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***<http://www.npdn.org>***

# Bagrada Bug

*Bagrada hilaris* (Burmeister 1835)



Family: Pentatomidae  
(Stink bugs)

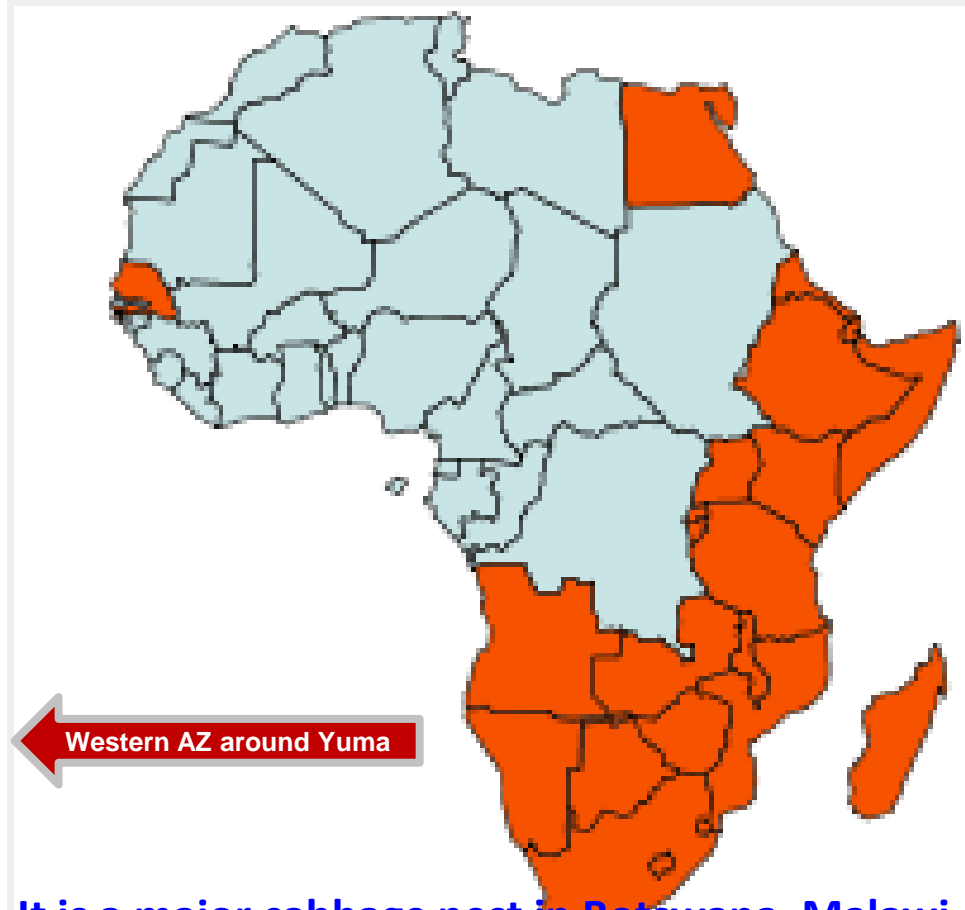
Order: Hemiptera  
(true bugs)

Common names: bagrada bug, painted  
bug, painted stink bug, African stink  
bug

# Bagrada Bug Distribution and Spread



## Distribution in Africa



It is a major cabbage pest in Botswana, Malawi, Zambia and Zimbabwe.

First found in LA county in 2008

# Bagrada Bug Distribution and Spread

The global distribution of this pest also includes southern Asia in India, and southern Europe on Malta and Cyprus, and in Italy.



# The Bagrađa bug spreads



2011	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AZ			x	x	x	x	x	x	x	x	x	x
CA	x		x	x	x	x	x	x	x	x	x	x
NV					x		x				x	
NM					x							





Photo by Ettore Balocchi

# Bagrada Bug Host Range

**Crops:** Brassicaceae: arugula, broccoli, Brussels sprouts, cabbage, Chinese cabbage, cauliflower, collard greens, cress, horseradish, kale, mustard, radish, rapeseed (canola), rutabaga, turnips, wasabi, & watercress.

Ornamentals include candytuft, *Lunaria* (honesty) purple rock cress, stock, sweet alyssum, & the weeds London rocket, & shepherd's purse.

