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RUSSIAN OLIVE CONTROL: HERBICIDE RATES AND TIMING

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ABSTRACT

Studies were conducted to determine how herbicide rates and timing of applications influenced the efficacy of herbicides applied to Russian olive (Eleagnus angustifolia) using the frill cut method. Trees were treated in October, 2005 with Roundup (41% glyphosate), Habitat (28.7% imazapyr), or 2,4-D Amine (47.3% dimethylamine salt of 2,4-Dichlorophenoxyacetic acid) at rates of 1.0, 1.5 or 2.0 ml/inch of trunk diameter. All chemicals and rates provided acceptable control of Russian olive, with the 1 ml 2,4-D and the 1.5 ml Roundup treatments showing slightly lower control than other herbicides and rates. This suggests that 1 ml of herbicide/inch of trunk diameter is an acceptable rate using the frill cut method. In a follow-up study, trees were treated with 1 ml/inch of trunk diameter of Roundup or 2,4-D each month from November, 2006 through September, 2007. The results were compared with the 1.0 ml October treatment of the same chemical in the previous study. For 2,4-D, applications in September provided the best control. For Roundup, best control was achieved from applications in January, May, June, July, August and September. This suggests that September is the best time to apply 2,4-D and May through October is the best time to apply Roundup to Russian Olive using the frill cut method.

INTRODUCTION

Degradation of riparian areas, pastures and range lands in the Western United States is being intensified by the increasing encroachment of Russian olive (*Elaeagnus angustifolia* L.). The Russian olive is a small thorny tree or large shrub that is native to Europe. In the early 1900s it was promoted as a conservation plant by soil conservation districts and land grant universities. Russian olive is an extremely hardy and adaptable plant that tolerates drought, alkaline and saline soils, can fix nitrogen from the air, and reproduces by seed and through root suckers. Trees produce copious small fruits that are relished by many species of wildlife (particularly birds). These attributes make it valuable in windbreak and wildlife plantings but have also allowed Russian olive to spread explosively, out-competing and displacing native vegetation. It often creates a monoculture, reducing vegetative diversity. Although Russian olive fruit is eaten by birds, Muzika and Swearingen (2009) and Stannard, Ogle, Holzworth, Scianna, and Sunleaf, (2002) indicate that solid stands of Russian olive trees support fewer species of birds than native vegetation. These characteristics, along with its thorny growth habit, have caused many to view Russian olive as an invasive weed.

Russian olive has been declared a noxious weed in several western states and/or counties. Although it is no longer legal to plant Russian olives in these areas, the species continues to spread, reducing the quality of pastures and overpowering native riparian vegetation. Russian olive is essentially a mono-culture along some sections of riparian areas in western states. While total eradication of Russian olive is neither likely nor feasible, an aggressive control and maintenance program will help to restore desirable plant diversity.

There are four accepted methods of applying chemicals to Russian olives:

Foliar Spray—An herbicide solution is applied directly to the leaves of an actively growing plant. Foliar spraying does not always provide complete control, since leaf pubescence intercepts spray droplets before they reach the leaf surface. Care must be taken to apply herbicide to every branch, as unsprayed branches will not be killed. Dilution of the chemical is usually required.

Basal Bark Spray—Herbicide is applied to the lower area of the main trunk(s) of the tree and is absorbed through the bark. The herbicide is usually diluted with an oil or petroleum product, such as diesel fuel, to help with absorption.

Frill-cut—A hatchet or ax is used to cut notches through the bark and into the sap wood of the tree. Undiluted herbicide is poured or injected into each notch. Cuts are made with a downward motion so the resultant notches will hold the herbicide. Care must be taken to not girdle the tree with the chop marks.

In each of the methods listed above, trees are treated one year and removed the next, after they have been killed by the herbicide.

Cut stump—The tree is cut down and the stump is sprayed or painted with herbicide within ten minutes of cutting, paying particular attention to the cambium layer.

An undiluted chemical is more effective with frill cut and cut stump application methods.

There are no effective biological controls available for Russian olive at this time. However, goats have been widely observed eating young growth and even stripping bark off older Russian olive trees.

