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Further Observations on Tingis Beesoni (*Hemiptera: Tingidae*) Incident on Yemane (*Gmelina arborea*)

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Abstract

Attack by *Tingis beesoni* on plantation Yemane *Gmelina arborea* has been found to cause complete defoliation and eventual death of the above ground parts. Investigations on control of the insect through certain silvicultural methods as well as use of insecticides are discussed.

Contents

1. Introduction

Early results obtained in growth trials of *G.arborea* conducted by the Silviculture Division of the Forest Research Institute were very promising, but this species was found to be extremely susceptible to insect attack. Of the two species of insects that were found to seriously damage *G.arborea* trial plantations in Yezin, Moswe and Sein Ye areas, *T.beesoni* was found to cause complete defoliation and eventual death of the above ground parts within 4 to 8 weeks after the initial attack (Zeya, 1981). This paper describes attempts to control the insect from terminally damaging *G.arborea* in plantations by interplanting with other three species, and by using insecticides at various stages of attack by the insect.

2. Materials and Methods

All *G.arborea* trees used in the present series of experiments were obtained from seeds collected at random. The seeds were germinated in nursery seed beds and transplanted and grown in plastic bags 6 in. in length and 3 in. in diameter until seedlings attained a four-leaf stage when they were planted for experiments.

All experiments were carried out at the Forest Research Institute in Yezin situated at about latitude 19°15' N and longitude 95°55' E. The average annual rainfall in Yezin during 1970-1980 period was 57.16 in. (145.20 cm); the highest average monthly rainfall was 12.55 in. (31.88 cm) occurring in August and the lowest was 0.23 in. (0.58 cm) occurring in February. The average monthly temperatures during the same period ranged from a minimum of 89.37° F (32°C) occurring in December to a maximum of 103.96° F (40° C) occurring in May; the soil may be termed sandy.

In trials on control of *T.beesoni* on *G.arborea* by silvicultural means, three sets of experiments were conducted. In the first set of experiments, *G.arborea* was planted with 12 other tree species, in the second with Yinma *(Chukrasis tabularis)* and in the third with Ipil-ipil (*Leucaena leucocephela).*

In control trials using 12 other species, the experimental plots were laid out in randomised blocks of 20 or 25 trees each with three replicate blocks per species (Plate I, Figs 1,2,3). In the other two trials *G.arborea* was interplanted with the respective species in three replicate rows of ten trees each. Weeding was done by hand frequently; all weeds including grass were removed. All experimental trees were examined at two days intervals for *T. beesoni* attack.

In insecticidal control experiments three sets of three replicate rows of ten trees each of *G.arborea* were planted at a spacing of 4 ft. x 4 ft. . A control of three replicate rows of ten trees each was maintained without any treatment for each set of replicates. Dichlorvos, a contact-stomach fumigant insecticide, and Phosphamidon, a systemic insecticide were used for making a stock solution in the following proportion.

Dichlorvos	25 ml.
Phosphamidon	50 ml.
Water 1*	25 ml.
Total	100 ml.

