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ROLE OF SMALL-SCALE TREES PLANTATION AND FARMERS' ATTITUDE AND SKILL TOWARD PROPAGATION OF INDIGENOUS AND EXOTIC TREES: THE CASE OF SIDAMA, ETHIOPIA

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ABSTRACT

The tree land cover in Ethiopia is declining due to deforestation, agricultural land expansion, overgrazing, firewood use and construction. Farm tree plantation has a potential to improve tree cover and the country's vision towards reducing greenhouse gases (GHG) emission by 2030. This study was conducted in Sidama of Ethiopia to assess the role of small-scale tree plantations, and the attitudes and skills of farmers in propagating and conserving indigenous trees as compared to exotic ones, and to identify major impediments for exotic and indigenous tree plantation. By using stratified random sampling, 149 household heads were selected and interviewed, and the tree plantation practices of 46 randomly selected farmers were observed. Advice and support given to farmers concerning tree plantation and nursery care were collected from 16 Woreda Rural Development Experts. During the study a total of 46 tree species were identified, and 92% of the trees on the farmland were exotic. The percentage composition of the five most dominant tree species were *Eucalyptus spp*. (79.6%), *Cupressus spp* (8.5%), *Cordia africana* (4.8%), *Grevillea robusta* (3.3%), and *Millettia ferruginea* (1.8%). The trees provide several direct and indirect socio-economic and ecological importance (construction, fuel, income, medicinal value, fencing, asset for present and next generation, fodder for livestock, garden shade, aesthetic, recreation, spiritual value, improve soil fertility and environmental impact remediation). The majority of farmers prefer exotic trees due to their fast growth, ease of nursery preparation and fast establishment, and higher income generation in shorter period. Though farmers like to plant indigenous trees for their ecological services such as improving soil fertility, producing durable household utensils, shading and other ecological values; land shortage and lack of knowledge on plant biology, nursery preparation and propagation method constrained its plantation. Therefore, introduction of appropriate technologies to the existing farming system is required for sustainable indigenous tree plantation in the study area.

Key words: Exotic trees, farmers, indigenous trees, indigenous knowledge, preference, Sidama, small-scale, tree plantation

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INTRODUCTION

Ethiopia lost about 92,000 ha of its forest annually between 2000 and 2013 [1]. During the same years the annual rate of afforestation was about a fifth of annual forest loss, 19,000 ha/year. As a result, the actual forest cover of the country has declined below the estimated 3% of the total land area in 2004 (WBISPP, 2004 in FAO [2]). Deforestation and forest degradation in Ethiopia historically correlate with expansion of agricultural land, overgrazing, fuel wood consumption, forest fire and to a lesser extent, illegal logging and forest fires [3-5]. However, the country envisions reducing GHG emission by 2030 through reduced deforestation and forest degradation, and increased carbon sequestration through afforestation, area closures, sustainable agroforestry and management of forests and woodlands [3]. Considering the fact that most of the population depends on small-scale agriculture and natural resources for livelihood and energy, the current trend of deforestation and forest degradation is unlikely to abate in the near future unless appropriate measures such as alternative livelihood, energy source, afforestation and reforestation programs are devised [6]. The continued deforestation increases erosion, loss of productive top soil, reduces crop yield and farmers income, which consequently exacerbate the vicious cycle of poverty and natural resource degradation [7].

In Ethiopia, tree conservation has been part of indigenous farming system. Small-scale tree plantation is believed to play a role in solving problems associated with sustainable use of agricultural land, to reverse the adverse effect of lost forest, and to fulfill the livelihood and energy requirement of the ever increasing population. The tree plantation ranges from purely monoculture to a complex agroforestry system [8]. Small-scale plantations in domestic home garden agroforestry and farmlands have contributed to the conservation of useful tree species and provide supplementary food, fuel and fodder [5, 9]. Trees such as eucalyptus and other exotic tree plantations have played a role in alleviating the economic, fuel and construction material problems of the country [10, 11]. In countries such as Ethiopia where more than 90% of the energy is derived from wood and biomass and no other energy alternatives exist, it is not fair to discourage eucalyptus and other exotic tree plantations [10, 12]. However, care should be taken to avoid the unanticipated results of exotic tree plantations because there are reports suggesting that exotic plantations support much lower biodiversity [13], are vulnerable to pathogenic fungi [11], and cause allelopathic and other adverse effects on natural and agricultural ecosystem. Moreover signs of die-back were also observed [14].