Russian olives readily propagate sexually and asexually. Seeds are spread far and wide by birds and other wildlife that feed on the fruit. Trees that are cut off or pulled from the ground readily send up root suckers, creating even greater problems. Thus, it is very desirable to kill trees before removing them from the site, or to treat the stumps immediately upon removal of the crown.

MATERIALS AND METHODS

CHEMICAL APPLICATION METHODS

For environmental concerns and ease of determining the quantity of chemical applied, the frill-cut method was employed in this field study. Recent field research studies were conducted in Carbon County and Emery County in Utah to help determine application rate and time-of-year effectiveness on frill-cut chemical application control of Russian olive.

APPLICATION RATES

Three different rates of Habitat (28.7% imazapyr), 2,4-D Amine (47.3% dimethylamine salt of 2,4-Dichlorophenoxyacetic acid), or Roundup (41% glyphosate) were applied to test trees to determine the efficacy of each herbicide and rate. Undiluted Habitat, 2,4-D and Roundup were applied at the rates of 1 ml, 1.5 ml, and 2 ml per inch of trunk diameter using the frill-cut method of application. One frill cut was made for each inch of trunk diameter and the appropriate amount of chemical (1.0, 1.5, or 2.0 ml) was applied to each cut.

Russian olive has both single-trunk and multiple stemmed growth habits. To reduce the number of variables in this field experiment, single-trunk trees that were six to eight inches in diameter at one foot from ground level were selected for application. Each treatment was applied to three trees, making twenty-seven treatments and three control trees. Control trees received frill cuts like treatment trees did, but no chemical was applied to the cuts. Treatment and control trees were marked with spray paint, and GPS coordinates taken so trees could be identified and evaluated.

The trees were treated on October 12, 2005 and were evaluated on September 5, 2006. Each tree was given a visual appraisal of the effectiveness of the treatment and the percent of control was estimated by the amount of live growth on each tree.

TIME-OF-YEAR

Beginning in November 2006 through September 2007 three trees were treated each month with 1 ml of undiluted Roundup (41% glyphosate) per inch of trunk diameter in Emery County, Utah. During the same time period three trees were treated each month with 1 ml of undiluted 2,4-D Amine (47.3% dimethylamine salt of 2,4-Dichlorophenoxyacetic acid) per inch of trunk diameter in Carbon County, Utah. The frill cut application method was used.

Multi- and single-stemmed trees were treated. For multi-stemmed plants each stem from the same crown was treated individually but the entire crown was counted as one tree. The treatments were evaluated in May 2008, after healthy Russian olives in the region had leafed out, and compared with the results of the October 2005 treatment.

RESULTS

APPLICATION RATE TRIAL

Control (see Table 1.)

There was 0.00% control from this treatment.

Roundup (see Table 1.)

1.0 ml per inch diameter—All trees appeared dead—100% control.

1.5 ml per inch diameter—Two trees appeared dead—100% control, the third tree showed 90% control and the leaves that were still alive were very stunted and stressed.

2.0 ml per inch diameter—All trees appeared dead—100% control.

2-4,D (see Table 1.)

1.0 ml per inch diameter—Two trees appeared dead—100% control, the third tree showed 80% control and the leaves that were still alive were very stunted, showing symptoms of severe 2,4-D damage.

1.5 ml per inch diameter—All trees appeared dead—100% control.

2.0 ml per inch diameter— All trees appeared dead—100% control.

Habitat (see Table 1.)

1.0 ml per inch diameter—One tree had 90% control with some small adventitious sprouts on the trunk. Another tree showed 95% control with only some stressed buds on the trunk. The third tree showed 100% control.

1.5 ml per inch diameter—Two trees appeared dead—100% control, the third tree showed 95% control with only some stressed adventitious buds on the trunk.

2.0 ml per inch diameter— Two trees appeared dead—100% control, the third tree showed 95% control with only some stressed adventitious buds on the trunk and highly chlorotic suckers.

Table 1.

