Indigenous knowledge of *Allanblackia stuhlmannii* in the East Usambara Mountains, Tanzania.

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ABSTRACT

Indigenous knowledge of *Allanblackia stuhlmannii* tree species was studied and documented in five selected villages adjacent to the Amani Nature Reserve, East Usambara Mountains, Tanzania. The indigenous knowledge of the tree was studied through questionnaire responses from 110 households. Nearly all farmers mentioned that they know the tree and is widely known as Msambu. The tree has been traditionally used as cooking oil from seeds extraction, dried leaves are used as medicinal tea against chest pain and heated oil is smeared on aching joints, rashes and wounds. The majority of farmers have one to ten trees on their farms, which they have left for various uses. However none of the respondents is raising or planting the *Allanblackia* tree in the study area, except for one farmer who has started raising the tree through seeds. 83% of respondents said that they are willing to plant this tree for agroforestry purposes on their farms. Women expressed concern that they would need permission from their husbands to plant this tree, as most women in the study area do not own land. The difference between a male and female tree when they are not flowering was not established, though some characteristics were mentioned that the male tree has buttresses and the trunk has wrinkles while the trunk of the female tree is smooth. It was noted that the tree bears fruits each season and the number or quantity of the fruits per tree in each season is influenced by different factors such as age, canopy cover, predation and diseases. It was learnt that the fruits fall anytime of the day and it was not possible to tell a ripe fruit when still on the tree. The animals that depend on this tree for food include giant pouched rat, thick-tailed galago and blue monkey. The giant pouched rat is also a problem to agricultural crops. The study has revealed important information that needs further investigation and monitoring to establish a scientific basis for future sustainable nut harvesting and agroforestry efforts.

INTRODUCTION

Allanblackia stuhmannii is a medium- to tall-sized evergreen forest with a drooping and often conspicuously whorled branches tree found in moist eastern arc mountain forests in Tanzania. Other tree species in the genus of *Allanblackia* are found in the regions of Tanzania, Uganda, Democratic Republic of Congo (DRC) Liberia, Ghana, Cote d'ivore, Nigeria, Cameroon, Gabon, Congo and Angola (Amanor *et al*, 2003). It is a rainforest tree that grows to height of 35 – 45 metres tall and between altitudes 500 – 1600 above sea level (Schulman *et al*, 1998). The species is endemic species to the Eastern Arc Mountains (Hamilton *et al*, 1989; Harkonen and Vainio-Mattila 1998).

The bark of the *Allanblackia* tree is dark grey or black, sometimes smooth or with rough squares scales. The slash is red with white stripes, fibrous/granular and exuding clear exudate latex, which later turns yellowish. The thin branches are straight and appear to be arranged in whirls from 9 metres up the main trunk. *Allanblackia stuhlmannii* has multi-purpose uses for its nutritive, medicinal and timber values (Schulman *et al*, 1998).

For some years now the communities living around the Eastern Arc Mountains, specifically farmers around the East Usambara Forest Mountain, used the nuts of *Allanblackia stuhlmannii* for the extracting cooking fat for domestic purpose. Although various studies have been conducted in the East Usambara forests to establish conservation status of the mountains and quite a substantial data exists of flora and fauna (Newmark 2002), there is limited information on the indigenous information about the *Allanblackia spp.* Schulman *et al*, (1998); Woodcock (1995); Harkonen and Vainio-Mattila (1998) in their studies reveal that this tree species is very useful tree for populations adjacent to East Usambara forests.

Unilever together with national and regional partners are exploring the possibility of building a sustainable food oil production industry based on *Allanblackia spp* (locally known as Msambu). They are committed to helping conserve natural forest areas where it occurs and stimulating a small-holder production supply chain. Unilever and ICRAF have

requested TFCG to assist as part of the domestication process to document the local knowledge of *Allanblackia spp*.

METHODOLOGY

Study site

The study was conducted in five villages that border Amani Nature Reserve forest, which is situated in East Usambara Mountains, north east of Tanzania (latitude 5^0' 06' S and longitude 38^0' 38' E). The climate is monsoonal with a mean annual rainfall of about 1918mm (Hamilton 1989). The site and villages were selected basing on where the Allanblackia tree is most prevalent. The selection of the households was randomly.

