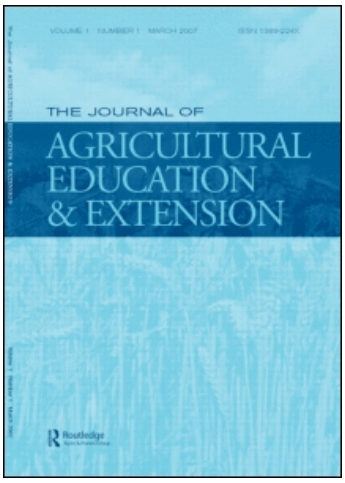

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Validating Farmers' Indigenous Social Networks for Local Seed Supply in Central Rift Valley of Ethiopia

B. Seboka and A. Deressa*

Abstract

The information on farmers' indigenous social networks in local seed systems is based on a case study undertaken in the central rift valley of Ethiopia. Farmers' indigenous social networks (social relation, locally developed seed exchange methods and local institutions) are presented as leverage mechanisms for the survival of local seed systems. A farmer decision to acquire seeds is discussed as an act of making a choice between whether to obtain a new germplasm/maintain old ones (genetic diversity management) or a search for renewable physical input (seed) or to take advantage of each merit in specific situations. This clearly underscores the need to value the individual merit of a seed before putting in place any type of variety selection, seed multiplication or extension programs. Analysis of the case study leads to the conclusion that the government imposed extension program should focus on institutional transformation of farmers' indigenous social networks in order to validate the complementary role of local seed systems in the development of a national seed industry.

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Key Words: seed, seed systems, social networks, exchange methods, extension

Introduction

Seed is considered as a basic input for agricultural development due to the fact that it ensures grain production and adds new genetic resources to the total crop gene pool. The productivity of a crop is directly linked to the genetic potential of the seed used though management practices and supplementary inputs exert a profound influence. A seed is mainly obtained from the formal and local seed sources. The share of the formal sector (seed companies/enterprises, research institute and university establishments) in total seed supply stands low as compared to local seed sources (farm-saved seeds, market and NGOs). It is estimated that around three quarters of the world's farmers save seed (Teshome, 1998). In Ethiopia over 80% of the national seed demand is met through the informal system of local seed maintenance and exchange (Hailye et al., 1998). Farmer-to-farmer seed exchange mechanisms form the prevailing system of seed supply in developing countries. Research findings elsewhere revealed that farmer-to-farmer seed exchange mechanisms are mostly based on traditional social networks and family relations (Almekinders et al., 1994). Franco and Schmidt (cited in Almekinders et al., 1994), Green (1987) and MacArthur (1989) found that most farmers obtained seed of new varieties from informal seed sources. Even much of the spread of Green Revolution varieties, rice and wheat for instance, has taken place through farmer-to-farmer contact (Tripp, 1997). However, farmer-to-farmer seed exchange is a neglected area of research though it is a successful living tradition for the rural farming majorities.

This paper presents a brief overview of the seed system in Ethiopia with particular emphasis to the role of indigenous social networks in local seed supply. Even though the local seed system has been widely reported as an important source

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of seed, information on the role of indigenous social networks in the local seed system is scarcely documented. To this end, the paper analyzes the role of indigenous social networks in local seed supply based on case study data recently generated by the Ethiopian Agricultural Research Organization (EARO) in the central rift valley of Ethiopia. It argues for the institutional transformation of farmers' indigenous social networks in order to validate the complementary role of local seed systems in the development of a national seed industry.

Seed supply system in Ethiopia

Variety development and release

The supply of seeds depends on the availability of seed sources (formal and informal sectors) and their ability to develop and provide seeds of the varieties needed by local grain producers. Of the formal sectors the Ethiopian Agricultural Research Organization (EARO) has been given a national mandate to develop agricultural technologies including crop varieties/hybrids since the mid 1960's. The agricultural university and colleges have also been undertaking research on a part-time basis. Private sector plant breeding did not exist prior to the establishment of the Ethiopian Pioneer Hi-bred seeds in December 1990.