The presence of exotic trees such as eucalyptus has immensely reduced the pressure on remnant indigenous trees by substituting for fuel, construction material and income source. Hence, many argue that it is important to educate farmers to plant and conserve indigenous trees beside exotic ones. Several studies have been carried out on indigenous tree propagation methods, establishment and habitat requirements. The establishment of demonstration site and field research centers (for example, Gulele sub-city of Addis Ababa and Center for Indigenous Trees Propagation and Biodiversity Development at Tulu Korma, Addis Alem, in West-Shewa Zone of Oromia Regional State) are evidences for indigenous tree conservation and propagation efforts [14].

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Similarly, the Green Ethiopia foundation in collaboration with Ambo University is supporting farmers on nursery preparation and seedling propagation of indigenous trees.

In the past decades, awareness creation through public media and trainings has been attempted. Different rural developmental bodies such as rural development agents, researchers, NGOs have tried to support and advice rural communities to reduce the rate of deforestation and promote plantations of indigenous trees. Moreover small-scale plantations in home garden agroforestry and farmlands were indicated to contribute to the conservation of useful tree species and in providing supplementary food, fuel and fodder [5, 9]. In the vicinity of woreda cities of Sidama zone, Ethiopia, where this study was carried out, the trees and the indigenous knowledge is under threat from urbanization and introduction of new tree species. In the Sidama Zone of Ethiopia no thorough study has been done to assess the role of farm trees, attitude, knowledge and skills of farmers in planting, propagating and conserving indigenous and exotic trees. Therefore, it is important to assess the role of farm trees, farmers' attitude and factors governing preferences of farmers. The specific objective of the present study was i), to assess factors affecting propagation and conservation of farm trees and ii), to assess attitude and skills of farmers in planting, propagating and conserving indigenous as compared to exotic trees in Sidama zone of Ethiopia.

MATERIALS AND METHODS

Study site

The study was carried out in rural kebeles (peasant associations) selected from four districts[1] (w*oredas*) of Sidama zone, Southern Ethiopia (Figure 1). The kebeles selected by multi-stage random sampling were Chaffe Koti-Jabessa and Tulo from Hawassa Zuria woreda, Konsore-Fulas and Koran-Goge from Borricha Woreda, Tulla and Ganne from Yirgalem (Dale) Woreda and Abaye from Wondogenet woreda. The dominant tribe in the zone is Sidama. Sidama zone has a bimodal rainfall pattern, with the *belg* rains falling from February to April and the *kiremt rains* falling from June to October. The agricultural practice is mainly agroforestry including mixed cropping of chat, coffee, fruits, vegetables and food crops. The three wealth classification systems that exist in the districts are model farmers, middle income farmers and poor farmers. Land is an important household asset for tree planting and production of crops and rearing of livestock. The high complexity and strong inter-linkage between crop production and livestock tending makes the two livelihood systems difficult to consider separately.

[1]District (in Amharic: *Woreda*) is an administrative structure below the zone which is further sub-divided into smallest local government units called peasant associations (in Amharic: *kebeles*).