Questionnaire development and field work

To understand traditional uses and knowledge of this tree, questions were written up as a questionnaire and then initially reviewed by key stakeholders including Amani Nature Reserve, ICRAF and Unilever. Changes were subsequently made and incorporated into the final questionnaire (see Appendix I). Prior to distributing the questionnaire, training was provided to six enumerators. The study was conducted with knowledge of village leaders in the five villages. It was explained to the respondents the reasons the knowledge is being collected. The study was conducted between 1st and 8th August 2004. The villages visited include Mbomole, Kwezitu, Mikwinini, Shebomeza and Misalai.

Data processing and report writing

The results of the questionnaires were analysed using Statistical Package for Social Science (SPSS). Each questionnaire was reviewed for corrections and constancy. The results were then entered, post coded and summarised based on frequency. Information from open-ended questions were analyzed and compiled to respond to the objective of this study. This was done by using content analysis (one of the method used to analyze qualitative information).

RESULTS

In total, 110 questionnaires were completed in the five villages that included Mikwinini (25), Shebomeza (23), Mbomole (20), Misalai (21) and Kwezitu (21). The results of the responses are as follows:

1. Trees commonly raised in nurseries in the five villages

It was observed that, all five villages have group and / or individual tree nurseries. Villagers reported that the common tree species which they raise in these nurseries include; *Grevillea robusta, Cedrella odorata, Croton macrostachyus, Delonix spp* and Spice trees/plants (e.g. cloves, pepper vines, coffee and other spices). They also mentioned fruit trees such as avocado and jackfruit (*Artocarpus heterophyllus*).

2. a) The range in the cost of seedlings of various tree species

About 71% of the respondents reported that, the cost of tree seedlings ranges from Tsh 100 –250 per seedlings, while 19% mentioned that, a seedling costs above Tsh 250 -500. The remaining 10% said that they do not know. However, it was noted that the seedling that cost up to 500 include coffee, cloves and spice seedlings.

b) The kind of nursery equipment used in tree nursery management

The majority mentioned the following nursery equipment is commonly used in nursery management; Polythene tubes, watering canes, spade, knives, hoes, wheelbarrows, plastic pipes, water and locally available materials such as banana leave.

c) Forest experts (Extension Officers) who visit villagers to provide technical support in tree nursery management

About 68% of the respondents said that they receive regular extension service related to tree nursery management and tree planting. However 32% mentioned that, no extension worker has ever contacted them. Those who have been contacted mentioned TFCG, IUCN and FINNIDA staff. They also mentioned staff from the agriculture sector.

d) Kind of support required to start individual nursery or improve the existing one

The majority of the respondents mentioned that in order to start a tree nursery, they require technical and material support such as polythene tubes, knowledge on seed extraction and propagation techniques, pesticides use and the market for the seedlings. They also mentioned that they need to access water.

e) Purpose of raising Allanblackia tree seedlings

When asked what would be the primary reasons for raising the *Allablackia spp*, 52% of respondents mentioned that they will plant on their farms and the remaining seedlings will be sold. In the other hand 17% mentioned that they will only be selling the seedlings and 26% reported they will plant on their farms and very few (6%) mentioned that they do not know.

f) Problems of raising indigenous trees such as *Allanblackia spp* tree

Most (83%) of the respondents mentioned that they do not know the problems of raising the indigenous trees and a few (17%) acknowledged to understand the challenge of raising the seedlings and they mentioned that indigenous tree seedlings grow very slowly and survival is unpredictable. This is probably attributed by limited knowledge of raising indigenous tree seedlings.

g) **Understanding the period of *Allanblackia* seedlings (indigenous tree) supposed to stay in the nursery before they are transplanted.**

Nearly all (95%) of respondents mentioned that they do not know the period that seedling has to stay in the nursery. Very few (5%) of the respondents mentioned that indigenous seedlings take about six to twelve months depending on the tree species.

h) Is the Allablackia tree shade or light demander?

When asked this question, about half (52%) of the respondents mentioned that the tree is light demander, while 26% reported that the tree is shade demander and 14% mentioned that tree depend on shade when still young and when it becomes mature depends on light.

Very few (8%) said that they do not know.

i) Do the Allanblackia tree grow together with other trees?

