***Artemisia cana* Pursh** silver sagebrush
ASTERACEAE

Synonyms: *Seriphidium canum* (Pursh) W.A. Weber

General Description.—Silver sagebrush, also known as white sagebrush or hoary sagebrush, is an erect, freely branched, rounded shrub up to 1.5 m tall. Older stems have a dark brown, fibrous bark while younger stems are covered with a dense white to yellowish-green tomentum. Branches often layer when in contact with the soil. Leaves on vegetative branches are 1 to 10 mm wide and 2 to 8 mm long. Leaf shape is linear to linear-oblanceolate, entire, or occasionally with one or two irregular lobes. Leaves are covered with a silvery-white pubescence that becomes slightly viscid with age. On flowering stalks, leaves are similar to those on vegetative branches but may be smaller, especially toward the distal end. The foliage emits a mild to pungent odor when crushed. Flower heads are arranged into dense, narrow, leafy panicles, sometimes reduced to a raceme or spike-like inflorescence. Each head contains from four to 20 disc flowers that are subtended by ovate involucral bracts. Silver sagebrush exhibits several levels of polyploidy based on x = 9, varying by subspecies and population. Diploid, tetraploid, and octaploid, populations have been documented (McArthur and others 1981, McArthur and Sanderson 1999, Ward 1953).

Taxonomy.—Silver sagebrush comprises three subspecies: *A. cana* ssp. *cana*, *A. cana* ssp. *viscidula*, and *A. cana* ssp. *bolanderi*. Ploidy levels are octaploid, diploid or tetraploid, and diploid, respectively (McArthur and others 1981, McArthur and Sanderson 1999, Ward 1953). Plains silver sagebrush (*A. cana* ssp. *cana*) and mountain silver sagebrush (*A. cana* ssp. *viscidula*) have a strong tendency to layer. Plains silver sagebrush is an erect, round, canescent, freely branched shrub up to 1.5 m tall. It has a more eastern distribution than the other subspecies. Putative natural hybrids have been found between plains silver sagebrush and big sagebrushes (Beetle 1960, Ward 1953). Plains silver sagebrush has the ability to spread rapidly after burning by resprouting and by rhizomes (Beetle 1960).

Mountain silver sagebrush (*A. cana* ssp. *viscidula*) is an erect shrub usually not more than 1.0 m tall. It is distinguished from plains silver sagebrush by its smaller, darker leaves, and more western distribution. Leaves on vegetative stems are 1 to 5 mm wide and up to 7 cm long. They are typically simple, entire, and grow in dark green clusters. This subspecies varies in appearance but is always darker than mountain big sagebrush, with which it is often growing (Beetle 1960). Bolander silver sagebrush (*A. cana* ssp. *bolanderi*) has narrow leaves like mountain silver sagebrush, but leaves are canescent like plains silver sagebrush.

Range.—Aside from big sagebrush, silver sagebrush is the most widely distributed member of the genus. It occurs over approximately 140,000 km^2, from British Columbia and Saskatchewan in the north, to Arizona and New Mexico in the south, and west to Oregon and California (Beetle 1960). Ranges for each subspecies, however, are smaller. Plains silver sagebrush is found mostly east of the Continental Divide, through Montana,

the Dakotas, Wyoming, western Nebraska, and northern Colorado. Mountain silver sagebrush inhabits mountainous regions (around 1,800 m or higher) of Montana, south along the Continental Divide, and west to Arizona, Nevada, and Oregon. The range of Bolander silver sagebrush is restricted, generally to enclosed basins, in central Oregon and eastern California.

Ecology.—Silver sagebrush grows on soils that are less mature, with less phosphorous, potassium, nitrogen, organic matter, and lower cation exchange capacity than soils supporting big sagebrush (Hazlett and Hoffman 1975). It inhabits various environments, each subspecies adapting to different soil conditions. Plains silver sagebrush grows particularly well on well-watered, deep soils of the northern Great Plains, especially along stream bottoms and drainageways (McArthur and others 1979, Walton and others 1986). Mountain silver sagebrush, on the other hand, grows in areas with a heavy, lingering snow pack (Beetle 1960, McArthur and others 1979, Tisdale and Hironaka 1981, Winward 1980). Bolander silver sagebrush grows on poorly drained, alkaline soils (Beetle 1960, McArthur and others 1979, Tisdale and Hironaka 1981, Winward 1980). Silver sagebrush usually grows in areas with precipitation between 350 and 600 mm but it occurs in areas of water accumulation, such as near streams or in enclosed basins.

Reproduction.—Flowers bloom between August and September and seed ripens in October and November. Seeds are wind dispersed during the winter months. Establishment by direct seeding has been successful (Kelsey 1986), especially when sown in the fall on the soil surface or at shallow depths (Wasser 1982). Seedlings emerge in spring and grow rapidly. Seeding silver sagebrush is best done in the late autumn or early spring to maintain high viability and high germination of seeds (Hou and Romo 1998, Romo and Grilz 2002, Romo and Young 2002). Seedlings are best established in lightly tilled soils so that stands of existing perennial grasses are maintained (Romo and Grilz 2002).

Plants respond dramatically to moist conditions and may reach 35 to 50 cm in 1 year. Silver sagebrush can also spread asexually. Harvey (1981) successfully propagated plants through hardwood cuttings, and plants can also spread by rhizomes. There are approximately 2,900 cleaned seeds per gram (Meyer 2003).

Management.—Silver sagebrush can provide an important source of browse and is used quite extensively by livestock and big game, especially when other food sources are scarce (Kufeld and others 1973, Wasser 1982). In the western Great Plains area, silver sagebrush is an important survival food for antelope. Domestic sheep and mule deer found Bolander silver sagebrush among the most preferable sagebrushes during winter and fall feeding trials (Sheehy and Winward 1981). Sheep often browse silver sagebrush in the fall after forbs and grasses are dry.

Silver sagebrush can occupy areas at high densities, and therefore is a candidate for plant control. It can be difficult to control because of its tendency to resprout from the crown and to spread by rhizomes. It is not as susceptible to fire as other species of sagebrush (Wright and others 1979, White and Currie 1983). White and Currie (1983) reported that silver sagebrush mortality after prescribed fall and spring burns was directly related to fire intensity. In general, fall burns are more effective at reducing silver sagebrush than spring burns.

Benefits.—Silver sagebrush is an abundant native shrub that provides additional diversity to shrubland ecosystems. It is an important winter forage source for domestic sheep and game animals and adds structural variety to the landscape. Native Americans traditionally used a decoction from silver sagebrush to stop coughing (Stubbendieck and others 1997). In addition, Euro-American settlers and Native Americans used it for fuel (McArthur and others 1979).

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E. Durant McArthur and Jeffrey R. Taylor, Research Geneticist and Biological Technician, U.S. Department of Agriculture, Rocky Mountain Research Station, Shrub Sciences Laboratory, Provo, UT 84606-1856