Other hosts are sorghum, Sudangrass, corn, cucurbits, potato, cotton, okra, pearl millet, sugar cane, wheat, and some legumes and those yet to be observed in the western hemisphere

# Bagrada Bug

Female

Male

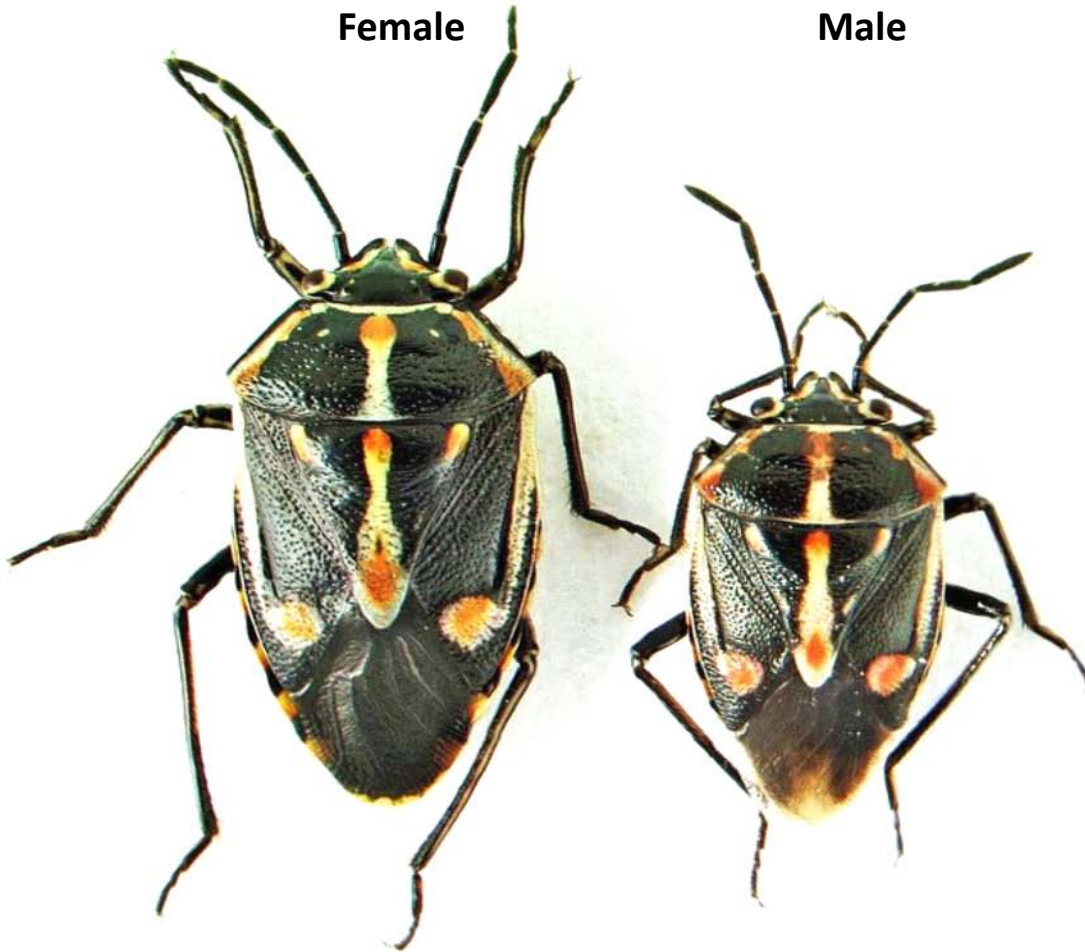


Photo by G. Arakelian

# Relative Size of the Bagrada Bug



Size comparison of Bagrada bugs and Convergent Lady Beetles

Photo courtesy of:

