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Working Paper 02-02

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Preliminary Findings

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Abstract: This paper explores social arrangements associated with seed transactions among smallscale maize farmers in the Central Valleys of Oaxaca, Mexico, a centre of crop genetic diversity. A formal seed distribution system has yet to develop in the region and when seed loss occurs, farmers are faced with costs and difficulties identifying, locating, and obtaining seed of desired varieties. For these reasons, it was hypothesized that there were strong incentives for collective action among farmers to facilitate seed supply. The study found, however, no evidence of collective action with regards to seed supply in the three study communities—San Pablo Huitzo, San Lorenzo Albarradas, Santa Ana Zegache. Instead, farmers acquired seed using a variety of networks of social relations and different types of seed transactions. The results suggest that seed flow among farmers in the Central Valleys of Oaxaca is a complex process of negotiation and reciprocity, influenced by a variety of agroecological, socioeconomic, and cultural factors.

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Social Relations and Seed Transactions among Smallscale Maize Farmers in the Central Valleys of Oaxaca, Mexico

L. B. Badstue, M. R. Bellon, X. Juárez, I. Manuel, A. M. Solano

Introduction

Mexico is a center of origin for maize and maize diversity. Mexican smallscale farmers are not only heirs to this diversity, but many continue to maintain it. Unlike farmers in developed countries or commercially oriented farmers in developing countries, smallscale farmers in Mexico continue to grow local maize landraces and depend almost entirely on themselves or other farmers to access this diversity.

Most small scale Mexican farmers keep seed from one season to the next. When they lose or need seed, they turn mostly to other farmers. Farmers acquire seed periodically, either because of seed loss due to climatic or storage problems or because they want to test seed of other crop varieties¹. They sometimes face problems acquiring seed of varieties they prefer. Acquiring seed can be difficult, time consuming, and costly, especially when a farmer wants a particular maize variety. The farmer has to first find out who is growing what variety, the characteristics of those varieties, and especially, their performance. He or she then has to ensure that the information is accurate and that the seed is reliable (i.e. it will have an acceptable germination rate). Finally, the farmer has to negotiate the conditions of the transaction with the supplying farmer. The last step may be difficult if the supplying farmer is from another village or if there are no social ties between them. The problem of identifying and finding seeds of varieties farmers want is exacerbated by poor nomenclature for maize varieties in the region.

Given the importance of the maize crop for farmers' livelihoods, the probability of seed loss, and costs and difficulties associated with identifying maize varieties that meet their needs, one can hypothesize that there are strong incentives for farmers in the region to organize a group or other form of collective action to secure access to seeds; as a group farmers can maintain greater diversity at a lower cost and incur less probability of loss than individually.

The research described in this paper builds on another research project undertaken by the International Maize and Wheat Improvement Center (CIMMYT) and Instituto Nacional de Investigaciones Forestales Agrícolas y Pecuarias (INIFAP) in the Central Valleys of Oaxaca,

¹ Here we refer to varieties in terms of "farmer varieties," i.e. different crop populations that a group of farmers recognize as distinct units. This meaning is not the same as the one given to varieties in the context of industrialized agriculture (Union for the Protection of New Varieties of Plants (UPOV) 1991), where a variety should be new, distinct, uniform, and stable. In this paper, the term variety is applied mainly to distinct maize landraces that farmers distinguish in the Central Valleys of Oaxaca, Mexico. It should be pointed out that while these may be recognized as distinct, they may not have specific names beyond the color of the kernel, i.e. a farmer may plant two varieties of white maize. Even though a farmer would recognize them as different, he does not have specific names for each, and refers to both varieties as '*blancos*' (whites).

Mexico (Bellon et al. 2000; Smale et al. 1999). The aim of that research, which began in 1997 and ended in 2002, was to determine whether it is possible to improve maize productivity while maintaining or enhancing genetic diversity. This working paper increases the scope of the 1997 study by examining the social infrastructure (social relations and seed transactions) that shapes seed and information flows on which farmers depend. Only three of the six communities in the 1997 study—San Pablo Huitzo, San Lorenzo Albarradas, and Santa Ana Zegache—were included in this report because of its preliminary and qualitative nature and time constraints.

This study is a first approach to issues of social arrangements and seed transactions. Studying and understanding social arrangements and seed transactions is important because they form the basis of supply of landrace diversity for farmers in the area, who value these landraces and continue to plant them. By doing so, farmers are contributing to the conservation of biodiversity. The long-term viability of genetic resources in farmers' fields depends to a great extent on the structure and function of these social arrangements and seed transactions.

