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Research Application Summary

Cassava landraces and indigenous tree interactions in agro ecological zones of Uganda

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Abstract

There are issues and practices that influence farmers' decision for cassava and tree intercrop choices on the farm. The aim of this research was to evaluate the traditional conservation management practices of cassava landraces and tree interactions in three agro-ecological zones of Uganda. Data were collected using simple random sampling method and focus group discussions with farmers in cassava growing areas from three agro-ecological zones (Lake Victoria crescent, Lake Albert, and West Nile). Data were analysed using descriptive statistics and factor analysis. The study found that farmers intercrop cassava landraces with different indigenous trees species for different purposes. The cassava landraces intercropped with trees on the farm by farmers included Bukalasa, Kalimanzila, Kalintusi, Kawogo, Kwatamumpare, Abiri, Kazimwenge, Kirimumpare, Mulyandongo, Nyakakwa, Nyalanda, Nyruiwic, Serengule, Welobedyo, Abiria, Akaral, Bali, Drua, Malukwa and Tongolo. Findings show that the most common trees in the intercrop with cassava included avocado, mangoes, jackfruit, maesopsis, ficus coffee and *Albizia* spp. Also, tree pruning, pollarding, lopping, spot planting and hedge planting were the key tree management practices for better yield in tree-cassava intercrop system. The findings suggested that cassava landraces and tree intercropping is a key driver for climate-smart agriculture and this requires attention among the technologies for mitigating climate change effects.

Key words: Cassava, intercrop, tree intercropping, Uganda

Résumé

Il y a des problèmes et des pratiques qui influencent la décision des agriculteurs en matière de choix de cultures intercalaires de manioc et d'arbres à la ferme. Le but de cette recherche était d'évaluer les pratiques traditionnelles de gestion de la conservation des variétés locales de manioc et les interactions des arbres dans trois zones agro-écologiques de l'Ouganda. Les données ont été collectées à l'aide d'une méthode d'échantillonnage aléatoire simple et de discussions de groupe avec des agriculteurs dans les zones de culture du manioc de trois zones agro-écologiques (croissant du lac Victoria, lac Albert et West Nile). Les données ont été analysées à l'aide de statistiques descriptives et d'une analyse factorielle. L'étude a révélé que les agriculteurs intercalent des variétés locales de manioc avec différentes espèces d'arbres indigènes à des fins différentes. Les variétés locales de manioc associées aux arbres de la ferme par les agriculteurs comprenaient Bukalasa, Kalimanzila, Kalintusi, Kawogo, Kwatamumpare, Abiri, Kazimwenge, Kirimumpare, Mulyandongo, Nyakakwa, Nyalanda, Nyruiwic, Serengule, Welobedyo, Abiria, Akaral, Bali, Druakwa Tongolo. Les résultats montrent que les arbres les plus communs dans la culture associée avec le manioc comprenaient l'avocat, la mangue, le jacquier, le maesopsis, le café ficus et *Albizia spp*. De plus, l'élagage des arbres, l'étêtage, l'élagage, la plantation ponctuelle et la plantation de haies étaient les principales pratiques de gestion des arbres pour un meilleur rendement dans le système de culture intercalaire arbre-manioc. Les résultats suggèrent que les variétés locales de manioc et les cultures intercalaires d'arbres sont un moteur clé pour une agriculture intelligente face au climat et cela nécessite une attention parmi les technologies pour atténuer les effets du changement climatique.

Mots clés : manioc, culture associée, culture intercalaire, Ouganda

Introduction

Indigenous tree species influence farmers' decisions when planting cassava on farmlands. The indigenous trees species shed leaves and influence the amount of light that go through tree crowns down into the cassava crop (Degrande and Schreckenberg, 2006). Hawkins *et al*. (2009) noted that the cassava agroforestry system provides food and wood to farmers. Adjebeng -Danquah *et al*. (2016) reported that indigenous agro forestry farming systems have high density of trees with cassava within home gardens and their boundaries for increased productivity from the intercrop. Farmers have used traditional agro forestry to influence cassava-tree intercrop products and services. For example, post-harvest survival of certain fungi on cassava stems stored under humid conditions of tree shades decreases (Fokunang, 2006). Montero-Rojas *et al*. (2011) noted that in Brazil, farmers intercrop cassava with other trees to get fruits, food, firewood and incomes alongside reduced disease incidences. Therefore, tree interactions with cassava on farm land could result into many tangible benefits to the farmer and thus support cassava landraces conservation and management as a driver for climate smart agriculture in Uganda. This study was thus done to evaluate traditional conservation and management practices for cassavaa landraces and tree interactions in Uganda.