Once varieties/hybrids have been developed in research centers and university campus they will be tested across multi-locations in different agro-ecological zones for two or three years and one year of verification trials on farmers' fields. Then after pertinent information has been compiled by breeders the proposal for release is submitted to the National Variety Release Committee (NVRC). The NVRC is an ad hoc committee established in 1982, having no legal status. It consists of breeders, agronomists, crop protection experts and social scientists representing different agricultural institutions. The NVRC releases varieties/hybrids based on performance, distinctiveness and uniformity criteria, weighted against the farmer's variety. For breeders and the NVRC farmers' varieties are considered inferior and should be replaced. Replacement of the farmer's variety (land race) by an improved variety on the single factor measurement, yield, contributes much to the neglect of important traits found in the local genetic pool. This also means that farmers' management of genetic diversity for multiple uses has been narrowed down to yield or resistance per se in plant breeding. So far, several varieties (more than 120) have been recommended by the NVRC, most of them with exotic pedigrees.

Seed production and distribution

Unavailability of seeds of the farmers' choice in required quantity and quality, poor seed marketing and distribution network, non-existence of seed quality standards, inefficient seed promotion and extension activities have been cited as major weakness of the formal seed sector in Ethiopia. In 1978, the National Seed Council was constituted and on its recommendations the Ethiopian Seed Corporation, the then Ethiopian Seed Enterprise (ESE), an autonomous organization, was established with a national mandate to produce and distribute seeds of improved varieties/hybrids. Later in 1993, the Government of Ethiopia established a National Seed Industry Agency (NSIA) to help develop a national seed industry in which both the public and private sectors could co-exist to play their roles in increasing food production. The NSIA will provide policy and national guidance on all matters related to the seed industry. Neither an institutional framework nor an officially legalized guideline exist for seed certification and quality control. It is expected that the NSIA will establish a national seed quality control and certification body with the responsibility for overseeing all aspects of seed certification and quality control. However, in Ethiopia's National Seed Industry Agency Proclamation No 53/1993 farmers' seed does not conform to the definition and standards set in the proclamation. This would seriously threaten the local genetic resources for which the local seed system is widely acknowledged.

Until 1990, the ESE was the only institution charged with responsibility for seed production. The private sector was not permitted to produce and sell seeds until then. Due to limited institutional capacity the ESE used to multiply and supply seeds of a few cereal crops, often in limited quantity. The ESE was responsible for the sale of seeds to state farms, and to the Agricultural Input Supply Corporation (AISCO) and non-governmental organizations involved in relief and rehabilitation programs. The AISCO of

the Ministry of agricultural has a monopoly on the distribution of inputs such as seeds, fertilizers, etcetera, to the peasant sector in the absence of well-defined distribution channels. Over 13 years, seed sales by ESE averaged about 5% of the potential annual requirement, mostly wheat (Agrawal and Mariam, 1995).

Following the new free-market economic policy of the early 1990's, and having recognized the incapability of the formal sector to satisfy the national seed demand, the Government of Ethiopia encouraged participation of the private sector in seed production, processing and marketing to stimulate competition, increase the use of germplasm from a wide range of sources and strengthen managerial and technical competence in the seed sector. As part of this initiative the NSIA, with a loan obtained from World Bank (USA$ 31.8million), has initiated a Seed System Development Project where a Secondary Seed Multiplication scheme has been taken as centerpiece. It is proposed to develop and expand the informal seed multiplication and supply system to ensure the availability of seeds for use in the peasant sector. The advantage of this system is explained by the fact that local needs could be satisfied, the existing genetic pool could be preserved, and the local seed sector could be trained in producing quality seed which should be cheap and dependable. A total of 15,000 farmers are to participate in the secondary seed multiplication scheme during a Five Year project phase begun in 1996 (Dhaabii, 1996). However, there is no strategy stated in the seed project proposal as to how the secondary seed growers would enjoy the profit margin from seed marketing over grain production so that they would remain in seed production and marketing for some time. Moreover, the type of agreement should be entered into between contract seed growers and local grain producers, government and private/NGOs seed sectors are all challenging and undefined. It is also the question how this scheme could revitalize the indigenous social networks in the development of a national seed industry and community seed bank, remains to be seen. Apart from the Seed Project mentioned above, community seed banks were also established in northern Ethiopia (Tigray) initially as survival strategy during times of severe distress caused by war and recurrent drought. At present these community seed banks are shifted from crisis management to economic development, that is, from supply of seed to the poor, towards more emphasis on the maintenance of a genetic resource base for the area (Berg, 1996). This is a positive move and needs to be encouraged and supported.

