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Preliminary Findings

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Social Relations & Seed Transactions: Small-Scale Farmers´ Access to Maize Landraces in the Central Valleys of Oaxaca: Preliminary Findings

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Abstract

The purpose of this paper is to explore the social arrangements associated with seed transactions among maize growing small-scale farmers in the Central Valleys of Oaxaca, 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 the costs and difficulty of identifying, locating and obtaining seed of the desired varieties. This led to the hypothesis that there are high incentives for some sort of collective action among farmers to facilitate the supply of seed from landraces. However, building on a series of qualitative interviews with key informants in three different communities, no evidence of social networks with the specific purpose of securing access to seed supply of local landraces was found. A number of different types of seed transactions were identified together with a number of different types of social relations involved in these transactions. Furthermore certain relations between these two categories were detected, stressing the important role of social relations. Our results suggest that seed flow is a complex process of negotiation and reciprocity, influenced by a variety of agro-climatological, socio-economic and cultural factors. Rather than maintaining a specialised social organization for securing access to seed, people make use of other types of social relations and networks to obtain seed.

1. Introduction

Mexico is within the primary region of maize diversity. Mexican small-scale farmers are not only heirs to this diversity, but many of them continue to maintain it. Unlike farmers in developed countries or even commercially oriented farmers in developing countries who are able to purchase improved varieties from the formal seed distribution system, Mexican small-scale farmers who continue to plant landraces depend almost completely on themselves and other farmers to access landrace diversity. They have to keep seed harvested from their own crop from one season to the next, or alternatively to get seed mainly from other farmers. Farmers lose their seed periodically due to climatic or storage problems, alternatively they may want to test seed of new crop varieties[1]. From time to time they therefore face the problem of acquiring seed of the varieties they like. This is not a trivial problem, particularly if they demand very specific crop varieties. When requiring seed, a farmer has to a) find out who has which variety, its characteristics, and, particularly, its performance; b) make sure that the information is accurate and the seed reliable (i.e., it will have an acceptable germination rate); and c) negotiate the conditions of the transaction with the supplying farmer. The latter may be difficult if the supplying farmer is from another village or if there are no social ties between them.

A group of farmers can maintain more diversity at a lower cost and incur less probability of loss than an individual farmer. Therefore, one can hypothesize that farmers in an area of great diversity, such as Mexico, may have strong incentives to maintain a social arrangement among themselves to access seed of the different crop varieties available. Clearly, these incentives may be higher the higher: a) the importance of the crop for their livelihoods, b) the probability of seed loss, and c) the difficulty they have identifying varieties with the characteristics they require. The problem of identifying appropriate

[1] Here we refer to varieties in the sense 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 (e.g. UPOV 1991), where a variety should be new, distinct, uniform and stable. In this paper, the term variety is applied mainly to the distinct maize landraces that farmers distinguished in the Central Valleys of Oaxaca. 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. The farmer would recognize them as different, but not have a specific name for each of them, besides calling them Blancos (whites).

varieties may be particularly important, the more diversity available, if each farmer requires very specific ones, and there is a poor nomenclature to identify them.

The purpose of this paper is to explore the social arrangements associated with seed transactions that take place among small-scale farmers in the Central Valleys of Oaxaca. These farmers are heirs to a long history of cultivation of maize, which still remains an important component of their livelihoods. They rely almost completely on a diversity of local landraces for their farming. Improved varieties have had a negligible impact in this region. Although individual farmers maintain relatively few different varieties, regionally they maintain many. They have a demand for many traits in their maize, particularly associated with culinary uses. They also perceived that there is a strong genotype by environment interaction in the maize landraces they maintain. Furthermore, while at the regional level many different landraces are grown, the nomenclature to identify them is poorly developed. Therefore one would expect some specialized social arrangements among these farmers associated with the access to the maize diversity available. For these reasons, one may hypothesize that these farmers have created and maintain social networks to access the maize diversity they value, but that individually they cannot maintain efficiently.

Studying and understanding the social arrangements and the seed transactions these mediate is important because they are the basis of the supply of landrace diversity to these farmers who value and are willing to continue planting these genetic resources. Besides the specific value of these landraces to these farmers, by continuing to plant them, they are contributing to the conservation of agrobiodiversity. Hence the long-term viability of these genetic resources in farmers fields—and therefore their capacity to continue to evolve—may depend to a great extent on the structure and function of these social arrangements and seed transactions.

The research described in this paper builds on another research project that has been carried out in the Central Valleys of Oaxaca since 1997 (Bellon et al. 2000; Smale et al. 1998). Its goal is to determine whether it is possible to improve maize productivity while

maintaining or enhancing genetic diversity. This project has conducted and compared different participatory interventions with small-scale farmers in six communities in this region. Around 90% of the study area is planted to maize and there is no formal seed distribution system. Through the project, farmers have gained access to the diversity of maize landraces present in the region, have been trained in seed selection and management techniques, improved seed and grain storage practices, and learned principles to assist them in maintaining the characteristics of landraces they value. The six communities were chosen because they represent diverse and contrasting agroecological and socioeconomic conditions representative of the region. The research presented here increases the scope of the original project by trying to understand the "social infrastructure" that shapes seed and information flows on which these farmers depend to maintain landrace diversity.

The rest of the paper is divided into six sections. The methodology is presented in section 2. Section 3 describes the field sites and the context of the social relations in these sites. Section 4 presents the results, which deal with the local distinction between grain and seed, how farmers gain access to information on seed, the different types of seed transactions, the social relations involved in these transactions, and finally the considerations of donors and recipients before entering into a seed transaction. Section 5 presents the discussion, while the conclusions are presented in section 6.

2. Methodology

The study described here is our first approach to the issues of social arrangements and seed transactions. Its preliminary character and qualitative nature, as well as the time available determined that it took place only in three of the six communities where the original project has been working. These three communities, however, represented the most contrasting conditions of the six. The three communities are San Pablo Huitzo, San Lorenzo Albarradas and Santa Ana Zegache. In each of the three communities a series of key informants were identified.

