

Summary of Buckthorn Herbicide Experiments at UNH Kingman Farm

Compiled by T. Lee, October 16, 2020

COOPERATORS

University of New Hampshire (Steve Eisenhaure, Tom Lee, Hannah McCarthy, David Moore)

New Hampshire Department of Agriculture, Markets, and Food (Doug Cygan)

Ibis Wildlife Consulting (Ellen Snyder)

INTRODUCTION

The following is a brief summary of the results from the herbicide experiments initiated in September, 2019, at the UNH Kingman Farm. The experiments were designed by Cygan, Eisenhaure, Lee, McCarthy, and Snyder.

(1) GLYPHOSATE APPLICATION TO CUT STEMS

Sixteen, three-year-old and 16 two-year-old buckthorn plants at Kingman Farm were selected. All were cut at the base in September 2019. Half the plants were controls, half were treated with glyphosate solution brushed over the cut stump. Half of the treated plants received 5% glyphosate, half received 10%. Treatments and controls were divided equally among two- and three-year-old plants. Treatments were applied by Doug Cygan from NH Department of Agriculture, Markets, and Food.

All control plants survived to the most recent sampling date (23 September 2020). All treated plants, regardless of % glyphosate, were dead by our first 2020 sampling date (12 May 2020), and (mercifully) remained dead through the most recent sampling.

Treatment	Number of Plants (n)	Percent Alive					
		5/12	5/27	6/18	7/15	8/12	9/23
Control	16	100	100	100	100	100	100
5% glyphosate	8	0	0	0	0	0	0
10% glyphosate	8	0	0	0	0	0	0

Control plants sprouted early in the season (May) and the number of sprouts remained relative constant until measurements ceased on 23 September.

Treatment	Number of Plants (n)	Mean number of basal sprouts					
		5/12	5/27	6/18	7/15	8/12	9/23
Control	16	33.3	38.4	36.2	35.5	33.3	30.3
5% glyphosate	8	N/A	N/A	N/A	N/A	N/A	N/A
10% glyphosate	8	N/A	N/A	N/A	N/A	N/A	N/A

Control plants grew vigorously in height, reaching a mean height of over 1.5 meters by 12 August.

Treatment	Number of Plants (n)	Mean height (cm above cut base) of tallest sprout					
		5/12	5/27	6/18	7/15	8/12	9/23
Control	16	0.0	12.8	66.4	136.4	157.1	160.4
5% glyphosate	8	N/A	N/A	N/A	N/A	N/A	N/A
10% glyphosate	8	N/A	N/A	N/A	N/A	N/A	N/A

Conclusion: You can kill buckthorn plants with cut-stem application (in the fall) of as a little as 5% glyphosate. If you cut once and don't treat with glyphosate, plants will survive and grow to over 5 feet in the next growing season.

(2) GARLON APPLICATION TO SURFACE OF STEM BASES

Sixty-four, four-year-old buckthorn plants at Kingman Farm were selected and assigned to one of eight treatments, including two controls. One control received no treatment at all, the other received canola oil with no herbicide. The six herbicide treatments were 1, 2.5, 5, 10, 20 and 25% Garlon. Treatments were applied in September 2019, with herbicide solution or oil being painted over the lower 1.5 feet of the surface (i.e., bark,) of each stem.

