A NEW FORMULATION OF 2,4-D ACID AND ITS EFFECT ON GROUNDSEL BUSH

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Summary. A new low volatile liquid 2,4-D acid formulation has been developed and tested successfully for the control of groundsel bush (*Baccharis halimifolia*) growing near sensitive tropical crops. The new product has become available commercially for foliar and basal applications.

INTRODUCTION

Various salts and esters of 2,4-D are used in the chemical control of tropical weeds (Kasasian 1971). Crop damage from 2,4-D spray and vapour drift has been well documented in tropical zones (Hartley 1964; Arvier 1977; Priestley 1979; Gage and Munro 1979). Particularly sensitive crops are bananas, beans, cotton, cucurbits, lettuce, papaya, pineapple and tomatoes.

Government legislation has been implemented in several countries to restrict herbicide usage (Arvier 1977). In Queensland "The Agricultural Chemicals Distribution Control Act", promulgated in 1966, has prohibited the use of chlorinated phenoxy esters in declared hazardous areas in the vicinity of sensitive crops (Anon. 1970). Since that time there has been a clear need for a new chlorinated phenoxy herbicide formulation which would provide comparable results to the commonly used esters.

Preliminary laboratory and glasshouse investigations have shown that the free acid form of 2,4-D is similar in phytotoxicity to the ester forms (Crafts 1975) but without the attendant volatility problem (Marth and Mitchell 1949). No data have been available on field applications of 2,4-D acid mainly because a suitable formulation of 2,4-D acid has not been available commercially. The author, therefore, set about developing and testing a new liquid formulation of 2,4-D acid suited to tropical conditions in Queensland.

MATERIALS AND METHODS

Since liquid 2,4-D acid was not available commercially, a suitable method of solubilisation and formulation had to be developed in the research laboratory. This was achieved with the aid of ethoxylated nonalol and dodecanol type surfactants. The formulated material (code named AF201) contained 300 g L^{-1} 2,4-D acid. It was tested in the laboratory for 2,4-D content, stability, miscibility in solvents such as diesel distillate and kerosene, emulsifiability in soft and hard water (up to 1000 ppm hardness) and subjected to accelerated shelf storage tests to ensure quality and uniformity in performance.

Replicated field trials were set out on the woody weed groundsel bush in January 1980 to determine the efficacy of AF201 applied as foliar and basal bark sprays. Foliage of individual plants (1.5 m high) were thoroughly wetted

using a pneumatic sprayer whilst the basal bark treatments were applied by paint brush to the lower 10 cm of stem. Ten plants per treatment were used, replicated four times. Concentrations of 2,4-D used in foliar spraying ranged from 0.1 to 0.5% (w/v) (diluted with water) whilst for basal bark painting from 0.25 to 4.0% (w/v) (diluted with kerosene). Observations were taken over a four month period.

RESULTS AND DISCUSSION

The effect of foliar spraying groundsel bush is shown in Table 1. A concentration of 0.3% (w/v) 2,4-D acid in water was required for a complete kill. Plants died three months after treatment.

Table 1. Effect of foliar spraying groundsel bush with 2,4-D acid in water.

2,4-D acid concentration (% w/v)	% Kill after 4 months
0 (Water + Surfactant)	0
0.1	30
0.2	75
0.3	100
0.4	100
0.5	100
Control	0

The effect of basal bark painting is shown in Table 2. Chemical girdling which took place following painting was greatly accelerated by the addition of 2,4-D acid. In the highest concentration of 2,4-D acid (*i.e.* 4.0% w/v) the ring of bark was dead five days after painting compared with 4 weeks for the lower concentration of 0.25% (w/v). The leaves and young stems had a slower reaction than the stems and died three months after treatment, without regrowth appearing.

Table 2. Effect of basal bark painting groundsel bush with 2,4-D acid in kerosene.

2,4-D acid concentration (% w/v)	% Kill after 4 months
0 (kerosene only)	10
0.25	20
0.5	80
1.0	100
2.0	100
4.0	100
Control	0

CONCLUSION

The 2,4-D acid formulation, code named AF201, has proved to be a

satisfactory substitute for esters of 2,4-D for the control of groundsel bush in Queensland. The new formulation has been made available in two commercial products - as the concentrate AF201 and a diluted ready-to-use basal paint.

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