Most (88%) of respondents mentioned that the *Allanblackia spp* tree grows together with other tree such as *Maesopsis eminii* (Kisw. Muhumula, Kis. Mhesi), *Newtonia buchananii* (Kisw. Mnyasa), *Cephalosphaera usambarensis* (Kisw. Mtambala), *Ocotea usambarensis* (Kisw. Mtambaa au Kamfa), *Antiaris toxicaria* (Kisw. Mkunde, Kis. Mkuzu), *Ficus sur* (Kisw. Mkuyu), *Isoberlinia schffleri* (Kis. Mbaika au Piga makofi), among others. In the other hand, the remaining (12%) mentioned that they are not aware.

j) Allanblackia nuts are now becoming a commercial crop, are you ready to buy seedlings of it and raise in your farm?

About 83% of respondents are ready to buy seedlings and plant in their farm at a price of Tsh 50-200/seedlings. 17% mentioned that, they are not ready to buy seedlings; one of the reasons mentioned, especially by women is that this would depend on their husband's decision because most women in the study area do not own land/farms nor are they allowed to make such decisions regarding land-use.

3. Knowing the Allanblackia tree

When respondents asked whether or not they know the Allanblackia tree, nearly all (99%) of respondents mentioned that they know the Allanblackia tree and only 1% of the respondents mentioned that they do not know the tree. The common names given includes: Msambu, Mkimbo, Mkanye or Mkanyi (tree) and Makanye (referring to fruits).

4. Tree ownership (Allanblackia trees in the farm)

Most (76%) of respondents mentioned that they have Allanblackia trees in their farms and the reason they have kept these trees in their farm include; to obtain seeds for extraction of oil, shade for cardamom crops, and leaves of the trees are believed to cure chest pain. However, when asked how many trees of Allanblackia they have in their farms, 60% of respondents mentioned that they have between 1 to 10, 13% mentioned to

have 11-20, very few 5% said they have above 20 trees and the remaining 21% they do not have Allanblackia trees on their farms (table 1).

Table 1. Percentage response on the number of Allanblackia in the farmland

		Frequency	Percent
Valid	1-10 trees	66	60.0
	11-20 trees	15	13.6
	Above 20 trees	6	5.5
	Do not have	23	20.9
	Total	110	100.0

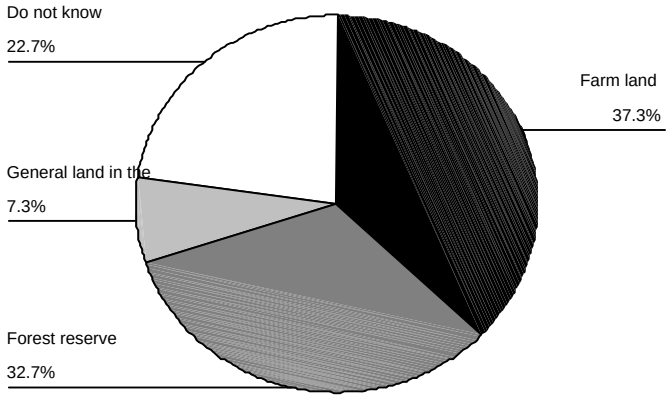
5. Sufficient land for establishing the Allanbackia tree as new cash crop

73% of respondents said that they have enough land to plant these trees, while 27% said that they do not have enough land. When asked about the size of the farm, most (46%) said that they have about 0.5 to 2 acres and only 27% said that they have 2.5 to 5 acres. It was noted that women do not own land and this will have implications on tree planting. Women will need to seek for permission from their husband prior to tree planting. It was noted that due to limited land availability, the *Allanblackia spp* would be promoted as agroforestry tree.

6) Availability of clustered trees of Allanblackia (between 5 and 10 or more in this village).

About 37.3% of the respondents mentioned that the clustered trees can be found in the farmlands. While 32.7% and 7.3% mentioned in the forest reserve and in general land respectively. Where as 22.7% said that they do not know (fig. 1). When a comparison is made among the villages, it was observed that, in Mikwinini village the clustered trees of *Allablackia* are mostly found in the forest reserve (fig.2).

Fig.1. Percentage response of where clustered trees can be found.



