Horticulture

EXTENSION UtahStateUniversity

extension.usu.edu

January 2019 Horticulture/Trees/2019-01pr

# Minimizing Regrowth When Removing Russian Olive—Points to Consider

***Dennis Worwood***, Emery Co. Extension Agent
***Ron Patterson***, University of Idaho Educator, Bonneville County
***Steve Price***, Carbon Co. Extension Agent

- **Problem**—Russian olive has epicormic buds on the trunk that break dormancy and produce sprouts as soon as the upper part of the tree is removed if conditions are suitable for growth.
- **Solution**—Herbicide treatment is an effective way to prevent crown sprouts by killing epicormic buds.
- **Problem**—Russian olive can develop adventitious buds on roots that are exposed or near the soil surface. These buds sprout to form root suckers.
- **Solution**—Burying exposed roots under at least three inches of soil after tree crowns are removed greatly reduces root suckering.

## Introduction

Russian olive (*Elaeagnus angustifolia*), native to Eurasia, is the fourth most common riparian tree in the western United States (Friedman et al., 2005). Russian olive readily invades pastures and fence lines, effectively reducing the amount of forage available for livestock. Mechanical removal of Russian olive without herbicide or follow-up mechanical treatments typically results in a denser stand of shrubby Russian olive. The authors conducted a variety of trials to gain a greater understanding of the patterns of Russian olive regrowth and determine management practices that reduce the regrowth potential of mechanically-removed Russian olive.

## Regrowth

Russian olive control is challenging because crowns and/or roots sprout prolifically after trees have been removed. In trials conducted in Emery County, Utah, Russian olive stumps produced an average of 51 and 21 sprouts per tree after trees had been felled or shredded, respectively, without an accompanying herbicide treatment. Russian olives uprooted near Ferron, Utah, produced an average of 38 suckers per tree from exposed ends of broken roots. Even though many sprouts and suckers do not survive, enough regrowth persists to quickly recolonize sites through dense, shrubby regrowth unless steps are taken to prevent or control it.

Like some other woody species, Russian olives regrow from both existing epicormic (dormant) buds and newly formed adventitious buds. Epicormic buds are located just beneath the bark, sometimes in clusters, and can remain dormant for decades until environmental conditions are right for growth (Fig. 1). If trees are cut down or shredded during the growing season, epicormic buds sprout immediately from stumps and grow

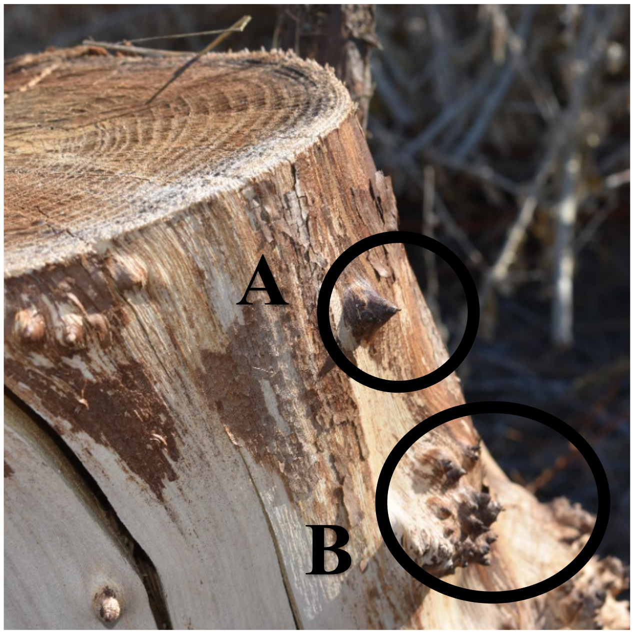


Figure 1. Individual Epicormic buds (A) and bud clusters (B) are visible after the bark was removed from this Russian olive stump.

rapidly (Fig. 2). Trees removed during the winter dormant season will reinitiate growth when conditions later become favorable (Patterson et al., 2018). Adventitious buds develop from meristematic tissue in places where buds are not normally produced (e.g., the cambium). All root suckers grow from adventitious buds, and the cambium layer of stumps can also produce adventitious buds after the tree crown is removed. Shoots arising from adventitious buds typically do not appear for 3 or more months after trees have been removed, since it takes that long for callus tissue (unspecialized cells) to form and new buds to develop (Fig. 3).

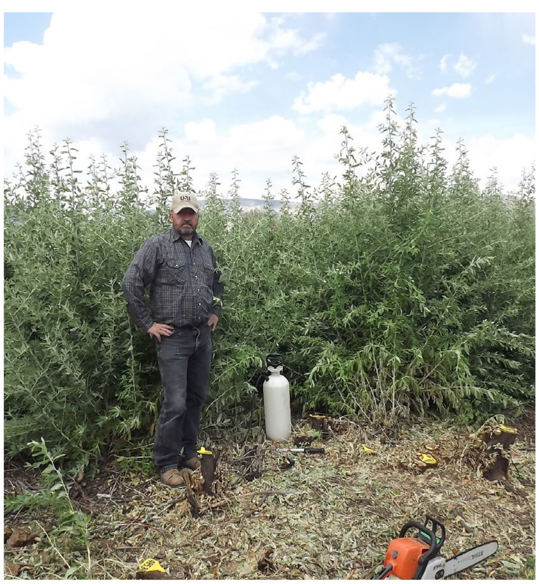

Figure 2. Sprouts from stumps of Russian olives that were cut down 4 months earlier.