The key informant selection criteria was to identify male and female maize farmers with considerable knowledge about their communities and willing to share their knowledge about maize cultivation, as well as about the different ways to obtain seed. For each of the three communities a list of possible key informant candidates was elaborated based on our prior knowledge of the communities. When a person on this list could not be located or did not have the time available for an interview, we simply went on to the next person on the list. A total of 22 informants, 13 males and 9 females, were interviewed during the first weeks of December, 2000.

On many occasions other members of the informant's household were also present, for example the spouse, a son or a daughter, son or daughter in law etc. The interviews were of a semi-structured character, following an informal interview guide.

The study was carried out by an all-female team: two agronomists, one sociologist and one anthropologist, split up into two sub-teams of two persons each. On two occasions the person interviewed did not agree to the use of tape recorder during the interview, and on these occasions only note taking was used.

3. The Study Site and the Context

San Pablo Huitzo, San Lorenzo Albarradas and Santa Ana Zegache all belong to the region known as the Central Valleys of Oaxaca. This region covers the central part of the state of Oaxaca, surrounding the city of Oaxaca at 1778 masl. The climate is mild, December, January, and February being the coolest months and April and May the warmest. The rainy season usually starts in May stretching into September-October (SEP, 1991). Maize, beans and squash are cultivated in all of the Central Valleys. Although the different parts of the Central Valleys are similar in many aspects, in others, they tend to differ somewhat, and for this reason it is considered useful to provide a brief characterization of each of the three communities mentioned here.

Between the three of them San Pablo Huitzo is the most prosperous community, and the one with the most stable and mild climate. It also has the best soils and the largest irrigated area, favouring a more intensive agriculture than in the two other communities, for example the use of tractors for land preparation is much more common here. Besides basic grains, alfalfa is grown for fodder, since milk production is important in San Pablo Huitzo. Some farmers also grow vegetables for the market. Besides agriculture, various persons in this community work as skilled labour or day labourers within or outside the community. San Pablo Huitzo is furthermore situated right on the Puebla-Oaxaca highway, a fact that in economic and communication terms is an important advantage for the community.

Santa Ana Zegache is remarkable for its high percentage of indigenous population; more than 30% belong to the zapoteco ethnic group (Smale et al. 1999). The soils are not particularly good, rainfall is very scarce, and only 3 % of the farms have some sort of irrigation (Smale et al. 1999). Alfalfa is also cultivated in this community, although on a much smaller scale than in San Pablo Huitzo. Some farmers also cultivate *higuerilla* (Ricinus communis), and although they are very few, some also plant flowers, garlic and groundnuts. In spite of the fact that Santa Ana is somewhat distant from the paved main roads, the community has good communication with Oaxaca (travel time:1-1:30 h) and with Ocotlàn (30-45 min.), and some members of the community work in these places or in other neighbouring communities. Likewise there are students from Santa Ana who travel daily to Ocotlán for their classes.

Of the three communities San Lorenzo Albarradas is the most remote from the city of Oaxaca. This community covers three *agencias*, a Mexican administrative term for branch or unit: San Isidro Roaguía, San Lorenzo and San Bartolo. The landscape is characterized by strong differences in altitude, resulting in great differences in the agro-climatological conditions within the community, particularly in terms of temperature as well as suitability for agriculture. A large part of the land in San Lorenzo is not only steep slopes, it is also very stony and its yield potential is considered low (Smale et al. 1999). Besides maize, beans and squash, the cultivation of the *maguey mezcalero* is common

here, a type of agave used for the spirit known as *mezcal*. Various families furthermore harvest the leaves of a local palm tree variety, used in the elaboration of *petates* (hand woven mats) and other local handicrafts.

The best land for agricultural purposes in the municipality of San Lorenzo, is located in the *agencia* or subdivision of San Bartolo, on the sides of the road to the Sierra Norte de Ixtlán. A smaller part of this land has some sort of irrigation. San Bartolo is also where the maguey stock is located, - a source of paid work and cash income for some community members. There is also a simple mechanics workshop and a few popular restaurants and food stalls attending travelers and others.

In the *agencia* of San Isidro Roaguía is the tourist attraction known as Hierve el Agua, where a number of families sell food and handicrafts. There is a series of cabins for rent and the income here from is administered by the ejido authorities[2] of San Lorenzo Albarradas.

The state of Oaxaca is divided into districts and municipalities. Municipal elections are held every three years and each municipality corresponds to an *ayuntamiento*, headed by the municipal president and a body of counsellors. The *ayuntamientos* are responsible for providing the population with public services such as drinking water, electricity, garbage collection etc. as well as overseeing that law and order is respected. Still, in the state of Oaxaca some municipalities do not offer all of these services due to the lack of funds.

Each of the three communities described is a municipality and is organized administratively as mentioned above. All three have electricity and drinking water, and in all of them, some sort of medical service exists, as well as primary school. In San Pablo Huitzo and in Santa Ana there is furthermore a secondary school and in San Lorenzo Albarradas there is a *tele-secundaria* (a national programme imparting secondary school

[2] The ejido is a land tenure system by which a community of peasants received a land grant from the government under the Agrarian Reform. An ejidatario is a member of an ejido. It also refers to the community of ejidatarios, and as such entails a form of social organization.

classes via television broadcasting). Of the three communities San Pablo Huitzo is the only one with a sewage system.

The average farm size in the six communities that are part of the project, is 3,49 ha according to the baseline study realized by CIMMYT / INIFAP 1997, based on a sample of 240 households (Smale et al 1999).

3.1 Institutions of social relations

As in other parts of Mexico social relations and networks between people play an important role in Oaxacan communities. The fundamental reference is kinship. This group of social relations includes biological and affiliate kinship, but it is also important to consider what we could call fictitious kinship into which fall the categories of friendships and *compadrazgo*.

The concept of *compadrazgo* refers to very close social relations considered almost as family. It can be perceived of as a way of formalizing a close relation of mutual help, reciprocity and confidence. One can ask ones compadres for help, and they cannot easily refuse. Being asked to be some one's compadre also includes a certain element of prestige, being, as it is, a sign of recognition, and being compadre or comadre also creates ties of loyalty and assistance. In a certain way *compadrazgo* can signify social capital (Greenwood: 1966, Cordero Avendaño de Durand: 1997).