A description of the study area and the methodology used is presented in the next section. This is followed by a section on farmers' distinction between maize grains and seed and access to information on seeds. The next section looks at social relations and seed transactions, followed by a discussion of the findings and the conclusion.

The Study Area

The three study communities, San Pablo Huitzo, San Lorenzo Albarradas, and Santa Ana Zegache are located in the Central Valleys of Oaxaca. The climate is mild—December, January, and February are the coolest months and April and May are the warmest. The rainy season is from May-October. Maize, beans, and squash are the most common crops and average farm size is 3.49 hectares (Smale et al. 1999).

Oaxaca state is divided into districts and municipalities. San Pablo Huitzo, San Lorenzo Albarradas, and Santa Ana Zegache each constitute municipalities headed by a municipal president and a body of councillors. All three have electricity and drinking water, some medical services, and a primary school. San Pablo Huitzo furthermore has secondary schools, and Santa Ana Zegache and San Lorenzo Albarradas each have a *tele-secundaria* (a national secondary school programme via television).

San Pablo Huitzo is located at 1,700 masl and is the most prosperous of the three municipalities. It also has the most stable and mild climate, the best soils, and the largest irrigated area, favouring more intensive agriculture. The use of tractors for land preparation, for example, is more common here. Besides the basic grains mentioned above, alfalfa is also grown for fodder, since milk production is important. Some farmers also grow vegetables for the market. Some inhabitants work as skilled or day laborers within or outside the community. Finally, San Pablo Huitzo also benefits from its close proximity to the Puebla-Oaxaca highway.

Santa Ana Zegache is located at 1,480 masl. A large part of the population in this community (>30%) belongs to the ethnic group known as Zapotecos. The area is characterized by poor soils and scarce rainfall. Only 3% of farms have irrigation (Smale et al. 1999). Like in San Pablo Huitzo, alfalfa is also cultivated here, although on a much smaller scale. Some farmers also cultivate castor beans (*Ricinus communis*), flowers, garlic, and groundnuts. Even though the community is situated some distance from main transportation roads, access to urban centers like Oaxaca (1-1 1/2 hours) and Ocotlán (30-45 minutes) is fairly easy.

San Lorenzo Albarradas is the most remote of the three communities. It covers three *agencias*, a Mexican administrative term for branch or unit: San Isidro Roaguía, San Lorenzo, and San Bartolo. There is a wide range in altitudes in this community (from 1,300 to 2,500 masl) resulting in vast variations in temperature and suitability for agriculture. A large part of San Lorenzo Albarradas' terrain is made up of steep and stony slopes with very low yield potential (Smale et al. 1999). As with the other two municipalities, maize, beans, and squash are cultivated, along with *maguey mezcalero*, a type of agave² used to prepare a spirit known as *mezcal*. Several families make *petates* (hand woven mats) and other local handicrafts.

The best agricultural land in San Lorenzo Albarradas is found in the San Bartolo agencia, on the road to the Sierra Norte de Ixtlán. Some parts of San Bartolo have irrigation. San Bartolo is also where the harvested maguey is gathered and prepared for transport; a source of paid work and cash income for some community members. There is also a mechanics workshop and a few restaurants and food stalls.

The San Isidro Roaguía agencia is where "Hierve el Agua" is located – a natural phenomenon and tourist attraction where a small number of families earn income from the sale of food and handicrafts to tourists. There are also a number of cabins for rent. The *ejido* authorities³ of San Lorenzo Albarradas administer the income from these cabins.

Methodology

Twenty-two informants, 13 males and 9 females, were interviewed in December 2000. Informants were identified according to their knowledge of communities and their willingness to share information about maize cultivation and ways to obtain seed. On several occasions, other members of the informant's household were also present during interviews. Interviews were semi-structured and were carried out using an informal interview guide. Two agronomists, a sociologist, and an anthropologist conducted interviews in teams of two. On two occasions, the person interviewed did not agree to the use of tape recorder, and only notes were taken.

² The agave varieties most commonly used for mezcal are *Potatorum zucc*, *Amalidaceas* and *Angustifolia haw* (<http://www.Oaxaca.com/miembros/journal/html>).

³ The *ejido* is a land tenure system through which peasant communities received land grants from the government under the Agrarian Reform. An *ejidatario* is a member of an *ejido*. The term *ejido* also refers to the community of *ejidatarios*, a form of social organization.

Farmers' Distinction Between Grain and Seed

In theory, any maize kernel could serve as seed or as food as long as they are healthy and have no specific, immediately observable characteristics objectively distinguishing these kernels as seed. Farmers, however, operate with different categories and clearly distinguish between seed for planting and grain for consumption or sale (Aguirre 1999; Louette and Smale 1998).

