ETHIDIMURON (USTILAN^{R}) FOR TOTAL VEGETATION CONTROL IN REMOTE AREAS OF AUSTRALIA

M.W. Sumner and K.W. Russell
Bayer Australia Ltd., 47-67 Wilson Street
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Summary. Experiments commenced in 1977 in remote areas of Australia with ethidimuron showed that many species when emerged are susceptible but there are differences in susceptibility of different species. These differences disappeared as the application rate of ethidimuron was increased. Experiments also showed that low rates of application will prevent vegetation colonising treated areas for periods in excess of 12 months. In the arid area, ethidimuron at 4.2 kg a.i./ha has prevented growth establishing for more than six years. Should control of established perennials be required an appropriate herbicide, e.g. 2,4-D ester, or amitrole, can be added to low rates of ethidumuron.

INTRODUCTION

Ethidimuron is a herbicide with post-emergence activity identified for a great number of species which characterise weed problems in the higher rainfall zones of Australia. Its pre-emergence activity has also been identified for these environments.

The likelihood that it would be a suitable herbicide for weed control in remote and/or arid zones of Australia lead to the establishment of a series of experiments at sites chosen in variety of remote geographical locations encompassing a range of environmental conditions.

Vegetation control with herbicides in sparsely inhabited remote areas poses particular problems. Many of the places where weed control is required, such as along railway tracks, at the base of vermin fences, around staunchions supporting power transmission lines, are in arid and semi-arid zones and can be long distances from population centres where administrative decisions concerning maintenance are made.

The variability of the rainfall and plant growth patterns in arid and semi-arid environments makes it difficult to determine weed control strategies in advance.

This paper reports trials assessing the knockdown and residual efficacy of ethidimuron plus mixtures with other herbicides, applied to weed growth or bare ground in remote areas of Australia.

METHODS

The experiments commenced at the following times and places:

The Pilbara, W.A. in February 1977 and at Pt. Hedland W.A. in November 1982.
Tarcoola, S.A. in June 1980.
Yunta, S.A. in March 1983.
Blamey, W.A. in May 1985.
Bardoc, W.A. in October 1985.
Norseman, W.A. in August 1986.

In the earliest trials, a wettable powder formulation +/- amitrole was evaluated at application rates of ethidimuron ranging from

4.2-17.5 kg a.i./ha. In later experiments a much narrower and lower range of application rates was used. These were based on already assessed treatment effects on emerged weeds in the Pilbara and at Tarcoola and observation that the subsequent pre-emergence effect of ethidimuron exceeded 12 months. Thus, in later trials application rates ranged from 0.7-3.5 kg/ha of the wettable powder formulation at Pt. Hedland, and from 2.1-7.0 kg/ha of both the 150 G granule, 50 G granule, and/or wettable powder formulations +/- 2,4-D at 2.4 kg a.e./ha as the amine or ester, or amitrole 2.5 kg a.i./ha at other sites.

The wettable powder formulation was applied in 50 to 340 L water/ha using 3-7 m booms and the granule formulations were applied by hand, or with Dyna rail equipment fitted with a Macspread granule applicator.

Plots ranged in size from 20x3 m in trials with granules at Bardoc, at Pt. Hedland, and Yunta, to 900-1000x7 m on railway track at Tarcoola and Blamey.

In trials with small plots plant numbers or percentage ground cover were assessed at the time of application. In trials with larger plots on railway tracks only the relative frequency of species was recorded.

Treatment effects on emerged species were assessed using the same criteria to calculate percentage control towards the end of the growing season of treatment. Pre-emergence effects were assessed by recording either the percentage bare ground in plots at the time of treatment and at subsequent times up to six years afterwards in the case of the Tarcoola trial, or by recording species which were growing outside treated plots on railway tracks and which reasonably could have been expected to have colonised plots had they not been treated with ethidimuron.

RESULTS AND DISCUSSION

The experiments have shown that many emerged species are susceptible, especially annuals and seedling perennials. In general, well established perennial plants, notably the saltbushes, particularly, *Atriplex acutibractea*, and to a lesser extent its sub-species, *karoniensis* in the Blamey and Bardoc environments, were relatively tolerant of ethidimuron and required application rates in excess of 7 kg/ha for effective control. Likewise *Sclerolaena uniflora* at Bardoc was incompletely controlled with 7.0 kg/ha.

Complete control of pop saltbush, *Atriplex spongiosa*, at Blamey, and of bladder saltbush, *Atriplex vesicaria*, at Yunta was obtained with both the wettable powder and 150 G granule formulations of ethidimuron at 3.5 kg/ha.

