

## UW – Madison Weed Science Renz Lab

### **Can Method control buckthorn as effectively as recommended standards?**

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#### **Objective:**

Determine whether foliar applications of Method 240SL (aminocyclopyrachlor) can control common buckthorn (*Rhamnus cathartica*) as effectively as established standards.

#### **Summary:**

At 36 Days After Treatment (DAT), highest injury resulted from Method at 0.375 and 0.5%, and Garlon 3A at 3% (60-78%).

One year after treatment (YAT), Arsenal and Method (0.375-0.5% resulted in >90% buckthorn control across all size classes (small, medium, large). Small shrubs were also controlled effectively by Milestone and 3% rate of Garlon 3A (>90% control). For hard-to-control large buckthorn shrubs, the medium and high rates of Method in addition to Arsenal provided >85% control, outperforming Milestone and both rates of Garlon 3A (25-38% control).

Two years after treatment results were similar as 1 YAT, but more variable. Arsenal and Method continued to provide high levels of control (> 90%) of small and medium shrubs, but large shrubs were difficult to control and only the high rate of Method (5%) had control over 90%.

Results suggest that Method and Arsenal were superior at controlling common buckthorn as mortality of shrubs was > 85% over the two-year timeframe of this experiment. Both Garlon 3A and Milestone provided effective buckthorn suppression, but mortality was <60% with medium and large shrubs suggesting these are most effective in targeting small sized shrubs (< 3 ft tall with one stem). While Method and Arsenal provided high level of control the survival and basal shrub resprouting of shrubs indicates that the need for repeat treatments across multiple

growing seasons to fully control established populations of common buckthorn, especially large shrubs.

## Research Plot Information:

Plot Dimensions: 10 feet x 15 feet

Design: Randomized Complete Block, 4 blocks

Soil Type: 88% Griswold loam, 12% Plano silt loam, 0 – 2 percent slopes

## Notes:

- Buckthorn on site was cut by volunteers in 2017-18 and treated with Garlon in 2018
- Individual buckthorn shrubs were classified according to size
  - Classifications were intended to help capture whether Method has the same activity on a range of buckthorn shrub sizes

Buckthorn Size Class	Small	Medium	Large	Total
Characteristics	less than 3 feet tall, single-stemmed	less than 3 feet tall, multi-stemmed	greater than 3 feet tall, single, <b>or</b> multi-stemmed	all shrubs
<b># Evaluated</b>				
Total (all plots)	41	48	77	166
Average (per plot)	1.4	1.7	2.8	5.9
Minimum (per plot)	0	0	0	3
Maximum (per plot)	5	5	11	15

## Herbicide Treatments:

Treatment Number	Treatment	Rate
1	Untreated Control (UTC)	-
2	Method 240SL	0.25% volume/volume (v/v)
3	Method 240SL	0.375% v/v
4	Method 240SL	0.5% v/v
5	Milestone	0.33% v/v
6	Garlon 3A	3% v/v
7	Arsenal	3% v/v
8	Garlon 3A	1.5% v/v

**Note: treatments 2-8 included methylated seed oil at 1% v/v**

## Herbicide Application:

<b>Date</b>	August 27 <sup>th</sup> , 2019
<b>Time</b>	2:00pm – 3:15pm
<b>Buckthorn Phenology</b>	Fully leafed out and actively growing