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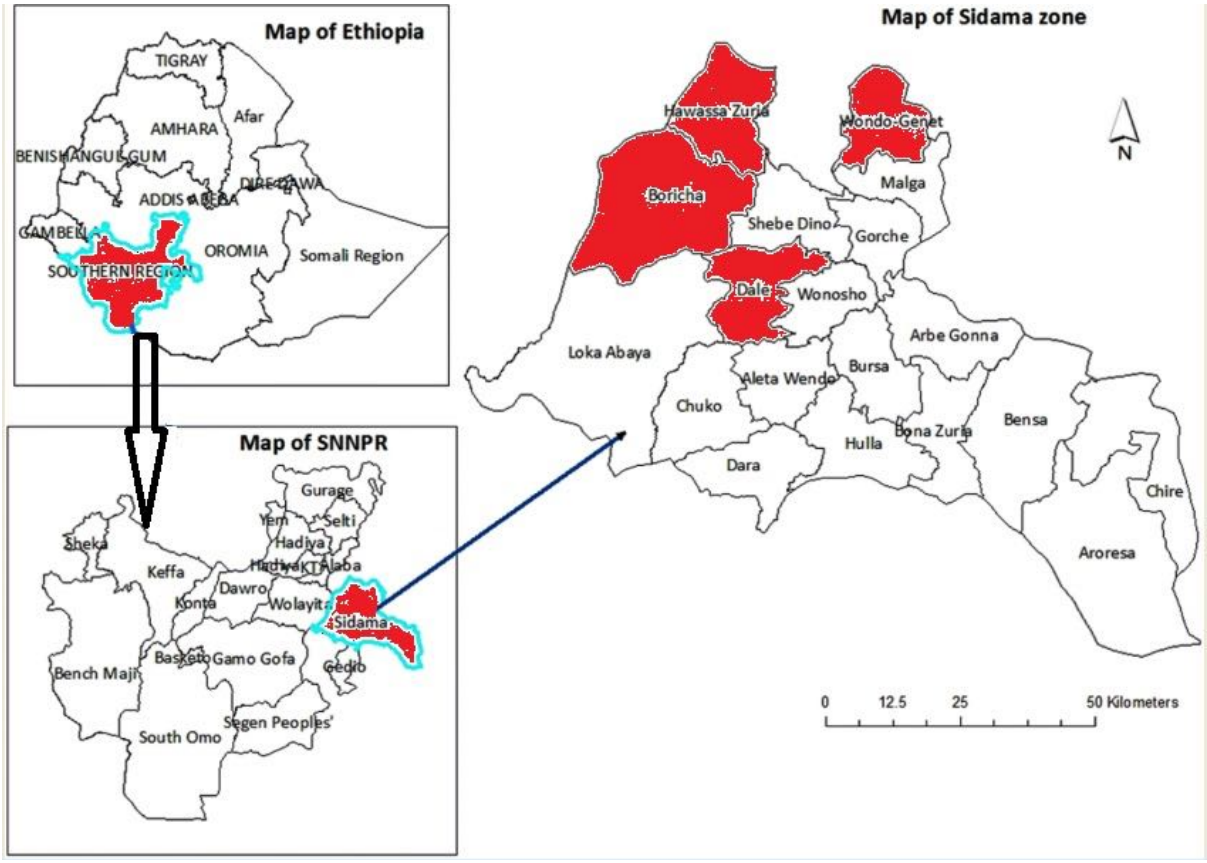

Figure 1: Map of the study sites, Sidama Zone, Southern Ethiopia, 2017 [15]

Data collection Method

In consultation with district experts, 149 sample households were selected from representatives by multi-stage random sampling. A combination of structured and semi-structured interviews was administered to collect information. Moreover, the gardens of 46 randomly selected farmers were observed for major tree species planted, propagated, and seedlings prepared at nursery sites. The numbers of individual trees were counted from each species. Farmer knowledge and skill in tree propagation and care for seedlings at nursery stage and after transplantation was observed. Information on major tree species planted, trainings, support and supervision given for farmers concerning conservation and tree plantation was collected from 16 Rural Development Experts (4 from each woreda). The generated data was analyzed quantitatively and qualitatively.

RESULTS AND DISCUSSION

Demographic characteristics of respondents and its influence on tree planting

From the interviewed 149 household heads, 137 were males and 12 were females, and 98.7% were married (Table 1). Most of the interviewed households (94.6%) were above the age of 30 and only 5.4% were below the age of 30, and 16.1% of them were in old ages (above 60 years old). The lower female numbers in the study areas (8.1%) were mainly attributed to society's tradition of male-dominance where the male is responsible for tree plantation and believed to have more knowledge. However, females

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are involved in managing plants in the home garden by hoeing, weeding and planting. The majority of the respondents were in the age range of 30 and above, and most of them (81.2%) owned their lands during/before the Derg regimes (27 years ago) (Table 1). Due to their age most of the farmers believe that they have good attitude, more knowledge and good experience of planting trees. Regarding education, 69 % of the farmers got primary education and above, which is higher than Aleta Wondo woreda of Sidama zone [16] and Ezha Districts of Gurage Zone [17]. Educated farmers are aware of not only the economic benefit of trees but also their contribution to sustainable development [18].

