

## *Shepherdia* Nutt.

### buffaloberry

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**Growth habit, occurrence, and use.** The genus *Shepherdia*, commonly called buffaloberry, is found wholly in the north and west of North America. It includes 3 species with varying distributions and uses (table 1). All are capable of fixing nitrogen in root nodules that contain bacteria (Mozingo 1987; Thilenius and others 1974).

Silver buffaloberry is a shaggy-barked, thorny, deciduous, large shrub to small tree up to 6 m tall, that often forms thickets. Plants spread by underground stems and readily sucker. Leaves are silvery and scurfy; both surfaces are covered with small star-shaped scales that reflect the light and account for the shrub's rusty silver aspect. These scales undoubtedly help reduce water loss during the summer (Knudson and others 1990; Lackschewitz 1991; Mozingo 1987; Wasser 1982; Welsh and others 1987).

Habitat includes moderate-textured soils at 1,100 to 2,300 m, along moist stream banks, terraces, and hillsides to open dry regions of the plains, and frequently on valley bottoms where the soil is not too saline (Knudson and others 1990; Smith 1987; Wasser 1982; Welsh and others 1987).

Silver buffaloberry with its strong grazing resistance, aided by thorny branches and root sprouting, has considerable potential for shelterbelts and for game food and cover plantings. It often forms single-clone patches and nearly impenetrable clumps. It is an important source of cover and food for small and large game animals (Knudson and others 1990). This species is regarded as poor to fair forage for sheep, deer (*Odocoileus* spp.), and elk (*Cervus* spp.), and generally considered worthless for cattle. The fruits provide abundant and nutritious food and are highly sought after by birds (Mozingo 1987; Wasser 1982). The berries are edible and were used by Native Americans and are still commonly used as they make excellent jelly (Borland 1994; Knudson and others 1990; Lackschewitz 1991).

Russet buffaloberry is a thornless, deciduous, small to medium shrub with a characteristically spreading growth form, 1 to 3 m tall at maturity (Lackschewitz 1991; Mozingo 1987; Stubbendieck and others 1986). Twigs are slender, round, and densely scurfy with rusty, bran-like scales. Leaves, which are paired, have a bright green upper surface and paler lower surface with conspicuous brown scales (Lackschewitz 1991; Welsh and others 1987). This species is very cold and drought hardy and it can grow in a variety of habitat types. It is typically found along the banks of streams, and moist open wooded slopes at 1,000 to 3,400 m. It can also be found on sandy or rocky, often sterile, soils. At its southern extremity, it is confined to the higher vegetation zones in the mountains (Link 1993; Mozingo 1987; Thilenius and others

1974).

Russet buffaloberry has little or no browse value for cattle and is only fair for sheep before frost. The berries are bitter and though not highly palatable to humans are used by birds and other wildlife (Lackschewitz 1991; Stubbendieck and others 1986).

Roundleaf buffaloberry has a low sprawling habit and is mainly 1 to 2 m tall, and 1 to 4 m wide. The thornless brachlets are covered with small white to yellowish hairs often appearing silver. The thick, persistent, somewhat evergreen leaves are silvery green above, and pale densely scurfy beneath, and as the name implies, circular or oval in outline (Welsh and others 1987). This species inhabits warm, dry, sandy or rocky slopes and occurs from southern Utah into the Grand Canyon region of Arizona throughout the saltbrush, sagebrush, and piñon zones. Welsh and others (1987) describe roundleaf buffaloberry thusly: "This is a beautiful shrub. It festoons slopes with silvery clumps." It is reported to have some value as a winter browse in southeastern Utah.

**Flowering and fruiting.** Buffaloberries are dioecious. The small, petal-less, yellow to yellowish green flowers are borne single or clustered at the nodes. Plants resume growth in very early spring, usually soon after snowmelt. Flowering occurs quite early in the season (March to April), before or soon after the leaves appear. Fruits mature in late summer and fall (late June to September), varying with environment and source of planting stock (Borland 1994; Mozingo 1987; Thilenius and others 1974; Vories 1981; Wasser 1982).

Fruits are 3.2 to 8.5 mm in diameter and drupe-like, with a solitary smooth achene or small nutlet enveloped in a fleshy perianth. Color of mature fruits vary from orange-red (silver buffaloberry), red-yellow (russet buffaloberry), to silvery (roundleaf buffaloberry) (McTavish 1986; Mozingo 1987; Smith 1987; Wasser 1982; Welsh and others 1987). Cleaned achenes are used as seeds (figure 1). Minimum seed-bearing age is 4 to 6 years (Thilenius and others 1974).

Seedcrop quality and quantity can vary from year to year. McTavish (1986) reports that one of the major propagating problems with russet buffaloberry is poor seed quality. Researchers have obtained widely varying germination percentages from year to year under identical treatments. This seems to be due to poor embryo development. Therefore, it is suggested that seed collectors check the seeds before collection to ensure that proper embryo development has taken place (McTavish 1986).

**Collection of fruits.** The fruits may be harvested by stripping or flailing them from the bushes onto canvas; they may also be picked by hand or collected from the ground. The use of mechanical shakers has shown to be effective in harvesting the seed of silver buffaloberry (Halderson 1986). Heavy gloves should be used when collecting this species to avoid injury from the thorns. Care should be taken when collecting seeds of roundleaf buffaloberry as the silvery hairs that cover the fruit, branches, and leaves can be very irritating to the eyes and skin.

Cleaned seeds can range from 28,600 to 147,700 seeds/kg (13,000 to 67,000/lb), varying with ripening, environmental conditions, and seed source (Jorgensen 1995; Link 1993; Smith 1987; Thilenius and others 1974; Vories 1981; Wasser 1982).

