University of Nebraska–Lincoln Extension EC167

Weeds of Nebraska

Russian Olive

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Biology
Identification
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Russian Olive

Russian olive (*Elaeagnus angustifolia* L.) occurs in most of the continental United States but is more prevalent in western states. In the west, Russian olive has spread from original plantings to infest riparian environments. Along some streams it covers 80 percent of the soil surface at densities of 500 plants per acre. Some western states have listed Russian olive as a noxious weed and advocate aggressive strategies to minimize or eliminate infestations.

Russian olive can be found throughout Nebraska but is primarily a concern in riparian environments of the Platte, Republican, and Niobrara rivers *(Figure 1)*. Russian olive has gained notoriety because of the large quantities of water used by dense infestations of the tree. Researchers studying water consumption by classes of riparian vegetation in the Middle Rio Grande Region of New Mexico estimated that one acre infested with cottonwood, Russian olive, or saltcedar could consume 4.5, 4.2, or 3.8 acre feet of water per year, respectively.

A survey conducted along the North Platte River from the Wyoming/Nebraska border to Kingsley Dam at Lake McConaughy estimated that over 8500 acres of land was heavily infested with Russian olive and saltcedar *(Figure 2)*. This infestation may use up to 35,000 acre feet of water per year. This large loss of water has raised concerns because water supplies in Nebraska are limited and competitive demands of agriculture, natural habitat, and interstate compacts require us to look for ways to minimize unnecessary water losses.

Biology

Russian olive is a member of the Elaeagnaceae family of plants. In western North America common native species that belong to the Elaeagnaceae family are silver-berry (*Elaeagnus commutata* Bernhardi) and buffalo-berry (*Shepherdia canadersis* (L.) Nutall), both of which resemble Russian olive. Autumn olive (*Elaeagnus umbelata* Thumb.), like Russian olive, is native to Asia. It was introduced into the mid-western and eastern United States and has become invasive.

Russian olive can be classified as a small tree or a multi-stemmed shrub. It loses its leaves during winter and begins spring growth in late April *(see life cycle on page 5)*. Leaves are alternate, simple, narrowly lanceolated, and covered with silvery-gray star-shaped hairs and scales *(Figure 3)*. Its bark is reddish brown and branches may possess sharp thorns *(Figure 4)*. Flowers occur in May through June and are yellow, arranged in clusters, and highly fragrant *(Figure 4)*. Fruits are oval-shaped, 0.3 to 0.5 inch long with a fleshy outer layer covering a large football-shaped seed *(Figure 5)*. The seed of Russian olive is large compared to cottonwoods and willows.

Large seed size can be associated with enhanced seedling establishment, growth, and survival in shade. These attributes may allow Russian olive to establish within intact vegetation and litter and may increase its competitiveness. Russian olive seeds are dormant at maturity and require a period of cold temperature to break dormancy. Seed can remain viable in the soil for up to three years. Seed dispersal occurs during fall and winter primarily by birds. A number of birds eat the fruit and tests conducted with starlings showed that Russian olive seeds suffered no significant loss in viability as they pass through the digestive tract.

Russian olive trees survive in upland and riparian environments. However, it is in riparian environments that the tree becomes invasive. Once seedlings become established. they extend roots downward up to 9 feet until they reach a groundwater supply. The tree avoids drought stress by tapping into a constant water supply. Russian olive is tolerant of alkaline soil conditions and seedlings can tolerate high concentrations of both sodium chloride (NaCl) and potassium chloride (KCl). Thus, it can become established in poor soils where other species do not grow.

Distribution

Russian olive can be found throughout Nebraska but is primarily a concern in riparian environments of the Platte, Republican, and Niobrara rivers. Russian olive can spread by root sprouting or by seed which can be carried by birds, wind, and water. The large seed size enhances seedling establishment, growth, and survival. Once established, the tree can develop a symbiotic association with certain bacteria in the soil and form nitrogen-fixing root nodules. These provide the tree with nitrogen to enhance growth.

