



Seed systems and crop genetic diversity in agroecosystems

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This poster is dedicated to the memory of Alfredo Riesco, valued collaborator and friend, who died on 23 August, 2005 in an aeroplane crash near Pucallpa, Peru

1. Introduction

Most rural farming communities in developing countries continue to use traditional or informal sources of seed and vegetative planting materials to meet their seed needs. Either they save their own seed or they obtain seed from sources such as relatives, neighbours and local markets, independently of the formal certified seed sector. The numbers and proportions of different crop varieties depend significantly on the patterns of exchange within an area and the forms that it takes. The operation of informal seed systems is clearly important to the maintenance of crop genetic diversity on farm.

2. Objectives

The operation of informal systems of exchange of seed and other planting materials has been identified as a key element in the maintenance of crop genetic diversity on farm. As part of a multi-country project on *in situ* conservation of crop diversity on farm, IPGRI, together with partners in Burkina Faso, Hungary, Mexico, Morocco, Nepal, Peru and Vietnam, has investigated the characteristics and operation of seed systems of a selection of major field crops and vegetables, including barley, beans, cassava, cowpea, maize, pearl millet and sorghum. The studies aimed to identify how different seed system properties affect the extent and distribution of crop genetic diversity.

3. Results and Discussion

Most seed in traditional farmer systems is maintained and exchanged through the informal system as studies of the percent of farmers using particular methods of obtaining seeds have shown.

Country and crop	Percent of farmers			
	Self saved	Exchange with relative or neighbour	Other informal source (e.g. local market)	Formal sector
Nepal mid hills – rice	44	54	0	2
Mexico, Yucatan – maize	39	44	not determined	17
Morocco – local durum wheat	76	6	18	0

Seed source, seed availability, patterns and amounts of seed exchange, on farm selection practices, and seed storage procedures can all have a significant effect on the amount and distribution of diversity present in traditional production systems. Through their effect on population size, gene flow, migration, selection and other evolutionary forces, these features of the seed system partly shape the genetic structure of crop variety populations.

