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Gender, agroforestry and food security in Africa☆

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This paper reviews agroforestry's contribution to food security from a gender perspective. Emphasis is placed on women's contribution relative to men and the challenges they face. Agroforestry practices examined include fodder shrubs, 'fertilizer trees' and indigenous fruit trees. In examining the practices, we highlight women's and men's involvement in management, utilization and marketing of agroforestry products. The review shows that agroforestry makes a substantial contribution to food security. Furthermore, women are as actively involved as men; however, their level of participation and benefits are constrained by cultural norms and lack of resources. For women to benefit fully from agroforestry and hence contribute to food security, various policies, technological and institutional interventions are recommended.

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Introduction

About 870 million people were chronically undernourished in 2010, the majority living in developing countries and depend on agriculture for their livelihoods [1,2]. In order to meet the global demand for food which is expected to increase by 60% by 2050, agricultural production must increase by 70–100% and most of this will have to come from smallholder fields [3]. Agricultural production has however been on the decline as a result of natural resource constraints, climate change and competing demands for land. One of the potential options to increase yields, productivity, food security and resilience to climate impacts is agroforestry — the integration of trees and shrubs with crops and livestock systems. Research has shown that agroforestry contributes to food security by boosting field crop yields, diversifying income, and increasing resilience to climate change [4–8]. Agroforestry requires relatively little land as trees can be planted around the homestead and on field boundaries. It also has low labour requirements [9]. Furthermore, many trees require cash inputs only for the purchase of seed or seedlings (Table 1). The total number of people practicing agroforestry in the world currently stands at 1.2 billion [5].

Why gender and agroforestry?

The last few years have witnessed a dramatic increase in global attention to gender, its role in development and inequalities that exist between men and women [10–12,13••,14,15••,16–20]. In the present international political arena the view is widely shared that addressing gender imbalances, hold the potential to decrease poverty and food insecurity in Africa while delivering environmental services and mitigating climate change [14,21]. Gender issues in agricultural production have been well documented; however, very little is known about the contribution of gender and agroforestry to food security in Africa. Women farmers, for example, are an integral part of agroforestry systems — they are often responsible for managing trees especially at the early stages of establishment [22]. They provide 50% of the agricultural labour force in sub-Saharan Africa [15••]. Research has however shown that in many contexts, women have less access than men to productive resources and opportunities such as land, labour, education, extension, financial services and technology [9,16]. Land is the key determinant to production and is central to Africa's agricultural and economic development. In a survey carried out in 16 African countries, women are as likely to own land as males in only six countries and only 2% have land titles [23,24]. The survey further shows that conditional to owning land, female headed households have less land than male headed households. In Tanzania current laws grant equal land ownership and inheritance rights for men and women but customary laws still lock women out [25]. As regards to tree tenure, men and women have separate rights to different parts of the tree; however, women's rights are mostly confined to byproducts such as branches, fodder and indigenous fruits. These byproducts are considered secondary with no significant economic importance. Whenever the 'byproducts' become valuable they are usually taken over by men [26]. As regards to extension,

Table 1

The resource requirements of options that farmers use to obtain agroforestry products such as fruits, firewood and fodder

Resource/means	Collect off-farm	Buy	Grow annual crops	Practice agroforestry
		Resource requirements		
Land	0	0	High	Low
Labour	High	0	High	Low to medium*
Capital	0	High	Low or 0	Low or 0

Adapted from [26]

* Medium if a nursery is required.

only 15% of extension agents are women. Furthermore women receive only 5% of extension services [24]. Addressing these inequalities will not only benefit women and men but also increase agricultural productivity and stability [15••]. Armed with the same resources as their male counterparts, women farmers could increase their yields by 20–30%. This increase in production has the potential of increasing women's income as well as reducing the number of hungry people worldwide by 12–17% [15••].

This paper reviews the contribution of gender and agroforestry to food security in Africa and the imbalances that exist. Agroforestry practices likely to contribute to food security examined here include fodder shrubs to boost milk production for improved human health and income, indigenous fruit trees for improved nutrition and income and 'fertilizer trees,' for increased crop production. The paper draws on lessons learned to make recommendations on how to promote gender equity in agroforestry in order to generate greater benefits for both men and women in increasing food security in Africa.

The contribution of agroforestry to food security: a gender perspective

Fodder shrubs for increased milk production, improved human health and income

The shortage and low quality fodder are major constraints to improving livestock productivity in Africa, especially during the dry season [27,28]. Balanced nutrition contributes to improving animal output as well as to reducing both the cost of production and the emission of greenhouse gases per unit of animal products [28]. The use of fodder shrubs has been shown to contribute to increased milk production and improved livestock productivity leading to improved human health and income [29,30,31•]. Shrubs available in East Africa are easy to grow, capable of withstanding repeated pruning and compete very little with food crops. The plants mature in 9–12 months and are then ready to be cut periodically and fed to cows and goats. *Calliandra calothrysus* is the most common species grown for fodder in East Africa. Two kilograms of dry calliandra leaves have about the same amount of digestible protein as 2 kg of dairy meal (16% crude protein and 80% digestibility); each increases milk production by about 0.6–1.3 kg per cow per day, increasing farm income by 5–10% [32]. Across East Africa, it is estimated that fodder shrubs contribute about US$3.8 million annually to farmer incomes [30].

Estimates from surveys on the dissemination and adoption of fodder shrubs in the East African region indicate that roughly 205 000 smallholder farmers had planted the fodder shrubs by 2005: 82 000 each in Kenya and Uganda, 28 000 in northern Tanzania and 14 000 in Rwanda [29]. About 47% of planters were women. The high participation of women was facilitated by project extension staff, who targeted women's groups [29]. The average number of shrubs per farmer is between 71 and 236 depending on the country. The number is below 500 shrubs (covering an area of 250 m^2 if planted in a block and 250 m in a hedge) recommended for feeding a single cow throughout the year [31•]. However, lack of seed and adequate knowledge and skills limit the expansion in fodder planting [31•].

Few studies look at women's access to cash earned from dairy. Results from a study in Tanzania and Uganda show that women managed and controlled 39.8% of the income from milk, and 70.4% of the income if sold in informal markets [33•]. Studies conducted in Kenya, Uganda and Rwanda showed that formalization of the milk market can erode the traditional female control of milk and its by-products, thereby decreasing their power within the household [34]. Where the milk is sold and whether it is morning or evening milk have implications on whether or not women manage the income [34]. The morning milk is sold to cooperatives where men are the registered members and therefore receive the payment, whereas the evening milk benefits women who sell it to neighbors and local traders. The funds generated from dairy are used to pay school fees and general household improvements [30]. It is important to note that this only happens if households are relatively food secure [8]. Other benefits include improved animal health, fuel-wood which is a direct benefit to women, improved nutrition of the family, seedling sales, high quality manure, bee forage, stakes for vegetable production and environmental benefits [29]. Growing the fodder shrubs also often reduces the amount of fodder that has to be collected off the farm. This benefits women directly, because they are usually