Smallscale farmers in the Central Valleys of Oaxaca generally refer to maize kernels as “grano” or grain, without specifying its’ intended use. Grain can be used for consumption purposes, for animal feed, or for selling. It has not (yet) been classified according to its’ intended use and its’ destiny is therefore not homogeneous. Contrary to this, seed is destined specifically for planting and is an altogether different category.

Seed is defined through a process of categorization. A series of criteria is applied, according to which farmers decide from which ears to select kernels to be used as seed, as well as which kernels on these ears to define as seed. As has been documented by Smale et al. (1999) farmers’ seed selection criteria tend to emphasize aspects related to ear and grain health and size, and grain filling. However, other factors may also play a role, for example, grain colour or other local perceptions associated with what makes a good seed. In this process, farmers exercise selection pressure in an attempt to enhance favoured varietal traits and lessen the influence of undesired traits.

Seed is then maize kernels that have been selected for traits associated with a high potential for producing good parent plants capable of enhancing certain favoured varietal traits.

Once redefined as seed, the value of the kernels (turned seed) also changes. Like any other valuable object or good, farmers take good care of their seed and store it in the best possible condition, often separated from the rest of the maize. A series of beliefs and recommendations is furthermore tied to maize seed. According to some informants, one must take care not to spill any seed while shelling maize ears, lest a hen, a turkey or other runs for it and picks it up. Birds may also pick seeds in the field and this is sometimes interpreted as an omen that the *milpa*⁴ will not be established. Another precaution some farmers take is to keep cobs from which seeds were selected in a closely tied sack in a safe and dry place until the milpa is knee high and well underway. Burning the cobs, feeding them to animals or discarding them before then brings bad luck and consequently the milpa will not develop properly. It has not been possible so far to record these practices and

⁴ The concept of *milpa* has several interpretations. In Mexico, the word milpa generally refers to any plot where maize is cultivated (Lara Ramos 2001; Whipperman 2000). This is the sense in which it is used here and most commonly used by Oaxaqueños. However, in certain contexts, milpa refers to a traditional Meso-American intercropping system where maize is cultivated with other crops, most commonly beans and/or squash, and sometimes also tubers or others (Terán, Rasmussen, and Cauich 1998; Museo de Culturas Populares/SEP 1982; <http://www.agroecology.org/cases/milpa.htm>)

recommendations in a systematic way but their existence indicates the importance and value attributed to seed. This is also reflected when seed transactions take place among farmers in the Central Valleys. As shown in Table 1, maize seed has greater value than maize grains for consumption purposes.

Table 1. Producer and consumer prices for maize seed and grain, San Pablo Huitzo, San Lorenzo Albarradas, and Santa Ana Zegache, Central Valleys of Oaxaca, Mexico, May 1998.

Maize	San Pablo Huitzo	San Lorenzo Albarradas	Santa Ana Zegache
See (\$MX/kg)			
Buy	4.66	–	4.09
Sell	4.34	4.97	4.07
Grain (\$MX/kg)			
Buy	2.20	1.54	2.61
Sell	2.17	2.06	2.60

Note: US\$1= MX\$ 8.89 (May 1998)

Source: CIMMYT/INIFAP 1997 Survey, Smale et al. 1999.

In spite of the seemingly clear distinction between seed and grain, under certain circumstances, farmers may use ‘grains’ as seed, i.e. maize kernels originally destined for consumption. This mainly happens in relation to smaller quantities of ‘grains’ or during circumstances when it is difficult to obtain seed—either because of lack of resources or because the seed donor is not willing to provide seed. Although a clearly defined concept of seed exists (selected, clean, and of good quality), it is not a rigid or a static concept. Rather, the concept of seed appears to be dynamic and negotiable, depending on the circumstances. This in turn demonstrates the flexibility of farmer categories and the inclination towards experiments and practical solutions.

Access to Information on Seed

Farmers in the study communities look for diverse traits in maize varieties they grow—traits that relate to the farming environment, production risks and management constraints, as well as consumption preferences (Bellon 2001). Farmers therefore demand crop diversity. As pointed out in the introduction, the nomenclature for maize varieties in the Central Valleys of Oaxaca is poorly developed, even though a strong genotype-by- environment interaction is generally perceived. These factors contribute to the difficulties farmers face to find and identify seeds. How do farmers obtain information on the types of maize seed available? How do they find out who has what kind of seed? And how does a farmer ensure that the information is accurate – especially when the existing nomenclature is vague and ambiguous?

Farmers obtain information about seeds in a number of ways – during conversations with family members, *compadres* (see Social Relations section, p. 9) and neighbors, by paying attention to what other farmers are growing(for instance, when working together in a

*tequio*⁵ or a *guelaguetza*⁶), and as they move around in their communities. Most informants emphasized that seed must not only be of good quality but that the variety must also be adequate for local production conditions. Some also take into consideration the way the maize has been cultivated and the quality of the farmer's work.

