traders, their primary source of procurement is from farmers (62 percent) or sourced from their own farms (37 percent). Only 1 percent of the total sample (167) sourced their material from other traders, mostly from mobile vendors. In these village fairs, vendors stocked specific or named pigeonpea types for a number of reasons. For instance, 60 percent of the shopkeepers and grain traders reported that they stocked specific pigeonpea types because they were easily available in the local communities, whereas open-air traders stocked specific types because more farmers demanded them repeatedly.

During the 2006 short-rains season, we found 22 named varieties as well as unknown varieties and mixtures of known or unknown varieties of pigeonpea being sold by vendors across the seven village fairs. They are reported in Table 5. Out of the total sample of 198 pigeonpea vendor lots sold, 35 percent were identified as “mixtures of unknown varieties,” 21 percent were “Kionza,” a traditional type with medium duration, 8 percent were “Kikomo,” a local variety with a long growing period, and 8% were “Katoli #40,” an improved, medium-duration type. Of the named types sold, Katoli #40 and a local land race, Kionza, were found in all seven of the markets surveyed. In recent years, the Katoli variety has become popular among farmers as it yields more (fresh) green peas for an extended period of time (six months), in addition to producing higher yields of dry peas and having better pest-resistance attributes versus traditional varieties.

The maximum number of pigeonpea types (12 named plus mixtures) were sold in the Mulala market, and the least were sold in Kalawa and Wote markets (only two types in each). Mulala village is one of the few villages in Makueni district that has benefited from ICRISAT- and KARI-led farm demonstration trials over the last two decades, which may be one reason for the higher observed pigeonpea diversity. In general, it is evident that vendors located in village fairs in wetter regions (Mulala, Kasikeu, Emali, and Sultan Hamud) sold more pigeonpea types than those found in drier regions (Kathonzweni, Wote, and Kalawa). The fairs in wetter regions are much closer to Nairobi-Mombasa highway (2–15 kilometers away), which most likely further improved the marketing of peas. The ICRISAT-KARI research station, located in Kiboco, is also in the vicinity of the Mulala, Kasikeu, Emali, and Sultan Hamud village fairs. This also helped in rapid dissemination as well as increased availability of different pigeonpea types in the fairs located in wetter regions. ICRISAT also serves the dry regions of Makueni district through another research facility based in Kampe ya Mawe. However, excepting Kathonzweni, both of the other markets in drier regions (Kalawa and Wote) are located farther away and are connected only by poor road infrastructure. This also affects the diversity of pigeonpea types available in these fairs.

Table 4. Vendor lot characteristics

Vendor lot characteristics	Shops and grain stores			Open-air traders			All vendors	Sig. diff. (5%)	
	Shop-keeper	Grain store trader	All	Local farmer-trader	Onetime farmer-trader	Mobile trader			All
n	74	48	122	36	25	15	76	198	
Mean									
# of years variety sold by vendor	4.7	5.1	4.8	5.8	5.3	5.2	5.5	5.1	
Amount of pigeonpea sold (kg)									
I week immediately after rains in October 2006	44.4	64.0	52.1	28.8	18.8	46.3	29.1	43.3	*
Sold during short-rains season, October 2006 ^a	229.5	250.9	237.2	132.5	84.0	104.5	110.0	186.1	*
Sold during short-rains season, October 2005 ^b	51.3	85.3	63.6	34.5	19.6	49.6	32.5	51.1	*
In a normal year	651.8	315.0	518.2	132.5	109.7	161.1	130.5	371.1	*
In a bad year	216.6	209.3	213.6	69.7	44.3	76.4	63.0	149.7	*
Per day in peak season	16.1	20.5	17.8	12.0	16.2	15.3	14.0	16.4	
Price over the past three years (Ksh/kg)									
Average	29.1	31.1	29.9	29.2	27.0	28.9	28.4	29.3	
Low	22.1	24.3	23.0	21.5	18.9	19.9	20.3	21.9	*
High	39.8	40.7	40.2	40.6	36.5	43.3	39.9	40.1	
Percentage of vendor lots									
Primary source of pigeonpea types									*
Own farm	41.9	29.2	36.9	63.9	96.0	60.0	73.7	51.0	
Farmer	56.8	70.8	62.3	36.1	4.0	33.3	25.0	48.0	
Local trader	1.4	0.0	0.8	0.0	0.0	6.7	1.3	1.0	
Primary characteristics of vendor lots sold									*
Many farmers request it	23.0	37.5	28.7	50.0	44.0	60.0	50.0	36.9	
Farmers will pay a good price	4.1	6.3	4.9	8.3	8.0	13.3	9.2	6.6	
Easy to get locally	73.0	56.3	66.4	41.7	48.0	26.7	40.8	56.6	