The mean land size of the respondents was about 0.8±0.53 ha (smallest for Wondogent and largest for Yirgalem) (Figure 2). Mean land size of Yirgalem (1.34 ± 0.86 ha) was significantly larger ($p \leq 0.05$) than the other study sites. Moreover, land size was positively correlated with both tree plantation (r=0.42) and number of tree species (r=0.21). The respondents in Wondogenet covered less than 2% of their total land with trees whereas in Hawassa Zuria 11-25% of the respondents covered their land with trees. An increase in land size of households is believed to increase both the propensity to plant trees and the amount of trees planted [19, 20]. The lower land size and large family size in Wondogenet area has a long history that began due to migration of people and attraction of large agricultural investments to the area [21, 22]. The mean family size per household in Wondogenet (8.8 ± 0.63) was significantly larger ($p \leq 0.05$) than that of Boricha (6.62± 0.48). Consequently, the area is forced to support too many people and farmers prefer growing cash crops such as coffee, chat and sugarcane by clearing trees.

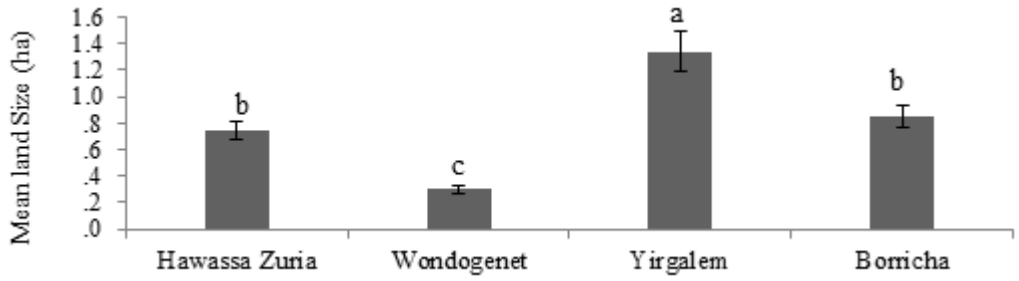

Figure 2: Mean land size (ha) of farmers in the study sites. Bars show means ± SE and different letters indicate significant differences for the sites, Tukey HSD post hoc test at $p \leq 0.05$

Tree Species and diversity of the farmlands

During observation, the gardens of most farmers were extended and it was difficult to distinguish home gardens from farmlands. Some farmers had only a small parcel of garden area which was used for cultivation of both annual and perennial plants including enset (*Ensete ventricosum),* coffee*,* maize, chat (*Catha edulis*), avocado, mango, roots and tubers, vegetables and several other grasses, shrubs and trees. A total of about 46 tree species belonging to 22 families (22.9 % Fabaceae) were identified (**Table 2**).

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Few tree species were restricted to some farmlands while others were found across all farmlands. The three most dominant trees on the lands of farmers were *Eucalyptus* spp., *Cupressus* spp. and *Cordia africana.* All farmers were observed to have at least two species of trees in their farmland, *Eucalyptus* spp. and *Cordia africana*. It was found that about 92% of the trees on farmland were exotic. In terms of mean count the nine most common tree species, from largest to smallest, were *Eucalyptus* spp. (79.6%), *Cupressus* spp (8.5%), *Cordia africana* (4.8%), *Grevillea robusta* (3.3%), *Millettia ferruginea* (1.8%), *Croton macrostachyus*(0.5%), *Azadirachta indica* (0.47%), *Afrocarpus falcatus (*syn. *Podocarpus falcatus)* (0.455%), *Acacia* spp. (0.38%) and others (1.2%) (Figure 3). The mean number of tree species on the sampled farmland in the study sites were not significantly different ($p < 0.05$). But when the mean count of individual trees such as *C. africana* was compared, the number of *C. africana* around Yirgalem (53.4±27.98) was significantly larger than the other study sites ($p < 0.05$).