The dualism of seed survival in local seed systems

As mentioned earlier in this article and in other related literatures seed is seen as basic agricultural input. However, there is a difference in emphasis among agricultural professionals on characteristics that make seed a basic agricultural input. For the formal seed sectors and extension specialists, seed is valued in most cases as physical input for grain production. For others, like conservationists and farmers, seed is valued beyond physical input and they associate it with germplasm that adds genetic diversity to the total crop gene pool. This dualism of seed survival (as physical input and germplasm) in local seed systems represent the farmer's decision to acquire new germplasm or maintain old ones (genetic diversity management) and/or a search for renewable physical input (seed) that the farmer is unable to maintain for some reasons. This distinction on dualism of seed survival clearly underscores the need to value the merits of a seed in specific situations before putting in place any type of variety selection, seed multiplication and extension programs.

When a seed is available from the formal sector as physical input, it survives in a local seed system as a profitable item of commerce mainly in the course of seed renewal or varietal replacement. In this case, it is no more a public good, thus, there would be inequities in access to seed between rich and poor farmers. Moreover, when the value of seed as physical input predominates in the local seed system it enhances the dissemination of uniform modern varieties at the expense of local genetic diversity. On the other hand, when a seed is seen as a germplasm for diversity of uses, it survives in a local seed system as a genetic pool worth enough to meet farmers' social, cultural, economical and ecological needs. It is for these basic needs that farmers select and maintain a wide array of crop varieties. Their selection is based on a range of criteria such as earliness, culinary quality, storage ability, multiple uses, drought tolerance and disease resistance, etcetera. In the formal

seed supply system these processes of crop genetic diversity management have been largely eliminated through the selection and maintenance of uniform varieties and the strict seed quality control system (Almekinders et al., 1994). Almost all farmers have access to these varieties through indigenous social networks. In this case a seed has the characteristic of a public rather than a private good in local seed systems.

It is therefore helpful to have adequate understanding of the dualism of seed survival and its relative importance from which farmers are most likely to benefit. It is a question of whether to select high yielding varieties at the expense of crop diversity or to maintain stability through diversity at the expense of productivity or to take advantage of each merit in specific situations.

Redefining the role of extension in local seed systems

Due, mainly, to the urgent need to achieve self-sufficiency in food and in the pursuit of a global approach to the development of agriculture, extension intervention has largely relied on 'package technology' transfer in Ethiopia. The intervention emphasizes the transfer of aggregated high technological inputs to interested and well-to-do farmers who could afford risk. Even though the acceptance of a 'package technology' is variable and not yet quantified, recent studies revealed that variety adoption did not exceed 10% and that of fertilizer is lower than 20kg DAP equivalent per hectare of crop area (Yao, 1996) at national level. Hence, farmers have largely been relying on local seed sources to acquire seeds, and overwhelmingly the crop output is explained by three traditional inputs: local seeds, land and labor.

Analysis of the present role of extension in package technology transfer reveals that there is a clear failure, at least when one refers to the rift valley areas of Ethiopia. In the first place, the economic, market and agro-climatic conditions required for successful adoption of a 'package' does not readily exist. Economically poor farmers who could not afford risk are left out, for those farmers who are economically better off and can adopt a package, rainfall is too erratic and unpredictable. Secondly, the assumption that a 'package technology' boasts production is not applicable to every corner of the country and has thus contributed much to the neglect of useful genetic and technical insights emerging from the rural people context. Consequently, local genetic resources, farmers' indigenous knowledge, and lateral technology diffusion through indigenous social networks were trivially considered in extension intervention. Thirdly, the adoption of a 'package technology' is not necessarily a decision to attain the highest productivity level on the part of a farmer. There is ample evidence of farmers maintaining different varieties for diversity of use (see the dualism of seed survival discussed above) and hence, they either adopted, rejected or unpacked some of the packages (Seboka and Deressa, 1995). Fourth, even though the extension program has focused and spent much of its time on creating awareness or popularization of newly developed varieties, seeds of these varieties are not adequately available mainly due to lack of a seed multiplier and inefficient seed distribution channels . As a result farmers have largely relied on the informal sector and indigenous social networks to acquire seeds.

