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USE OF OXYFLUORFEN AS A PRE - EMERGENT WEEDKILLER IN YOUNG TEA

(Camellia sinensis (L) O Kuntze)

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An experiment was carried out at St Coombs Estate, Tea Research Institute to test the suitability of Oxyfluorfen (Goal) at rates of 0 12, 0 24 and 0 36 kg active ingredient (a i) ha $^{-1}$ in 800 l water as a pre-emergent weedkiller in young tea of clone TRI 2025 Diuron at 0 90 kg (a i) ha $^{-1}$ was included for purposes of comparison

Visual assessment of weed control showed that 18 weeks after treatment Oxyfluorfen at 0 12, 0 24, and 0 36 kg (a i) ha $^{-1}$ gave about 50%, 70% and 90% weed control respectively compared to the untreated control Effect of diuron was comparable to that of the lowest rate of Oxyfluorfen tested In terms of total dry weight of weeds per plot, determined at the end of the experimental period, suppression of weed growth by Oxyfluorfen amounted to 82%, 95% and 98% at 0 12, 0 24, and 0 36 kg (a i) ha^{-1} respectively whereas that by Diuron at 0 90 kg ha^{-1} was only 62% Suppression of broad leaf weeds was comparable with both herbicides used whereas suppression of grasses was more effective with Oxyfluorfen especially at the two higher rates used Total number of broad leaf weeds were significantly reduced by all treatments and the control ranged from 85% to 97% There was a strong trend to indicate that Oxyfluorfen at 0 36 kg ha^{-1} suppressed broad leaf weeds more effectively than the other treatments There was no serious phytotoxic symptoms seen in plants when foliage of young tea plants were drenched with a solution of Oxyfluorfen at concentrations same as those tested in the field experiment or when sprayed only to the soil in pots containing tea plants

INTRODUCTION

Chemical weed control in tea in Sri Lanka is based on a few herbicides such as Paraquat, 2, 4-D, Simazine, and Diuron Under special circumstances when pernicious grasses are a problem Dalapon and Glyphosate are also used Use of only foliage acting herbicides such as Paraquat or 2, 4-D will entail frequent spraying rounds as there is a vast store of weed seeds in the soil It is therefore customary to use residual or pre-weed-emergent herbicides such as Diuron and Simazine In young tea, however, chemical weed control is precluded because of phytotoxicity due to spray drift when using foliage applied herbicides especially if the young tea plants have been bent and pegged down for frame development or due to uptake by roots of residual herbicides Residual herbicides such as Diuron are generally considered phytotoxic to young tea Therefore, the search for pre-emergent or residual herbicides with low phytotoxicity to tea is a continuing process

In recent times Oxyfluorfen (2-chloro-1-(3-ethoxy -4 nitro phenoxy)-4-(trifluormethyl) Benzene) has been shown to be a versatile herbicide in many crops (Price, 1979, Arce *et al* 1980, Biroli, Kodirah and Croci, 1980, Frank, 1980, Yeh, 1980) including tea (Ghosh and Ramakrishnan, 1981, Rao and Kotoky, 1981) The

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experiments reported here were therefore designed to study the suitability of Oxyfluorfen for weed control in young tea in Sri Lanka. If a herbicide is suitable for use in young tea then it follows that it will be suitable for mature tea as well.

MATERIALS AND METHODS

The experiment was conducted at St. Coombs Estate (1500 m amsl) Tea Research Institute, Talawakele in a field planted with young tea (clone TRI 2025) about two months prior to commencement of the trial. Oxyfluorfen was tested at rates of 0.12 0.24 and 0.36 kg active ingredient (a.i.) ha^{-1} in 800 l of water. As a comparison Diuron was included at 0.90 kg ha^{-1} (a.i.) in the same volume of water. The experiment was laid out in a randomized block design with 3 replicates. The plot size was 6 m X 2.4 m with 20 plants per plot. The appropriate quantities of the herbicides were dissolved in water at the rates mentioned above and sprayed uniformly over weed-free ground using a knapsack sprayer fitted with a flood jet nozzle on 1 July 1982. Degree of weed control was assessed visually as indicated by germination and emergence of weed seedlings by scoring on the scale 0 = (no control) weed density in unsprayed plots, 10 = complete control (no weeds).

