Invasive Shrub Management Field Day- UW-Madison Arboretum Grady Tract 2022

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Objective: Demonstrate effective invasive woody shrub management techniques using herbicides on invasive common buckthorn (*Rhamnus cathartica*) shrubs.

Site Description: Management demonstrations using herbicides (Cut surface, foliar, basal bark, and injection (hack and squirt) were applied to common buckthorn shrubs growing in the Grady Tract of the UW-Madison Arboretum. The buckthorn is growing in a degraded red pine planting on silt loam soils (13.3% clay, 0.46% organic matter, 7.4 pH, 2% slope). Buckthorn shrubs were single stem/single trunk and ranged in height from < 1 m (foliar, basal bark, cut surface) to shrubs > 3 m tall (stem injection, stem diameter > 10 cm).

Application Conditions: Foliar herbicide applications were made with a CO_2 pressurized single nozzle sprayer with a Teejet 8002 E nozzle that delivered approximately 50 gallons per acre. Cut surface and basal bark applications were also made with the same equipment, but psi was reduced to accurately apply to the targeted area. Injections treatments were made with a syringe.

TREATMENT DETAILS AND RESULTS

Injection (Hack and Squirt) Herbicide Treatment: Shrubs with a height of >2.5 m and average trunk diameter of 7 cm were treated on 4/27/2021 at a cost of $0.50-1.52 per shrub. Injection treatment involves using a machete or hatchet to cut pockets into the outer layer of bark in a circle around the trunk and then injecting a small amount of herbicide into each pocket. Each herbicide treatment was used on 5 shrubs. All treatments provided 100% control as of June 2022.

Injection Herbicide Treatment			
Treatment	**Rate**	**% Control 429 DAT (June 2022)**	**Cost per shrub: Labor Product[1] TOTAL**
Arsenal Powerline	100% v/v	100%	$0.41 $0.13 **$0.54**
Method 240SL	100% v/v	100%	$0.41 $0.80 **$1.21**
Vastlan	100% v/v	100%	$0.41 $0.15 **$0.56**

[1] product cost per shrub represents cost of the herbicide applied.

Basal Bark Herbicide Treatment: Shrubs from 1.0 – 2.5 m tall were treated with herbicide on 4/27/2021 in plots measuring 10' x 15', with an average of 58 shrubs per plot. Cost to control each shrub was $0.29-0.51/shrub, but as density of buckthorn was high, cost per area was $5,000-$6,000/A. All treatments provided 100% control as of July 2022.

Basal Bark Herbicide Treatment				
Treatment	Rate	% Control 435 DAT (July 2022)	Cost per shrub: Labor Product[2] TOTAL	Cost per acre: Labor Product TOTAL
Remedy Ultra Bark Oil Blue	5% v/v 95% v/v	100%	$0.16 $0.01 **$0.17**	$2,641 $137 **$2,778**
Arsenal Powerline Bark Oil Blue	12% v/v 88% v/v	100%	$0.27 $0.04 **$0.31**	$2,043 $320 **$2,362**
Method 240SL Bark Oil Blue	6% v/v 90%v/v	100%	$0.19 $0.10 **$0.29**	$2,641 $1,396 **$4,037**

Foliar Herbicide Treatment: Herbicide treatments were applied on 5/20/2021 to single-stemmed, fully leafed-out buckthorn shrubs in plots measuring 10' x 30'. Shrubs ranged in height from 0.25 – 1 m, and there were on average 119 shrubs per plot. Cost to control each shrub was $0.09-0.14/shrub, but as density of buckthorn was high, cost per area $1,892-$1,982/A. All treatments provided acceptable control (≥ 90%) as of July 2022.

Foliar Herbicide Treatments to Shrubs				
Treatment	Rate	% Control 412 DAT (July 2022)	Cost per shrub: Labor Product TOTAL	Cost per acre: Labor Product TOTAL
Vastlan MSO	3% v/v 1% v/v	100%	$0.07 $0.01 **$0.08**	$1,072 $110 **$1,182**
Method 240SL MSO	0.5% v/v 1% v/v	100%	$0.06 $0.01 **$0.07**	$1,072 $112 **$1,184**
Arsenal Powerline MSO	3% v/v 1% v/v	100%	$0.06 <$0.01 **$0.07**	$1,072 $73 **$1,145**
Roundup PowerMax NIS AMS	3% v/v 0.25% v/v 8.5 lb / 100 gal	92%	$0.05 <$0.01 **$0.05**	$1,072 $22 **$1,094**
Escort MSO	1.5 oz wt / 100 gal 1% v/v	77%	$0.06 <$0.01 **$0.06**	$1,072 $3 **$1,075**

[2] product cost per shrub represents cost of the herbicide applied and adjuvants.

Cut Surface Herbicide Treatment: Shrubs from ~0.5 – 2 m tall were cut with a brush cutter and treated with herbicide on 4/27/2021. Treatments occurred in plots measuring 10' x 20', with an average of 28 shrubs per plot. Cost to control each shrub was $0.95-1.29/shrub, but as density of buckthorn was high, cost per area was between $6,814-$7,270/A. All treatments except Roundup PowerMax provided acceptable control (≥ 90%) as of July 2022.

Cut Surface Herbicide Treatment				
Treatment	**Rate**	**% Control 435 DAT (July 2022)**	**Cost per shrub: Labor Product [3] TOTAL**	**Cost per acre: Labor Product TOTAL**
Roundup PowerMax AMS	33% v/v 8.5 lb / 100 gal	86%	$0.65 $0.14 **$0.79**	$3,522 $781 **$4,303**
Remedy Ultra Bark Oil Blue	25% v/v 75% v/v	100%	$0.49 $0.09 **$0.58**	$3,522 $671 **$4,192**
Arsenal Powerline	8% v/v	100%	$0.58 $0.12 **$0.70**	$3,522 $717 **$4,239**
Tordon 22K	75% v/v	100%	$0.62 $0.20 **$0.82**	$3,522 $1,127 **$4,649**

Abbreviations used in report:

AMS = Ammonium Sulfate
NIS = Non-Ionic Surfactant
MAT = Months After Treatment
MSO = Methylated Seed Oil
DAT = Days After Treatment

[3] product cost per shrub represents cost of the herbicide applied, adjuvants and fuel used for a brush cutter.

Figure 1: Comparison of effectiveness of stem injection, basal bark, cut surface and foliar applications on common buckthorn. Effectiveness was evaluated on 7/6/2022 (412-435 DAT)