Equipment: Tolco 942 hand-pumped sprayer calibrated to apply 30GPA

Nozzles: 1 adjustable brass tip

Regulator PSI: Variable

## Weather Data:

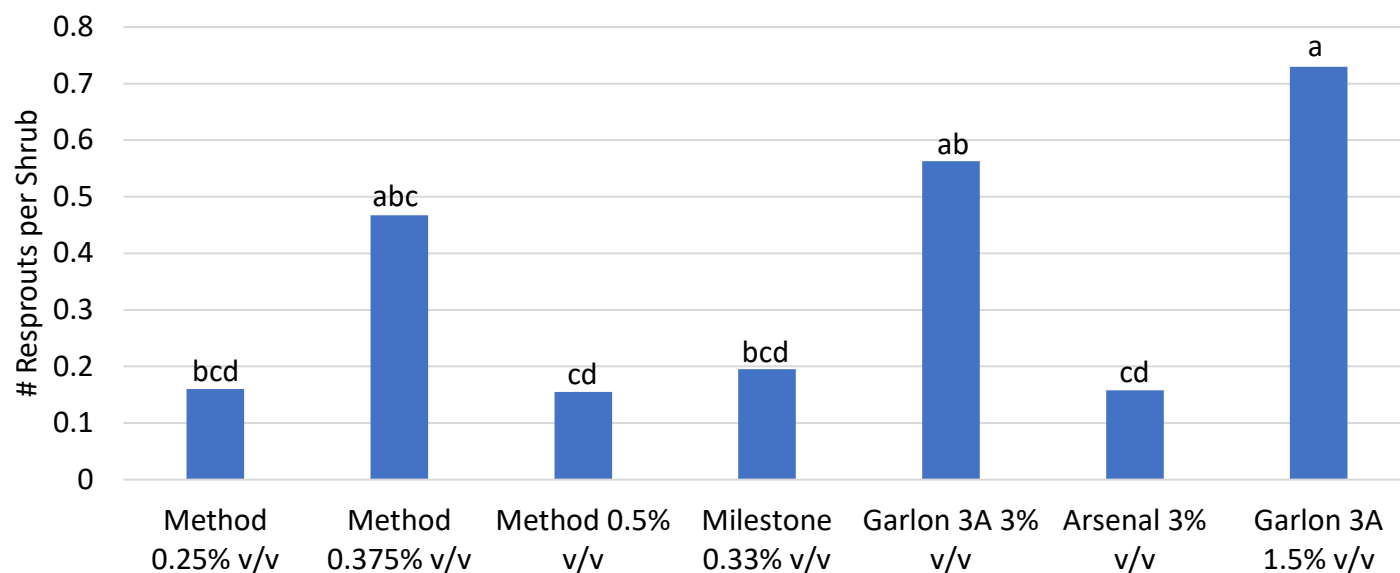
<b>Weather Station</b>	<a href="#">KWIMADIS214</a>
<b>Temperature</b>	77°F
<b>Wind Speed and Direction</b>	7mph SW
<b>Relative Humidity</b>	52%
<b>Cloud Cover</b>	50%
<b>Previous Rain Event Within 48 Hours</b>	August 26 <sup>th</sup> , 2019 – 0.24 inches
<b>When <math>\geq</math> 0.25 inches of precipitation occurred after treatment</b>	September 9 <sup>th</sup> , 2019 – 1.86 inches

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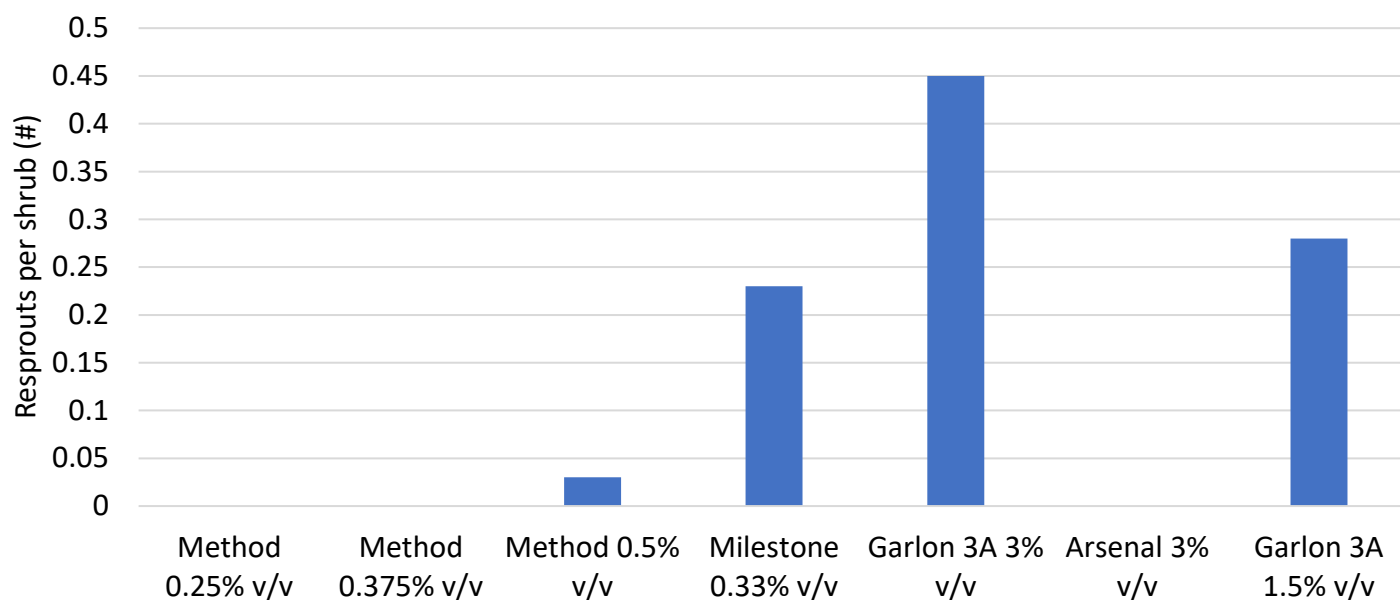
## Results:

