

RED OAK CLEARWING BORER: *Paranthrene simulans* (Grote)

Order - Lepidoptera; Family – Sesiidae

DISTRIBUTION - *P. simulans* occurs throughout the eastern United States and ranges west to Iowa, Missouri, Nebraska, and Texas. It also occurs in eastern Canada.

DESCRIPTION - Egg: The egg is oval, light brown in color, and has a reticulated surface.

Larva: The larva may range in length anywhere from 22 to 30 mm at maturity. It has a black head, yellowish-brown thoracic shield, and a purplish-brown abdomen. Elliptical spiracles on the abdomen are prominent. Ventral prolegs on abdominal segments three to six bear two transverse rows of well-developed uniordinal crochets; anal prolegs have one row of crochets.

Pupa: The pupa is about the same size as what it was as a mature larva. It is brown to black in color, the maxillary palpi are well-developed, and most of the abdominal segments have two dorsal, parallel transverse rows of spines with the tips pointing posteriorly.

Adult Male Moth: The male moth may range from 5/8 to 3/4 of an inch in length and have a wing expanse which may range from 1-1/8 to 1-1/4 inches. It is yellow and black in color; in some locations the yellow shades toward orange. The male moth closely resembles the German yellow jacket wasp, both in size and coloration. The male moths have stout, black bi-pectinate antennae with reddish-brown tips. The stout abdomen is mostly yellow, except for segment one, which is mostly black, and segments two and three, which are dorsally black. Wing length may vary from 12 to 18 mm. The hindwings are transparent, while the forewings have the anterior margins shaded with brown scales, and have reddish discal marks (the region of its forewing distad of the discal spot is covered with brownish-black scales, except for a hyaline area (window) between M2 and Cu2).

Adult Female Moth: Female moths closely resemble male moths in coloration, but are larger and more robust. The antennae of the female moth are simple and touched with yellow at the inner base.

HOSTS - *P. simulans* primarily infests oaks of both the red and white oak groups. It has also been reported to infest elm and American chestnut. In the South, red oaks, especially Nuttall, Shumard, cherrybark, and black oaks are preferred hosts; whereas in the North, northern red, pin, and black oaks are favored. In Florida, both deciduous and evergreen scrub oaks have been reported as hosts.

Host preferences may vary from region to region. In the Gulf States, *P. simulans* is reported as more of a problem on mature red oaks; whereas, in the states of Kentucky and Ohio, it is reported as more of a problem on young pin oaks.

DAMAGE - *P. simulans* may be readily found damaging oaks wherever oaks are grown. This would include trees in parks, nurseries, woodlots, and along city streets. The larvae bore through the bark and into the wood. This borer is reported to seriously damage young oak shoots, branches, and saplings. Larval tunneling may produce gall-like swellings on small saplings and branches, often causing death of the stem beyond the injury. In trunks, larvae excavate galleries up to 9 mm in diameter and 10 cm long. For the first 3 to 5 cm, the gallery slopes upward, then it continues straight up. Coarse brown frass (held together by a light web) and areas of dark, sap-stained bark may be evident on infested trunks and limbs. Trees heavily infested may eventually die, and even trees lightly infested, are vulnerable to the infections of wood decay fungi.

LIFE CYCLE (east-central Iowa and northern Illinois) - *P. simulans* requires two years to complete its life cycle. Adult moths typically emerge from their galleries during early to mid-June. The average life of the adult moth is 6 days. The adult flight period is relatively short (as compared with other endemic clearwing moth species) and only lasts about four weeks. Females lay up to 459 eggs over a five day period. Eggs hatch in 15 to 18 days. Eggs are laid in bark crevices, mostly around the tree base. Young shoots and saplings are attractive to egg-laying females, which lay their eggs on thin bark. The young larvae make tunnels under the bark and then tunnel into the wood. The larvae maintain contact with the outside to expel frass and wood cuttings. Dark frass held together by a light web is noticeable on infested trunks and limbs. During the second fall after hatching, mature larvae construct slightly enlarged areas in their innermost galleries in which they overwinter. In the spring, they enlarge the galleries to the

bark surface and cap them with an almost colorless material that the pupae can easily rupture just before they emerge as adults. As the adults begin to emerge, the cast pupal skins are easily noticed, half exposed from the bark surface. The cast pupal skins can remain protruding from the adult exit holes for months.

In southern latitudes, adult moths tend to emerge during April, May, and June. In northern latitudes, adult moths tend to emerge during June and July.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
						[----Eggs---]					
						[-A. Flight-]					
						[---- Larvae --(2 years)-----]					
						-----]					
						[--- Pupae--]					
Observed at: Northern Illinois						General Rule: +/- 1 week for each 60 miles change in Latitude					

INSPECTION TIPS (east-central Iowa and northern Illinois) - One of the best ways to positively identify the presence of *P. simulans* is by the use of a pheromone trap. *P. simulans* is readily attracted to the ash/lilac borer pheromone lure. Once an adult is captured (which will appear about the size and shape of a German yellow jacket), it should be identified as to whether it is *P. simulans* or *P. pellucida*. The adult flight period of *P. pellucida* is typically a month or so later than *P. simulans*. The best way to distinguish these two species is by viewing their forewings. The forewings of *P. simulans* have their anterior margins shaded with brown scales, except for a transparent area between M2 and Cu2. The forewings of *P. pellucida* have the entire distal region of their forewing transparent.

During the summer, and especially during the early fall, active tunnels are easily noticed. The bark surface directly beneath an active hole is usually darkly sap-stained. From these active tunnels, coarse brown frass held together by a light web, is readily visible.

During the dormant season, old adult exit holes are more easily noticed on trees having a smooth bark surface. These old exit holes may be about 9 mm in size. In nursery stock, pay close attention to the lower trunk region.

CONTROL TIPS (east-central Iowa and northern Illinois) - Sanitation used in combination with protective insecticide treatments works the best. Any severely infested trees should be removed and destroyed.

Insecticide treatments should be applied during the time period when the adult moths are in flight. Pheromone traps really help to identify this period. Observations made in east-central Iowa and northern Illinois suggest that *P. simulans* begins its adult flight period about the time that *Spiraea vanhouttei* (bridal wreath) is beyond the time of its peak bloom and brown blossoms are present. The flight period usually lasts for about four weeks.

One insecticide treatment may be adequate; however, if live borers are still being captured at the end of four weeks, another application may be warranted. Emulsion formulations of persistent insecticides seem to work the best.

Non-chemical controls include utilizing a stiff wire to kill larvae and pupae in their tunnels. Woodpeckers serve as predators and are important natural enemies. Predation is heaviest during the winter. Parasite controls that have been recorded include *Pterocormus saucius* (Cresson), a hymenopterous parasite.

RELATED PESTS - The summer oak borer, *P. pellucida* (Greenfield and Karandinos), very closely resembles *P. simulans*, both in appearance and life cycle. It also requires two years to complete its life cycle.

The adult flight period of *P. pellucida* typically appears about a month after the end of the adult flight period of *P. simulans*. *P. pellucida* has only been recorded on pin and black oaks.

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PREPARED BY - William R. McAdams, Iowa. 1997.

PHOTOGRAPHS -



Frass from an ejection hole --- (Left & Right)

William McAdams, Iowa.



Larva & Galleries --- William McAdams, Iowa.



Adult male caught in a pheromone trap ---