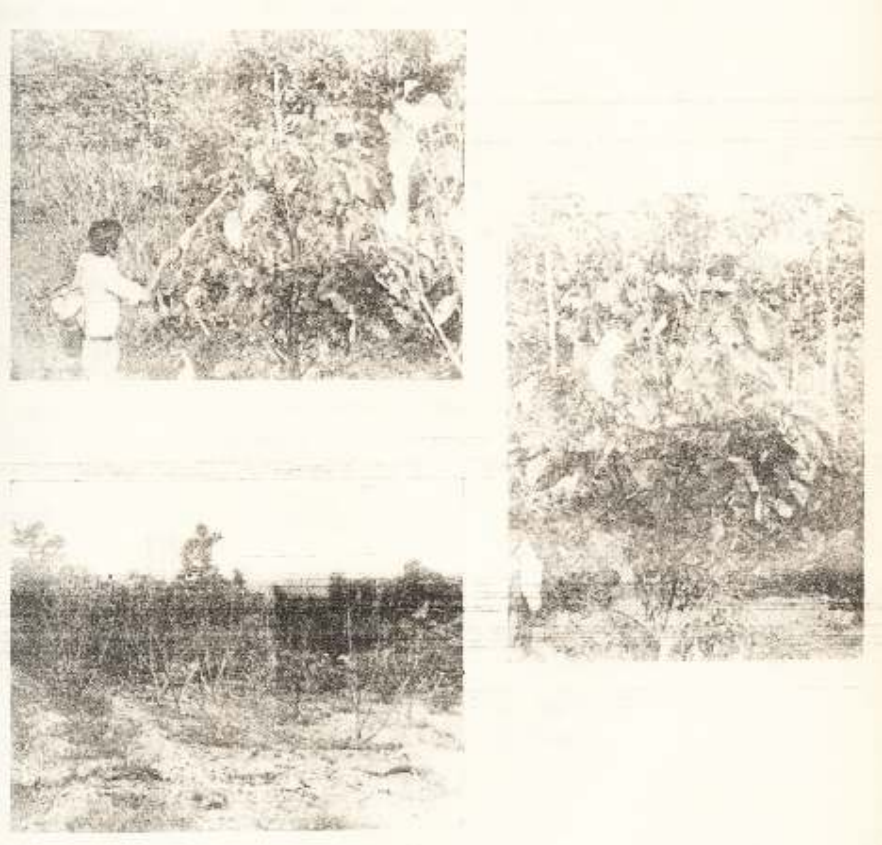
1* Water was added for easy measurement. The mixture is not to be stored.

PLATE 1

Figs 1-3 Growth of *G. arborea* planted with 12 other species of forest trees in triplicate randomized blocks.

Note *G. arborea* plots on left and right background on lowermost figure.

PLATE II



Figs 4-5 Clockwise from top
(4) Spraying *T. beesoni* affected *G. arborea* trees just before complete defoliation.
(5) Same tree 3 days after spraying.
(6) Experimental plot of *G. arborea* completely defoliated by *T. beesoni.*

Working Solution of Insecticide mixture

20-30 ml. of the insecticide mixture in 8.5 liters (approx. 2 gals.) of water with thorough mixing.

Equipment

Ordinary 9 liter (2-gallon) knapsack sprayer.

Method of spraying

All above ground appendages of each tree especially the under surfaces of the leaves were sprayed thoroughly.

Interval and time of spraying

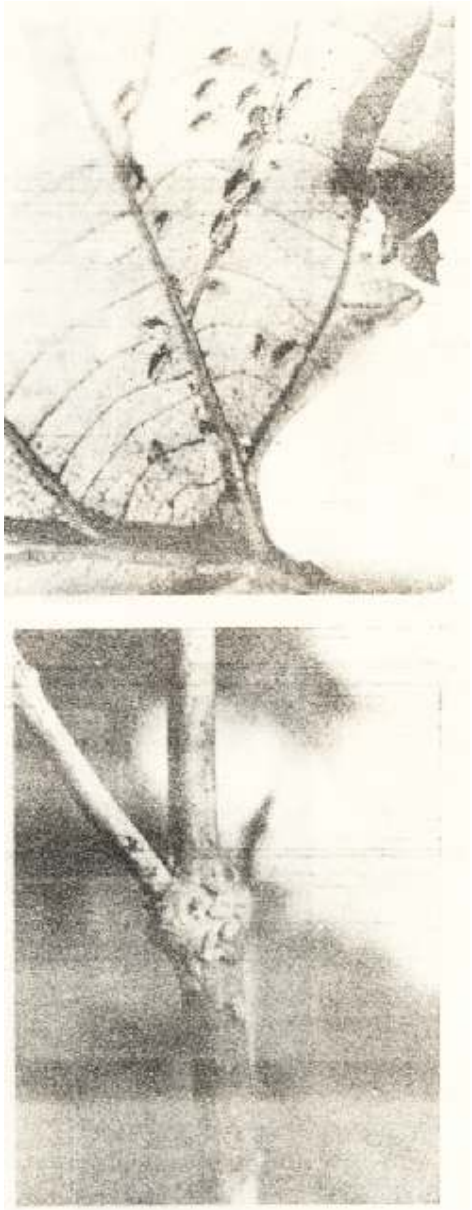
Insecticide was applied to the first set of *G.arborea* trees once every week beginning from first detection of *T.beesoni,* to the second set after defoliation has begun but before complete defoliation had occurred and to the third set just after complete defoliation (Plate 2, Figs, 4,5,6).