### Common Buckthorn Resprouts 1 YAT

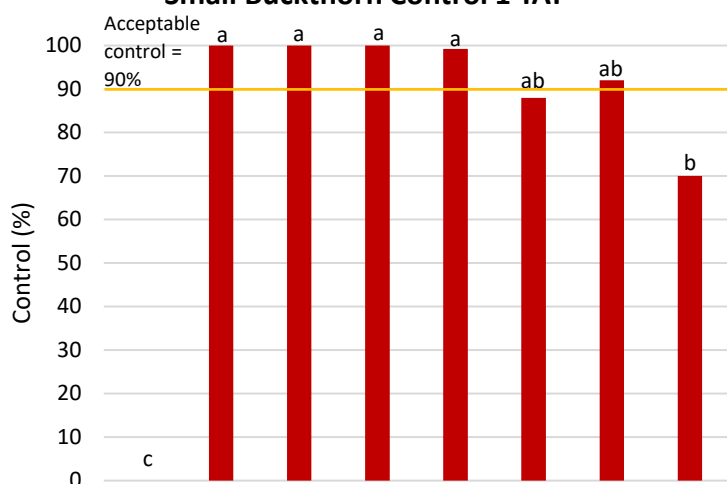
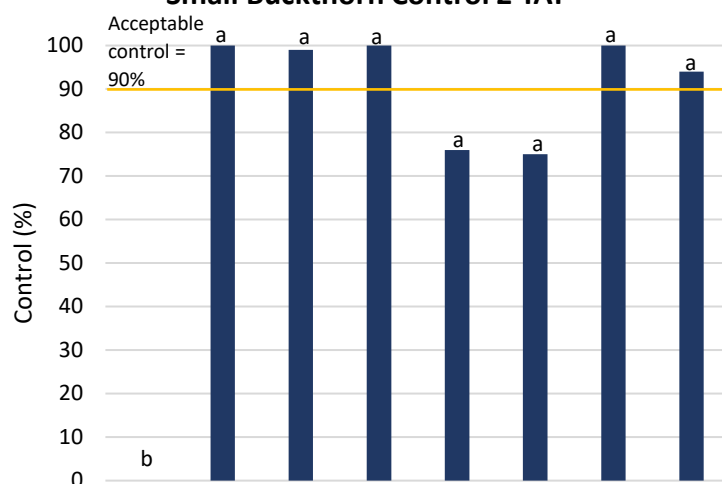
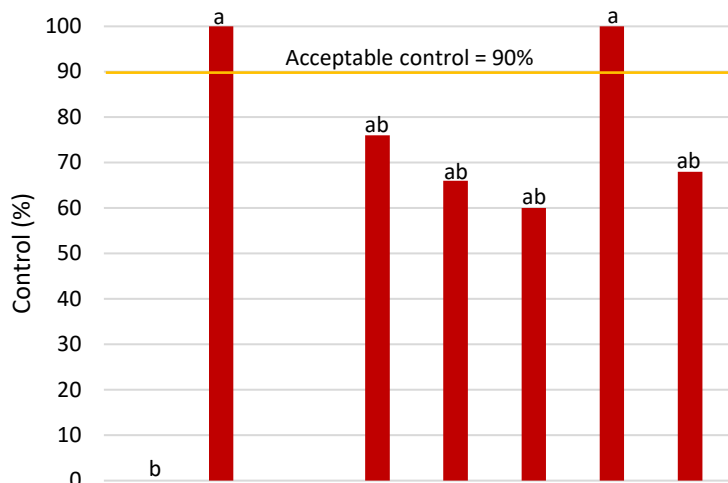
