

## WHITE ROOT

### *Carex barbarae* Dewey

Plant Symbol = CABA4

Contributed By: USDA NRCS National Plant Data Center



Used with permission of the publishers  
© Stanford University  
Abrams & Ferris (1960)

#### Alternate Names

Santa Barbara sedge, sedge

#### Uses

**Ethnobotanic:** White root is a significant basketry material used by central California Native Americans, who use the long white rhizomes for the sewing strand in coiled baskets. White root was used by over one third of California tribes for basket weaving. Traditionally tended white root plants may have rhizomes as long as 4- 6 feet in length; untended plants have short, twisted rhizomes. Sandy, moist soils are the preferred locations for production of long rhizomes.

Other uses of white root include gathering the shoots into a loose knot to hold worms for fishing or to gather eggs. The Miwok occasionally used sedge leaves to cover the floor where spectators sat in the roundhouse. Today they use pine needles.

A significant portion of the riparian forest understory was tended prior to European settlement. It is highly likely that most areas with desirable rhizomes were harvested every two to four years. This maintained a lawn-like, grassy appearance under California riparian forests. Given the high population of native peoples in California, particularly in the low elevation range of *Carex barbarae*, it is probable that most available plants in suitable soils were sustainably harvested.

White root is one of the most difficult plants for basket weavers to obtain due to elimination of traditional gathering sites and difficulty accessing those still remaining. Valley oak riparian woodlands have diminished to less than five percent of their original range. *Carex barbarae*, as an understory dominant, has been reduced even further. Many traditional gathering sites have been eliminated or destroyed. Where gathering sites still exist, access for Indian people to private or public lands has been difficult. Facilitating access for tending and gathering traditional materials is a top priority for the California Indian Basketweavers Association.

**Ecological Restoration:** *Carex barbarae* is increasingly being recommended for riparian restoration, streambank stabilization, and erosion control. Plants establish readily in a wide variety of environmental conditions. Adult plants produce many rhizomes each year and each rhizome can be used for revegetation. Subdivision of adult plants also results in very high plant survival and rapid colonization. Seeds are fairly easy to germinate, and seedlings are easy to transport and replant. Cultivation of *Carex barbarae* for nursery stock has only been recently initiated and studies are underway to determine optimum revegetation procedures. This plant is useful for green stripping outside riparian areas, causing fires to lay down before reaching the forested areas along rivers. Mature plants have well-developed, deep root systems and are therefore resilient to low intensity fire.

**Wildlife:** Because of their wide availability in riparian corridors, the lens-shaped seeds of sedges are eaten

by many kinds of wildlife. Waterfowl and ducks eat sedge seeds frequently in small to fair amounts. Sedges are also of value to rails, grouse and to seed-eating songbirds. *Carex* species seeds, along with insects, are the most regular item of diet of grouse chicks. Birds known to eat sedge seeds include coots, ducks (such as wood ducks, canvasbacks, mallards, pintails, teal, shoveler), marsh birds and shorebirds (dowichers, rails, and sandpipers), upland gamebirds (grouse, pheasant, and wild turkey), and songbirds (house finch, junco, sparrow, and towhee). In addition to providing food for many wildlife species, sedges are also valuable for cover. Frequently they provide nesting cover for ducks, and their tufted growth furnishes concealment and bedding for other animals.

Wood ducks nest in the trees above the sedges. The grassy beds soften the fall of fledglings as they plunge from their nests to the ground. White root seeds and leaves are eaten by black bear, jack rabbit, porcupine, squirrels, moles and other small rodents. The sedge plants provide cover and habitat for reptiles and amphibians, rabbits, raccoons, deer, porcupines, opossums, and skunks. Beavers, otters, muskrats and minks make their way through the sedges as they go to and from the water. White root also stabilizes the bank and provides bank overhang for fish and invertebrate species habitat.

### Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status and wetland indicator values.

### Description

*General:* Sedge Family (Cyperaceae). White root is a grass-like plant with long horizontal rhizomes. The common name white root is based on these long horizontal rhizomes used by Indian people for basket weaving. Stems are 12 to 40 inches long. Leaf blades are light green and triangular shaped 0.25 to 0.75 inch in width. Flowers are on lateral spikelets, 1 to 4 inches long. The linear spikelets have the base of lower spikelets staminate and narrowly tapered. The pistillate (female) flower bract is distinctive in that it has a long golden brown awn often over 0.2 inches in length covering the pistillate flower (perigynia). This plant has long rhizomes that can be 4 to 6 feet long. Similar plants include the following: *Carex senta*, *Carex nebrascensis*, and *Carex schottii*.