Some farmers mentioned learning about maize from other regions from family or friends who travelled or worked in other parts of the country. In San Pablo Huitzo, a loudspeaker used by a local merchant to announce the sale of seed constituted another source of information on seed for farmers.

The maize mill, which is frequented particularly by women, is another arena where farmers learn about the different types of maize grown. Likewise, women who make tortillas or other maize dishes for sale are also a source of information on the types of maize cultivated in the community.

Seed Transactions and Social Relations

The most common way farmers in the study area secure seed is to select and store seed from the previous harvest. Nevertheless, they sometimes have to obtain seed from other sources for a number of reasons, for example, a poor harvest, losses during storage, because the family had to use it for consumption, or simply because they wished to try another variety.

In general, respondents mentioned several different types of transactions through which seed flow occurred both to obtain and supply seeds. These transactions take place between different persons and represent a wide variety of roles or social relations. There are no fixed rules, and each transaction is influenced by the relationship of the two contracting parties, their social positions, and the degree of confidence (or closeness) between them.

Seed Transactions

Farmers obtain seed by either actively going out and looking for seed or simply taking advantage of opportunities that present themselves. In many cases, the process of acquiring seed contains elements of both. The different ways of obtaining maize seed are referred to as seed transactions, in which at least one contracting party receives seed. Seed is defined as any type of maize kernels used as seed at the moment of planting. It can be seed of improved varieties (open-pollinated, hybrids or synthetics), seed obtained from

⁵ *Téquio* refers to a form of communal work in which one has to provide a service to the community. It can refer to communal work in the interest of a certain group (for example, the conditions of a local school), or it can be in the interest of the community in general (for example, construction and maintenance of roads in the community, drinking water, infrastructure, sewage etc.).

⁶ *Guelaguetza* is a Zapotec institution of mutual aid between households. It can take place in many different situations and between different people and includes agricultural tasks, the roofing of houses, weddings, funerals, and fiestas of village saints (Montes Vasquez 1985). Under *guelaguetza*, gifts must be repaid in kind and in exactly the same amount (Beals 1970; Montes Vasquez 1985). Hence, all exchanges are carefully recorded. For example, turkeys are weighed or appraised as to maturity, and maize and sugar measured and recorded (Beals 1970). Nowadays the concept of *guelaguetza* has lost much of its former popularity, although it is still practiced in some Oaxacan communities.

another farmer, or maize grains that were originally destined for consumption. The following is a list of seed transactions that are common in the study area:

- *Purchased seed.* Purchased seed is the most common seed transaction and refers to seed that has been bought and paid for in cash at a price agreed upon by both parties.
- *Borrowed seed.* Borrowed seed refers to a transaction in which the 'borrowed' seed has to be paid in kind. In other words, the person who receives the seed does not pay for the seeds with money but promises to return the seed after the harvest, either as seed or grain (mixed grains). The quantity returned depends on the agreement between the two parties and the relation they have with each other. If the seed has to be paid back in grain, it is common for the quantity to be greater because of the higher value of seed.
- *Seed as a gift.* Informants differed in their views on this transaction. Some say the transaction ends when the seed is given as a gift. Others, however, say that the transaction carries an implicit obligation to return the favour when the farmer who provided the seed needs assistance.
- *Exchanged seed.* This is another type of seed transaction in which seed of one type is exchanged for seed of another. These exchanges usually involve only a few kilos of seed or grain. It is a way of obtaining seed of a desired type of maize, provided the other person is also interested in the seed offered in exchange. If this is not the case, the person with the desired seed may accept maize grains in exchange. However, quantities may vary. Furthermore, when the quantities are of equal proportions, the transaction can be perceived partly as a gift, due to the higher value attributed to seed. It is also common to exchange grain of one kind with grain of another kind, for example, when a certain kind of maize is needed for the preparation of a special dish. Sometimes farmers may even decide to use this maize as seed instead of consuming it.
- *Seed obtained without the knowledge of the provider.* In this case, the seed donor is not actively involved and does not know whether the maize was used for consumption or planting. This may occur when maize is stolen (something that is frowned upon), or just taken without asking the owner, or simply when maize grains that were provided for consumption or for the making tortillas were used as seed.

