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**Coppice control in a thinned Blue Gum plantation:
trialing of contact and systemic herbicides in autumn
2004**

A report for FFORNE (Farm Forestry North East Victoria), Bayer Crop Science, FMC (Chemicals) Pty Ltd, (Crop & Specialty Division), DuPont Agricultural Products, Macspred Pty Ltd and Nufarm Ltd

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Introduction

Eucalyptus globulus subsp. *globulus* (Southern or Tasmanian Blue Gum) is a eucalypt species which coppices from cut stumps, whether these are created by a thinning operation or from clear falling.

A cut stump treatment with glyphosate herbicide to prevent coppicing in the thinning of a Blue Gum plantation is not always effective, and carries the risk of flashback, that is, transfer of herbicide from the roots of cut stumps to the roots of retained trees with consequent mortality. The alternative is to allow the trees to coppice then to treat the foliage with appropriate herbicides, but again, failures have occurred with this method, although the risk of flashback is reduced.

The FFORNE project in the north east of Victoria was established to develop eucalypt plantations on farms for eventual sawlog production. These plantations are now at an age at which thinning is required in order to provide space and add growth to retained trees.

A trial was established in the autumn of 2004 to test the possibility of using two contact herbicides on their own and in combination with systemic herbicides to control coppicing after thinning in a FFORNE Blue Gum plantation. The idea arose in part following the successful use of these herbicides in autumn or spring to control *Radiata* pine wildlings in pine plantation re-establishment (Tomkins 2003a,b & 2004, unpublished), but also because of past failures eg. in Blue Gum after clearfelling in some WA plantations (Ray Fremlin, WA FPC, pers. Comm.). Defoliation eg. by fire or killing of pine foliage by herbicide treatment is sufficient to kill *Radiata* pine. It was recognised, however, that without the addition of systemic herbicides, re-coppicing in eucalypts was more likely even if the contact herbicides killed existing foliage. Nevertheless, use of these in the trial, alone or with surfactant, was necessary to establish the foliar effect.

Timing also influences efficacy of coppice control. Coppice should be actively growing, so that spring and autumn foliar treatment would be expected to provide the best results. There is an alternative argument that if chemical is applied in late autumn and into the winter, retention of chemical is prolonged with consequent better effect.

Methods

(i) The herbicides used in this trial were:

Contact chemicals

- glufosinate (Finale Herbicide 200 g/L glufosinate ammonium, Bayer Crop Science). This herbicide releases ammonia which effectively 'cooks' the foliage.
- carfentrazone (Hammer Herbicide 240 g/L carfentrazone ethyl, FMC (Chemicals) Pty Ltd). This herbicide is slower acting on foliage than glufosinate, and should allow entry of systemic herbicides before killing foliage.

Systemic chemicals

- glyphosate (Roundup PowerMax 540 g/L potassium salt, Monsanto/NuFarm)
- metsulfuron methyl (BrushOff Herbicide, 600 g/kg Macspred Pty Ltd/DuPont Agricultural Products).

Surfactant - Pulse Penetrant (Monsanto).

(ii) Site

The trial site was on the property of Peter and Kate Houghton at Lurg, near Benalla. The plantation of *E. globulus* subsp. *globulus* was established in 1997, and was thinned in 2003. Coppice height was 30 cm to 3 m, and retained trees were 12-15 m with DBHOB of 15-25 cm.

(iii) Herbicide mixes and application

a) Knapsack calibration

A Hardi 15 L knapsack with a single fan nozzle was used. Output was about 110 to 120 mL/10 seconds. However, for foliar application, in order to wet all or most of the foliage, the volume applied per tree depended on the size of the coppice and also on the height of application.

b) Treatment mixes

These are given for a 15 L knapsack mix. However, for the trial treatments lower volumes were prepared, sufficient to spray about 30 trees.

1. Finale 100 mL/15 L.
2. Finale 67 mL plus Pulse 0.2%/15 L.
3. Finale 67 mL plus Powermax 100 mL plus Pulse 0.2%/15 L.
4. Finale 67 mL plus Powermax 100 mL plus BrushOff 1.5 g plus Pulse 0.2%/15 L.
5. Hammer 25 mL/15 L.
6. Hammer 25 mL plus Pulse 0.2%/15 L.
7. Hammer 25 mL plus Powermax 100 mL plus Pulse 0.2%/15 L.
8. Hammer 25 mL plus Powermax 100 mL plus BrushOff 1.5 g plus Pulse 0.2%/15 L.
9. Hammer 12.5 mL plus Finale 50 mL plus Pulse 0.2% /15 L (half rates of both).
10. FFORNE standard of PowerMax 88 mL plus BrushOff 1.5 g plus Pulse 0.2%/15 L.
11. Half rate of treatment 10.

(iv) Trial establishment

Spraying was conducted on Monday 15th March 2004, commencing at 10.00 a.m. Weather conditions were clear and sunny, with temperature rising to about 24-25 deg. By mid-afternoon wind was gusty and strong at the crown of the retained trees, but given the shelter provided by the plantation and the close-to-target spraying, was not a problem.

The aim was to treat about 30 trees in two different areas of the trial site. A 10 L mix for treatment 1 (2/3 of above, 67 mL/10 L) was mixed, and it was found that 6.7 L was sufficient to adequately spray 30 trees, with wetting of all or most of the foliage. All other treatments were made to 6.7 L, and the amount sprayed per 30 trees varied from about 5 L up to 6.5 L. The factors affecting the volume used included the size of the coppice, which varied from 30 cm up to 3 m, the addition of surfactant (Pulse) in the treatment mix or the inclusion of a surfactant in the herbicide product (Rounduo PowerMax and Hammer have an included surfactant). In particular the volume tended to

be lower for treatments that included surfactants. This was because the visible effect of spraying was more easily observed, and because surfactant disperses chemical on the foliage.