### Distribution

For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site. White root grows from Ventura County in

southern California to southern Oregon. Plants grow in riparian areas; moist places along streams or on slopes, occasionally bordering marshes, and on open or brush slopes and valley flats that are wet in the spring. Plants grow from sea level to 3,000 feet elevation. The distribution of white root includes the mountains of coastal southern California, San Bernadino Mountains, Channel Islands, Coast Ranges from Ventura County north to Humboldt county, Central Valley, Sierra Nevada foothills from Fresno County north to El Dorado County, and southern Oregon.

### Establishment

*Adaptation:* White root is an understory dominant of the oak woodland gallery riparian forests (Holland 1986); *Leymus triticoides* and *Carex praegracilis* are co-dominants in the understory. The oak woodland gallery riparian community type is a dense, broad-leaved, winter deciduous riparian forest dominated by valley oak (*Quercus lobata*), cottonwood, (*Populus fremontii*) and willow (*Salix goodingii*, *S. lucida*). Understories are dense, with abundant vegetative reproduction of canopy dominants plus box elder (*Acer negundo californica*), walnut (*Juglans hindsii*), sycamore (*Platanus racemosa*), red willow (*Salix laevigata*), and gray willow (*Salix exigua*). Shade-tolerant shrubs like buttonbush (*Cephalanthus occidentalis*) and Oregon ash (*Fraxinus latifolia*) are also present. California grape (*Vitis californica*) and poison oak (*Toxicodendron diversilobum*) are the most conspicuous lianas.

*General:* White root may be planted from bare rootstock or seedlings from container stalk or directly seeded into the soil. Bare rootstock or seedlings are preferred revegetation methods, particularly where there is moving water. Plants started as seed tend to stay diminutive for over a year, with plant leaves remaining stunted and fragile for a considerable period of time.

*Live Plant Collections:* No more than 1/4 of the plants in an area should be collected; a depth of 15 cm (6 in) is sufficiently deep for digging plugs. This will leave enough plants and roots to grow back during the next growing season.

Live transplants should be planted as soon as possible. Plants should be transported and stored in a cool location prior to planting. Plugs may be split into smaller units, generally no smaller than 6 x 6 cm (2.4 x 2.4 in) with healthy rhizomes and tops. Weeds in the plugs should be removed by hand. For ease in transport, soil may be washed gently from roots. The

roots should always remain moist or in water until planted.

Clip leaves and stems from 15 to 25 cm (6 to 10 inches); this allows the plant to allocate more energy into root production. Planting densities of approximately 1 meter centers provide full coverage the first year (given good site conditions). Plant densities should be increased with fine soils such as clay or silt, steep slopes or prolonged inundation. Use an annual grass cover with white root plantings the first year to facilitate sediment deposition. When plants are isolated clumps, erosion tends to occur around each plant. The annual grass covers works well for mid-slope sites with minimal erosion. For more extreme hydrology or steeper slopes, use filter fabric to stabilize sites.

Ideally, plants should be planted in late fall just after the first rains (usually late October to November). This enables plant root systems to become established before heavy flooding and winter dormancy occurs. Survival is highest when plants are dormant, temperatures are cool, and soils are moist. Plants usually need to be planted by hand, as soils are too moist to use machines.

#### ***Seed Collections***

- Seed can be harvested by hand or mechanically with a stripper header. Collect seeds when they are ripe, from July to September. Make sure seed heads are full.
- Plant clean seeds in the fall in weed free, moist seedbeds.
- Planting seeds after weeds have germinated. Burning, disking, raking, hoeing, or weeding by hand can control weeds.
- Most Indian people in gathering sites do not approve of herbicides. Many other people have objections to the use of herbicides, so caution and sensitivity is advised.
- Broadcast seed and roll in or rake 1/4" to 1/2" below the soil surface.
- Hold off watering so seeds doesn't float out.
- Some seeds may be lost due to scour or flooding.
- Use erosion control blankets to protect soil and seeds.
- Plants grown from seeds and planted from container stock have higher transplant survival than direct seeding.
- Recommended seed density is unknown at this time. In greenhouse germination experiment done by Stevens (1999), a high temperature was required for germination.