In the Central Valley communities where the project works, it is common practice to establish or reconfirm *compadrazgo* relations at the baptizement of a child, at the presentation of a child in the church, at confirmation, graduation, at girls' 15 years birthday and at weddings.

In Oaxaca other social organization institutions are also significant. *Téquio* refers to a form of communal work in which one has to provide a service to the community. It can refer to a communal work in the interest of a certain group (for example parents interest in the conditions of the local school), or it can be in the interest of the community in

general (for example the construction and maintenance of roads in the community, drinking water infrastructure, sewage etc.).

Guelaguetza is another social tradition in this region. It is an institution of mutual aid, given through the reciprocal exchange between households according to demand. It can take place in many different situations and between different people, but among the most important occasions where *guelaguetza* is practiced we find agricultural tasks, the roofing of houses, weddings, funerals, and the fiestas of the village saint (Montes Vasquez 1985). It is a significant point of the *guelaguetza* institution, that gifts must be repaid in kind, and in exactly the same amount (Beals 1970, Montes Vasquez 1985). For that same reason gifts are normally carefully recorded; turkeys are weighed or apprised as to maturity, maize and sugar etc. is measured, and notes are taken, recording "gifts" received and "gifts" made (Beals 1970).

Another important social organization institution in the communities are the *mayordomìas* and the fiesta committees, who are in charge of the organization of the fiestas in honour of the village saints. It is a complex organization of sponsorship and voluntary work. The *mayordomìa* is responsible for all that has to do with the religious part of the fiesta and the religious celebration of the saint, such as the processions, music, food and drink, flower arrangements and decorations, presents, fireworks etc. In some cases there may be a fiesta committee, organizing the more secular aspects of the celebration, that is: the dance, the rodeo, other food and drink stands etc or it may all fall under the responsibility of the *mayordomía*. For those who assume the principal cargos or responsibilities of this organization it signifies a very big effort, not only in terms of the amount of work required, but also in terms of the monetary contributions they are expected to give.

Often there are several mayordomos sharing the burden of sponsoring the fiestas of the village saint, meaning that the responsibility, the work and the costs of the celebration are shared among several households.

Mayordomos are expected to sponsor a considerable part of the celebration, which may go on for several days and involve attending and feeding most of the community, hosting the dance etc. In order to be able to take on this burden, mayordomos ask for contributions from other people, and call in the debts others owe them, be it in cash, in *kind* or in terms of labour; - for example in terms of *guelaguetza*. Even though these are heavy cargos requiring much time, work, and resources, they are also cargos that signify much prestige and one might say, that the better organized the celebration, and the more abundant it is, the more prestige does it bring the mayordomos and their helpers (Stephen 1991, Starr 1993, Montes Vasquez 1985, Beals 1970). The actual structure and organization of the mayordomia as an institution may differ from place to place. Formerly an important civic-religious authority the mayordomia institution has been weakened significantly with the introduction of civil municipal government (Thomas: 1962). In the past, mayordomia service by community members used to be a 'duty' following a cyclical and dyadic alteration between civic and religious service (Cordero Avendaño 1997, Greenwood: 1966). In most communities the mayordomia institution nowadays is a voluntary service motivated by the seeking of status and by wows made to the saints (Thomas: 1962).

However, the respect towards these social institutions is strong, and many Oaxaqueños living and working outside their communities, in other parts of Mexico or abroad, send their contributions to the village fiestas by mail. Many furthermore return to take part in the annual fiesta or to comply with the cargos and duties that may correspond to them or that they have chosen to take on (SEP:1999, Stephen 1991).

4. Results

The most common way to secure seed supply is to select and store seed from the previous harvest. Nevertheless, people sometimes have to obtain seed from other sources. The reasons for this can be multiple. Among those mentioned by our informants were for example, that the harvest failed; that the stored seed or part of it had been lost due to

attacks by insects or rodents, or because the family had had to use it for consumption; or simply because they wished to try another type of maize.

In general the persons interviewed mentioned a series of different types of transactions through which seed flow can occur among farmers, either to obtain seed from or supply seed to other persons. These transactions can take place between different persons, representing a wide variety of roles or social relations. There are no fixed rules, and each transaction is influenced by the kind of relation between the two contracting parties, their respective social positions and the degree of confidence (or closeness) between them.

The results of the data analysis are presented below. First the campesino concepts of grain and semilla are discussed briefly. The different ways to access information is then described in order to provide an idea about how people inform themselves about the different options they have for obtaining seed. It is worth to note the importance of social relations in this respect, and comments are made on how social relations can influence one's efforts to obtain seed. Next, a list of the different types of seed transactions identified is presented, and the characteristics of each one of them are explained. Likewise, the different types of social relations involved in these transactions are characterized. As a whole, these results indicate the existence of a relation between certain social relations and certain types of transactions. Finally, some of the factors that may influence farmer's decision-making when deciding whether or not to enter a seed transaction, are identified and discussed.

4.1 The local distinction between grain and seed

In theory any maize kernel could serve as seed or as food. As long as these are healthy kernels, there are no specific, immediately observable characteristics objectively distinguishing some kernels from others as seed. Yet, farmers operate with different categories, and clearly distinguish between seed for planting on one hand, and grain for consumption or sale on the other; a practice that has also been reported from other parts of Mexico (Aguirre 1999, Louette and Smale 1998), and which was strongly confirmed by the research.

Among the Central Valleys' small-scale farmers, "grano" or grain, refers to maize kernels in general, without specifying its' intended use. Grain can be used for consumption purposes, for animal feed, for selling etc. 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 referred to as an all-together different category.

Seed is defined as such through a process of categorization. A series of criteria is applied, according to which farmers decide from which ears to select the kernels to be used as seed, as well as which specific 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, but 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 a selection pressure in an attempt to enhance favoured varietal traits and lessen the influence of other, undesired traits.

