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CONTROL OF WHITE GRUB (*HOLOTRICHIA SERRATA* F.) ATTACKING RUBBER AT THE NURSERY STAGE IN INDIA

C. R. Nehru and K. Jayarathnam

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In a 2-year field experiment, seven insecticides viz., carbofuran 3G, phorate 10G, carbaryl 5D, HCH 10D, carbaryl 4G, phosalone 4D and carbaryl + lindane (sevidol) 4 : 4G broadcast at the time of sowing were evaluated for their relative effectiveness in controlling white grub infesting rubber seedlings in the nursery. Among the insecticides tested, phorate 10G followed by carbaryl + lindane (sevidol) 4 : 4G was proved to be very effective in managing the population of white grub in rubber nursery below the economic threshold. The treated plots recorded the lowest grub population and highest plant survival.

Key words – *Holotrichia serrata*, Phorate 10G, Carbaryl + lindane (sevidol) 4 : 4G, Carbofuran 3G.

C. R. Nehru (corresponding author) and K. Jayarathnam, Rubber Research Institute of India, Kottayam – 686 009, India.

INTRODUCTION

White grubs have attained the status of a national pest infesting a variety of crops. The losses inflicted by them are so high that in India the white grub has been declared as a national pest (Yadava and Yadava, 1973). White grubs of the species *Holotrichia serrata, H. rufoflava, H. fissa* and *Anomala varians* are the serious pests of rubber causing severe damage to seedlings in nurseries and rendering them unfit for transplanting (Jayarathnam and Nehru, 1980 and 1984). The most predominant and serious among the four species is *H. serrata*. The peak period of occurrence of the pest in the field is from June to December, when the grubs of different instars would cause serious damage to rubber seedlings. The damage in general is severest when the voracious third instar grubs are abundant in the nursery. In endemic areas, the estimated quantum of losses inflicted by this major pest to nursery rubber seedlings ranges from 42 to 45 per cent.

The control of white grubs by chemicals has been evaluated by several research workers in India (Kalra and Kulshrestha, 1961; Ramakrishnan and Radhakrishna Pillay, 1964; Desai and Patel, 1965; David and Kalra, 1966; Patel et al, 1967; Sachan and Pal, 1974; Raodeo et al, 1976; Veeresh, 1977 a, b and 1981; Jayarathnam and Nehru, 1980; Lal, 1983; Viswanath et al, 1984). So far, field trials have been conducted mainly to evaluate insecticidal formulations in different dosages before and after sowing. In the present investigation, granular and dust formulations of newer and commonly available insecticides were tested for their comparative effectivness at sowing time for the control of *H. serrata* F.

MATERIALS AND METHODS

A field trial was conducted in a severely grub infested area at the Rubber Board Regional Nursery, Neriamangalam during 1985-86 and 1986-87 using randomised block design with seven treatments and a control, replicated four times. Each plot measured 9.30 m^2 consisting of 100 plants in 4 rows of 25 plants each. Spacing between the plots and plants was 60 cm and 30 cm, respectively. Carbofuran 3G, phorate 10G, carbaryl 4G and carbaryl + lindane (sevidol) 4 : 4G were applied at 25 kg/ha as granules where as HCH 10D, phosalone 4D and carbaryl 5D were applied at 100 kg/ha as dusts at first instar stage of the grubs. All insecticides were broadcast and incorporated into the soil at the time of sowing. Mean percentage survival of the plants in treated plots was evaluated on the basis of reduction in the number of plants damaged by white grubs rendering them unfit for transplanting. Grub population was assessed after 4, 8, 12 and 16 weeks from 10 pits per plot in 30 cm^3 soil between rows and the average worked out. The effects of different insecticides on the white grubs infesting rubber seedlings were determined on the basis of plant survival and grub population. The data obtained were subjected to statistical analysis and the mean percentage survival of plants is presented in Table 1.

Table 1. Comparative evaluation of different insecticidal formulations for the control of *H. serrata* F. (1985-86 and 1986-87)

Treatments	Dose (kg/ha)	Mean percentage survival of plants/ plot*		Grub population/ 30 cm^3	
		1985-86	1986-87	1985-86	1986-87
Carbofuran 3G	25	68.20 (55.67)b	69.75 (56.65)b	0.20	0.15
Phorate 10G	25	88.80 (70.45)a	90.50 (72.12)a	0.15	0.10
Carbaryl 5D	100	30.90 (33.77)c	33.25 (35.19)d	0.30	0.25
HCH 10D	100	14.40 (22.30)d	18.75 (25.62)e	0.50	0.40
Carbaryl 4G	25	57.90 (49.55)b	60.25 (50.93)c	0.25	0.20
Phosalone 4D	100	34.50 (35.97)c	36.00 (36.86)d	0.30	0.25
Carbaryl + lindane 4 : 4G	25	88.10 (69.82)a	89.75 (71.51)a	0.15	0.10
Control		2.40 (8.91)e	7.25 (15.54)f	1.00	0.90
F test		Significant	Significant		
SE of X		2.08	1.08		

* Mean of four replications, at eleven months after treatment.

Figures in parenthesis are arc sin values.

