

Do Trees on Farms Matter in African Agriculture?

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Overview

Common wisdom: *Trees on farms are not important in Sub-Saharan African agriculture.*

Findings:

- *With about a third of smallholder farmers reporting cultivating trees on their farms, trees are not uncommon in the five Sub-Saharan African countries studied. Fruit trees and tree cash crops (such as coffee, cacao, and cashew nuts) are the most frequent tree categories grown.*
- *The prevalence of on-farm trees for timber is also sizable in Tanzania (18 percent of smallholders), but minimal or poorly recorded elsewhere.*
- *In addition to sales, fruit trees are also commonly used for self-consumption in Ethiopia and Uganda, implying that they may play an important role in food security and nutrition.*
- *Their contribution to income is not negligible—17 percent of total gross income among tree crop growers, and 6 percent on average across all rural households.*
- *Tree-growing households are better off on average in most of the study countries.*
- *Trees are more likely on larger farms, in warmer areas, and closer to forests. Their prevalence also appears to be shaped by national policies and institutional factors.*

Policy message: *This study highlights the prevalence and importance of trees in African agriculture. Trees on farms provide a significant source of income for many households across the continent. In many contexts, trees provide a measure of food security and play a key role in soil and water management. However, trees on farms are often overlooked in African agricultural and forestry policy. This research suggests they should be given much more attention in agriculture, food security, and*

poverty-related policy debates in Sub-Saharan Africa, particularly in the context of climate change.

The Issue: Can Trees on African Farms Be Safely Ignored?

Trees on farms, particularly those that do not yield cash crops, are often overlooked in research and policy on African agriculture. Trees are usually considered the domain of forestry. However, forestry as a field is largely focused on trees in forests rather than outside them. The focus in agriculture is usually on annual crops. For their part, small farmers appear to have few incentives to engage in agroforestry (the incorporation of woody perennials into farming systems). High input prices, a long time lag between planting and harvesting, weak access to information and credit, and informal, often insecure property rights present significant barriers to such practices in many African contexts (Godoy 1992).

Nonetheless, whether as a source of timber or nontimber products—or for ecological services such as shade, nitrogen fixing, prevention of soil erosion, and water management—trees do play an important role on farms across the continent (Place and Garrity 2015). Indeed, roughly a third of the agricultural land in Sub-Saharan Africa is estimated to have had at least 10 percent tree cover during 2008–10 (Zomer et al. 2014). Trees and agricultural activities therefore often coexist not only in larger landscape contexts but also in single landowner holdings. Such arrangements likely have important implications for household welfare. The welfare implications are especially important given that trees have been found to reduce the exposure and sensitivity to external shocks, such as those related to climate change, market volatility, and liquidity constraints, among others (Place and Garrity 2015).

Despite their prevalence and likely importance, however, knowledge of the prevalence and economic contribution of trees on farms at the national scale remains limited. This lack of evidence, along with the institutional separation of forestry and agriculture, means that policy recognition and support for agroforestry also remain lacking.

The Analysis: Trees in African Agricultural Landscapes

The data for this chapter pertain to five of the six countries originally covered under the Living Standards Measurement Study–Integrated Surveys on Agriculture (LSMS-ISA) initiative. The countries are Ethiopia, Malawi, Nigeria, Tanzania, and Uganda. The first challenge is to define what plants to consider as trees. Based on an initial classification using biological definitions, the study carried out focus group interviews with experts to refine and validate the definition (box 13.1). This resulted in a crop classification that combined the biological description of each crop/tree and its economic role on the farm. The five categories are fruit trees; cash crop trees; timber and fuelwood trees; plants, herbs, grasses, and roots; and those not identified. The study focused on the first three.

Box 13.1 What Is a Tree?

Identifying trees on farms is not a straightforward conceptual or analytical task. There appears to be no standard approach to classify crops as trees. For each species, the study therefore started by using the comprehensive description provided by the Encyclopedia of Life, a collaborative project that gathers scientific information on all species of life on Earth (Parr et al. 2014), to categorize plants as trees or not. To qualify as a tree, the plant should be a woody perennial with an elongated stem or trunk that supports branches and leaves. Turning to the data, the Living Standards Measurement Study–Integrated Surveys on Agriculture (LSMS-ISA) data focused on trees with a productive function on farms. To pinpoint the existence and nature of these trees, the study used data from two modules used in all six LSMS-ISA countries. First, for uncultivated plots, it identified those that were covered by *forest*. Second, for cultivated plots, it extracted information on all crop planting and production by each household and identified those crops that can be considered a tree.