Seed, then, is basically maize kernels that have been selected as possessing certain 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 grain (turned seed) also changes. Like with any other valuable object or good, farmers seek to take good care of their seed and store it in the best possible conditions, often separated from the rest of the maize. A series of beliefs and recommendations is furthermore tied to maize seed. According to some of the informants one must take care not to spill any seed while degraining the maize ears, lest a hen, a turkey or other runs for it and picks it up. If this happens, birds will pick the seeds in the field, and the milpa will not establish. Another precaution is to keep the cobs from which seed was selected in a closely tied sack in a safe and dry place until the milpa is kneehigh and well underway. Burning the cobs, feeding them to the animals or otherwise discard of them before then brings bad luck and the milpa will not develop properly. It has not been possible so far to register these practices and recommendations in a

systematic way; yet, their mere 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 is valued considerably higher than maize grains for consumption purposes.

Table 1. Producer and consumer prices reported by survey households for maize seed, grain, and fodder, Central Valleys of Oaxaca, May 1998

	Huitzo	San Lorenzo	Santa Ana
Seed ($MX/Kg)			
Buy	4.66	---	4.09
Sell	4.34	4.97	4.07
Grain ($MX/Kg)			
Buy	2.20	1.54	2.61
Sell	2.17	2.06	2.60

Source: CIMMYT/INIFAP 1997 survey, 240 total households with 40 households by community.
Notes: Estimates in "All" category are weighted by inverse probability of selection. The correlation between consumer and producer prices was high, particularly for seed and fodder. Many farmers were unable to report prices (see column "n").
*Paired t-tests show no significant differences between mean consumer and producer prices.

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. While not unusual, this is not a common practice either, and mainly seems to take place in relation to smaller quantities of 'grains' or to circumstances under which it is very difficult otherwise to obtain seed, be it either because of lack of resources or because the seed donor in question for some reason is not willing to provide seed (section 4.5). Although a clearly defined concept of seed exists (selected, clean and of good quality) it is, then, not a rigid or a static concept. Rather, the concept of seed appears to be dynamic and negotiable, depending on the situation. This in turn demonstrates the flexibility of campesino categories and the inclination towards experiments and practical solutions.

4.2 Access to information on seed

Farmers have diverse interests and concerns relating, among others, to farming environment, production risks and management constraints, as well as consumption preferences etc. (Bellon 2001). Farmers therefore demand crop diversity. As pointed out in the introduction the nomenclature relating to maize varieties in the study area is poorly developed. At the same time a strong genotype by environment interaction is generally perceived. These factors contribute to the difficulties of identifying adequate seed that farmers face when in need of seed. How does one obtain information on the types of maize seed available? How to find out who has what kind of seed? And how does one make sure the information is accurate – especially when the existing nomenclature is somewhat vague and ambiguous? According to the informants, general agricultural information are common themes of *daily life conversations* between family members, compadres and neighbours as among villagers in general.

Apart from conversations with other persons, several mentioned that whenever they would *move or walk* form one place to another, say to their fields, they would notice what crops others have in their fields, and the state these would be in. At the same time they would also notice, how other farmers work.

Working together, be it as a hired farm hand or just helping a friend or a family member, for example paying back a favour, or, as a farmer from San Lorenzo mentioned, participating in a *guelaguetza*, is also an opportunity for hearing about and exchange experiences about crops and farming. Some informants emphasized not only, that seed must be of good quality, but also of an adequate variety in terms of production conditions such as soil conditions, rainfall etc. i. e. genotype by environment interaction. The technologies applied by the farmer and the quality of his or her work should also be taken into account.

Some also mentioned that on certain occasions they had come to know of types of maize from other regions, through family or friendship relations, for example work mates who had travelled or worked in other parts of the country.

In the community of San Pablo Huitzo, an individual installed a loudspeaker equipment destined for information diffusion and messages, outside his little shop. The users pay a certain amount per message or announcement to the owner of the equipment. According to some informants the owner has used this equipment, after the harvest, to announce the sale of individual farmers´ maize seed, including his own.

Another way, or a place of central importance when seeking information on who has what kind of maize and from whom seed can be obtained, is the maize mill. In many homes the mechanized maize mill has substituted the metate in the grinding of maize. However, the production of tortillas is still a principal task for many women, and many of them go to the mill every day. Besides providing a service, the mill is a meeting point, a social space, frequented especially by women, since the milling of maize is part of the reproductive work, traditionally considered women's. While each person waits her turn at the maize mill, conversation thrives and friendships are made. The different types of maize brought along to the mill are compared, the colours discussed, as well as the taste and the advantages and disadvantages of each kind. Sometimes small amounts of masa (maize dough) for a few tortillas are exchanged, in order to try the taste of somebody else's maize.

Some women make tortillas or other maize dishes to order for sale, sometimes with maize produced by their own household, at other times with maize brought by the person who places the order. These persons, who make tortillas or other maize dishes to order, can also be considered a source of information on the types of maize cultivated in their community.

4.3 Different types of seed transactions

The process of obtaining seed is an active and conscious effort, when the farmer is actively seeking to obtain seed. However, it can also be a passive process in the sense that the farmer is not actively or explicitly looking for ways to obtain seed, but that he or she simply takes advantage of the opportunities that present themselves. In many cases the

process of acquiring seed contains elements of both, but in reality it is rather a question of a whole spectrum of variations or combinations between these two extremes.

In the present study different ways of obtaining maize seed were identified, and in this paper these are referred to as different types of seed transactions. With this term we make reference to the different kinds of transactions in which at least one of the contracting parties obtain seed.

In this specific context, seed is considered as any type of maize grain that is used as seed at the moment of planting. It can be a commercial product of improved seed (OPV´s, hybrids or synthetic varieties), it can be seed obtained as such from another farmer, but it can also be maize grains, which were originally destined for consumption purposes, but which at the moment of planting were used as seed. Based on the data collected, the different types of seed transactions identified are presented below.