Each tree was colour coded with forestry marking tape to identify the treatment.

Results

The treatments were assessed 17 days, 57 days and 205 days after spraying.

The trees were scored as follows:

No damage visible	0
<100% of tips damaged	1
100% tips damaged	2
Tips + 50% of shoots damaged	3
All damaged but still some green	4
100% above ground kill	5

Tree scores were totalled for each treatment and the mean score calculated.

Total deaths recorded were 55, or about 16% of all trees treated. At the final assessment, over 30 trees were regrowing from the base, despite having lost most of their foliage at the second assessment. This occurred across most treatments and was not confined to the contact herbicide treatments alone.

There was very little change in scores for treatments 1 to 5, 7 & 10 from the second to the third assessment; certainly nothing that could be described as significant. Treatments 6 & 9 which were contact herbicides with added surfactant appeared to have regressed, and treatment 5 had not changed. Treatment 11 (systemic herbicides only) at half the rate of treatment 10 improved over the assessment period but was one of the lower scores on completion.

Table 1. Mean treatment score for approximately 30 trees

Treatment 15 March 2004 Day 0	1 April 2004 Mean score 17 days	11 May 2004 Mean score 57 days	22 October 2004 Mean score & number of dead trees () 205 days
T 1 (Finale)	1.48	3.47	3.21 (8)
T 2 (Finale/Pulse)	1.27	2.86	2.96 (3)
T 3 (Finale/PowerMax/ Pulse)	1.3	2.55	2.79 (8)
T 4 (Finale/PowerMax/ BrushOff/Pulse)	2.0	2.94	2.97 (9)
T 5 (Hammer)	1.22	1.55	1.61 (3)
T 6 (Hammer/Pulse)	2.18	1.97	1.57 (3)
T 7 (Hammer/PowerMax/ Pulse)	2.77	3.03	2.70 (7)
T 8 (Hammer/PowerMax/ BrushOff/ Pulse)	2.44	2.88	2.31 (5)
T9 (Finale/Hammer/ Pulse)	2.1	2.12	1.23 (1)
T 10 (PowerMax/BrushOff/ Pulse)	1.63	2.45	2.18 (4)
T 11 (Half rate of T 10)	0.52	1.13	1.69 (4)

Coppice in the surrounding plantation was treated by the owner shortly after the trial was established, with a prescription of 90 mL of Roundup (360 g/L glyphosate, isopropylamine salt), 1 g of BrushOff plus 30 mL Pulse in a 10 L mix. Spraying was carried out to wet all the foliage and was very successful, with a majority of the coppice killed.

Discussion

None of the experimental treatments resulted in satisfactory control of Blue Gum coppice. Nearly all of the trees killed by the treatments were small, generally <50 cm in height. Many larger trees up to 3 m were only slightly affected and had recovered with new growth by the final assessment, and as noted above, a number of trees almost completely defoliated earlier were re-sprouting from the base of the stump.

Based on the scoring system adopted, the best result was achieved with Finale herbicide alone with or without Pulse, but this was not noticeably better than treatments that included glyphosate or metsulfuron methyl or both. However, Finale appears to be quite effective in defoliating the coppice leaf.

Treatments with Hammer Herbicide alone or with surfactant were less effective than Finale alone or with surfactant, but improved in combination with glyphosate (treatment 7) and glyphosate/metsulfuron methyl (treatment 8).

A concern has arisen in the meantime from the pine wildling trials conducted with the same chemicals that Roundup PowerMax may not be the most appropriate glyphosate product to use in these combinations. The cation in the glyphosate salt in PowerMax is potassium, and there is a suggestion from the results that there is some incompatibility with these contact herbicides and/or with BrushOff, and that better results are obtained with the isopropylamine salt in ordinary Roundup.

Treatment 10 possibly illustrates this effect. PowerMax was used at the same glyphosate rate employed in the owner's use of ordinary Roundup later in the surrounding plantation, yet the results were not comparable with those achieved with ordinary Roundup.

There was no evidence of flashback in any of the treatments which included the systemic herbicides, nor was there any apparent effect in the owner's treatment in the surrounding plantation. This suggests that autumn foliar treatment with the mix as above (90mL of Roundup (360 g/L glyphosate, [isopropylamine salt], 1 g of BrushOff plus 30 mL Pulse in

a 10 L mix) may generally be safe, at least in plantations thinned at 6-7 years.

Conclusion & recommendation

Finale Herbicide was reasonably effective in defoliating Blue Gum coppice, but did not improve the kill of coppice even in combination with glyphosate and metsulfuron methyl. In part this may have been because the choice of glyphosate product, Roundup PowerMax, may not have been the most appropriate. Further work will be required to determine if a better result could be obtained with ordinary Roundup.

Hammer Herbicide was less effective in defoliating trees, but the same reservation applies.

There appears to be no better prescription for autumn treatment of Blue Gum coppice than thorough wetting with the prescription *given above* using ordinary Roundup 360 g a.i./L. Coppice growth should not be allowed to develop beyond about 1 m in height and preferably smaller. Smaller coppice is obviously easier to kill and the amount of chemical and time required is minimised.

References

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