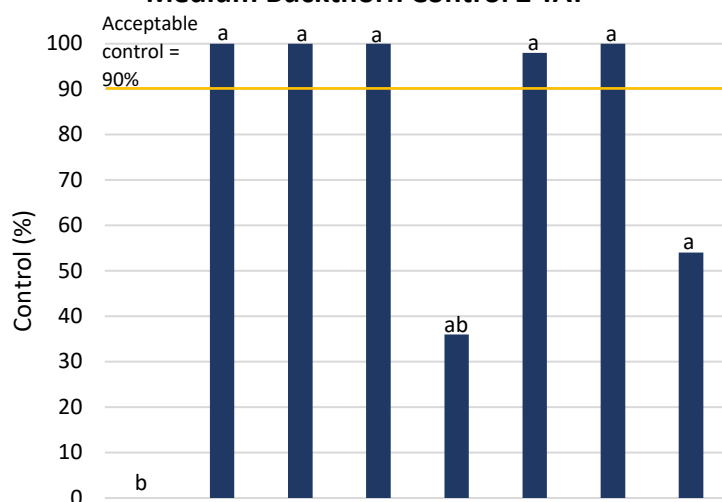
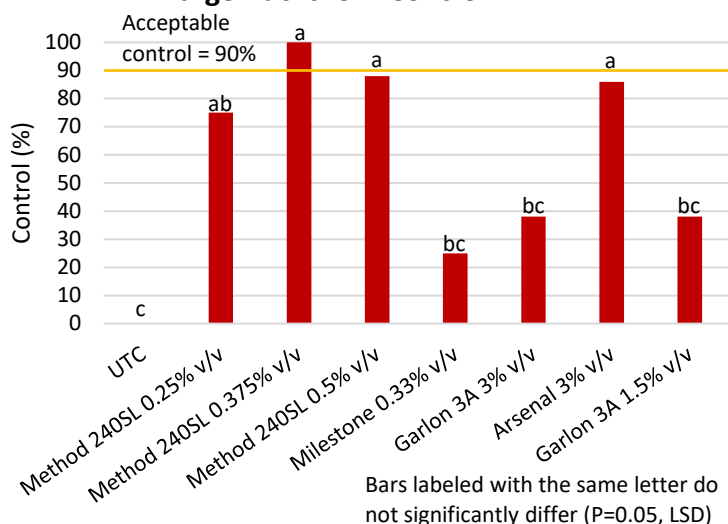
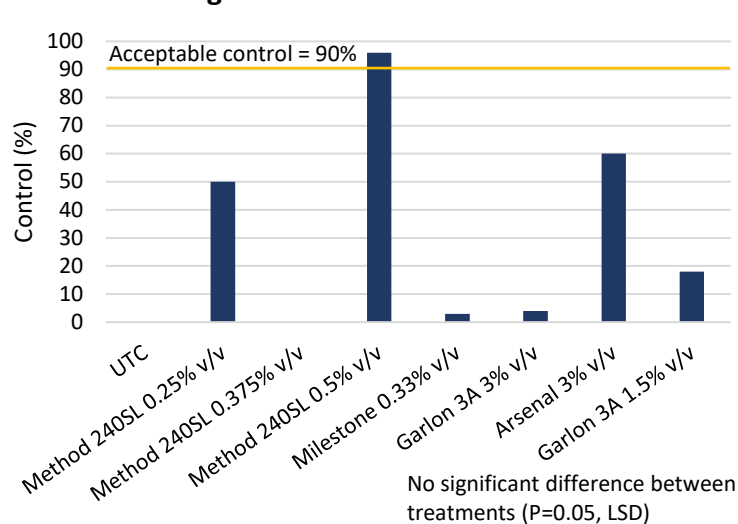


