

The Control of *Tetracera scandens*

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In tests on the control of Tetracera scandens, amitrole, paraquat, dimethyl arsinic acid, disodium methyl arsonate, trichlorobenzoic acid, 2-methoxy-3,6-dichlorobenzoic acid, 2-methoxy-3,5,6-trichlorobenzoic acid, 2,4-D (Na salt), a formulation of mixed esters of 2,4-D and 2,4,5-T, and 2-(2,4,5-trichlorophenoxy) propionic acid were compared.

The latter two herbicides proved the most effective, 2,4,5-TP being slightly superior. Their performance was not affected by volume of application or level of wetting agent, and application of either herbicide at 1—2 lb active ingredient per acre can be recommended for the control of T. scandens.

Grasses constitute the main weeds in rubber plantations, especially in the early stage, but ferns and other plants such as *Melastoma malabathricum* and *Eupatorium odoratum* commonly occur. Less commonly occurring weeds are *Tetracera scandens* and *Tetracera indica*, species belonging to the *Dilleniaceae* (HOOGLAND, 1949; 1953), which can be found throughout the Malayan peninsula, Sumatra, Java and North Borneo.

These *Tetracera* spp. are small shrubs, creepers or climbers occurring in thickets and in secondary forest or in more open vegetation. The leaves are scabrous and may be used as sand-paper (HOOGLAND, 1949), and will scratch and irritate the skin on contact; as such the plant is disliked by estate labourers and would be considered undesirable in a plantation even if it were not strongly competitive with *Hevea brasiliensis*.

Chipping and spraying with sodium arsenite has been found to be an expensive and ineffective method of controlling this plant, since chipping merely increases the number of shoots developing from axillary buds, below the surface of the soil. Growth regulators are, however, the indicated type of herbicide for this type of perennial weed and in the past two years a number of experiments have been carried out with these and other herbicides to determine optimum methods of chemical control.

EXPERIMENTAL METHODS

The field experiments carried out have been summarised in Table 1, and in Table 2 the herbicides used in the various experiments, together with percentage active ingredient and rate of application, have been listed. In the paper reference will be made to the commercial product and the active ingredient in lb per acre applied.

Standard methods were employed in all the experiments described. A uniform plot size of 1/200 acre was used and all experiments were sprayed with a knapsack sprayer provided with a spray boom carrying two Teejet nozzles spaced twelve inches apart. The nozzle size varied from 730154 to 730308 (RIEPMA, 1963).

A point quadrat method described previously (RIEPMA AND WONG, 1963) was employed to characterise the effects of the herbicides. The number of first contacts in each plot, including the control plots, were determined before and after spraying and the percentage mortality due to herbicide application calculated after allowing for the natural mortality or growth in agreement with Abbott's Formula (FINNEY, 1952). Observations were made at various intervals after spraying to determine the susceptibility and recovery of the weed.

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TABLE 1. SUMMARY OF THE EXPERIMENTS ON THE CONTROL OF TETRACERA SCANDENS

Experiment no.		Estate	Design	Treatments	Replications	Purpose
Code	Actual					
1	(49/1962)	Sungei Rambai	Youden Square	13	4	To determine the most active herbicides.
2	(66/1962)	Port Dickson-Lukut	Simple lattice	25	2	} Comparison of Kuron, Floroxone and Banvel D (or Banvel T) at 2 and 4 pints per acre in 50 or 100 gal. water per acre with 2 conc. of Lissapol N.
3	(66/1962)	Port Dickson-Lukut	Simple lattice	25	2	
4	(9/1962)	Sungei Rambai	Youden Square	13	4	Comparison of Floroxone and Kuron at 2, 4 and 8 pints per acre in 50 and 100 gal. water per acre.

