Eucalyptus verses indigenous trees: what do tobacco farmers prefer in Northwestern Uganda?

F. Yikii, J.G. Agea and J.R.S. Kaboggoza
Faculty of Forestry & Nature, Makerere University, P.O. Box 7062 Kampala, Uganda

Abstract

Northwestern Uganda, especially Arua district is the leading producer of fire-cured tobacco in Uganda. The curing process has exerted much pressure on the forest and woodland resources in the district. To cope with this pressure, BAT (U) has been promoting eucalyptus growing in the area. This study assessed farmers' attitudes towards planting eucalyptus trees, documented other tree species preferred by them and established sources of the preferred tree seedlings. Data were collected using 66 semi-structured questionnaires. Logistic regression was used to show the relationship between farmers' socio-economic characteristics and their attitudes towards eucalyptus growing while Friedman's rank test was used to show other tree species preferred by tobacco farmers and the reasons for the preferences. Majority (89%) of the farmers planted eucalyptus trees and 71% wanted BAT (U) to continue promoting it. Age and education level positively influenced farmers' attitudes towards growing eucalyptus trees (P<0.1). Most of the indigenous trees preferred by tobacco farmers were multipurpose such as *Ficus* sp., *Markhamia lutea, Senna* sp., *Combretum* sp., *Mangifera indica*, and *Annona muricata*. Most (80%) farmers obtained seedlings of *Eucalyptus* species from BAT (U) while seedlings of other preferred species were mainly bought or raised by farmers themselves. There is a need to promote indigenous tree species that are fast growing and multipurpose alongside eucalyptus trees for tobacco curing, domestic use and for market value.

Key words: *Eucalyptus*, flue curing, *Nicotiana tobacum*

Résumé

Le Nord-Ouest ougandais en particulier le district de Arua est en tête de liste des producteurs de tabac traité par le feu. Le procédé de traitement a exercé beaucoup de pression sur la forêt ainsi que sur les ressources des terres boisées au sein du district. Dans le but de faire face à cette pression, BAT(U) s'est engagé dans la promotion de la plantation d'eucalyptus dans la région. Cette étude a évalué les attitudes des agriculteurs face à l'arbre eucalyptus, documenté d'autres espèces d'arbres préférés par eux et établi des sources de jeunes pousses d'arbres préférés. Les données étaient recueillies à l'aide de soixante-six questionnaires structurés. La régression logistique a été utilisée pour montrer la relation entre les caractéristiques socio-économiques des cultivateurs et leurs attitudes face à la plantation d'eucalyptus alors que le test de rangée de Friedman était utilisé pour montrer les autres espèces d 'arbres préférés par les cultivateurs de tabac ainsi que les raisons de leur préférence. La majorité (89%) de cultivateurs ont planté l'arbre eucalyptus et 71%ont voulu que BAT(U) continue à !a promouvoir. L'age et le niveau d'instruction influençaient positivement les agriculteurs quant à planter labre eucalyptus (P<0,1). La plupart d'arbres indigènes préférés par les cultivateurs présentaient un caractère 'multi usages' tel *Ficus* sp., *Markhamia lutea*, *Senna* sp., *Combretum* sp., *Mangifera indica* et *Annona muricata*. La plupart d'agriculteurs obtenaient les jeunes pousses d'eucalyptus à partir de BAT(U) pendant que les pousses des autres espèces préférées étaient principalement apportées ou développées par les agriculteurs eux-mêmes. Il existe un besoin de développer des espèces d'arbres indigènes qui sont de croissance rapide et à caractère 'multi usages', à coté de l'eucalyptus pour le traitement du tabac, usage domestique et valeur de marché.

Mots clés: *Eucalyptus*, flue curing, *Nicotiana tobacum*

Introduction

Tobacco (*Nicotiana tabacum* L.) is one of the major cash crops grown in Uganda. It is largely produced in Arua district and cured by use of firewood. This curing process has exerted much pressure on the forest and woodland resources in the district (Raemaekers, 2001). With the number of tobacco growers increasing, deforestation has become an important environmental problem in the district (ADSOER, 2000). The high demand for fuelwood that currently outweighs its supply in the district is indicative of this effect. Besides tree cutting for curing tobacco, forests and woodlands are also cleared to increase the acreage under tobacco production. Tobacco, being a light-demanding crop, tends to grow best in newly cleared field (ADSOER, 2000). Therefore, it is clear that if this trend of deforestation continues, the whole forest and woodland biomass in the district could disappear in the near future. To cope with this pressure, British American Tobacco Uganda Limited has over the past years, been promoting *Eucalyptus* growing by tobacco farmers. This study was conducted to (1) determine farmers' attitudes towards planting eucalyptus trees (2) document other trees species preferred by tobacco farmers and (3) establish the sources of tree seedlings preferred by tobacco farmers.