Scoring was started only from the 11th week after spraying in order to allow sufficient time for weed seedlings to emerge. Thus the visual scoring also gives an estimate of the duration of control achieved. At the end of 18 weeks after spraying all the weeds in each plot were carefully dug out and separated first into broad-leaf weeds and grasses. The former were further separated into the component species. The number of plants in each broad leaf species were counted before drying in an oven at 105° C over-night for dry weight estimation. No such count was made of grasses. The phytotoxicity of Oxyfluorfen to young tea (clone TRI 2025) when sprayed on the foliage was tested in a glass house by spraying solutions of the herbicides on the foliage, at the same concentrations as those used for the field experiment. All the leaves were drenched. Diluted herbicidal solutions at the same concentrations used in the field experiment were also poured on the soil surface in pots (3 ml per pot) containing young tea of clone TRI 2025, taking care not to wet the leaves or stem, on the same date (28 October 1982).

The plants were watered regularly. Observations were made periodically until December 1982 and unusual symptoms, if any, were noted.

RESULTS AND DISCUSSION

The visual estimates of weed control (by scoring) is shown in Fig. 1. It is clear that Oxyfluorfen at the rate of 0.36 kg ha^{-1} gave almost 90% control even at the end of 18 weeks after spraying. At the end of 12 weeks, a period for which most residual herbicides are usually effective, the control with Diuron and that with Oxyfluorfen at 0.12 kg ha^{-1} had come down to about 50% and 65% respectively whereas Oxyfluorfen at 0.24 and 0.36 kg ha^{-1} gave 80% and 90% control respectively. There were no visible symptoms of phytotoxicity to young tea in plots sprayed with Oxyfluorfen at any stage. Occasional chlorosis was noticed in plots sprayed with Diuron..

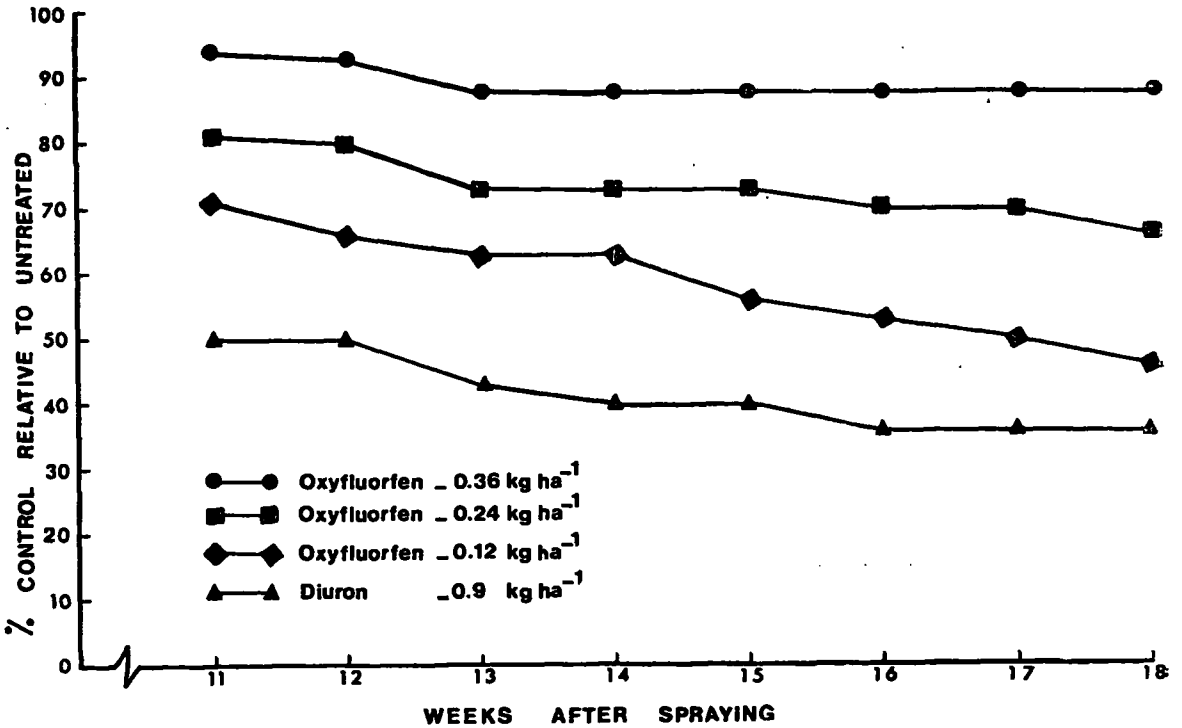

Fig. 1 — Visual estimate of weed control (relative to untreated plots) in plots treated with Oxyfluorfen and Diuron

Table 1 gives the dry weights of weeds in the different treatments at the end of the experimental period (4½ months). The degree of suppression of weed growth as compared with the growth in untreated control was around 60% with Diuron at 0.90 kg ha^{-1} (a.i.).