**Extraction and storage of seeds.** Twigs, leaves, and other debris are removed by running material over an air-screen cleaner. Fruit is then put through a macerator with water, and dried. The dried pulp and seeds can be hand-rubbed or lightly chopped, and again run over the cleaner to separate out the seeds (Link 1993; Thilenius and others 1974; Vories 1981; Wasser 1982).

The seeds are orthodox and should be stored dry, in cool conditions, optimally at 5 EC. Seed can be stored for 4 to 5 years while maintaining good viability (Thilenius and others 1974; Vories 1981). For short-term storage, seed extraction is not necessary. The fruits may be spread out in a thin layer and dried. For short-term storage of fruit, place the fruit in open plastic bags under cool-dry conditions. Care should be taken to prevent heating of the collected fruits (Link 1993; Thilenius and others 1974). Seed quality has not been standardized. Minimum standards established by the USDI Fish and Wildlife Service (Wasser 1982) are 90% purity and about 60% germination.

**Germination.** A physiologically dormant embryo, and physical dormancy due to impenetrable seedcoats, are the major problems affecting germination (McTavish 1986; Thilenius and others 1974). Two generally accepted methods of breaking dormancy are scarification with sulfuric acid and moist cold stratification (table 2). After pretreatment, the majority of viable seeds of silver buffaloberry germinate in 20 days. Some seeds do delay germination up to 60 days (Wasser 1982). Germination is epigeal (figure 2).

**Nursery practice and seeding.** In nursery practice, seeds are planted 6 mm (¼ in) deep and covered with up to 2.5 cm (1 in) of mulch. This suggests that seeds could be planted, perhaps to advantage, at depths up to 2 cm (¾ in) in coarse, dry, and loose soil or in fall under wildland conditions. About 50% of the viable seeds sown produce usable 1+0 seedlings in nurseries, whereas only 5 to 15% establishment would be good survival from seeding under dryland field conditions (Thilenius and others 1974; Vories 1981; Wasser 1982).

The recommended seeding rate for wildland seedings is 1.1 to 2.2 kg/ha (1 to 2 lb/ac) in seeding mixtures totaling 11 to 34 kg/ha (10 to 30 lb/ac) (Wasser 1982). In nursery row plantings, seeds can be sown in rows at a rate of 100 to 160 viable seeds/m (30 to 50/ft). Seeds should be sown in the fall, but seeds that are prechilled for 3 months can be sown in spring, or probably later where late summer moisture is more reliable, or with irrigation (Thilenius and others 1974).

Silver buffaloberry can be propagated by cuttings, and wildings can be transplanted successfully. Success of propagating russet buffaloberry from cuttings can vary. Vories (1981) reports that it roots well from cuttings, while McTavish (1986) reports that attempts at propagation by cuttings was largely unsuccessful. Roundleaf buffaloberry is generally grown from seed because cuttings do not do well (Borland 1994; Vories 1981; Wasser 1982).

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**Figure 1**—*Shepherdia argentea*, silver buffaloberry: exterior view of cleaned achene (**right**) and longitudinal section through the embryo of an achene (**left**), H 9.

**Figure 2**—*Shepherdia argentea*, silver buffaloberry: Seedling development at 1, 9, and 38 days after germination.

**Table 1** *Shepherdia*, buffaloberry: nomenclature and occurrence

Scientific name & synonym(s)	Common name	Occurrence
<b><i>S. argentea</i> (Pursh) Nutt.</b> <i>Lepargyrea argentea</i> (Pursh) Greene <i>Elaeagnus utilis</i> A. Nels.	<b>silver buffaloberry,</b> buffaloberry, redberry, silverberry, bullberry, wild-oleaster	Manitoba to Alberta, to Oregon & California, through the Great Basin to New Mexico, Kansas & the Dakotas
<b><i>S. canadensis</i> (L.) Nutt.</b> <i>Lepargyrea canadensis</i> (L.) Greene <i>Elaeagnus canadensis</i> (L.) A. Nels.	<b>russet buffaloberry,</b> Canadian buffaloberry, thornless buffaloberry, wild-oleaster, wild-olive, nannyberry, soapolalillie, soapberry	Newfoundland to Alaska, from central Maine, to Washington, through Oregon, Utah, & New Mexico
<b><i>S. rotundifolia</i> Parry</b> <i>Lepargyrea rotundifolia</i> (Parry) Green	<b>roundleaf buffaloberry</b>	S Utah, N Arizona

**Source:** Thilenius and others (1974).

**Table 2**—*Shepherdia*, buffaloberry: germination treatment conditions and results

Species	Pretreatment	Germination treatment	Percent germination
<i>S. argentea</i>	Moist chill (3 EC for 90 days)	20–30 EC (18 days)	93
	Acid soak (20–30 min)	20–30 EC (21 days)	71–86
	None	Moist chill (3 EC for 170 days)	94
<i>S. canadensis</i>	Acid soak (15 min)	Moist chill (3 EC for 30 days)	89
	Acid soak (20–30 min)	20–30 EC (21 days)	80
	None	Moist chill (3 EC for 170 days)	80
<i>S. rotundifolia</i>	Acid soak (15–30 min.)	20–30 EC	80–90
	Moist chill (3 EC for 30–60 days)	20–30 EC	80–90
	None	Moist chill (3 EC for 170 days)	86

**Sources:** Borland (1994, 1996), Jorgensen (1995), McTavish (1986), Thilenius and others (1974), Vories (1981).