

Using *Tithonia* concoctions for ter

As part of the Kenya Woodfuel and Agroforestry Programme (KWAP) farmers in Western Kenya are taking part in an on-farm experiment in pest control. In keeping with the participatory approach, farmers identified the major insect pests in their area. A number of local, wild shrubs were selected and used to prepare insecticides. *Tithonia* turned out to be a very effective multi-purpose shrub.

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Busia is a district in Western Kenya that lies close to the Ugandan border. Altitudes in the region vary from 1128 to 1500 metres above sea level. The district falls within the Lake Victoria Basin and receives a mean annual rainfall of between 600 and 2030 mm. Mean annual maximum temperatures range from 26° C to 37° C and mean annual minimum temperatures fall between 14° C and 22° C. Evapotranspiration rates range from 1800 mm to 2200 mm. Busia covers some 1776 km² and 137 km² of this is permanent water. Crop cultivation, animal husbandry and fishing are the main economic activities.

KWAP has been active in Busia since 1984. It uses Participatory Rural Appraisal techniques (PRA) to analyse the factors that constrain tree growing in the district. Farmers have identified the scarcity of firewood, a lack of building materials and fodder trees, the absence of fruit trees, shallow soils, and the heavy incidence of such pests as termites, moles, monkeys, weevils, stalk borers, ticks, liver-fluke and worms as major problems. Pests threaten food supply at the household level, and the main cereal crops of this drought-prone area - maize, sorghum and finger millet - are especially vulnerable. Termites are particularly destructive and attack planted trees as well as dried materials being used in building. Chemical pesticides are not used very much in Busia because they are too expensive for most smallholders and are not thought to be very effective.

Since 1986, KWAP has been actively developing an operational approach designed to help farmers in Western Kenya achieve more effective farming practices. Small-scale, on-farm experiments have been part of this initiative. Working together with research institutes and government extensionists, farmers have adapted and modified technologies in an attempt to find concrete solutions to their farming problems.

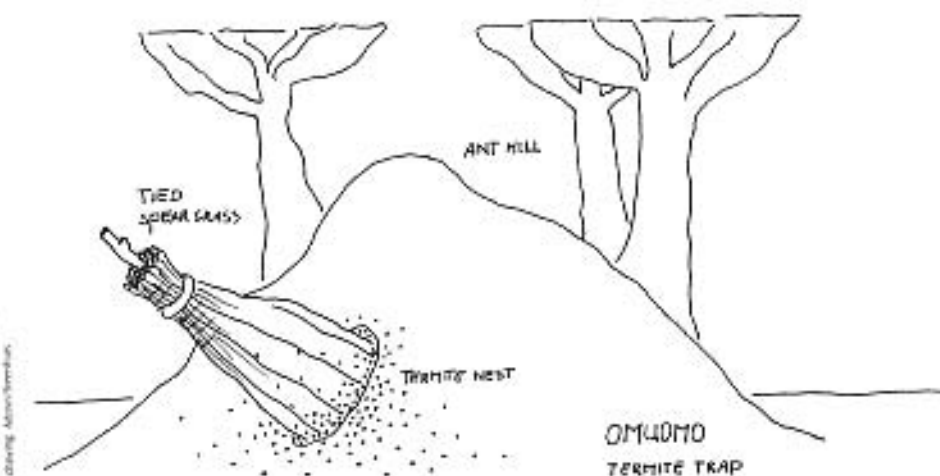
Busia's wonder shrubs

A number of remarkable shrubs can be found along the roadsides of Western Kenya. In Busia, the botanical pesticide potential of these shrubs had not yet been fully recognised by development workers. Local shrubs that may provide a solution to the widespread problem of termite infestation include *Tithonia diversifolia* which has proved useful in improving soil fertility (see ILEIA Newsletter 13.3). *Tithonia* decomposes fast, releases plant nutrients readily, and is particularly rich in phosphorus.

During on-farm bio-mass transfer trials, it was noted that plots treated with *Tithonia diversifolia* or with a mixture of *Tithonia* and *Melia azedarach* hardly suffered from termite attack, irrespective of the stage of crop development. This motivated many farmers to experiment with *Tithonia* and to combine it with other herbs and shrubs in an attempt to control termites on their farms. This article draws on the farm

been experimenting with various technologies in order to increase his production. In his farm records he notes how he experimented with a solution of *Tithonia* and *Cassia* spp. in an attempt to control termites and increase his production.