Figure 3. Cross section of an exposed Russian olive root. The suckers on the right grew from adventitious buds originating from the root's cambium layer.

Russian olives can be "farmed out" if the land is repeatedly cultivated after trees are removed. The authors have observed multiple sites in eastern Utah where traditional soil preparation activities (plowing, disking, etc.) were enough to prevent or kill regrowth after Russian olives were uprooted. Tillage may also reduce seedling establishment by burying seed. Hybner and Espeland (2014) observed "…Russian olive does not appear to have the capability of emerging from or surviving burial at or beyond a 3-inch depth…" One drawback to relying on farming practices to control Russian olive is the possibility of flat tires on farm equipment from thorns on regrowth.

## Crown Sprouts

Trials were conducted to determine if burning or burying Russian olive stumps would prevent or minimize regrowth (Worwood & Patterson, 2015). Burning killed many buds that formed on the stumps as epicormic buds, but new shoots eventually emerged from just below ground level (Fig. 4). Burying stumps after trees had been felled or shredded did not prevent new shoots from emerging from epicormic and adventitious buds (Figure 5).

Regrowth from stumps can be minimized by 1) completely removing all crown tissue; or 2) treating remaining crown tissue with herbicide after trees are removed. A3-year study demonstrated that applying undiluted glyphosate herbicide to the

cambium (Fig. 6) layer of freshly cut Russian olive stumps provided nearly 100% control of regrowth (Patterson et al., 2018).

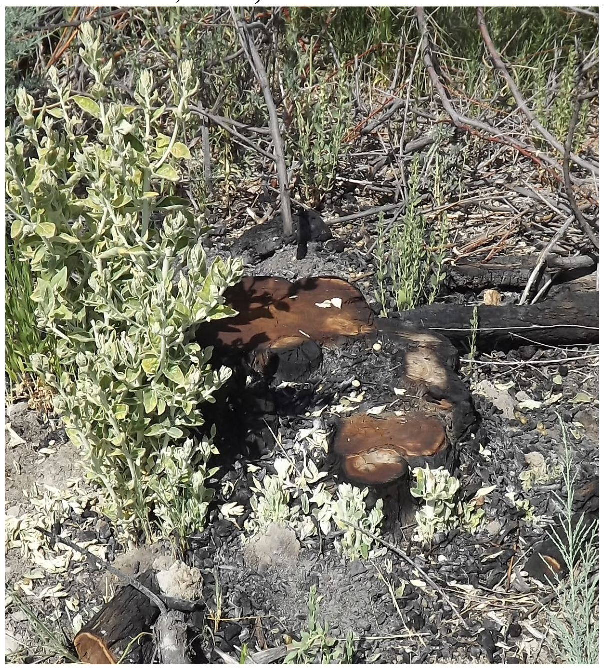

Figure 4. Regrowth from a Russian olive stump that had been burned.

Figure 5. Regrowth from a Russian olive stump that had been buried.

## Root Suckers

Unlike poplars, which can send up suckers from roots several inches deep, Russian olives sucker only from roots that are exposed or very shallow (Fig. 7). In a cut stump herbicide study where there were no exposed roots, suckers did not emerge from either treated or untreated stump roots (Patterson et al., 2018). In a similar Montana study,

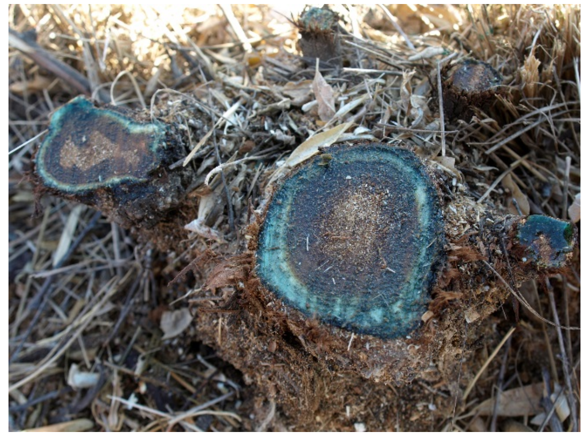

Figure 6. The cambium is the growth area that produces annular rings in woody plants. It is the area where almost all the water and food translocation takes place.

Figure 7. Suckers on Russian olive roots exposed by streambank erosion.

only 4 percent of treated stumps produced regrowth with about 90 percent of the regrowth observed in the study originating from roots that had been exposed by erosion (Espeland et al., 2017).

