Triclopyr - a new herbicide for control of broadleaved and woody weeds

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SUMMARY

Triclopyr (3,5,6-trichloro-2-pyridyloxyacetic acid) is a new herbicide developed by The Dow Chemical Company. The chemical, physical and biological characteristics of triclopyr are reviewed. The results obtained from use of triclopyr on various weeds in Australia and overseas are discussed.

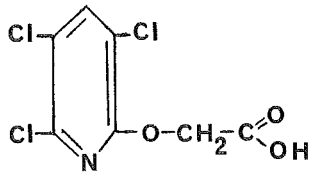
It appears that triclopyr has a similar weed spectrum to 2,4,5-T (2,4,5-trichlorophenoxyacetic acid) with improved activity on some species such as blackberry (*Rubus* spp.) and eucalypts (*Eucalyptus* spp.).

INTRODUCTION

Triclopyr (3,5,6-trichloro-2-pyridyloxyacetic acid) is a new herbicide developed by The Dow Chemical Company. Details of the chemical were first released in 1974 (Anon, 1974) under the code name Dowco 233. Trials have shown that triclopyr is very effective in controlling many woody and broadleaved weeds. Established grasses are not usually injured at rates required for broadleaved and woody weed control.

Chemical and physical properties

Structural formula:



3,5,6-trichloro-2-pyridyloxyacetic acid

Molecular formula:	$C_7H_4Cl_3NO_3$
Molecular weight:	256.48
Physical state:	White solid, odourless
Melting point:	148-150°C
Decomposition temperature:	290°C
Vapour pressure:	1.26×10^{-6} mm Hg at 25°C
	5.30×10^{-6} mm Hg at 40°C

Solubility: Water - 430-440 ppm at 24.5°C
Ethanol - very soluble
Benzene - slightly soluble

Formulations

Currently two formulations of triclopyr are being evaluated:

M-3724 A water soluble triethylamine salt containing 360 g/ℓ a.e. triclopyr.

M-4021 An oil soluble, water emulsifiable ethylene glycol butyl ether ester containing 480 g/ℓ a.e. triclopyr.

Work in New Zealand and Europe suggests that the ester formulation is more active than the amine formulation.

Toxicology

Acute oral toxicity to mammals: Triclopyr has a moderate acute oral toxicity to mammals.

	LD50 mg/kg	
	Triclopyr	M-3724
Rats - male	713	2830
- female	713	2140
Rabbit	550	-
Guinea pig	310	-

Eye irritation: Triclopyr is only slightly irritating to the eye.

Skin irritation: Essentially non-irritating to either intact or freshly abraded skin.

Fish toxicity: Both triclopyr and its triethylamine salt have a very low toxicity to fish.

Toxicity to birds: Triclopyr has a very low toxicity to mallard duck and Japanese quail.

Fate in soil

Triclopyr degrades quite rapidly in soil under temperature and moisture conditions favourable for microbial activity. The half life in trials carried out in U.S.A. varied from 10 to 46 days. Triclopyr under field conditions degrades somewhat more slowly than 2,4,5-T but considerably faster than picloram. At anticipated rates of use it is not expected that triclopyr residues will present phytotoxic problems in most soils one year after application.

Physiological behaviour in plants

Triclopyr induces characteristic auxin-type responses in growing plants. It is absorbed by both leaves and roots and is readily translocated throughout the plant.

Biological activity

Triclopyr has been evaluated on a wide range of woody and

broadleaved weeds in the U.S.A., Europe, Japan, New Zealand and Australia.

Species of interest in Australia on which trials have been carried out are listed in Table 1.

CONCLUSIONS

It would appear the triclopyr will find a place in Australia for weed control. Results in Australia and overseas suggest that the major field of use will be on woody weeds. Some work has been carried out in Europe using triclopyr for post-emergence broad-leaved weed control in cereals and in Asia for similar purposes in rice. Work in Japan indicates that triclopyr may have a place in weed control in turf (Ishikura, 1977).