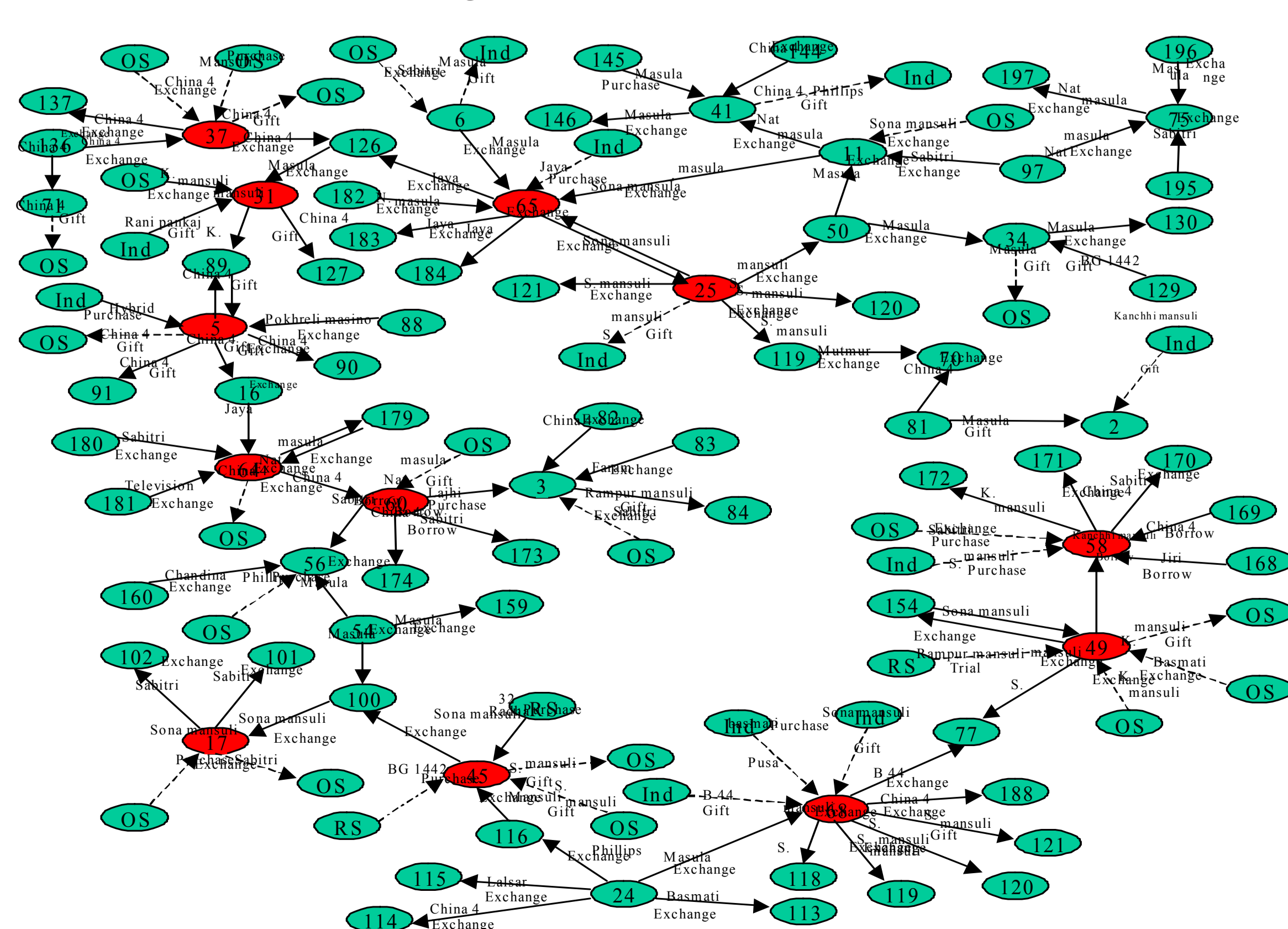
Population size

Prior to 2002, 70% of farmers in central Yucatan State grew their own local varieties of common bean. Much of this material was lost as a result of a hurricane in 2002 and in 2003 the proportion of farmers growing beans was reduced to 20%, most using material from new off-farm sources. Thus, a dramatic reduction in the population size of most local bean varieties occurred over these 2 years.

Migration

Seed exchange between relatives and neighbours and seed purchase from markets are major sources of gene migration in traditional farming systems. Complex networks of exchange can build up involving many farmers. In this case, in Nepal, over 50 rice varieties are grown by local farmers and many exchanges occur in any year. Some farmers seem to act as nodal farmers for distribution of several varieties.

Flows of rice seed in a village in Nepal. Nodal farmers shown in red.



Selection

Selection of planting materials is important for banana growers in Uganda and Tanzania. Farmers may grow 20–30 varieties in a single area as complex mixtures. Farmers deliberately select and collect material from friends, neighbours and relatives according to specific preferred criteria.

Criterion	% farmers using criterion to select material	
	Tanzania *	Uganda *
Bunch size	32	29
Palatability/taste	20	16.5
Maturity period	14	16.5
Resistance to disease	8.5	18
Other bunch or use characteristics	2.5	3
Other agronomic traits	6	1

