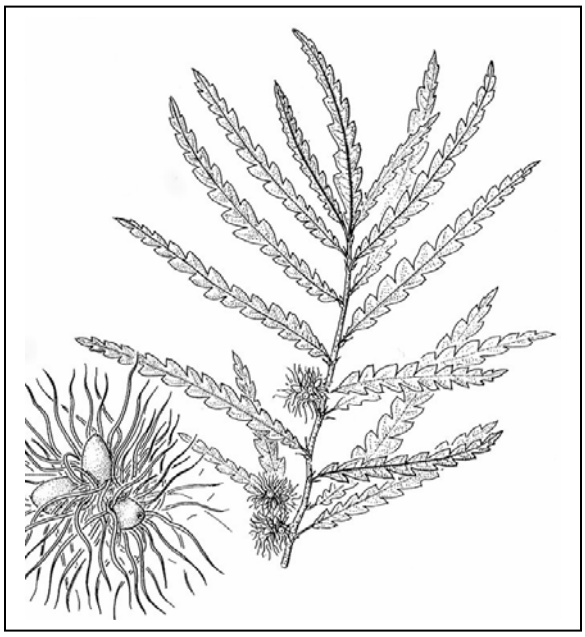
***Comptonia peregrina* (L.) Coult.** sweet fern
MYRICACEAE

Synonyms: *Comptonia asplenifolia* L.
Myrica asplenifolia (L.) Ait.



General Description.—Sweet fern is a densely branched, deciduous, rhizomatous shrub that grows 0.5 to 1.5 m tall and 1.2 to 2.5 m wide or more (Dirr 1998, Gleason and Cronquist 1991). Sweet fern is a dioecious or seldom monoecious (Gleason and Cronquist 1991), actinorhizal nitrogen-fixing shrub (Del Tredici 1996, Ziegler and Huser 1963) with fern-like leaves and stems that are aromatic when crushed. Leaves are alternate, oblong-linear, deeply pinnately lobed, stipulate, dark green, pubescent, 5 to 12 cm long, 1 to 1.5 cm wide, with petioles 0.3 to 0.6 cm long (Dirr 1998, Gleason and Cronquist 1991, Hall and others 1976). Stems are green, yellowish, or reddish-brown when young, turning reddish-purple or coppery-brown with age. Buds are globular, minute, solitary, and sessile, with two to four exposed scales (Dirr 1998). The flowers are inconspicuous. Staminate catkins are olive green, cylindrical, clustered (usually three to four) on the tip of the previous year's wood, 1.5 to 4 cm long, and drooping (Gleason and Cronquist 1991, Hall and others 1976). Pistillate catkins are dark red at the beginning of anthesis, subglobose at maturity, up to 0.7 cm long, with the ovary surrounded by eight persistent bracts (Gleason and Cronquist 1991, Hall and others 1976). The fruit is an ovoid nut, olive-brown, 3 to 5 mm long, enclosed in a burr-like cluster of bracts (Dirr 1998, Gleason and Cronquist 1991). The chromosome number of sweet fern is 2n = 32 (Gleason and Cronquist 1991). Two varieties are recognized: var. *asplenifolia* (L.) Fernald and var. *tomentosa* A.Chev. (Krüssmann 1984, Missouri Botanical Garden 2002).

Range.—Sweet fern occurs from Nova Scotia to North Carolina, western South Carolina, and northern Georgia, and west to Saskatchewan, Minnesota, Illinois, and Tennessee (Gleason and Cronquist 1991). *Comptonia peregrina* var. *asplenifolia* occurs only from Long Island, New York, to Virginia (Hall and others 1976). In Canada, sweet fern is found in all three Maritime Provinces, Ontario, and certain parts of Quebec (Hall and others 1976).

Ecology.—Sweet fern prefers well-drained, dry, acid, sandy or gravely soils with full exposure to the sun (Del Tredici 1996, Schwintzer 1989, Snyder 1993). These sites include dry piney woods, exposed mountain slopes, abandoned pastures, barrens, highway embankments, gravel pits, weathered mine tailings, and cut-over forested land (Del Tredici 1996). Sweet fern is shade intolerant, adaptable to infertile soils, fixes nitrogen in a symbiotic association with *Frankia*, a filamentous bacterium (actinomycete) (Callaham and others 1978), has cluster roots that aid in phosphorus uptake (Hurd and Schwintzer 1997), and is a pioneer colonizer of sites disturbed by fire, logging, clear-cutting, and road construction (Del Tredici 1996, Lynham and others 1998, Snyder 1993). Sweet fern is drought and salt tolerant. Sweet fern colonizes areas via lateral roots that form endogenous root buds from which shoot sprouts are readily formed (Louis and Torrey 1991). The shrub is a serious weed problem in the commercial lowbush blueberry fields in Canada and New England (Hall and others 1976, Snyder 1993). The nymphs of the Saratoga spittlebug (*Aphrophora saratogensis* Fitch.) feed on sweet fern but do not cause serious damage (Johnson and Lyon 1991). Sweet fern is susceptible to attack by *Botryosphaeria dothidea* (Moug.:Fr.) Ces. and DeNot. (causing dieback) and *Gymnosporangium ellisii* (Berk.) Ellis