*What's That Bug?*



# Bagrada Bug Lifespan

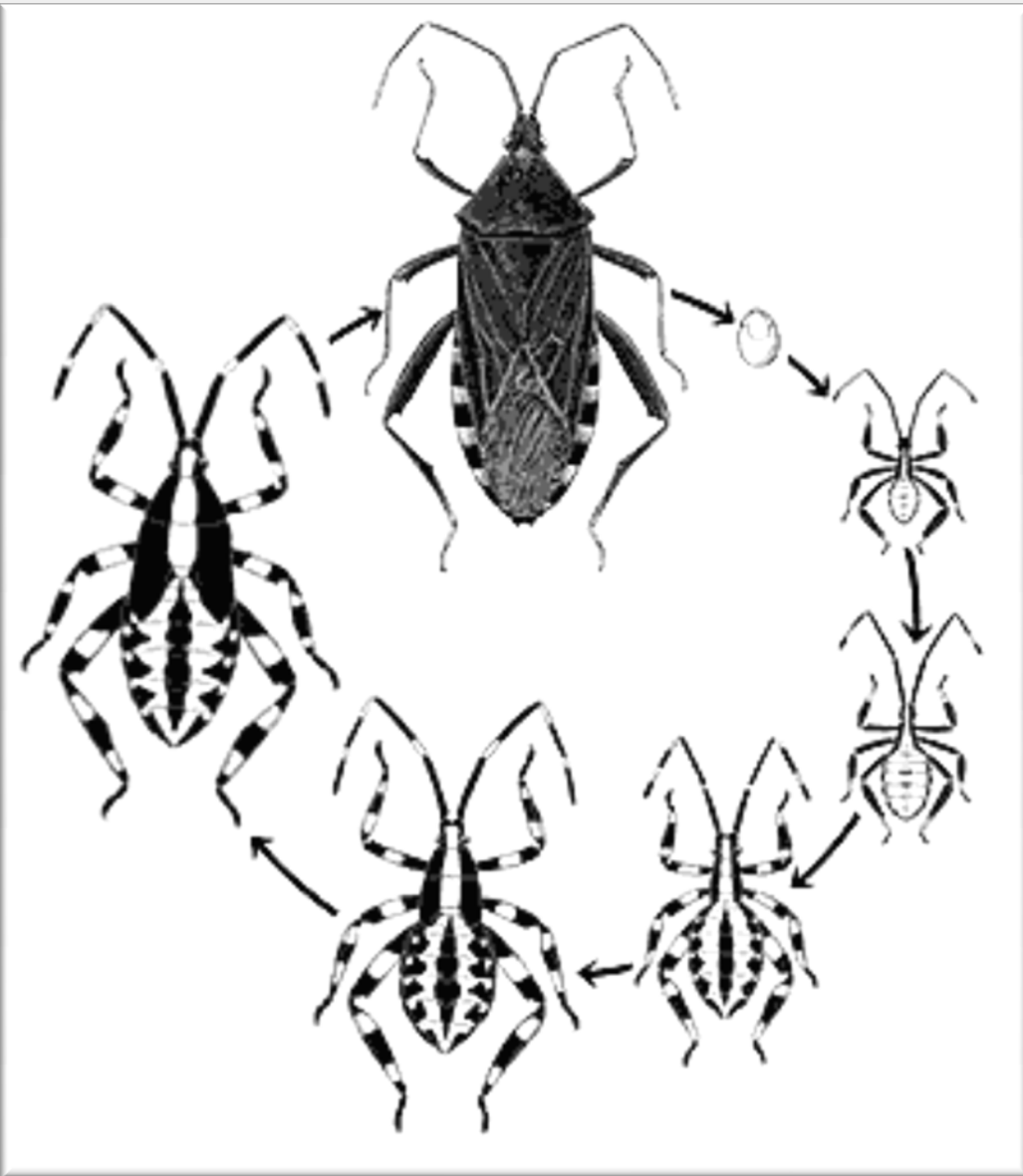
The bugs are often seen in characteristic mating pairs, moving around attached end-to-end. The adults lay 100 or more eggs on the foliage or soil. In about a week, these darken in color and hatch. There are five nymphal instars lasting 2-3 weeks, in which the developing wings become gradually bigger. There are several generations per year. The adult Bagrada bug lives about 5 – 8 weeks. A mature female can lay up to 100 eggs within two to three weeks.



# Hemiptera Life Cycle

## Incomplete Metamorphosis

1. Eggs
2. 6 -8 nymphal stages: moulting each time, and are wingless
3. Adult stage: winged & sexually mature



# Life stages of the Bagrada Bug

Adults are 5-7 mm ( ¼ inch) in length



Photos courtesy of F. Haas, icipe

Photo courtesy of Elliott Rusty Harold



# Nymphal stages of the Bagrada bug



Photos courtesy of Ron Hemberger



# Bagrada Bugs



**Bagrada bugs mating**



**Underside of the Bagrada bug**





# Bragrada bugs in San Pedro, California





# Look alike: The Harlequin Bug

## *Murgantia histrionica* (Hahn 1834)



Photos courtesy of Ron Hemberger



The Harlequin bug spread from Mexico into the southern US around the time of the Civil War. It also feeds on members of the Brassicaceae family.

