EVALUATION OF AERIAL APPLICATIONS OF 2,4-D ALONE, OR WITH 2,4,5-T, TRICLOPYR, OR DICAMBA FOR CONTROL OF RUBBER VINE

G.J. Harvey
Alan Fletcher Research Station, PO Box 36, Sherwood Qld. 4075

Summary. Aerial application of esters of 2,4-D alone or in combination with 2,4,5-T, triclopyr, or an oil-soluble amine salt of dicamba gave good control of rubber vine, *Cryptostegia grandiflora*. Increasing the rate of 2,4-D was as effective as adding the more expensive 2,4,5-T, triclopyr, or dicamba. Added oils decreased the effectiveness of the spraying proportionately.

INTRODUCTION

Rubber vine is a serious weed of the Queensland pastoral industry north of latitude 26°S. It is susceptible to 2,4-D, 2,4,5-T, triclopyr, picloram and dicamba using ground application equipment (3, 4).

A major aim of the chemical control programme has been to find a chemical suitable for aerial application to the very large tracts of land where ground application is inefficient, or impossible, owing to the rough terrain. This paper presents the results of a trial using aerial application of 2,4-D ester.

METHODS

Location. The trial was conducted at Dalma, about 20 km west of Rockhamptom. The ex-softwood scrub soils are fertile but rocky and many of the hillsides are covered in lantana, *Lantana camara*, or rubber vine, often in mixed associations.

Herbicide application. The herbicides used were 2,4-D ethyl ester, dicamba oil-soluble amine, 2,4,5-T butyl/isobutyl ester, and triclopyr butoxyethyl ester, applied in a randomized block design, with 8 treatments by 2 replications. Plot size varied from 0.8-0.9 ha.

All herbicide treatments were applied using a Pawnee Brave 400 (fixed-wing) aircraft with a boom fitted with raindrop nozzles. The boom was calibrated to deliver 22.4 L/ha. The herbicides were applied in 44.8 L/ha, the aircraft making two passes in opposite directions over each plot.

Assessment and analysis. All plots were assessed (in April) 12 months after treatment. Plant densities were estimated using a point-centred quarter method (1, 2). Points were located at 8 m intervals along a transect running lengthwise down the middle of each plot. At each point, the following data was recorded for each of 4 plants: distance to the plant, whether the plant was dead or alive, and an injury rating on a 1-6 scale where 1 = no effect and 6 = plants dead.

Analysis of variance and linear regression were used to analyse the data.

RESULTS AND DISCUSSION

Plots were chosen to be as uniform as possible, but the density ranged from 463 to 1910 plants/ha, with a mean of 1030 $\pm$ 421 (s.d.).

Table 1. The effect of 2,4-D aerially applied alone in water, or in combination with diesel or other herbicides on rubber vine.

Herbicide	Rate (kg/ha)	Carrier	Kill (%)	Rating
1. 2,4-D	2.5	Water	24	4.83
2. 2,4-D	3.0	Water	40	5.43
3. 2,4-D	4.0	Water	55	5.39
4. 2,4-D	3.0	20% diesel	38	5.20
5. 2,4-D	3.0	36% diesel	14	4.01
6. 2,4-D + dicamba	2.0 + 0.5	Water	20	4.80
7. 2,4-D + 2,4,5-T	2.0 + 0.5	Water	38	5.11
8. 2,4-D + triclopyr	2.0 + 0.5	Water	27	4.92

No differences were found between treatments. A subset of the data (Treatments 2, 4 and 5) was then analysed by linear regression using the percentage oil phase in the mixture as the independent variable (X) and percent kill (Y), or rating (Z) as the dependent variable. The results were:

% Kill	Rating
$Y = 59.19 - 1.23X$ ($r = -0.95$**)	$Z = 6.43 - 0.07X$ ($r = -0.89$*)

All treatments were effective, since even the least effective treatment (3 kg/ha 2,4-D ester + 36% diesel distillate) reduced rubber vine biomass by 60-80%. Increasing the amount of 2,4-D from 2.5 to 4.0 kg/ha gave a slight improvement in biomass reduction but noticeably improved the percentage killed, as did the addition of 2,4,5-T, or triclopyr. The poor result with dicamba probably reflects a formulation problem. However, since all are more expensive than 2,4-D, increasing the rate of 2,4-D may be a cheaper option than the partial substitution of other chemicals for 2,4-D (as in Treatments 6-8). Some of the plants killed were quite large (5-6 m tall), having clambered over small trees, and it is noteworthy that the 2,4-D ester selectively killed the rubber vine but caused only minor damage to the native vegetation. An exception was several large trees, *Brachychiton* spp., which were also killed by 2,4-D.

Although all plots were chosen to be as uniform as possible within the selected area, variability within plots and between plots meant that no statistically significant differences were found. Linear regression analysis does, however, show a clear relationship between decreased result and increasing oil phase in the o/w emulsion spray. This relationship has now been demonstrated for rubber vine with several types of phytotoxic and non-phytotoxic oils, and for differing methods of application from high volume ground application to low-volume ground and earial application (3, 4).

Herbicide treatment resulted in the death of many seeds in seed pods which were very immature at the time of spraying. However, in more mature pods, apparently normal seed was produced, so some seed pods were harvested to test for seed viability.

It was found that only 22% of the seed from such pods germinated, compared with a germination rate usually in excess of 85% for normal, untreated seed. Herbicide treatment reduces the reproductive potential of rubber vine plants even when those plants do not die immediately following treatment.

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