

COMPASS PLANT

Silphium laciniatum L.

Plant Symbol = SILA3

Contributed by: USDA / NRCS Plant Materials Center, Manhattan, KS



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Alternate Names rosinweed, gum weed, cut-leaf silphium, or turpentine plant

Uses

Livestock: It is reported that compass plant is palatable and nutritious and grazed by livestock especially in a juvenile state. It will decrease in heavily grazed pastures and eventually disappear from the site (Haddock, 2005). Eddy (1992) found it along roadsides in the Kansas Flint Hills, but rarely found it in pastures.

Native American uses: The pounded root of compass plant was used by the Pawnees to make a tea for "general debility". This tea was also used by the Santee Dakotas to rid horses of worms and by the Omahas and Poncas as a horse tonic (Kindscher, 1992). The Indian children of several tribes used the resinous sap as a chewing gum to cleanse their teeth and sweeten their breath. Preparations from compass plant were used by nineteenth century doctors as an antipyretic, diuretic, emetic, expectorant, tonic, styptic, antispasmodic, and stimulant and for their diaphoretic properties (Kindscher, 1992).

Wildlife: Birds and small mammals eat the seeds (Art, 1991). In grasslands, devoid of woody species, the compass plant provides a sturdy perch for prairie songbirds. Eastern kingbirds use the compass plant as a perch to locate and capture grassland insects (Platt and Harder, 1991).

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status (e.g. threatened or endangered species, state noxious status, and wetland indicator values).

Description

General: Compass plant is a long lived perennial member of the sunflower or composite family (Asteraceae). The basal leaves and stems all arise from an underground crown. A large reddish brown tap root 2.54 to 5.08 centimeters (cm) is located just below the crown, but rapidly loses diameter as it descends into the soil (Weaver, 1954). The tap root extends from 3 to 4 meters (m) deep into the soil with a few branching roots extending out into a column of soil from 2 to 3 m in diameter. Basal leaves of younger plants are large (.6 m) deeply cut, angularly lobed, clasping, hairy, and are oriented vertically instead of horizontally. The leaf blades tend to point north and south, thereby avoiding the heat of the noonday sun and earning the plant its common name (Art, 1991). Stems are erect and number from one to several with total height between 1 and 3.5 m. Simple leaves have an alternate arrangement on the stem and are large and deeply lobed at the stem base and less divided, smaller leaves exhibit sessile attachment higher up on the stem. Leaves are leathery and stiff with rough surfaces and hairs located on the main veins. Large yellow flower heads (5 to 10 cm) are borne along the upper half to two thirds of the stem in small clusters, on short stalks, from the axils of the reduced leaves or the stem apex. Flower blooming begins in late June and proceeds through August. The flower heads begin to open at the top of the stem. There are 15 to 34 narrow yellow "petals" (ray florets), 2.5 to 5.0 cm long, and numerous disk florets with yellow corollas in the center of the flower (Platt and Harder, 1991). The fruits are achenes, flattened, about 1.3 cm long with notched tips. The achenes only develop on the outside of the head since only the ray florets have fertile pistils and produce seed units (Platt and Harder, 1991).

Distribution: For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site. Compass plant grows in the eastern half of Kansas. It is found in the eastern section of the Great Plains from North Dakota to Texas and eastward to Ohio and Alabama.

Habitat: Compass plant grows in full sun in tallgrass and mixed grass prairies and in moderately disturbed areas such as roadsides. It is found on a variety of soil types from clay loams to silt loams, but thrives where there is moist, deep subsoil present. It can tolerate a wide pH range. Weaver and Fitzpatrick (1934) found it in 66 percent of the lowland prairies and 45 percent of the upland prairies they studied.

Adaptation

Found on open prairies and roadsides, especially in areas with mild soil disturbance (Kindscher, 1992). Full sun is the major requirement of this easily cultivated, hardy species (Art, 1991). It is found on a variety of soil types, but it needs a moist, deep subsoil to thrive.