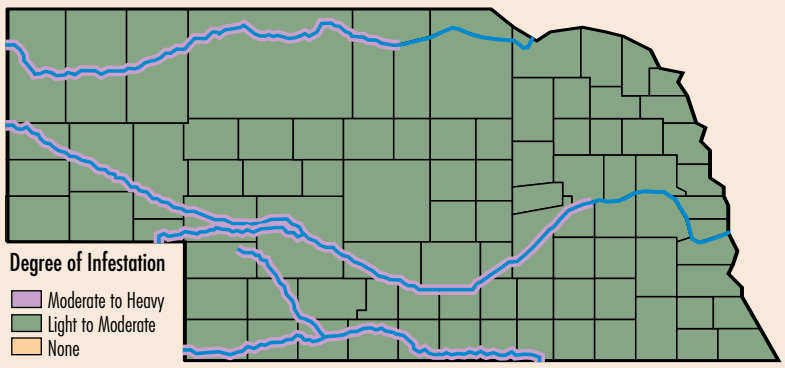
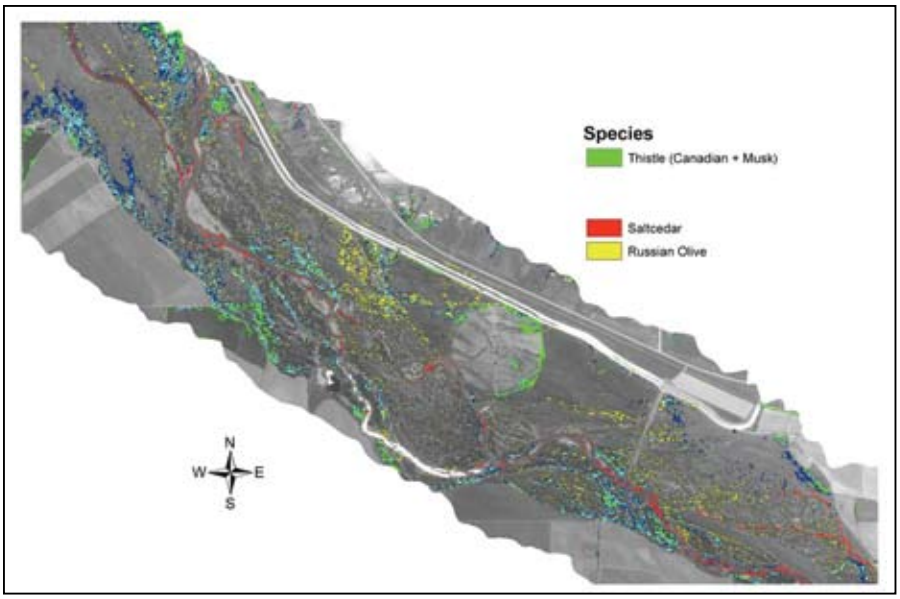


Figure 1. Russian olive is not listed as a noxious weed in Nebraska; however, along the Republican, Platte, and Niobrara river drainages, dense infestations of the shrub have limited water movement and encroached upon native vegetation.



Figures 2. Aerial map showing the distribution of Russian olive along the corridor of the North Platte River near Mitchell, Nebraska on June 21, 2005.

Figure 3. Russian olive leaves are alternate, simple, narrowly lanceolate and covered with silvery-gray hairs.

Figure 5. Russian olive fruit with f eshy outer layer covering a large football-shaped seed.

Figure 4. Russian olive bark is reddish brown and branches may possess sharp thorns. Flowers are yellow and arranged in clusters.

The adaptive characteristics of Russian olive have allowed the tree to spread along streams and rivers and once established, to compete with native vegetation, and in some areas to develop monocultures. It develops a symbiotic association with certain bacteria in the soil and forms nitrogen-fixing root nodules which provide the tree with nitrogen. Leaves of Russian olive contain greater concentrations of nitrogen compared to other riparian plants. As leaves are shed in the fall, the leaf-litter adjacent to the tree provides the plant with an abundant nitrogen supply which enhances plant growth. Russian olive is relatively shade tolerant and can grow as an understory plant under cottonwood trees *(Figure 6)*. It also grows well in full sunlight in pastures or along streams.

Because many streams in the west have been dammed for water storage, the natural cycle of periodic flooding which would scour the river bed does not occur. Without these flooding events, Russian olive becomes established in river channels and as the river channel becomes narrower or changes, Russian olive continues to grow in areas above the normal flood plain.