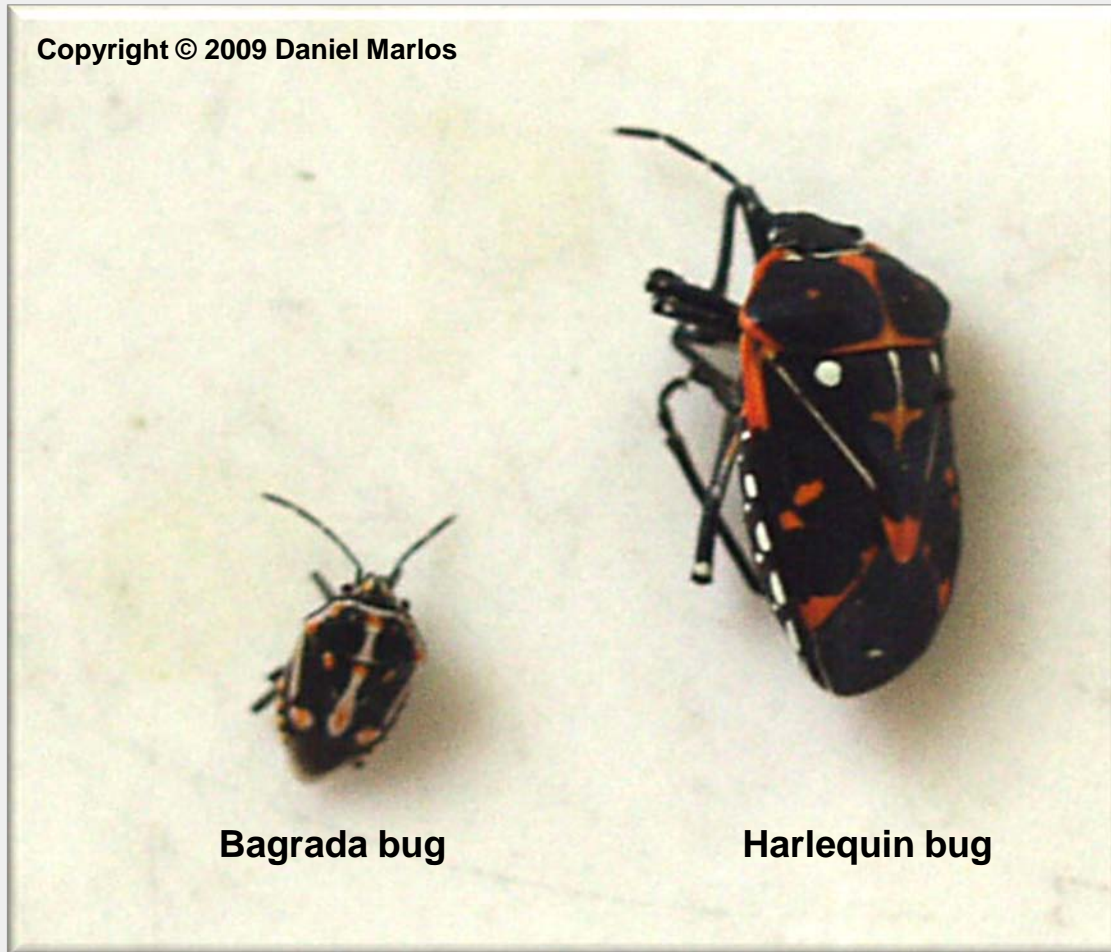
# The Harlequin Bug



The harlequin cabbage bug ,also known as calico bug, fire bug or harlequin bug, is a black stinkbug of the family Pentatomidae, brilliantly marked with red, orange and yellow. It is destructive to cabbage and related plants in tropical America as well as throughout most of North America, especially the warmer parts of the United States. In addition to cabbage it can be a major pest to crops such as broccoli, radishes and the ornamental flower cleome. Nymphs are active during the summer and in the South the bug can achieve three generations a year. In the North there is only one generation annually and the insects overwinter as adults.