Purchased seed refers to seed that has been bought from someone else, paid for with cash and at a price agreed upon by the two parties, for example the market price. According to the information obtained in the present study, this is the most common type of seed transaction.

Borrowed seed refers to the transaction in which one person provides another with seed, and this person in stead of paying for the seed with money, assumes the promise of giving back this maize, once he or she has harvested, either as seed (selected seed) or as grain (mixed grains). The quantity to give back can vary according to the agreement between the two and according to the relation they have with each other. If the agreement is that the seed has to be paid back in grain, it is common for the quantity to be somewhat larger, than what was received as seed, because of the higher value of seed compared to grain for consumption purposes.

Seed as a gift. In this type of transaction no cash payment is demanded (purchased seed), neither does the receiver have to give back a certain quantity of maize, once he or she has

harvested (borrowed seed). Some informants claimed that once the donor has provided the receiver with seed the transaction ends. As a farmer from Huitzo said, "A gift is a gift and it does not have to be paid back, neither in cash, nor in kind." Yet, in general the statements of the informants cannot be considered to confirm, that such is the case. Even though it is not discussed explicitly, there is no doubt that the fact of entering this kind of transaction implies the scheme of "what goes around comes around". In other words; even though it is said that one does not have to give back anything, an obligation is implicitly assumed, that on another occasion, when the donor of the seed needs assistance in some respect, the receiver will return the favour. In this way a certain balanced reciprocity can be considered to be implicit. On some occasions this type of transaction furthermore has the function of demonstrating closeness or confidence between the involved persons, and in this case, it can be perceived as an insult to refuse the gift. On other occasions the fact of doing favours of this kind creates a type of patron-client relationship; that is, a power relation, but one that has certain benefits for both parties involved. On the other hand this type of transaction can also be considered to carry implicitly an indebtedness of the receiver towards the donor, due to the fact that the latter, in socio-cultural terms, has the right anytime to ask the person, who received the seed, to return the favour.

Exchanged seed is another type of seed transaction in which seed of one kind of maize is exchanged with seed of another kind of maize. These exchanges usually involve just a few kilos of seed or grain. It is a way of obtaining seed of a desired kind of maize, provided the other person is also interested in seed of the kind of maize offered in exchange. If this is not the case the owner of the desired seed may eventually accept to give seed in exchange for maize grains for consumption in stead. However, like in the case of borrowed seed, the quantities may vary. What is more, when the quantities are of equal proportions, the transaction can be perceived of, partly, as a gift, due to the higher value attributed to seed. albeit most likely in a larger quantity. It is also common to exchange grain for consumption of one kind with grain for consumption of another kind of maize, for example when a certain kind of maize is needed for the preparation of a

special dish. In some cases farmers may even decide to use this maize as seed instead of consuming it, for example if it interests him or her a lot.

Seed obtained without the knowledge of the provider. In this case the donor is not actively involved. According to the informants it sometimes occur in the communities, that maize cobs are stolen in the field, a thing that is generally looked upon with much regret, unless the quantity in question is minimal. In these cases it is not possible for the owner to know whether the one who took the cobs used them for consumption or for planting.

It is clear that in many cases people have planted maize kernels that were not obtained as seed in any of the kinds of transactions described above, but that were still used as such without the knowing of the actual provider of the seed. In one of the communities, for example, a farmer commented, that one of the maize varities that he grows, originally came from his neighbour's maize field. According to this señor, the beauty and the sturdiness of the type of maize, his neighbour had planted, attracted his attention. When he realized, that she was not going to harvest it, he decided to "tear off some cobs, before they would be wasted". From these maize cobs he selected the best kernels and planted them on his own land in the following season.

A female informant, who among other activities dedicates herself to the making of tortillas, told us about once she received an order for tortillas. The person who placed the order brought the maize to be used. The colour of this maize so fascinated her, that out of pure curiosity she selected a smaller part of the grains in order to ask her husband to plant it, and from the maize harvested she then selected seed. However, she never shared this information with the person who brought her the maize and placed the order for the tortillas.

On another occasion a farmer told us, that he once lost his seed, when a sack of seed fell off the trailer connected to his tractor. When he realized what had happened, he went back the same way to look for the sack of seed, but did not find it. Somebody had

obviously found it before him, and he does not know whether it was used as seed or for consumption.

It does not seem to be extraordinary or unusual to use grains, at first considered as maize for consumption, as seed. Several informants commented on experiences of this kind, although in the majority of the cases the quantities in question were small and/or the experience was an effect of what could be termed farmers experiments. Still, according to one of the informants, it can even be part of a strategy to obtain seed. This farmer explained, that if you really want to obtain a certain kind of seed, belonging to a person who is not very willing to sell seed, or as he put it:" someone very jealous of his seed", one simply asks this person for maize for consumption, and from this you select the best kernels for seed. This type of statements indicate, that this kind of practice is not uncommon, that is, farmers inclination towards making their own experiments and using as seed, grain that was originally destined for consumption. This, on the other hand, signals the dynamic and complex character of what we refer to as seed flow.

Share cropping, or *siembras a medias*, is a traditional arrangement, common in the Central Valleys. It refers to an agreement between two farmers in order to finance the costs of the resources needed for the planting, such as the land and other inputs and the amount of labour needed in the whole production cycle. For example; one farmer agrees to supply the labour. This is the *mediero* or shareholder. Meanwhile the other farmer, owner of the land to be planted, supplies the land and the seed, and it is his privilege to choose what kind of seed it will be. The further costs in terms of other inputs are shared equally between the two of them, as is the harvest. Sometimes the cash subsidy from PROCAMPO (Programa de apoyos al campo) is also shared.

Some farmers have also obtained seed through their collaboration with the CIMMYT / INIFAP project and the experiments involving maize landraces. They were given small quantities of seed of 7 different varieties and they were paid a compensation for their labour input. Of the harvest of these varieties, the farmers only had to give back a small quantity to the project. The rest of the harvest was theirs to keep and use, as they found

best. During fieldwork we realized that some farmers had selected seed from some of these varieties. In that sense one could also say that for these persons, the fact of participating in this project, also turned out to be a way of obtaining other kinds of seed.