New Zealand work with triclopyr shows that triclopyr has significantly greater activity on blackberry (*Rubus fruticosus*) than the standard 2,4,5-T treatment (Forgie et al, 1977). Preliminary results in Australia tend to confirm these findings. Triclopyr also appears to be more active on *Eucalyptus* spp. than 2,4,5-T which could be of interest in areas where picloram formulations cannot be used for overall foliage sprays because of possible soil residue problems. The activity of triclopyr on gorse (*Ulex europaeus*) and brigalow (*Acacia harpophylla*) is also of interest.

If for some reason the use of 2,4,5-T is restricted or withdrawn triclopyr should provide a very effective substitute free from both dioxin and the emotionalism associated with that very useful herbicide.

REFERENCES

Anon. (1974).- Technical information on Dowco 233 - a new experimental herbicide. Dow Chemical U.S.A.

Forgie, C.D., Saunders, D.G. and MacDiarmid, B.N. (1977).- Blackberry control with triclopyr. *Proceedings 30th New Zealand Weed and Pest Control Conference*, 71-75.

Ishikura, H., Arai, F., Tagucki, J. and Oinuma, T. (1977).- Triclopyr, a promising herbicide for control of broad leaved weeds. *Proceedings 6th Asian Pacific Weed Science Society Conference*.

Table 1. Efficacy data on triclopyr

Weed	Country	Formulation	Concentration (g/ℓ)	Rate (kg/ha)	Control (%)
Acacia harpophylla	Aust.	M-4021	4.0		100
Ailanthus altissima	U.S.A.	M-3724	2.0		100
Ambrosia elatior	Japan	"		0.5	100
Artemisia vulgaris	"	"		2.2	70
Aster yomena	"	"		2.0	80
Berberis glaucocarpa	N.Z.	Butoxyethanol ester	2.0		100
Callitris spp.	U.S.A.	M-4021	7.2		Good
Centaurea depressa	Turkey	"		3.36	93
Cirsium arvense	N.Z.	M-3724		2.0	70
Commelina communis	Japan	"		1.4	100
Convolvulus arvensis	Germany	"		1.4	90
Crataegus spp.	U.S.A.	"	4.3		98
Cyperus rotundus	Japan	"		2.0	100
Cytisus scoparius	N.Z.	Butoxyethanol ester		4.0	Good
Datura stramonium	U.S.A.	M-3724		4.5	Good
Erigeron spp.	Japan	"		1.0	100
Eucalyptus foecunda	Aust.	"	4.0		95
E. socialis	"	"	4.0		95
Gnaphalium multiceps	Japan	"		1.4	100
Hydrocotyl subthorpioides	"	"		1.0	100
Lupinus arboreus	N.Z.	"		4.0	Good
Melaleuca spp.	U.S.A.	M-4021	7.2		Good
Oxalis martiana	Japan	M-3724		1.0	100
Pinus spp.	"	"	4.3		100
Plantago asiatica	"	"		2.2	94
Polygonum spp.	"	"		2.2	100
Populas spp.	U.S.A.	"	4.3		100
Pueraria thunbergiana	Japan	"		2.0	100
Rhus javanica	"	"		2.0	100
Robinia pseudoacacia	U.S.A.	"	4.3		100
Rosa californica	"	"		4.5	90
R. multiflora	Japan	"		3.6	100
R. rubiginosa	N.Z.	"	2.0		72
Rosa spp.	U.S.A.	"	4.8		100
Rubus crataegifolius	Japan	M-4021		3.0	100
R. fruticosus	N.Z.	M-3724	2.0		100
R. procerus	Aust.	M-4021	4.0		100
R. procerus	"	M-3724	4.0		90
Rubus spp.	U.S.A.	M-3724,M-4021		3.36	100
R. ulmifolius	Aust.	M-3724,M-4021	0.5		100
Rumex japonicus	Japan	M-3724		2.0	90
R. obtusifolius	"	"		4.0	100
Salix spp.	U.S.A.	"	4.5		100
Senecio jacobaea	N.Z.	"		2.0	45
Solanum mauritianum	"	Butoxyethanol ester		4.0	Good
Solidago altissima	Japan	M-3724		3.6	100
Taraxacum officinale	"	"		1.4	100
Trifolium repens	"	"		1.0	100
Ulex europaeus	Aust.	M-3724,M-4021	4.0		100