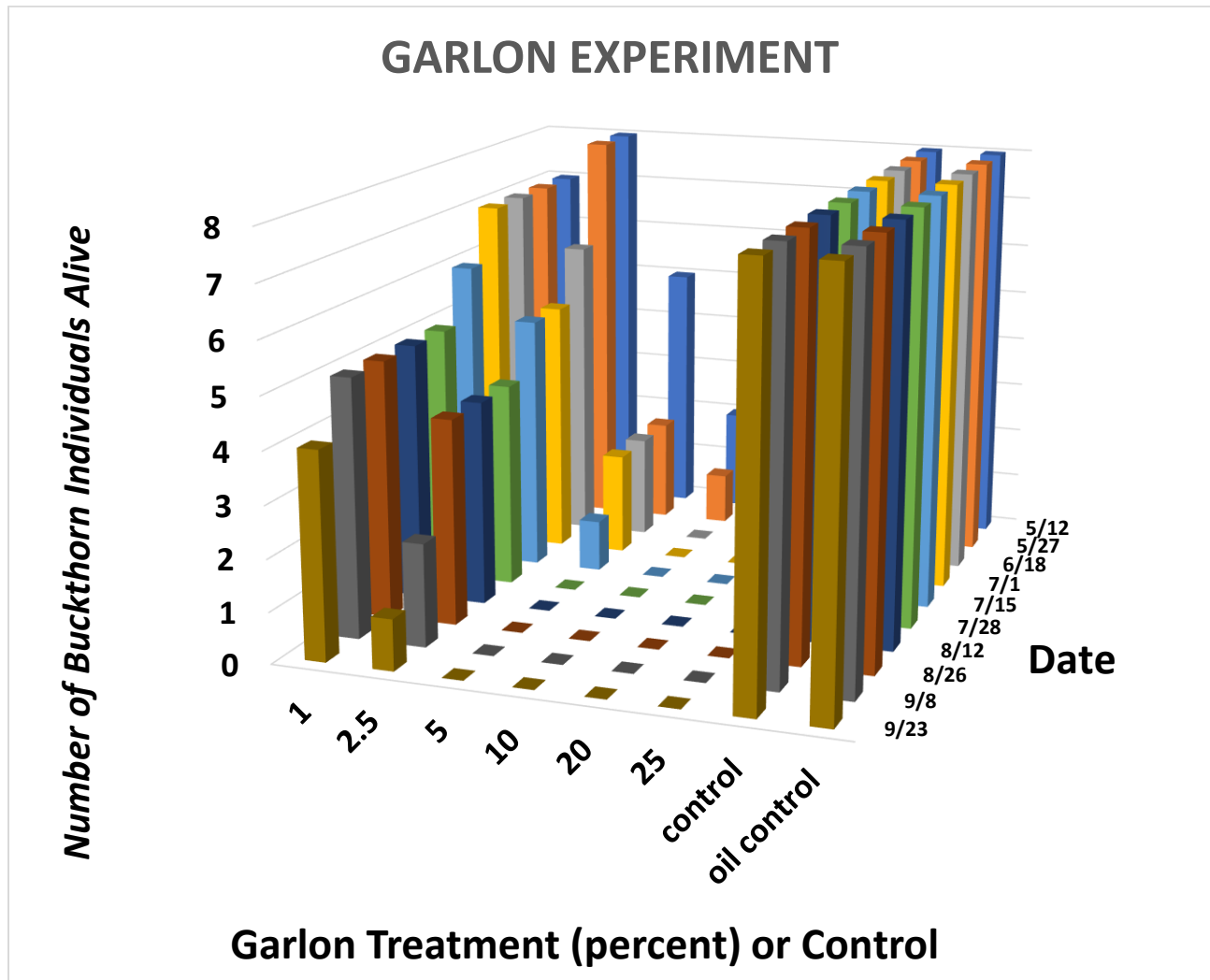
Hannah McCarthy followed the plants after treatment in fall 2019 and noticed some stem deformation and leaf chlorosis of treated plants. You have seen her report. Here we report only data from this summer (2020).

All plants from both control groups survived to the last sample time (23 September 2020). There was some mortality in all treated groups, with mortality occurring earlier in the season in plants receiving higher Garlon concentrations. By 28 July, *all* plants in the 5, 10, 20, and 25% Garlon treatments were dead. Half or less of the plants receiving 1% to 2.5% Garlon survived to 12 August with mortality continuing into September. Some survivors had substantial branch mortality. No basal sprouting was observed in treated plants. See table and graph below (both show the same data).

From August through September 2020 the study site experienced 'severe' and then 'extreme' drought. Mortality occurring after 1 August may have been influenced by dehydration.

Number of Buckthorn Individuals Surviving (out of 8 plants)

Treatment (% Garlon)	5/12	5/27	6/18	7/1	7/15	7/28	8/12	8/26	9/8	9/23
1	7	7	7	7	6	5	5	5	5	4
2.5	8	8	6	5	5	4	4	4	2	1
5	5	2	2	2	1	0	0	0	0	0
10	2	1	0	0	0	0	0	0	0	0
20	1	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0
control	8	8	8	8	8	8	8	8	8	8
oil control	8	8	8	8	8	8	8	8	8	8



Conclusion: Fall surface application of 5% or greater Garlon to the lower 1.5 feet of buckthorn stems causes total plant mortality within 10 months of application. Application of 1% and 2.5% Garlon kills up to 50% of stems after one year.