Bars labeled with the same letter do not significantly differ ( $P=0.05$ , LSD)

### Buckthorn Resprouts 2 YAT



No significant difference between treatments ( $P=0.05$ , LSD)

**Small Buckthorn Control 1 YAT****Small Buckthorn Control 2 YAT****Medium Buckthorn Control 1 YAT****Medium Buckthorn Control 2 YAT****Large Buckthorn Control 1 YAT****Large Buckthorn Control 2 YAT**

0 DAT (Pre-Treatment Data) - August 27<sup>th</sup>, 2019

Trt. No.	Treatment	Rate	Small Buckthorn Count (#)	Medium Buckthorn Count (#)	Large Buckthorn Count (#)	Total Buckthorn Count (#)
1	UTC	-				
2	Method 240SL	0.25% v/v	1.3 ab	2.5 -	2.5 -	6.3 -
3	Method 240SL	0.375% v/v	2.8 a	1.3 -	1.0 -	5.0 -
4	Method 240SL	0.5% v/v	0.8 b	1.8 -	3.5 -	6.0 -
5	Milestone	0.33% v/v	1.5 ab	1.8 -	4.3 -	7.5 -
6	Garlon 3A	3% v/v	1.5 ab	1.0 -	3.0 -	5.5 -
7	Arsenal	3% v/v	1.5 ab	1.5 -	2.8 -	5.8 -
8	Garlon 3A	1.5% v/v	1.0 b	2.3 -	2.3 -	5.5 -
<b>Statistics<sup>1</sup></b>						
Least Significant Difference (LSD) P=.05			1.15	1.62	3.70	4.31
Standard Deviation			0.78	1.09	2.49	2.90
Coefficient of Variation (CV)			53.04	63.43	90.53	48.98
Treatment Prob(F)			0.0486	0.4872	0.6735	0.9269

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

36 DAT - October 2<sup>nd</sup>, 2019

Trt. No.	Treatment	Rate	Small Buckthorn Injury (%)	Medium Buckthorn Injury (%)	Large Buckthorn Injury (%)	Weighted Buckthorn Injury (%)
1	UTC	-	0 c	0 d	0 -	0 d
2	Method 240SL	0.25% v/v	82 ab	52 b	44 ab	52 ab
3	Method 240SL	0.375% v/v	95 a	74 a	36 abc	78 a
4	Method 240SL	0.5% v/v	83 ab	88 a	60 ab	75 a
5	Milestone	0.33% v/v	38 c	18 cd	18 bc	25 c
6	Garlon 3A	3% v/v	78 ab	74 a	64 a	60 ab
7	Arsenal	3% v/v	68 abc	50 b	55 ab	50 b
8	Garlon 3A	1.5% v/v	58 bc	30 c	55 ab	44 bc
<b>Statistics</b>						
LSD P=.05			30.93	19.22	38.62	22.446
Standard Deviation			20.90	12.94	26.00	15.264
CV			33.83	27.79	61.54	31.7
Treatment Prob(F)			0.0001	0.0001	0.0355	0.0001

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

<sup>1</sup> All statistical analyses were conducted in ARM software and assumptions of ANOVA were not evaluated.