Material and methods

Study area. The study was carried out in three agro-ecological zones of Uganda i.e., West Nile, Lake Albert and Lake Victoria crescent in Uganda. West Nile agro-ecological Zone (1,000-1,800 m above sea level) receives mean annual rainfall of 1300mm. The Lake Albert agro ecological zone (600 to 1,030 m) receive mean annual rainfall ranging from 800-1,400 mm while the Lake Victoria Crescent agro ecological zone receives annual rainfall ranging from 1,200-1,450 mm.

Sample size determination and sampling procedure. A total of 330 farming households were studied. The sample size was determined based on Krejcie and Morgan (1970) and summary statistics is presented in Table 1. From each agro-ecological zone, two main cassava growing districts were selected. From each selected district, one cassava growing sub-county was selected with the help of District Agricultural Officer, and County Agricultural Officers. From each selected sub-county, one parish and one village in each parish were randomly chosen. A list of registered households in each village was obtained from the area local council authorities. A total of 55 households per sub-county were randomly selected to be interviewed.

Table 1. Sample sizes of respondents in the different study districts

Zone	Districts	Sub counties	Villages	Total number of households	Sample size
L. Albert	Bulisa	1	2	116	55
	Hoima	1	2	144	55
West Nile	Arua	1	2	132	55
	Maracha		2	124	55
L. Victoria Crescent	Masaka	1	2	119	55
	Bukomasimbi	1	2	145	55
	Total				330

Tools and data collection. A semi-structured questionnaire was administered to 330 respondents. A semi-structured questionnaire is flexible and can be used on small or large numbers of sample population. Focus Group Discussions (FGD) were conducted in each zone. A total of six focus group discussions involving males and females were held. Thirty key informants, at least 5 from each agro-ecological zone were interviewed. They included District agriculture officers, Extension officers, local and youth leaders. Data generated were subjected to descriptive statistics and factor analysis using Statistical Package for Social Scientists (SPSS) 16 programme.

Results

The study showed that indigenous fruit, medicinal and timber tree species were intercropped with cassava (Fig. 1). The trees mentioned by respondents included avocado (31%), mangoes (10%), jackfruits (8%), eucalyptus (3%), coffee (13%), *Albizia corriaria* and *Maesopsis eminii* both at (3%), *Pinus spp.* (9.24%), and *Ficus natalensis* (21%).

The study revealed that farmers intercrop trees with cassava for different reasons (Table 2). These included better farm yield (West Nile 100%, L. Albert 99% and L. Victoria 99%), improving soils (West Nile 91%, L. Albert 100% and L. Victoria 77%) and providing shade to crops (West Nile 50%, L. Albert 100% and L. Victoria crescent 67%).

Different tree management practices were also recorded as shown in Figure 2. These were pollarding (9%), lopping (6%), branch pruning (60%), spot planting (44%) and root pruning (4%). Further, different reasons were given for having trees intercropped with cassava. They mostly included better yield, providing shade for crops and improving soil.

Discussion

The study revealed that farmers weigh benefits of intercropping trees with cassava before making decisions to plant. Among reasons included for tree planting were better farm yield for food security, good land management and provision of shade for crops. Indigenous fruits, medicinal and timber tree species were intercropped with cassava. Farmers have developed tree branch management practices to facilitate cassava production. Farmers have also adopted different practices such as spot planting where a single tree is planted in the bigger spaces on farm. This increases availability of fire wood, fruits and other products from such planted trees. Many farmers intercrop cassava with trees many of which are indigenous. The most intercropped trees are avocado, mango and coffee. This combination is however most common in the Lake Victoria Crescent agro-ecological zone. The need for fire wood, animal fodder and income at household level drive the farmers' motivation for introducing trees into cassava. Intercropping on farmland is based on the need for improving soil fertility and meeting other financial obligations. Tree management is important for cassava to remain productive and to minimize diseases (Sseruwagi *et al*., 2004). However, the tree must be managed to maintain the right height and crown size. Tree management practices include pollarding, lopping and branch pruning (Ajani and Onwubuya, 2013). Failure of farmers to understand such management practices impacts the system negatively (Okonya and Kroschel, 2013). Managing tree branches in the intercrop ensures that farmers continue benefitting from the intercropping system.