© Smithsonian Institution, National Museum of Natural History, Department of Entomology

# Bagrada vs. Harlequin bug



Found in the neighborhood of Mount Washington near downtown Los Angeles, Los Angeles County, California, USA, July 26, 2009



# Bagrada bug populations

This is a quote from Ron Hemberger, an entomologist and nature photographer from Irvine, Orange County, CA

**“Peters Canyon is loaded with Bagrada bugs. I'd estimate that, after the honey bee, this was the most numerous insect I saw in my last two treks there. Mating pairs on the trail look and move much like a harvester carrying food. Nymphs on the trail appear to be small beetles. Dry brush is covered with bugs of all ages, and a few are found feasting on flowers, per this example”.**





# Bagrada Bug's Habitat



Damaged cotyledon

Photo from the Farm Press



Photo by Davefoc



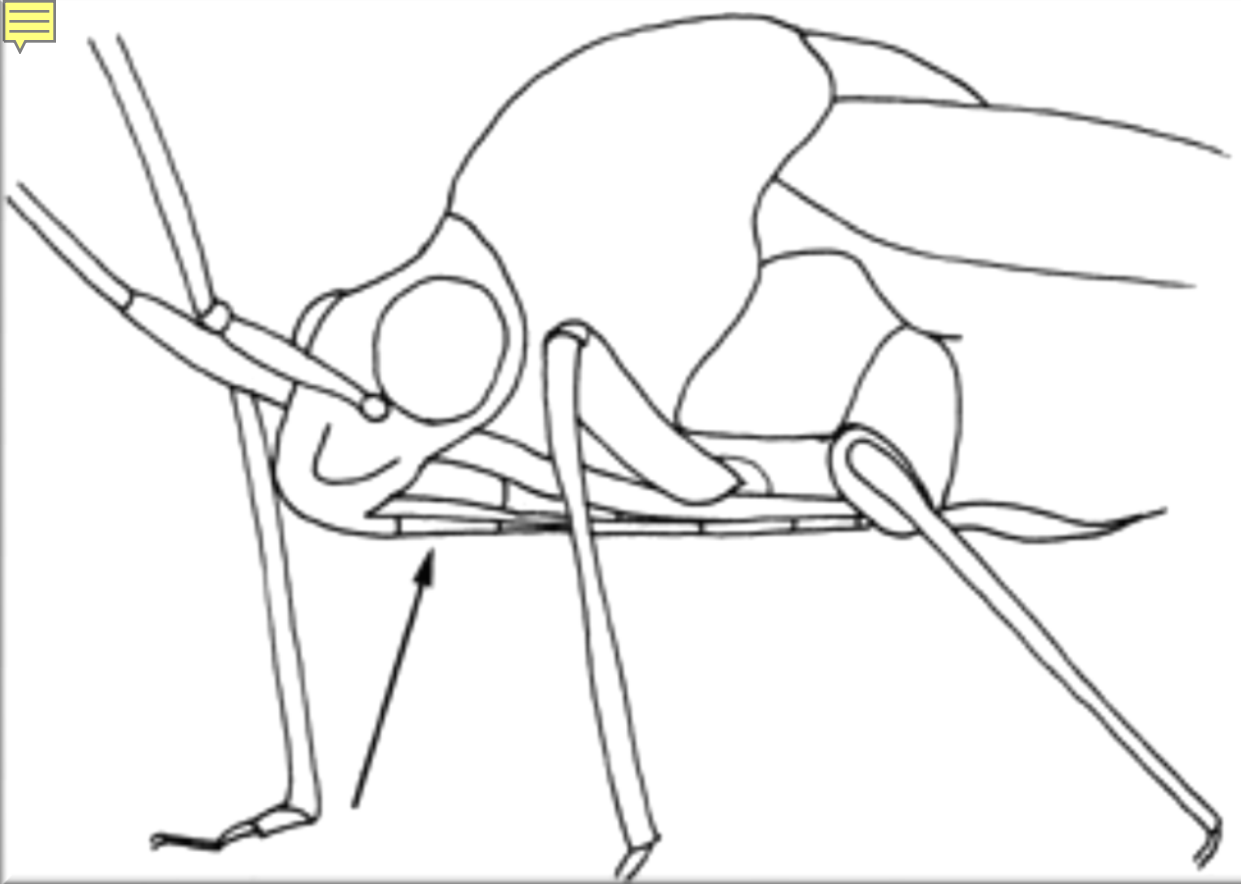
Photo from What's That Bug?