There were many instances where farmers planted maize kernels that were not obtained as seed in any of transactions described above, but that were still used as seed without the knowledge of the seed provider. In one of the communities, for example, a farmer commented that one of the maize varieties that he grew originally came from his neighbor's maize field. He said he was attracted by the 'beauty' and sturdiness of his neighbor's maize, and when he realized that she was not going to harvest it, he decided to "tear off some cobs, before they were wasted". From these maize cobs he selected the best kernels and planted them on his own land the following season. A female respondent, who among other activities makes tortillas, said she was so fascinated by the color of a maize type that was brought to her for making tortillas that she took some grains and asked her husband to plant it. She then selected seed from the harvested maize, but never shared this information with the person who brought her the maize.

The latter is not an extraordinary occurrence. Several informants commented on experiences of this kind. In most cases, the quantities were small and in some cases, the experience was an effect of what could be termed farmers' experiments. It can also be part of a clear strategy to obtain seed. As one farmer explained, if you really want to obtain a certain kind of seed from someone who is not very willing to sell or provide the seed, or, as he put it, "someone very jealous of his seed", one can simply ask this person for maize for consumption and select the best kernels from this maize for seed. These statements reflect farmers' inclination towards conducting their own experiments using grain that was originally meant for consumption as seed. At the same time, it demonstrates the dynamic and complex character of what we refer to as seed flow.

- *Sharecropping*. Sharecropping is a common traditional arrangement between two farmers who agree to share farming costs, such as land, inputs, and labor. For example, the farmer who owns the land supplies land and seed, and he or she has the privilege of choosing what seed will be used. The other farmer supplies labor and both share additional costs as well as the harvest between them. Sometimes cash subsidies from the Programa de Apoyos al Campo (PROCAMPO)⁷ is also shared.
- *Seed from various projects*. Sometimes farmers obtain seeds from research projects or other programs operating in their area. This was the case with the CIMMYT/INIFAP project mentioned earlier, where some farmers obtained seed through their participation in the research activities, while others bought seed directly from the project.

It is important to underline that each of these transactions may exist in many variations. Hence they should not be considered as fixed or static models, but rather as dynamic categories with room for variations.

Social Relations

Seed transactions occur within a set of specific social relations. The following is a list of social relations frequently used in seed transactions in the study area. However, the list is not exhaustive. In addition, it should be noted that each category can be divided into subcategories with overlaps and variations among them. For example, neighbors can sometimes be relatives or *compadres* (see below).

- *Family members*. This category includes blood relatives and affiliated relatives. This category is the most important for most informants, many of whom received their first seed from lots their parents cultivated for many years. Some believed the seed they received were passed down from their grandparents. For many people, parents, siblings, and children are the closest social relations and the most readily accessible when help is needed. Family relations are therefore among the first to be consulted when farmers need seed. Furthermore, it appears to be quite common that seed is sold at a lower price when the transaction takes place between close relations such as family members or *compadres*. In other words, one may say that an "element of gift" is more present when the transaction is between relatives.

⁷ PROCAMPO is a government program that provides subsidies for agricultural production. The subsidy consists of a fixed amount (MX\$ 873 in 2002) per hectare of land a farmer cultivates.

- *Compadres*. *Compadrazgo* refers to a ritual kinship, through which close relations of loyalty, mutual help, reciprocity, and confidence are established and formalized. Compadres are considered almost like family and cannot easily refuse when asked for help. However, there is also a certain degree of prestige in being asked to be someone's compadre or comadre, and in some ways compadrazgo can signify social capital (Greenwood 1966; Cordero Avendaño de Durand 1997). While compadrazgo plays an important role in Mexico, a more in-depth study of the structure and significance of this concept was not within the scope of this study.
- *Neighbors*. Neighbors constitute another important social relation, and many informants mentioned this group in relation to seed transactions. It should be noted that neighbours may also be relatives or compadres.
- *Friendships*. Friends include current and former workmates and people who belong to the same social organizations, church group or communal work group. These relations may be a little less close and not quite as confidence related as, for example, blood relatives or compadres. Nevertheless their importance is significant both as a source of information and in terms of exchange or mutual help.
- *Acquaintances*. This includes persons people know, but with whom they do not have close social ties.
- *Commercial seed vendors*. These are persons who sell maize commercially, i.e. vendors in Ocotlán, Oaxaca or Tecolutla or small businesses in communities. For example, one female informant in Santa Ana Zegache, who has a small grocery shop said she sometimes gets paid in maize instead of cash. This maize is then sold either as seed or as maize for consumption.
- *CIMMYT / INIFAP project*. This project is mentioned because seed of local landraces have been bought from and sold to farmers through the project.
- *Strangers*. This category includes persons of whom nothing or very little is known, but with whom some form of seed transaction has been carried out. In this instance, seed is usually sold for cash, as no relation of trust or familiarity exists.