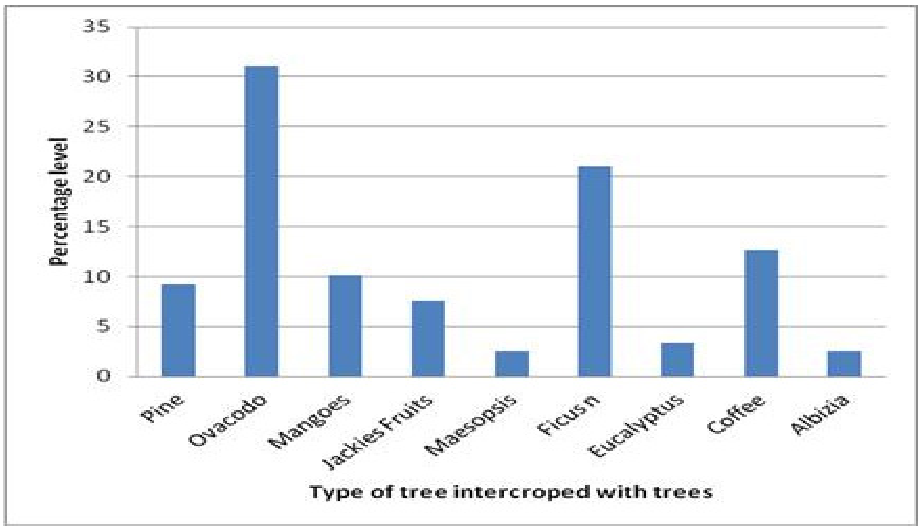

Figure 1. Trees commonly intercropped with cassava in the study areas

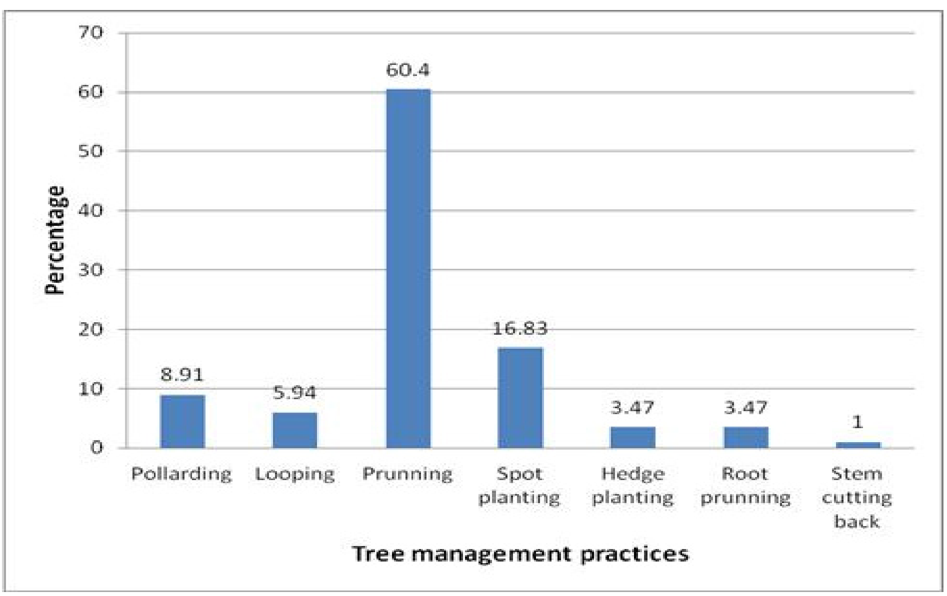

Figure 2. Tree management practices encouraged for better cassava yield

Table 2. Reasons for intercropping cassava with trees

Reasons	Agro ecological zones															
	West Nile					Lake Albert						Lake Victoria Crescent				
	Ser	Abi	Bal	Akr	Tog	Welo	kaz	Nyak	Mul	Nyal	Nyr	Kwa	Kali	Kalz	Buka	Njo
Better farm yield	0	100	0	0	0	33	0	33.3	0	0	33	44.4	22	0	11.1	22.2
Good land management	50	100	0	0	0	25	50	0	0	25	0	100	0	0	0	0
Provides shade to crops	0	50	0	0	0	0	0	50	50	0	0	44.4	0	0	22.2	0
Improves soil	0	78	9	4.3	0	0	25	25	25	25	0	31.8	32	32	13.6	0

Conclusions and recommendations

Farmers intercrop trees with cassava landraces for different reasons which include better crop yield, improving soil fertility and providing shade to crops. A number of tree management practices are also used to manage trees in the intercrop. These include pollarding, lopping, spot planting and pruning. Further studies aimed at enhancing indigenous tree productivity in cassava-tree systems are recommended.

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