

**WRITTEN FINDINGS OF THE  
WASHINGTON STATE NOXIOUS WEED CONTROL BOARD  
(Updated December 1999)**

Scientific Name:        *Mirabilis nyctaginea* (Michx.) MacM.  
                                 SY= *Allionia nyctaginea* Michx.  
                                 SY= *Oxybaphus nyctagineus* (Michx.) Sweet

Common Name:        wild four o'clock

Family:                    Nyctaginaceae

Legal Status:            Class A

Description and Variation:

Wild four o'clock is a perennial herb, sometimes woody at the base, reaching 3 to 4 feet tall, that reproduces by seed and by fragmented root pieces. The overall plant shape is bushy, and the stems are much branched. The stems are glabrous (smooth), often four-sided, sometimes ridged and reddish. The stem branching is opposite and the stems are thickened at the nodes. The leaf arrangement is also opposite. The leaves are usually cordate (heart shaped) to ovate, sometimes with a truncate base, ranging from 2 to 4 inches long and 1 to 3 inches wide. The leaves are glabrous, or nearly so. The leaf margins are entire, and each mid to lower leaf is supported by a short petiole. The upper leaves may be sessile. The upper stems, and leaves are sometimes glaucous (covered with a whitish or bluish waxy covering). The flowers are found in terminal clusters, on forked branches. A short, hairy stalk supports each cluster of usually three to five flowers, and an involucre (whorl of bracts) is found at the base of each flower. This involucre is persistent, 5-lobed, 5-6 mm long at flowering. When in fruit, the involucre increase to 8-16 mm, becomes veiny and turns colors, and it also aids in the dispersal of seeds. The flowers are perfect, and consist of a reddish to lavender calyx (5 sepals), no petals, 3-5 stamens and a pistil with a single style. The flowers are about 3/8" in diameter. The seed is a hard, elongated nutlet. It is prominently five-ribbed, warty, somewhat hairy, grayish brown in color and ranges from 1/8 to 1/4 inch in length. The thick and fleshy, black taproot is large and tough. The root system can extend downward for two feet.

There are three native *Mirabilis* species growing in the northwest region: *M. linearis* (narrow, linear leaves, usually found east of the Rocky Mts.); *M. bigelovii* (upper plant is densely covered with hairs, usually found from Malheur Co., OR and southward); and *M. macfarlanei* (flowers are large, 1" in diameter, seeds have 10 ribs, found in the Snake River Canyon and lower Salmon River in Idaho and Oregon) (Roche' 1991; Hitchcock et al. 1994).

Economic Importance:

**Detrimental:** In Washington State this species has shown the ability to spread from a small 10 acre site to several hundred acres, where an aggressive control program continues to be necessary to reduce the infestation size. Wild four o'clock is capable of establishing in a wide range of habitats in our state, including orchards, alfalfa fields, range lands, sandy, rocky or

heavy cultivated soils, dry meadows, railroad embankments and vacant lots of industrial/residential areas. This plant grows along river areas where it is found downstream in high water areas, and it is found growing along the inside of an old irrigation canal.

*Beneficial:* None known. This species is native to the central states, and growing tips for gardeners are offered over the Internet.

Habitat: Considered a weed of uncultivated lands in its native range, wild four o'clock is found in a range of habitat in our eastern counties, which include orchards, alfalfa fields, range lands, sandy, rocky and heavy cultivated soils, fence rows, dry meadows, railroad embankments and in industrial/residential vacant lots. It is also reported growing along deer trails where it spreads to the mountainsides. This plant grows along river areas where it is found downstream in high water areas. And it is found growing along the inside of an old irrigation canal. (Personal communications with Okanogan and Spokane Counties, 1999).

Geographic Distribution: Native east of the Rocky Mountains, from Montana to Mexico, and east to Wisconsin and Alabama (Hitchcock et al. 1994). It is considered weedy, but does not establish in cultivated lands in its native range. Outside of its native range, wild four o'clock is found in waste places, fields and stream valleys east to Massachusetts and Virginia, and in California (Gleason and Cronquist 1991; McGregor et al. 1986).

