

PRELIMINARY OBSERVATIONS ON SUSCEPTIBILITY OF TEA CLONES TO WHITE GRUB, *HOLOTRICHIA DISPARILIS* ARROW (COLOEPTERA: SCARABAEIDAE) ATTACK

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Thirteen tea clones were observed for their natural resistance or susceptibility for white grub damage which becomes serious in new clearings. Monthly assessments of the pest symptoms (yellowing, defoliation and death) were carried out from November 1986 to November 1987 and the degree of attack in each clone, estimated using a 'Bush Scoring Index'. The study showed significant variation among clones to this pest attack.

INTRODUCTION

White grubs or cockchafer beetle larvae were considered as occasional pests of young tea in the nursery and in new clearings. The larvae feed on tender roots of young tea (Cranham, 1966). Damage by white grubs in newly planted clearings is a cause for concern as it could seriously affect the replanting programme. The following species of white grubs have been associated with tea:

1. *Holotrichia disparilis* Arrow
2. *Microtrichia costata* Walker
3. *Leucopholis pinguis* Burmeister
4. *Anomala Walkeri* Arrow
5. *Anomala dussumeri* Blanchard
6. *Anomala mundissima* Walker

The instances of severe damage to the roots of young tea were caused largely by only *Holotrichia disparilis* Arrow. This species is commonly noted in the planting districts of Udupussellawa, Hewaheta, Maturata and Dimbula. The adult beetles (Fig.1) emerge in April - May and deposit their eggs in the soil. The larvae (grubs) (Fig.2) emerge from June onwards and continue to develop towards the end of the year (October - November) and pupate in the soil in December-January, thus completing its life cycle within a year. Damage to young tea occurs mainly from June to October. Attacked plants show symptoms of characteristic yellowing, defoliation and eventually death, in that succession. (Figs. 3,4 and 5 respectively). Figure 6 shows healthy and damaged tea roots caused by the white grub attack.

MATERIALS AND METHODS

The clonal rows of Field No. F1B, Division No. 3 (elevation 1500 m amsl.) of High Forest Estate, Kandapola (Planting District: Maturata - Kurundu Oya Valley) were observed to be infested with white grub. The following clones were observed monthly for pest damage from November 1986 to November 1987:

(a) TRI clones	TRI 2025	(b) Estate clones		
	TRI 3013	Drayton	—	DT1
	TRI 3015	Kirkoswald	—	K 145
	TRI 3016	Park	—	PK 2
	TRI 3017	Tangakelle		
	TRI 3018	(Wallaha Div.)	—	WY
	TRI 3019	Waltrim	—	WT 26
	TRI 3020			

A scheme of 'Bush Scoring Index' method was utilized to assess pest damage, based on the following symptoms:

Symptom	Score
Yellowing	01
Defoliation	03
Death	05

As an additional estimate, the dead plants were uprooted and the soil surrounding the plants (15 cm radius and 30 cm depth) were carefully examined for the livestages of the pest (eggs, larvae, pupae and adults). Assessments made were subjected to an analysis of variance on a completely randomized block design with the 13 monthly observations as replicates.



Fig. 1 — Adult beetle of white grub



Fig. 2 — Larvae of white grub.



Fig. 3 — Yellowing of young tea plants due to white grub attack



Fig. 4 — Defoliation of young tea due to white grub attack



Fig. 5 — Death of young tea due to white grub attack



Fig. 6 — Healthy (right) and effected (left) roots of young tea

RESULTS

The monthly visual observations of the damage symptoms are presented in Table I. Figure 7 illustrates the population trends of the white grub in relation to the calendar months of the year in respect of observations made on clone TRI 2025.

TABLE I - Clonal resistance for white grub (*Holotrichia* sp.) damage at High Forest Estate, Kandapola (values corrected for 100 plants per clone)

<i>Clones (in order of increasing susceptibility)</i>		<i>Mean damage Index</i>	<i>Total live stages (eggs larvae, adults) underneath dead plants</i>
Waltrim	WT 26	6.62 a	0
Kirkoswald	K 145	20.62 a	0
TRI	3019	22.23 a	0
TRI	3017	27.47 b	0
TRI	3015	29.31 b	0
TRI	3013	31.38 b	05
Park	PK 2	31.62 b	01
TRI	3018	33.16 b	0
TRI	3020	38.93 b	01
TRI	3016	41.53 b	03
Drayton	DT 1	53.16 c	16
TRI	2025	57.93 c	21
Walaha	WY	87.38 d	07

Figures with same symbol do not differ significantly at $P = 0.001$

Based on this analysis, the following categories of resistance/susceptibility of the clones to white grub attack are derived:

- A — High resistance — WT 26, K 145, TRI 3019
- B — Moderate Resistance — 3017, 3015, 3013, PK 2, 3018, 3020, 3016
- C — Susceptible — DT 1, TRI 2025
- D — Very Susceptible — WY

