



# Bagrada Bug News

Issue 1 • March 1, 2016

## Welcome to the Bagrada Bug News!

By Jane Sooby, CCOF

The *Bagrada Bug News* is a service of the Bagrada Bug Working Group, a multi stakeholder collaboration that CCOF and CDFA initiated in 2015 to explore options for organic producers experiencing crop loss due to this invasive pest.

Bagrada bug is an invasive stink bug that has a taste for plants in the mustard family; however, it does not restrict its feeding to these crops. Much information about this pest is lacking, including the scope and degree of the damage it has caused. Based on anecdotal reports, crop losses in California could range in the hundreds of thousands to millions of dollars. In some parts of southern California, mustard crops can no longer be grown at certain times of the year.

While the Working Group focuses on organic management and biocontrol of bagrada bug, it is open to all participants.

Since the Working Group started, scientists from many agencies have joined. Developing strategies for non-chemical control of bagrada bug seems to be a passion for many of them.

What started as a California-specific effort quickly expanded into an international group, thanks largely to the participation of Dr. Walker Jones from the USDA-ARS, Biological Control

of Pests Research lab in Stoneville, Mississippi. This year marks the third year that Dr. Jones has worked toward biocontrol of bagrada bug. He is connected with an international team that has traveled to Pakistan and South Africa seeking natural enemies of the pest.

***Based on anecdotal reports, crop losses in California could range in the hundreds of thousands to millions of dollars.***

The purpose of *Bagrada Bug News* is two-fold: to publish useful guidance for organic and other producers in managing bagrada bug infestations, and to serve as a resource for scientists worldwide working to manage this pest.

Feel free to contact us with any comments, suggestions, or articles.

Jane Sooby, editor, [jsooby@ccof.org](mailto:jsooby@ccof.org)

## Bagrada Bug, Painted Bug, *Bagrada hilaris*: A Wide-Ranging Pest of Brassicas

By Thomas M. Perring and Darcy Reed

Department of Entomology, University of California, Riverside

The painted bug was first detected in the United States in June 2008, at the port of Los Angeles. With a geographic

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## Slides from Bagrada Bug Meeting Available Online

The Bagrada Bug Working Group held a meeting Dec. 11, 2015, in Salinas, CA. Co-organizer David Pegos with CDFA's Plant Health and Pest Prevention Services spearheaded the web broadcast, supported by Colleen Murphy. View presentations by clicking on this link: <https://www.cdfa.ca.gov/plant/presentations/bagrada/>

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origin in Africa and the Middle East, it has quickly spread throughout California and into Arizona, New Mexico, Nevada, west Texas, and northern Mexico.

Climate matching models and host plant distributions predict its spread in North America from southern Mexico through the Pacific Northwest, and eastward through Texas and southern Oklahoma and most of Florida.

The painted bug is unique among stink bugs in that it lays its eggs singly in the soil or on plants, which makes it more difficult for egg parasitoids to find the eggs. There are 5 nymphal instars that mature from egg to adult in as little as 16 days at the optimal temperature of 95°F. At this temperature, the average generation time is 17 days. A warm weather insect, they are most active during the warm parts of the day, when the temperature is above 80°F. They have a single population peak in urban southern California that peaks in September, and a bimodal distribution in the desert agricultural regions of California and Arizona with peaks in April and October timed with the presence of cole crops (broccoli, cauliflower, cabbage, Brussels sprouts, and leafy brassicas).

In addition to brassicas, painted bug will utilize a wide range of plants including cheeseweed, groundsel, India mustard, sunflower, Bermuda grass, corn, cotton, cowpea, Sudan grass, and watermelon. The feeding is easily recognized by the star-shaped feeding patterns on the plant leaves. These insects have a tremendous ability to find brassicas, and the most damage is done when they feed on plants that just emerge from the ground. This feeding kills the seedling. Plants that survive continue to grow and many produced forked heads, or no head at all (“blind” plants).

Research has focused on developing a lure to attract painted bugs for monitoring, and this has been difficult.