Mean values followed by the same letter do not differ significantly (P=0.05) as per Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

The results reveal that all the insecticidal treatments were significantly superior to control in protecting the rubber seedlings from white grubs. However, in both the years the application of phorate 10G at 25 kg/ha proved to be the best treatment in giving maximum plant survival and in reducing the white grub damage and it did not differ significantly from carbaryl + lindane (sevidol) 4 : 4G in its effectiveness. Viswanath et al. (1984) proved phorate 10G to be effective against white grubs infesting groundnut. The application of carbaryl + lindane (sevidol) 4 : 4G offered promising results against white grubs infesting chillies (Sachan and Pal, 1974) and rubber seedlings (Jayarathnam and Nehru, 1980 and 1984). Both of these treatments were significantly superior to others. The next effective treatments were carbofuran 3G followed by carbaryl 4G. Kadu et al. (1976) reported the efficacy of carbaryl against the larval of *H. consanguinea* giving 62.83 per cent larval kill. Lal (1983) reported the effectiveness of carbofuran 3G in providing maximum protection (98.1 per cent) against the grubs of *Leucopholis coneophora* attacking cassava. Carbaryl 5D and phosalone 4D were on par. The survival of seedlings was lowest in the plots broadcast with HCH 10D. However, in areas with low infestations HCH 10D at 100 kg/ha may be sufficient considering its low cost.

The population of white grub was in general, higher in the control plot as well as the plots treated with inscecticides in the first year than that in the second year (Table 1). The lowest grub population was recorded by the plots broadcast with phorate 10G at 25 kg/ha and carbaryl + lindane (sevidol) 4 : 4G at 25 kg/ha followed by carbofuran 3G during both the years. The percentage survival of plants in the treated plots was lower in the first year than in the second year.

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REFERENCES

David, H. & Kalra, A. N. (1966). Some observations on *Holotrichia serrata* F., a beetle pest of sugarcane in Hospet area of Mysore State. *Indian Sugar*, **16**, 195–198.

Desai, M. T. & Patel, R. M. (1965). Some observations on the biology and control of white grubs in soil (*Holotrichia* sp. near *consanguinea* Blanch.) affecting groundnut and cereals in Gujarat. *Indian Journal of Entomology*, **27**, 89–94.

Duncan, D. B. (1955). Multiple range and multiple F tests. *Biometrics*, **11**: 1–42.

Jayarathnam, K. & Nehru, C. R. (1980). Control of root grubs in rubber nursery. *Paper presented at the International Rubber Conference, India*. Kottayam, 27–29 November, 1980.

Jayarathnam, K. & Nehru, C. R. (1984). White grubs and their management in rubber nursery. *Pesticides*, **18**: 27-29.

Kadu, N. R., Tadas, P. L., Anvikar, D. G., Radke, S. G., Borle, M. N. & Mundiwale, S. K. (1976). Efficacy of insecticides against white grub, a serious polyphagous pest in Vidarbha. *Indian Journal of Entomology*, **38**: 351–381.

Kalra, A. N. & Kulshrestha, J. P. (1961). Studies on the biology and control of *Lachnosterna consanguinea* Blanch, a pest of sugarcane in *Bihar* (India). *Bulletin Entomological Research* **52**: 577–587.

Lal, S. S. (1983). Field evaluation of certain insecticides against white grub, *Leucopholis coneophora* Burm. attacking cassava. *Madras Agricultural Journal*, **70**: 556.

Patel, R. M., Patel, G. S. & Vyas, H. N. (1967). Further observations on the biology and control of white grubs (*Holotrichia* sp. near *consanguinea* Blanch.) in soil, affecting groundnut in Gujarat *Indian Journal of Entomology*, **29**: 170–176.

Ramakrishnan, T. S. & Radhakrishna Pillay, P. N. (1964). Cockchafer grubs. *Rubber Board Bulletin*, 1 : 76-78.

Raodeo, A. K., Deshpande, S. V., Deshpande, A. D., Puri, S. N. & Bilapate, S. G. (1976). A large scale campaign for the control of white grubs. (*Holotrichia serrata* F.) in Maharashtra State *PANS*, **22**: 223–225'.

Sachan, J. N. & Pal, S. K. (1974). Control of white grub *Holotrichia insularis* Br. in chillies (*Capsicum frutescens* Linn). *Pesticides*, **55**: 43–45.

Veeresh, G. K. (1977a). Studies on the root grubs in Karnataka. *UAS Monograph Series*, Vol. 2. pp. 87.

Veeresh, G. K. (1977b). Bionomics and control of white grubs in India. *Sugar News*, **9**: 44–56.

Veeresh, G. K. (1981). White grubs and their management in pulses and oil seeds. *Pesticides Annual*, 1980–81; 59–63.

Viswanath, Kawal Dhari & Srivastava, A. S. (1984). Effect of insecticides on the control of white grub *Holotrichia consanguinea* Blanch. (*Coleoptera: Melolonthidae*) in groundnut. *Pesticides*, **18**: 30–31.

Yadava, C. P. S. & Yadava, S. R. S. (1973). Field trial with certain commonly used soil insecticides against white grub *Holotrichia consanguinea* Blanch. *Indian Journal of Entomology*, **35**: 329–332.