3. Results and Discussion

Table 1. Comparison of percent survival of variously treated *G.arborea* trees at the end of one growing season.

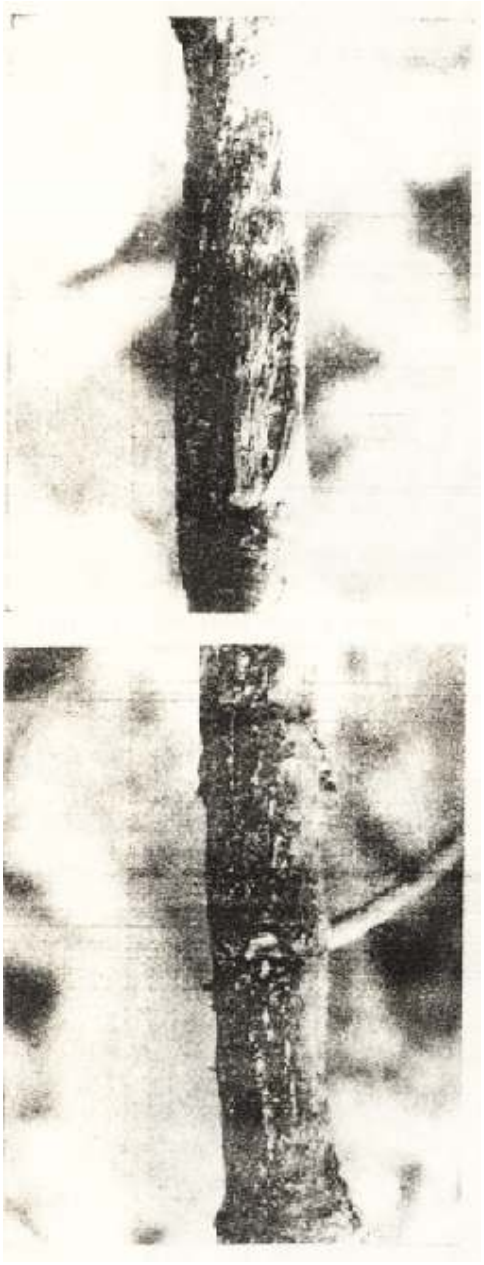
Treatment	Survival %			
	Replicate 1	Replicate 2	Replicate 3	Mean
In mixture with 12 other species of trees	0	0	0	0
Interplanted with Yinma (*Chukrasia tablularis*) at 4' x 4'	0	0	0	0
Interplanted with (*Leucaena leucocephela*) at 4' x 4'	100	100	100	100
Application of insecticide mixture soon after complete defoliation	0	0	0	0
Control	0	0	0	0
Application of insecticide mixture just before complete defoliation	80	100	90	90
Control	0	0	0	0
Application of insecticide mixture at first detection of *T.beesoni*	100	100	100	100
Control	0	0	0	0

PLATE III



Figs 7-8. *G. arborea* leaf and branch under *T. beesoni* attack.

PLATE IV



Figs 9-10. Cracks on *G. arborea* stems caused by *T. beesoni* attack.

PLATE V

Figs 11 Coppices issuing from *G. arborea* tree after complete defoliation by *T. beesoni*

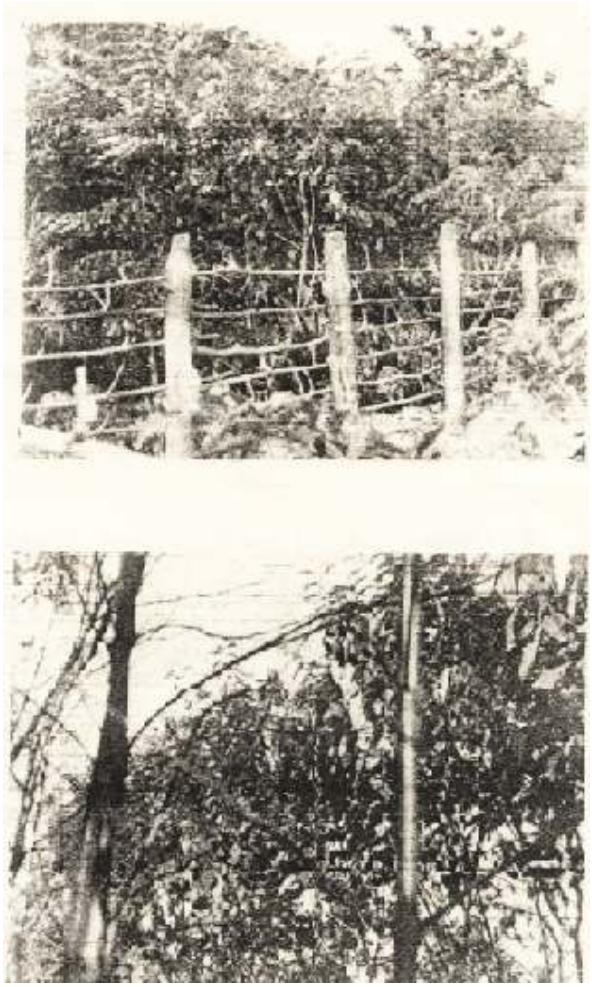
Figs. 12 *G. arborea* tree that never recovered from *T. beesoni* attack