Establishment

The easiest way to propagate compass plant is by planting stratified seed in the spring or unstratified seed in the fall. Moist stratification (60 days at 40 degrees F) and scarification will enhance germination (Art, 1991). To scarify the seed, nick the seed coat with a sharp knife prior to planting. The first year the seedlings have only a single leaf, and it will take 2 to 3 years for the plant to mature and produce flowers. Much of the plants energy and carbon are invested in extensive root production the first years of life. Pleasants and Jurik's (1992) study of plant seedling recruitment of compass plant indicated that the plants with the larger number of seedheads had a significantly higher density of seedlings around them. Estimates of seed production of individual compass plants indicated that about 1 percent of the seed became seedlings each year (Pleasants and Jurik, 1992).

Management

Seedling plants have only a single leaf their first year of growth. Kindscher (1992) indicated that the compass plant will flower in two to three years. Platt and Harder (1991) stated that in their experience compass plants did not bloom until the fourth or fifth growing season. Should compass plant be grown as a specimen plant it may need to be staked to keep the stalks from blowing over.

Pests and Potential Problems

A recent study has revealed that insect natural enemies can influence reproductive success of host plants by eliminating natural herbivores, thereby reducing damage to photosynthetic or reproductive plant tissues (Tooker and Hanks, 2006). Price et al. (1980) proposed that natural enemies can indirectly influence plant fitness by killing herbivorous insects. Tooker and Hanks (2006) presented field evidence that parasitoids of an endemic community enhance

plant reproduction by killing larvae of gall wasps and that plants produced volatile cues that parasitoids use in locating hosts.

Kindscher (1992) indicated that mature cultivated compass plants often become large and top heavy and have a tendency to fall over.

Silphium laciniatum is a new horticultural plant in Poland grown for medicinal, ornamental and forage crop purposes. A disease was noticed on 15 percent of the plants causing stunting, yellowing of leaves, and reduced inflorescence production. Oblong brown-purplish lesions developed on the stems during the month of July. *Alternaria alternata* was isolated from the affected stems, cultured on artificial media grown in the lab, and finally inoculated on compass plant seedlings to recreate the disease symptoms (Wagner and Jamiolkowska, 2004).

Environmental Concerns

Compass plant does not spread vegetatively except as the clump of the original plant grows in diameter. The basal clump of leaves of a mature plant may grow to 1 to 1.75 m in diameter and tend to shade out plants within the basal leaves. This species volunteers easily from seed (Platt and Harder, 1991).

Seeds and Plant Production

Seed Production: Seed can be harvested from nursery stock in late August or September. The plants flower from about June 27 to August 20th. After drying, the seed units can be run through a hammer mill to break up the seed head and release the achenes. Then seed units can be run over a two screen Clipper cleaner with a top screen of 25 and a lower screen of 9 to 13. The seed can then be finally cleaned to a purity of 48 percent with approximately 46,600 seeds per kilogram (k). Other methods of seed processing can be utilized to improve final purity of the harvested seed.

Bareroot Plant Production: Field collected seed is planted in the fall without being subjected to cold storage. Seed can be sown in raised propagation bed that preferentially consists of sandy loam soil. Total time from planting to plant harvest can take from 12 months for fall dug propagules to 18 months if plants are harvested in the spring.

Cultivars, Improved, and Selected Materials (and area of origin)

Contact your local Natural Resources Conservation Service (formerly Soil Conservation Service) office for more information. Look in the phone book under "United States Government." The Natural Resources Conservation Service will be listed under the subheading "Department of Agriculture."

Two compass plant germplasm lines, NF-1 (Reg. no. GP-114, PI 628632) and NF-1 Profuse Ligule (Reg. no. GP-115, PI 628633) were developed by the Samuel Roberts Noble Foundation, Inc., and released January 7, 2002. NF-1 is a broad based population intended to provide breeders and other researchers with germplasm adapted to the southern Great Plains (Hopkins et al., 2002). NF-1 Profuse Ligule is a half-sib family derived from a single plant expressing the profuse ligule trait. Chromosome number of NF-1 and NF-1 Profuse Ligule is $2n=2x=15$. The germplasm lines should be useful in developing improved cultivars, novel germplasm, as well as studying the biology, genetics, and ecology of compass plant. Seed stocks of NF-1 and NF-1 Profuse Ligule will be maintained by the Forage Biotechnology Group at The Noble Foundation, Ardmore, OK 73401.

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