HONEY LOCUST *(GLEDITSIA TRIACANTHOS)* AND ITS CONTROL

T.R. Armstrong
Alan Fletcher Research Station, Queensland Department of Lands,
PO Box 36, Sherwood Q 4075, Australia

Summary. Practical control measures for honey locust (*Gleditsia triacanthos*) were investigated near Clifton on the Eastern Darling Downs and Toogoolawah in the Brisbane Valley in South East Queensland. Basal bark spraying with fluroxypyr as the methyl heptyl ester (Starane) at 3 g/L of diesel for basal diameters up to 10 cm, at 6 g/L for stem diameters of 10 to 20 cm and at 10 g/L for trunks greater than 20 cm in diameter at their bases gave the most consistent control. Foliar spraying with fluroxypyr at 1 g/L of water when actively growing gave effective control of seedlings and regrowth to 2 m tall. These findings have been used to obtain Agricultural Requirements Board approval for using fluroxypyr in a new initiative scheme of progressively controlling honey locust throughout Queensland.

INTRODUCTION

Honey locust (*Gleditsia triacanthos* L., Caesalpiniaceae), was introduced from North America and cultivated at Camden Park, New South Wales along with three other *Gleditsia* species as early as 1843(2). Honey locust has been widely promoted as an ornamental, fodder (1), shade and bee keepers' tree with its first reported planting in Queensland being in 1907(3).

It is a deciduous leguminous tree growing up to 24 m tall and bearing prolific green bipinnate leaves ca. 10 cm long, from spring to autumn. In spring it bears creamy, yellow pendulous flower spikes ca. 10 cm long which develop into 30 cm or so long brown pods. Some varieties have separate male and female plants, while cv. *inermis* has been developed, sold and planted as a thornless type. Naturalized offspring develop formidable (up to 25 cm long) trifid (crucifix like) spines along trunks and branches especially after pruning, cutting or grazing (Fig. 1).

Honey locust's pods are sweet and are relished by livestock which spread its seeds in their dung. Seedlings quickly grow a strong tap-root and dominate surrounding vegetation. Flood waters also transport the floating pods, causing major infestations of dense thorny thickets along the fertile alluvial flood plains from Southern Australia (5) to north of Monto (latitude 24ºS) in Central Queensland. Its potential for spread over large areas is enormous, as it grows naturally from Mexico to Ontario (latitude 26º to 50ºN) (3) (Fig. 2).

Following the first infestation reported to Queensland Lands Department in 1955 along Cressbrook Creek, a survey revealed it present along the Brisbane River, and in the Killarney, Maryvale and Warwick districts. Control trials resulted in a 1959 endorsement by the Co-ordinating Board (precursor of the Rural Lands Protection Board) of a Weeds Committee recommendation 'That all Local Authorities in South East Queensland be requested to destroy infestations on roads and reserves and to encourage landholders to take similar action on their holdings' (4). Since that time public, resumed and ungrazed land has become more densely infested to the detriment of the native vegetation and wildlife (3). Fire and/or dozing kills plant tops but produces massive regrowth from their bases unless deeply ploughed and regularly cropped.

Gleditsia triacanthos was declared a P2 category plant following a detailed submission in 1992 (5), which means it must be destroyed.

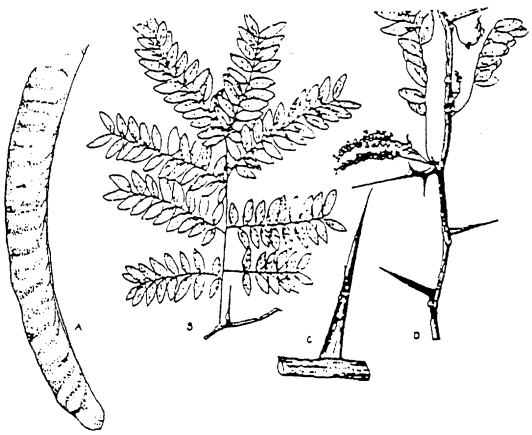

Figure 1. Honey locust (*Gleditsia triacanthos*).

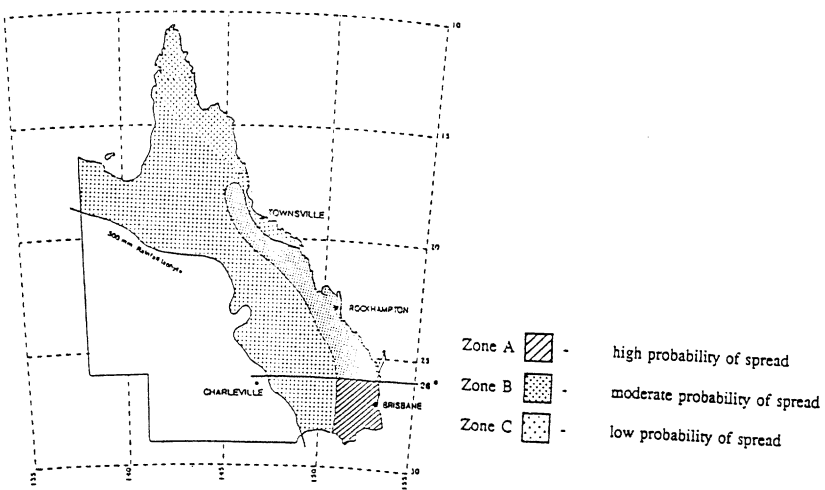

Figure 2. Potential distribution of Honey locust in Queensland.