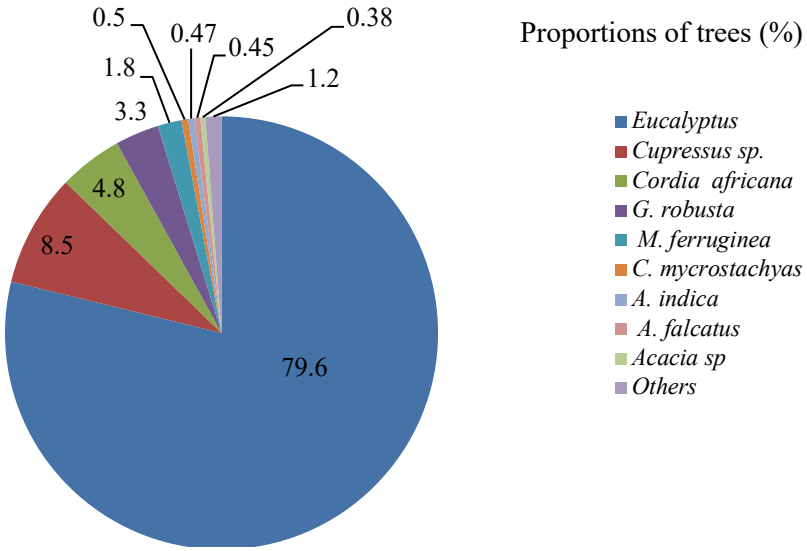

Figure 3: Proportion of tree species (%) in the study areas

When the tree diversity was compared in the study sites, all diversity indexes except richness indicated that Hawassa Zuria woreda had the highest tree diversity and Boricha had the lowest tree diversity (Table 3). The species richness ranged from 16 for Wondogenet to 26 for Yirgalem. The evenness (J) ranged from 0.05 (Boricha) to 0.33 (Hawassa Zuria). The Simpsons index (D) ranged between 0.43 (Hawassa Zuria) and 0.95 (Boricha). The Shannon-Weiner Index of Heterogeneity (H') ranged from 0.15 (Boricha) to 1.05 (Hawassa Zuria). The low evenness, low Shannon-Weiner diversity and high Simpsons index shows high dominance and low diversity. The evidence that shows 79.6% of all farmland coverage by eucalyptus tree is an indication for farmers' preference for some economically and agriculturally important tree species. The Shannon-Weiner diversity index was reported to vary between 1.5 and 3.5 [23]. However, H' of 1.07 was found in enset-coffee based agroforestry system in Sidama Home gardens [8, 24, 25] . The lower tree diversity in farmland indicates farmers' selection of economically important tree species for livelihood [26]. The preference of farmers for some trees over others leads to dominance of the farmland with some species unlike the natural forest patches where there is relatively uniform distribution of species. The low diversity in Boricha woreda compared to other woredas was

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attributed to the low evenness of the species. The agro-ecology of Boricha is 25% midland (*Woynadega*) and 75% lowland (*Kola*). Boricha is often prone to drought and the low seedling establishment rate and the climate might have, therefore, contributed for the lowest tree diversity.

Household tree use

In the study areas trees provide direct and indirect values including construction, major fuel source, timber, medicinal value, fencing, sells, asset for present and next generation, fodder for livestock, garden shade, hanging beehives, aesthetic, recreation, spiritual value, soil fertility and environmental impact remediation (Figure 4). Exotic trees are preferred for sale and daily use (such as firewood and construction), whereas indigenous trees are preferred for farmland, ecological values, fodder and to produce long lasting household utensils (Table 4).

