CONTROL OF FOREST WEEDS WITH DPX 3674

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Summary

Trials with DPX 3674 over a three year period have given good control of many forest weeds. Rates and times of application are given for control of toetoe (*Cortaderia fulvida*), bracken (*Pteridium aquilinum* var. *esculentum*), buddleia (*Buddleia davidii*) and other species. Radiata pine (*Pinus radiata*) has proved tolerant to normal application rates.

INTRODUCTION

Initial trials with DPX 3674 suggested the possibility of control of bracken and toetoe in plantations of radiata pine, and showed that radiata pine was tolerant to low rates applied as a foliar spray. There were also indications that this chemical could control tall fescue (*Festuca arundinacea*), kiokio (*Blechnum capense*), buddleia, blackberry (*Rubus fruticosus* agg), tutu (*Coriaria arborea*) and grasses and annuals (Bowers and Porter 1975).

A total of 65 trials (including 12 aerial trials) has allowed further definition of rates and times of application for control of these species. This paper gives recommendations for the use of DPX 3674 in radiata pine plantations for the control of toetoe, bracken, buddleia, tall fescue, kiokio and paspalum (*Paspalum dilatatum*) and gives further information in the tolerance and growth of planted radiata pine.

EXPERIMENTAL

Small plot trials were sprayed with a modified Oxford precision sprayer at a pressure of 200 kPa at varying total application rates. Aerial trials were sprayed by helicopter in two half-overlapping passes with a total application of 5.6 kg DPX 3674 in 500 litres/ha.

Weed control was assessed on a 0-10 scale and expressed as percent control. Green weight of trees is given as the mean tree weight per plot above ground level.

Three trials to test tree tolerance and grass control were laid down in August 1975 and September and November 1976, in pasture. DPX 3674 at rates of from 0.9-7.2 kg/ha were applied alone and in combination with other herbicides directly over 20-tree plots of radiata pine, with three replications.

Tree heights and diameters were measured in May 1977. In the August 1975 trial green weights above ground level were measured in May 1977 (Table 1). In the two 1976 trials weed control was assessed in May 1977 (Table 2).

Further trials were laid down to find optimum times and rates of application for the control of bracken, toetoe, tall fescue, buddleia, kiokio and paspalum (Table 3).

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TABLE 1: Tree tolerance in grass control trial

Mean Tree Measurements May 1977 Treated August 1975						
Treatment (kg/ha)		Height (cm)	Diameter (cm)	Survival %	D ² H*	Green weight (kg)
DPX 3674	0.9	158	3.0	87	1422	1.7
DPX 3674	1.8	183	3.5	100	2242	2.3
DPX 3674	2.7	193	3.9	98	2936	2.9
DPX 3674	3.6	189	3.7	92	2587	2.7
DPX 3674	5.4	194	3.8	88	2801	2.8
untreated control		110	1.7	65	318	0.4

* D²H = diameter squared x height cm³

TABLE 2: Tree tolerance and weed control

Mean Tree Measurements May 1977					
Treatment	Rate kg/ha	Treated 16.9.76 D ² H	% Weed Control	Treated 18.11.76 D ² H	% Weed Control
DPX 3674	2.7	353	60	150	85
DPX 3674	3.6	344	68	186	94
DPX 3674	4.5	293	80	153	95
DPX 3674	5.4	334	94	123	95
DPX 3674	7.2	373	99	152	98
DPX 3674	1.35 + simazine 3.2	162	37	124	83
DPX 3674	1.35 + atrazine 3.2	217	35	125	79
DPX 3674	1.35 + terbumeton 1.6 + terbutylazine 1.6	250	65	122	91
DPX 3674	1.35 + diuron 3.2	141	23	46	90
DPX 3674	1.8 + amitrole-T 1.0	314	70	—	—
untreated control		60	0		

RESULTS AND DISCUSSION

Bracken

In the Kinleith area most of the bracken fronds die off in the winter, and control during this period relies entirely on root absorption. The best control was obtained when all the fronds were fully unfurled and maximum foliar absorption occurs. With the autumn frosts foliar absorption appeared to be reduced and control relied on herbicide

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residues in the soil. Since these had 6 months or more to leach out before frond emergence, the degree of control even at 7.2 kg/ha was poor (Fig. 1).