Source: Authors' survey, October–December 2006, from 7 markets, 167 vendors, 198 vendor lots.

^a Total quantities of pigeonpea sold in the 2006 season are for 198 vendor lots.

^b Amount of pigeonpea sold in October 2005 short-rains season is an approximation of the quantity sold, as recalled by 166 vendors, during our survey.

* Denotes statistical significance between two aggregated vendor types viz. shopkeepers and grain store traders versus open-air traders—by parametric (chi-squared and t-) and nonparametric (Kruskal-Wallis) tests at 5%.

Table 5. Frequency of pigeonpea type stocked, fairs where sold, and sources of variety, 2006 short-rains season

Pigeonpea type stocked	Number of vendor lots	Markets where variety is sold	Number of markets	Sources of variety
Katoli	16	Kathonzweni, Wote, Mulala, Emali, Sultan Hamud	6	own farm/farmer
#777	4	Mulala	1	own farm
Kionza	41	Kathonzweni, Kalawa, Wote, Mulala, Emali, Kasikeu, Sultan Hamud	7	own farm/farmer/local trader
Mwiyumbi	2	Kathonzweni, Emali	2	farmer
Kikomo	18	Kasikeu, Sultan Hamud	2	own farm/farmer
Mukune	5	Kathonzweni, Emali	2	own farm/farmer
Katamani	8	Kathonzweni, Wote, Mulala	3	own farm/farmer
Mixture of unknown varieties	69	Kathonzweni, Kalawa, Wote, Mulala, Emali, Kasikeu, Sultan Hamud	7	own farm/farmer/local trader
ICEAP 00554	1	Kathonzweni	1	farmer
ICPL 87091	2	Kalawa	1	own farm
Bernard	1	Kalawa	1	own farm
Ilaa	1	Wote	1	own farm
Munovi	5	Mulala, Emali	2	own farm/farmer
Kari	2	Mulala, Emali	2	own farm/farmer
Ngamba	1	Mulala	1	farmer
Kinyaanya	1	Mulala	1	own farm
ICEAP 00936	1	Mulala	1	own farm
Unknown variety	12	Mulala, Emali, Kasikeu, Sultan Hamud	4	own farm/farmer
Mixture of known varieties	1	Mulala	1	own farm
Kithuku	1	Emali	1	farmer
Nzau	2	Kasikeu, Sultan Hamud	2	own farm
Kikuyu	1	Kasikeu	1	own farm
Ipusu	1	Kasikeu	1	own farm
Yumbu	1	Kasikeu	1	own farm
Kikundi	1	Sultan Hamud	1	own farm

Source: Authors' survey, October–December 2006, from 7 markets, 167 vendors, 198 vendor lots.

3.4. Transactions

As Table 4 shows, we found no significant variation in average prices of pigeonpea sold by the different vendor types in the weekly markets, since the prices were fixed on the commencement of each market day and all the vendors used the same prices (Smale et al. 2008).⁶ In some instances, farmer-traders accepted prices lower than the fixed price (2 to 5 Ksh lower) so as to dispose of their produce quickly through local shops or grain traders in the earlier part of the market day. Table 6 presents the major characteristics of the market transactions among the different vendor types. Eighty-seven percent of the vendors interviewed offered the same prices to all buyers (no discrimination); in very rare circumstances, discounts were provided to either friends or relatives.