From informants' responses we can get a sense of the frequency by which different types of transactions are applied according to the type of social relation between contracting parties. Table 2 illustrates the relationship between social categories and types of seed transactions. While the table does not cover all types of social relations, it nevertheless indicates a tendency in the pattern of common transaction types.

Table 2. Types of seed transactions by social relations, San Pablo Huitzo, San Lorenzo Albarradas, and Santa Ana Zegache, Central Valleys of Oaxaca, Mexico.

Social relation	Seed transactions			
	Purchased	Borrowed	Interchanged	Gift
Family	Sometimes	Sometimes	Sometimes	Sometimes
Compadres	Sometimes	Sometimes	Sometimes	Sometimes
Neighbors	Common	Sometimes	Sometimes	Rarely
Friendships	Common	Sometimes	Sometimes	Rarely
Acquaintances	Common	Rarely	Sometimes	Rarely
Commercial seed vendors	Common	Rarely	Rarely	Rarely
INIFAP/CIMMYT	Common	Rarely	Rarely	Rarely
Strangers	Common	-	-	-

Although not a determining factor in itself, the data suggests that social relations between persons involved in a seed transaction influenced the type of transaction used. The “closer” the social relationship between donor and recipient, the higher the possibility of negotiating a transaction other than ‘purchased seed’. This trend may also be expressed graphically. Figure 1 shows that the greater the social distance, the weaker the obligation. This is very much in line Marshall Sahlins’ finding on ‘primitive exchange’ (1972).

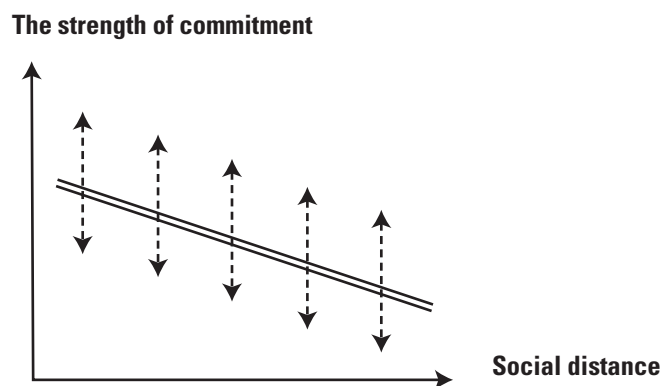


Fig. 1. The relation between social distance and strength of commitment.

Social distance refers to the degree of “closeness” of the social relation between contracting parties, while ‘strength of commitment’ refers to the degree of obligation implied beyond the immediate transaction.

Considerations Before Entering a Seed Transaction

Seed transactions have different implications for the donor (the person who provides the seed) and the recipient (the person who receives the seed). For the recipient, it may imply costs or debt in cash or kind, or an unspoken obligation to return a favor. Asking someone for seed can also imply embarrassment, as this need for seed can be interpreted to be due to poor farming skills or laziness. Furthermore, farmers often run the risk of being cheated and receiving bad or poor quality seed. Receiving or providing seed can also imply the confirmation of social ties, fulfilment of a promise, or recognition of the seed donor.

A seed transaction may also be risky for the seed donor, for example, when the recipient does not keep his or her promise. On the other hand, accepting the transaction means helping another person. From a power relation perspective, this creates a situation in which the donor has the better position or upper hand. Likewise, providing someone with seed can be interpreted as an investment; if at some point in the future the donor needs help or support, there is someone who owes a favor to whom he or she could turn to. From this perspective, helping others carries strong social capital.

The examples of commitments and obligations of those involved illuminate the social mechanisms of seed transactions. This, in turn, helps identify considerations that contracting parties often take into account before entering a seed transaction. For the persons trying to obtain seed, the following considerations are relevant:

- *That the seed is from the same region.* Many informants emphasized this criterion as important when obtaining seed because it is assumed that seed from the same region is adaptable to local agroecological conditions. This consideration relates to farmers' perception of a high genotype-by-environment interaction, i.e., only seed of certain maize types will work under their farming conditions.
- *That the person selling the seed is trustworthy.* This is a way of protecting oneself against being cheated. Several informants pointed this out as another reason for acquiring seed in their own community where they know who is trustworthy and who is not.
- *That the seed owner is willing to sell seed.* Some farmers are very reluctant to part with their seeds. In this case, it becomes necessary to obtain seed from someone else or decide on another type of seed. However, as mentioned earlier, there is also the possibility of asking for grains for consumption and use some of this as seed.
- *Production objectives - commercial, fodder, pozole⁸ tortillas, elote⁹ or others.* For the majority of respondents, the intended use of the maize is important when looking for seed. As documented elsewhere (Bellon 1996 ; Smale et al. 1999) different types of maize occupy different niches. For example, some special dishes are only made with certain kinds of maize, some maize varieties are good only for fodder, and the grain of some varieties weigh more than grain of other varieties—a fact that may play an important role in marketing.¹⁰