METHODS

Control experiments have been set out progressively since the 1950s in Queensland as new methods and herbicides became available (8). With the loss of 2,4,5-T and requests for

alternative controls of honey locust, a series of experiments were set out along King Creek near Clifton from October 1989 to January 1990 (Table 1).

Table 1. Clifton application techniques, herbicides, rates and control as percentage kill of untreated *Gleditsia triacanthos*.

Date treated	Technique	Herbicide	Rate	Target type	Control % by 14/12/90
30/10/89	Basal Bark[a]	2,4,5-T ester	20 g/L Diesel	>10 m tall	100
11/01/90	Basal Bark	Triclopyr ester	10 g/L Diesel	>10 m tall	95
"	Cut Stump[b]	Triclopyr ester	10 g/L Diesel	<10 m tall	95
"	Over all spray[c]	Triclopyr ester	10 g/L Diesel	<1 m tall	95
"	Basal Bark	Fluroxypyr ester	10 g/L Diesel	>10 m tall	100
"	Cut Stump	Fluroxypyr ester	10 g/L Diesel	<10 m tall	100
"	Over all Spray	Fluroxypyr ester	10 g/L Diesel	<1 m tall	100
"	Stem inject[d]	Dicamba	200 g/L	>10 m tall	100
"	Stem inject	Picloram + Triclopyr amine	50 g + 100 g/L	>10 m tall	100
"	Stem inject	Clopyralid	300 g/L	>10 m tall	100
"	Stem inject	Glyphosate	450 g/L	>10 m tall	100
"	Stem inject	Hexazinone	250 g/L	>10 m tall	50
"	Stem inject	Metsulfuron methyl	6 g/L water	>10 m tall	95
12/01/90	Foliar Spray[e]	2,4-D amine + 'Pulse'	5 g/L + 2 mL/L water	<10 cm tall	100
"	Foliar Spray	Picloram + Triclopyr ester	0.35 g + 1.05 g/L water	<2 m tall	100
"	Foliar Spray	Fluroxypyr + Pulse	1.3 g/L + 2 mL/L water	<3 m tall	100
"	Foliar Spray	Clopyralid + Ethokem	1.3 g/L + 5 mL/L water	<1 m tall >1 m tall	100 50
"	Foliar Spray	metsulfuron methyl + Ethokem	6 g + 500 mL/100 L water	<2 m tall	50
"	Sprinkler Spray	Glyphosate + Ethokem	18 g + 10 mL/L water	<2 m tall	50
"	Checks	untreated	0	0-20 m tall	0

a. Basal Bark treatment of full circumference of each trunk to 40 cm above ground level.
b. Cut stump and immediately swab fresh sap.
c. Overall spray leaves and stems with knapsack sprayer.
d. Stem Inject with 1 mL/3 cm cut with <3 cm between cuts around circumference.
e. Foliar Spray all leaves to point of run-off at ca 2000 L/ha with knapsack sprayer.
f. Sprinkler Spray foliage with large droplets at ca.100 L/ha.

Following more interest and requests, further experiments were set out along Cressbrook Creek near Toogoolawah from December 1991 (Table 2).

Table 2. Toogoolawah application techniques, herbicides, rates and control as percentage kill of untreated *Gleditsia triacanthos*