Table 6. Characteristics of market transactions, 2006 short-rains season

	Shops and grain stores			Open-air traders			All vendors	
	Shop-keeper	Grain store trader	All	Local farmer-trader	Onetime farmer-trader	Mobile trader		
n	64	36	100	30	23	14	67	167
Percentage of vendors								
Offering the same price to all buyers	90.4	79.2	85.9	97.2	80.0	80.0	88.2	86.8
Providing credit	17.6	25.0	20.5	19.4	20.0	26.7	21.1	20.7
Obtaining no information about the seed lot	59.7	43.2	53.2	38.5	0.0	33.3	34.2	48.3*
Providing no explicit information about the seed lot to buyers	50.0	31.3	42.6	27.8	16.0	20.0	22.4	34.9*

Source: Authors' survey, October–December 2006, from 7 markets, 167 vendors.

* Denotes statistical significance between two aggregated vendor types—namely, shops and grain stores versus open-air traders—by parametric (chi-squared/t-) and nonparametric (Kruskal-Wallis) tests at 5%.

Across vendor types, 21 percent provided some kind of credit or advance to buyers, based on their trust and close association with the client. Credit provision was more prevalent among shopkeepers and grain traders than open-air traders. Fifty-three percent of shopkeepers and grain traders interviewed had no prior knowledge or information regarding the seed lots they sold. However, open-air traders had considerable knowledge about the seed lots sourced as well as exchanged. Most of the open-air traders are farmers and obtained seed or grain either from their own farm (74 percent versus 37 percent of local shopkeepers and traders) or from the farms of their neighbors.

With regard to grain quality control, 33 percent of the vendors adopted some way of differentiating grain from seed at sourcing. Traders differentiated seed and grain based on physical purity (size, color, and cleanliness of the produce). Among trader types, consciousness of quality was highest among open-air traders and grain traders (39 percent each). Only 12 percent of local shopkeepers were aware of the concept. Farmers in these marginal environments often found small packs of grain/seed more affordable for purchase with limited cash at their disposal. In recent years, the traders in the weekly village markets have taken the preference for small seed/grain packs into account, and the sales of small packs have become apparent. This practice is more recognizable among open-air traders (19 percent) than among grain traders and shopkeepers (14 percent), and thus among women vendors, who constitute the majority of this group. Farmers prefer the small packs for size and cleanliness of the produce, although the price difference is negligible (1 to 2 Ksh/kilogram).

⁶ We could observe during market day that prices are fixed in collusion; however, it was difficult for us to comprehend the collusive nature of prices among traders through our interviews.

3.5. Regression Analysis

During the planting season in the marginal environments of eastern Kenya, exchanges of pigeonpea genetic resources occurred through various actors and channels at village fairs. The quantity of pigeonpea supplied (exchanged) by vendors varied significantly in these village fairs. Getting precise information about the total quantity of pigeonpea traded for seed purposes among vendor types proved difficult. The reasons for that difficulty are manifold, including the following: (i) vendors did not differentiate between sales of seed and sales of grain during the planting season; (ii) open-air traders were active only during and just before planting or following a prolonged drought; and (iii) farmer-traders, in particular, participated only during weekly village fairs. To counter this imprecision, we took extreme care in estimating the quantity of pigeonpea sold across different vendor types that corresponded to demand for pigeonpea seed or grain during the short-rains season in 2006. The quantity traded was calculated approximately for two market days during the 2006 short-rains season (across two weeks), immediately after the first rains. For the open-air vendors, approximate quantities of pigeonpea sold were calculated for the market days in two consecutive weeks. However, getting responses from the same vendor continuously for two market weeks was difficult, as 60 percent of the vendors who participated during the first market week did not participate in the second week. Therefore, we cross-checked the estimated figures on quantity traded by all trader types with extension officers, the ICRISAT research station, and farmer groups for validation.