The key challenge is thus, to redefine the role of extension which should be centered around three major areas of intervention in the local seed system: mobilizing/organizing farmers, enhancing in situ genetic conservation and ensuring institutional (formal and informal seed systems) linkage. In a local seed system the primary task of extension intervention will be visualized by organizing farmers into community seed banks or cooperatives. The formation of community seed banks/cooperatives is based on intimacy and trust, and thus, will be of access to all without discrimination between social classes and gender, and regardless of economic backgrounds. At this level, the task of extension professionals will be the identification of the strongest social network (friendship, neighborhood, lineage clusters, etc) as mechanism of drawing and assembling individual farmers into cooperatives, without overruling their interest, of course. Taking into account the large share of the informal seed sector in the total seed supply and given the existence of only one enterprise engaged in seed production, organizing individual farmers into cooperatives or community seed banks is of paramount importance. It has at least three advantages in complementing the development of a national

seed industry: In the first place, members of the cooperative could pool their resources to enter into the business of seed production and marketing and ensures timely availability of seeds. Moreover, organizing farmers into cooperatives enhances their access to credit from the financial institutions. Secondly, the community-based farmers' organization is a key linking entity among government, private and NGOs research and seed institutes/companies for any sort of joint venture or contractual agreement to be entered into. They could participate as a farmers' research group in technology development, as pilot seed multipliers, or as in situ seed conservationists. Thirdly, many of the natural resource management approaches and technologies largely depend on community level or group actions. Hence, farmers' organizations would enhance such group actions and provide a vehicle for scientists and groups of farmers to work together.

Apart from organizing farmers into a form of cooperative/farmers' research group, the role of extension will be directed to enhancing in situ conservation of genetic resources and strategic seed reserves of different classes of seed including breeders', basic, commercial and local seed in different regions. Even though the adoption of uniform varieties in Ethiopia is not as great a threat as agro-ecosystem destruction for the erosion of genetic resources, extension intervention has to continue initiating the transfer of uniform varieties, mainly of exotic sources. This means that in situ conservation of locally available genetic resources has survived mainly in local seed systems and should be supported by extension in the future. Strategic seed reserve is also important, given the recurrent drought and crop failures seriously limiting seed availability in the country. This is particularly true in the central rift valley of Ethiopia where drought is more severe. In most cases, farmers ran out of seed when there was a low harvest the previous year owing to crop failure; sale of seeds for other obligations (tax, contribution for war fare, school fees, clothing, health care, etc) and fear of storage pests; when consumed entirely locally; or when they decide to obtain fresh seed stock of a variety/land race.

Ensuring institutional linkage is by far the most rewarding pace in the realization of the complementary role of the informal and formal sector in the development of a national seed industry. The informal sector can be a source of important traits, and the formal sector can identify the potential and quality of these traits for the benefits of mankind. This and other advantages can be explored when research and extension have worked through the farmers' research group, community seed banks/ cooperative, and by initiating on-farm and participatory technological development. It is, therefore demanding to redefine the role of extension in the local seed system (seed production and supply, technology development, conservation and seed reserve) to be centered around farmers mobilization, in situ the conservation of genetic resources and institutional linkage rather than wasting much time on the downward trickling of technologies.

Indigenous social networks for local seed supply

Estimates made by members of peasant associations in Ethiopia indicated that between 25 and 50% of farmers borrowed or bought seed of at least one crop season in any given year (Henderson and singh, cited in Tripp, 1997). These chronic seed shortages are rarely addressed by the formal seed sector, as most farmers turn to neighbors in search of seed. To overcome the problem of seed unavailability farmers have largely been depending on local seed sources (farm-saved seed, other farmers, market, NGOs, relief organization, etc). It has to be noticed that NGOs and relief organizations have played an important role in emergency seed supply for survival during times of natural disasters or civil disorder in Ethiopia. However, the activity of distributing free seed by NGOs and relief organizations has been criticized for reasons of creating dependency on free services and disrupting the local farmer-to-farmer seed exchange systems (Hailye et al., 1998).