History: In our region, wild four o'clock was identified in 1974 in Bonner Co., Idaho growing along railroad property. In Washington, this species was originally known from, and confined to, 10 acres on a ranch in Okanogan Co. in 1974. When the ranch was re-seeded in 1987, wild four o'clock quickly spread to 100 acres, and eventually to 300 acres in 1988. Wild four o'clock was listed as a Class A noxious weed in Washington in 1989. It is known from 3 counties in WA. An active control program reduced the Okanogan Co. infestation size to less than 10 acres, in spotty locations. Spokane Co. reports the weed was identified in 1981, with that site eradicated. However, in 1999 two new locations were reported. Chelan Co. also has wild four o'clock. (Personal communications with Okanogan and Spokane Counties, 1999).

Growth and Development: The botanical name refers to the flowers, which open late in the day and wither early the next morning. *Mirabilis* translates as 'wonderful' from Latin, and *nyct* translates as night, from Greek. Wild four o'clock is a winter dormant, heavy rooted perennial that spreads by seeds and roots (Muenscher 1955). When stems are broken from the crown of the plant, new stems will sprout. Broken root pieces will also produce stems.

Reproduction: Blooms throughout the summer. Seed is set from July to September. The involucre aids in the dispersal of the seeds, acting as a small umbrella which catch on bumpers and radiators of vehicles (Roche' 1991).

Response to Herbicide: Wild four o'clock is considered resistant to 2,4-D (Jennings et al. 1980). The extensive root system and the waxy covering on the leaves hamper the effectiveness of herbicides. Experimental plots were monitored in Okanogan County in the early 1990's. The results are documented and available from the Washington State Noxious Weed Control Board

(WSNWCB) office in Kent (253-872-2318). Refer to the annually updated Pacific Northwest Weed Control Handbook for chemical control recommendations.

Response to Cultural Methods: Informational bulletins originating in the Midwest recommend control by cultivation, however that was not effective when tried in Washington in 1990. Plow infested meadows and plant a cultivated crop for 2 years. Where plowing is not practical, hoe out the remaining plants (Meunscher 1955). Field corn does compete well the wild four o'clock (Personal communications with Okanogan Co., 1999).

Response to Mechanical Methods: Hand pulling is not recommended because the stems break at the crown, the roots are strongly branched, and broken root pieces will produce sprouting. Small infestations can be spaded, or dug up. Repeated mowing or cultivation will prevent seed production to lower the seed bank, and eventually the plant will die from loss of nutrient reserves stored in the root.

Biocontrol Potentials: Susceptible to *Mirabilis* mosaic caulimovirus (Brunt et al. 1996).

#### References:

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\* McGregor, R.L., T.M. Barkley, R.E. Brooks and E.K. Schofield (Editors). 1986. Flora of the Great Plains. University Press of Kansas. P. 150.

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\* 1989. The Wenatchee World. Newspaper Article, 6/2/89. Weed War – The only good Marabilis is a dead Marabilis (Mirabilis).

\*References available from the Washington State Noxious Weed Control Board Office in Kent, WA.

Rationale for Listing: *Mirabilis nyctaginea*, wild four o'clock, is considered weedy outside of its native range of the central United States. This is demonstrated by this species spreading and eventually becoming naturalized in the northeastern United States and California. In Washington State this species has shown the ability to spread from a small 10 acre site to several hundred acres, where an aggressive control program continues to be necessary to reduce the infestation size. Wild four o'clock is capable of establishing in a wide range of habitats in our state, including orchards, alfalfa fields, range lands, sandy, rocky or heavy cultivated soils, dry meadows, railroad embankments and vacant lots of industrial/residential areas. This plant grows along river areas where it is found downstream in high water areas, and it is found growing along the inside of an old irrigation canal.

As a Class A noxious weed, eradication is required, which will prevent further spread. Wild four o'clock is capable of causing an impact to both agricultural and range lands in our state. Control is difficult as this perennial can spread by seed and by re-growth from root fragments, leaves and stems have a waxy covering that hamper the effectiveness of herbicides, and this species is resistant to some herbicides. At this time the distribution is still small in Washington, and control or eradication is possible.