

INFLUENCE OF PLANT STRESS ON TERMITE INFESTATION

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ABSTRACT

Influence of plant stress on termite infestation was studied through the parameters of foliage loss, root damage and water deficiency at two sites. Plants with 3/4 roots cut showed maximum stress and plant mortality, followed by

half root cut and low irrigation frequency. Foliage loss helped in improving vitality of plants by reducing moisture loss through transpiration thereby decreasing plant mortality. Further, almost all dying and dead plants were infested by termites at Kharian while only 30% of dead plants were infested at D.I. Khan showing that termites are not

the cause of mortality of plants.

INTRODUCTION

Eucalypts being fast growing species are presently grown on farmlands as well as in forest plantations on a large scale. Mortality of saplings is always attributed to the termite infestations as the literature review reveals that in most tropical countries where eucalypts have been introduced root feeding termites are known to cause large scale mortality.

Termites have been reported as major pests of forests in India, causing damage to the roots and bark of standing trees by Dhamadhera and Rawat (1978). *Odontotermes gurdaspurensis* Holmgren and Holmgren and *O. obesus* Rambur were found damaging *Eucalyptus* spp. in the arid regions of Western Rajasthan, India. Seedlings were more susceptible to attack than mature trees (Parihar, 1981). *Mastotermes darwiniensis* Froggat has been reported causing more damage to saplings than to mature trees in Australia by Hickin (1971).

Eucalypts are the pre-dominant trees in the reafforestation programmes of Africa and India. Serious losses to these plantations by termites have been reported by Harris (1971), Rajagopal (1982) Thakur and Sen-Sarma (1980). Attack on roots of young trees by a number of non-fungus growing termite species has also been recorded in Africa and India. Midgley and Weerawardane (1986) in Sri Lanka, and Roonwal and Rathore (1984) in India have reported attack by *Nasutitermitinae* and *Trineryitermes biformis* Wasmann, respectively; but the extent of losses is not indicated. Attack by various species in India in particular recording 20-30% mortality of *Eucalyptus citriodora* due to *Microcerotermes minor* Holmgren has been reported by Roonwal (1978). Nair and Verma (1985) have reported termite species attacking roots of eucalypts in India.

Chaudhry and Ahmad (1980) have found Chlordane, Heptachlor, Dieldrin, Agritox, Aldrin and B.H.C. effective when applied in 0.12%, 0.25% and 0.5% dilution, to plant pits before planting at the rate of 1 litre of each dilution per pit soil in polythene bags containing seedlings at the rate of 50 cc of dilution per bag, and soil before filling and sowing of seeds in polythene bags at the rate of 50 cc of dilution per bag. Gul and Chaudhry (1989) have found BHC, Lorsban, sevin, Heptachlor and Malathion most effective in protecting living shisham trees from termite attack when applied in 0.25, 0.5 and 1.0% doses as soil treatment.

The influence on host plant susceptibility to insect attack are reviewed by Speight (1986). The topics dealt with include drought stress, edaphic effects, the basis of resistance and prediction models. Larsson (1989) has hypothesized that plants under abiotic stress become more suitable as food for herbivorous insects.

MATERIAL AND METHOD

Seedlings of *Eucalyptus camaldulensis* of almost equal size and vigour were taken. Since irrigation or watering was a parameter, two separate blocks duly randomized were kept for weekly and biweekly treatments. The treatments were.

- i. Watering weekly
- ii. Watering biweekly
- iii. Seedlings with 1/2 root pruned
- iv. Seedlings with 3/4 roots pruned
- v. Seedlings with 1/2 leaves removed
- vi. Seedlings with 3/4 leaves removed
- vii. Control

For roots treatment the seedlings were removed from their polythene containers. Their roots were washed and pruned upto specified length before

planting. In the foliage treatment the specified portion of leaves were removed from the seedlings before transplanting.

The experiment was laid out on split plot design replicated thrice keeping 10 seedlings in each

treatment. Observations on the survival of seedlings and termite infestation in various treatments were recorded 3 months after planting.

RESULTS AND DISCUSSION

The observation recorded on the influence of plant stress on termite infestation in various treatments are tabulated as follows:

AT KHARIAN

% Mortality of plants due to stress at Kharian (three months after planting)

Treatments	No of Dead Plants			
	R ₁	R ₂	R ₃	Mean
WEEKLY IRRIGATION				
T ₁ 1/2 roots cut	50	60	10	40
T ₂ 3/4 roots cut	10	80	80	56.7
T ₃ 1/2 leaves removed	0	20	40	20
T ₄ 3/4 leaves removed	10	30	10	16.7
T ₅ control	30	30	50	36.7
FORTNIGHTLY IRRIGATION				
T ₁ 1/2 roots cut	40	60	20	40
T ₂ 3/4 roots cut	40	70	40	50
T ₃ 1/2 leaves removed	10	10	10	10
T ₄ 3/4 leaves removed	10	40	0	16.7
T ₅ control	10	40	10	20

The data in the above table show that in the weekly irrigation block a mean mortality of 40 plants occurred in the half root cut treatment and 56.7 plants died in 3/4 roots cut treatment. In the foliage removal treatment 20 plants died in half leaves removed and 16.7 plants in 3/4 leaves removed treatments. In control 36.7 plants were

found dead. In the fortnightly irrigated block 40 and 50 plants died in 1/2 roots cut and 3/4 roots cut treatments, respectively. In the foliage removal treatments 10 and 16.7 plants died in 1/2 and 3/4 leaves removal treatments, respectively. 20 plants were found dead in the control.

This shows that root cut treatment caused maximum stress while removal of foliage improved the plants vitality in initial stages

because of reduction in water loss through transpiration. Almost all the dying and dead seedlings were found infested by termites while healthy plants were safe from termite infestation.

% Mortality of plants due to stress at Kharian (three months after planting)

Treatments	No of Dead Plants			
	R ₁	R ₂	R ₃	Mean
WEEKLY IRRIGATION				
1/2 roots cut	100(0)	90(10)	100(10)	96.6(6.6)
3/4 roots cut	100(10)	80(10)	90(10)	90 (13.3)
1/2 leaves removed	80(10)	100(10)	90(10)	90 (6.6)
3/4 leaves removed	100(20)	100(10)	100(10)	100 (10)
Control	100(0)	100(0)	100(10)	100 (6.6)
FORTNIGHTLY IRRIGATION				
1/2 roots cut	100(10)	100(20)	100(0)	100 (10)
3/4 roots cut	70(20)	100(0)	100(0)	90 (6.7)
1/2 leaves removed	80(30)	90(0)	100(0)	90 (10)
3/4 leaves removed	80(10)	100(10)	90(10)	90 (10)
Control	100(0)	80(20)	100(20)	93.3(13.3)

(Figures in brackets shows % plant infested by termites).

The data indicate that 70 to 100% seedlings died in various treatments but termite infestation was recorded in 0 to 30% plants. It clearly indicates that termites were not the major cause of mortality of plants.

CONCLUSION

Different types of stresses cause weakness in plants which lead to their death and in this process

termites also attack. Healthy living plants are not infested by the termite.

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