395 DAT – September 25<sup>th</sup>, 2020

Trt. No.	Treatment	Rate	Small Buckthorn Control (%)	Medium Buckthorn Control (%)	Large Buckthorn Control (%)	Resprouts per Shrub (#)
1	UTC	-	0 c	0 b	0 c	0 d
2	Method 240SL	0.25% v/v	100 a	100 a	75 ab	0.16 bcd
3	Method 240SL	0.375% v/v	100 a	ND	100 a	0.46 abc
4	Method 240SL	0.5% v/v	100 a	76 ab	88 a	0.155 cd
5	Milestone	0.33% v/v	99.2 a	66 ab	25 bc	0.20 bcd
6	Garlon 3A	3% v/v	88 ab	60 ab	38 bc	0.56 ab
7	Arsenal	3% v/v	92 ab	100 a	86 a	0.158 cd
8	Garlon 3A	1.5% v/v	70 b	68 ab	38 bc	0.73 a
<b>Statistics</b>						
LSD P=.05			25.93	52.13	32.27	0.3906
Standard Deviation			17.45	33.09	20.73	0.2648
CV			21.73	53.86	42.96	88.86
Treatment Prob(F)			0.0001	0.0439	0.0011	0.012

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

Trt. No.	Treatment	Rate	Small Buckthorn Mortality (%) (#dead/total small shrubs*)	Medium Buckthorn Mortality (%) (#dead/total medium shrubs) *	Large Buckthorn Mortality (%) (#dead/total large shrubs) *
1	UTC	-	.	.	.
2	Method 240SL	0.25% v/v	100 (5/5)	100 (10/10)	90 (9/10)
3	Method 240SL	0.375% v/v	100 (11/11)	100 (5/5)	100 (4/4)
4	Method 240SL	0.5% v/v	100 (3/3)	86 (6/7)	93 (13/14)
5	Milestone	0.33% v/v	83 (5/6)	71 (5/7)	35 (6/17)
6	Garlon 3A	3% v/v	83 (5/6)	75 (3/4)	50 (6/12)
7	Arsenal	3% v/v	100 (6/6)	100 (6/6)	91 (10/11)
8	Garlon 3A	1.5% v/v	75 (3/4)	56 (5/9)	22 (2/9)

\*Mortality data was summed across treatments therefore no statistical analyses were performed.

720 DAT – August 16<sup>th</sup>, 2021

Trt. No.	Treatment	Rate	Small Buckthorn Control (%)	Medium Buckthorn Control (%)	Large Buckthorn Control (%)	Resprouts per Shrub (#)
1	UTC	-	0 b	0 b	0 -	0 -
2	Method 240SL	0.25% v/v	100 a	100 a	50 -	0 -
3	Method 240SL	0.375% v/v	99 a	100 a		0 -
4	Method 240SL	0.5% v/v	100 a	100 a	96 -	0.03 -
5	Milestone	0.33% v/v	76 a	36 ab	3 -	0.23 -
6	Garlon 3A	3% v/v	75 a	98 a	4 -	0.45 -
7	Arsenal	3% v/v	100 a	100 a	60 -	0 -
8	Garlon 3A	1.5% v/v	94 a	54 a	18 -	0.28 -
<b>Statistics</b>						
LSD P=.05			33.18	47.82	50.64	0.364
Standard Deviation			22.42	31.53	31.06	0.247
CV			28.32	47.59	102.89	196.21
Treatment Prob(F)			0.0001	0.0043	0.0698	0.1162

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

Trt. No.	Treatment	Rate	Small Buckthorn Mortality (%) (# dead/total small shrubs) *	Medium Buckthorn Mortality (%) (# dead/total medium shrubs) *	Large Buckthorn Mortality (%) (# dead/total large shrubs) *
1	UTC	-	-	-	-
2	Method 240SL	0.25% v/v	100 (5/5)	90 (9/10)	80 (8/10)
3	Method 240SL	0.375% v/v	91 (10/11)	100 (5/5)	100 (4/4)
4	Method 240SL	0.5% v/v	100 (3/3)	100 (7/7)	79 (11/14)
5	Milestone	0.33% v/v	67 (4/6)	43 (3/7)	53 (9/17)
6	Garlon 3A	3% v/v	67 (4/6)	50 (2/4)	75 (9/12)
7	Arsenal	3% v/v	100 (6/6)	100 (6/6)	91 (10/11)
8	Garlon 3A	1.5% v/v	100 (4/4)	44 (4/9)	33 (3/9)

\*Mortality data was summed across treatments therefore no statistical analyses were performed.