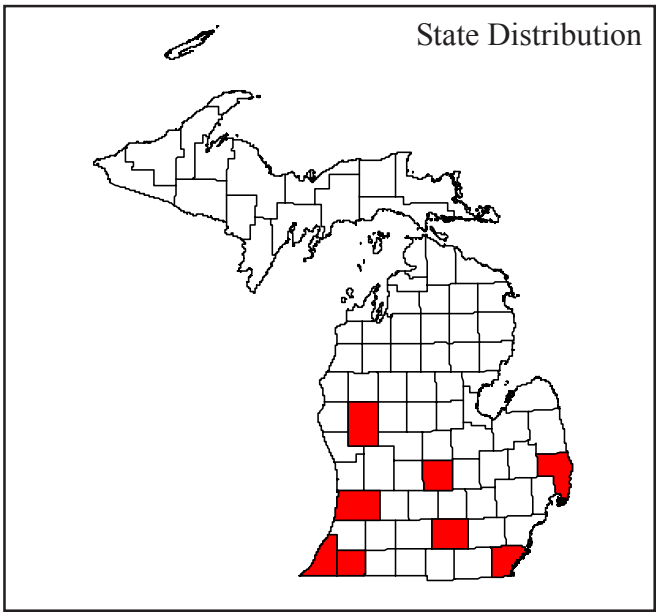
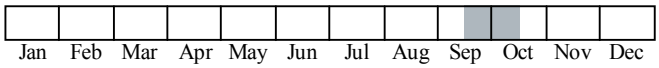
Papaipema sciata Bird — culver's root borer


Photo by David L. Cuthrell



Best Survey Period



Status: State special concern

Global and state rank: G3G4/S2S3

Family: Noctuidae (owlet moths)

Range: The culver's root borer has been reported from several disjunct localities from the following states: historically Connecticut, Maine, New York, and New Jersey with current records from Iowa, Michigan, Missouri, Minnesota, Illinois, and Wisconsin (Forbes 1954; Peterson et al. 1990).

State distribution: Known from nine sites in eight counties in lower Michigan including Barry, Berrien, Cass, Clinton, Jackson, Monroe, Newaygo, and St. Clair. These moths are very local in occurrence and are rarely found a great distance from their larval food plants.

Recognition: The culver's root borer (Lepidoptera: Noctuidae) has a wingspan of near 40 mm (1.6 in.). Adult forewings with **basal (inner portion of wing nearest the body) two-thirds chocolate brown, marginal third bluish gray, typically with a series of yellowish lunules (crescent-shaped markings) surrounded with white; forewings also with a group of white spots** (Forbes 1954). Hind wings are a solid light chocolate brown. The more common ironweed borer, *Papaipema limpida*, is very similar in appearance but usually can be separated by the pattern of white spots on the forewings. 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 of specimens, which are usually 5-10 individuals from the same location, are easier to work with because they capture the individual variation typical for each site. In addition, many field-collected specimens can be quite worn (many of the wing scales missing) which gives the specimen a lighter appearance than normal, and can eliminate many of the scale characteristics important for identification. To add to the confusion many similar *Papaipmea* species are sympatric (occur at the same location at the same time).

Best survey time: The culver's root borer is a late-season flier with Michigan capture dates ranging from mid-September to mid-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 in late July or early August. This includes inspecting culver's-root (*Veronicastrum virginicum*) plants that are wilted or otherwise stunted, for a small hole near the base of the plant and a pile of frass (caterpillar feces) near this opening. Oftentimes you can see the pile of frass at the base of the plant and then locate the hole in the stem (see Nielsen 1995).

Habitat: The culver's root borer occurs with its larval host plant, culver's-root (*Veronicastrum virginicum*). In Michigan culver's-root has been recorded from a

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variety of plant communities crossing gradients from wet to dry including lakeplain prairies, prairie fens, and sand prairies. Many Michigan sites represent only small isolated parcels of what was once widespread habitat. At known sites, associated prairie plants typically include big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), common mountain mint (*Pycanthemum virginianum*), tall coreopsis (*Coreopsis tripteris*), Ohio goldenrod (*Solidago ohioensis*), marsh blazing star (*Liatris spicata*), and switch grass (*Panicum virgatum*).

Biology: Eggs are laid on or near the food plant in the fall and hatch in late spring or early summer. Larvae can be found in the root and lower stem of the host plant in most years from 21 July through 14 August. Feeding and tunneling in the root causes the plants to wilt, dry and become black. In extreme cases the stem becomes broken and dies. The final instar leaves the root and pupates in the soil near the plant. Pupae can be found from late August until adults fly, typically 28 September through 17 October. *Papaipema* moths as a whole fly late in the season, usually late August through October. *Papaipema sciata* adults have been recorded in Michigan from 19 September through 3 October. Limited data suggests that prairie *Papaipema* moths are active late in the evening (actually early morning hours) (Schweitzer 1999). Several factors seem to effect moth beahavior including ambient temperatures, humidity levels, precipitation, wind, and moon phase. Major natural enemies of *Papaipema* include mammals such as rodents and skunks (Hessel 1954, Decker 1931, Schweitzer 1999), woodpeckers (Decker 1930) as well as numerous parasitoids and predatory insects. Small mammals in some cases can completely eradicate small populations of *Papaipema* (Hessel 1954). A tachinid fly, *Masicera senilis*, and a braconid wasp, *Apanteles papaipemae*, are probably the most important parasitoids of *Papaipema* larvae (Decker 1930).

Conservation/management: Protection of known populations is essential to preserve this species in Michigan. Almost all major workers on the genus have commented on the fire sensitivity of *Papaipema* eggs, while Decker (1930) highly recommends use of fire to control the pest species *P. nebris*. Land managers should heed Dana's (1986) general advice and always assume high mortality of *Papaipema* eggs in fall, winter, or spring burn units. To preserve the rarer *Papaipema* populations, Schweitzer (1999) recommends protecting an adequate amount of the foodplant by dividing their habitat into smaller burn units. These smaller units can be burned in rotation with 3-5 years between burns of a single unit, and adjacent units should not be burned in consecutive years. **No *Papaipema* site should ever be entirely burned in a single year.** Foodplants spread over a large area or in several discrete patches reduce the risk from predators and parasitoids as compared to a comparable number of plants in a single dense patch. Most, if not all, of these parasitoids are native species and in most cases they do not need to be controlled. All known sites of *sciata* on managed lands should be monitored periodically. There is no information to suggest how often this should be done and likely these surveys will be at the level of presence/absence, either of larvae or adults. Researchers can quantitatively sample larvae (or at least larval burrows) to estimate the actual size of a population. Monitoring is especially critical when planning to implement prescribed dormant season burns. Keep in mind that distribution of the *Papaipema* population among the various burn units will probably vary from year to year, so current information is needed. Generally decisions will be made on information from the previous growing season, since this is the best information on the distribution of *P. sciata* eggs within a site.

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 any 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/mowing rotations. 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, eastern prairie fringed orchid, blazing star borer, red-legged spittlebug

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Abstract citation

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