

## VELVETBEAN CATERPILLAR (LEPIDOPTERA: NOCTUIDAE): SURVIVING FREEZING WEATHER IN LOUISIANA

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The velvetbean caterpillar (VBC), *Anticarsia gemmatilis* Hübner, (Lepidoptera: Noctuidae) is predominately a tropical to subtropical species (Buschman et al. 1977, 1981) and cannot overwinter north of southern Florida (Ellisor 1938, Buschman et al. 1977) and southern Texas (Gregory et al. 1990). However, adults are collected as far north as Ontario, Canada (Watson 1916) by late summer. VBC is a yearly immigrant to Louisiana and other soybean growing areas in the southeastern U. S. (Johnson et al. 1991) and can be a severe pest if not controlled.

There has been considerable discussion about the factor(s) limiting the VBC's northern overwintering range. Several limiting factors have been suggested including: host plant availability (Anonymous 1927; Watson 1932), absence of a mechanism of winter dormancy (Anonymous 1927), or direct exposure to sublethal temperatures (Buschman et al. 1977). Near the VBC's normal northern overwintering boundary in Central Florida (Bartow, FL) larvae of all sizes have been collected throughout the winter on a wild host plant, kudzu *Pueraria lobata* (Willd.), even though the host plant was nearly defoliated; however, this was an area with no freezing temperatures (Buschman et al. 1977). Using both laboratory and field cage experiments in Mississippi, Buschman et al. (1981) investigated the overwintering ability of the VBC and

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concluded that it did not survive the winter of 1978-79, which was regarded to be severe in that area. They collected the last VBC larvae on kudzu on December 6 at Hillsdale (southern Mississippi) after the kudzu foliage at Hillsdale was killed by freezing temperatures on December 5, 1978.

In this note, we provide evidence that the VBC can withstand subfreezing temperatures in Louisiana. In our study, we set up two cages (1.8 x 1.8 x 1.8 m) in a soybean field at Ben Hur Experiment Station, Louisiana State University Agricultural Center, Baton Rouge on October 9, 1993. The ground inside the cages was covered with nylon screen and a layer of vermiculite about 2 cm was placed on the screen. Vermiculite was used to facilitate pupal collection (see also Wei & Johnson 1994). Approximately 200 VBC third and fourth instars were collected from adjacent soybean fields with a sweep-net and introduced into each cage. AMDRO® (American Cyanamid Company, Wayne, NJ) insecticide was applied around the cages to prevent fire ants from attacking the insects in the cages. On October 31, 1993, three weeks after larval introduction, the temperature dropped to - 2.3°C and was below 0°C for 9 hrs. This was preceded by 134 mm of rain on October 29, 1993 which caused water to stand in the cages for more than 48 hrs. Observations at the cage sites and in the adjacent soybean field were made on the evenings of November 8th, 12th, and 14th, 1993. All soybean plants at the farm had senesced and died due to three freezes (ranging from -1 to - 2.3°C) that occurred from October 31 to November 7, 1993. However, on each sample date we observed many VBC moths feeding on the ergot-infested spikes of Dallis grass, *Paspalum dilatatum* Poiretat, which had not totally senesced (Fig. 1). On November 8th over 60 moths were observed in the fields.

Sampling for VBC was conducted on November 8, 1993 (four weeks after larval introduction) and we found that many larvae had pupated in the vermiculite. A total of 126 pupae, 13 larvae/prepupae and 10 adults were recovered from the two cages. We returned the larvae and pupae to the laboratory and recorded 61 percent moth emergence over the next 12 days. This indicates that VBC larvae, pupae, and adults can survive freezing weather during October and November; however, the soybean host plant did not survive the freezing conditions.

Results of the study reported here indicate that timing of the first killing freeze for host plants may determine the limit of the VBC's temporal distribution. It is likely that VBC larvae die from starvation after host plants are killed. Results from a four year population ecology study on the wild legumes in Plaquemines Parish, the most southern parish in Louisiana, support this same conclusion. In this study VBC larvae were not collected after host plants were killed by freeze; however, the last month in which larvae were collected showed considerable variation among years: (January 1986-87 and 1987-88; February 1988-89; December 1989-90) (unpublished data S. J. Johnson, B. M. Gregory, Jr. and A. M. Hammond, Jr.). Also, it is not expected that many VBC moths could fly south after November because of the extremely short duration of prevailing winds in this direction with temperatures above flight threshold. Therefore, VBC populations present in Louisiana after November would likely not survive.

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#### SUMMARY

This note documents that the velvetbean caterpillar can survive freezing weather (-1 to - 2.3°C) in Louisiana. This finding suggests that the low lethal temperature limit for the VBC is lower than that for its host plants. Therefore, in Louisiana and

probably in areas near its overwintering boundary, availability of suitable host plants for VBC may be more important than cold temperature in limiting the ability of this insect to overwinter.

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Fig. 1 Velvetbean caterpillar moth feeding on honeydew from ergot-infected seed head of Dallis grass

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