TABLE 2. SUMMARY OF THE HERBICIDES EMPLOYED IN THE EXPERIMENTS TOGETHER WITH THEIR COMMERCIAL NAMES, AND ACTIVE INGREDIENT IN LB PER ACRE APPLIED

Herbicide used	Commercial name	Active ingredient in lb per Imp. gal. or %	Quantity of product applied per acre	lb per acre active ingredient applied	Experiment no.
2,4-D and 2,4,5-T (mixed esters)	Floroxone	3.0 lb + 2,4-D 3.0 lb + 2,4,5-T	0.25 gal.	1.5	2, 3, 4
			0.5 gal.	3.0	1, 2, 3, 4
			1.0 gal.	6.0	1, 4
2-(2,4,5-trichlorophenoxy) propionic acid	Kuron	4.8 lb	0.25 gal.	1.2	2, 3, 4
			0.5 gal.	2.4	2, 3, 4
			1.0 gal.	4.8	4
2-methoxy-3,6-dichlorobenzoic acid	Banvel D	4.8 lb	0.25 gal.	1.2	2
			0.5 gal.	2.4	2
2-methoxy-3,5,6-trichlorobenzoic acid	Banvel T	4.8 lb	0.25 gal.	1.2	3
			0.5 gal.	2.4	3
2,4-D (Na salt)	Fernoxone	80%	2.0 lb	1.6	1
Paraquat	Gramoxone	2.0 lb	0.25 gal.	0.5	1
			0.5 gal.	1.0	1
Dimethyl arsinic acid (cacodylic acid)		65%	6.0 lb	3.9	1
			12.0 lb	7.8	1
Disodium methyl arsonate		63%	6.0 lb	3.8	1
			12.0 lb	7.6	1
3-amino-1,2,4-triazole (amitrole)	Weedazol TL	3.0 lb	2.0 gal.	6.0	1
			4.0 gal.	12.0	1
Trichlorobenzoic acid	TBA	14.4%	1.0 gal.	1.4	1

RESULTS

In Experiments 1 and 2 a preliminary screening of available herbicides was carried out, in order to determine the most active and persistent herbicide against *Tetracera* spp.

The results of Experiment 1 are summarised in Table 3. From this experiment it is evident that Floroxone, Fernoxone and TBA had the most severe and persistent effect on *Tetracera scandens*. Weedazol TL proved to be very slow acting, and although the leaves were yellowing at 183 days after spraying the plant was not killed. The other herbicides, which in addition to any translocation effect may act as severe contact herbicides (Gramoxone, cacodylic acid and disodium methyl arsonate), gave rather high initial control as indicated by a reduced number of first contacts due to defoliation, but over a period recovery was relatively rapid. These herbicides, together with Weedazol TL, may thus be considered as

unsatisfactory. In a further experiment, not quoted, a comparison of Floroxone with two other herbicides, Kuron and Banvel D, showed that the latter two herbicides were sufficiently active to merit further investigation.

In Experiments 2 and 3 the most promising herbicides, Floroxone and Kuron together with Banvel D and a related compound Banvel T, were tested with variations in modes of application, including wetting agents, gallonage and concentrations of the herbicides.

Statistical analysis of data from Experiment 2 (not quoted) showed that significant differences occurred only between the three herbicides Kuron, Floroxone and Banvel D, but that no difference in percentage control could be detected between the two gallonages of water in which the herbicides were applied (50 and 100 gal water per acre), the two levels

TABLE 3. EXPERIMENT 1. THE EFFECT OF VARIOUS HERBICIDES ON CONTROL OF *TETRACERA SCANDENS* AT VARIOUS INTERVALS AFTER SPRAYING
(DATE OF SPRAYING 9.7.62)