Our first hypothesis is based on the expected impacts of two types of seed-based interventions carried out in and around the farming communities located near the markets surveyed. The interventions aimed to develop and promote producer marketing groups and community-based seed production. In the regression analysis, we therefore tested the effect of market location in intervention areas on the quantities of pigeonpea sold. We expected that vendors in markets located in areas benefiting from interventions would offer more pigeonpea types, attracting more clients and selling greater quantities.

The second hypothesis concerns vendor typology—that is, the sales through three major vendor types (namely, local shopkeepers, grain traders, and open-air traders) within the same fair. We expected that grain traders would dominate other vendor types in terms of volume of sales, although the amount sold for specific (seed) purposes would be limited. Third, consistent with economic theory, we postulate that the quantity traded would respond to market price. Fourth, we hypothesized that vendor characteristics such as age (experience), education status (access to information/human capital), ability to differentiate the quality of the produce (knowledge), and amount of time spent in market (time of sales) would have a significant effect on the total quantity sold by vendors in the village markets. Quality consciousness among vendors could be an added price incentive. However, due to market imperfections in these rural markets, quality differences may not have a significant impact on the quantities sold. One could say that the price farmers are willing to pay for improved varieties, or high-quality seeds, is lower than the price at which the seeds are offered, particularly because a good low-cost alternative always exists—that is, farm-saved seeds.

Timely access to and availability of communication and infrastructure facilities (electricity, phone, public transportation, and roads) is vital for people living in marginal environments, providing them with the means of contacting others and participating in economic activities more efficiently. Here, we hypothesized that there would be a positive impact (if not significant) of the ownership of a mobile phone on the sales of pigeonpea among vendors.⁷ Another market infrastructure indicator that could significantly affect the supply of pigeonpea in these village fairs is their distance from major market centers.

Factors affecting the quantities of pigeonpea traded by vendors during the 2006 short-rains season are reported in Table 7. As hypothesized, vendors located in weekly markets closer to communities where there were seed-based intervention programs in place traded greater quantities of pigeonpea during the

⁷ There exists a significant, positive correlation between the amount of pigeonpea sold and traders (grain traders and local shopkeepers) who owned mobile phones. In the regression analysis, we tested for the exogeneity of the variable *ownership of mobile phones* and could not reject the null hypothesis.

season than those located in nonintervention areas. The vendors located in the village markets stocked more pigeonpea types than those in the markets located near communities with no seed-based development programs (Wote market). For instance, on the day of the market, we observed more pigeonpea sales among vendors located in Kathonzweni (56), Emali (53), and Kasikeu (41) markets, which were benefited by seed-based interventions. These markets were also ranked higher in the participation of more vendors. Therefore, one could infer that the participation of traders and farmers was higher in the weekly markets located in intervention areas.

Among the vendor types, open-air traders and local shopkeepers did not influence pigeonpea sales during the 2006 short-rains season. But grain traders in the village fairs dominated through their sheer volume of sales, higher investment, and storage capacity. However, it is not clear if they sold more seeds than open-air traders, especially during the planting season.

Of the vendor characteristics, education is statistically significant. Vendors with a higher education level sold more, as education correlates to acquiring more knowledge through increased access to and sources of information. The age of the vendor (i.e., experience) had a very minor impact on pigeonpea sales (less than 10 percent significance). One could observe that young, educated vendors sold greater quantities on market days during planting season. It should be noted that the average age of the vendors operating in these markets was 41 years. The vendors also preferred to sell in their nearby village markets as the traveling distance to their nearest big market center increased. The roads connecting village communities to big market centers are mostly earth type (85 percent) and poorly maintained. Availability of transportation was inadequate and expensive, costing 200 to 400 Ksh per roundtrip.

The amount of time spent selling by different vendors in the village fairs had a significant influence on the pigeonpea quantity traded. The vendors with more specialization in trading activities, such as shopkeepers and grain traders, sold slightly more (18 kilograms/day) than open-air traders in the village fairs (14 kilograms).