TABLE 3: Mean visual ratings for weed control

Species	Date of Treatment	Rate of DPX 3674 (kg/ha)	Percent weed control months after treatment				
			2	4	6	12	15
bracken	9.6.75	3.6					40
		5.4					44
		7.2					57
	4.9.75	3.6			50		68
		5.4			44		64
		7.2			87		90
	7.11.75	3.6	100		45	50	72
		5.4	100		62	77	87
		7.2	100		77	87	94
	8.12.75	3.6	80	90		90	
		5.4	95	94		95	
		7.2	100	95		98	
	3.2.76	3.6	95		94		95
		5.4	100		95		97
		7.2	100		100		99
toetoe	17.5.75	5.4		45		65	55
		7.2		75		90	90
	10.6.75	2.7		24	30		35
		3.6		50	57		44
		4.5		45	67		60
		5.4		60	67		67
		7.2		73	92		92
	30.10.75	2.7				87	75
		3.6				87	75
		4.5				93	88
		5.4				100	96
		7.2				98	97
	30.10.75	2.7	100			73	74
		3.6	100			87	90
		4.5	100			97	98
		5.4	100			100	100
		7.2	100			97	98
buddleia	12.10.75	3.6		87		75	
		5.4		80		80	
		7.2		80		95	
	4.2.76	1.8	30		30		
		3.6	85		95		
		7.2	90		95		
	7.12.75	3.6	66	62		53	
		5.4	92	93		65	
		7.2	97	97		63	
paspalum	7.12.75	9.0	98	98		63	
		10.8	98	98		82	

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When DPX 3674 was applied during periods of active growth fronds browned off in 4-6 weeks. New fronds continued to emerge, vigorous during the time of normal flush and weak at other times, but these soon died. The percentage of fronds surviving was very low or none during the first season after application and less than 10% and stunted during the second season. During the third season 20%-30% of the original frond numbers were present, but these fronds showed poor vigour and often exhibited symptoms of DPX 3674 toxicity. The rate necessary to achieve good control depended not only on the time of application but also on the vigour of the bracken.

Five sites ranging from 1-25 ha were aerially sprayed to control bracken during January 1977. Three sites were sprayed over radiata pine planted in winter 1976 as a release treatment. At four sites the bracken fronds had browned off in two months. In one area the main vegetation was bracken up to 1.5 m and dense blackberry; both were successfully controlled and the trees were visible 10 weeks after spraying. An area of very dense bracken 2-3 m high was treated before all fronds had emerged. Following application many new fronds emerged, and final brown off took three months.

Fig 1 Control of bracken with DPX 3674 at 15 months

Fig 2 Control of toetoe with DPX 3674 at 15 months

Toetoe

Over 80% control of toetoe was obtained at all times of year with 7.2 kg/ha of DPX 3674. To achieve control with lower rates treatment should be applied from mid-Spring to late Summer. Treatments before or after the period of active growth appear to rely on root absorption for control (Fig. 2). Plants up to 1 m high died within 1 month; large plants from 1-3 m took 2 months. A rate of 3.6 kg/ha was sufficient for good control if applied from the ground.

An area of two hectares was aerially treated in mid-December 1976. Plants up to 2.5 m were dead in 2 months. Other species fully controlled in this trial were Yorkshire fog (*Holcus lantus*), tall fescue, kiokio, bracken, koromiko (*Hebe salicifolia*) and broadleaf annuals. Control of Himalaya honeysuckle (*Leycesteria formosa*) at 4 months was 60%.

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Tall fescue

Good control of tall fescue was obtained at rates as low as 2.7 kg/ha applied during periods of active growth. When sprayed in the winter, there was no control at rates up to 7.2 kg/ha.