TABLE 1—*Effect of soil application of Oxyfluorfen and Diuron on dry weight (g) of weeds (Means of 3 replicates).*

Treatments	*Broad leaf weeds*	*Grasses*	*Total*
Untreated control	1,146	1,045	2,191
Oxyfluorfen 0.12 kg ha^{-1}	153	239	392
Oxyfluorfen 0.24 kg ha^{-1}	82	20	102
Oxyfluorfen 0.36 kg ha^{-1}	24	12	36
Diuron 0.90 kg ha^{-1}	231	597	828
LSD (P=0.05)	388	680	1,068

With Oxyfluorfen it was approximately 82%, 95% and 98% at 0.12, 0.24 and 0.36 kg ha^{-1} (a.i.) respectively. While Diuron at the rate used suppressed grass weed growth by about 43% and broad-leaf weed growth by 80%, Oxyfluorfen gave similar degrees of control of both types of weeds and this ranged from 85% at 0.12 kg ha^{-1} to about 98% at 0.36 kg ha^{-1}. The broad-leaf weeds were separated into the component species and the number in each species was counted (Table 2). All treatments suppressed a number of weeds significantly. Although there was a strong trend to indicate that Oxyfluorfen at 0.36 kg ha^{-1} gave more effective control than Diuron at 0.90 kg ha^{-1} this difference just failed to reach statistical significance. Control of different weeds in the four herbicidal treatments tested was very high and rather uniform except with respect to *Ageratum conyzoides*, *Commellina* species and *Polygonum nepalense* which appeared to be higher in numbers in plots treated with 0.12 kg ha^{-1} Oxyfluorfen and 0.90 kg ha^{-1} Diuron. It has to be noted that the latter two species are predominantly propagated by vegetative means.

In the observational pot-trial in the glass house conducted to test phytotoxicity of Oxyfluorfen, no phytotoxic symptom was noticed with the soil application whereas when the foliage was drenched, Oxyfluorfen showed slight scorch of the terminal tender leaves. There was no effect on other leaves. Such exposure of terminal leaves to drift would be rare with soil applied herbicides. The results, therefore, indicate that Oxyfluorfen is a promising herbicide for pre-emergent weed control in young tea. Suitability of Oxyfluorfen for weed control in young tea and in pruned tea has already been demonstrated in North East India (Ghosh and Ramakrishnan, 1981).

TABLE 2—*Effect of Oxyfluorfen and Diuron on the number of weeds of different species, 18 weeks after treatment (Mean of 3 replicates.)*

Weed species	*Untreated control*	*Treated with*			
		Oxyfluorfen		*Diuron*	
		0.12 kg/ha (*a. i.*)	0.24 kg/ha (*a.i.*)	0.36 kg/ha (*a.i.*)	0.9 kg/ha (*a.i.*)
Ageratum conyzoides	429	43	32	6	42
Artemisia vulgaris	15	0	0	0	0
Bidens pilosa	10	3	2	0	3
Crassocephalus crepidioides	30	7	6	2	12
Commellina benghalensis	51	10	6	2	8
Commellina nudiflora	44	12	6	0	9
Drymaria cordata	8	2	1	4	1
Emilia javanica	7	0	0	0	2
Erigeron sumatrensis	19	4	2	3	3
Eupatorium riparium	8	0	2	1	0
Gnaphalium spp.	17	3	2	0	2
Hedyotis spp.	18	4	3	2	1
Justica procumbens	5	2	0	0	2
Oxalis latifolia	0	0	3	0	0
Polygonum capitatum	11	0	1	0	5
Polygonum nepalense	33	14	3	4	20
Viola spp.	8	3	4	0	2
Total number of weeds	713	107	73	24	112
LSD (P=0.05)			92		

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