Figure 4: Some uses of trees in the study area: timber production, bee hive preparation, house and fence construction, and as part of agroforestry system

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Factors affecting household tree plantation

Exotic trees were the most dominant on the land of 56.4% respondents (Table 4). About 80% of the respondents preferred exotic trees for daily consumption and income generation, 93% of respondents preferred exotic trees because they are: easy to prepare nursery, easy to establish, grow faster, grow on degraded lands, and generate more income. The respondents indicated that the establishment rate of exotic tree seedlings was 76% when compared to 55% for indigenous ones. Similarly, expert interview indicated that 86% of the farmers preferred planting exotic tress due to their fast growth and easier establishment on degraded lands. On the other hand, 93% of the respondents depicted that indigenous trees do not harm the nearby trees, vegetables, crops and the soil; and 97% of them specified that indigenous trees were used to make more durable utensils and furniture and serve as a shade in agroforestry system and add fertility to the soil. The trees in the agroforestry systems are almost indigenous, and the selection of the trees in the system is based on its contribution for crop yield improvement, litter contribution, soil and water conservation, food and animal feed production, shade provision as well as cultural values.

Preference for Indigenous Trees

The majority of farmers prefer indigenous trees for farmland and ecological values. About 93% of the respondents indicated that indigenous trees do not harm the nearby trees, vegetables, crops and the soil; and 97% of them specified that indigenous trees were used to add fertility to the soil, serve as shades in agroforestry systems, and make more durable utensils and furniture. Many respondents wanted to plant and conserve indigenous trees due to their ecological and economic services and due to traditional significances. However, due to shortage of land, most farmers gave priority to plantation of exotic trees. The trees in the agroforestry systems are almost native, which indicates that the societies have maintained the time tested indigenous knowledge that was passed to them long ago. The leaves cut from trees and enset leaves on the ground were observed during field observation. However, the negative effect of exotic trees particularly eucalyptus on soil, water sources and undergrowth plants in the farmland were witnessed by most respondents. Hence farmers prefer growing eucalyptus trees separately (in monoculture) away from farmland and grasslands to reduce their negative effect on crops, vegetables, grasses and other trees, and in water-logged areas unlike other indigenous trees which are included in agro-forestry systems. A previous study indicated that exotic plantations support few biodiversity when compared with indigenous trees [13].

Farmers' Skill and Knowledge on Indigenous Tree Plantation and Constraints

Many respondents want to plant and conserve indigenous trees for their ecological and economic services and due to traditional significances. However, due to shortage of land and lack of seedlings or knowledge on seedling preparation, most farmers gave priority to fast growing exotic trees. About 70% of the interviewed farmers suggested that the growth rate of indigenous trees is very slow. Indigenous trees such as *A. falcatus*, *Ficus sycomorus* and *O. europaea* sub spp. *Cuspidate* were not easily available; and seeds of *A. falcatus*, some *Acacia* spp., *Hagenia abyssinica* and *O. europaea* subsp. *Cuspidate* don't easily germinate. Personal observations also

confirmed that farmers mainly transplant the seedlings of indigenous trees that did already germinate naturally rather than preparing seedling nurseries.

The majority of the respondents did not know any seed pre-treatment method to remediate seeds that have a germination problem. Concerning seedling preparation, 62.4% of the respondents indicated that they prepared nurseries once in one to two years. However, during the actual observation, out of the 46 sampled farmers only two farmers were found owning seedlings on their own nursery. According to the experts, only 35% of the farmers practically apply the advices given on indigenous tree plantation and care. Regarding the advices obtained from experts 70% of the respondents indicated that they got advice to plant trees from kebele/woreda Development Agents (DAs) at least sometimes (Table 4), but no practical support and follow up was given. Moreover, no sufficient advice, support and practical training was given to farmers concerning nursery preparation, proper plantation and conservation of trees. Development agents (DAs) lack some knowledge on tree propagation and the support they provided is not similar among the districts. The expert support provided was higher in Boricha and less in Wondogenet. The seed viability of many indigenous trees is low and societies lack knowledge on the environmental requirements of the indigenous trees [27].

