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THE USE OF OXYFLUORFEN AS A PRE-EMERGENT HERBICIDE IN TEA

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The effect of a new pre-emergent herbicide, Oxyfluorfen was studied by spraying clean-weeded plots in young as well as in pruned tea at 0.12, 0.24 and 0.48 kg a.i.ha^{-1} and comparing it with Diuron at 0.90 kg a.i.ha^{-1} and an untreated control. In both young as well as pruned tea while Oxyfluorfen at 0.48 kg a.i.ha^{-1} gave complete control, satisfactory control was achieved at 0.24 kg a.i.ha^{-1} considering the wide spectrum of weeds controlled as well as the persistence of spray applications compared to the control obtained by Diuron. No adverse effects were noted on the tea due to the spray applications.

INTRODUCTION

A primary consideration in the search for newer residual type herbicides is the period of time over which they are persistent. A pre-emergent herbicide that is persistent for a considerable period of time could be expected to give an extended period of weed control by killing germinating seedlings. Other considerations would be the range of weed species that the herbicide is capable of controlling.

In tea, only a few residual herbicides like Diuron and Simazine are being used and this imposes a limitation on the choice of this category of herbicides. This study reports the results of trials conducted on the use of a new pre-emergent herbicide, Oxyfluorfen (2-chloro - 1 - (3-ethoxy - 4 - nitrophenoxy) - 4 - (trifluormethyl) benzene), in young as well as in pruned tea. Oxyfluorfen is a diphenyl ether herbecide exhibiting a broad spectrum of weed control (Yih and Swithenbank, 1975). It is marketed under the trade name " GOAL 2E " and the commercial formulation is said to contain 24% of the active ingredient.

MATERIALS AND METHODS

Experiment 1

Oxyfluorfen was sprayed on previously clean weeded plots planted with clonal tea (TRI 2025) at Lamiliere Estate, Talawakele in mid-August, 1984. The plants were one-year-old at the time of spray applications. The treatments were:

1. Control
2. Oxyfluorfen at 0.12 kg a.i.ha^{-1} (0.5 l ha^{-1})
3. Oxyfluorfen at 0.24 kg a.i.ha^{-1} (1.0 l ha^{-1})
4. Oxyfluorfen at 0.48 kg a.i.ha^{-1} (2.0 l ha^{-1})
5. Diuron (Karmex) at 0.90 kg a.i.ha^{-1} (1.12 ha^{-1}).

Experiment 2

The above treatments were sprayed in pruned clonal tea (TRI 2025) at Mattakele Estate, Talawakele after removing whatever weeds that had emerged. The treatments were applied about 3 weeks after pruning in early December, 1984.

In both experiments, the plot size was 40 m^2 with about 50 bushes per plot. The spray applications were given when there was sufficient soil moisture. The herbicides were applied in 560 l water ha^{-1}, care being taken to avoid spray drift to the tea. The design was of the randomized block type with treatments replicated five times. The herbicides were sprayed using hand-operated knapsack sprayers fitted with flood-jet nozzles of orifice size 062.

Regeneration of weeds was assessed in both experiments by visual scoring by two observers in the scale of 0 to 10, with 0 for no control and 10 for 100% control of the target weed species and expressing the results as percentage control relative to the untreated plots. Visual scoring commenced 7 weeks after spray application and was done at weekly intervals. At the end of 16 weeks from spray application, all the weeds were harvested from each plot, sorted out into the different weed species and their dry weights determined in a forced-draught oven at 100° C for 24 h.

RESULTS AND DISCUSSION

It will be seen from Figure 1 that the Oxyfluorfen sprayed at 0.48 kg a.i.ha^{-1} in young tea gave a high degree of control of all weed species in young tea. (As the effect of Oxyfluorfen on weed regeneration in pruned tea assessed by visual scoring was almost similar to the degree of control achieved in young tea only the results obtained in young tea are presented). It will also be seen that Oxyfluorfen at 0.24 kg a.i.ha^{-1} gave satisfactory control compared to the control achieved by Diuron.

