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The Bagrada Bug (Hemiptera: Pentatomidae): A New Invasive Pest of Cole Crops in Arizona and California

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A new pest of cole crops, the Bagrada bug [*Bagrada hilaris* (Burmeister)], was recently found infesting commercial *Brassica* crops throughout the southwestern desert growing areas of Arizona and California. In September of 2009, vegetable growers reported finding small (5-7 mm long, 3-4 mm wide) stink bugs (Fig. 1) that resembled harlequin bugs (*Murgantia histrionica*) damaging emerging seedling and newly transplanted cole crops. By October, reports of the new stink bug damaging crops were widespread throughout Yuma, AZ, and the Imperial, Coachella, and Palo Verde Valleys of California. Adult specimens were collected and submitted to the California Department of Food and Agriculture where they were identified as *B. hilaris*. The Bagrada bug was first reported in the United States in Los Angeles Co., CA, in June 2008 (1). The bug is considered Old World in origin where it is a major pest of cruciferous crops in Africa, Italy, Iran, Iraq, Pakistan, and India, and Sri Lanka (2).



Fig. 1. Adult Bagrada bugs (5 to 7 mm long, 3 to 4 mm wide); female is larger (right), male is noticeably smaller (left).

Based on our observations in Arizona and southern California during 2009, Bagrada bug adults and nymphs were found damaging direct-seeded and transplanted broccoflower, broccoli, cabbage, cauliflower, Chinese cabbage, kale, radish, rutabaga, collards, arugula, turnip, and mustard. Adult bugs were also reported on lettuce, spinach, cantaloupes, sugarbeet, and watermelons, but no damage was observed. In addition to *Brassica* plant species, bagrada bugs are known to attack potato, maize, sorghum, cotton, capers, some legumes, and several weed species (2,4).

Seedling (cotyledon stage) and young transplanted cole crops appear to be very susceptible to the piecing-sucking feeding damage of the Bagrada bug. Adults were observed feeding predominantly on cotyledons, newly emerged leaves and the apical meristems. In many cases, this feeding caused small puncture marks that were visible as white patches starting on the edges of leaves as the leaves expanded (Fig. 2). We observed that adults and nymphs remove plant assimilates from newly emerging leaves, causing the small plants to wilt and desiccate. In addition, the apical meristem was often killed or severely

damaged causing a loss of apical dominance, resulting in adventitious bud break; this results in spindly plants with multiple head development.



Fig. 2. Symptoms of Bagrada bug feeding damage on young cauliflower leaf.

Observations in commercial organic fields and untreated experimental plots showed that heavy infestations (2 to 4 bugs per m²) on *Brassica* seedlings often resulted in stunted plant growth with portions of leaves later becoming bleached or chlorotic. Feeding on small plants also resulted in the death of the apical meristem. In green cabbage, it was readily evident that damaged plants often did not produce heads (“blind heads”), or produced multiple unmarketable heads instead of a single large head (Fig. 3). Local growers estimated that in some fields Bagrada bugs caused as much as 35% yield loss in green cabbage and greater than 35% yield loss in early transplanted red cabbage due to multiple head formation. In cauliflower, damaged plants often did not produce heads (“blind heads”), where anecdotal estimates of yield loss by Bagrada bug have been as high as 20%. In broccoli, damage estimates by growers have ranged from 15 to 30% losses due to delayed harvest as a result of multiple crowns on plants (Fig. 4). Heavy infestations on organically grown diakon radish and turnip have persisted through the winter months causing damage to these crops in January and February 2010.



Fig. 3. Feeding damage from Bagrada bugs during early plant growth caused the plant to produce four heads on green cabbage.



Fig. 4. Feeding damage from Bagrada bugs during early plant growth caused this broccoli plant to produce six additional crowns.

To examine the damage potential of adult Bagrada bugs on seedling cauliflower plants a preliminary lab study was conducted at the Yuma Agricultural Center in Yuma, AZ. Field collected adults (n = 9) were placed, one per plant, on “Minuteman” cauliflower transplants that were grown individually in small, caged pots. A corresponding group of plants (n = 9) were caged without adult bugs. Caged plants were held at a constant temperature (30°C) and humidity (35%). Damage was estimated by recording the number of plants that had the terminal leaf either wilted or desiccated at 2, 3, and 6 days following infestation. Adults feeding for 3 days caused the terminal leaves to

wilt on 88% of the infested plants, and after 6 days of adult infestation, nearly 80% of the terminals were considered desiccated and dead. Wilted or dead terminals were not observed in the non-infested plants.

Experience with control of Bagrada bug on seedling cabbage plants in Africa suggest that insecticides should be applied when an action threshold of 1 bug/m² is exceeded (3). Preliminary efficacy trials conducted by both authors have shown that contact insecticides (pyrethroids, methomyl, chlorpyrifos) can effectively prevent feeding damage on cole crops (*unpublished data*). Anecdotal reports from organic growers suggest that biopesticides (pyrethrins and azadirachtin) approved for use in organic production have not provided adequate protection.

Given the widespread occurrence of the Bagrada bug throughout the desert southwest in 2009, and the numerous plant hosts found year long within these cropping systems, we anticipate that this pest will become permanently established. Development of information on the Bagrada bug's biology and ecology on our local crops will be important for developing pest management recommendations. Although this pest can be effectively controlled with conventional insecticides, infestations may require additional insecticide applications with broad-spectrum materials that might otherwise not be needed. Furthermore, the lack of effective biopesticide alternatives could threaten production of organic cole crops in the future.

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