Options to Improve Farmers Attitude toward Growing Indigenous Trees

The low attitude of farmers toward planting indigenous trees was exacerbated by land shortage and lack of knowledge in nursery preparation and germination. However, Legesse [14] argues that people generalize wrongly about germination and establishment of indigenous trees of Ethiopia. Many indigenous trees can germinate and establish easily if one knows their biology and methods of pre-treatments for germination and suitable environments for establishment. He further argued that many indigenous trees produce seeds that are covered with stony or hard seed coat, as endocarp of *O. europae*, sclerotesta of *A. falcatus* and hard seed coat of various *Acacia* species, and so called 'difficult' indigenous trees of Ethiopia [28, 29]. Under natural conditions, such stony/hard seed coats require a set of suitable environmental or biological actions that modify their structure to facilitate imbibition. Even after the seeds have germinated, the seedlings may require shade in order to protect themselves from harmful UV radiation, wind, low relative humidity and other detrimental environmental factors [14].

Mechanical removal of hard seed coat/endocarp of seeds of *A. falcatus* and *O. europae* sub sp. *cuspidata* significantly increase both germination rate and percentage of fully grown trees. Similarly, proper mechanical scarification and pre-treatment of seeds with hot water also significantly increase both the rate and percentage of germination of various *Acacia* species [14]. Seeds of *H. abyssinica* can be treated by easily available plant-derived aqueous smoke extracts (40%) and were found to have higher and significant seed germination percentage (86%) compared to the control (72%) [30]. However, farmers of the present study area had no awareness of such skill and knowledge of tree plantation. Moreover, the advices that have been given to farmers to plant and conserve indigenous trees by the Kebele Development workers were not accompanied with practical support and supervision.

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CONCLUSION

The present study investigated factors affecting preferences, skill and practices of farmers toward indigenous and exotic tree plantation by using four districts in Sidama zone. Farmers preference for tree plantation strongly correlated with land size (significantly larger for Yirgalem ($p \leq 0.05$) and smallest for farmers around Wondogenet). The majority of farmers preferred exotic trees, particularly, *Eucalyptus spp*. (79.6%), *Cupressus spp* (8.5%), *Grevillea robusta* (3.3%), and *Millettia ferruginea* (1.8%). The farmer preference for exotic trees is due to seed availability, fast germination rate, ease of nursery preparation and fast establishment rate and high income generation in a shorter period. Indigenous trees are preferred for their ecological services such as improving soil fertility, producing long-lasting household materials, shading, spiritual and aesthetic values. However, the majority of farmers didn't know pre-treatment methods to enhance germination of indigenous tree seeds to break physical and/or biological seed dormancy. Moreover, no sufficient advice, support and practical training was given to farmers concerning nursery preparation, proper plantation and conservation of trees. Therefore, the present study suggests the need for trainings for farmers and woreda/kebele experts concerning nursery preparation, plantation and conservation.

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Table 1: General information on the respondents' backgrounds

Variables	Categories	Frequencies	Percentage
Sex	M	137	91.9
	F	12	8.1
Age range	18-30	8	5.4
	31-39	29	19.5
	40-65	90	60.5
	>65	22	14.8
	Mean age		48.5
Marital status	Married	147	98.7
	Single	2	1.3
Educational status	Illiterate	46	30.9
	elementary	80	53.7
	Secondary	20	13.4
	Tertiary	3	2.01
Year of land owing	1-5	0	0
	6-10	2	1.3
	11-22	26	17.7
	> 23	121	81.2

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Table 2: Tree species identified in the home garden of the respondents

