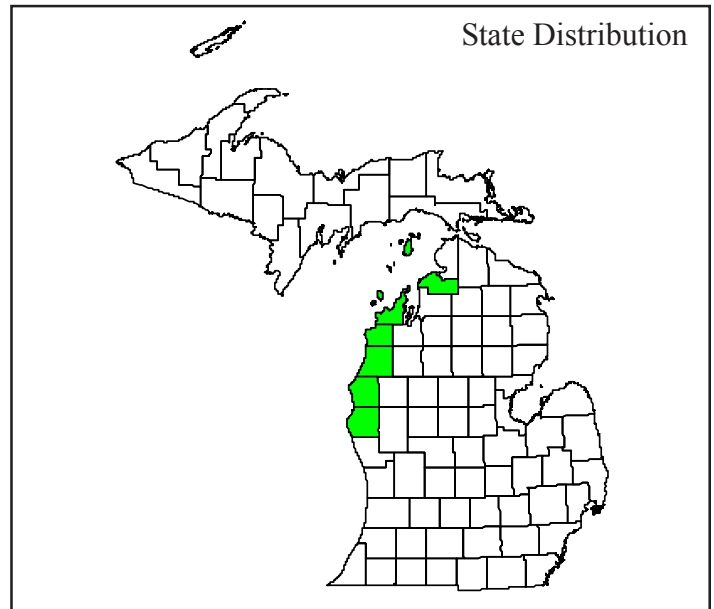
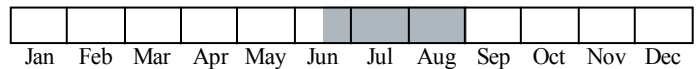




Photo by Susan R. Crispin



Best Survey Period



Status: State threatened

Global and state rank: G4/S2

Family: Orobanchaceae (broom-rape)

Other common names: broom rape, clustered or yellow cancer-root, sand cancer-root

Synonyms: *Thalesia fasciculata* (Nutt.) Britton, *Anoplanthus fasciculata*

Total range: This species reaches its easternmost distribution in the Great Lakes region, extending into Michigan and Indiana. In western North America it ranges to the Yukon and British Columbia, extending south to Arizona, California, and northern Mexico. It is considered rare in Illinois, Indiana, Wisconsin, Kansas, Minnesota, Ontario, and the Yukon.

State distribution: Fascicled broom-rape is restricted to the Lake Michigan shore from Charlevoix to Oceana Counties—including Beaver, South Fox and South Manitou Islands—with barely more than a dozen localities recorded. Most and the largest of these lie in Leelanau and Benzie Counties. One Oceana County population appears to be no longer extant. No inland localities are known. The species is relatively scarce at all sites except one occurrence in Sleeping Bear Dunes National Lakeshore.

Recognition: *Orobanche fasciculata* is a parasitic plant that **completely lacks chlorophyll**, the stem and scale-like leaves appearing a **pale yellow-brown in color**. The **fleshy, somewhat succulent stem** is primarily subterranean, with the aerial portion, including the inflorescence,

reaching 5-15 cm in height. The reduced **scale-leaves are hairy** and widest toward the stem base, becoming more narrow and pointed upward. A cluster of **3-10, tubular, bilaterally symmetrical flowers** terminates the stem, each flower on a stalk 2-6 cm long. The flowers are rose-purple when in bud, becoming **pinkish to creamy white upon maturity**. **Bright yellow splotches**, which serve as nectar guides for pollinators, are visible within the throat of the floral tube. After flowering, this plant becomes dark brown and **forms erect fruiting capsules**. It is easiest to see at this time, when in contrast with the buff-colored open dune sands of its habitat.

Orobanche uniflora (one-flowered broom-rape), a similarly obscure species but not considered particularly rare within the state, is easily distinguished by its shorter stature (1-5 cm), hairless scale-leaves, fewer flowers (1-3) on longer stalks (6-20 cm), and violet-tinged flowers. This species occurs in association with juniper, its host species, whereas the host of *O. fasciculata* is wormwood (*Artemisia campestris*; shown in lefthand corner of photo).

Best survey time/phenology: Due to its small size and inconspicuous coloring, fascicled broom-rape is best sought when in flower, or better yet, in fruit when the dark brown color of the fruiting capsules poses a better contrast to the dune sands than the sandy buff colored flowers. Most of the occurrences in Michigan are noted to flower in late June and fruit in the latter part of July and August. Since wormwood is its only known host plant in Michigan, surveys should focus on sites where this species is present.

Habitat: In Michigan, fascicled broom-rape inhabits



dunes along the northern Lake Michigan shoreline and usually grows on the leeward slope of the first or second dune ridge inland from the lake. It favors zones of sand deposition where *Calamovilfa longifolia* (sand reed grass) often dominates and its host *Artemisia campestris* (wormwood) is common. Other common dune associates of this species include *Ammophila breviligulata* (beach grass), *Andropogon scoparius* (little bluestem), *Arabis lyrata* (lyre-leaved rock cress), *Monarda punctata* (horse-mint), *Asclepias syriaca* (milkweed), *Salix myricoides* and *S. cordata* (dune willows), and the Great Lakes endemic *Cirsium pitcheri* (Pitcher's thistle). Farther west where it is more common, it is primarily a plant of dry plains and prairies, and parasitizes a variety of other plant species, including several western species of *Artemisia*.

Biology: This annual plant is a parasite on other species, and is dependent on *Artemisia campestris* (wormwood) as its host plant in Michigan and Wisconsin. It is believed that germination of its seed is triggered by root secretions from the host plant (Kuijt 1969), after which a haustorium, or root connection, establishes between the seedling's primary root and the host root. Fleshy, tuberous structures then emerge around the apical meristem and develop into flowering stalks in June and July. The flowers of fascicled broom-rape are well adapted to cross-pollination by bees and bumblebees (Kuijt 1969), but are capable of setting seed without fertilization (Reuter 1986). The copious seeds produced are dispersed by wind and rainwater via their minute size and the numerous air-retaining cavities (testa) on their surfaces (Kuijt 1969).

Conservation/management: Dunes supporting fascicled broom-rape should be protected from heavy disturbance (e.g., from pedestrians or vehicles) and from development. However, light disturbance may tend to increase the frequency of this species' host-plant and thus enhance conditions for germination. Fortunately, six colonies of *Orobanche* have been found within Sleeping Bear National Lakeshore, two others on State Park property, and one on Nordhouse Dunes Research Natural Area/Wilderness Area in Manistee National Forest. Recent surveys of a known fascicled broom-rape site discovered several years previously did not result in observations of any plants; within this site there were many signs of artificial disturbances, including ORV traffic, increased recreational use of the site by pedestrians, and evidence of exotic plant invasion. Protection of shoreline habitat may thus be essential to maintaining viable populations of this rare species within the state.

Comments: An extract from one member of this genus has been used to treat kidney stones (Thieret, 1971).

Research needs: An important need for *O. fasciculata* is to assess genetic variability within and between known populations and the relative rates of outcrossing and self fertilization. This will ultimately be important for determining which and how many populations are necessary for successful conservation of the species. Long term demo-

graphic studies are also suggested in order to better predict the long-term viability of individual populations.

Key words: open dune, American dune wild-rye, Lake Huron tansy, Pitcher's thistle, Pumpell's brome grass, Lake Huron locust, piping plover

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