The better control of bladder saltbush at Yunta, may reflect the higher rainfall there (225 mm) than at Blamey (89 mm) during the growing season.

At Tarcoola complete control of *Sclerolaena brevifolia* and *Sclerolaena obliquicuspis* at 4.2 kg/ha may also reflect the higher rainfall (42.4 mm) during the four month period following treatment.

Control of well established perennial grasses, bottle washers, *Enneapogon avenaceus*, and leafynineawn, *Enneapogon polyphylla*, in the dry climate of Tarcoola was not obtained with ethidimuron 8.4 kg/ha, but control was achieved by adding amitrole 2.75 kg/ha to ethidimuron 4.2 kg/ha.

Control of scent grass, *Cymbopogon ambiguus*, was obtained at Yunta with ethidimuron 3.5 kg/ha but not in the drier environment at Blamey.

At the Pilbara, the related species camel grass, *Cymbopogon bambycinus*, in addition to spinifex, *Triodia* spp., was controlled with the lowest rate of ethidimuron applied, 7 kg/ha.

Post-emergence control of annuals notably the widespread Ward's weed, *Carrichtera annua*, and annuals typical of less remote places including barley grass, *Hordeum leporinum*, burr medic, *Medicago polymorpha*, and Indian hedge mustard, *Sisymbrium orientale*, were controlled whenever present at the lowest rate of ethidimuron applied, viz. 2.1 kg/ha.

The experiment at Norseman was established after assessment of treatment effects at Blamey showed that *Atriplex acutibractea* tolerates 8 kg/ha ethidimuron applied as the 150 G granule formulation.

The results at Norseman showed that this species could be controlled by adding 2.4 kg/ha 2,4-D ethyl ester to 3.5 kg/ha ethidimuron applied as a spray.

The duration of residual activity of ethidimuron at all trial sites is not yet determined because many of the treated plots are still completely bare - notably at Tarcoola where successive weed germinations have been killed. At other sites there has been no decrease in the percentage bare ground following control of all or some of the emerged species present, and/or natural senescence of annuals.

The following list has been drawn up to show for the various species which characterise the vegetation at trial sites, the residual effects of particular application rates:

Pilbara 7.0 kg/ha, > 4 years

Cymbopogon bambycinus
Triodia sp.

Pt. Hedland 2.8 - 3.5 kg/ha, > 1.5 years (2 wet seasons of 500 mm rain)

Acacia sp.
Cassia chatelainiana
Corchorus walcottii
Evolvulus alsinoides
Indigofera monophylla
Triodia sp.
Sida sp.

Yunta 3.5 kg/ha, > 2 years 8 months

Atriplex vesicaria
Cymbopogon
Hordeum leporinum
Medicago polymorpha
Sisymbrium orientale

Blamey 2.1 kg/ha, > 15 months

Atriplex acutibractea
Atriplex spongiosa
Carrichtera annua
Sonchus sp.

Tarcoola 4.2 kg/ha, > 6 years

Acacia aneura
Aristida contorta
Atriplex spongiosa
Atriplex vesicaria
Cassia artemisioides
Cassia nemophila var. *platypoda*
Citrullus lanatus
Conyza bonariensis
Cymbopogon ambiguus
Dissocarpus paradoxus
Enneapogon avenaceus
Enneapogon oblongus
Enneapogon polyphyllus
Eragrostis dielsii
Eragrostis setifolia
Erodium cygnorum
Euphorbia drummondii
Ixiolaena leptolepis
Maireana sp.
Maireana pentatropis
Maireana turbinala
Mesembryanthemum aitonis
Nicotiana glauca
Nitraria billardieri
Oryzopsis miliacea
Panicum capillare
Paspalidium basicaldum
Pennisetum villosum
Podolipis capullaris
Pterigeron adscendens
Pterocaulon sphacelatum
Ptilotus obovatus
Rumex vesicarius
Salsola kali
Schismus barbatus
Sclerolaena sp.
Sclerolaena brevifolia
Sclerolaena divaricata
Sclerolaena diacantha
Sclerolaena obliquicuspis
Senecio lautus
Sida sp.
Solanum petrophilum
Sonchus tenerrimus
Stipa nitida
Stipa variabilis
Vittadinia sp.
Vittadinia triloba

CONCLUSION

The series of experiments shows that ethidimuron will control a number of emerged species and that low rates of ethidimuron will completely prevent the establishment of a wide range of species in places where bare ground is required for periods exceeding one year. Should control of established perennials be required, an appropriate herbicide, e.g. 2,4-D ester or amitrole, can be added.