RESPONSE OF NABIS ROSEIPENNIS [HETEROPTERA : NABIDAE] TO LARVAE OF MEXICAN BEAN BEETLE, EPILACHNA VARIVESTIS [COL. : COCCINELLIDAE]

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Laboratory studies were done to measure predation by adult damsels bugs, Nabis roseipennis Reuter [Heteroptera : Nabidae], on 3rd instar larvae of Mexican bean beetle (MBB), Epilachna varivestis Mulsant [Coleoptera : Coccinellidae], and to measure longevity and body weight of the nabids. In the 1st experiment, field-collected nabids were isolated for 24 h in 9 cm Petri dishes with lima bean foliage (Phaseolus lunatus L.) and were assigned to one of 3 prey treatments: either 4 3rd-instar MBB larvae, 4 3rd-instar larvae of boll weevil (BW), Anthonomus grandis Boheman [Coleoptera : Curculionidae], or 2 larvae of each species. No MBB larvae were attacked in either the MBB treatment or 2-species treatment. In contrast, BW larvae were attacked in both BW and 2-species treatments. Significantly more BW larvae were attacked in the BW treatment than in the 2-species treatment, and both were greater than the number of MBB larvae attacked. Nabids that did not attack prey lost weight during the 24 h, whereas those that attacked prey gained weight. In the 2nd experiment, nabids that had attacked prey were isolated with lima foliage, and nabids that had not attacked prey were kept with MBB and lima foliage until an attack or death. In no instances were MBB attacked. Longevity and the pattern of weight loss did not differ between nabids that did or did not attack prey. We discuss possible reasons for the failure of N. roseipennis to attack MBB larvae, as well as the implications for using nabids to influence pest populations in the field.

KEY-WORDS: Nabis roseipennis, Nabidae, Epilachna varivestis, Mexican bean beetle, generalist predators, predation.

Damsel bugs (Heteroptera : Nabidae) are generalist predators found in both natural and agricultural ecosystems. Nabids are among the most abundant foliage-inhabiting predators associated with crops such as cotton (Bell & Whitcomb, 1964; Dinkins et al., 1970), soybeans (Barry, 1973; Shepard et al., 1974; McCarty et al., 1980), and alfalfa (Pimentel & Wheeler, 1973; Benedict & Cothran, 1975; Wheeler, 1977). Nabids, like other generalist predators in crops, may serve as ecological buffers by limiting or delaying the population growth of potential pests (Rabb et al., 1984). Because of the potential importance of generalist predators to pest dynamics, it is necessary to incorporate the benefits of these indigenous natural enemies when developing pest management strategies.

In Indiana soybeans and alfalfa, 3 species of Nabis are encountered frequently: N. roseipennis Reuter, N. americoferus (Carayon), and N. rufusculus Reuter (O’Neil, unpubl.)
data). Of these species, *N. roseipennis* is the largest and often the most numerous. This species has been evaluated in field studies for its potential as a predator against many soybean pests, where it has been shown to attack noctuid larvae (Reed et al., 1984), eggs of *Anticarsia gemmatalis* Hubner (Buschman et al., 1977), both eggs and larvae of *Plathypena scabra* (F.) (Braman & Yeargan, 1989), eggs of *Pseudoplusia includens* (Walker) (Richman et al., 1980), and eggs and the first 3 larval instars of Mexican bean beetle (MBB), *Epilachna varivestis* Mulsant (Waddill & Shepard, 1974). In laboratory studies, *N. roseipennis* has been shown to attack *Heliothis zea* (Boddie) larvae (Donahoe & Pitre, 1977), *H. virescens* (F.) larvae (Nadgauda & Pitre, 1978), both eggs and larvae of *P. scabra* (Sloderbeck & Yeargan, 1983), and adults and nymphs of *Empoasca fabae* Harris (Rensner et al., 1983). In addition, *N. roseipennis* in the laboratory has been reported to attack eggs and the first 3 larval instars of *E. varivestis* (Waddill & Shepard, 1974). However, the acceptability of the ultimate (4th) larval instar has not been tested.

Since *N. roseipennis* is potentially an important predator of soybean pests, and MBB occasionally reaches pest status in Indiana soybeans, we designed studies to use the 2 species as a model system to understand how generalist predators search for prey in soybeans (e.g. O'Neil, 1988). However, in a preliminary laboratory study, we found that *N. roseipennis* failed to attack 3rd-instar MBB larvae (Wiedenmann & O'Neil, unpublished data), in contrast to the findings of previous workers (Waddill & Shepard, 1974). Because of this discrepancy, we designed 2 laboratory studies to examine the predator-prey relationship between the 2 species. The objectives of the 1st study were to document whether *N. roseipennis* would attack 3rd-instar MBB larvae and to identify predator behavior associated with attacks. The objectives of the 2nd study were to determine how feeding on prey affected predator longevity and body weight. Here we report the results of our laboratory studies, offer an hypothesis to explain the observed level of predation on MBB larvae, and relate the findings to the role played by generalist predators in agricultural crops.

**METHODS**

**PREDATION EXPERIMENT**

Adult *Nabis roseipennis* were collected from an alfalfa field near West Lafayette, IN, during September and October 1987. Within 1 hour of collection, nabids were brought into the laboratory, sexed, weighed, and isolated in 9 cm diameter Petri plates containing a lima bean leaf (*Phaseolus lunatus* L.). Experiments were conducted in the laboratory under a 14:10 L:D photoperiod at ambient room temperature (about 23 °C). We used a total of 60 nabids: 47 ♀♂ (mean weight 8.28 mg, S.E. = 0.17) and 13 ♀ (mean weight 11.36 mg, S.E. = 0.33) for the experiments. Nabids were assigned randomly to one of three 24 h feeding treatments: either four 3rd-instar MBB larvae (MBB), four 3rd-instar larvae of boll weevil (BW), *Anthonomus grandis* Boheman (Coleoptera: Curculionidae), or 2 of each species. Boll weevil larvae were used as prey since prior laboratory culture of *N. roseipennis* had shown that boll weevils were attacked readily (pers. obs.). Each treatment was replicated 20 times. Because we used newly collected predators for each 24 h experiment, replication of each treatment occurred over a 2 month period. Predators were watched for the 1st hour they were isolated with prey, in order to document any characteristic attack behaviors, e.g., approach, probing, and attack posture. If no attack occurred, observations concerning predator and/or prey avoidance were made. Prey that were attacked were not replaced during the 24 h experiment. Attacked prey were identified as dead individuals.