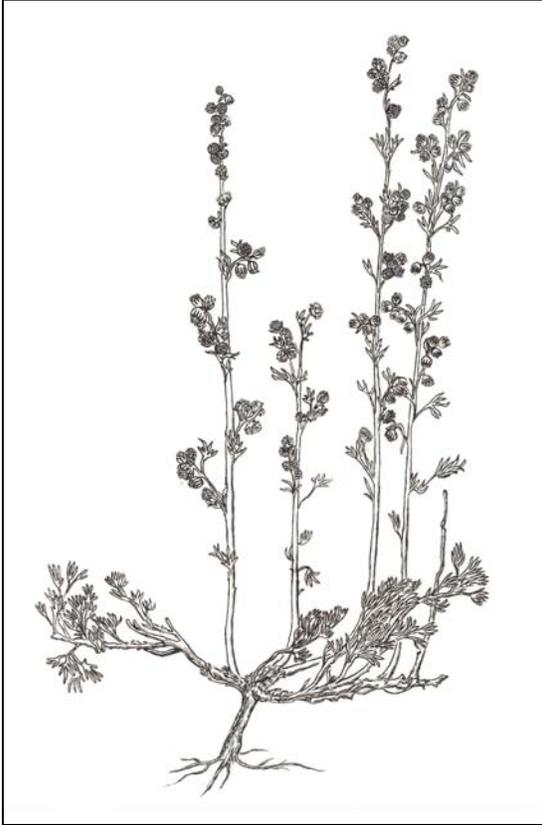


***Artemisia frigida* Willd.**
ASTERACEAE

fringed sage

Synonyms: *Artemisia virgata* Richardson



General Description.—Fringed sage, known also as prairie sagewort, fringed sagewort and fringed sagebrush, is an aromatic, mat-forming, perennial shrub 20 to 60 cm tall (McArthur and others 1979, Stubbendieck and others 1997). The lower woody stems are spreading and often branched, while upper herbaceous stems are erect and leafy. Adventitious roots may occur when stems come in contact with soil. The entire plant is densely silver-canescenscent. Leaves are abundant, 6 to 12 mm long, and two or three times ternately (sub-pinnately) divided. Flowerheads are arranged into nodding racemes or open panicles. Small, densely hairy involucral bracts occur in series around each flowerhead. Each head contains 10 to 17 outer, seed-producing, pistillate, ray flowers and numerous (25 to 50) tubular, funnellform, perfect seed-producing disc flowers (McArthur and others 1979, Stubbendieck and others 1997). This species has a deep perennial taproot with numerous

extensive lateral roots as adaptations to withstand drought.

Taxonomy.—Undoubtedly, fringed sage, with its broad geographical and altitudinal distribution, has considerable genetic variation. The taxon has three varieties: the typical variety, *Artemisia frigida* Willd. var. *frigida*, *Artemisia frigida* var. *gmelinianum* Besser, and *Artemisia frigida* var. *williamsae* S.L.Welsh (International Plant Names Index 2003). Unlike several other widespread *Artemisia* species, fringed sage is known only at the diploid ($2n = 2x = 18$) chromosome level (McArthur and Pope 1979). Fringed sage is a member of the subgenus *Artemisia* (McArthur and Pope 1979).

Range.—Fringed sage is probably the most widely distributed and abundant species of *Artemisia* L. Its range extends from Mexico in the south, through most of the Western United States, Western Canada, and Alaska in the north, and into Siberia, Mongolia, and Kazakhstan (Harvey 1981; USDA 1937). In the United States, it is most abundant in the eastern and northern parts of its range on the high plains along the eastern slope of the Rocky Mountains. The altitudinal gradient of fringed sage in the Intermountain area extends from 900 to 3,500 m; in other parts of its range (Great Plains and Asian Steppes) the lower elevational limits are somewhat less.

Ecology.—Mean annual precipitation throughout the native range of fringed sage varies between 210 and 550 mm. It inhabits a wide variety of sites but typically grows in full sunlight on dry, coarse, shallow soils. On winter livestock and game ranges in western Utah and eastern Nevada, fringed sagebrush may grow in dense stands along shallow depressions that collect moisture from summer rains. In such areas, it is frequently associated with winterfat [*Ceratoides lanata* (Pursh) J. T. Howell], shadscale [*Atriplex confertifolia* (Torr. & Frem.) Wats.], and rabbitbrushes (*Chrysothamnus* Nutt. species). On plains, foothills, and mountain slopes, fringed sage may grow in association with a variety of grasses and forbs as well as with various shrubs, including big sagebrush (*Artemisia tridentata* Nutt.),

Bigelow sagebrush (*Artemisia bigelovii* Gray), sandsage (*Artemisia filifolia* Torr.), and especially in overgrazed areas, with broom snakeweed [*Gutierrezia sarothrae* (Pursh) Britt. & Rushby]. It is also a common understory shrub in ponderosa pine communities in several Western States (McArthur and others 1979).

Reproduction.—Blooming occurs from June at high elevations and latitudes, to November at lower elevations and latitudes. Fringed sage is a prolific seed producer; each 2.5 cm length of inflorescence contains approximately 1,000 seeds (Harvey 1981). There are about 10 million cleaned seed per kg (Plummer and others 1968). Seed matures between September and December (McArthur and others 1979) and are wind dispersed in winter. Seedlings emerge in spring. Fringed sage can be established by seed, transplanting young plants, or from rooted segments of mature plants. Surface seeding on disturbed soils is recommended (Wasser 1982).

Management.—The forage value of fringed sage varies considerably with location and season (Dietz 1972). On Western ranges, it is most valuable to big game and livestock in late fall, winter, and early spring (Cooperrider and Bailey 1986, Kufeld 1973, USDA 1937, Wasser 1982). Nutritive quality is highest in the spring but remains adequate throughout much of the year (Cooperrider and Bailey 1986, Rauzi 1982). Individual plants are susceptible to overgrazing, but populations tend to increase under heavy grazing pressure (Cooperrider and Bailey 1986). In the northwestern Great Plains, fringed sage may be less palatable than other available forages and occasionally invades deteriorated grasslands. Pronghorn (*Antilocapra Americana* Ord) utilize fringed sage extensively during winter, and to a lesser extent, year round (McArthur and others 1979).

Fringed sage is well suited to grass and broad-leafed herb communities. Seedlings are competitive and can establish in areas with herbaceous competition. It is adapted to mine spoils, perhaps better than any other species of *Artemisia*. It can be used as a biological control to reduce rapid weed expansion on large disturbed sites but can be controlled when it is too abundant (Alley 1972).

Benefits.—Fringed sage is a good pioneer shrub for stabilizing disturbed sites. It is often used in seeding Western strip mines, especially coal areas. Its strong taproot and numerous lateral roots help

stabilize gullies and reduce soil erosion. These rooting characteristics enable the shrub to resist considerable grazing and trampling. It also provides forage for livestock and forage and habitat for wildlife in both North America and Asia (Li and others 2002, USDA 1937). It is an important food for sage grouse (Wallestad and others 1975). Fringed sage has some value as a medicinal plant (Hall and Clements 1923). Native Americans traditionally used fringed sagebrush as toilet paper, to eliminate unpleasant odors from dried meat, as a chewed application for wounds prior to bandaging, and to make mats and fans (Stubbenieck and others 1997).

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