Methods

This study was undertaken in Arua district located in northwestern Uganda between latitudes of 2° 30′ N and 3° 50′ N and longitudes of 30° 30′ E and 31° 30′ E (ADSOER, 2000). The average maximum and minimum temperatures are 31.3 °C and 19.5 °C, respectively (www.tutiempo.net) while the average annual rainfall is 1,250 mm. The district is largely covered with mixed woody savanna which, due to the highly prevailing subsistence farming, has been greatly reduced. The food crops grown include beans *(Phaseolus vulgaris)*, simsim *(Sesame* sp.), sweet potatoes *(Ipomea batatus)*, cassava *(Manihot esculentum)*, millet *(Eleusine indicum)*, maize *(Zea mays)*, sorghum *(Sorghum bicolor),* groundnuts *(Arachis hypogea)* and rice *(Oryza sativa)*. The cash crops grown are tobacco, cotton and coffee. Like cash crops, food crops are also grown for money. However, the agricultural yields of these crops are generally low. The main cash crop is tobacco which is widely cultivated throughout the district.

Three sub-counties of Yivu, Oleba and Nyadri were purposively selected for study according to the intensity of tobacco cultivation. Sixty-six pre-tested semi-structured questionnaires were administered in data collection on the socio-economic and demographic profiles of the farmers, their attitudes towards *Eucalyptus* growing, preferences for and sources of seedlings of other trees planted. Each respondent was asked to indicate five species in order of preference. The highest priority species was assigned five points and the lowest preferred species assigned one point. The points for each species were summed across all respondents. Ethnographic face-to-face interviews were held with farmers' representatives in BAT (U). This provided insights into how BAT (U) administers the *Eucalyptus* tree-planting programme for tobacco curing. The interview also helped to crosscheck farmers' responses to some issues of administrative nature. Observations on other trees planted by farmers were also conducted.

The Statistical Package for Social Scientists (SPSS) was used to analyse the data. Logistic regression analysis (Green, 1995) was used to show the influence of socio-economic characteristics on farmers' attitudes towards *Eucalyptus* growing. The Friedmans' test (a non-parametric test) was used to rank other tree species preferred by farmers according to their uses.

Results

Demographic and socio-economic characteristics of respondents. The demographic and socio-economic characteristics of respondents are presented in Table 1. Few women owned tobacco farms due to land and other customary laws and practices. Thus, all our respondents were male. However, these males were always helped by their women folk on the family tobacco farms. Fifty six percent of the respondents were more than 30 years old. Most of the respondents, were peasant farmers (73%), married (71%), with secondary level (47%) of education and of the protestant faith (45%). Majority (67%) of the respondents lived close (<4 km) to the

Table 1: Demographic and socio-economic characteristics of the respondents (N = 66).

Variables	%
Sex	
Male	100
Female	0
Age	
<30	44
30-45	41
>45	15
Religion	
Catholic	38
Protestant	45
Muslim	17
Other	3
Education background	
Primary	38
Secondary	47
Tertiary	12
Marital status	
Single	29
Married	71
Current occupation	
Peasant farmer	73
Trader	3
Formal sector employment	14
Distance from tobacco centres (km)	
<4	67
4-8	30
>8	3
Land ownership	
Own land	96
Do not own land	4
Land size (Ha)	
<2	62
>2	58

tobacco centres. About 96% owned land although the majority (58%) had smaller pieces of land less than 2 ha.

Attitudes towards *Eucalyptus growing*. Eighty nine percent of the farmers planted eucalyptus trees and 71% said BAT (U) should continue to promote the growing of *Eucalyptus*. This response was indicative of their positive attitudes towards growing of *Eucalyptus* trees for use in curing tobacco. Cross tabulation (Table 2) indicated that 76% of the farmers who planted *Eucalyptus* trees had a positive attitude in favour of cultivating the trees. Over 29% of the respondents who did not plant *Eucalyptus* trees had positive attitudes towards cultivation of *Eucalyptus*, however 71% of them had negative attitudes.