"I mixed the leaves of two kilograms of *Tithonia diversifolia* with two kilograms of *Cassia spectabilis* and *Cassia siamea*. I left it for three days before I stirred it. After 15 days, on 23 October 1994, it was ready for use. I applied the solution to my trees. It stopped the termites for two weeks. I filled a 100 gram tin with the mixture and used this to treat each tree. I forgot to mention that I used 16 litres of water to make the solution. I prepared another batch of the solution the same day using the same amount of leaves and water. This was ready for use on 17 December. I used the same 100 gram tin but this time added a half measure extra. I sprinkled this mixture on my trees and it kept the termites away



records kept by one of the farmers who took part in these trials.

Experiments in termite control

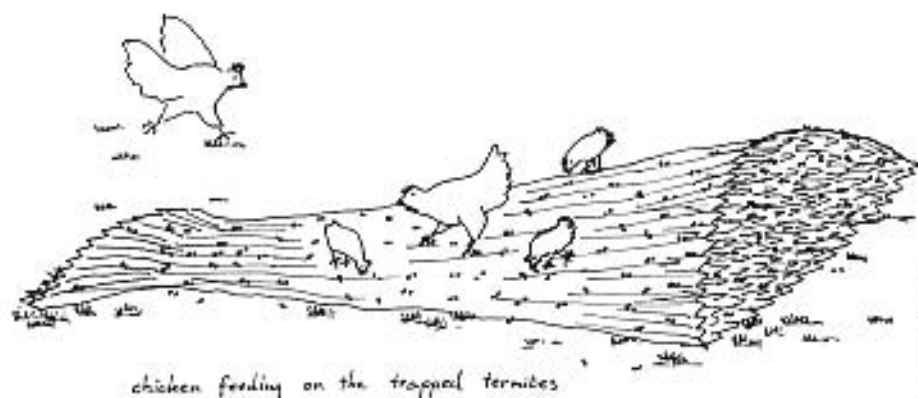
Mr Egesa took part in the experiments designed to test the effectiveness of various termite control substances. He lives on a 7-acre farm which he shares with his three brothers. Egesa has one wife and their marriage has been blessed with five children. Farm activities include dairy farming under zero grazing and Egesa has one animal and one heifer. He cultivates fodder crops, napier grass and calliandra trees, and observes soil and water conservation measures. The family's horticultural crops consist mainly of tomatoes and pigeon peas which are grown on two acres of land. Maize, beans and cassava are the main subsistence crops. To earn extra income, Egesa has taken up selling tree seed to his neighbours, and often travels from market to market in search of customers. He has

Figure 1: Trapping termites

for about 18 days. The mixture has a bad smell. You really have to be devoted to your work to use it! In the meantime I prepared another 'tea'. This time I sprinkled twice as much solution on my trees as I had done the very first time. I am still waiting for the results".

Egesa also reports experimenting with a mixture of *tithonia* and *cassia* spp ash. Here he had less success. "On 10 January 1994 I picked 6.5 kilograms of *Tithonia diversifolia* and six kilograms of *Cassia spectabilis* and *Cassia siamea*. After I had dried them I was left with 8.5 kilograms of dry matter. I burned this and applied the ash to the trees using a 100 gram container as a measure. I applied 100 grams of ash to each tree. After five days I found the termites were already destroying my trees".

mite control in Busia District, Kenya



chicken feeding on the trapped termites

A third experiment was considerably more successful. On 24 November 1994 Egesa prepared a solution from these ashes rather than applying the ash directly. The solution controlled the termite attack for about a month. A week later he reported that he had made yet another solution, using 8.5 kilograms of dried leaves. This time, however, he made it stronger.

"I added 14 litres of water to the leaves in my third experiment so the solution would be stronger. On 12 December it was ready for use. Because it was stronger it controlled the termites for 40 days, and between 16 December and 24 January I had no problem with these pests. On 24 January I made another solution using the same amount of leaves and water. I wanted to repeat the experiment because last time it had worked well. The new solution was ready on 8 February 1995. I poured it around my trees and it helped control the termites for 45 days.

