RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security

CGIAR CCAFS

Info Note

Social Seed Networks for Climate Change Adaptation in Western Kenya

Results from a study to better understand farmers' primary sources of seed information in the Nyando Climate-Smart Villages

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Key messages

- Farmers' most common sources of seed were own seed (55%) and local markets (37%), while main sources of seed information were field days (68%) and agricultural shows (50%).
- There is a wide range of diversity within the community—13 varieties of sorghum, 6 of millet, and 6 of beans have been identified. Only 3 varieties of sorghum, 2 of beans, and one variety of millet are currently being used by farmers in times of climate-related risks such as drought.
- Networks of female farmers have more connections for accessing and exchanging a wide range of diversity for information on climate change adaptation. Mean betweenness is 30.3 in networks of female workers and 4.3 in networks of male workers.
- Seed networks for sorghum had the highest mean centrality (0.733) compared to those for beans (0.708) and millet (0.583). This means that farmer seed networks are important to access a wide range of sorghum diversity.

Introduction

Kenyan smallholder farmers are vulnerable to the effects of climate change, including increased temperatures and variability in precipitation, which results in shorter growing seasons in most areas of East Africa (Adhikari et al. 2015). One strategy for adapting to these climactic changes is to utilise genetic resources to mitigate the effects of abiotic and biotic stresses (IPCC 2014). Farmers could benefit from accessing and exchanging genetic resources, seed, and the information needed to use those resources effectively.

Farmers' seed networks are believed to supply about 80% of seed to farmers in Kenya, where, for example, 75-80% of seed used by farmers' is from 'informal' systems. Farmer seed networks are important for accessing seed and providing genetic diversity that is vital for resilience (Louwaars et al., 2013). Research in East Africa has suggested that community-generated information sharing might support more effective farmer response to the changing seasonal and weather patterns associated with climate change (Comes et al. 2015). However, little is known about the farmers' social seed networks in supporting adaptation to climate change in Kenya.

Study methods

To better understand farmers' primary sources of information, we analysed survey data collected by Bioversity International in July through September 2016, which include data from 364 household surveys in the Nyando Climate-Smart Villages in western Kenya. Surveys collected various farm- and individual-level data on household demographics; sources of bean, millet and sorghum seeds and their networks for access and exchange; sources of information on adaptation to climate change; and the varieties that are widely used for climate change adaptation.

Following established network analysis methods drawn from literature review, we used UCINET software to conduct a social seed network analysis, illustrating how information is transmitted through farmer networks and how seed is accessed and exchanged among smallholders. We conducted three different analyses for each social seed network.

Findings

A high percentage of seed is from informal sources, 'own seed' being the most common source (55%), followed by local market (37%), neighbour (25%), farmer group (24%), and seed company (15%). The most common sources of seed information were field days (68%) and agricultural shows (50%). Approximately 55% of Kenyan respondents were involved in an agriculture-related organisation. CCAFS was the most commonly named organisation by Kenyan respondents. The most common expert that farmers obtained seed information from was also affiliated with CCAFS. Sixty-nine individuals were identified as having a betweenness greater than or equal to 20 among the social seed networks involving three locations; these were possibly nodal farmers. Ninety-six percent of the respondents indicated that they had experienced climate-related risks to agriculture. These included: shifting rainfall seasons (95%), shorter rainfall season (96%), more intense rainfall (95%), erratic rainfall (95%), flooding (71%), drought (96%), increased temperatures (96%), increased pests and diseases (93%), and stronger winds (82%).

The level of diversity of crops in Nyando consists of 13 varieties of sorghum, 6 of millet, and 6 of beans. Of these, three varieties of sorghum, one variety of millet, and two varieties of beans are used for climate change adaptation. The networks of seed exchange among farmers revealed that networks of female farmers were stronger than those of male farmers. The higher total mean betweenness values in networks of female farmers (30.3) compared to those of networks of male farmers (4.3) indicate that more women are connecting to each other and creating longer chains of seed exchange than men.

The networks of bean and millet farmers had mean centralities of 0.708 and 0.583 respectively (Figure 1). Sorghum farmers had the highest mean centrality (0.733), meaning that they had the highest number of connections. Sorghum was one of the most commonly grown crops among the respondents.

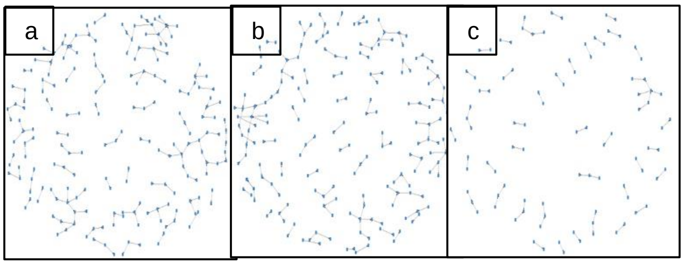

Figure 1. Seed exchange among sorghum (a), bean (b), and millet (c) farmers.