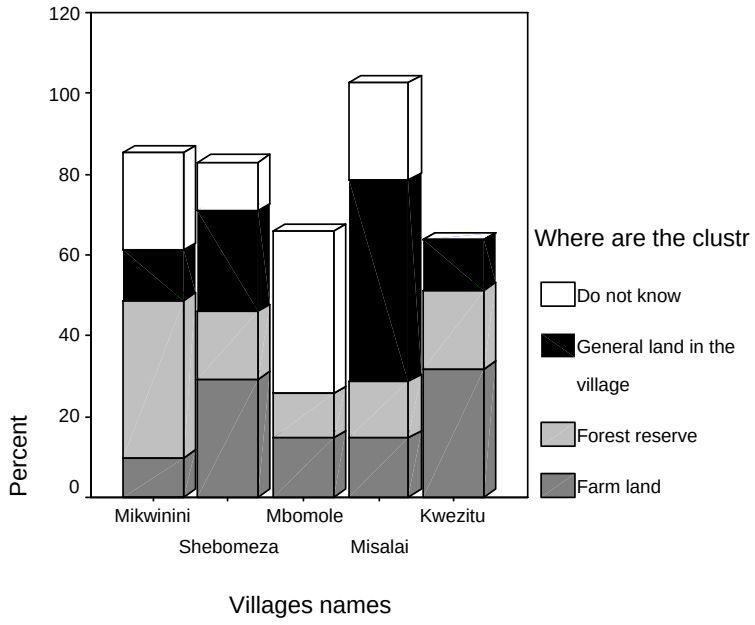


Fig. 2. Comparison among the villages where clustered trees of *Allanblackia spp* can be found.

8) Abundance of Allanblackia trees in the last 10 or years ago

Most (72%) of the respondents agreed that in the last 10 or 20 years ago, the *Allanbackia* tree species was more abundant, while 16% mentioned that the species was less abundant and 12% said that they do not know. It was reported that the trees were cut in the expense of opening agricultural land and timber extraction.

9) When the Allanblackia tree is cut, does it resprout?

Most (69%) of respondents mentioned that when the *Allanblackia* tree is cut, it resprouts mainly from the stem and roots. However, they commented that pruning is very important in order to reduce the branches (multistems). A few (10%) said that the tree does not resprout and the remaining (11%) said that they do not know completely.

10) Uses of *Allanblackia spp*

When asked about the uses of the Allanblackia tree in the study site, 100% of respondents mentioned the following uses; timber and fuel wood, cooking oil from seeds extraction, dried leaves are used as medicinal tea against chest pain and heated oil is smeared on aching joints, rashes and wounds.

11) Someone raising or planting seedlings of tree seedlings

92% of respondents said that they do not raise *Allanblackia* seedlings and they do no know anyone else who is raising the trees. However, 8% said that they knew one person who has started locally raising the seeds (Mr. Chamngwana from Kwezitu village).

12) Special treatments required getting good germination of seed

94% of respondents said that they do not know any special treatment, as they have not started raising the *Allanblackia* seeds. While 6% said that in order to raise the Allanblackia seeds, it is very important that fresh seeds are collected, buried in the soil, cover with dry grass and keep watering until they germinate.

13) Can seed be stored for some months and still germinate?

About 42% of the respondents said if seeds are properly dried and kept in dry place it can

stay between one and six months or more and it can still germinate. 52% said that the seeds would not germinate while 6% said that they do not know.

14) Anyone planting Allanblackia tree on the farm

Nearly all (99%) of the respondents said that they do not know anybody who is planting *Allanblackia* from wilding/seedlings/cuttings in their farms.

15) The difference between a male and female tree when they are not flowering

84% of the respondents said that they could not tell the difference between a male and female tree of *Allanblackia spp* when they are not flowering. While remaining 16% of respondents mentioned that the leaves of male tree are thinner compared to the female that are broad. They also mentioned that the female branches incline down while those of male tree are slightly up. The male tree has buttresses and the trunk is wrinkled and grooved where as the female tree has no buttresses and the trunk is smooth and not grooved. However, this is conspicuous when the trees are mature enough.

16) How many times per year do the Allanblackia tree bear fruits?

81% of respondents mentioned that the Allanblackia tree bears fruits twice per year that is in November - December and the other period is March to May. The remaining 19% said that they were not sure. However, fruiting varies among populations and no individuals trees were known to fruit more than once in a year.