There is considerable debate concerning the relationship of Russian olive and wildlife. The fruit matures in the fall and for most of the winter will remain on the tree where it is available for birds to eat. In the spring, the fruit falls to the ground where it is available for ground feeders. Robins, pheasants, grouse, quail, partridge, and cedar waxwings are a few of the bird species reported to feed on Russian olive fruit. These same species also spread the seeds to new locations.

Magpies can nest in Russian olive trees, but may decrease the nesting success of certain ground-nesting birds as they feed on eggs or juveniles. Duck nesting success decreased as Russian olive density increased. Native beaver prefer to eat cottonwood or willows and avoid Russian olive, thereby enhancing the survival of Russian olive compared to the native species. Domestic livestock will browse on Russian olive but the abundance of the trees in pastures suggests the damage does little to slow the spread of the plant. Mice flourish in the litter

Figure 6. Russian olive trees are relatively shade tolerant.

Figure 7. Russian olive trees were removed by pulling only to resprout from broken roots the next year.

Figure 8. Cutting Russian olive trees off at the soil surface followed by treatment with an approved herbicide.

Figure 9. Cutting Russian olive trees off at the soil surface without treatment with herbicide.

Figure 10. Russian olive tree being shredded with a chipper (left); chips covering the stump prevent stump treatment with an approved herbicide (right).

beneath Russian olive trees, feeding on the fruit and seeds.

Russian olive nursery stock has been injured by fungal infections (cankers). The cankers cause a dieback of branches resulting in dead limbs and sometimes tree death. However, the disease is not widespread and seems to affect only scattered trees in a dense infestation. While it is not unusual to observe die-back in Russian olive trees, the trees seldom succumb to the disease.

Control Methods

Many techniques have been used to control Russian olive, some with success and many with failure. The most common cause of failure is the capacity of Russian olive roots to resprout. Pulling, chaining, or bulldozing removes the trunk, branches and some of the roots, but the roots that broke off and remained underground resprout new trees. Some land managers have spent several hundred dollars per acre to bulldoze Russian olive, stack the dead trees, and burn the brush piles only to have resprouting trees reinfest the area several years later *(Figure 7)*.

The control method used for Russian olive should be dictated by the size of the tree. Older established trees may have stem diameters ranging from 10 to 20 inches, resprouts from broken roots may range in diameter from 0.5 to 2 inches, and new seedlings may only have a 0.12-inch diameter stem.

Combinations of mechanical and chemical control have been successful on older established trees. Cutting Russian olive near the soil surface with a chain saw or shear and then immediately treating the stump with an approved herbicide provides excellent control *(Figure 8)*. The above ground portion of the tree can be run through a chipper or piled for disposal at a later date. Russian olive can be cut throughout the year and treated with a herbicide as long as air temperatures are above freezing. Herbicides such as Garlon 4 (Remedy Ultra) in combination with basal bark oil or diesel fuel (33/67) or Habitat in combination with basal bark oil or methylated seed oil (10/90) are approved for use in riparian areas on freshly cut Russian olive stumps. If trees are cut and not treated with a herbicide, they will resprout *(Figure 9)*. Russian olive resprouts grow rapidly, can grow through mulch, and can be several feet tall a year after cutting.

Chippers mounted on the front of skid loaders may be used to chip the standing tree into mulch and thus avoid stacking and burning of discarded trees. However, care should be used with this method because often the cut chips cover the stump and prevent the herbicide treatment from working well. This leads to resprouting *(Figure 10)*.

Control of Russian olive resprouts can be difficult because foliage sprays sometimes fail to provide satisfactory control. Spraying Russian olive foliage with Habitat at 2 quarts per acre will provide good to excellent control if foliage is completely covered *(Table 1)*. Failure to cover the entire tree with the spray solution can lead to resprouting. Also, use caution with Habitat as it will kill other vegetation growing near the tree.

