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MET 1486: A NEW HERBICIDE FOR NON-SELECTIVE VEGETATION CONTROL

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Summary

MET 1486, a new urea derivative, has been evaluated as a non-selective herbicide over a 2½-year period under varying climatic and soil conditions. MET 1486 produced an acceptable level of total vegetation control for 5 months at 3.5 kg/ha, 9 months at 7 kg/ha, and at least 15 months at 14 kg/ha in areas of annual rainfall of 650 - 1500 mm. In areas of higher rainfall, 2000 - 3000 mm per annum, this level of control was maintained for 9 and at least 15 months at 7 and 14 kg/ha respectively. A table of species susceptibility is included and MET 1486 provided a broad spectrum of efficacy when considered in view of the common weeds of non-crop areas in the South Island. Furthermore, this herbicide was less affected by high rainfall, thus producing a longer period of acceptable total vegetation control under these conditions than the standards with which it was compared (bromacil/diuron, diuron, and karbutilate).

INTRODUCTION

MET 1486 contains the active ingredient of 1,3- dimethyl -3-(5 ethylsulfonyl - 1,3,4 - thiadiazole -2-yl)-urea and is formulated as a 70% wettable powder. MET 1486 has only slight foliar activity and is therefore chiefly absorbed through the roots, being transported by the transpiration stream to the aerial parts of the plant. Like other urea derivatives, MET 1486 is also a photosynthetic inhibitor.

Evaluation has taken place since 1973 at various sites throughout the South Island using comparative standards of karbutilate, bromacil, diuron, and a bromacil plus diuron mixture. In order to determine weed spectrum efficacy, sites were selected so as to contain the most common non-crop weeds in each of the respective areas.

METHOD

The trials were of randomised block design and replicated 4 times. Treatments were applied using a precision back-pack sprayer with a hand held boom fitted with Tee Jet 730308 nozzles applying 400 litres/ha at 275 kPa. Each plot size was generally 10 × 2 m over which two spray passes were made in reverse directions (total water 800 litres/ha). MET 1486 was applied at 3.5 - 14.0 kg/ha on suitably selected sites alongside railway tracks or roadsides where vegetative growth varied in height from 5 - 60 cm, with the average annual rainfall varying from 650 - 3000 mm.

On the spraying date a record was made of weed species present and at each routine assessment the whole plot was rated on a 0 - 10 scale where 0 = no effect, and 10 = complete kill, with the presence of surviving plants, and/or new growth, being recorded.

Rates of the standard non-selective herbicides were based on established field usage and were: 8 and 16 kg/ha for diuron, bromacil, and karbutilate, and 4 + 4 and 8 + 8 kg/ha for the mixture diuron/bromacil. Overseas data suggested MET 1486 be used at 3.5, 7.0, and 14.0 kg/ha.

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A total of 14 trials were laid down progressively over a period of 2½ years. The trials were located throughout the South Island: Nelson, Kaikoura, Christchurch, Timaru, Dunedin, Invercargill, Murchison, Westport, Greymouth. Thus trial sites included a wide range of soil types and rainfall.

RESULTS AND DISCUSSION

For the purposes of evaluation the results have been divided into two sections.

- (i) Rainfall between 650 and 1500 mm per annum comprising results from a total of 8 trials.
- (ii) Rainfall between 2000 and 3000 mm per annum comprising results from a total of 6 trials.

The line drawn on histograms figures 1 and 2 signifies the level to which control can deteriorate before re-treatment is warranted, or the over-all control becomes unacceptable for practical purposes (Meeklah 1964).

The histogram (Fig. 1) shows MET 1486 at 3.5 kg/ha to give acceptable control for less than 6 months and is therefore not sufficiently residual for anything other than short-term vegetation control, although initial knockdown was sufficient under the lower rainfall conditions.

At comparative rates of product under lower rainfall conditions MET 1486 has greater initial activity than the other materials tested at all rates. However, the residual activity of MET 1486 7 kg/ha was surpassed by bromacil 8 kg/ha 12 months after treatment. This was not the case with MET 1486 14 kg/ha where it showed greater initial activity and residual life than 16 kg/ha of the two comparative products.

The histogram (Fig. 2) under higher rainfall conditions shows MET 1486 at both comparative rates to have greater initial knockdown and residual activity than the two comparative products.

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FIG 2 COMPARATIVE EFFICACY OF MET 1486 AT HIGHER RAINFALL: 2000 - 3000 mm pa

Residual activity

Under lower rainfall conditions: MET 1486 at 3.5 kg/ha gave 4-5 months acceptable control while 7 kg/ha lasted 9 months and 14.0 kg/ha in excess of 15 months.

Under higher rainfall conditions: Here only rates above 7 kg/ha were tested as it was considered that the 3.5 kg/ha rate would not have the residual activity to sustain the heavier rainfall. MET 1486 at 7 kg/ha gave 9-10 months acceptable control while the 14 kg/ha rate gave in excess of 15 months.

Weed susceptibility

Table 1 lists the weed species and level of control obtained in all trials in relation to rate and duration of control experienced. MET 1486 provides a wide spectrum of control to include the majority of species which are to be commonly found in non-crop situations in the South Island.

Time of application

MET 1486 has given satisfactory results at all rates tested in spring application under both high and low rainfall conditions. However, only under lower rainfall conditions has autumn application been satisfactory.

Commercial usage

Commercial applications of MET 1486 have been made at rates varying from 8-12 kg/ha in areas in which it has been tested. Assessments at 6 months have demonstrated excellent weed control (including that of blackberry). Experience gained in N.Z. Railways' weed control programmes has shown that on metal substrates (ballast) lower rates of residual herbicides are required than on soil (e.g., 8 kg/ha on ballast will give similar results to 16 kg/ha on soil [D. A. Kennedy pers comm]).