As explained in the previous section, the quantities sold were not responsive to expected prices as most of these prices were the same for different types of pigeonpea sold and prices were often fixed on the market day. However, from our discussions with vendors, we understood that the average price of pigeonpea sold during the planting season is 10 to 15 percent higher than at other times of the year. The ownership of mobile phones is not a significant factor influencing the sale of pigeonpea in the weekly markets. However, there exists a significant, positive association between mobile phone ownership by grain traders and local shopkeepers and its impact on pigeonpea sales in these markets, compared with open-air traders. Very few open-air traders (just 12) owned mobile phones in the sample. Further, our detailed informal discussions with traders also confirmed their perception that mobile phones had influenced their sales. It is also interesting to note that many open-air traders (30 percent) during the survey gave a mobile phone number as their point of contact, which denotes the growing interest in exchange of market related information among members in the community.

Thus it could be seen that vendor characteristics such as age and education, along with market infrastructure variables such as distance, selling time, and location of markets, are significant determinants of pigeonpea sales among different vendor types during the planting season in the communities in and around Makueni marketshed.

Table 7. Factors affecting total quantity sold by vendors during the 2006 short-rains season

Variable	Definition	Coefficient	Standard error	t-value	P > t
Expected price in Ksh ^a	Calculated as the mean of a triangular distribution of prices elicited from the vendor (minimum, maximum, and mode)	0.3581	0.3309	1.08	0.281
Distance in kilometers ^a	Calculated as the total distance to be traveled to the nearest large market town from the weekly market	0.3701	0.1131	3.27	0.001
Education	Number of years vendor attended school	0.0581	0.0166	3.51	0.001
Age ^a	Age of the vendor in years	0.3629	0.2375	1.53	0.129
Time selling	Number of hours per day multiplied by number of market days participated by the vendors in weekly markets	0.0056	0.0034	1.68	0.096
Mobile phone	Ownership of mobile phone: 1 if yes; 0 if no	0.0881	0.1866	0.47	0.638
Seed quality	Ability to differentiate quality (i.e., differentiating seed vs. grain): 1 if yes; 0 if no	-0.1765	0.1431	-1.27	0.219
Weekly markets location ^b					
	Location of market in producer marketing group intervention area	0.2508	0.1384	1.81	0.072
	Location of market in no seed-based intervention area	-0.7270	0.3302	-2.2	0.029
Type of the vendor ^c					
	Local shopkeeper (<i>n</i> = 64)	-0.2896	0.1802	-1.61	0.11
	Open-air trader (<i>n</i> = 67)	-0.2812	0.1708	-1.65	0.102
Constant	Intercept	0.6867	1.6568	0.41	0.679
<i>Number of traders</i>	<i>167</i>	<i>F(11,155)</i>	<i>8.5</i>		
<i>R-squared</i>	<i>0.321</i>	<i>Prob > F</i>	<i>0.000</i>		

Note: One hundred sixty-seven vendors from seven markets interviewed during October–December 2006 short-rains season.

^a Denotes variables that have been transformed into their natural logarithm values.

^b The omitted category is markets located in community-based seed production programs implemented in Sultan-Hamud, Kalawa, and Kasikeu village communities. The communities located in Wote did not have any seed-based programs, whereas communities located in Kathonzweni, Mulala, and Emali had producer marketing groups.

^c The omitted category of vendor type is grain traders (*n* = 36).

4. CONCLUSIONS

In eastern Kenya, traders in village fairs (markets) play a critical role in providing necessary genetic resources for the pigeonpea crop. Depending on the onset of the short-rains season, the major planting season for the crop, traders and farmers participate in village fairs, either to purchase or to sell seed. It is estimated that more than 90 percent of pigeonpea seeds are accessed through village fairs, especially after droughts, during the short-rains season. For this study, we surveyed seven village fairs, located in Makueni marketshed in eastern Kenya.