17) Do some trees bear fruits each season? YES/No if No, at what bearing interval? Biennial?

Most (77%) mentioned that, trees bear relative more or less fruits each season but the next season the tree bears less or not at all depending on the quantities of the fruits were born the previous season. The remaining 23% of respondents said that they do not know.

18) The smallest size tree that bear fruit in terms of height

When asked this question, 65% of the respondents said that they do not know and about 16% said that the smallest size of the tree they have seen bearing fruits was 5-10 meters,

14% said 11-20 meters and only 6% said 20 meters and above. (table 3).

19) The earliest age the tree can flower/fruit

62% of respondents mentioned that they do not know (table 4). Others (22%) said between 10 – 20 years, 14% said between 21-30 years and the rest 3% said above 30 years.

20) How long does it take from flowering to fruit maturity?

57% of respondents mentioned between 5 to 8 months. While 12% said between 3 to 4 months and the remaining 31% of respondents said they do not know.

21) Time of the day when fruits do fall

The majority (88%) mentioned that the fruits fall any time provided they are ripe. The remaining 10% of respondents said the fruits fall at night and the rest 2% of respondents said during the day.

22) Do you know of any way to tell fruit are ripe when on the tree?

83% of respondents said that they do not know. While the remaining 17% of the respondents said they could tell by looking at the gum or fluids on the fruit the ripe fruit has a crack and the colour of a ripe fruit is gray, brown etc.

24) How do you harvest your nuts? How do you separate the nuts from the fruit? How do you process it to get your product?

99% of the respondents mentioned that they wait the fruit to fall down and extract the seeds from the fallen fruits and clean seeds. If they want to extract oil the seeds are dried, then are grinded and boiled with water in a saucepan. The oil layer comes to the top and this layer is poured very gently in a clean container ready for local use. The major comment that was stipulated is that the oil solidifies very quickly and becomes very hard.

25) Number of fruits per tree and seeds per fruits in a season.

When asked this question, about 14% of the respondents mentioned between 20-49 fruits

per season, 26% said 50 – 199 fruits, while 22% said above 200 and 38% said that they do not know (fig 3). When asked about the number seeds per fruits again varied responses were provided. About 24.5% mentioned 20-49 seeds per fruits, 11% said 50-100 seeds per fruits, 22% mentioned above 100 seeds per fruits while 43% said that they do not know (fig. 3).

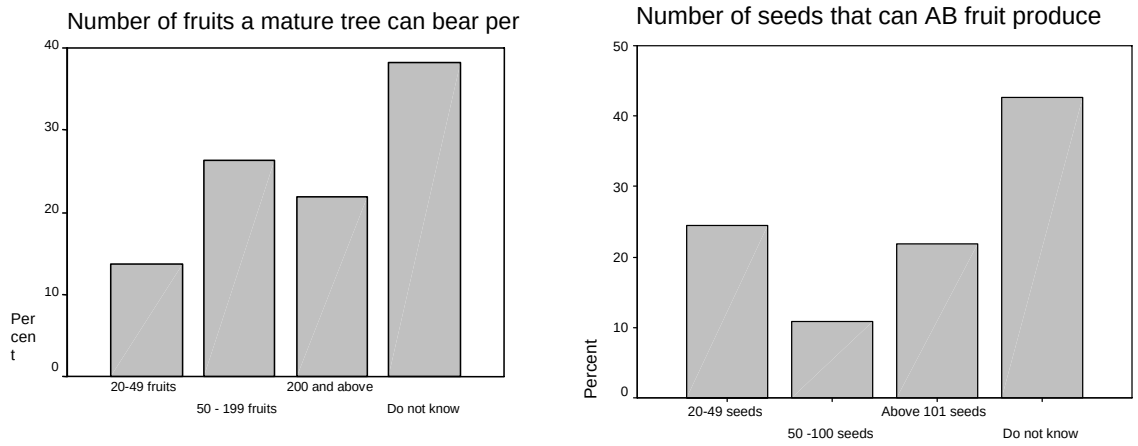


Fig. 3 Showing the percentage response on the number of fruits per tree and number of seeds per fruit.

26) What animals depend on this tree for food?

