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Indigenous methods of controlling termites in agroforestry systems in Uganda

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Abstract

Termites are one of the major agroforestry pests in the tropics causing substantial economic losses. Losses ranging from 50% to 100% have been reported. Control of termites has largely relied on insecticides. There are however serious limitations to these pesticides in terms of cost, pollution and destruction of non targets. Due to the expenses involved, farmers are using various indigenous based methods to manage the pests. A survey was therefore carried out in selected districts of Uganda to identify, document and eventually evaluate the methods. Several control practices used by farmers in agroforestry system were reported and documented. The practices included use of wood ash, cow urine, red pepper, intercropping with repellant plants such as *Tephrosia vogelli,* physical removal of queen, pouring hot crude waragi distillate into anthills, and directing water run off into ant hills

Key words: Agroforestry, Indigenous Knowledge, and termites.

Introduction

The current demand for both forestry and non-forestry products is quite enormous. This demand has put a lot of pressure on the forests and their biodiversity, leading to serious environmental degradation. Problems such as loss of biodiversity, and insufficient supply of tree products are evident in many places of the country (National Environment Management Authority (NEMA), 1989). Agroforestry has been identified as one of the key approaches for increasing both food production and reducing the degradation of natural resources.

A number of agroforestry technologies have over the years been developed, recommended and adopted. Most of these technologies are however exotic trees species, which are unfortunately quite susceptible to pests and diseases. Termites have long been recognised as pests of agricultural, forestry and domestic importance (Logan *et al*, 1990).
They are one of the major agroforestry pests in the tropics causing substantial economic losses both in nurseries and in the field (Wardell 1987). There are indications that termites are a major problem in agroforestry systems in Uganda. Losses of crop and tree stands ranging from 50% to 100% attributed to termite attack have been reported (Ssekamatte, 2001).

Control of termites has largely relied on broad spectrum and persistent organochlorines (Logan *et al.*, 1990). These can however be quite expensive for the ordinary farmer besides their increasing legal restrictions. Because of the importance that farmers attach to termite damage, they are using a number of Indigenous Knowledge (IK) methods to manage the termites. Most of these methods however, are not well documented. A survey was therefore initiated countrywide to identify and document the different Indigenous Knowledge (IK) methods being used by farmers to control termites with the aim of evaluating potential ones.

Material and Methods

A survey was conducted in selected districts in Uganda between March 2002 and March 2003 to document IK methods of controlling termites. Districts selected were those known to have high termite infestation levels. These included Mbarara, Masaka, Luwero, Nakasongola, Iganga, Mayuge, Tororo, Soroti, Katakwi and Kumi.

From each district twenty households practicing agroforestry were identified with the assistance of the District Forestry and Agricultural officers or Forestry Research Institute (FORRI) field staff and interviewed. Both the household head and his wife were interviewed using a structured questionnaire.The structured questionnaire was intended to capture important data such as:

1. Major agroforestry tree species planted
2. Major pest problems
3. Indigenous knowledge control methods.
4. Application procedure of the IK methods by farmers

Results and discussions

Major agroforestry tree species

Table 1 shows the agroforestry tree species that were found planted by respondents in the different districts.
The most planted tree species is *Grevillea robusta*, reported 22% of the respondents. The tree species is a favourite probably because of its fast growth and multi purpose use such as firewood, poles and timber.The second most favoured agroforestry tree species is *Makhamia lutea* reported by 9.0% of the respondents. The species reportedly shows some resistance to termites but is not as fast growing as *Grevillea* and *Eucalyptu*s

Table 1: Agroforestry tree species found planted by respondents in selected districts of Uganda

Agroforestry tree species	% of respondents planting the species
Grevillea robusta	22
Casuarina junghuhniana	5.2
Mangifera indica	7.8
Senna spectabilis	2.6
Cashew nut	0.9
Artocarpus hterophyllus	7.8
Ficus natalensis	6
Albizia cinensis	5.2
Makhamia lutea	9.6
Persea Americana	6.1
Calliandra calothyrsus	2.6
Leaucaena leucocaphala	2.6
Psidium guajava	2.6
Citrus sinensis	6.6
Cupressus lustanica	1.7
Melea azediracta	3.5
Azediracta indica	0.9
Moringa oleifera	0.9
Citrus lemon	0.9
Sesbania sesban	0.9
Maesopsis eminii	2.6
Pinus patula	1.9

Table 2 . Agroforestry tree species prone to termite damage

Agroforestry tree species	% of respondents who reporting damage by termites
Grevillea robusta	80
Casuarina junghuniana	6.7
Artocarpus hterophylla	3.3
Makhamia lutea	3.3
Mangifera indica	3.3
Calliandra calothyrsus	3.3

Not all the trees listed in Table 1 were reported to be attacked and damaged by termites. Only a few were reported to be frequently damaged by termites (Table 2).