Herbicide	Active ingredient applied, lb per acre	% control days after spraying		
		37	75	183
Floroxone	3.0	100.0	97.5	74.3
Floroxone	6.0	99.2	99.8	89.7
Fernoxone	1.6	99.6	98.5	74.8
Gramoxone	0.5	74.7	68.9	28.1
Gramoxone	1.0	86.4	79.5	32.5
Cacodylic acid	3.9	86.3	57.7	38.6
Cacodylic acid	7.8	96.3	84.5	52.6
Disodium methyl arsonate	3.8	44.3	30.9	5.3
Disodium methyl arsonate	7.6	61.4	44.0	15.2
Weedazol TL	6.0	31.9	31.9	61.4
Weedazol TL	12.0	36.2	36.8	55.4
TBA	1.4	86.5	87.9	71.8
s.e. of difference between means		±8.4	±8.6	±13.5

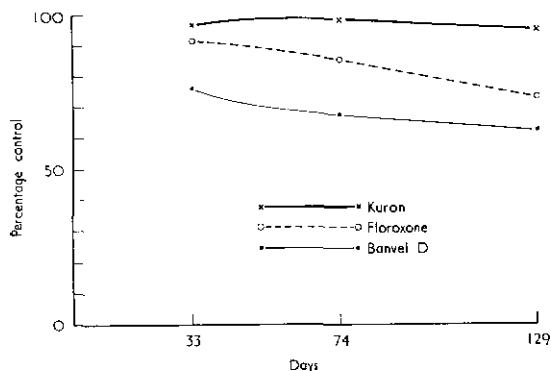


Figure 1. The effect of three herbicides on the control of *Tetracera scandens* at three times after spraying, meaned over two concentrations of herbicide and wetting agent and two volumes of application.

of wetting agent or the two concentrations of herbicide. The relative effectiveness of the three herbicides is illustrated in Figure 1.

In a similar experiment (Experiment 3 in which Banvel D was replaced by Banvel T) Kuron and Floroxone were found to be much more effective than Banvel T (Figure 2a). Again no effect due to gallonage was found on the herbicidal efficiency of the three herbicides (Figure 2b) and only a very slight but

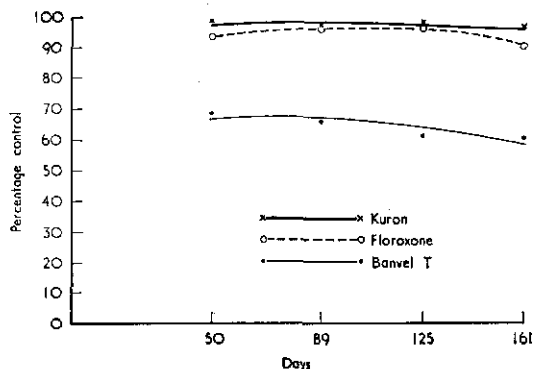


Figure 2(a). The effect of three herbicides on the control of *Tetracera scandens* at four times after spraying, meaned over two concentrations of herbicides and wetting agent and two volumes of application.

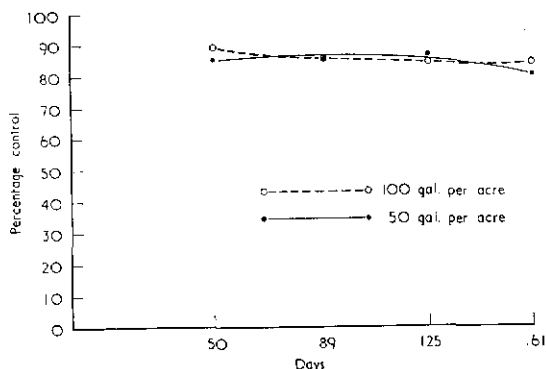


Figure 2(b). The effect of 50 and 100 gal. per acre water on the control of *Tetracera scandens*, meaned over three herbicides, and two concentrations of herbicides and wetting agent.

not significant difference between the two levels of applications (Figure 2c) was observed.