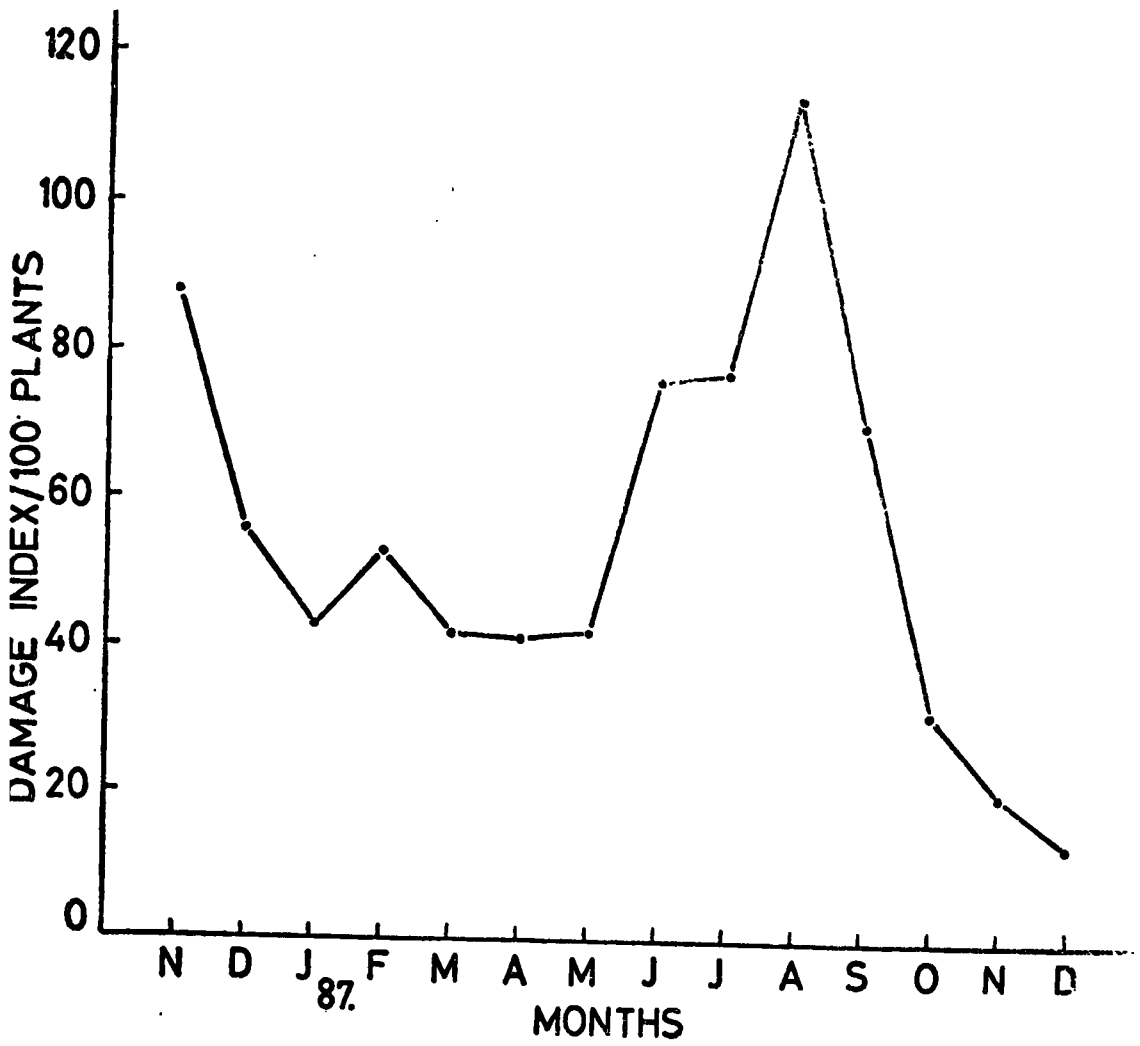


Fig 7- Monthly damage (Nov. 1986 to Dec. 1987) due to white grub expressed in terms of a 'Damage Index' (clone TRI 2025)

DISCUSSION

White grubs were earlier considered as occasional and minor pests in localized areas. However, observations made in the recent past have shown that they are becoming more serious in many varied localities, such as Maturata, Udapussellawa, Dimbula and Maskeliya districts. In some instances, even mature tea plants have been observed to be seriously infested. As a result the damage caused by this pest poses great concern.

One approach in meeting the problems posed by this pest is to identify tea clones that are tolerant or resistant to this pest. Such a programme should necessarily be an on going work involving continuous screening of newly developed clones. From the preliminary studies made so far three clones, WT 26, K 145 and TRI 3019 have been found to be resistant while clones TRI 2025 and DTI are susceptible; the clone WY is very susceptible. It has also been observed that the life history of this pest is well synchronized seasonally within the calendar months of the year (see Fig. 7). Similar trends have been observed in the other clones as well.

It is hence suggested that when replanting and large scale infilling programmes are undertaken in areas prone to white grub attack, it is best to select clones that are resistant to this pest and avoid those that are susceptible. In such cases, as an additional insurance, 10g of Furadan (Carbofuran) 3G should be incorporated into each planting hole (TRI Advisory circular No. 14). The granules should be well mixed with the planting soil to ensure good root contact. This root systemic insecticide/nematicide gives good protection to white grubs and other pests as well besides boosting growth and enabling the plant to establish early in the field.

It is also desirable to test other popular clones for their resistance and susceptibility to the white grub attack in areas with heavy infestation of the pest.

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REFERENCES

CRANHAM, J.E. (1966) *Monograph on tea production in Ceylon, No.6; Insect and mite pests of tea in Ceylon and their control*. Tea Research Institute of Ceylon, 121pp.

Tea Research Institute (1985) *Advisory Circular No. 14, 'Recommendations for the management of shothole borer induced damage in tea.* 116 pp.