Previously unpublished trials conducted in Utah confirmed the relationship between root exposure and suckering (Worwood & Patterson, 2015). In one trial, broken roots of eight uprooted Russian olive trees were left exposed, while broken roots of eight additional trees were immediately reburied under 3 to 5 inches of soil. One year later, the trees with exposed roots had an average of 38 suckers, while those with buried roots produced a

total of one sucker from a small root that had remained unburied. In a similar study, trenches 16 inches deep were dug completely around nine Russian olive trees where every encountered root was severed. Half of each trench was backfilled to ground level, while the other half remained open. Twelve months later, an average of 25 suckers had emerged from exposed roots in open trench segments (Fig. 8). Almost all of the root suckers grew from roots that were no longer attached to the trees likely due to the trees' continued apical dominance that suppressed new shoot growth. A total of two suckers emerged from buried trench segments from two accidentally exposed roots. Two conclusions can be drawn from these results, coupled with observations of root suckers from undisturbed Russian olive trees: 1) Russian olives rarely produce root suckers unless roots are shallow or exposed, and 2) root suckering can be minimized by burying roots that are exposed by tree removal activities.

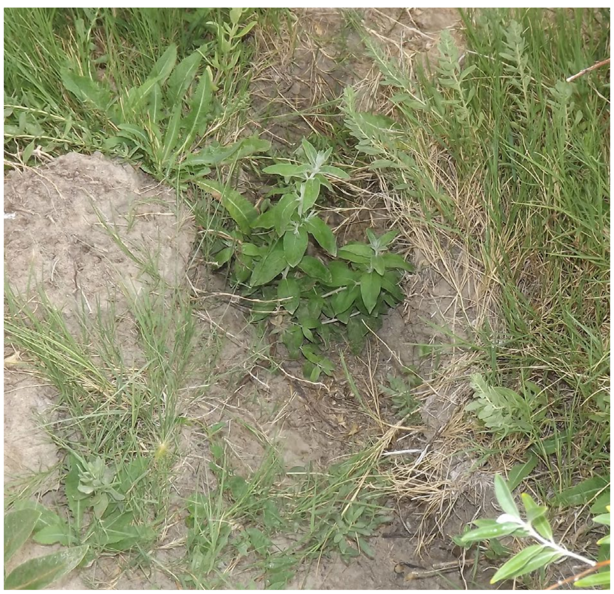

Figure 8. Russian olive suckers from a root exposed in an open trench.

Others have also made the management recommendation that "Any remaining exposed roots should be cut off below ground level and buried" after mechanical uprooting (DiTomaso et al., 2013). Cutting roots below ground level insures that all crown tissue has been removed while burying the remaining roots discourages sucker development.

Root sucker growth is likely on sites where roots have been exposed by erosion, tree removal, or on sites where root depth is already limited by a hardpan or high water table. In these situations, provision should be made for both crown sprout and root sucker control after trees are removed. Herbicide applied to cut stumps may be translocated to kill root suckers (Fig. 9), but may not provide complete control (Espeland et al., 2017). Multiple foliar or basal bark herbicide treatments are usually required to completely control root suckers.

Figure 9. Herbicide damage symptoms on a Russian olive root sucker after the attached stump was treated with glyphosate.

## Conclusion

Russian olive cannot be effectively controlled by a simple mechanical removal. Continued cultivation, herbicide treatment, or burying exposed roots, in addition to treating seedlings for several years will be required for long-term control. When crown tissue, with epicormic buds, is left post-mechanical removal, herbicide treatment is the most effective control option. When only roots are left behind, it is important to bury the broken root ends with 3-5 inches of soil or spray the resulting sucker growth with an herbicide.

## References

DiTomaso, J. M., G. B. Kyser et al. (2013). *Weed Control in Natural Areas in the Western United States*. Weed Research and Information Center, University of California. 544 pp.

Espeland, E. K., Muscha, J. M., Scianna, J., Kilian, R., West, N. M., and Petersen, M. K. (2017). Secondary Invasion and reinvasion after Russian-Olive Removal and Revegetation. *Invasive Plant Science and Management 10(4),* 340-349.

Espeland, E., Peterson, M., Muscha, J., Scianna, J., & Kilian, R. (2014). Soils and Vegetation change following Russian olive removal [Video file]. Retrieved from https://www.youtube.com/watch?v=lKn4e9R0NKk&index=20&t=0s&list=PLtUMrpnG2_A_0la55IiXY8vmsDNc2ENxy

Friedman, J. M., Auble, G. T., Shafroth, P. B., Scott, M. L., Merigliano, M. F., Preehling, M. D., & Griffin, E. K. (2005). Dominance of non-native riparian trees in western USA. Biological Invasions, 7(4), 747-751.

Hybner, R. & Espeland, E. (2014). Russian Olive Elaeagnus angustifolia L. Effect of Seed Burial Depth on Seedling Emergence and Seed Viability. Natural Resources Conservation Service, Plant Materials Technical Note No. MT-107

Patterson, R. K., Worwood, D. R., & Price, S. (2018). Year Round Control of Russian Olive Using the Cut Stump Treatment. *NACAA Journal*, 11(1), June 2018 [On-line]. https://www.nacaa.com/journal/index.php?jid=841.

Worwood, D. R., & Patterson, R. K. (2015). [Russian olive root sucker growth after burning or burial]. Unpublished data.



This publication is issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Ken White, Vice President for Extension and Agriculture, Utah State University.