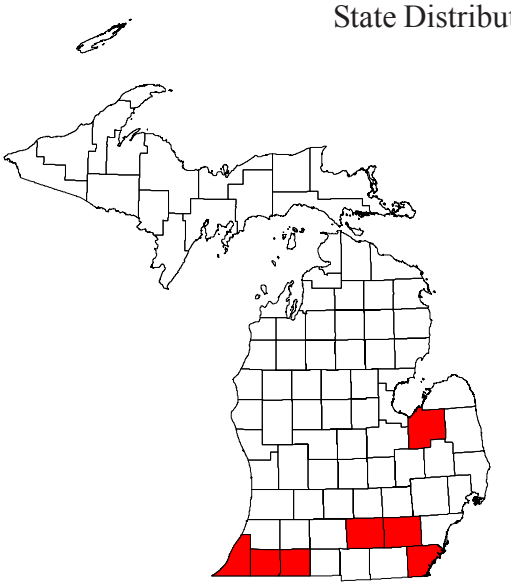
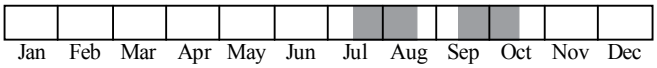
Papaipema silphii Bird — silphium borer


Photo by David L Cuthrell

State Distribution



Best Survey Period



Status: State threatened

Global and state rank: G5/S2S3

Family: Noctuidae (owlet moths)

Range: The silphium borer is restricted to the northeastern fringe of the tallgrass prairie region of North America. It has been reported from Michigan, Missouri, Ohio, Illinois, and Wisconsin.

State distribution: Known historically from nine sites in seven counties (Berrien, Cass, St. Joseph, Jackson, Washtenaw, Monroe, Tuscola) of southern Michigan, a recent survey (1989) for the moth found it to be extant at only seven locations in Michigan. The populations are very localized in distribution, though prior to European settlement and agricultural development, this species undoubtedly was more common than it is today. Most remaining populations are small, occur in habitat that requires management, and are threatened by fires, and roadside and railroad right-of-way maintenance activities. Many of the scattered occurrences of *Silphium* species in Michigan do not support the moth.

Recognition: The silphium borer (Lepidoptera: Noctuidae) is one of the largest *Papaipema* species in Michigan with a wingspan of 40-50 mm (1.6-2.0 in.) (Bird 1915). It can easily be confused with the two sunflower borers, *Papaipema necopina* and *P. maritima*, as well as the plain form of *P. beeriana*. The silphium borer moth is **brownish-black with a dusting of white scales on the dorsal forewings**. **When fresh, this species has a distinctive purplish cast and a large tuft of hair-like scales on the thorax**. Many species of *Papaipema* are difficult to identify but most can be sorted into species groups (Rings et al. 1992). These species groups can then be sent to experts for positive identification. Series (5 to 10 individuals from the same location) of specimens are easier to work with because of the large amount of individual variation. In addition, many field-collected specimens can be quite worn (many of the scales missing) giving the specimen a lighter appearance than normal, or eliminating many of the scale characteristics important for identification. **Larvae of *P. silphii* are pinkish in color with a large, brown head and may reach a length of 50 mm or more at maturity** (Bird 1915). They bore in the root of their food plant, prairie dock (*Silphium terebinthenaceum*) and perhaps other *Silphium* species. Signs of feeding are a few brown or yellow leaves, a wilted flower stalk, and large amounts of brown frass around the base of the plant (Hessel 1954).

Best survey time: Adult dates range from mid-September through the third week of October. The best way to survey for this species is by blacklighting, a technique where a sheet is stretched across two trees or poles and an ultraviolet light is used to attract moths to the sheet. Moths can be collected directly from the sheet. You also can search for the larvae of many species of *Papaipema* by searching for signs of feeding activity (Hessel 1954, Nielsen 1995). This includes inspecting *Silphium* plants that are wilted or otherwise

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stunted, for a small hole near the base of the plant and a pile of frass (caterpillar feces) near this opening. Often times you can see the pile of frass at the base of the plant and then locate the hole in the stem. Larvae are most easily located between mid-July and mid-August.

Habitat: In Michigan, the silphium borer occurs in a variety of prairie habitats including mesic prairie, prairie fen, and lakeplain mesic prairie. In many cases, only a remnant of the former habitat remains and frequently it is along a roadside or railroad where past maintenance activities have kept the habitat open. Formerly, controlled burns were frequently used to maintain railroad rights-of-way, thus enhancing the remnant prairies. However, the fire-sensitive borer moth would have survived these burns only if they were properly timed or if some individuals escaped the fires and later recolonized the area. Today, herbiciding, and in some places bulldozing, are the common maintenance practices, both of which can destroy host plant populations.

Biology: The silphium borer is restricted to large colonies of the larval food plant, prairie dock (*Silphium terebinthenaceum*) or possibly other *Silphium* species. The minimum plant population size necessary to sustain the moth is not known. Eggs are laid on or near the food plant in the fall and hatch in late spring. By early July, larvae have moved to their final feeding place by burrowing into the stem of the host plant and moving down into the rootstock. They create extensive tunnels while feeding, causing the plant to wilt slightly or to lose a few leaves. The final instar pupates in the soil under or near the root (Bird 1915). Adults are somewhat sedentary, though they will come to a blacklight.

Conservation/management: Protection of known populations is essential for the persistence of this species in Michigan. Only two populations occur in nature preserves and one of them is quite small due to the limited number and poor vigor of the food plant. Several populations are on roadsides or within railroad rights-of-way where intensive maintenance activities such as bulldozing and herbicides can eliminate a population. Landowners and managers should be contacted at all sites and advised of protection and management concerns. Habitat management for prairies typically includes brush removal and prescribed burns. The eggs and young larvae of this species and all other *Papaipema* are extremely sensitive to fires. The later instar larvae and pupae are protected from all but the hottest fires because they are underground. If prescribed burns are necessary, they should be conducted only in late summer, after the larvae are within a rootstock and before adults emerge in early fall. Prudent management requires dividing the site into subunits and burning only part of the site each year. Adults are quite sedentary and would not be expected to quickly recolonize an isolated site from which they had been extirpated (Hessel 1954), though they should move quickly between adjacent burn units (D. Schweitzer 1990, pers. comm.). Additional surveys and monitoring are needed. Of particular importance is information about the minimum size of a *Silphium* population necessary to support the moth indefinitely and the effects of management on both the moth and the host plant populations.

Research needs: Major research needs, as outlined by Schweitzer (1999), include information on habitat requirements other than foodplants, on conditions under which females disperse, and on presence or absence of *Papaipema* on prairie preserves and other fire managed habitats. The latter is needed before dormant season burn regimens are implemented. Any information on speed of recolonization after prescribed burns would be useful. It would be important to try and document how recovery occurred, i.e., from other burn units, from outside the managed area, from skips in the burn, or from very wet microhabitats. More actual information on survival of *Papaipema* in mid or late summer burns is needed. More precise information as to what date *Papaipema* larvae have moved below ground is needed. This information can be used to better time burns or schedule grazing rotations or mowing. Information is needed to determine whether adults can locate suitable places for oviposition in foodplant patches burned or grazed earlier in the same season. For example, can adults (which typically occur October 1) find places to lay eggs in habitats burned in July or August. Information on how high eggs are placed on the host plant is needed so that the potential suitability of mowing as a management option can be evaluated.

Related Abstracts: lakeplain prairie, prairie fen, English sundew, mat muhly, prarie dropseed, culver's root borer moth, blazing star borer, Mitchell's satyr, red-legged spittlebug

Selected references:

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