Buddleia

Rates of 3.6 kg/ha and over gave good control of buddleia plants up to 2 m high. Initial defoliation with some tip dieback was followed by a further flush, with leaves smaller and chlorotic; these leaves then fell and severe stem dieback occurred. After 6 months chlorotic regrowth from the base of some plants was visible, which became more vigorous the following season though still weaker than normal.

An area of 20 ha was aerially sprayed in early January 1977, to control buddleia 1.5-2 m high smothering a plantation of radiata pine planted in winter 1975. Complete dieback of most plants had occurred by the end of April, control being estimated at 95-98%.

Kiokio

Plots treated in November 1974 with 3.6 kg/ha have shown no regrowth to date. Plots sprayed in February at rates of 0.9, 1.8, 2.7 and 3.6 kg/ha show control of 70%, 80%, 100% and 100% respectively after 3 months. An area treated aerially in January 1977 showed an estimated 98% control at 4 months.

Treatment outside the period of active growth gave poor control. A rate of 3.6 kg/ha applied in April gave only 55% control by November; uptake was apparently by root absorption only, as little or no foliar effects were seen until spring.

Paspalum

Treatment in December 1975 gave good control during the first growing season at rates of 5.4 kg/ha and above. Treatment in winter had little or no effect.

Other species

Grasses and broadleaf annuals including fleabane (*Erigeron* spp.), fireweed (*Erechtites* spp.), and white clover were controlled at rates of 3.6 kg/ha and over. Lotus major (*Lotus pedunculatus*) was initially controlled but regrowth soon occurred at rates up to 7.2 kg/ha. Blackberry was controlled at 5.4 kg/ha, and 7.2 kg/ha gave control for two growing seasons. A rate of 7.2 kg/ha applied in winter gave good control for at least one year. Wineberry (*Aristotelia serrata*) was fully controlled at rates of 2.7 kg/ha and over applied in December.

Tree tolerance

Radiata pine has proved tolerant to rates of DPX 3674 up to 7.2 kg/ha. In some trials for release of trees from grass an initial growth depression was noted at 7.2 kg/ha but no differences were evident by the end of the first growing season, probably due to better weed control (Bowers and Porter 1975).

Radiata pine is less tolerant to DPX 3674 during the period of maximum spring flush than at other times of year. The reductions in growth shown in Table 2 for the November treatments are due

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partly to the time of application and partly to lack of weed control up to the time of treatment.

From observation trees show greater tolerance to DPX 3674 applied aerially than to the same rate applied using ground equipment. This is probably due to spray pressure. In aerial applications in summer to release trees in the first year after planting, the rate used of 5.4 kg/ha caused slight needle scorch on a small percentage of the trees in open areas. No tree deaths were seen. The same rate applied in December 1976 over trees planted for 18 months caused tree scorch on an estimated 5% of the trees. Trees planted for 30 months treated in early January have shown slight scorch on the lower needles of less than 5% of the trees.

Timing of application

Application should be made to suit the optimum stage of growth of the weeds to be controlled, taking into account the effect of the weeds on tree growth and survival and the stage of growth of the trees.

The following times and rates of application are given for the control of weeds in the Kinleith forests:

Weed species	Rate of DPX 3674 (kg/ha)	Month of application
bracken	3.6 to 7.2	mid December to February
toetoe	3.6 to 5.4	late September to February
tall fescue	2.7 to 4.5	late September to February
buddleia	4.5 to 7.2	December to February
kiokio	1.8 to 3.6	November to February
paspalum (Mahurangi forest)	3.6 to 5.4	October to March

When treating mixtures of the above weeds and mixtures with other species rates of DPX 3674 should be adjusted accordingly.

Because of the optimum timing as indicated above, DPX 3674 is better used as a release treatment following planting rather than for site preparation. This offers the further advantage that control of many species by residues is extended by up to 12 months.

CONCLUSIONS

DPX 3674 gave control of bracken, toetoe, tall fescue, buddleia, kiokio, paspalum and many other weeds in plantations of radiata pine. Radiata pine was tolerant to rates up to 7.2 kg/ha. DPX 3674 was best applied as a release treatment following planting.

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