Unlike the formal sector, farmer seed production is an integral part of a grain-cum-seed production process. Some times, farmers also obtain considerable amount of seeds of unknown quality from the market which usually escapes the official statistics. It seems appropriate to question the quality and purity of seeds coming from local seed sources. However, it is widely reported that farmers consciously maintain quality seeds by careful selection of heads, pods, seeds and plants

before or after harvest and the storing of them in protected areas (Almekinders et al., 1994; Janssen et al., 1992; Sperling et al., 1993), and we did not discuss it here. Rather we give emphasis to indigenous social networks which are seldom covered in seed and seed related literatures published so far. The flow of seeds or farmer-to-farmer exchange of seed is a neglected area of research. There is an urgent need to understand more in details the process of farmer-to-farmer exchange of seed.

Farmer-to-farmer exchange of seed is based on indigenous social networks and family relations. In most cases these networks are not governed by a commercial aspect of a seed but rather in the context of mutual interdependence and trust. Farmers benefit a great deal from social networks in acquiring seeds particularly during times of drought which reduces yield levels; civil disturbances; renewal of degenerated seed and the adoption of new varieties. The following are some of the most important social networks practiced by farmers of different ethnic backgrounds in Ethiopia: Co-rearing and co-sharing of livestock; rotating of credit schemes involving cash or material produce; lease farming in which the poor lease their land to others for a share of the harvest; securing seed and/or grain in return for labor provided for others; mutual exchange of labor to help families meet their needs during heavy work schedules, etcetera. These indigenous social networks are perhaps reinforced by the most significant traditional institution called Edir.

On the surface the edir is a burial society, but over the years it has evolved to a welfare society and more recently to a kind of 'political' body, access to all without discrimination (Rahmato, 1991). It serves as a platform for members of the edir to inform each other about recent development and other emerging issues in farming and social affairs. Within this traditional institution farmer-to-farmer exchange of seeds is effected in the form of bartering, gift, borrowing and of course, on sale. There is no restriction in the exchange of seeds and information among members of same or different edirs. The rate of exchange of one type of seed with others depends on the importance of a seed (cash crop, food or both) in question and thus the exchange would not necessarily be based on a one-to-one ratio. A farmer also obtains seed in return of his labor he provided for others. It is this living tradition of mutual interdependence that sustains local seed supply though limitations have been reported elsewhere with regard to speed and range (Almekinders et al.,1994).

A case study on local seed exchange has been initiated in the central rift valley of Ethiopia using improved haricot bean seeds since 1995. Haricot bean is the second important cash crop next to tef [Eragrostis tef (Zucc.) Trotter] in the central rift valley of Ethiopia. Of the total haricot bean produced in the country in 1994/95, the share of haricot bean in terms of area and total production in the rift valley was 44% and 68.6% respectively (Central Statistical Authority, 1995). Based on the trend of area allocation and export value existing at present, the growing importance of haricot bean in the rift valley of Ethiopia could easily be predictable. Haricot bean has thus been chosen for this case study for reason of its economic importance. The objective of the case study was to evaluate the role of indigenous social networks in local seed supply.

The following methods were pursued to implement the case study: First, interested seed growers from local farmers were identified who agreed to take breeder seeds on credit and multiply them and then disseminate them to farmers. A list of interested farmers was obtained to establish a sampling frame. Then eighty farmers from 20 Peasant Associations (PAs) were drawn randomly from the established sampling frame representing nine sub-districts in the central rift valley of Ethiopia in 1995 and 1996. Before distributing breeder's seeds, training was given to pilot seed growers on the subject related to the required isolation distance; proper application of crop husbandry; seed selection and storage practices, etcetera. Twenty-five kilogram of breeder's seeds of newly released haricot bean variety (Awash) was given to each grower. Being a new one in the area, the variety (Awash) is expected to stimulate seed exchange between local farmers. Eventually, the role of indigenous social network in enhancing the dissemination of Awash seed from pilot seed growers to local grain producers and local exchange methods were assessed in the consecutive cropping seasons in 1996 and 1997.