Some persons have had to look for seed several times, and in this exercise it became clear that in some cases they would seek out the same persons in order to obtain seed. However we do not know how frequently this happens, nor how many times people will go back to the same persons for seed. Neither do we know peoples motives for seeking out the same persons.

It is important to underline that each type of transaction may exist in many variations, and the types mentioned here should not be considered as fixed or static models.

4.4 The social relations involved

The transactions described above do not occur in a social vacuum. They are associated with a set of specific social relations. During the interviews the informants mentioned different groups of reference. The following is not to be considered an exhaustive list, and each category mentioned here can be divided into a series of subcategories with overlappings and variations among them. Furthermore it is also possible that other relations may be involved, which were not registered during the study, due to its preliminary character and the time limits.

Family members: The family member category refers to blood relatives and affiliated relatives. It should not be confused with household members: while household members may also be family, family members usually span and extend over several households. The family member category is without doubt the most important for many of the informants, many of who received their first seed from their parents, when they started cultivating maize on their own. In several cases the seed that they received came from seed lots that their parents had cultivated and kept during many years. Some of the informants even thought, that their parents had received this seed from their grandparents.

For many people, parents, siblings, children etc are the closest social relations and for that same reason also the most readily accessible persons in case of emergencies or when help is needed. Family relations are therefore among the social relations first to be consulted, when seeking to obtain seed. Furthermore, considering the data, 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.

Compadres: Traditionally compadrazgo plays an important role in Mexico. The results of this preliminary study do not allow a clear vision of the exact structure of compadrazgo, its extension or significance in the Central Valleys of Oaxaca. However, there is no doubt that compadrazgo relations are very important and considered close, almost like family. These relations can therefore be considered to be among the closest social relations and among those with which ties of mutual aid are often established.

Neighbours: For many people neighbours is another group with which to establish good relations, and many informants also mentioned this group in relation to seed transactions. In some cases an overlap may occur when referring to this group, as neighbours, quite frequently, are also relatives or compadres.

Friendships; This is another group of reference, that was often mentioned by informants when talking about seed exchange or the exchange of information relating to seed and seed availability. Within this group we find present or former work mates, friends belonging to different social organizations, from the church or the communal work, from the maize mill etc. These are perhaps a little less close and maybe not entirely as confidence related as in the case of blood relatives or compadres. Nevertheless, their importance is significant both as a source of information, in terms of exchange or mutual help, although maybe at a lesser scale.

Acquaintances: Several of the persons interviewed also referred to this category. It includes persons, whom they know, but with whom they do not have close social relations, like with friends or neighbours.

Commercial seed vendors: These are persons who sell maize commercially, as vendors in the markets of Ocotlán, Oaxaca or Tecolutla or in the small businesses in the communities, like for example one female informant in Santa Ana Zegache, who has a small grocery shop. Once in a while she will receive maize instead of money, and this maize is then sold, either as seed or as maize for consumption.

A minority of the informants on some occasion has bought seed at the market. Although the majority does not share this experience some of them were quite conscious of the existence of this option. Some also mentioned that when going to the market in Oaxaca they would normally bring along with them some maize that they would sell to the shopkeepers in the market. According to another (female) informant from Santa Ana Zegache, the maize from Santa Ana is highly recognized in the market for it's good quality.

The *CIMMYT / INIFAP* project is mentioned here because it has both bought seed from the farmers and sold seeds from local landraces, and some of the farmers furthermore have participated in field trials and demonstrations carried out within this same project.

Strangers; This category includes persons of whom nothing or very little is previously known, but with whom some form of seed transaction has been carried out, meaning that someone unknown has provided or received seed. The type of seed transaction used in these cases normally is purchased. In other words, in these cases seed is usually sold (seed for cash), as no relation of trust or familiarity exists, which could otherwise inspire to another type of seed transaction, such as borrowing, interchange, much less gift.

From the informants we can get a sense of the frequency by which different types of transactions are applied, according to the type of social relation existing between the

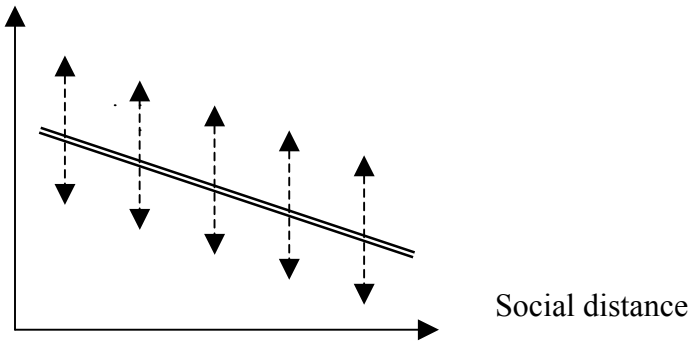
contracting parties. Table 2 illustrates the relation between social categories and the types of seed transactions. As pointed out above, more types of social relations and more types of transactions may exist, and as such the table does not pretend to cover all types. However it nevertheless indicates a tendency in the pattern of common transaction types as according to the sondeo.

Table 2. Types of seed transactions by group of social relation

Type of social relation	Purchased	Borrowed	Interchanged	Gift
Family	somewhat	somewhat	somewhat	somewhat
Compadres	somewhat	somewhat	somewhat	somewhat
Neighbours	common	somewhat	somewhat	-
Friendships	common	somewhat	somewhat	-
Acquaintances	common	-	somewhat	-
Commercial seed vendors	common	-	-	-
INIFAP/CIMMYT	common	-	-	-
Strangers	common	-	-	-

Although not a determining factor in itself, what is shown in Table 2, suggests that the social relation between the persons involved in a seed transaction influence the type of transaction used. The "closer" the social relationship between donor and recipient, the higher the possibility of negotiating a transaction, which is not 'purchased seed'. This tendency, or trend, may also be expressed graphically as in Figure 1.