Our analysis focused on the seed exchange network of farmers within Kenyan sub-counties. The Soin-Sigowet sub-county within Kericho County had a high total mean betweenness (43.4) and had the most complex and connected network (Figure 2). Those who have a betweenness of 230 or greater (n=5) could potentially reach 230 other individuals in the network. The majority of these individuals were female (4/5), married (4/5) and had basic education (3/5). The total mean betweenness were also analysed for Kisumu (0.71) and Kericho (4.29) counties.

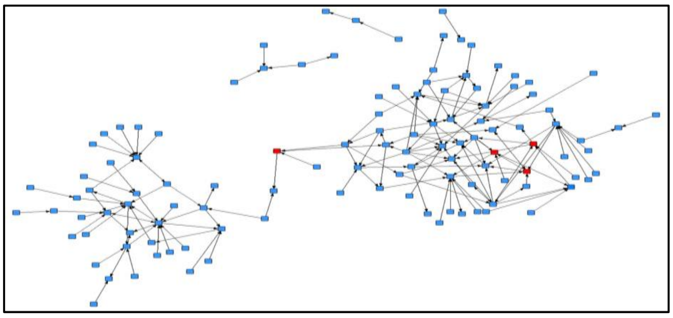

Figure 2. Seed exchange network among farmers in Soin-Sigowet sub-county of Kericho County. Farmers represented with red dots are those with a betweenness of ≥ 230.

Complex networks continue to be found when farmer networks are analyed by ward. High total mean betweenness was found for the wards in Soin-Sigowet sub-county of Kericho County which are Kaplelartet (a) (43.37), and Soliat (b) (4.3), indicating long chains of connections between farmers. The higher mean centrality values in Kaplelartet (1.43), and Soliat (0.95) reveal that a high number of connections was being made.

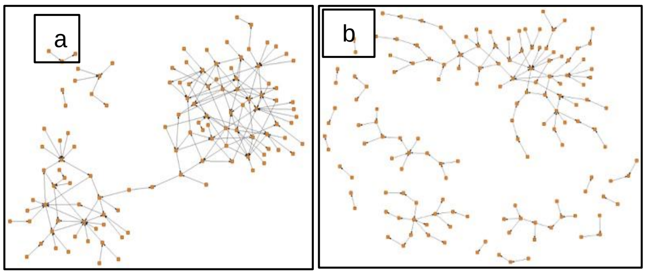

Figure 3. Seed exchange networks among Kenyan respondents with the highest mean centracity, for Kaplelartet (a), and Soliat (b) wards of Soin-Sigowet sub-county.

Policy Implications

Based on our analyses, climate change information and seed exchange between rural farmers in Kenya can be improved and expanded in several ways. In order to improve seed distribution, government and organisational influences could redirect their efforts towards more localised and informal forms of seed exchange. This could include increasing the use of field days and agricultural shows to spread information about genetic diversity and climate change.

Additionally, organisations such as CCAFS could be used as a source of seed and information for distribution to members. Experts identified by farmers may serve as sources of information for rural farmers. The individuals identified as nodal farmers having high betweenness could also act as key points to start interventions for example in the introduction of new varieties.

Governments and local institutions could improve accessibility of extension services to farmers in order to enhance information and seed exchange. Alternatively, governments could shift resources from these services to more localised initiatives such as those indicated above.

Most of the respondents indicated that they had experienced climate-related risks whose variability heavily influenced the agriculture they depend on. Therefore, there is need to increase diversity in farmers’ fields to cope with risk. Understanding these changing climate patterns in Kenya and farmers’ perceptions of those changes helps in enforcing the use of local knowledge to inform policy. It also helps guide what adaptation methods are appropriate and what kind of diversity is needed for adaptation to climate change.

Women could also be targeted as sources of seed and a means of seed distribution. Women may have larger networks as they often retain ties in their parents’ village while creating new relationships where they are married.

The social seed network analyses by sub-county and ward indicate that there may be strong and frequent connections among farmers within close proximity to each other. Dispersing seeds and technology among smaller, densely connected administrative units could have the potential to maximise the efficiency of information distribution to farmers.

Strengthening informal seed networks and building a connection between the formal and informal sectors is crucial in providing farmers with a wide range of genetic diversity and other farming requirements. Improving dissemination of information on adaptation to climate change will enable farmers to increase the genetic diversity of their crops and be more resilient in the face of climatic change.

Finally, community seed banks are repositories of local genetic diversity that is often adapted to prevailing climatic conditions, including biotic stresses. They may be useful in contributing to community-based strategies for adaptation to climate change. Establishing community seed banks in an area will not only strengthen the adaptation strategies but will also motivate collective action in the management and conservation of genetic resources for adaptation to climate change.

Seeds displayed in a farmer exchange visit in Nyando Climate-Smart Villages
Photo: P.Kimeli (CCAFS)

Further Reading

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Research led by

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