There do not appear to be any insect pheromones that work, and the best attractant so far has been sweet alyssum leaves or mustard seed meal. However, these attractants do not produce consistent results throughout the year.

## Prospects for Biological Control of *Bagrada hilaris*

By Walker Jones<sup>1</sup> and Thomas M. Perring<sup>2</sup>

<sup>1</sup>ARS-USDA National Biological Control Laboratory, Stoneville, MS; <sup>2</sup>Dept. Entomology, University of California, Riverside, CA

There are a number of natural enemies that will feed on the painted bug (=bagrada bug). Generalist predators include assassin bugs, solitary wasps, ants, preying mantids, spider, and vertebrates (lizards and birds). These generalists don't have much of an impact on the population. More effective are parasitoids that attack the painted bug eggs.

Research has shown that one of our native parasitoids will parasitize *B. hilaris* but not in the soil where eggs are laid. Two species from Europe, *Trissolcus* sp. and *Ooencyrtus telenomicida*, were also able to parasitize eggs in the lab but not in the soil. Three additional parasitoids, *Trissolcus* sp., *Ooencyrtus* sp. and *Gryon* sp., were collected in Pakistan from *B. hilaris* eggs and these were brought into quarantine in Mississippi. While waiting on permits to bring the insects to the quarantine facility at UC Riverside, colonies of two of these species died. Consequently, we currently have only the *Ooencyrtus* species in Riverside, and we are beginning to conduct host range studies with this species.

At the same time, we suspect there are a number of other parasitoid species across the native range of the bagrada

bug in the Old World. We are collaborating with the USDA-ARS European Biological Control Laboratory in France, CABI South Asia Station in Pakistan, and the Agricultural Research Council in South Africa to collect and import parasitoids for biological control in the US.

## Bagrada Bug Moves into Central and Northern California

By Larry Godfrey<sup>1</sup>, Shimat Joseph<sup>2</sup>, Jhalendra Rijal<sup>3</sup>, Surendra Dara<sup>4</sup>, Richard Smith<sup>2</sup>, and Ian Grettenberger<sup>1</sup>

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The bagrada bug was first found in California in 2008 and over the next few years adapted to the southern California/Arizona desert vegetable production system. Significant pest management concerns developed for this pest in Brassica crops, which are the favored hosts for bagrada bug. IPM programs based on well-designed research were put in place and losses to growers were largely mitigated.

This pest expanded its range northward and over the last 3-4 years has infested central and northern California. Vegetable production in the coastal production areas has been greatly impacted and the infestation has progressed as far north as Butte County in the Sacramento Valley. We started a project in Fall/Winter, 2014, funded by (continued)

the Specialty Crop Block Grant program, to research and develop IPM programs for this pest in the Central Coast, particularly Salinas Valley, vegetable system. Specific objectives were 1.) to investigate bagrada bug biology in the Salinas Valley, 2.) to study the infestation and damage severity of bagrada bug on key crops, and 3.) to design management programs for bagrada bug on key Salinas Valley crops. This project was designed to build upon the significant research that had been conducted in southern California and Arizona, but the substantial differences in environmental conditions, cropping patterns, crop diversity, crop growth cycles, growing seasons, etc. dictated that adaptive research needed to be conducted.

During the winter and spring 2015, bagrada bug overwintering populations on key weed species--pepperweed and shortpod mustard--and early-season population development were monitored. In the summer, bagrada bugs were placed on emerging broccoli seedlings within cages in field plots. Various densities and timings of infestation were studied. Plant response, i.e., injury sites, plant mortality, growth, development, etc. were recorded. Finally, studies were conducted on perimeter trap crops for bagrada bug management in organic broccoli. Alyssum (either treated with organic insecticides, vacuumed or natural) and turnip (natural) were investigated as potential trap crops.

Similar studies are being conducted in the winter 2016 and planned for the 2016 summer and fall periods.