The pilot seed growers (80 farmers) have multiplied a total of 25310 kg of clean Awash

seed from 20 ha in 1995 and 1996 (Table 2). They maintained clean seed by carefully selecting healthy pods, by avoiding shriveled seed, and those free from physical impurity. The average clean seed multiplied by each grower ranges from 261-415 kg per quarter of a hectare (Table 2). Of the total seeds multiplied the largest share (16000kg) was sold on the local market (Table 3). The remaining seeds were partly reserved as seed for next season and/or as grain for local consumption, and exchanged between farmers. Only 26% of the multiplied seeds entered the local seed systems (Table 3). About 76% (61 out of 80) of the interviewed seed growers explained that the need for cash and fear of storage pests had forced them to sell the bulk of seeds immediately after harvest. If it were not for these reasons the quantity of seed saved and exchanged locally would have been much higher than this. However, there is no one from the seed growers who did not transfer a seed to others though there was elsewhere reported that not all farmers exchange seed for some reasons (value, rituals, belief or jealousy, social differences, etc) (for more information see Almekinders et al. 1994). About 80%, 34% and 15% of the interviewed seed growers transferred seeds to their neighbors, friends and members of their relative respectively, usually in small quantities (Table 4). The number of farmers to whom each seed grower has given seeds ranges from one to three, that is to say, each seed grower has given seeds to at least one farmer from his neighbors or relatives.

Local seed exchange methods were also assessed in this case study. It is envisaged that lending, selling, bartering and gift were the methods commonly used by seed growers to transfer seeds. The cross tabulation of farmers' seed exchange methods by social networks revealed that of the seed growers 74% (59 out of 80 farmers) transferred seeds to others by lending, 38% by selling, 14% by means of exchange with seeds of other grains like maize and 4% gave as gifts mainly to members of their relatives (Table 5). About 19% (15 out of 80) of the interviewed

Table 1. Comparison of the formal vs local seed sector

Factor	Formal seed sector	Local seed sector
Target client	resource rich farmers	all farmers with varying socio-economic status
Farmer participation	seed receiver	seed selector, producer, owner and supplier
Seed importance	it is a private good and is available as commodity or physical input	a public good and has survived both as a physical input (seed) and germplasm
Means of seed exchange	on sale, credit	on sale, credit, bartering, gift
Speed and range	relatively fast, reaches more farmers along main roads and covers wider area at a time	slow pace, reaches less farmers, covers small area at a time
Seed quality and genetic diversity	pure, certified, genetically uniform	less pure, uncertified, genetically diverse
Seed availability	unavailable, mostly delivered late, expensive	available in limited quantities, relatively cheap
Adaptability	less known to farmers in remote areas where the extension program is weak	well known, farmers have confidence on seed and familiar with supplier
Ultimate objective	select and provide high yielding modern varieties	secure and maintain a wide array of crop varieties that meet a range of farmers' criteria.
Limitation	reduce crop diversity but relatively less affected by social disorder, drought or other natural disaster through long terms ecurity stores or seed reserves	easily affected by social disorder, drought or other natural disaster

Table 2. Quantity of haricot bean (Awash) multiplied by pilot seed growers (1995 and 1996)

Site/sub-district	No. of farmers	Area Planted/ grower (ha)	Total area (ha)	Quantity of seed multiplied (kg)	Mean/grower (kg)
Adama	8	0.25	2.00	2305.00	288.00
Dodota	6	0.25	1.50	1590.00	265.00
Boset	7	0.25	1.75	1830.00	261.00
Shashamane	9	0.25	2.25	3204.00	356.00
Lume	7	0.25	1.75	1720.00	246.00
Siraro	13	0.25	3.25	4025.00	310.00
Dugda Bora	11	0.25	2.75	3046.00	277.00
Jido	5	0.25	1.25	1781.00	356.00
Adami Tulu	14	0.25	3.50	5859.00	415.00
Total	80	0.25	20.00	25310.00	

Source: Survey data

Table 3. Quantity of seed marketed and exchanged by seed growers

Ways of seed utilization	Quantity (kg)	% of the total
Marketed	16000.00	63.00
Reserved[a]	2800.00	11.00
Exchanged	6510.00	26.00
Total	25310.00	100.00

[a] Reserved as seed for next season and/or as grain for local consumption

Table 4. Seed transfer from seed growers to non-growers (N-80)

Type of social relation (network)	No. of growers who transferred seed to others	%
Neighborhood	64	80
Friendship	27	34
Members of relative	12	15