(alternate host for aecia stage) (Sinclair and others 1987). Sweet fern is the alternate host of the fungus, *Cronartium comptoniae* Arth., that causes sweet fern blister rust on hard pines (Farr and others 1989, Sinclair and others 1987). The fungus is not seriously harmful to sweet fern, but it can reduce the growth and even cause death of susceptible pines, such as jack (*Pinus banksiana* Lamb.), pitch (*P. rigida* Mill.), shortleaf (*P. echinata* Mill.), and loblolly (*P. taeda* L.) (Del Tredici 1996, Snyder 1993).

Reproduction.—Sweet fern flowers are small, inconspicuous, wind-pollinated, and shed large amounts of pollen (Hall and others 1976). In the United States the shrub blossoms in April or early May with fruit maturation by fall. In Canada, sweet fern blossoms mid-May to mid-June with fruit maturation from July through September (Hall and others 1976). Hall and others (1976) determined the mean number of staminate catkins per shoot based on 42 shoots to be 6.43 $\pm$ 0.48 (SE) and for the pistillate catkins 0.60 $\pm$ 0.01 (SE). The fruit of sweet fern is borne in a bur-like cluster of bracts containing on average 5.52 $\pm$ 0.43 (SE) nuts per bur (Hall and others 1976). The pericarp is composed of a thin, fleshy outer layer and a hard, thick inner layer (Del Tredici and Torrey 1976). Seeds do not germinate readily but can remain viable (for as long as 70 years) buried in the soil (Del Tredici 1977). Sweet fern seeds are in deep primary dormancy when they are shed from the plant and become incorporated into the soil (Dow and Schwintzer 1999). They enter seasonal cycles of secondary dormancy over time in which dormancy is induced during the summer. The seeds are then released from this dormancy by chilling during the winter. However, most buried seeds still require exposure to strong daily temperature fluctuations before they germinate (Dow and Schwintzer 1999). Strong temperature fluctuations indicate that shade cover has been removed, which stimulates the seeds to germinate in an open situation favorable for seedling establishment. Fresh seed will germinate (80 percent) after scarification and treatment with 500 mg/l gibberellic acid (GA_3) for 24 hours (Del Tredici and Torrey 1976). Sweet fern propagates itself vegetatively via lateral roots that form endogenous root buds from which shoot sprouts are readily formed (Louis and Torrey 1991). These sprouts can spread extensively over large areas forming thickets. Juvenile stems (7.6 cm or less in length) root when treated with 3 g/l indole-3-butyric acid and placed under mist (Dirr 1998). Root pieces (10 cm long x 0.2 cm wide, or 5 cm x 1.3 cm) dug in late winter or early spring, placed horizontally at a depth of 1.3 cm in a mixture of fine sand and sphagnum peat, will develop shoots and additional roots (Dirr 1998). Sweet fern can be grown in containers and successfully transplanted (Dirr 1998). Micropropagation of sweet fern has been achieved by the induction of root buds in excised root culture (Louis and Torrey 1991).

Growth and Management.—Sweet fern is a slow to medium growing shrub that develops a broad, flat-topped to rounded habit as it spreads and colonizes (Dirr 1998). It is hardy in zones two to six (USDA Plant Hardiness) and is sexually mature in 2 to 3 years (Snyder 1993). Burning and disking following logging will stimulate the growth of sweet fern (Snyder 1993). Sweet fern is used for erosion control, low maintenance plantings along highway embankments, and as naturalistic plantings under power company rights-of-way (Del Tredici 1996, Snyder 1993). Sweet fern can become weedy in pastures, old fields, and open woods, but can be controlled with herbicides, such as dicamba, 2,4-D, and glyphosate (Hall and others 1976, Heyd and others 1987, Snyder 1993).

Benefits.—Sweet fern is planted as a landscape plant because of its fern-like, aromatic foliage and stems. Because it fixes nitrogen, sweet fern is useful for rehabilitation of disturbed sites. Sweet fern has limited use as a food source and cover for wildlife. The fruits are consumed by flickers, moose and deer browse sweet fern, and prairie chickens and sharp-tailed grouse use it for nesting cover (Snyder 1993). The leaves can be used for potpourri and tea (Stokes 1981). The chemical betulin occurs in the leaves, root, and stem of sweet fern, and its biological activities have been described (Duke 1996).