Aspects that seed donors or distributors consider are:

- *That the recipient is able to pay and can be trusted to do so.* Some informants said it was better not to enter a transaction if there was reason to suspect that the person asking for seed will have difficulty paying. In a few cases, informants singled out single women, explaining that it is usually more difficult for a single mother to accumulate resources (e.g., cash) than for a man or a woman who has a husband. In the case of borrowed seed, where the payment or part of it is realized after the seed has been handed over, it is important for the donor to make sure that the recipient takes his or her obligation seriously. In other words, some transactions imply a considerable element of obligation and trust between parties.
- *That the person requesting the seed has a real need for it.* Several informants mentioned that the recipient's need for seed is an important consideration. For example, they pointed out that seed is rarely given away to someone who does not really need it unless they are very close relations. This emphasizes the aspect of moral obligation (and the implicit priority to those who really "deserve" the favor, i.e. those who normally save seed from the previous harvest and rarely lose it).

⁸ A traditional and very popular dish prepared with a particular kind of maize.

⁹ The Mexican term for corn on the cob, a very popular snack or light dish throughout Mexico. For some farmers in the study, elotes represent a source of cash income. Seed of maize varieties, which produce big ears, are preferred for elotes.

¹⁰ In markets in the Central Valleys of Oaxaca, maize can be sold by measure or by weight. In the case of the latter, the weight of the kernel is important.

- *That the person who requests the seed is someone, who will “take care of it”.* As previously mentioned some persons watch fiercely over their seed. People say they are “very jealous” or “very attached to” their seed, almost as if attributing a personal dimension to it. These persons do not like to sell or lend their seed, unless they are assured that the person requesting the seed is a good farmer who is able to and keen on taking good care of the seed.

Discussion

The considerations presented here suggest the existence of a general norm: that each farmer is expected to select and keep seed from the previous harvest, and that this is part of the practice of being a “good farmer”. This is similar to the concept of “bonus pater familias”¹¹ of Roman law. Following this hypothesis, a farmer is expected to make every effort not to lose his or her seed. It is acceptable and legitimate for a farmer to obtain seed from other farmers in a bad year, provided he or she has followed the norm of “taking good care” of his or her seed. In this case, the person is someone who has a justifiable need for the seed and the donor is also assured that he or she will “take good care” of it. In other words, this person is someone who “deserves” the seed and who will appreciate the favor. He or she is not someone who does not make the effort of selecting and keeping seed from the previous harvest, and instead relies on others for seed. This may also reduce the problem of free riders, i.e. farmers who are always asking for seed but are not capable of providing it to others. This hypothesis helps explain the absence of local organizations to secure seed supply, as one could claim that there is no need for such an effort.

If seed loss occurs, for example, every five years on average, it is a big investment in terms of time and energy to sustain an organization whose sole purpose is to secure access to seed of a diverse set of maize landraces. Moreover, from the point of view of farmers, seed loss may not seem at all likely, given the fact that people generally follow the practices of a “good farmer”, carefully selecting, treating and storing seed from each cycle to another.

The frequency of seed loss among farmers in the study area is not clear. However, research shows that most seed losses occur among non-white maize varieties (Bellon 2001). As previously mentioned, different maize varieties occupy different niches. White maize is most widely used and accounts for the majority of maize production in the study area. Moreover, it is the least difficult to sell and generally fetches the best price. Colored maize varieties, on the other hand, are used for more specific purposes and are generally planted on much smaller plots.

¹¹ *Bonus Pater Familias* (“good father of family”) is a legal concept referring to a certain standard of reason and conscientiousness applied when estimating a person’s guilt. A bonus pater familias is expected to act with reason and care. The concept can be applied to practically all categories of persons, professions, and ages in terms of whether or not the person in question behaved in a reasonable and conscientious way under the given circumstances.

Planting several varieties can be seen as a way of diminishing the risk of seed loss. Seed loss would not be so serious if only one variety was lost, particularly if the variety was not as important in terms of area planted and contribution to the household's total maize production and income. For example, if a farmer loses a black variety, he or she still has the white and the yellow variety.

However, from another perspective, planting several varieties can also increase the risk of seed loss. Smallscale farmers have little land at their disposal. The more varieties they grow on these plots, the smaller the area for each variety. Some varieties are often planted on very small plots (for example belatove, pinto, and black maize). It then follows that the quantities harvested are small. This obviously increases the risk of seed loss if the harvest fails. Moreover, very small plots also enhance the degree of inbreeding and/or contamination from neighboring fields.