Fig. 1. The strength of the commitment



Social distance refers to the degree of "closeness" of the social relation between the contracting parties, while the strength of the commitment refers to the degree of obligation implied beyond the immediate transaction. Very much in line with Marshall Sahlins' writings on 'primitive exchange' (1972), the pattern suggested by the findings of the preliminary study, is shown in Figure 1, expressed as a gradient: the further the social distance, the lesser the obligation.

4.5 Donor and recipient - Some important considerations before entering a seed transaction

For both the donor and the recipient, entering a seed transaction can have very different implications. In the case of the person who receives seed in a transaction, it can for example imply costs, getting oneself into debt either in terms of cash or kind, or in terms of a favour received, that one may have to pay back anytime. Having to ask someone else for seed can also imply embarrassment, as well as a risk (of being cheated or of receiving seed of bad or inadequate quality). Yet, it can also imply the confirmation of social ties, the fulfilling of a promise; recognition or an opportunity, which may also be the case for the one who provides the seed.

For the donor the transaction may also imply a risk, although of a different kind, in case the recipient of the seed does not keep his or her promise, however, accepting the transaction also means helping another person. From a power relation perspective, this transaction on the other hand creates a power relation, in which the donor has the better position. Likewise, the fact of providing someone else with seed can be perceived of as a future investment, conscious or not. It is a way of ensuring that when at some point in the future the donor needs help or support; there is someone who owes him or her a favour. From this perspective the fact of helping others becomes a strong social capital.

These examples of the commitments and obligations of those involved illuminate the social mechanisms of seed transactions. This, in turn, contributes to identifying some considerations, which, according to the informants, are taken 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 emphasize this criterion as important when obtaining seed. If the seed comes from the same region it is generally assumed that the variety is adapted to the local agro-ecological conditions of the region. This consideration obviously relates to the farmers' perception that there is a high genotype by environment interaction, i.e. only seed of certain maize types will work under their conditions.

That the person selling the seed is trustworthy. According to the informants this precaution is a way of protecting oneself against being cheated, or rather, avoiding that the donor will sell you one thing, claiming it is another. An example, which at the same time makes reference to the previous consideration, could be that the seed vendor will claim that, "Yes! The seed is from the same region", when in fact this is not the case.

That the owner of the desired seed is willing to sell seed. According to the informants there are some persons who are very jealous of their seed. In these cases it is necessary to consider the possibility of obtaining the same type of seed from some one else, or of deciding on another type of seed. However, some persons told us, that there is also the possibility of asking for grains for consumption, in order to select some of this as seed.

Production objectives - commercial, fodder, pozole, tortillas, elote or others. For the majority of the persons interviewed, the intended use of the maize is important to consider when looking for seed, and in general very few of the informants appeared to be indifferent to the type of maize they grow. As documented elsewhere, the different types of maize occupy different niches (Bellon 1996, Smale et al. 1999).

Seed donors or distributors tend to consider other aspects before entering a seed transaction. Let us just mention a few:

That the person who receives the seed is able to pay and can be trusted to do so. According to some informants, it is preferable not to enter a transaction if there is reason to suspect, that the person asking for seed will have difficulty in paying. In a few cases the informant referred, among others, to 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 person, who asks for seed, is actually going to take his or her obligation seriously. In other words; some transactions imply a considerable element of obligation and therefore, likewise, require a considerable degree of trust between the parties.

That the person requesting the seed has a real need for it. Several informants mentioned the need of the person requesting the seed, as an important point to take into consideration. According to these persons, one does not run the risk of for example lending seed to someone, without this person really needing it. Likewise, one does not give seed away, if the person requesting it is not really in need of it, with the exception of very close social relations. This concern emphasizes an aspect of moral obligation (and the implicit priority to those who really "deserve" the favour, i.e. those who normally save seed from the previous harvest and rarely loose it). It is likely to assume, that this consideration is stressed after a bad harvest, when seed is scarce.

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 very personal dimension to it. These persons are said not to like to sell or lend their seed, unless they feel assured that the persons requesting the seed are good farmers, able to and keen on taking good care of it.

5. Discussion

Comparing the above-mentioned considerations suggests a hypothesis. The considerations indicate that a general norm exists: that each farmer is expected to select and keep seed from the previous harvest, and that this is considered to be part of the practice characteristic of the "good farmer". In other words, something that could be likened to the concept of the "bonus pater familias" of Roman law [3]. Following this hypothesis, as a maize growing farmer one is expected to be alert and make an effort not to loose one's seed. If then, a bad year hits and one finally happens to loose one's seed, it is acceptable and legitimate to seek to obtain seed from other farmers, provided that until then one has followed the norm of "taking good care of" one's seed. In this case the person in question is someone, who needs the seed, and the donor can be certain, that it is also a person who will "take good care" of it. Differently put, this is a person who "deserves" that one provides him or her with seed, and who is able to appreciate this favour, contrary to other persons who, instead of making the effort of selecting and keeping seed from the previous harvest, prefer to ask somebody else for it. This may also reduce the problem of free riders, i.e. farmers that are always asking for seed, but are not capable of providing it to others.

This hypothesis can prove helpful in explaining the absence of local organizations focusing specifically on securing seed supply, as one could claim that there is no need for such an effort. Assuming, that people generally try to follow the norm, under normal circumstances this would mean that the large majority of the farmers in the community in this way could count on having seed assured for the next planting season, and it would only be a small minority, who would have to obtain seed from other sources. For the time being we do not have data that support this, but it is a point that must obviously be pursued. If the problem of loosing one's seed occurs, say, every five years on average, it appears to be a big investment in terms of time and energy etc., to sustain an

[3] *Bonus Pater Familias* ("good father of family"); 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 in relation to practically all categories of persons, professions and ages in terms of a consideration of whether or not the person in question behaved in a reasonable and conscientious way under the given circumstances.

organization, whose sole purpose is to secure seed supply. This point is further stressed, when taken into account, the fact that many farmers plant several varieties at the same time, this way incorporating a kind of risk spreading in their maize production. Moreover, from the point of view of the farmers, loosing one's seed may not seem at all likely, given the fact that one generally follows the practices of the "good farmer", carefully selecting, treating and storing one's seed from each cycle to another.