We found five different vendor types within the village fairs who were responsible for the exchange of genetic resources: local shopkeepers, grain traders, onetime farmer-traders, farmer-traders, and mobile traders. They could be broadly classified as local shopkeepers and grain traders, who have permanent infrastructure and trade year-round and open-air traders, who have no fixed infrastructure and who trade during “market days” in weekly village fairs. The open-air markets were usually organized and managed by local administrative authorities. The authorities collected market fees (20 to 30 Ksh/day) from the vendors to operate from these markets.

The weekly open-air markets served farmers living within a radius of 50 to 100 kilometers and were dominated by farmer-traders, mostly women vendors, during the planting season. Farmer-traders mostly brought their own farm produce for sale, or they purchased grain from their neighboring farmers or villages. The farmer-traders also had extensive knowledge regarding the varieties they sold. The local shopkeepers and grain traders dominated the market sales by huge volume of sales and storage capacity. Nevertheless, in recent years, the women vendors, especially open-air traders in the village fairs, have turned to innovative methods to attract more clients by adopting simple sales techniques such as offering clean, sorted produce in small packs. Some of them are also part of producer marketing groups or other social groups based on religion in their village communities that provide opportunities to access information and achieve increased sales through social networking.

Agro-ecologically, village fairs located in slightly wetter regions (Emali, Mulala, Sultan Hamud, Kasikeu) offered more varieties and handled higher sales compared with fairs in dry regions (Kathonzweni, Kalawa, Wote). In general, the fairs in wetter zone are located very close to a major road connecting Nairobi and Mombasa port. This enabled the traders to assemble and transport their produce more efficiently. The fairs in drier regions such as Kathonzweni, Kalawa, and Wote are located in the interior region of Makueni district and have poorly developed transportation and road networks. However, invariably, vendors in fairs located both in wetter and drier zones with seed-based development programs sold more pigeonpea compared with vendors in village fairs in communities with no development initiatives.

Pigeonpea, a self-pollinating legume crop, could be effectively exploited for hybrid vigor that would improve existing yields enormously.⁸ Even under normal farming conditions, the seed replacement rate of pigeonpea or any other legume crop is much higher than that of cereals (except maize and pearl millet with high out-crossing rates). Legume crops are also highly susceptible to pests (in the field and in storage) with very minimal seed viability, which has led farmers to search for seed elsewhere. There is also a continued and increased export potential for pigeonpea. Hence, in eastern Kenya, especially for legume crops such as pigeonpea, formalizing the existing informal supply sources—that is, local markets and their actors—could benefit farmers and traders.

Currently no formalized channels of seed provision exist for open-pollinated varieties of dryland cereals and legumes in the village fairs except for maize. Agro-vets are one type of formal node, but although they are present in the local markets, they do not sell any improved varieties other than maize.⁹ The stringent seed laws and regulations in Kenya have further slowed the introduction of more modern

⁸ Scientists at ICRISAT have tested hybrid pigeonpea successfully and await further approval and commercial release for subsequent multiplication.

⁹ In our interviews with 26 agro-vets from the seven village fairs surveyed, we found that no one stocked pigeonpea seed/grain.

varieties into the system. It is therefore necessary to devise methods suitable for use in the local-markets setting to improve the quality as well as increase the variety of the supply of quality-declared seeds. The pigeonpea seed/grain value chain in the local markets of eastern Kenya has shown the existence of two types of vendors: open-air traders, who provide fairly good quality materials along with relatively more information, and local shopkeepers and grain traders, who supply large volumes but have little knowledge about the types sold. Both vendor types have highly specialized skills that could be utilized through proper synergies and by offering monetized (local market-based) solutions. This could be done by using certain key seed interventions to work with selected vendors in the local markets and by providing them adequate quantities of initial seed materials for multiplication and further supply. In addition, any efforts to improve the capacity of local market vendors by providing increased access to both crop-related and price information would further enhance improved availability of quality plant materials for farming communities in the marginal environments of eastern Kenya.

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