An alternative to cut stump treatment is basal bark treatment. Basal bark treatments involve mixing Garlon 4 Ultra (Remedy Ultra) with basal bark oil at a ratio of 33/67 or Habitat with

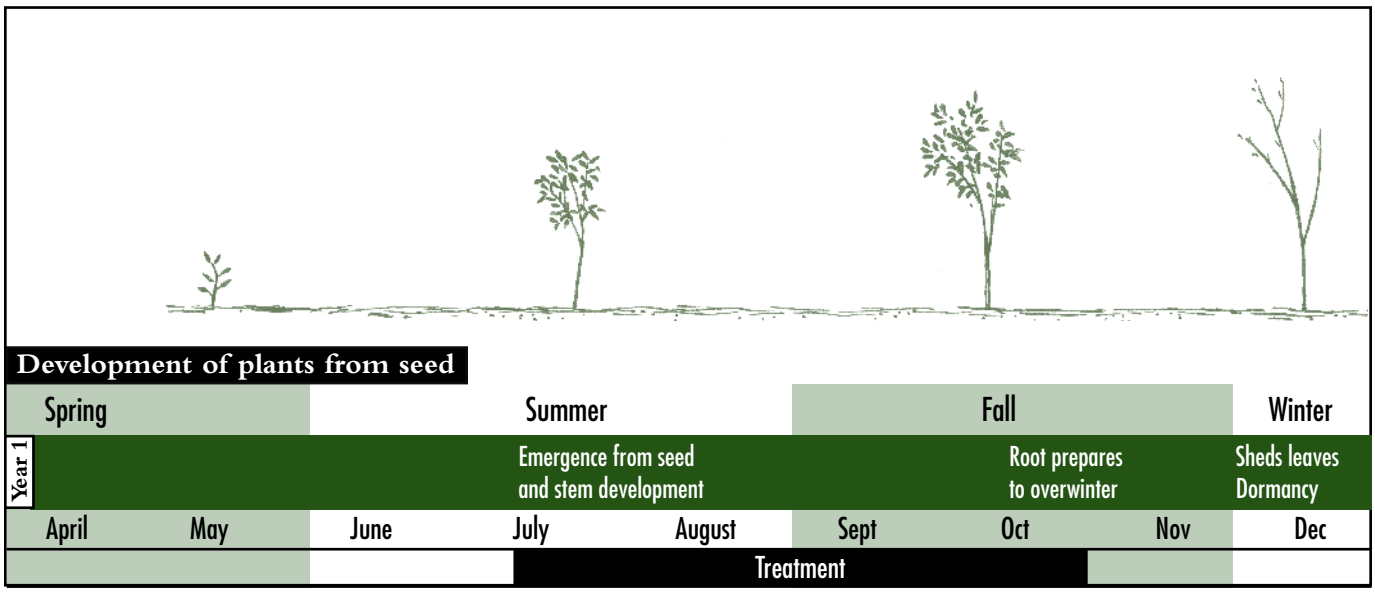
History

Russian olive was introduced into the United States in the early 1800s by Russian Mennonites who settled in Minnesota, Nebraska, Kansas, and the Dakotas. Russian olive is native to southern Europe and central and eastern Asia. Because Russian olive grew well after its introduction as an ornamental, the tree was recommended by state and federal agencies for planting in windbreaks and landscapes and for wildlife habitat, erosion control, and as a source of nectar for bees throughout the U.S. Even today the Natural Resources Conservation Service lists Russian olive as a recommended shrub for windbreaks and wildlife habitat in some states.

Table I. Herbicide treatments for Russian olive control.

Herbicide	Rate/acre	Time of treatment	Notes
Garlon 4 Ultra/Remedy Ultra	33% with basal bark oil or diesel fuel	Cut stump or basal bark treatment: any time of year	Avoid spray drift to non-target plants
Habitat	10% with methylated seed oil or basal bark oil	Any time of year	
2,4-D ester	50% with basal bark oil or diesel fuel	Any time of year	
Habitat	4 pt (broadcast) or 1% solution, add methylated seed oil to the spray solution at 1% per volume of solution	Foliage spray in early summer or fall before leaf drop	Do not disturb shrubs for one year after treatment and avoid spray drift to non-target plants
2,4-D ester + dicamba	2 qt + 1 qt	Foliage spray in early summer	