Eighty percent 80% of the respondents reported *Grevillea robusta* to be the most susceptible to termite attack. This is in conformity with other observations. (Okorio 2004 un published) observeed that the proneness of *G.robusta* to termite damage has hampered its adoption in the drier parts of the country.

Other pest problems

Although 80% of the respondents reported termites as the major insect pest attacking and damaging their agroforestry trees, some farmers reported other pest problems. Nine percent 9% of the farmers said mole rats were a problem as they damage young tree seedlings and agricultural crops such as millet. Of all the respondents, 4.5% reported aphids damage oranges crops while 2.7% said it was *Leucaena psyllid,* which was a problem as it damaged *Leucaena lucocephela.*

From Table, 26% of the respondents reported using physical removal of the queen to control the pests. This was the most commonly used method. However, farmers complained that after sometime, the termites started causing damage again. This was probably because one of the supplementaries which in the absence of the queen, produces chemicals that suppress other termites them from developing into a queen or king eventually developed into a new queen and took over the role of reproduction, hence the renewed continued damage.

About 10% of the farmers interviewed used a mixture of cow urine, ash and red pepper. The exact quantities of the different mixtures differed among farmers but most of them mixed $^{3}/_{4}$ kg of red pepper with 1kg of wood ash in 20 litres of cow urine.

Some farmers used wood ash alone (11%) others used red pepper mixed in water (4%) and others used cow urine alone (2.7%). These concoctions were reportedly effective probably because they have some organic chemicals in them. About 7% of the farmers interplanted susceptible agroforestry tree spp with *Tephrosia vogelli* while 8.2%interplanted with *Melea azediracta*. These plants probably have insecticidal or repellant effects on the termites.

Other methods cited seemed to cause physical damage to the termites.These include directing water run off into anthills (5.5%), and pouring hot crude waragi distillate in anthills (2.7%). Some respondents (5.5%) indicated that they were managing termites by biological control using a black ant. This was particularly the case in Mbarara. The ants are released into the termite nests and the latter disappear. The ants are probably predatory and evade the soldier termites to reach and kill the queen.

Most of these methods are reportedly effective but have not been evaluated to ascertain their efficacy. Methods such as use of cow urine, ash, redd pepper and their mixtures are quite potential and affordable and could save millions of dollars used on importation of chemicals. Interplanting termite susceptible crops with repellant tree species such as *Melea azediracta* would serve a dual purpose of protecting the crops and providing wood products e.g *M.azediracta* to the former of interest is the biological control method being used in Mbarara using a predatory ant. If proved effective biological control would be a very useful method against the problematic termites.It might therefore be important to look into the host specificity of the predatory ant its host searching ability, synchronization of life cycle and its reproductive potential.

Table 3. Indigenous knowledge methods used by tree growers to control termites

Method	% of respondents using the method
Ash (1kg) mixed with cow urine (20litres) and pepper ($^3/_4$kg)	9.6
Intercropping with Tephrosia vogelli/pouring pounded Tephrosia mixed with water into anthills	6.8
Intercropping with Melea azediracta/pouring Melea leaves mixed with water into anthills	8.2
Biological control using black ant	5.5
Physical removal of queen	26
Directing water run off into anthill	5.5
Use of wood ash	11
Red pepper mixed with water	4
Pounded tobacco + water + cow urine + pepper	1.4
Cow urine	2.7
Smearing used oil on tree bases	4
Ash + cassia leaves/seed + water	7
Urine + Tithonia + red pepper	1.4
Tithonia leaves spread as mulch	1.4
Use of farm yard manure	1.4
Pouring hot crude waragi distillate in anthills	2.7
Pouring hot water into anthills	1.4

Conclusion

The importance of termite problem in agroforestry systems can not be overemphasized. Besides, their negative effects, chemicals are too expensive for the ordinary resource poor farmer. The non-chemical methods being practiced by the farmers are affordable and could go along way in assisting farmers to manage termites. It is therefore important that potential methods such as use of cow urine, ash, red pepper, use of repellant plants and biological control using a predatory ant are evaluated for efficacy and where possible improvement made on them to make them more effective.

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