The majority (93%) mentioned a giant pouched rat (locally known as kuhe) depends on the *Allanblackia* seeds as a source of food. Other animals that were mentioned include squirrels though this was confirmed also to eat fruits of *Maesopsis eminii*. One respondent mentioned bush pig, the answer for this was triangulated and confirmed that bush pig does not eat fruits/seeds of the tree; however the blue monkeys were reported to consume the flowers. Others went to the extent of mentioning thicked-tailed galago (komba mkubwa) also eat seeds. In the other hand, the rest 7% of the respondents mentioned that they do not know that there are animals that depend on the Allanblackia tree for food.

27) What part of the tree do these animals eat? Seed/fruit/roots/bark?

93% of the respondents mentioned that the giant rat, bush babies and squirrels feed on the seeds and fruits. Very few (7%) of respondents mentioned that they do not know which

part of the tree these animals eat. They also said the giant rat is believed to be an important seed predator and a good dispersal seed agent by storing seeds in buried caches. They do so to protect the seeds from other surface feeding seed predators and storage for future consumption (in periods of food scarcity) and if the rodent dies or forgets the location of the cache, the seeds may germinate and establish.

28) Are these animals a problem to any other crops? If yes, which crops?

92% of the respondents said that the giant pouched rat also feed other crops such as maize, beans. Squirrels feed on sugar cane, where as blue monkey feed on cassava, maize, potatoes and bananas. While the rest 8% of the respondents mentioned that they do not know,

29) What are the pests or disease that attack Allanblackia and other indigenous trees?

Nearly all 98% of the respondents mentioned that they do not know any diseases or pests that attack the tree. However, the remaining 2% said that they have seen the tree being attacked by fungus and woodlot disease.

30) Have you noted any problems of Allanblackia trees when planted with other food or cash crops?

89% of the respondents reported that they have not discovered any problems of *Allanblackia* tree with other agricultural crops. Apparently the tree has been providing shade for Cardamom cultivation. They also use it as a stake for other climber crops such as pepper vine. The remaining 11% of the respondents said that the tree is however not compatible with maize, beans, cassava, potatoes etc. They recommended that the tree if planted should be along the farm boundary and in scattered way and they appreciated that the tree is a good agroforestry tree to be promoted.

DISCUSSION

The study has revealed important information related to the indigenous knowledge of *Allanblackia*, in particular the knowledge on tree planting and the tree in general. During the study, it was observed that in each village there are tree nurseries that are owned by individuals, groups, institutions etc. However, not every villagers/farmers own tree nurseries and in case they need tree seedlings to plant in their farm, they have to buy from the individuals who own nursery. Although these tree nurseries exist they are mainly exotic tree species and that there was no evidence of raising indigenous trees in all of the villages. Only one farmer was mentioned in the Kwezitu village that has started raising trees from the Allanblackia seeds. In the other hand farmers showed interest of planting natural trees if they receive knowledge on how to raise the indigenous tree seedlings. The reason behind why farmers have not been planting indigenous trees include the lack of knowledge on how to raise the seedlings, the rotation age of the indigenous tree is too long (50 years and above) and the belief that indigenous trees grow naturally. Although the forest policy recognizes the importance of promoting indigenous trees in the farms, there is little emphasis in planting the natural tree as opposed to exotic tree species (Meshack 2002).

Understanding the Allanblackia tree

Nearly all the farmers that were interviewed knew the *Allanblackia* tree. The tree is popularly known as Msambu. Indigenous knowledge from farmers who own *Allanblackia* trees said that the tree dependence on light to grow, however the literature shows that the tree depends on shade when still young and it requires light when it is mature enough (Gynn and Ritzl 2000). The tree grows together with other tree species with no problems. The most interesting observation is that most farmers were not aware of the existence of male and female trees and this had implication especially to the farmers who have trees on their farms that do not bear fruits annually. They said that they were planning to cut such trees. It is important that education is provided to the farmers on the importance of keeping both male and female *Allanblackia* trees maintaining a ratio

of about 1 male to 10 female (Mujuga per communication). It is clearly known that the *Allanblackia stuhilmannii* is a dioecious species (Schulman *et al,* 1998) and any future farming of it will require to provide this knowledge on the ratio at which male and female trees should be planted to guarantee crops.

The difference between a male and female tree when not flowering

It was noted that it was difficult to tell the difference between the male and female tree when not flowering. Although some differences were mentioned, they mostly referred to a mature tree and there was no evidence that they could differentiate the tree while at young stage. The majority of respondents were not aware of the existence of a separate male and female Allanblackia tree.