The Bagrada bug can live and hide in the soil, esp. in soils high in clay that crack. They are most active in the warmer part of the day. Eggs are oval, creamy-white and turn orange as they age. Females lay them in the soil beneath host plants, but may also oviposit on the leaves.

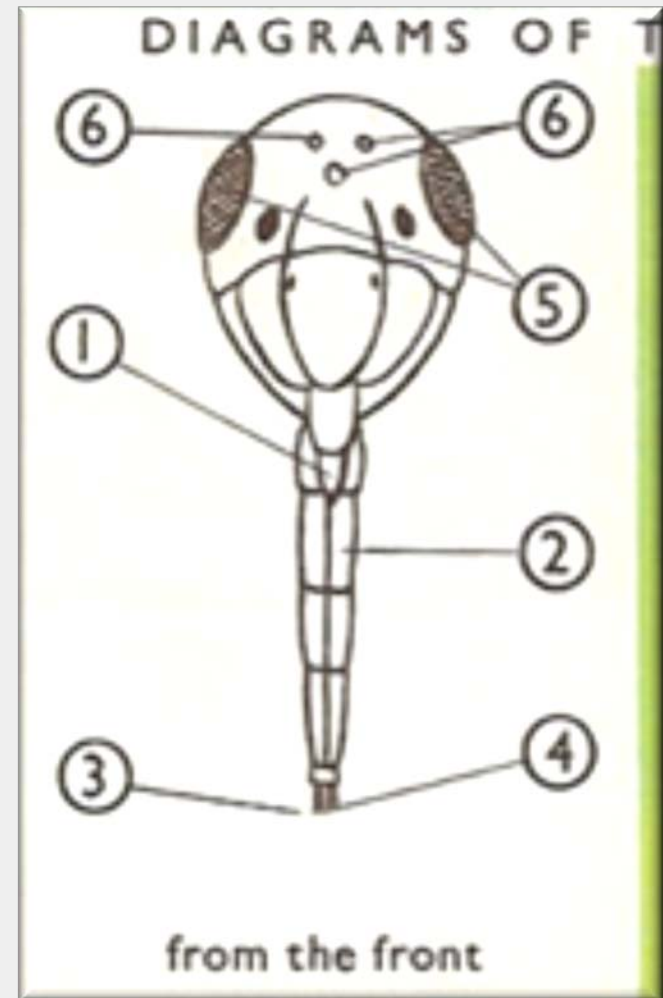


# Bagrada Bug CDFA Rating “B”

**"An organism of known economic or environmental detriment, and if it is present in California, it is of limited distribution. If found in the state, they are subject of state endorsed holding action and eradication only to provide for containment, as when found in a nursery. At a discretion of the individual county agricultural commissioner they are subject to eradication, containment, suppression, control, or other holding action". In plant nurseries the owner is required to eradicate the population.**