## ARS-Albany Bagrada Bug Team In Place

By Paul Pratt, USDA/ARS/WRRC

The USDA Agricultural Research Service's Western Regional Research Center in Albany, California, has pulled

together a group of scientists to work on biocontrol methods for managing bagrada bug in the coming year. Paul Pratt, Research Leader of the Exotic and Invasive Weeds Research Unit, announced that a new research entomologist, Dr. Brian Hogg, has been hired to lead the unit's research on developing biological control options for bagrada bug. Dr. Hogg has over 12 years' experience working in the field and will spend much of his time coordinating risk assessments of biological control agents of bagrada bug. Dr. Keith Stokes has also joined the USDA team in Albany as a postdoc researcher, and technician Adam Pepi has also been assigned to work on the project.

## Bagrada Bug Proposal Moves Forward

By Charlie Pickett, CDFA

CDFA, University of California-Riverside, UC Cooperative Extension, and USDA-Agricultural Research Service entomologists collaborated on a successful pre-proposal submitted to the California Specialty Crop Block Grant Program. A full proposal will be submitted later this month.

Investigators will find out in the fall whether their proposal was selected for funding. Here is the abstract of the proposal:

The bagrada bug is an invasive insect that has become a serious pest in cole crops throughout California. The purpose of this project is to provide a sustainable pest management strategy for suppressing this pest in this state.

First reported in 2008, the bagrada bug has spread throughout agricultural areas of Imperial and Riverside Counties, up through the Central Valley, and along the coast from San Diego to Monterey Bay. Currently the only means for controlling this pest is conventional pesticides. This leaves organic producers of cole crops at risk since there are no

effective organically registered control measures.

A long term, self-sustaining solution is the introduction of parasitoids specialized in feeding on this pest. This proposal will evaluate a novel parasitoid for host specificity, determine if any resident natural enemies are attacking bagrada bug, and request field release permits from the appropriate authorities. The ultimate goal is the release of the new parasitoid.

## Bagrada Bug Exploration Continues Abroad

By Paul Pratt and Link Smith, USDA-ARS

Dr. René Sforza of the USDA's European Biological Control Laboratory (EBCL) is, as of the writing, surveying for natural enemies of bagrada bug in South Africa. See photos on page 4 of this newsletter.

EBCL has established a colony of bagrada bug from Tom Perring's lab in anticipation of receiving egg parasitoids from foreign cooperators. EBCL plans to send prospective agents as soon as they are available to cooperating labs in the US for host specificity testing.

Marie-Claude Bon (USDA-ARS-EBCL) is planning to conduct DNA analysis of specimens of bagrada bug from cooperators to confirm that the target in the US is one species and to compare it to foreign populations.

## In the Literature

A Note relevant to bagrada bug biocontrol was published in *the Journal of Entomological Science*: Mahmood, R., W. A. Jones, B. E. Bajwa, and K. Rashid. 2015. Egg Parasitoids from Pakistan as Possible Classical Biological Control Agents of the Invasive Pest *Bagrada*

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*hilaris* (Heteroptera: Pentatomidae).  
Journal of Entomological Science 50 (2):  
147-149. Contact *Bagrada Bug News*  
editor Jane Sooby for a reprint.

## Bagrada Bug Found in Hawai'i

By Randall T. Hamasaki, UHM  
College of Tropical Agriculture  
and Human Resources, Kamuela  
Extension Office

The bagrada bug was first discovered on the Island of Maui in late 2014. It was discovered on the Island of Hawaii in May 2015. Once it becomes established on-island, this insect seems to be dispersing fairly rapidly. On the Island of Hawaii, the bagrada bug seems to prefer weed hosts (like *Cleome gynandra* and *Brassica nigra*) than crops but this could change rapidly.

## Bagrada images from South Africa



Photo by René FH Sforza

Showing South African farmers how to recognize bagrada bug in a cabbage field from a smartphone picture.



*Bagrada hilaris* on organic  
Raphanus sp. in South Africa.  
Photo by René FH Sforza

## About the Bagrada Bug News

Numerous agencies are cooperating in the effort to discover effective organic management and biocontrol of bagrada bug.

Please refer any questions about this newsletter to editor Jane Sooby, [jsooby@ccof.org](mailto:jsooby@ccof.org). Design by Sarah Watters, CCOF