Although the effort to capture tree-related information is as comprehensive as possible, the stock of trees on farms identified in the study likely represents a lower bound, for several reasons. First, home gardens may have been underreported as plots, and trees with no immediate productive function may have been left out. Second, respondents may not recall all the trees on their lands or may be hesitant to report them where, for example, colonial legacies of state control of tree resources persist (Ribot 1999). Last, the study was also unable to classify a few species for which only the local name was available. However, such omissions would especially affect the number of trees reported, and not so much their incidence or the share of land allocated to trees (for each plot, the surveys recorded whether trees were present). Consequently, the study focuses on the prevalence of trees on farms and the share of land allocated to trees, as opposed to the number of trees per se.

The Results: Trees Are Significant on Farms in Sub-Saharan Africa***Many African Farms Are Growing Trees***

Across the study countries, about one-third of African farms report growing trees, often in the proximity of existing forests. Nonetheless, the stock of trees on farms varies substantially by country and category of tree (table 13.1). On the one hand, there are the cases of Nigeria and Malawi, where the prevalence of trees on farms is relatively low. In these countries, only 16 and 23 percent (respectively) of landholders report having trees on their farmland. On the other hand, in Tanzania, Ethiopia, and Uganda, trees on farms are considerably more prevalent (54, 38, and 30 percent of landholders, respectively).

The prevalence of trees also varies across countries by tree type. In Tanzania, for example, fruit trees are especially widespread, with 45 percent

Table 13.1 A Non-negligible Share of Farmers Have Trees on Their Farms

Country	Share of smallholders with trees on farms (%)	Share of smallholders with fruit trees (%)	Share of smallholders with tree cash crops (%)	Share of smallholders with trees for timber or fuelwood (%)
Ethiopia	37.9	17.1	32.2	3.5
Malawi	23.4	23.3	—	0.2
Nigeria	16.1	5.5	14.2	—
Tanzania	54.2	45.2	22.6	18.2
Uganda	30.4	5.6	27.2	2.5
Overall average	33.1	20.0	20.0	5.1

Source: Calculations from LSMS-ISA data sets.

Note: All descriptive statistics corrected by sampling weight; — = not available.

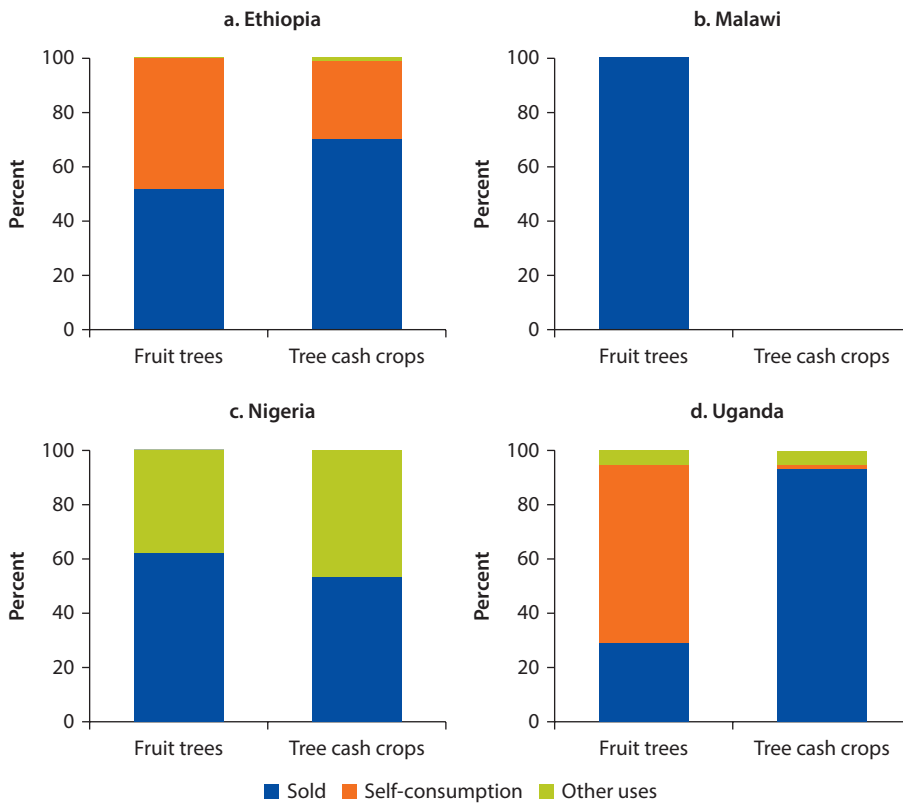
of the landholders having at least one plot with fruit trees. Trees for timber and fuelwood were reported among 18 percent of smallholders in Tanzania, but very little elsewhere. In contrast, in Ethiopia, less than 4 percent of smallholders report having trees for timber and fuelwood (likely an underestimate, given that eucalyptus trees were not properly captured in the questionnaires). But Ethiopia has the highest proportion of farms with tree cash crops (32 percent), especially coffee. Uganda follows a similar pattern to that of Ethiopia, with tree cash crops being the most common type of tree found on farms (27 percent). In Malawi, fruit trees are the most common trees (found on 23 percent of plots).