References

Callaham, D., P. Del Tredici, and J.G. Torrey. 1978. Isolation and cultivation in vitro of the actinomycete causing root nodulation in *Comptonia*. Science 199: 899-902.

Del Tredici, P. 1977. The buried seeds of *Comptonia peregrina*, the sweet fern. Bulletin of the Torrey Botanical Club 104: 270-275.

Del Tredici, P. 1996. Bulldozers and bacteria: the ecology of sweet fern. Arnoldia 56: 2-11.

Del Tredici, P. and J.G. Torrey. 1976. On the germination of seeds of *Comptonia peregrina*, the sweet fern. Botanical Gazette 137: 262-268.

Dirr, M.A. 1998. Manual of woody landscape plants, Their identification, ornamental characteristics,

culture, propagation, and uses. Stipes Publishing, Champaign, IL. 1,187 p.

Dow, M.A. and C.R. Schwintzer. 1999. Seed germination, seedling emergence, and seed bank ecology of sweet fern (*Comptonia peregrina* (L.) Coult.). Canadian Journal of Botany 77: 1,378-1,386.

Duke, J.A. 1996. Phytochemical Database, U.S. Department of Agriculture, Agricultural Research Service, Beltsville, Maryland. http://www.ars-grin.gov/cgi-bin/duke/farmacy2.pl.

Farr, D.F., G.F. Bills, G.P. Chamuris, and A.Y. Rossman. 1989. Fungi on plants and plant products in the United States. The American Phytopathological Society, St. Paul, MN. 1,252 p.

Gleason, H.A. and A. Cronquist. 1991. Manual of vascular plants of northeastern United States and adjacent Canada. 2nd Edition. The New York Botanical Garden, Bronx, NY. 910 p.

Hall, I.V., L.E. Aalders, and C.F. Everett. 1976. The biology of Canadian weeds. 16. *Comptonia peregrina* (L.) Coult. Canadian Journal of Plant Science 56: 147-156.

Heyd, R.L., R.L. Murray, and L.F. Wilson. 1987. Managing Saratoga spittlebug in pine plantations by suppressing sweet fern. Northern Journal of Applied Forestry 4: 16-17.

Hurd, T.M. and C.R. Schwintzer. 1997. Formation of cluster roots and mycorrhizal status of *Comptonia peregrina* and *Myrica pensylvanica* in Maine, USA. Physiologia Plantarum 99: 680-689.

Johnson, W.T. and H.H. Lyon. 1991. Insects that feed on trees and shrubs. Cornell University Press, Ithaca, NY. 560 p.

Krüssmann, G. 1984. Manual of cultivated broad-leaved trees and shrubs, Volume I, A-D. Timber Press, Beaverton, OR. 448 p.

Louis, I. and J.G. Torrey. 1991. In vitro clonal multiplication of the actinorhizal plant *Comptonia peregrina*. Plant Cell, Tissue and Organ Culture 26: 89-96.

Lynham, T.J., G.M. Wickware, J.A. Mason, and H. Krause. 1998. Soil chemical changes and plant succession following experimental burning in immature jack pine. Canadian Journal of Soil Science 78: 93-104.

Missouri Botanical Garden. 2002. w3TROPICOS, Nomenclatural database. http://mobot.mobot.org/W3T/Search/vast.html. [not paged].

Schwintzer, C.R. 1989. All field-collected actinorhizae examined on *Comptonia peregrina* and *Myrica pensylvanica* in Maine are spore negative. Canadian Journal of Botany 67: 1,460-1,464.

Sinclair, W.A., H.H. Lyon, and W.T. Johnson. 1987. Diseases of trees and shrubs. Cornell University Press, Ithaca, NY. 575 p.

Snyder, S.A. 1993. *Comptonia peregrina*. In: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Fire Effects Information System. http://www.fs.fed.us/database/feis/plants/shrub/comper/index.html.

Stokes, D.W. 1981. The natural history of wild shrubs and vines, eastern and central North America. Harper and Row Publishers, New York. 246 p.

Ziegler, H. and R. Huser. 1963. Fixation of atmospheric nitrogen by root nodules of *Comptonia peregrina*. Nature 199: 508.

Paula M. Pijut, Plant Physiologist, U.S. Department of Agriculture, Forest Service, North Central Research Station, Hardwood Tree Improvement and Regeneration Center, 195 Marsteller Street, West Lafayette, IN 47907