Tree ownership and availability

Although majority mentioned that have Allanblackia trees in their farm, it is only between one and ten trees, which is actually a small number that cannot meet the demand of seeds required in future. This is probably due to limited land that is available for promoting this tree in the farm and it was learnt that women do not own land and this will have implications on planting additional trees. Women would require to seek permission from their husband prior to tree planting.

It was also observed that the clustered tree of Allanblackia can be found in Amani Nature Reserve. Most of the respondents in Mikwinini village agreed that the clustered trees can only be accessed in the nature reserve as opposed to Kwezitu where trees are scattered in the farmland (fig. 3). During the study respondents mentioned that tree abundant was more in the last 10 to 20 years ago and those trees were cut in the expense of opening and expanding agricultural land and timber extraction. Recent cutting on farmlands to serve the fuel wood for the tea estate processing needs raises further conservation issues. It was confirmed that when the *Allanblackia* tree is cut, it resprouts, however it was commented that pruning is very important in order to reduce the branches (multistems)

Fruits bearing

Although the majority mentioned that the Allanblackia tree bears twice a year (November – December and March to May) this observation need further monitoring in order to establish the fact. This applies whether the tree bears every season. It was learnt that the tree bears fruits each season and the quantity of fruits produced varies each season. In the side of the smallest size tree and earliest age tree can flower the majority mentioned that they do not know the smallest size tree in terms of height or age that they have seen flowering or bearing fruits. Further monitoring is important to establish the evidence. This applies to the period between flowerings to fruit maturity. It was also noted that there is no exact time when the fruit falls. The fruits fall anytime be it at night or during the day and it is not possible to tell the ripe fruit when on a tree.

Number of fruits per tree and seeds per fruit.

Varied responses were provided regarding this question, however a study by Elinge and Ndayishimaje (2003); Mohamed and Mlowe (2002) observed that there were a higher percentage of trees with fruits in disturbed areas (farmland) than the undisturbed forest. They also observed that the greater the canopy cover, the fewer fruits produced and vice versa. This suggests that the number of fruits per tree is influenced by other factors and that is why varied responses were recorded during the study. Number of fruits on trees differs. For example, the study by Glynn and Ritz (2002) observed a tree having a maximum of 146 fruits and the tree with minimum number of fruits was seven. The difference number of fruits per tree may be due to variation in fruiting period, tree age or size, canopy cover, microhabitat conditions, pests and diseases. They have also recorded mean weight of fresh fruits was higher on the farmland where trees stand isolated and exposed to greater degrees of sunlight than inside the forests where the fruits size are much smaller (Mohamed and Mlowe 2002); (Cordeiro unpublished). This suggests that even the number of seeds per fruit differs depending whether the tree is found in the forest or farmland. Fruits of *Allanblackia stuhlmannii* can weigh up to 7 kg and contain over 60% extractable fat (Newmark 2002).

Animals that depend on this tree for food

Allanblackia tree is also an important part of the forest ecosystem, many animals feed on the fallen fruits, such as blue monkeys (depredate flowers), bushbabies, giant pouched rats, squirrels (eat the seeds of this tree), rodents and bush pig (Novella project 2003). It is important that collection of seeds does not negatively impact on these animals or on regeneration of Allanblackia. The primary dispersal agent is the giant rat, and in periods of food scarcity, i.e. when other fruit trees are not in fruit, in the absence of sufficient Allanblackia nuts, it is conceivable that the giant rat population could suffer, and that these rats would invade adjacent farmland and become severe pests. Furthermore, lack of sufficient Allanblackia nuts from over harvesting would negatively impact the regeneration of *Allanblackia* tree. The issue is that controlling harvest is essential, perhaps by rotating use of forest sections/parts, with one year in harvest and the other not (per comm. Cordeiro unpublished).