Figure 11. Life cycle of Russian Olive



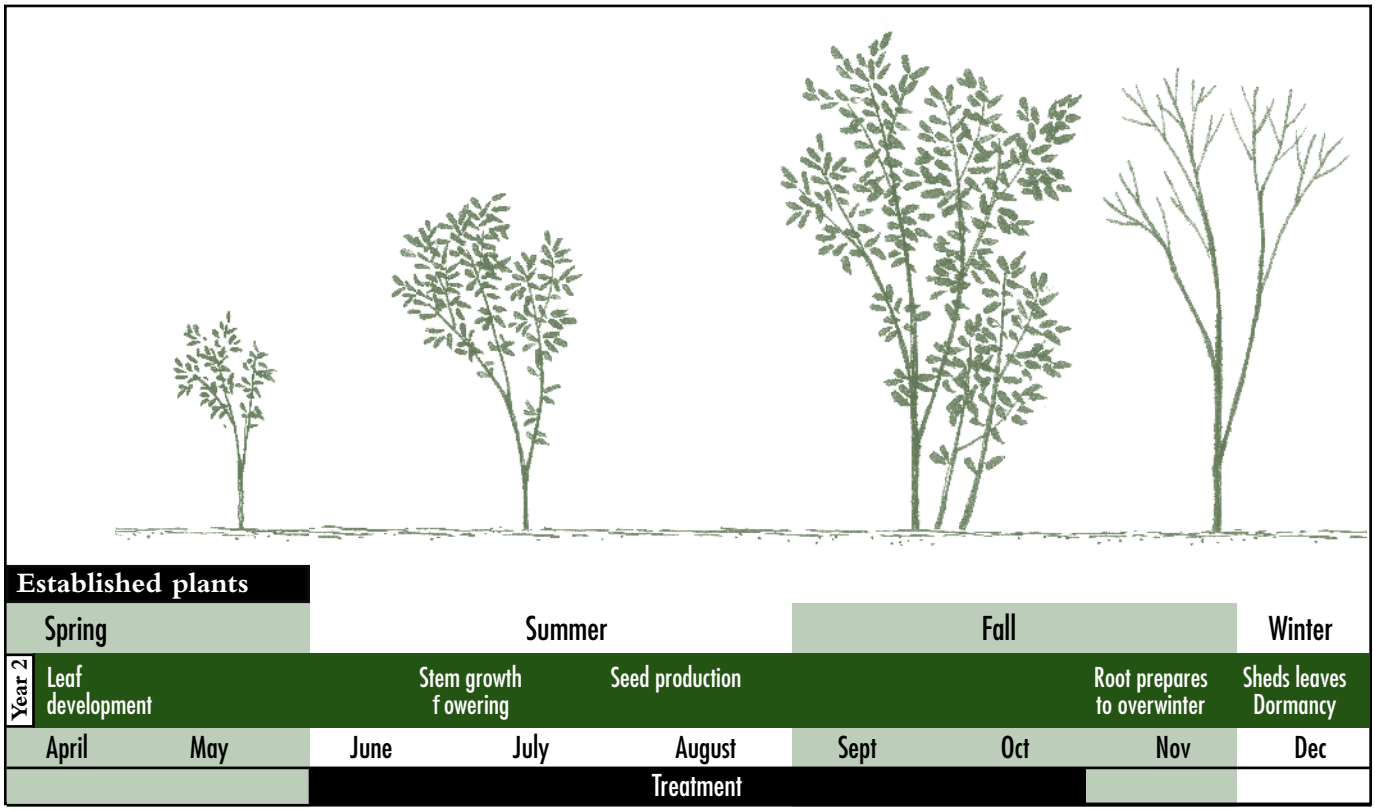


Figure 12. Basal bark herbicide treatment on seedling Russian olive trees.

methylated seed oil or basal bark oil at a ratio of 10/90 and spraying the herbicide at the base of the tree *(Table 1)*. Apply the herbicide solution on the lower foot of the tree and make sure to cover all sides of the tree *(Figure 11)*. Basal bark treatments have been more effective than foliage sprays and will cause less injury to other plants growing near Russian olive. Basal bark treatments are effective on smaller shrubs while cut stump treatments are more effective on shrubs with trunk diameters of more than 5 inches.

After removing or killing Russian olive resprouts, it is important to replace the tree with more desirable vegetation. If this doesn't occur, weeds such as Canada thistle, musk thistle, or Scotch thistle can invade the area. Birds that roost in Russian olive trees often distribute thistle seeds in the litter below trees. Past experience indicates that thistles are some of the first plants to appear following Russian olive control activities. It is important to plan for this when beginning a Russian olive control program. After Russian olives have been treated, scout the removal area for Russian olive resprouts and thistles and apply direct control measures to both species if needed.