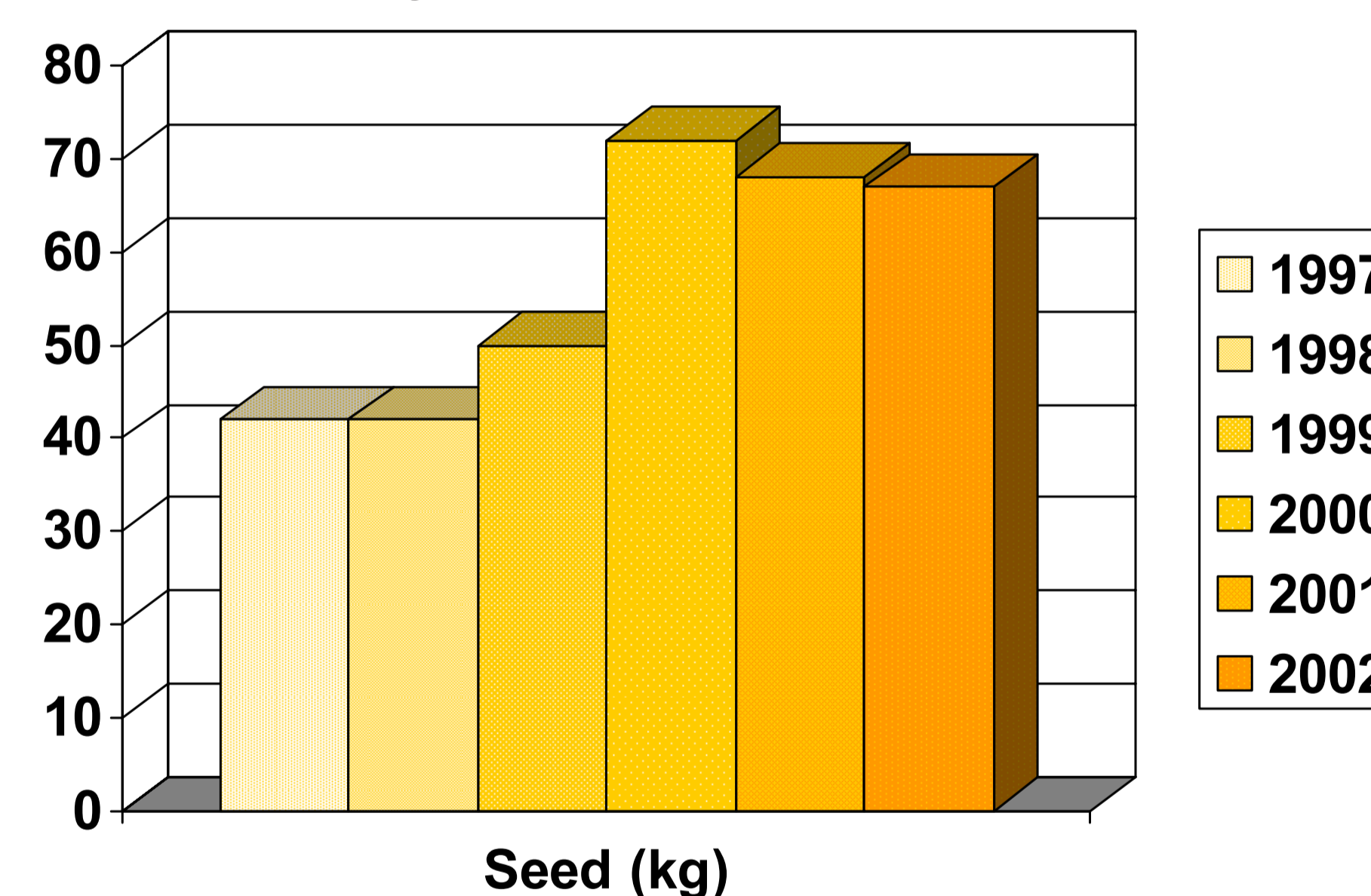
* two villages from each country

In Burkina Faso both men and women play an important part in selecting seed for crops such as pearl millet, sorghum and cowpea. However, selecting frafra potato seed is done by men and okra only by women. Over the 5 years of the project, seed quantity of pearl millet conserved by farmers from year to year increased significantly in villages such as Ouahigouya as a result of improved seed systems

A farmer in Burkina Faso selecting sorghum.



Change in pearl millet seed quantity produced by 12 farmers in Ouahigouya, Burkina Faso



4. Conclusions

Farmers' livelihoods in many poor rural communities around the world depend on maintaining effective local seed supply systems. Variation in production, market fluctuations and events such as floods or hurricanes have a substantial effect on the availability of seed locally and the diversity of the materials maintained in production. Maintaining crop diversity may depend as much on the maintenance of effective seed supply and exchange systems as on the conservation of specific varieties or types.

References

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