



Results and discussion

On 8/19/02, 10 months after treatment, we conducted visual evaluations of canopy reduction, and we counted and measured resprouts. Trees which were not treated at all showed a mean canopy reduction of 13% (owing entirely to a single tree which spontaneously died). Likewise, only one of the trees which were cut down but not treated with herbicide died. Thus, 86% of cut control trees showed resprouting, with a mean of 7.3 sprouts per stump reaching a mean of 1.1 m tall.

We noticed several instances of root grafting or vegetative parentage, where untreated trees close to treated trees showed herbicide injury symptoms. We didn't observe symptoms in other tree species nearby.

Resprouts from untreated stumps reached as high as 3.1 m in a single year (left).

Cut stump. There were no differences among times of application; applying herbicide 1 hour after cutting gave the same result as applying immediately after cutting. Overall, 30% of stumps treated with Roundup Pro resprouted, compared with 0% of stumps treated with Chopper and 21% of stumps treated with Garlon 4. Stumps which resprouted following treatment with Roundup Pro had a mean of 4.4 sprouts; stumps which resprouted following treatment with Garlon 4 had a mean of 2.0 sprouts.



Chopper applied to stumps 60 minutes after cutting (above left); Garlon applied immediately after cutting (above right). The latter is a standard treatment for weed tree control.

Table. Treatment list and results from *Ailanthus* trial.

	Delay or tree size	Canopy % redn	Overall mean vigor ¹	% of trees w sprouts	Sprouts only ²			
					Vigor ¹	No.	Ht (m)	
Cut stump	glyphosate	0 min	---	2.9	28.6	10.0	3.5	1.4
		15 min	---	2.6	42.9	6.2	2.7	1.1
		30 min	---	2.9	37.5	7.7	6.3	1.2
		60 min	---	1.5	25.0	6.0	3.0	0.4
	imazapyr	0 min	---	0.0	0.0			
		15 min	---	0.0	0.0			
		30 min	---	0.0	0.0			
		60 min	---	0.0	0.0			
	triclopyr	0 min	---	0.3	12.5	2.0	1.0	0.1
		15 min	---	2.1	42.9	5.0	2.0	0.4
		30 min	---	1.7	28.6	6.0	2.5	0.8
		60 min	---	0.0	0.0			
Cut-n-hack	glyphosate	none	---	5.9	71.4	8.2	4.4	0.9
		1 hr	---	7.7	100.0	7.7	6.1	1.3
		1 day	---	6.3	85.7	7.3	5.5	0.6
		1 week	---	7.4	85.7	8.7	5.8	0.5
	imazapyr	none	---	0.5	28.6	1.8	10.0	0.2
		1 hr	---	0.6	28.6	1.5	4.0	0.2
		1 day	---	0.7	42.9	1.0	2.4	0.2
		1 week	---	1.7	42.9	4.0	8.0	0.4
	triclopyr	none	---	6.6	85.7	7.7	1.8	0.6
		1 hr	---	2.9	42.9	6.7	1.3	0.3
		1 day	---	5.0	57.1	8.8	5.3	0.5
		1 week	---	4.9	57.1	8.5	4.8	0.4
Hack-n-squirt	glyphosate		82.3	2.3				
	imazapyr		99.9	0.1				
	triclopyr		66.7	6.2				
Basal bark	imazapyr	< 3" dia	100.0	0.0				
		> 3" dia	99.8	0.1				
	triclopyr	< 3" dia	90.0	1.3				
		> 3" dia	100.0	0.0				
CONTROLS	cut		---	8.3	85.7	9.7	7.3	1.1
	uncut			12.5	8.8			

¹Vigor is a visual evaluation scale where 0 = dead, 10 = healthy.

²Means only for resprouting stumps.

Hack and squirt. Treatments using Roundup Pro, Chopper, and Garlon 4 reduced tree canopy by 82.3%, 99.9%, and 66.7% respectively. Mean tree vigor was 2.3, 0.1, and 6.2, respectively, on a 1 to 10 scale. As in previous studies, Chopper produced excellent control in a hack-and-squirt treatment. Roundup Pro was barely acceptable, and Garlon 4 did not produce adequate control.



Hack-and-squirt using a backpack herbicide reservoir (above). Below, a barely-surviving tree shows Chopper injury. A dead tree following hack-and-squirt with Chopper (right).



Cut and hack. Again, we saw no differences among times of application. Overall, stumps treated with Roundup Pro, Chopper, and Garlon 4 resprouted in proportions of 86%, 36%, and 61% respectively. This treatment was not as successful as we had hoped. The success of conventional hack-and-squirt treatments may depend on the tree's vascular system remaining intact and distributing herbicide throughout the tree.