Below 18°C, very little if any seed germinated. Between 21°C and 30.5°C, germination of pure live seed was 14 to 23% for seeds grown in higher nitrate fertilizer treatment, and 5 to 17% germination for seeds grown at low nitrate fertilization treatment. Above 31.5°C, seeds desiccated or failed to germinate, and germination results were very low.

- As expected, at high nitrate levels both high rates of biomass and fecundity are greatly increased. Fertilizing plants at moderate nitrate levels increased flower stalk and seed production, seed weight, and seed viability. A number of studies show that increasing temperatures from 21°C to 32°C increases germination percentages.

#### ***Seed germination in greenhouse***

- Clean seeds by blowing out light seeds.
- Put in water with sphagnum moss.
- To grow seeds, plant in greenhouse in 1" x 1" x 2" pots, 1/4" under the soil surface. Keep moist at 100 degrees F (plus or minus 5 degrees). Seeds begin to germinate after a couple weeks in warm temperatures.
- Plants are ready as plugs in 100 to 120 days. By planting seeds in August, plugs are ready to plant in soil by November. These plants are very small; growing plants to a larger size will result in increased revegetation success.

#### **Management**

Since white root tolerates a wide range of shade, grows from dry slopes to areas which are seasonally inundated, and grows in a wide variety of soil textures and fertility, this plant has wide ecological amplitude.

Traditional Native American tending practices removed competing species and impediments to growth such as stones and branches. Tending practices aerated the soil and stimulated growth through pruning rhizomes. Plants were harvested every two to four years, and less than one third of the plants were harvested. The season of harvest was late fall through early spring, coinciding with the times that the plants were dormant and soils were moist. In some cases, plants were replanted into new areas.

Mowing, weeding by hand, or selective spraying with herbicides the first year are rapid and cost effective methods for weed control. Use of herbicides may be inappropriate in traditional gathering sites. White

root is a perennial plant; once established the first year, it will subsequently dominate the site.

Heavy grazing will eliminate *Carex barbarae* as well as other native species from riparian corridors. Historic records and personal interviews with Indian people document destruction of tended sedge beds from overgrazing. In addition, grazing of traditional tended beds desecrates sacred space used by basket weavers.

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

CABA4 is somewhat available through native plant nurseries within its range. 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."

#### **References**

Abrams, L. & R.S. Ferris 1960. *Illustrated flora of the Pacific states*. 4 Vols. Stanford University Press, Palo Alto, California.

Barrett, S.A. & E.W. Gifford 1933. *Miwok material culture. Indian life of the Yosemite region*. Yosemite Association, Yosemite National Parks, California. 388 pp.

Brode, J. & R.B. Bury. 1984. *The importance of riparian systems to amphibians and reptiles*. Pages 30-36 IN: R.E. Warner and K. Hendrix, eds. California riparian systems ecology, conservation and productive management. University of California Press, Berkeley, California.

Bye, R.A. 1985. *Botanical perspectives of ethnobotany of the greater Southwest*. Economic Botany 39(4):375-386.

Conrad, S.G., R.L. Macdonald, & R.F. Holland. 1976. *Riparian vegetation and flora of the Sacramento Valley*. pp. 47-55 in Warner and K. Hendrix, eds. California riparian systems ecology, conservation and productive management. University of California Press, Berkeley, California.

Gaines, D.A. 1977. *The valley riparian forests of California: their importance to bird populations*. Pages 57-85 IN: Anne Sands, ed. Riparian forests in California: their ecology and conservation. University of California, Davis, Inst. of Ecol., Publ. No. 15.

Goodrich, J., C. Lawson, & V.P. Lawson. 1980. *Kashaya Pomo plants*. Heyday Books, Berkeley, California. 171 pp.

Hickman, J.C. (ed.) 1993. *The Jepson manual. Higher plants of California*. University of California Press. 1 400 pp.

Hoag, J.C. & M.E. Sellers 1995. *Use of greenhouse propagated wetland plants versus live transplants to vegetate constructed or created wetlands*. Interagency Riparian/Wetland Plant Development Project, USDA, NRCS, Plant Materials Center, Aberdeen, Idaho.