Next, Egesa prepared a treatment using 2 kilograms of *Tithonia diversifolia* leaves and a mixture of two kilograms of *Cassia spectabilis* and *Cassia siamea*. This time he used ten litres of water and was curious to find out how strong the result would be. When it was ready he poured it around his trees. It worked for 20 days. He assumed that this was because much of the solution was washed away by the rains.

Two farmers were involved in the *Tithonia diversifolia*, *Cassia siamea* and *Cassia spectabilis* experiments. Other farmers carried out similar experiments using a mixture of *Tithonia diversifolia* and *Agave sisalana*. There were also farmers who used pepper mixed with the sisal leaves and leaves of *Vernonia amygdalina* and tobacco. After boiling this mixture for about 30 minutes they sprayed it on fruit trees in particular. These solutions and the ash mixture were applied to crops as well as trees. Some farmers poured the solution directly into the termite nest in an attempt

Figure 2: Excellent chicken food

to kill these pests. As farmer Isako Ramondo explained, organic concoctions were quite effective in destroying termite mounds.

"I had eight ant hills on my farm and the underground termites destroyed my crops and trees. I pounded together 4 kilograms of fresh *Tithonia diversifolia* leaves and 4 kilograms of fresh *Melita azedetrach* leaves. I immersed this mixture in 20 litres of water and left it to ferment for four days. I then poured the fermented mixture into the opening of each of the eight termite nests. The solution was very effective and controlled most types of underground termites. The good thing is that this mixture is cheap. I do not have to repeat the treatment until new termites move onto my farm. When they do they'll get the same treatment. However, this method only works on underground termites".

Trapping termites

The termite trap, or *Omtomo* as it is called in the Luhya language, is made from spear grass. A bundle of grass is tied at one end and left open at the other. A peg is pushed into the bundle and is anchored to a hole dug in the termite mound. The fresh grass attracts the termites and they come out to feed on it. Once the termites have completely infested the grass, the bundle is carefully pulled out (see Figure 1). The termites are then fed to poultry and to quails, which are a local delicacy (Figure 2). This technique helps reduce the termite population to some extent.

Farmers were involved in a variety of trials. In this way, results could be compared and it was possible to see which technique was the most effective. This created a sense of ownership, farmers felt the research process was theirs and it had a

favourable effect on participation. After two years of research, all the on-farm trials were analysed. The farmers were closely involved in this process. When the data had been compiled, it was found that the solution made from *Tithonia/Vernonia* and sisal leaves had an advantage over the other solutions. In addition to controlling termites, it contributed to soil fertility. Crops and trees sprinkled with this solution were healthier and grew faster.

Farmers also concluded that the pepper/sisal/*Vernonia*/tobacco solution could be used very effectively to remove scales from fruit trees. Scales could easily be brushed off after trees had been sprayed with this solution.

After the results had been analysed, farmer-managed field days were organised to explain the research findings to other farmers in the area. Now many farmers are using either the ash or one of the solutions to control termites and other pests. As Jenipher, a farmer from one of the project areas explained, "We use *Tithonia* solution on our fruit trees. It is very effective. The insecticide from the shops is too expensive for us. *Tithonia* has really helped us save our crops and trees". The *Tithonia* solution works well when poured into the termite nest, although it is sometimes difficult to identify nests because some of the termites are migratory and do not build nests.

Apart from its pesticidal qualities, *Tithonia diversifolia* is considered to be a medicinal shrub and people use it to deworm young children. It is used to prevent malaria and to cure fevers and stomach upsets. It is also given as fodder to goats, sheep and cattle in the dry season.

Farmers noted that there were some negative aspects to using *Tithonia*. It has a bitter taste, and after gathering and processing it farmers find it difficult to remove the stains it makes from their hands. Despite these problems farmers were enthusiastic about the shrub because it was so effective. It improves soil fertility, gives an increased yield, and saves farmers from having to spend money on chemical pesticides. It can also keep termite damage to acceptable levels. Using *Tithonia* has made it possible for farmers to increase their food production and tree planting activities, and the survival rate amongst newly planted tree seedlings has increased by sixty percent.

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References

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