

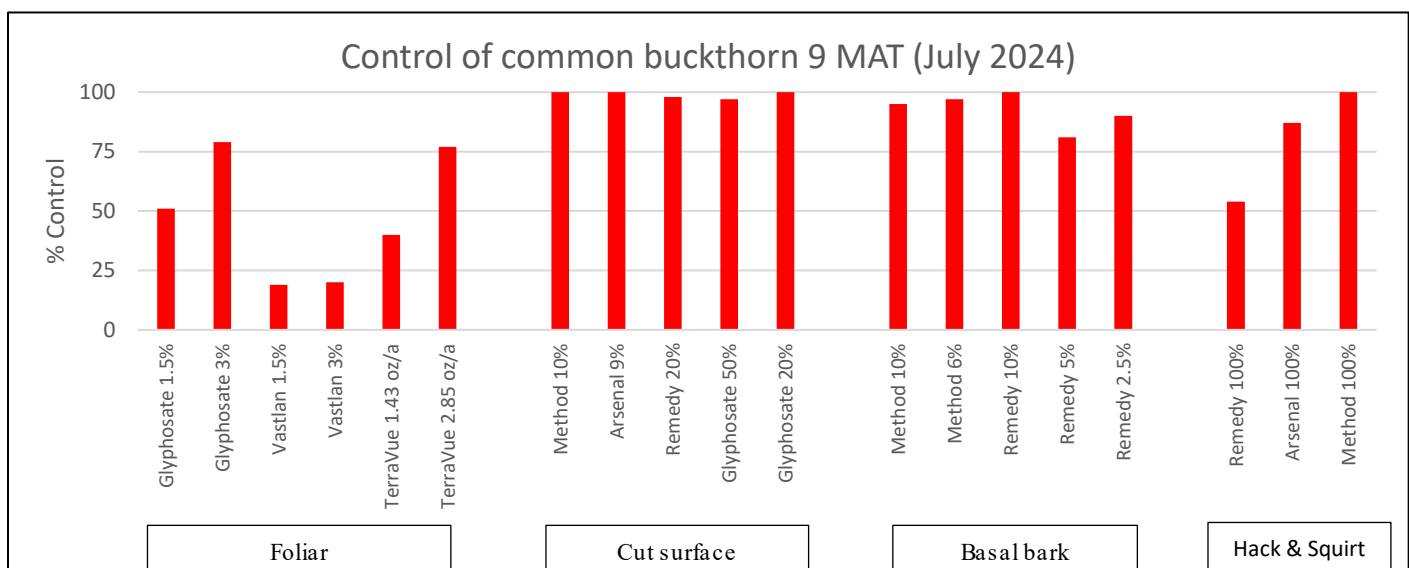
Objective: Demonstrate effective invasive woody shrub management techniques using herbicides on invasive common buckthorn.

Site Description: Demonstrations were applied along the edge of the Baird Creek bike trail in Green Bay, WI with degraded woodlands heavily invaded with common buckthorn. Buckthorn plants in cut surface, basal bark and hack and squirt treatments were mostly one stem that was 1-2 inches in diameter and greater than 6 ft tall. Buckthorn in foliar treatments were smaller (1-6 ft tall) and a mixture of single and multiple stems.

Application: Applications were made on October 17, 2023. For basal bark, cut surface and hack and squirt, treatments were applied to the target area (base of tree or cut surface) with the designated herbicide. This resulted in minimal off-target herbicide injury. Foliar treatments were broadcasted and had increased risk of off-target injury.

TREATMENT SUMMARY:

A range of control methods were effective, but in general foliar applications (25-75% control) were the least effective of all methods nine months after treatment. Applications in the fall may be the reason for reduced effectiveness as plants may have been beginning to senesce, limiting absorption and translocation into roots.