So far we do not have data providing us with a clear idea of the frequency with which the small-scale maize farmers of the Central Valleys of Oaxaca loose their seed. However, data from the CIMMYT project in the Central Valleys suggest that seed loss occurs most frequently in the case of non-white maize varieties (Bellon 2001). As previously mentioned the different maize varieties occupy different niches. White maize is the category with the most wide spectred use. It is the least difficult to sell, and furthermore the one that sells at the best price. Meanwhile the coloured maize varieties are used for much more specific purposes. This is also why they are generally planted on small pieces of land.

Planting several varieties can, on one hand, be interpreted as a factor that contributes to the diminishing of the problem of seed loss. If you plant several varieties, and loose the seed of one variety, it is not nearly as serious, as if you only had one variety and lost it. This is especially true if the variety you loose is the least important one in terms of area planted and its contribution to the household's total maize production and income, - say you loose a black variety, but you still have the white and the yellow. One the other hand, the planting of several varieties can also be interpreted as a factor emphasizing the problem of seed loss. Small-scale farmers have little land at their disposal. The more varieties a small-scale farmer grows, for each variety; - the smaller the area left for the other varieties. Some varieties are frequently planted on very small plots (for example belatove, pinto and black maize). It follows that the quantities harvested are small, and this obviously increases the risk of loosing the seed, if the harvest fails. What is more, very small plots also enhance the degree of inbreeding and/or contamination from neighbouring fields.

However, securing seed supply does not depend entirely on the farmers and their management. Weather conditions can be a determining factor and when a bad year hits, due to climatological circumstances, it usually affects small-scale farmers in general and many people may loose their seed. This, in turn, makes the demand for seed go up and may have the effect that seed becomes expensive and difficult to obtain. According to the results of the investigation, this is a situation where social relations in particular can be expected to play a significant role.

Seed flow is a social process, a negotiation, in which people's decisions can be perceived of or interpreted as adaptable responses to the conditions characterizing their current situation, economically, socially, culturally etc. Farmers select different strategies for seed transactions, according to with whom they think of carrying out the transaction, according to their own situation, taking into account one's responsibilities and obligations, the resources each of the contracting parties have at their disposition, as well as the particular opportunities, necessities and limitations influencing their lives. As has been pointed out, social relations play a central role in these processes, often transforming themselves into yet another resource for the individual, and this is also the reason, why it is appropriate to consider them as a kind of social capital.

Seed appears to be a special category that has fewer of the characteristics of a commodity than maize grains for consumption. Although it can be sold, bartered, lent, given away etc., people's 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, a fact emphasized by the ability of grain to redefine as seed and vice versa. The moral tone with which campesinos in Oaxaca talk about exchanging seeds using terms such as "jealous", "deserving" etc. indeed confirms it as a cultural construct that aims to separate the circulation of seed from that of grain for consumption, and most unlike money.

These results point out that there are not "specialised" networks to supply seed of landraces in these communities, in the sense of sets of multilateral relationships among a well-defined group of farmers, with a clear membership and rules of interaction. We found that mostly there was a set of bilateral transactions between farmers**,** albeit with rules, and in many cases with a medium to long-term perspective. However, in some cases access to seed happens through other means such as local markets, where seed sometimes can be bought, either as such, or as grain for consumption, yet, we do not know exactly how often this takes place. A formal seed market has yet to develop in Oaxaca, and according to many of the informants, one cannot always trust the information given by the merchants at the marketplace.

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 regular occurrence, and even when it does happen, it may not jeopardize the survival of the farmers who have other sources of income—such as off-farm labor and remittances. However, farmers still loose seed from time to time, and they still demand different types of maize. At the same time they perceive a high genotype by environment interaction, and they use a poor nomenclature. Therefore they still may need some social infrastructure to access seed of the varieties they demand. While there may not be very high incentives to maintain specialized seed networks, there still may be incentives to make use of networks particularly for decreasing the costs of identifying, locating and obtaining desirable maize types. By superimposing the seed supply on other networks and social obligations, such as kinship, *compadrazgo*, *mayordomía*, these farmers can spread the costs of maintaining a network over several different functions; one of them would be access to seed and the information required for identifying appropriate varieties. This raises new questions: Is there an association between farmers' different types of social relations or networks on one hand and social obligations and seed transactions on the other? And if so, why are some preferred over others? These questions merit further research.

6. Conclusions

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. While no evidence was found of the existence of social networks with the specific objective of securing access to seed supply, the important role of social relations has been stressed, not only in relation to seed transactions as such, but also in relation to the exchange of information on seed availability and the degree of accessibility of possible seed providers. The structure and functioning of social relations among the campesino population have therefore been emphasized as key elements of the investigation, whose relation to seed flow is a complex process of negotiation and reciprocity, influenced by a variety of agro-climatological, socio-economic and cultural factors.

A clear connection between seed flow and social relationships has been confirmed, and a set of ideas developed regarding the principles that might guide the mechanisms of local seed transactions in the Central Valleys of Oaxaca. Among others it seems to be common practice that seed transaction negotiations are initiated by making reference to shared social relations, and it appears that the successful establishment of some sort of common denominator between seed provider and seed receiver has a promoting effect on the latter's efforts to obtain seed.

What is more, a pattern has been identified according to which, the probability of arriving at an agreement different from the formal selling/buying of seed according to market prices, increases, the "closer" the social relation existing between the two contracting parties. Seed is not handed over as a gift, or borrowed to unknown persons, and on the other hand, it is very difficult to deny seed to persons representing very close social relations. However, this does not hinder the sale of seed to close relations (cfr. Sahlins 1972).

Preliminary findings suggest that rather than maintaining a social organization with the specific purpose of securing access to seed supply, people make use of other types of social relations and networks when faced with the need to obtain seed from other sources. Like mutual aid, loan of tools, advice, friendship and other sociabilities, seed may be just another resource, that farmers occasionally share with each other, and that it makes sense to keep away from market relations, for the simple reason that they are part of the arrangements that make life in rural areas possible.

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