DPX 3674 – A BROAD SPECTRUM HERBICIDE FOR WEED CONTROL IN FORESTRY

A. COACKLEY and R.W. MOORE

Neill, Cropper and Co. Ltd, Auckland and Christchurch

Summary

Trials conducted during the years 1974-76 in different forest locations in New Zealand showed that DPX 3674, a triazine dione, could provide effective control of a wide range of weeds. Excellent control of grasses such as Yorkshire fog (*Holcus lanatus*), brown top (*Agrostis tenuis*) and cocksfoot (*Dactylis glomerata*) was obtained at rates of application from 1.8-5.4 kg/ha while on bracken (*Pteridium aquilinum* var *esculentum*) rates from 5.4-7.2 kg/ha were required. Rates from 5.4-10.8 kg/ha also proved to be effective on wattle (*Acacia decurrens*) and broom (*Cytisus scoparius*). The best time of application was when weeds were actively growing during the early season flush, commencing mid-September in the Central North Island.

INTRODUCTION

The use of herbicides in forestry has become established practice, with chemicals being used for two thirds of all weed control in post-planting operations, and almost a third in pre-planting operations. However although the arsenal of herbicides for use in forestry has increased markedly over the last 8 years or so, most of these are specific in their control of certain weed species, some can only be used at a specific stage of weed growth and yet others can only be applied safely as pre-plant treatments. The search for a chemical with a broad spectrum of activity that would selectively control weeds in radiata pine (*Pinus radiata*) plantations is therefore still in the forefront of herbicide investigational work in forestry.

The present paper summarizes experimental work conducted with DPX 3674 over a period of more than 2 years at various forest sites in New Zealand with the objective of evaluating both its herbicide activity and its selectivity to radiata pine.

EXPERIMENTAL METHOD

Eleven trials were laid down over a period of two and a half years at various sites in forest plantations and under a varied set of climatic conditions and soil types. The layouts consisted of randomised blocks with 3-4 replications per treatment. The herbicides were applied using a modified Oxford precision sprayer fitted with fan nozzles operating at 205 kPa. Depending on the weed species present and their density at the experimental sites water rates varied from 350 to 450 litres/ha. Plot size was between 20-40 m² and applications made between September and February. In the "Timing of application trial" applications were made in June, August, September and February.

Proc. 30th N.Z. Weed and Pest Control Conf.

Forestry

DPX 3674 was evaluated at rates ranging from 0.45-10.8 kg/ha both alone and in combination with diesel oil for bracken control, and in combination with 2,4,5-T plus picloram for gorse and broom control. At each experimental site the treatment usually used for the particular weed problem at the location was included as the standard treatment. Assessment of effects was made at various intervals throughout the period of the trials and weed control efficacy was assessed on a 0-10 scale where 0 = no control and 10 = complete control. The trial sites were located at Dunsandel, Ashley, Kaingaroa, Rotoaira, Mohaka, Waitangi and Glenbervie in typical forest situations.

RESULTS AND DISCUSSION

Timing of application

From the data presented in Fig. 1 it will be observed that the optimum time of application for extended residual weed control was September (Fig. 1 c). Earlier applications in June and August (Fig. 1 a, b) and late season applications in February (Fig. 1 d) did not provide as good weed control nor as effective residual activity. From Fig. 1 it will be noted that weed control response improved as the rate of application of DPX 3674 was increased from 0.9 to 5.4 kg/ha irrespective of time of application. However 7.2 kg/ha was no better than 5.4 kg/ha suggesting that this rate would be the optimum for effective control of weeds under the growth conditions existing at the experimental site.

The small variation in the effect of rates of application 3.6, 5.4 and 7.2 kg/ha in February may indicate that after initial good control, which lasted for about 4 months, DPX 3674 activity gradually slowed down as the cold season set in. In June the decrease in weed control achieved during the cold season could be attributed to a decrease in the absorptive activity of the root system, due to a slower transpiration rate, thus preventing lethal concentrations building up at cell level, and/or a re-infestation from winter weeds germinating from seeds occurring in the upper soil layers from which the chemical had leached. As DPX 3674 has both foliar and root activity it seems reasonable to believe that in September, conditions suited these two modes of entry hence the better weed control response obtained. In addition leaching, following this application would be less, resulting in longer residual control.

WEED RESPONSE

Grass

From Fig. 2 it will be observed that excellent control of grasses, the dominant weed species, and mainly brown top and cocksfoot, was obtained up to 18 months at the Dunsandel site in the South Island with DPX 3674 at 3.6 kg/ha, while 1.8 kg/ha provided 12 months control (Fig. 2 a). In contrast 3.6 kg/ha at the two sites in the North Island, where Yorkshire fog was the dominant species (Fig. 2 b, c), provided acceptable to good weed control for only 6-8 months, while 5.4 kg/ha (Fig. 2 c) was barely more effective, giving about 10 months weed control.