PLATE VI

Fig 13. Coppies from *G. arborea* tree 6 months after complete defoliation by *T. beesoni.*

Fig 14. Dead stem (dark coloured) and coppies (light coloured) of a *G. arborea* tree 6 months after complete defoliation by *T. beesoni*

PLATE VII



Figs 15-16 *G. arborea* closely interplanted with *Leucaena leucocephela* under *T. beesoni* attack (top) and after unassisted recovery (bottom)

Table 1 shows the percent survival of *G.arborea* grown under various treatments. Results appear to indicate that there is a strong possibility of success in controlling *T. beesoni* on *G.arborea* in 1-3 year old plantations through use of insecticides as well as through silvicultural means.

Insecticidal control experiments showed that control of *T. beesoni* can be obtained even after the trees have undergone heavy initial attack, but before complete defoliation has occurred (Table 1; Plate II, Figs 4, 5). However, thorough application of insecticidal to all above ground appendages in addition to the undersurfaces of leaves was necessary for the trees to survive, because although the insect usually begins its attack by sucking the sap through the vascular tissue on under surfaces of the basal parts of the leaves, they were observed to attack all lateral branches and frequently the upper parts of the trunks of three year old planted trees having diameters of 18 in. as insect populations grew and complete defoliation occurred (Plate II, Fig 6 ; Plate III, Figs 7,8). Consequently, trunks and branches of 1-3 year old trees gradually became necrotic when left untreated and cracks soon appeared on them followed by fungal growth (Plate IV, Figs. 9,10). Coppices issued from the based soon after complete defoliation which usually occurred about 4 - 6 weeks after initial insect attack (Plate V, Fig 11; Plate VI, Figs 13,14).

However, heavily infested trees that were not treated rarely recovered from the attack (Plate V, Fig 12).

It may be mentioned here that although application of insecticides to under surfaces of leaves on low trees having 5-10 ft. heights is easily manageable, eliminating insects from under surfaces of leaves and various other appendages of trees that are considerable higher in over tree years old plantations would be difficult, and methods will have to be devised to carry insecticide spray droplets to reach heights of 15-20 ft. *G.arborea* is not known to be susceptible to *T. beesoni* attack beyond fourth year of growth.

In silvicultural control trials attempts to prevent *T. beesoni* from attacking *G.arborea* by close interplantation with Yinma (*Chukrasia tabularis*) was a complete failure (Table 1). But interplanting *G.arborea* with *Leucaena* was successful in preventing *T. beesoni* from causing treminal damage to *G.arborea* (Palte VII, Figs. 15,16). Although an attack by *T. beesoni* was observed in this case during early rains of April, the attack subsided before complete defoliation occurred, and the trees recovered from the attack. The reason for this is unclear, but in the course of the present investigations it was observed that *T. beesoni* tends to jump off its perch at the slightest touch to blend itself to the gray-brown back-ground of the earth and dry leaves. This habit may well explain the reason for the very high survivability rate of *G.arborea* when interplanted closely with *Leucaena* as movement of the dense foliage of the latter in frequent breeze probably brushes the insects off the *G.arborea* leaves almost incessantly making then unsuitable for *T. beesoni* to feed and live on.

However, development of biological and ecological information which from the basis to all studies toward control is still very much necessary.

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