The Contribution of Trees on Farms to Rural Livelihoods Is Not Negligible

Trees can perform multiple functions (for example, production, intercropping, and gardens, among others), which turn them into a valuable asset within the productive structure of farms (Deweese 1995; Place and Garrity 2015). Figure 13.1 shows the main uses for the products harvested from trees on farms. Most of the products (fruits and tree cash crops) are sold, although in Ethiopia and Uganda, a sizable share of the fruit is also directly consumed on the farm. In Ethiopia, the same holds for tree cash crops. Trees also contribute importantly to gross annual household income (17 percent on average among tree-growing households, and 6 percent of gross annual household income among all rural households). Among tree growers, 14 percent of annual gross income comes from cash crops, but a nonnegligible 5 percent also comes from fruit trees. The latter only stands to increase, as Africa's emerging urban middle class continues to expand.

Trees on farms can also have very important nonproductive uses, such as soil conservation, nitrogen fixing, water regulation, and carbon sequestration (Booth and Wickens 1988; Nair 2007; Place and Garrity 2015). The presence of trees can therefore have indirect (beneficial) effects on farm output—be it crops or livestock. It is very difficult to account for such impacts (Wunder, Angelsen, and

Figure 13.1 A Larger Share of the Tree Products Tends to Be Sold



Source: Computations based on LSMS-ISA data.

Note: The graphs show whether different categories of trees on farms were sold, used for self-consumption, or put to other uses. Information on the main uses for Tanzania is not gathered for trees. All statistics were corrected by sampling weights.

Belcher 2014), and information on them was not directly collected by the LSMS-ISA surveys. As an indirect measure, welfare levels among tree-growing households were compared with those among non-tree-growing households. The former were on average substantially better off than the latter in most of the study countries. For instance, real consumption per capita among tree cash crop growers was on average 84 percent higher in Ethiopia, 19 percent in Nigeria, and 3 percent in Tanzania, although no difference was discerned in Uganda. Fruit tree growers were also better off in three of the five countries (Ethiopia, Nigeria, and Uganda). Therefore, looking only at direct income contributions is bound to underestimate the contribution of trees on farms to household welfare.

Drivers of On-Farm Tree Growing

Using multivariate analysis, the correlates of on-farm tree growing are further explored. The analysis shows that the adoption of and land allocation to trees on farms are highly influenced by national policies and institutions. Together, they account for more than 40 percent of the explained variation in the models.

Proximity to forests is also an important predictor of on-farm tree presence. Beyond these broader policy and agroecological factors, household characteristics also play a role. Households with more land, for example, tend to allocate more of their land to trees (cash crop and fruit trees). This is consistent with the land-intensive nature of tree growing. Female-headed households tend to be less engaged in tree growing, with the effect being largest for tree cash crops. This is possibly linked to higher land tenure insecurity for female farmers and is consistent with the higher nutritional value of fruit trees. These findings provide first entry points for policy makers to investigate in designing interventions to foster on-farm tree growing.

The Implications

The main message from the study is that trees on farms in Sub-Saharan Africa are typically more widespread and important than was previously thought. They provide a significant source of income for many households across the continent. With data limitations preventing a proper accounting of the indirect effects of trees on farms to livelihoods—such as erosion control, climate regulation, and soil enrichment—they are likely even more important than the numbers presented here suggest.

The implication is that governments and others should raise the profile of trees as an important crop in debates concerning agriculture, food security, and poverty reduction policy in Sub-Saharan Africa. The occurrence of trees does not stop at the border of the forest. Trees on farms should be an integral part of landscape planning, given their relative resilience in the face of more intense and frequent climate stressors. Critically, realizing the full benefits that trees on farms can bring requires a supportive policy environment.

Overall, the analysis and database provide a baseline for future benchmarking, as well as the building blocks for improving the information base on Africa's privately owned tree coverage.

Additional Reading

This chapter draws on:

Miller, Daniel C., Juan-Carlos Munoz-Mora, and Luc Christiaensen. In press. "Prevalence, Economic Contribution and Determinants of Trees on Farms across Sub-Saharan Africa." *Forest Policy and Economics*. <http://doi.org/10.1016/j.forpol.2016.12.005>.

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