Forestry

Fig. 1 Effect of time of application on degree and persistence of weed control

The longer residual activity of DPX 3674 at the South Island site at equivalent rates of application would appear to be mainly due to the lower rainfall regime, 600 mm at Dunsandel compared to 1900 mm at Glenbervie and 1575 mm at Kaingaroa, coupled with the lower organic matter content of the soil, 4.6% at Dunsandel, 7.2% at Kaingaroa and 6% at Glenbervie.

Bracken

Good initial breakdown of bracken was obtained within 2 months of spraying DPX 3674 at 5.4 kg/ha and above (Fig. 3) while at 3.6 kg/ha the effect was less rapid and not as complete. However when DPX 3674 at 3.6 kg/ha was applied with 20 litres of diesel oil/ha results at 10 months were as good as 5.4 kg/ha used alone.

DPX 3674 at 3.6 kg/ha plus diesel oil and alone at 5.4 kg/ha and above provided excellent control of bracken from 9 to 12 months.

Forestry

Generally after this period new fronds appeared and reached 60 cm before they became chlorotic and ultimately died. This effect was more apparent at 5.4 kg/ha than 7.2 kg/ha or above where good control was maintained for 15-20 months. Again early spring applications (Waitangi) provided more effective and longer residual weed control than summer applications (Mohaka and Rotoaira). Applications were made at all sites when the majority of the bracken was unfurled.

Fig. 2 Grass control trials

Fig. 3 Bracken control trials

Broom, gorse and wattle

Results are presented in Table 1.

DPX 3674 at 10.8 kg/ha effectively controlled broom, 60 cm to 1 m high at time of spraying for at least 16 months. However 3.6 kg/ha DPX 3674 plus picloram (0.25 kg/ha) and 2,4,5-T (1 kg/ha) provided weed control as effective as the 10.8 kg/ha DPX 3674 alone.

Well established gorse was barely affected by 10.8 kg/ha of DPX 3674. However young regrowth of gorse following a pre-treatment

Forestry

TABLE 1: Percent control of broom, gorse and wattle

Treatment kg/ha	Gorse (Ashley)		Gorse (Waitangi)		Broom (Rotoaira)				Wattle (Dun- sandel)	
	Re-growth		Established		Established					
	7	13	3	8	2	6	11	16	5	15
DPX 3674 1.8	20	10							90	65
DPX 3674 3.6	30	10	20	8					100	91
DPX 3674 5.4	95	35			15	40	45	32	100	96
DPX 3674 7.2			40	23	22	65	85	72	100	99
DPX 3674 10.8			65	37	33	97	98	90		
2,4,5-T 2.16									100	95
DPX 3674 3.6 + 2,4,5-T 1.8	95	90								
DPX 3674 3.6 + picloram 0.25 + 2,4,5-T 1			80	55	42	90	95	85		
picloram 0.5 + 2,4,5-T 2			86	96	38	100	100	100		

burn was effectively suppressed for 7 months by DPX 3674 at 5.4 kg/ha. The degree of control obtained with 5.4 kg/ha alone was inferior to 3.6 kg/ha applied in combination with 1.8 kg/ha of 2,4,5-T which provided 13 months control. Wattle 1 m high at the time of spraying was adequately controlled for 15 months with DPX 3674 at 3.6 kg/ha. Higher rates of application were marginally better.

CONCLUSION

Over a wide range of weed species growing in forest situations, DPX 3674 gave best control when applied in early spring during the period of active weed growth. For grass and bracken control a rate of application of 5.4 kg/ha gave up to 10 months weed control in the North Island while only 3.6 kg/ha was required to give 18 months control of grass and wattle in the South Island.

Established gorse was only partially controlled with rates of DPX 3674 as high as 10.8 kg/ha whilst control of broom was maintained for up to 16 months at this rate. The addition of diesel oil brought an improvement in the degree of bracken control. The addition of either 2,4,5-T (1.8 kg/ha) or picloram (0.25 kg/ha) plus 2,4,5-T (1 kg/ha) allowed a reduction in the rate of DPX 3674 from 7.2 to 3.6 kg/ha without any loss in weed control performance.

ACKNOWLEDGEMENT

The authors gratefully acknowledge the assistance given by the Forest Research Institute, the New Zealand Forest Service, the Selwyn Plantation Board and Dr E. Rochecoste of Du Pont (Australia) Limited for valuable comments on the text.