No	**Local Name**	**Scientific name**	**Family**
1	Honcho	*Juniperus procera*	Cupressaceae
2	Gravilla	*Grevillea robusta*	Proteaceae
3	Sesbania	*Sasbania sasban*	Fabaceae
4	Dagucho	*Podocarpus falcatus*	Podocaraceae
5	Garbicho	*Prunus Africana*	Rosaceae
6	Kararo	*Aningeria adolfi-friedericii*	Sapotaceae
7	Sasa/kerkeha	*Sasa kurilensis*	Poaceae
8	Diredawa zaf	*Jacaranda mimosifolia*	Bignoniaceae
9	Walako	*Erythrina brucei*	Fabaceae
10	Shiwushiwe	*Casuarina equsetifolia*	Casuarinaceae
11	Hedhesa	*Olea welwitschii*	Oleaceae
12	Shisho/goraa	*Rubus apetalus*	Rosaceae
13	Nim	*Azadiracta indica*	Meliaceae
14	Kundoberbere	*Schinus molle*	Anacardiaceae
15	Kazmir	*Casimiro aedulis*	Rutaceae
16	Rejicho/Girawa	*Vernonia amygdalinum*	Asteraceae
17	Addama	*Euphorbia candelabrum*	Euphorbiaceae
18	Atat/Kombolcha	*Maytenus arbutifolius*	Celastraceae
19	Xadacha	*Acacia tortilis*	Fabaceae
20	Wacho	*Acacia absyssinica*	Fabaceae
21	Wacho	*Acacia albida*	Fabaceae
22	Karaaro	*Acokanthera schimperi*	Apocynaceae
23	Reje/Rejicho	*Vernonia auriculifera*	Asteraceae
24	Maticho	*Alibizia gummifera*	Fabaceae
25	Qenbo'o	*Ricinus communis*	Euphorbiaceae
26	Xabaricho/Teberako	*Bersama abyssinica*	Melianthaceae
27	Qilto	*Ficus vasta*	Moraceae
28	Korch	*Erythrina abyssinica*	Fabaceae

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29	Moringa/Shiferaw	*Moringa oleifera*	Moringaceae
30	Kenya Bisana	*Croton megalocarpus*	Euphorbiaceae
31	Dadako	*Hygenia abyssinica*	Rosaceae
32	Yeabebainchet	*Callistemon citrinus*	Myrtaceae
33	Chekata/Digta	*Calpurnia aurea*	Fabaceae
34	Weyira/ejersa	*Olea europaea*	Oleaceae
35	Tikurgirar	*Acacia abyssinica*	Fabaceae
36	Wadicho/Wanza	*Cordia Africana*	Boraginaceae
37	Sassa	*Albizia schimperiana*	Fabaceae
38	Odakko	*Ficus sur (F. capensis)*	Fabaceae
39	Hatawicho	*Brucea antidysenterica*	Simaroubaceae
40	Yeferenjitsid	*Cupressus lusitanica*	Cupressaceae
41	Macincho/Bisana	*Croton macrostachyus*	Euphorbiaceae
42	Bahirzaf	*Euclyptus camaldulensis*	Myrtaceae
43	Olenicho	*Ekebergia capensis*	Meliaceae
44	Buna	*Coffee Arabica*	Rubiaceae
45	Avocato	*Persea Americana*	Lauraceae
46	Haxawicho	*Brucea antidysenterica*	Simaroubaceae

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Table 3: Tree diversity indexes in households of four woredas in Sidama zone of Ethiopia, as expressed by richness, Evenness (J), Shannon Weiner index (H') and Simpsons index (D)

Name of Woreda	Richness (S)	Shannon-Weiner Index of Heterogeneity (H')	Shannon Weiner index of evenness (J)	Simpsons Index of Heterogeneity (D)
Boricha	24	0.18	0.05	0.95
Hawassa Zuria	25	1.05	0.33	0.43
Wondogenet	18	0.7	0.24	0.73
Yirgalem	26	0.55	0.17	0.77

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Table 4: Percent response of household heads on attitude, skill and preference of indigenous and exotic trees

Variables	Categories		Frequencies	Percentage
Dominant trees on farmland	Indigenous		58	38.9
	Exotic		84	56.4
	Both equal		7	4.7
Trees that grow faster	Indigenous		10	6.7
	Exotic		138	92.6
	Unknown		1	0.7
Frequency of seedling preparation	Once in 1-2 years		42	62.4
	Once in 5-10 years		87	24.2
	Don't prepare at all		17	6.7
Ease of seedling preparation	Indigenous		11	7.4
	Exotic		120	80.5
	Unknown		18	11.4
Tree preferred for use	Daily use	Exotic	119	79.8
		Indigenous	22	14.8
		Both	8	5.4
	For sale	Exotic	116	77.9
		Indigenous	20	13.4
		Both	10	6.7
Frequency of advices given by experts on tree plantation and care	Always		30	20.6
	Some times		71	48.6
	Not at all		45	30.8
Mean tree seedlings planted &established	Indigenous	Planted	45.2	
		Established	24.8	55
	Exotic	Planted	556.5	
		Established	423.43	76

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