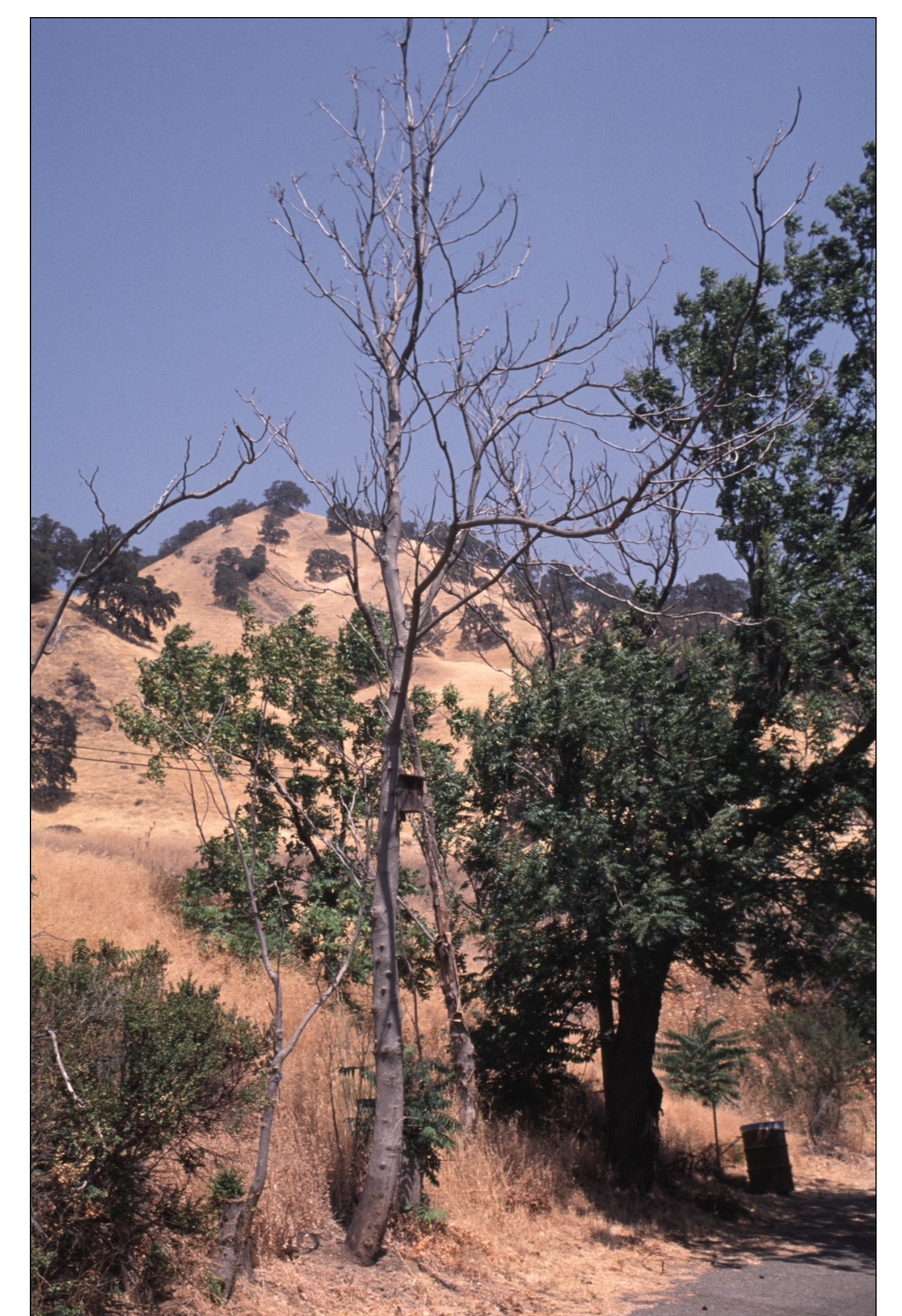


Cut and hack treatments, above: Chopper applied immediately after cutting (left), Roundup applied 1 day after cutting (center), Garlon applied 1 week after cutting (right).

Basal bark. Almost all basal bark treatments with Chopper or Garlon 4 resulted in 100% canopy reduction. One tree treated with Garlon 4 showed only 40% canopy reduction, but because this result was anomalous we assume operator error must have occurred.

This was a successful technique requiring minimal equipment and easily performed by one person. However, it used more herbicide than other treatments (a mean 10 ml of formulation compared to 3 or 4 ml for cut stump or hack and squirt). It also took more time to make the application, but this could be remedied by using a backpack sprayer. And around trees basal-bark treated with Chopper, we often found a dead zone approximately 1 m in diameter; herbicide either leached off the bark over winter or was released from the roots into the soil, where it was toxic to this year's spring vegetation.

Tree basal-bark treated with Chopper is completely controlled but shows "ring of death" at base (right).



Conclusions

Cut stump applications using Chopper (20% in Hasten) produced excellent control. This would be our treatment of choice in situations where immediate tree removal was desired. We saw no difference in control with application any time within an hour after tree cutting, so the time window is more forgiving than we had expected.

Hack and squirt applications using Chopper (undiluted herbicide) and basal bark applications using Chopper or Garlon 4 (each 20% in Hasten) also produced excellent control and would be useful in situations where tree removal is not necessary. Both techniques require minimal equipment. Because of the possibility of Chopper being washed off the trunk or released by tree roots, Garlon 4 may be preferable for basal bark treatments in sensitive areas.

Cut and hack applications were not consistently successful.

Flags marking our drizzle plots had all disappeared at the time of evaluation. However, retracing our steps, we are fairly sure we found some dead saplings. Considering the success of basal bark treatment with Garlon 4, it would be worth testing this treatment again.