Source: Survey dta

Table 5. Cross tabulation of farmers' seed exchange methods by social networks (N-80)

Type of social network	No. of growers who transferred seeds to others using different seed exchange methods				%
	lend	sell	exchange	gift	
Neighborhood	33	21	8	2	80
Friendship	17	7	3	-	34
Members of relative	9	2	-	1	15
%	74	38	14	4	

Source: Survey data

seed growers have exchanged haricot bean (Awash) with maize seed on 1:2 ratio when planting of maize is delayed due to a late on-set of rain. In most cases direct lending and selling were commonly practiced between seed growers and their neighbors. From this case study it was observed that farmer-to-farmer seed exchange was found more efficient in neighborhoods than on either friend or family relation-based type of social network. Lending was recorded as the most efficient method for transferring seeds from seed growers to their neighbors. This clearly indicates that farmers can obtain seeds from neighbors trustfully on credit without cash in hand.

Local systems of seed supply through indigenous social networks and exchange methods ensures that all farmers with varying socio-economic status in local seed systems are the beneficiaries. Moreover, farmers know the adaptability and quality of seeds; they have confidence and familiarity with suppliers. For better insight and action the strength and weakness of the formal and local seed sectors is analyzed and presented on table 1.

Conclusion

It has been well recognized that the formal seed sector has failed to meet a national seed demand not only in terms of seed volume and of varieties of farmers' choice but also due to lack of a fully-fledged distribution channel, a guaranteed seed and grain market and market outlets, especially in remote and heterogeneous areas. As a result the prevailing system of seed supply in Ethiopia remains a traditional one, where a farmer depends on his own stock, other farmers, the local grain market, and any other source he can manage to find. Especially seeds of the cultivated land races, though they are the major source of genes for modern varieties, have come almost entirely from local seed sources.

As emphasized in this article, a seed in local seed system has survived both as physical input (seed) and germplasm mainly for ecological, cultural, social and economic worthiness. Even though a farmer's decision to exchange seed depends on mutual interdependence and trust, it is an act of making a choice between whether to obtain a new germplasm/maintain old ones (genetic diversity management) or a search for renewable physical input (seed) or to take advantage of each merit in specific situations. This clearly underscores the need to value each merit of a seed in specific situations before putting in place any type of variety selection, seed multiplication and extension programs.

In local seed systems farmers have access to seeds largely through indigenous social networks and by using locally developed seed exchange methods (borrow, barter, sale, gift). This system of seed procurement ensures that all farmers with varying socio-economic status, and in remote and heterogeneous areas are the beneficiaries. This does not mean that there is no limitation in local seed systems. Vulnerability to social disorder, drought or natural disaster, and the slow pace in reaching more farmers and covering wider areas are the major limitations.

In view of the fact that there is no organized system of seed supply that can ensure a steady flow of seeds, the farmers' possibilities for selecting, improving, storing and multiplying local varieties of seed must be increased. It is suggested that, with increasing recognition of the role of local seed sources in seed supply and the difficult task of the formal seed sector to serve small and remote farmers in a diverse and complex environment, farmers' indigenous social networks need to undergo institutional transformation. This requires foremost the identification of interested farmers, traditional institutions, the strongest social networks and exchange methods in local seed systems. Since farmers depend on their neighbors of the same peasant association, or friends and relatives of near villages for getting seeds, as envisaged in this case study, it is helpful to voluntarily organize farmers into cooperatives/community seed banks who could embark as contract seed growers for the state, commercial seed enterprises or NGOs, and who could remain as community seed suppliers and keepers.

The institutional transformation of farmers' indigenous social networks in the form of cooperatives or community seed banks can help to formally link the local and formal seed sectors. It will create a conductive environment for both sectors to complement each other and particularly for the formal seed sector to give technical backstopping in areas of improving farmers' practices of selecting, improving, storing and multiplying of seeds, while as the same time giving recognition to local land races. It is always easier to deal with a collective producer than with scattered individual farmers for reason of logistic alone. In this regard the role of extension needs to be redefined which should be centered around mobilizing/organizing farmers, enhancing in situ conservation and ensuring institutional linkage. It is therefore recommendable for farmers' indigenous social networks to undergo institutional transformation in order to capacitate the complementary role of the local seed systems in the development of a national seed industry.

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