

Managing Bagrada Bug on Organic Cole Crops: Community Forum Summary

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Guest Speakers

Andrew Brait, Full Belly Farm, Guinda, CA

Paul Underhill, Terra Firma Farm, Winters, CA

Bagrada bug is an emerging invasive stink bug pest in California, which preferentially feeds on plants in the mustard family (i.e. broccoli, kale, cauliflower, cabbage). It is a sucking insect and can cause severe yield losses, especially when it attacks young plants. On January 12, 2021 UCCE hosted a forum for Yolo, Sacramento, and Solano county organic growers to discuss their experiences with fighting bagrada bug. Paul Underhill and Andrew Brait led the discussion.

Observations made

- **Cold weather** Freezing or near freezing temperatures are associated with the 'end' of bagrada bug season. This occurred sometime in November on both farms. Likely, eggs are not surviving in the soil over winter but rather adults are finding protective cover under tree bark, around buildings and other niches.
- **Crop Selectivity** Growers and researchers agreed that bagrada bugs prefer green plants over those with red, purple or other hues. Eventually, however, they will feed on all.
- **Crop Damage** For 'heading' crops (broccoli, cauliflower, cabbage) damage to the meristem resulted in 'blinds' or small, deformed heads. For leafy greens, especially kale, cosmetic damage to leaves was severe and resulted in non-marketable or few marketable leaves.
- **Damage Zones** The edge-effect—highest damage on field edges where bagrada is migrating into the field, was typical. However, hot spots or 'islands' were consistently observed whereby a bagrada had presumably flown and established a population not adjacent to a field edge.

Bagrada bug nymphs and adults.



- **Planting timing** was important. Bagradas are most active in warm to hot weather (>80°F). Insect populations fluctuated with the weather, and the worst damage was done when high insect populations—often associated with a warm spells-- coincided with a recent fall planting. Spring bagrada bug pressure has not been reported locally. Early brassica plantings may require transplants and/or be delayed until cooler weather.
- **Production stunting and delay** In fields with bagrada bug infestations, plants that appeared to be healthy, were stunted (3/4 size) and matured later and at variable rates. This caused harvesting inefficiencies.

Management options discussed

- **Biological Control** In addition to parasitoids described more in 'areas for future research', collembola and ants were observed by researchers as predators of bagrada bug eggs in the soil.
- **Flaming** While flaming may torch those that come in direct contact with the heat, the soil will likely protect both the eggs and additional insects.
- **Managing weed hosts** may be useful. Andrew noted a big population buildup on weeds in the mustard family in the nearby riparian zone. While this is highly recommended from research, it's very difficult to accomplish at the farm scale.
- **Row covers** may be effective protection in a field with no history of bagrada, but only if the edges are well buried. If they are not, bagrada can easily burrow under. Row covers will not protect plants if bagrada eggs are already present in the soil.
- **Sprays** were ineffective. Bagradas lay eggs and live part of their lives in the soil, so contact insecticides including AzaGuard, PyGanic, Entrust and PureCrop1 were not able to control populations even sprayed at high frequency (every 4-7 or every 14 days) and with good plant coverage. One issue is that bagradas feed during the daytime, meaning that sprays which aim to catch them on the plant and feeding must be done during hot weather for young fall-planted crops. This leads to issues with daytime wind, and both photodegradation and evaporation associated with mid-day conditions.
- **Transplants vs Direct Seeding** The damage was especially severe for direct seeded crops, where bagrada attacks could kill young seedlings. Transplants were often essential to getting a crop.
- **Trap crops** Growers reported both positive and negative experiences. The choice of trap crop (for example, turnip, which provides stronger physical support for the bugs than something like alyssum), how the insects are destroyed, and the time of day at which it is done contribute to the success or failure of a trap crop. Flaming and vacuuming cannot reach eggs or individuals that are sheltering in the soil. Bagradas feeding on plants have been observed to drop into the soil when a gas-powered vacuum is approaching. Quieter methods like electric vacuums or chickens were suggested.
- **Vacuuming** Several growers experimented with vacuums but felt it was insufficient. Bugs hear the vacuum coming and fly away

Areas for future research

- **Degree-day models** Since bagrada cycles appear to be dependent on the weather, Paul Underhill suggests that developing a degree day model for this pest could help growers avoid risky transplanting windows.
- **What is happening during the 'off years'?** In Yolo County and other areas, there are years when bagrada bug has been bad and years with it is absent. The reason for this is unclear.
- **Chicken Rotations** Could chickens provide insect control or disrupt bagrada eggs in the soil? Potential scenarios: 1) Following an infestation, chickens could feed on remaining bagradas, bringing down the overwintering population; 2) prior to planting, chickens could move through a field disrupting existing eggs/adults; 3) chickens could tend weedy edges to prevent movement from field edges into production fields.
- **Soil drench** Paul speculates that if a soil drench product were available, adding it with the transplant water might be useful for controlling eggs and instars in the soil.
- **Biological controls** As a new invasive pest, bagrada in California is currently not controlled by natural enemies. A promising line of research is to prospect for biocontrol organisms in its native area and elsewhere. Recently, CDFA/USDA researchers made the exciting finding that a co-evolved parasitoid which searches and attacks bagrada eggs in the soil is present in California. Current research includes mapping the range of this parasitoid and pursuing population rearing and release.

Conclusions Bagrada management is an ongoing issue for California organic vegetable growers, which needs to be approached from several angles. Biological control with parasitoids present the most exciting and hopeful area of management.

Would you like more information, or do you have experience to share? Contact UCCE Capitol Corridor Small Farms Advisor Margaret Lloyd at 530-564-8642, mglloyd@ucanr.edu

For more resources, visit:

http://ccsmallfarms.ucanr.edu/General_Production/Pests/

<https://ucanr.edu/sites/SFA/files/295409.pdf>

<https://www2.ipm.ucanr.edu/Invasive-and-Exotic-Pests/Bagrada-bug/>