In Experiment 4, Kuron applied at 1.2, 2.4 and 4.8 lb per acre was compared with Floroxone applied at 1.5, 3.0 and 6.0 lb per acre in 50 and 100 gal. of water per acre. Again Kuron proved to be slightly superior to Floroxone (Figure 3a), especially with increasing intervals after spraying. Although the herbicidal effect increased with increase in the level of application, the differences were small (Figure 3b); again there was no significant

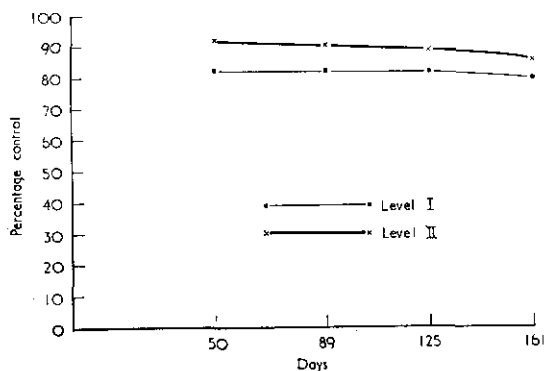


Figure 2(c). The effect of two levels of application of three herbicides on the control of *Tetracera scandens*, meaned over all herbicides, two volumes of application and two concentrations of wetting agent.

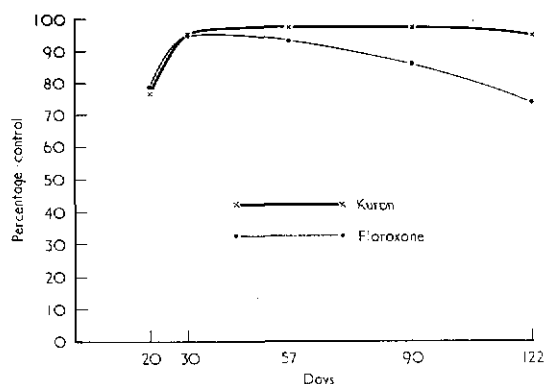


Figure 3(a). The effect of Kuron and Floroxone at various intervals after spraying on the control of *Tetracera scandens*, meaned over three concentrations and two volumes of application.

difference in effectiveness between 100 and 50 gal. of water per acre.

DISCUSSION

As might be expected, differences in the efficacy of the different herbicides have been demonstrated: of the two most effective herbicides Kuron gives better control of *Tetracera scandens* than does Floroxone. The fact that gallonage (50 or 100 gal. per acre water) did not influence the response is in agreement with earlier experience (RIEPM, 1963). With Kuron the effect of concentration or dose varying from 1.2—4.8 lb per acre was slight and 1.2 lb per acre Kuron could be applied with satisfactory results, respraying becoming necessary only after approximately eight months or more, an operation which need involve only spot spraying against the few surviving plants. Within limits, low concentrations of growth regulators may be expected to be very effective because with higher concentrations leaf scorch might impede transport and lessen the degree of control. The data recorded above indicate that application of 1—2 lb per acre active ingredient of Kuron or Floroxone in 50 gal. per acre water, to which 2 pints of Lissapol N has been added, could be recommended

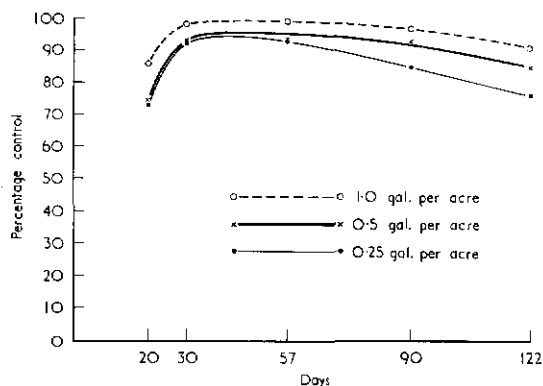


Figure 3(b). The effect of 0.25, 0.5 and 1.0 gal. per acre herbicide on the control of *Tetracera scandens* at various intervals after spraying, meaned over two herbicides and two volumes of application.

as an effective treatment for the control of *Tetracera scandens*.

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