RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security

CGIAR CCAFS

Info Note

Social Seed Networks and Climate Change Adaptation in Central Tanzania

Results from a study to better understand farmers' primary sources of seed information in Dodoma and Singida Districts, Tanzania

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Key messages

- Farmers' most common sources of seed were own seed (67%), neighbor (24%), local market (21%), and extension services (17%).
- A wide range of diversity exists within the community. Hombolo, which receives about 500 mm of rainfall per annum, has over 13 varieties of sorghum, 2 of pearl millet, 6 of beans, and one variety of finger millet. Singida, which receives about 680 mm of annual rainfall, has 16 varieties of sorghum, 6 of finger millet, and 11 of beans.
- Network analyses revealed that: total mean betweenness in networks of female farmers (2.04) was stronger than those of male farmers (0.62); there was a high number of connections among networks in Singinda, and the highest total mean betweenness was found among women in Ikhanoda Village (8.87).
- Findings suggest that seed and information exchange might be improved through popular organizations or more applied use of extension services. Establishing community seed banks could also be a pro-active way of increasing the communities' ability to adapt to climate change by acting as a repository for a wide range of genetic diversity for adaptation to climate change and improving access to adapted seed.

Introduction

Tanzanian smallholder farmers are vulnerable to the effects of climate change, especially the resultant rainfall variability. One strategy for adapting to the changing climate is to utilise genetic seed sources to resist abiotic and biotic stressors. Another strategy is to access and exchange genetic resources, seed, and the information needed to use those resources effectively.

In Tanzania, 'farmer managed' seed networks are believed to supply about 80-90 percent of seeds to farmers (Below et al., 2015). Farmer seed networks are an important element of seed access because they are resilient and work to maintain and conserve crop genetic diversity. 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 (Balama et al., 2013).

Methods

The sites were selected on the basis of their climatic challenges. The crops (beans, sorghum, pearl millet, and finger millet) were selected on the basis of importance for resilience and food security and their significant contribution towards adaptation to climate change. We analysed survey data collected by Bioversity International in July through September 2016, which included data from 334 household surveys in Hombolo and Zepisa Villages from Dodoma District, and Ikhanoda Village in Singida District in Tanzania. Surveys collected various farm- and individual-level data on household demographics; sources of bean, sorghum, and millet seeds; sources of information on adaptation to climate change; and relationships between farmers and their sources of information and seeds.

Following established network analysis methods drawn from a 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

Respondents most commonly reported 'own seed' as their seed source (67%), followed by neighbour (24 percent), local market (21%), and extension services (17%). Approximately 34% of Tanzanian respondents were affiliated to an agriculture-related organisation. Only nine individuals were identified with betweenness greater than or equal to 20 within the social seed networks by the village.

Ninety-one percent of respondents indicated that they experienced climate-related challenges, which included: shifting seasons (87%), shorter rainfall seasons (87%), heavier rainfall (13%), erratic rainfall (82%), flooding (17%), drought (89%), increased temperatures (69%), increased pests and diseases (88%), and stronger winds (87%).

The network of seed exchange among farmers revealed that networks of female farmers were slightly stronger than those of male farmers (Figure 1). The higher total mean betweenness in networks of female farmers (2.04) compared to those of male farmers (0.62) indicate that more women were connecting actors, creating longer chains of seed exchange.

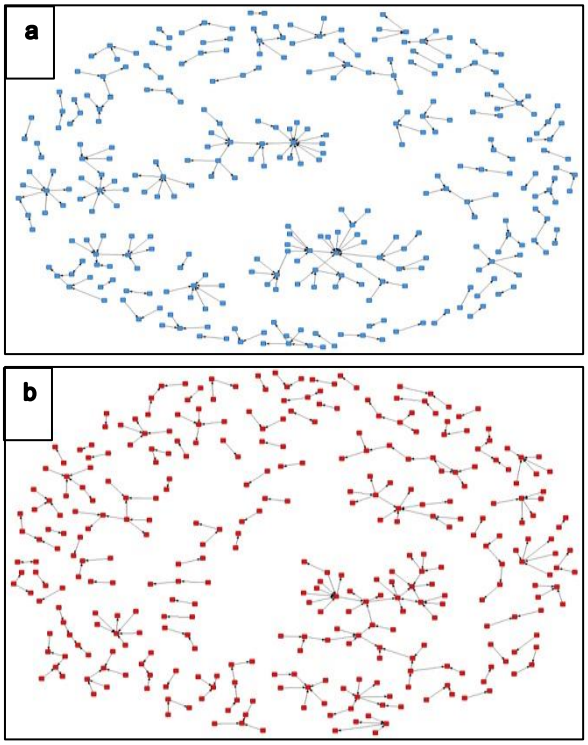

Figure 1. Seed exchange among male (a) and female (b) farmers

Networks were also analysed by sub-county. Singida (2.35) and Hombolo (1.05) had the highest total mean betweenness (Figure 2). The mean centrality for all three sites were relatively high: Singida (0.77), Hombolo (0.80), and Dodoma (0.81). This indicates that there is a high number of connections among these networks.

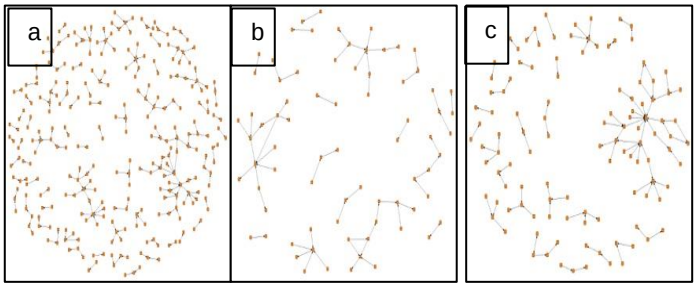

Figure 2. Seed exchange among Tanzanian respondents by sub-county. Singida (a), Hombolo (b), Dodoma (c).