Hoag, J.C. & M.E. Sellers 1994. *Seed and live transplant collection procedures for 7 wetland plant species*. Interagency Riparian/Wetland Plant Development Project, USDA. NRCS, Plant Materials Center, Aberdeen, Idaho.

Holland, R.F. 1986. *Preliminary descriptions of the terrestrial natural communities of California*. State of California Department of Fish and Game Natural Diversity DataBase. Natural Communities.

Holstein, G. 1984. *California riparian forests: deciduous islands in an evergreen sea*. pp. 2-22 IN: R.E. Warner and K. Hendrix, eds. California riparian systems ecology, conservation and productive management. University of California Press, Berkeley, California.

Katibah, E.F., K.J. Dummer, & N.E. Nedeff. 1984. *Current condition of riparian resources in the Central Valley of California*. pp. 314-322 IN: R.E. Warner and K. Hendrix, eds. California riparian systems ecology, conservation and productive management. Univ. of Calif. Press, Berkeley, California.

Laymon, S.A. 1984. *Riparian bird community structure and dynamics: Dog Island, Red Bluff, California*. Pages 587-597 IN: R.E. Warner and K. Hendrix, eds. California riparian systems ecology, conservation and productive management. University of California Press, Berkeley, California. 1035 pp.

Martin, A.C., H.S. Zim, & A.L. Nelson 1951. *American wildlife and plants. A guide to wildlife food habits*. Dover Publications, Inc., New York, New York. 500 pp.

Mayer, K.E. & W.F. Laudenslayer Jr., Eds. 1988. *A guide to wildlife habitats of California*. USDA, Forest Service; California Department of Fish and Game; and PG&E.

Peri, D.W., S.M. Patterson, J.L. Goodrich, & R.N. Lerner 1983. *Ethnobotanical mitigation Warm Springs Dam - Lake Sonoma*. Elgar Hill, Environmental Analysis and Planning, Penngrove, California 133 pp.

Peri, D.W. & S.M. Patterson 1976. "*The basket is in the roots, that's where it begin*." Pages 175-193, IN: Thomas C. Blackburn and Kat Anderson. *Before the Wilderness*. Environmental Management by Native Californians. A Ballena Press Publication.

Ratliff, R.D. & S.E. Westfall 1988. *Biomass trends in a Nebraska sedge meadow, Sierra National Forest, California*. *Aquatic Botany* 30: 109-124.

Roberts, W.G., J.G. Howe, & J. Major 1980. *A survey of riparian forest flora and fauna in California*. pp. 3-19, IN: Anne Sands (ed.). 1980. *Riparian Forests in California: Their Ecology and Conservation*. Institute of Ecology Publication No. 15. 122 pp. University of California, Davis, California.

Stevens, M.L. 1999. *The effect of nitrogen fertilization on the growth, reproduction, and nitrogen use efficiency of (Carex barbarae)*. PhD Dissertation, third paper. University of California, Davis. In progress.

Vernor, J. 1980. *Birds of California oak habitats: management implications*. Pages 246-264 IN: T.R. Plumb (tech. coord.) *Ecology, management and utilization of California oaks*. USDA, For. Serv. Gen. Tech. Rep. PSW-44, Berkeley, California.

Warner, R.E. 1984. *Structural, floristic and condition inventory of Central Valley riparian systems*. pp. 356-374 IN: Warner, R.E. and Hendrix, 1984. *California Riparian Systems*. University of California Press, Berkeley, California. 1035 pp.

Zeiner, D.C, W.F. Laudenslayer, Jr., K.E. Mayer & M. White 1990. *California's wildlife, Volume III, mammals*. State of California Department of Fish and Game. Sacramento, California. 407 pp.

#### **Prepared By**

*Michelle Stevens*

Formerly USDA, NRCS, National Plant Data Center

#### **Species Coordinator**

*M. Kat Anderson*

USDA, NRCS, National Plant Data Center  
c/o Plant Science Department, University of California, Davis, California

Edited: 05dec00 jsp; 29apr03 ahv; 31may06 sjp

For more information about this and other plants, please contact your local NRCS field office or Conservation District, and visit the PLANTS Web site <<http://plants.usda.gov>> or the Plant Materials Program Web site <<http://Plant-Materials.nrcs.usda.gov>>

*The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).*

*To file a complaint of discrimination write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.*

*Read about [Civil Rights at the Natural Resources Conservation Service](#).*