Date treated	Technique	Herbicide	Rate	Target type	Control % by 8/10/92
17/12/91	Foliar Spray[i]	Glyphosate	3.6 g/L water	<2 m Regrowth	97
	Foliar Spray	2,4-D amine ± Surfactant	5 g/L ± 2 mL/L water	<2 m Regrowth	0
	Foliar Spray	2,4-D acid	3 g/L water	<2 m Regrowth	0
	Foliar Spray	2,4-D ester	2.4 g/L water	<2 m Regrowth	0
	Foliar Spray	Picloram + 2,4-D amine	0.5 g + 2 g/L water	<2 m Regrowth	80
	Foliar Spray	Picloram + Triclopyr ester	0.35 g + 1.05 g/L water	<2 m Regrowth	70
	Foliar Spray	Picloram + Triclopyr ester	2.1 g/L water	<2 m Regrowth	20
	Foliar Spray	Fluroxypyr ester	1 g/L water	<2 m Regrowth	99
	Foliar Spray	Clopyralid ± Surfactant	1.5 g ± 2 mL/L water	<2 m Regrowth	50
	Foliar Spray	Dicamba ± Surfactant	2 g ± 2 mL/L	<2 m Regrowth	50
08/01/92	Foliar Spray	Dichlorprop K salt	6 g/L water	<2 m Regrowth	20
	Foliar Spray	Dichlorprop acid	4 g/L water	<2 m Regrowth	20
	Foliar Spray	Amitrol-T ± Surfactant	5 g ± 2 mL/L water	<2 m Regrowth	0
	Foliar Spray	Imazapyr	10 g/L water	<2 m Regrowth	20
	Foliar Spray	Fluroxypyr ester	1.5 g/L water	<3 m Regrowth	99
09/01/92	Foliar Spray	Metsulfuron methyl + 'Bond'	15 g + 150 mL/100 L water	<3 m Regrowth	97
	Basal Bark[k]	Triclopyr ester	10 g/L Diesel	>20 cm Diameter	95
	Basal Bark	Fluroxypyr ester	10 g/L Diesel	>20 cm Diameter	99
05/02/92	Basal Bark	2,4-D ester	10 g/L Diesel	>20 cm Diameter	80
	Basal Bark	2,4-D ester	20 g/L Diesel	>20 cm Diameter	90
04/03/92	Basal Bark	Fluroxypyr ester	6 g/L Diesel	>10 cm Diameter	95
	Basal Bark	Fluroxypyr ester	5 g/L Diesel	10-20 cm Diameter	100
	Basal Bark	Diesel	Neat	<10 cm Diameter	100
	Foliar Spray	Fluroxypyr ester	0.75 g/L water	<3 m Regrowth	90
	Checks	Untreated	0	0-40 cm Diameter	0

i. Foliar Spray with 12 volt battery powered pump and brush gun at ca. 3000 L/ha.
k. Basal Bark spraying of full circumference of each trunk to at least same height as its diameter.

RESULTS AND DISCUSSION

Mature honey locust trees were difficult to stem inject due to numerous spines along their trunk and cuts greater than 3 cm apart allowing growth to continue. In dense situations the cut stump

technique was only practical for trees less than 10 m tall. Basal bark spraying was the easiest and gave the best kills from the largest to the youngest trees, with the same diesel mixtures working as a cut stump or overall spray for young trees under 1 m tall. Trees less than 3 m tall were susceptible to foliar spraying with water based fluroxypyr (Starane) and picloram + triclopyr (Grazon). Seedlings not eaten by cattle were controlled by 2,4-D amine (Amicide 500), while plants up to 1 m tall were killed by clopyralid (Lontrel). Glyphosate (Roundup) as applied through a sprinkler sprayer and metsulfuron methyl (Brushoff) applied with a knapsack sprayer at Clifton (Table 1) were not as effective as treatments at Toogoolawah applied with a battery powered brush gun (Table 2).

Even though most of the honey locust on alluvial flats beside Cressbrook Creek was regrowth after dozing there was 90% or better control from foliar sprayed glyphosate (which was non-selective on pasture grasses), metsulfuron methyl at higher than normal rates, and fluroxypyr at 1 g/L of water. The latter was reformulated into Starane 200, which gave a more stable solution in diesel than the fluroxypyr at 300 g/L for reliable basal bark spraying of all sizes of honey locust.

As there is usually a wide range of sizes of honey locust to be controlled in the infested areas, it is most practical to use the basal bark rate for the largest trees present but to use less of the mixture for smaller trunks so long as the full circumference of each stem's base is treated to at least the same height above ground level as its diameter.

ACKNOWLEDGEMENTS

The assistance of Greg Harvey, Steve Csurhes, Bob Galagher, Barry Whyte and Wes Ostrofski in setting out control experiments, often in hot, humid and difficult situations is greatly appreciated. Thanks is also due to Dupont Australia Ltd and Dow Elanco Australia Ltd for supplying herbicide samples.

REFERENCES

1. Anderson, R.H. 1986. The Trees of New South Wales. NSW Department of Agriculture, Sydney.
2. Anon, 1843, 1845, 1850, 1857. Catalogue of Plants Cultivated at Camden Park, New South Wales.
3. Anon, 1993. Honey Locust PestFact. Land Protection Branch, Queensland Department of Lands, Brisbane.
4. Armstrong, T.R. 1990. *Gleditsia triacanthos* = Honey Locust, Beantree or McConnel's Curse. Rural Lands Protection Branch, Queensland Department of Lands, Brisbane.
5. Dellow, J.J. 1986. Weed Potential of *Gleditsia triacanthos* "Honey Locust". 10th National Noxious Plants and Animals Conference, Soldiers Point, New South Wales.
6. Dellow, J.J. 1992. Control of *Gleditsia triacanthos* L. Proceedings 1st International Weed Control Congress 2: 17-21.
7. Csurhes, S. 1992. Recommendations on the control of Honey Locust, a potentially serious Pest Plant in Queensland. Rural Lands Protection Branch, Queensland Department of Lands, Brisbane.
8. Kay, K.L. 1987. Honey Locust *G. triacanthos* Herbicide Trials at Toogoolawah. Internal Report, Queensland Lands Department, Brisbane.