Still, securing seed supply does not depend entirely on farmers and their management. Weather conditions, for example, can be a determining factor. When a bad year hits, it usually affects smallscale farmers and many may lose their seed. This increases demand for seed, which may become expensive and difficult to obtain. The findings of this study indicates that this is a situation where social relations, in particular, play a significant role.

Seed flow is a social process, a negotiation, in which people's decisions can be interpreted as responses adapted to conditions characterizing their current situation—economically, socially, and culturally. Farmers select different strategies for seed transactions: with whom they carry out the transaction, their circumstances, their responsibilities and obligations, and resources at hand. Social relations play a central role in these processes, often transforming themselves into yet another resource for the individual.

Seed appears to be a special category that has fewer of characteristics of a commodity than maize grains for consumption. Although it can be sold, bartered, lent, or given away, farmers' behavior and attitude towards seed is different than towards a commodity. Even though a conceptual effort to separate seed from grain obviously exists, it is nevertheless a very fluid one, emphasized by the fact that grain can be redefined as seed and vice versa. The moral tone with which farmers in Oaxaca talked about exchanging seeds using terms such as "jealous", "deserving" indeed confirms it as a cultural construct that separates the circulation of seed from that of grain for consumption.

The results support the view that there are no "specialized" networks of seed supply of maize landraces in these communities, in the sense of sets of multilateral relationships among a well-defined group of farmers, with clear membership and rules of interaction. Instead, we found that most farmers operate within sets of bilateral transactions, albeit with rules, and in many cases with a medium to long-term perspective. However, in some cases seed is accessed through other means such as local markets. It is not known exactly how often this takes place.

The lack of specialized networks seems logical given that seed loss may not be such an important problem in the study area, as we originally thought. Seed loss may not be a frequent occurrence for the farmer. Furthermore, even when it does happen, it may not jeopardize the survival of farmers who plant several maize varieties, or farmers who have other sources of income, such as off-farm labor and remittances.

Nevertheless, farmers still lose seed from time to time, and still demand different types of maize. In addition, they perceive a high genotype-by-environment interaction and the local nomenclature for maize varieties is poorly developed. Farmers therefore need some form of social infrastructure to access seed of varieties they want. While incentives to maintain specialized seed networks are not high, there is still an incentive to make use of networks and social relations to identify, locate, and obtain seed of desirable maize types. By superimposing seed supply on other networks and social obligations, for example kinship, *compadrazgo*, or neighbors, these farmers can spread the costs of maintaining a network over several different functions, one of which would be access to seed and the information required for identifying appropriate varieties.

Conclusion

This study is a preliminary and qualitative examination of the social infrastructure that shapes seed and information flows among smallscale farmers in the Central Valleys of Oaxaca, Mexico. It confirms the important role of social relations with regards to informal seed supply and local geneflow, and has led to the development of a set of ideas on guiding principles and mechanisms of local seed transactions in the study area.

Although the role of social relations with regards to local seed flow and exchange of information on seed availability and seed providers was stressed, no evidence was found of the existence of specialized networks or social institutions with the specific objective of securing access to seed supply of a diverse set of maize landraces. Instead, it seems to be standard practice among farmers in the study area to select and save seed from season to season. When there is a need to acquire seed from outside the farm (for example, because of seed loss), farmers' informal distribution and acquisition of maize seed were found to be mostly bilateral transactions that often involved a complex process of negotiation and reciprocity, and that was influenced by agroclimatological, socioeconomic, and cultural factors.

A number of different types of seed transactions have been identified together with a number of different types of social relations involved in these transactions. Furthermore certain relations between these two categories have been detected. For example, the study found a pattern whereby the probability of non-monetary exchanges (not buying and selling of seed according to market prices) increased with the degree of 'closeness' between contracting parties. Likewise, seed is not handed over as a gift or lent to unknown persons. At the same time, it is very difficult to deny seed to persons representing close social relations. It should be noted, however, that this does not hinder the sale of seed to close relations.

Social relations can also play a key role when locating and establishing contact with possible seed providers. Seed transaction negotiations are often initiated by making reference to shared social relations. If the establishment of some sort of common denominator between seed provider and seed receiver is successful, it may strengthen the latter's efforts to obtain seed.

The findings from this preliminary study suggest that rather than maintaining a social organization with the specific purpose of securing access to seed supply, farmers in the study area make use of social relations and networks when they need to obtain seed from outside the farm. Like mutual aid, loan of tools, advice, friendship and other sociabilities, seed may be just another resource that farmers occasionally share with each other that are part of the arrangements that make life in rural areas possible.

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