Russian Olive

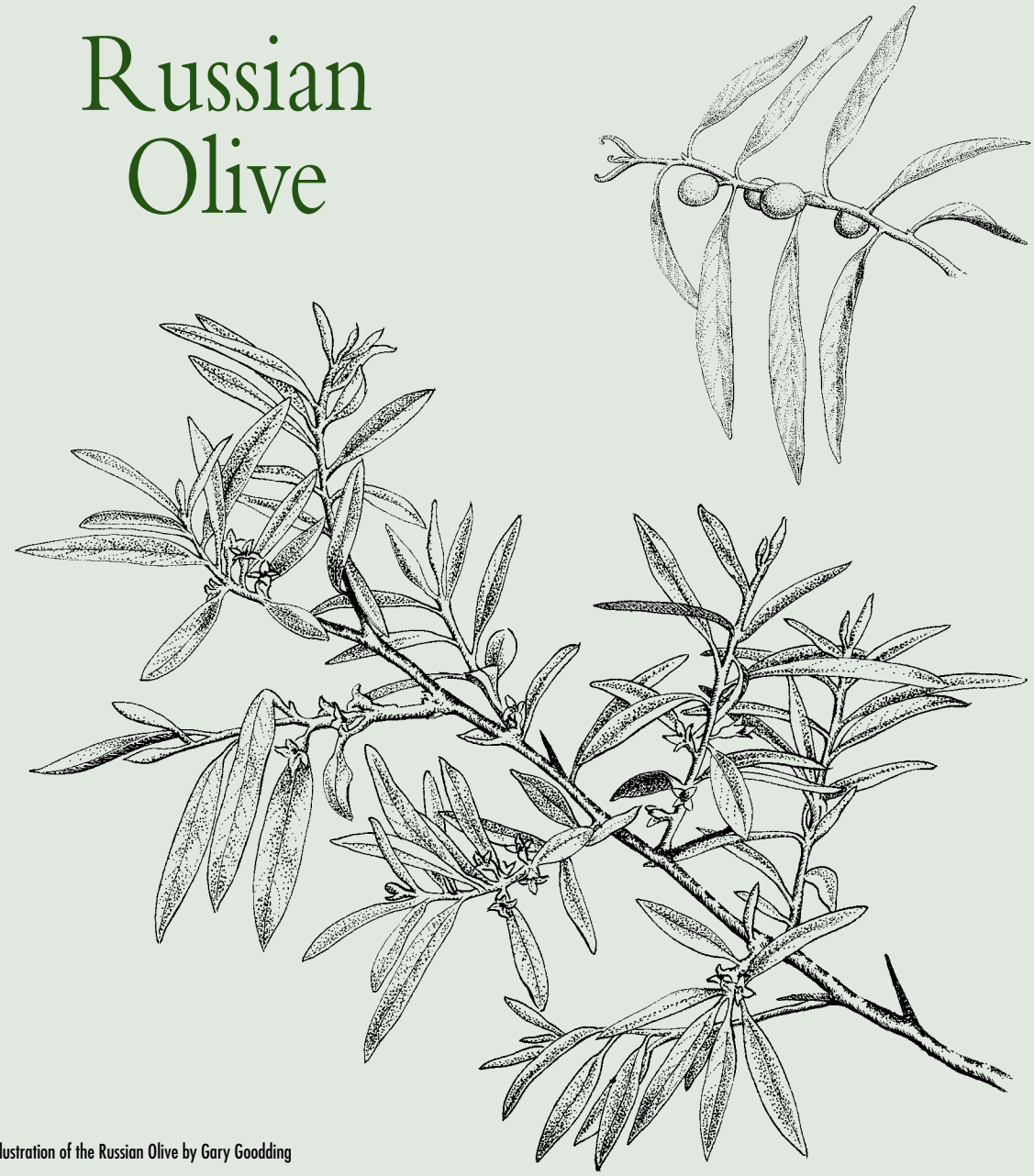


Illustration of the Russian Olive by Gary Goodding

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