Table 2: Cross-tabulation of opinions of actual engagement in eucalyptus growing against promotion by BAT (U).

Variables	Respondents	
Should BAT (U) continue to promote eucalyptus growing?	Yes (%)	No (%)
Yes (%)	76	29
No (%)	24	71

(N=66).

Use of *Eucalyptus* trees. Eighty two percent of the farmers said they like growing *Eucalyptus* trees as a source of wood mainly for curing tobacco. Some, however, valued *Eucalyptus* for income generation, especially from sale of firewood and constrution of poles (Table 3). There was a tendency of having positive attitudes towards *Eucalyptus* as the age of the respondent increased (Table 4). The educated farmers concurred with the view that BAT (U) should continue to promote growing of *Eucalyptus* species. The marginal change of 4.023 of attitudes towards

Table 3: Uses of eucalyptus trees to tobacco farmers (N=66).

Uses of *Eucalyptus*	%
Fuelwood for curing tobacco	82
Fuelwood, poles and timber for sale	32
Fuelwood for cooking	15
Others (environment protection, windbreak, shade)	11

Table 4: Logistic regression of demographic/socio-economic factors that influence farmers' attitudes towards eucalyptus growing.

Variable	Coefficient (B)	S.E. ±	P-value	Odd ratio Exp (B)
Age	0.825	0.469	0.049	2.282
Education	1.392	0.688	0.043	4.023
Occupation	-5.361	3.242	0.098	0.005
Land ownership	-8.475	4.787	0.077	0.000
Land size	-0.623	0.567	0.272	0.536
Time period of being tobacco grower	-0.951	0.504	0.059	0.386
Seedling sources	3.901	2.059	0.058	49.44

Eucalyptus cultivation as a result of the education level of respondents implies that educated farmers are 40.23% more likely to accept promotion of *Eucalyptus* as a major source of fuelwood than illiterate farmers.

Other trees species preferred by tobacco farmers. The tree species that tobacco farmers preferred to plant apart from *Eucalyptus* comprised both indigenous and exotic species and most of them were multipurpose. Some farmers preferred only exotic species while others included at least one indigenous tree among the species of their choice (Table 5). The most preferred species were *Azadarachta indica*, *Mangifera indica* and *Persia americana*. The least preferred species were *Combretum collinum*, *Albizia coriaria*, *Kigelia africana* and *Jacaranda* species(Table 5).

Table 5: Other multi purpose tree species preferred by farmers besides *Eucalyptus*.

Tree species in order of importance	Fuel wood	Fruits/ food	Medicine	Income	Fodder	Shade/ ornamental	Soil fertility	Wind break	Poles	Timber	Charcoal	Mean score	Rank
Azadirachta indica	1.95	0	29.99	13	0	4.94	4.94	7.02	1.95	2.99	0	19.11	1
Mangifera indica	30.02	142.12	0	52.06	0	31.16	0	26.98	0	0	0	19.07	2
Persea americana	17.15	115.15	0	82.95	0	26.95	0	17.85	0	0	0	18.71	3
Terminalia mantaly	4	0	0	1	0	25	0	2	0	5	5	18.54	4
Citrus sp.	9.9	81	0	44.1	0	23.1	0	18	0	0	0	18.36	5
Khaya sp.	4	0	0	4	0	10	2	0	0	19.04	4	17.89	6
Annona muricata	4.06	33.04	0	14	0	8.96	0	4.06	0	0	0	17.21	7
Cupressus sp.	1.98	0	0	5.04	0	5.04	0	1.98	1.98	18.99	0	17.14	8
Artocarpus heterophyllus	4.95	30.03	0	20.02	0	3.96	0	8.03	0	0	0	17.00	9
Moringa oleifera	3.06	0	46.98	30.06	0	5.04	0	5.04	0	0	0	16.96	10
Ficus sp.	21	4.02	0	0	4.02	4.02	0	3	0	0	0	16.86	11
Cassia sp.	8	0	0	0	0	3	0	0	5	0	0	15.89	12
Melia azedarach	7	0	0	0	0	0	0	0	4	0	0	14.11	13
Markhamia lutea	6	0	0	0	0	0	5	0	0	0	0	14.11	13
Combretum molle	2	0	0	0	0	4	0	0	0	0	4	14.04	14
Leucaena leucocephala	2.01	0	0	0	0	0	2.01	0	0	0	0	13.32	15
Jacaranda sp.	2	0	0	0	0	2	0	0	0	0	0	12.75	16
Kigelia africana	3	0	0	0	0	0	0	0	0	0	0	12.43	17
Albizzia coriaria	1	0	0	0	0	0	0	0	0	0	0	11.96	18
Combretum collinum	1	0	0	0	0	0	0	0	0	0	0	11.96	19

A lower rank such as 1 depicts a higher preference and a higher rank such as 19 depicts a lower preference.