CONCLUSION

The study has revealed various important information on the indigenous knowledge of *Allanblackia* tree. However, a lot still require further investigation before sustainable harvesting can be implemented. A detailed study is required to establish the feeding behaviour of the animals that feed on the *Allanblackia* tree nuts, flowering and fruiting studies need to be undertaken in order to establish whether *Allanblackia stuhlmannii* fruits are produced twice in a year, morphological characteristics of male and female trees especially when young, and the time taken for *Allanblackia stuhlmannii* fruits to reach maturity needs to be monitored. Furthermore, the efficacy of Allanblackia oil and leaves for medicinal purposes must be explored. With this essential research, sustainable use of this tree could be implemented in a more effective way to benefit local communities and still protect the incredible biodiversity of the Eastern Arc.

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APPENDIX I. Questionnaire

QUESTIONNAIRE FOR COMMUNITY ON LOCAL KNOWLEDGE OF ALLANBLACKIA EAST USAMBARA – AUGUST 2004:

Questionnaire No……..
Name of the interviewer……
Date of interview……
Village/Sub village Name…….…….
Ward/Division……

Information about Household

Gender of respondent: Male….. female……Age……
Occupation……
Land tenure or ownership……

Start with question number 3 and 4

1. What trees are commonly raised in nurseries in your village area? And what tree species have you raised yourself?

2. a) How much do seedlings of various species cost? (range)

   b) What kind of nursery equipment is used in tree nursery management?

   c) Do forest expert (Extension Officers) visit your village to provide technical support in tree nursery management?

   d) What kind of support do you need to start your own nursery or improve the one you have?

   d) If you raise Allanblackia tree seedlings how are you going to use them? Selling? farm planting? Selling and farm planting?

   e) Do you know problems of raising indigenous trees such as Allanblackia tree? YES/No if yes what are they?
   f) Do you know for how long Allablackia seedlings are supposed to stay in the nursery before they are transplanted? YES/NO if yes for how long.
   g) Is the Allablackia tree shade or light demander?
   h) Do the Allanblackia tree together with other trees? Yes/No if yes which tree?
   i) Allanblackia nuts are now becoming a commercial crop, are you ready to buy seedling of it and raise in your farm? YES/No if Yes at what price and if

No why…

3. Do you know the Allanblackia tree? YES/NO

4. What common names does it have?

5. Do you have Allanblackia trees in your farm? YES/No If Yes how many … Why have decided to keep these trees? If they cut why?… Are they producing fruits? …….
6. Do you have sufficient land for establishing the Allanblackia as new cash crop? YES/No if yes what is the size of that land? And if no how are going to benefit with this crop?
7. Do you know people who own many trees of Allanblackia in your village? YES/No If yes who are they? Any estimate number of the trees they own?
8. Do you know where we can find clustered trees of Allanblackia (between 5 and 10 or more in this village? YES/NO If yes where and owns that area.
9. Are Allanblackia trees more or less abundant than 10 or 20 years ago?
10. If you cut the Allanblackia tree, does it germinate? YES/No If yes which part does it germinate? Stem?, root? Etc.
11. What uses is Allanblackia used for in your village? Wood, fruit, seeds, leaves etc

12. Do you know of anyone (including yourself) raising or planting seedlings of Allanblackia?

13. Are any special treatments required to get good germination of seed?

14. Can seed be stored for some months and still germinate?

15. Are you aware of anyone planting Allanblackia? If yes? Where do he/she get seedlings from? Wildings/raised seedlings/cuttings

16. Do you know of any way to tell the difference between a male and female tree when they are not flowering?

17. How many times per year do the Allanblackia tree bear fruits? In which season of the year?

18. Do some trees bear fruits each season? YES/No if Not each season, at what bearing interval? Biennial?

19. What is the smallest size tree that you have seen fruit on in terms of height? diameter?

20. Do you have an idea of the earliest age the tree can flower/fruit?

21. How long does it take from flowering to fruit maturity?

22. What time of day do fruits fall?

23. Do you know of any way to tell fruit are ripe when on the tree?

24. What is the use of AB nuts locally?

25. How do you harvest your nuts? How do you separate the nuts from the fruit? How do you process it to get your product?

26. How many fruits a mature tree can bear per season? A range number. How many seeds do the Allanblackia fruit produce (A range)

27. What animals depend on this tree for food?

28. What part of the tree do these animals eat? Seed/fruit/roots/bark?

29. Are these animals a problem to any other crops? If yes, which crops?

30. What are the pests or disease that attack Allanblackia and other trees?

31. Have you noted any problems of Allanblackia trees when planted with other food or cash crops?