This principle applies also to MET 1486.

TABLE 1: EFFECT OF MET 1486 ON WEED SPECIES

	3 months 3.5 kg/ha	6 months 7 kg/ha	9 months 14 kg/ha
GRASSES:			
barley grasses (<i>Hordeum</i> spp)	xxx	xxx	xxx
barnyard grass (<i>Echinochloa crus-galli</i>)	xx	xxx	xxx
bromus spp (<i>Bromus</i> spp)	xx	xxx	xxx
browntop (<i>Agrostis tenuis</i>)	xxx	xxx	xxx
cocksfoot (<i>Dactylis glomerata</i>)	xxx	xxx	xxx
couch (<i>Agropyron repens</i>)	xxx	xxx	xxx
crested dogstail (<i>Cynosurus cristatus</i>)	xxx	xxx	xxx
Kikuyu (<i>Pennisetum clandestinum</i>)	—	xx	xxx
poa annua (<i>Poa annua</i>)	xxx	xxx	xxx
poa pratensis (<i>Poa pratensis</i>)	xxx	xxx	xxx
ryegrasses (<i>Lolium</i> spp)	xxx	xxx	xxx
sweet vernal (<i>Anthoxanthum odoratum</i>)	xxx	xxx	xxx
tall fescue (<i>Festuca arundinacea</i>)	xxx	xxx	xxx
timothy (<i>Phleum pratense</i>)	xxx	xxx	xxx
vulpia hairgrass (<i>Vulpia</i> sp)	xxx	xxx	xxx
wild oat (<i>Avena fatua</i>)	xxx	xxx	xxx
Yorkshire fog (<i>Holcus lanatus</i>)	xxx	xxx	xxx
OTHER WEEDS:			
blackberry (<i>Rubus fruticosus</i> agg)	x	xx	xxx
bracken (<i>Pteridium aquilinum</i> var. <i>esculentum</i>)	x	x	x
broom (<i>Cytisus scoparius</i>)	xxx	xxx	xxx
buttercups (<i>Ranunculus</i> spp)	x	xx	xxx
Californian thistle (<i>Cirsium arvense</i>)	x	xx	xxx
catsear (<i>Hypochaeris radicata</i>)	xxx	xxx	xxx
chickweeds (<i>Cerastium</i> spp)	xxx	xxx	xxx
cleavers (<i>Galium aparine</i>)	xx	xxx	xxx
clovers (<i>Trifolium</i> spp)	xxx	xxx	xxx
daisy (<i>Bellis perennis</i>)	xxx	xxx	xxx
dandelion (<i>Taraxacum officinale</i>)	x	xx	xxx
docks (<i>Rumex</i> spp)	x	xx	xxx
fathen (<i>Chenopodium album</i> agg)	xxx	xxx	xxx
fleabanes (<i>Erigeron</i> spp)	—	xxx	xxx
fumitory (<i>Fumaria</i> spp)	xxx	xxx	xxx
gorse (<i>Ulex europaeus</i>)	—	xxx	xxx
hawkbit (<i>Leontodon taraxacoides</i>)	xxx	xxx	xxx
hawksbeard (<i>Crepis capillaris</i>)	xxx	xxx	xxx
lotus spp (<i>Lotus</i> spp)	xxx	xxx	xxx
lucerne (<i>Medicago sativa</i>)	xxx	xxx	xxx
lupins (<i>Lupinus</i> spp)	xxx	xxx	xxx
manuka (<i>Leptospermum scoparium</i>)	—	xxx	xxx
plantains (<i>Plantago</i> spp)	x	xx	xxx
rushes (<i>Juncus</i> spp)	x	xxx	xxx
scotch thistle (<i>Cirsium vulgare</i>)	xxx	xxx	xxx
sheep sorrel (<i>Rumex acetosella</i>)	x	xx	xxx
shepherds purse (<i>Capsella bursa-pastoris</i>)	xxx	xxx	xxx
sow thistle (<i>Sonchus</i> spp)	xxx	xxx	xxx
speedwell (<i>Veronica</i> spp)	xxx	xxx	xxx
spurrey (<i>Spergula arvensis</i>)	xxx	xxx	xxx
tares (<i>Vicia</i> spp)	xxx	xxx	xxx
wild carrot (<i>Daucus carota</i>)	xxx	xxx	xxx
wild turnip (<i>Brassica campestris</i>)	xxx	xxx	xxx
wireweed (<i>Polygonum aviculare</i> agg)	xxx	xxx	xxx
yarrow (<i>Achillea millefolium</i>)	xx	xxx	xxx

xxx = excellent control

xx = acceptable control

x = less than acceptable control

— = not recorded

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Additives to MET 1486

In most cases the initial broad spectrum vegetation control with MET 1486 was such that additives would not be necessary except under very low rainfall conditions or high growth, where the addition of a contact herbicide (amitrole or paraquat) may help to hasten knockdown or brown-off. Because Compositae species may only be temporarily controlled the addition of 2,4-D to MET 1486 may be desirable when retreatment becomes necessary.

CONCLUSION

Evaluation over a 2½-year period in the South Island has shown MET 1486 to have longer residual activity and a broader spectrum of vegetation control of both broadleaf and grass weeds under both high and low rainfall conditions than other materials currently available. It has also been demonstrated that the amount of precipitation appears to have little effect on the residual activity of the material.

ACKNOWLEDGEMENTS

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REFERENCE

- Meeklah, F. A., 1964. Non-Selective Weed Control. *Proc. 17th N.Z. Weed and Pest Control Conf.*: 63 - 67.