Sources of tree seedlings preferred by tobacco farmers. The majority (80 %) of farmers obtained, seedlings especially *Eucalyptus,* from BAT (U) on loan, for which they pay after selling their tobacco. Some farmers raised their own tree seedlings or buy from other sources like the National Forestry Authority (NFA), private commercial nurseries while some said they depend on wildlings (Table 6).

Table 6: Sources of tree seedlings preferred by tobacco farmers (N=66).

Source of seedlings	%
Loaned/buy eucalyptus seedlings from BAT (U)	80
Raise own seedlings	48
Buy from other sources like NFA, private commercial nurseries	48
Collect the wildings	21

Discussion

Eucalyptus trees have received much controversy in the regions in which their cultivation has been introduced due to unjustified fears of soil degradation thus dissuading farmers from their cultivation. In Arua, however, most tobacco farmers said that *Eucalyptus* seedlings

compared to those of other indigenous tree species, grew rapidly into trees through a wide range of elevations and soils, sustainably producing fuelwood and also timber suitable for many local needs including construction, firewood for tobacco curing, cooking and others. Despite the rocky soils, *Eucalyptus* trees grow rapidly and spread fast. Each tree, when harvested, coppices into two or more trees. The other reason for the preference of*Eucalyptus* species. Th trees, among others, is the market provided by the industrial, building and commercial sectors. *Eucalyptus* cultivation has, in otherwords, opened a way for farmers to make profits from marginal lands such as rocky places.

A small section of the farmers were interviewed. However, they had strong feelings that *Eucalyptus* trees did not lend themselves well to sustainable land management systems. They complained that *Eucalyptus* trees inhibited the growth of other vegetation. Not only did they blanket the ground with their leaves, deterring the growth of other trees and crops, but also their roots are extremely "greedy" leading to soil degradation. These findings compare well with those of Evans (1990) who reported that farmers in areas with poorer soils and lower altitudes in Kenya (where fuelwood stocks are being rapidly depleted) were reluctant to grow *Eucalyptus* trees. The Kenyan farmers regarded *Eucalyptus* trees a threat to other agricultural crops. The same hesitation has curtailed the planting of *Eucalypts* in Tanzania, in spite of the high demand for it (Guggenberger *et al.*, 1989).

Most of these arguments against *Eucalyptus* trees are not backed by scientific evidence. However, there is rapid adoption of other tree species not only for firewood, but also for fruits and ornamental purposes. These other trees also encourage the growth of crops and vegetables around them. This is evidenced by many farmers' preferemce for raising their own seedlings of indigenous and/or exotic multipurpose trees or collecting them as wildings. The controversy regarding cultivation of *Eucalyptus* trees, coupled with unwarranted publicity, has thus rendered this plant an object of debate. Well meaning individuals (Reddy, 1985), have of late started to voice their concern on the subject. Their arguement is that *Eucalyptus* has undesirable effects on the environment.

Conclusion and recommendations

The majority of tobacco farmers in Arua district preferred to grow *Eucalyptus* trees for curing tobacco and for other purposes. Indeed many wanted BAT (U), who supplied the seedlings, to continue promoting it. Age and education level positively influenced farmers' attitudes towards growing *Eucalyptus* trees. However, a voicerous few (30%) expressed opinions against *Eucalyptus* trees. These preferred multipurpose indegenous trees such as Ficus sp., *Markhamia lutea*, Cassia sp., Combretum sp., *Mangifera indica*, and *Annona muricata*. These mainly bought seedlings or raised their own.

The debate on the positive and the negative ecological aspects of *Eucalyptus* trees, its general advantages and disadvantages should be made known widely to farmers. Indigenous tree species, which are preferred by some farmers for their multiple uses, should also be promoted alongside *Eucalyptus* trees. Further research needs to be carried out to assess the effects of *Eucalyptus* trees on agricultural crops with regard to competition for water and nutrients, and the overall effect of planting of *Eucalyptus* trees on the livelihoods of tobacco farmers.

Acknowledgements

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