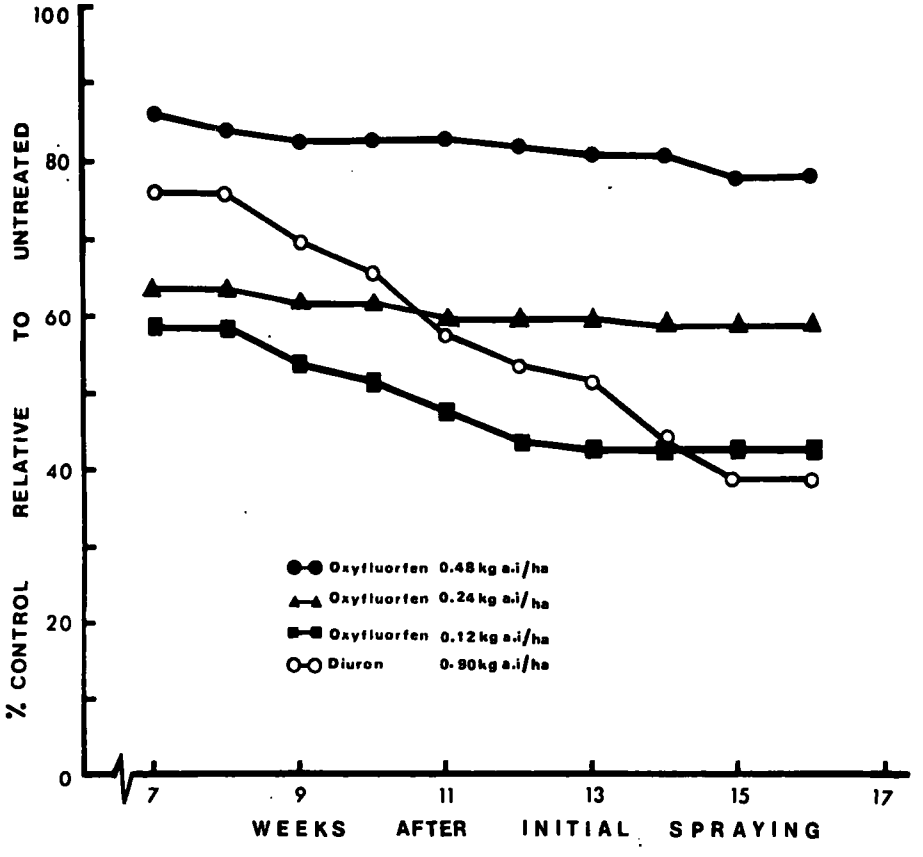

Fig. 1. — Effect of chemical control on regeneration of weeds as assessed by visual scoring.

The dry weight of predominant weed species including broad-leaf types like *Cynotis villosa*, *Crassocephalus crepidiodes*, *Ageratum conyzoides*, *Bidens pilosa* as well as grasses and the less prevalent weeds were drastically reduced by Oxyfluorfen at 0.48 kg a.i.ha^{-1} compared to the effect of Diuron when sprayed in young tea (Table 1). Oxyfluorfen at 0.24 kg a.i.ha^{-1} reduced the dry weight of *Crassocephalus* and *Ageratum* as well as the dry weight of the total weed species compared to Diuron. When sprayed in pruned tea Oxyfluorfen at 0.48 and 0.24 kg a.i.ha^{-1} reduced the dry weight of total weed species though not to a significant extent (Table 2). Sandanam (1983) noted that Oxyfluorfen reduced the dry weight of weed species compared to Diuron.

TABLE 1 — *Effect of Oxyfluorfen on mean dry weight (kg/ha) of weed species in young tea at four months after spray*

	Predominant weeds					
Treatments	*Cynotis villosa*	*Crassocephalus crepidiodus*	*Ageratum conyzoides*	*Bidens pilosa*	*Grasses*	*Total weed species**
Control ...	152.84	110.62	35.90	85.39	40.47	461.60
Diuron (0.90 kg a.i.ha-^{1}) ...	124.49	72.75	31.65	43.56	27.51	385.94
Oxyfluorfen (0.12 kg a.i.ha-^{1}) ...	86.86	48.49	15.08	40.68	15.79	308.84
Oxyfluorfen (0.24 kg a.i.ha-^{1}) ...	69.60	25.18	13.96	39.18	6.34	178.14
Oxyfluorfen (0.48 kg a.i.ha-^{1}) ...	60.43	9.03	5.85	33.31	1.40	130.82
LSD (P = 0.05) ...	57.86	45.50	16.92	6.57	22.91	145.13

*Includes predominant as well as other less prevalent weed species.

TABLE 2 — *Effect of Oxyfluorfen on mean dry weight (kg/ha) of total weed species in pruned tea at four months after spray*

Treatments	*Mean dry weight*
Control	437.73
Diuron (0.90 kg a.i.ha-^{1})	213.46
Oxyfluorfen (0.12 kg a.i.ha-^{1})	201.67
Oxyfluorfen (0.24 kg a.i.ha-^{1})	122.78
Oxyfluorfen (0.48 kg a.i.ha-^{1})	84.46
LSD (P = 0.05)	158.71

Though very good control has been achieved with Oxyfluorfen at 0.48 kg a.i. the degree of control achieved with 0.24 kg a.i. was satisfactory and this could well be a suitable rate of application to contain weed growth, taking the cost aspect into consideration and the fact that there was no break down in weed control for about 16 weeks. Other workers have also found satisfactory control at this rate of application (Ghosh and Ramakrishnan, 1981; Rao and Kotoky, 1981). Sharma (1980) found that the pre-emergent efficacy of this herbicide increased linearly with the dosage and gave satisfactory control for 12 weeks at 2.0 l ha^{-1} by itself. In tea, the choice of residual herbicides has so far been limited. The beneficial results obtained with the herbicide reported here introduces a further choice to the industry. It is also to be noted that no adverse effects were seen on either the young or the pruned tea during the 4 month period of this study even when Oxyfluorfen was sprayed at 0.48 kg a.i.ha^{-1}. This was further confirmed in small scale experiments in which Oxyfluorfen was sprayed over the top of the plants, as a non-directed spray with partial spray drift to the tea and to the soil close to young plants. The non-directed spray did not cause any phytotoxic symptoms even at 0.48 kg a.i.ha^{-1}, while toxic symptoms developed when the herbicide was directed to the plant. The directed spray to the soil did not show any signs of the herbicide being absorbed by the roots and translocated to other parts of the tea plant. These results were similar to those obtained by Rao and Kotoky (1981) and Sandanam (1983).

However, it is urged that caution be exercised by fitting a protective guard to eliminate spray drift. It would be prudent to give no more than two applications per annum. Oxyfluorfen should not be repeated until weed control from the previous application breaks down, i.e. until re-growth of weeds occur. It would be wasteful and dangerous to repeat applications before weed control breaks down.

Optimum results can be expected only when the soil is moist at the time of spray application as if the soil is dry then the herbicide would not be expected to remain active for a long period. If weed growth regenerates, a contact weed-killer, such as paraquat could be added to the spray solution provided the weeds are young (up to 7 to 10 cm high).

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