TREATMENT DETAILS

Foliar Herbicide Treatment: Shrubs were treated with herbicide on 10/17/2023 at a cost of **\$0.02-0.03 per shrub**. Leaves of common buckthorn were sprayed until the point of run off, from all sides of the tree. Control was moderate to poor with most buckthorn, injured but not killed from treatments. High rates of glyphosate and TerraVue performed best (>75% control 9 MAT), but all areas will require retreatment to kill plants. **Non-target injury was minor with all treatments and ample forbs, grasses and woody plants were present the following year.**

Common buckthorn control and resulting cover 9 months after foliar herbicide treatments							
Treatment	Rate	% Control	% Cover	% Mortality	Labor cost per shrub	Product cost per shrub	Total cost per shrub
Glyphosate + MSO	1.5 % v/v 1% v/v	51	40	0	\$0.02	\$0.002	\$0.02
Glyphosate + MSO	3% v/v 1% v/v	79	25	0	\$0.02	\$0.005	\$0.03
Vastlan + MSO	1.5% v/v 1% v/v	19	60	0	\$0.02	\$0.008	\$0.02
Vastlan + MSO	3% v/v 1% v/v	20	75	0	\$0.02	\$0.016	\$0.03
TerraVue + MSO	1.43 oz/A 1% v/v	40	35	0	\$0.01	\$0.002	\$0.02
TerraVue + MSO	2.85 oz/A 1% v/v	77	13	0	\$0.01	\$0.004	\$0.02

Cut Surface Herbicide Treatment: Twenty buckthorn trees were cut and treated with a specific treatment on 10/17/2023 at a cost of \$0.23-0.31 per tree. At nine months after treatment (248 days), all treatments resulted in >90% mortality. Off-target injury was not observed.

Effectiveness of cut surface treatments on common buckthorn						
Treatment	Rate	% Control 9 MAT (July 2024)	% Mortality 9 MAT	Labor cost per shrub	Product cost per shrub	Total cost per shrub
Method + Bark oil	10% v/v 90% v/v	100	100	\$0.24	\$0.04	\$0.28
Arsenal + water	9% v/v 91% v/v	100	100	\$0.28	\$0.02	\$0.30
Remedy Ultra + Bark oil	20% v/v 80% v/v	98	90	\$0.28	\$0.03	\$0.31
Glyphosate + water	50% v/v 50% v/v	97	90	\$0.22	\$0.02	\$0.24
Glyphosate + water	20% v/v 80% v/v	100	100	\$0.22	\$0.01	\$0.23

Basal Bark Herbicide Treatment: Twelve buckthorn trees were treated with herbicide on 10/17/2023 at a cost of \$0.14-0.20 per tree. This timing is considered appropriate as basal can be applied year-round as long as the bark is dry and herbicide solution doesn't freeze in container. At nine months after treatment (248 days), Method and the high rate of Remedy gave >95 % control. While control was high, some treated trees did survive in all treatments except the high rate of remedy. These plants likely will need retreatment in the future. Off-target was minimal.

Basal bark herbicide treatment on common buckthorn						
Treatment	Rate	% control 9 MAT (July 2024)	% Mortality 9 MAT	Labor cost per shrub	Product cost per shrub	Total cost per shrub
Method	10% v/v	95	70	\$0.14	\$0.06	\$0.20
Method	6% v/v	97	80	\$0.11	\$0.03	\$0.14
Remedy Ultra	10% v/v	100	100	\$0.13	\$0.02	\$0.14
Remedy Ultra	5% v/v	81	20	\$0.15	\$0.01	\$0.16
Remedy Ultra	2.5% v/v	90	50	\$0.13	<\$0.01	\$0.14

Hack and Squirt Herbicide Treatment: Four buckthorn trees were treated with herbicide on 10/17/2023 (cost was not calculated). This timing is considered appropriate as hack and squirt treatments can be applied year-round. At nine months after treatment (248 days), Method gave 100 % control of plants. Other treatments had substantial trees that survived and will require retreatment in the future. Off-target injury was not assessed.

Hack and squirt herbicide treatment on common buckthorn			
Treatment	Rate	% control 9 MAT (July 2024)	% Mortality
Remedy Ultra	100% v/v	54	0
Arsenal	100% v/v	87	50
Method	100% v/v	100	100