Chemical Effectiveness					
	Tree #1	Tree #2	Tree #	Mean	SD
Control	0	0	0	0	0
2-4,D—1.0 ml	100	100	80	93.33	11.55
2-4,D—1.5 ml	100	100	100	100.00	0.00
2-4,D—2.0 ml	100	100	100	100.00	0.00
Roundup--1.0 ml	100	100	100	100.00	0.00
Roundup--1.5 ml	90	100	100	96.67	5.77

Roundup--2.0 ml	100	100	100	100.00	0.00
Habitat--1.0 ml	100	90	95	95.00	5.00
Habitat--1.5 ml	100	100	95	98.33	2.89
Habitat--2.0 ml	95	100	100	98.33	2.89

TIME-OF-YEAR TRIAL

2-4,D (see Table 2.)

When evaluated for greater than 95% control and a standard deviation of less than 5, September provided the most effective and consistent treatment for 2-4,D.

Table 2.

Tree evaluations--Carbon County					
2-4,D, 1 ml per inch trunk diameter--percent kill by visual evaluation					
Date of Evaluation--May 29, 2008					
Treat date	Tree #1	Tree #2	Tree #3	Mean	SD
November 2006	100	60	50	70.00	26.46
December 2006	10	80	70	53.33	37.86
January 2007	55	95	70	73.33	20.21
February 2007	90	75	80	81.67	7.64
March 2007	40	20	95	51.67	38.84
April 2007	90	98	20	69.33	42.91
May 2007	90	95	90	91.67	2.89
June 2007	70	90	90	83.33	11.55
July 2007	95	90	95	93.33	2.89
August 2007	80	100	100	93.33	11.55
September 2007	100	100	100	100.00	0.00
Comparison 2-4,D treatment 1.0 ml per inch trunk diameter					
October 2005	100	100	80	93.33	11.55

ROUNDUP (SEE TABLE 3.)

When evaluated for greater than 95% control and a standard deviation of less than 5, January and May – September provided the most effective and consistent treatment for Roundup.

Table 3.

Tree evaluations--Emery County					
Roundup, 1 ml per inch trunk diameter--percent kill by visual evaluation					
Date of Evaluation—May 30, 2008					
Treat date	#1	#2	#3	Mean	SD
November 2006	100	45	60	68.33	28.43
December 2006	100	100	75	91.67	14.43
January 2007	100	100	100	100.00	0.00
February 2007	70	90	100	86.67	15.28
March 2007	40	40	100	60.00	34.64
April 2007	70	85	100	85.00	15.00
May 2007	100	100	100	100.00	0.00
June 2007	100	100	100	100.00	0.00
July 2007	100	100	100	100.00	0.00
August 2007	100	100	--	100.00	0.00
September 2007	100	100	100	100.00	0.00
Comparison Roundup treatment 1.0 ml per inch trunk diameter					
October 2005	100	100	100	100.00	0.00

CONCLUSIONS

Analysis of the data reveals that the frill cut method of application provided effective control across all herbicides and rates of treatment with the exception of the 2-4,D 1 ml treatment and the Roundup 1.5 ml treatment. However, in the time-of-year trial the Roundup 1 ml treatment was very effective during the summer and fall months. Herbicide manufacturers frequently recommend that 2.0 ml of product be applied per inch of trunk diameter. The results of this experiment suggest that not only are all three tested products effective in killing Russian olive trees, but the lower rates can be just as effective as the higher rates.

Time-of-year is also important in effective frill-cut Russian olive control. Undiluted Roundup provided the longest treatment season. It appears that good control can be achieved during the active growing season after the flush of new spring growth has slowed.

This data is made available so that those who are currently planning to remove Russian olive may do so in a targeted way. In order to give more statistical strength to the results this trial will be repeated over two more years.

RECOMMENDATIONS

The frill-cut method of chemical application is an effective and environmentally friendly way to apply herbicide to Russian olive trees. The treatment can be done by one person and the dead trees can be removed the following season by one person. Treat the trees during the latter part of their growing season. Individual landowners may find that killing the tree before removing the crown makes good use of time and resources. The main difficulty with this method is getting through the thorny lower branches of the tree to access the trunk. It is advisable to carry loppers or a pruning saw to remove lower branches.

REFERENCES

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