Source: Author calculations—UCINET analysis of farmers who provide and/or obtain seeds from other farmers

Networks were analysed by village (Figure 3). High total mean betweenness was found in Ikhanoda (7.1). The figures were lower in Hombolo (1.1), and Zepisa (0.82). This indicates higher numbers of connections between respondents in Ikhanoda. The highest total mean betweenness was found among women in the Ikhanoda Village in Singida (8.87) (Figure 4).

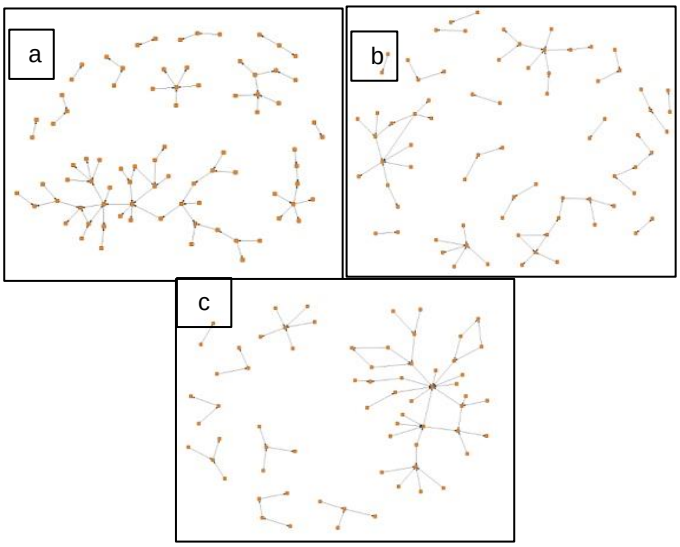

Figure 3. Seed exchange among Tanzanian respondents by village. Ikhanoda (a), Hombolo, (b), and Zepisa (c).

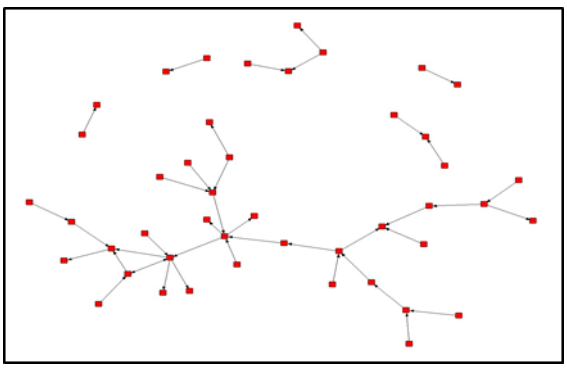

Figure 4. Seed exchange among women in the Ikhanoda village.

Policy Implications

In order to improve seed distribution, strategies that include expanding the accessibility of agricultural extension services and using organisations named by respondents as a source of seed and information could be used. Individuals identified as being nodal farmers, i.e., having high total mean betweenness, could also serve as a distribution source for diverse and adapted seeds.

Most respondents indicated that they had experienced climate-related challenges including shifting seasons and weather variability; this underlines the need to have a wide range of diversity that can cope with variable weather and climate. Acknowledging the needs of farmers that result from climate challenges is crucial in applying adaptive strategies especially for women farmers as they are critical in providing household food and nutrition security.

Seeds displayed in a community seed fair
Photo: P. Kimeli (CCAFS)

Because women's networks were larger and more connected, they could also be used to distribute seed and information. Women have been found to retain ties in their parents' villages, yet tend to create new relationships after marriage in new villages (Ellen & Platten, 2011). They may, therefore, bring new diversity from their villages and to their villages, encouraging the exchange of diversity.

The social seed network analyses by sub-county and village indicate that there were strong networks in Singida and disjointed networks in Hombolo and Dodoma. This emphasises the need to establish community seed banks where the seed networks are disjointed; the seed banks will improve access to diverse genetic resources for adaptation to climate change and also to enable farmers' make joint decisions regarding the use, management, and conservation of their genetic diversity. This might improve social relations and subsequent social seed networks. It should be accompanied by the introduction of more resilient varieties from national gene banks into the communities.

Strengthening informal seed networks and building the connection between the formal and informal sectors is also crucial in providing farmers with improved seeds and meeting other farming needs. This can be done by fostering partnerships between community-level organizations, extension, seed companies, national agricultural research organizations, and the national gene bank. 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.

Further Reading

- Adhikari U, Nejadhashemi PA, Woznicki SA. 2015. Climate change and Eastern Africa: A review of the impact on major crops. *Food and Energy Security*, 4(2):110-132.
- Balama C, Augustino S, Eriksen S, Makonda FSB, Amanzi N. 2013. Climate change adaptation strategies by local farmers in Kilombero District, Tanzania. *Ethiopian Journal of Environmental Studies and Management*, 6:724-736.
- Below TB, Schmid JC, Sieber S. 2015. Farmers' knowledge and perception of climatic risks and options for climate change adaptation: a case study from two Tanzanian villages. *Regional Environmental Change*, 15:1169-1180.
- Ellen R, Platten S. 2011. The social life of seeds: the role of networks of relationships in the dispersal and cultural selection of plant germplasm. *Journal of the Royal Anthropological Institute*, 17(3):563-584.
- Louwaars NP, de Boef WS, Edeme J. 2013. Integrated seed sector development in Africa: a basis for seed policy and law. *Journal of Crop Improvement*, 27:186-214.

Research led by

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