# The Mouthparts of the Bagrada Bug



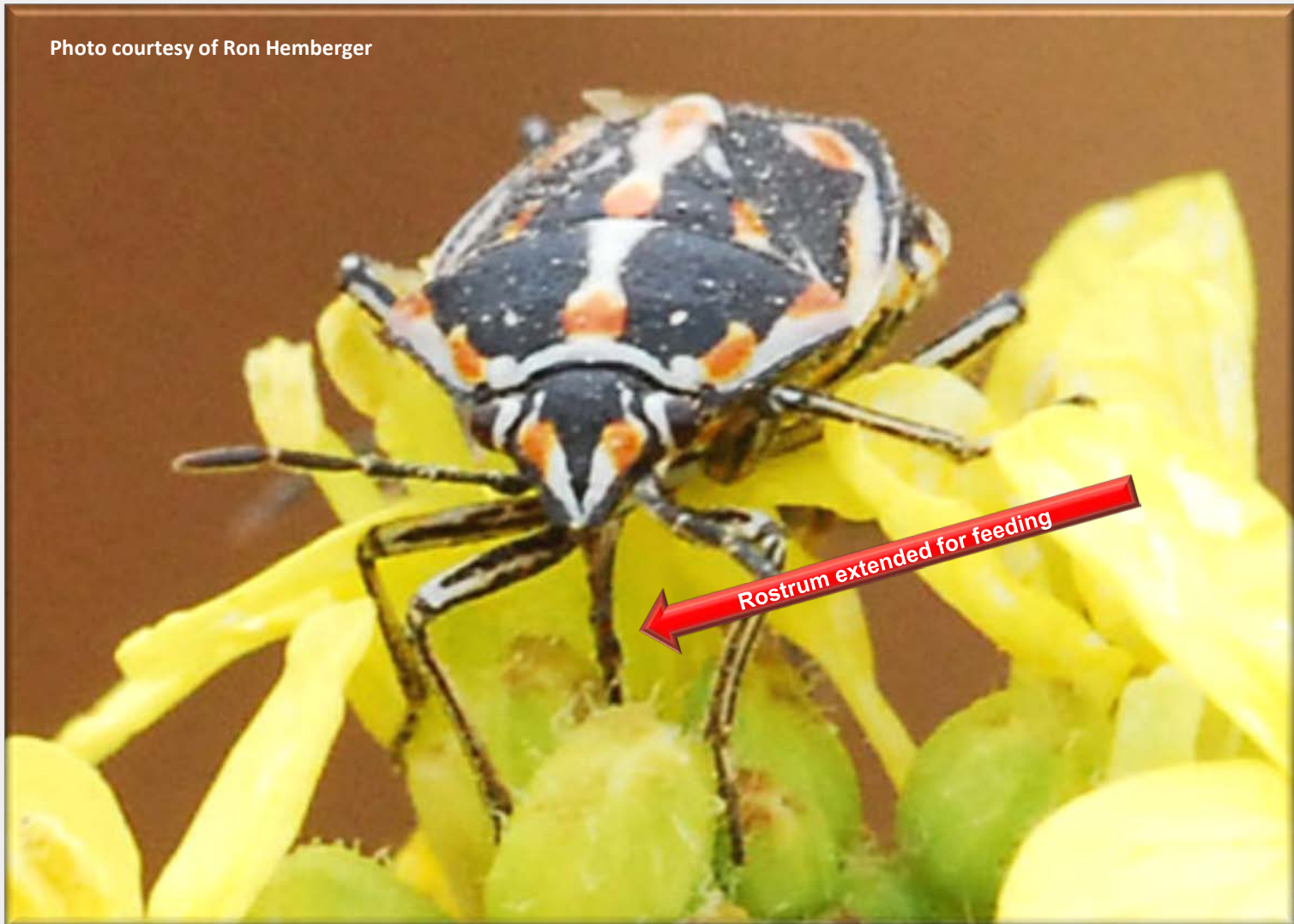
Mouthparts of Hemiptera - rostrum marked with arrow

The proboscis, sheathed within a modified labium to form a "beak" or "rostrum" which is capable of piercing tissues (usually plant tissues) and sucking out the liquids — typically sap.



# Bagrada Bug Feeding

Photo courtesy of Ron Hemberger



The rostrum is described as “needle-like” in its ability to pierce plant tissue

# Bagrada Bug Damage



Bagrada bugs damage plants by feeding on young leaves. Both adults and nymphs suck sap from leaves, which may wilt and later dry. Considerable damage is caused to young plants, which may die or have the growth points severely damaged. Significant damage may also be caused to older plants.

Bagrada bugs are major pests of cultivated crucifers. Severe infestations on cabbage result in stunted plants, leaves turning yellow with a rough texture, and death of the growing point. As a result, damaged plants do not produce heads or produce two or more small unmarketable heads instead of a large central head.



# Bagrada Bug Crop Damage

Feeding on a fig



Photo by Judi V. Cugat



Photo by John Palumbo, Univ. of Arizona

**Bagrada Bug damage to broccoli**



Photo by Joselito Villero

**Damage to cauliflower seedling**

# Bagrada Bug Crop Damage



**“Scorched” leaves  
on Chinese  
cabbage due to  
feeding by Bagrada  
bugs**

Picture from New Mexico State University Plant Diagnostic Clinic



# Bagrada Bug Crop Damage



**Bagrada bug damage to 5 day old broccoli seedling**



**Bagrada bug damage to 5 day old  
broccoli seedling**



**Bagrada bug feeding symptoms on 4 day old  
cauliflower transplant**

Photos and captions courtesy of John Palumbo, Ph.D.,  
University of Arizona, Yuma Ag Center

# Cultural Practices

## Monitoring

Regular monitoring of the crop is important to detect bagrada bugs before they cause damage to the crop.

Research in Namibia has shown that control measures should start if the number of bugs/m<sup>2</sup> in the early growing stage exceeds one. If the crop is past the early growing stage, a higher threshold level of 3 bugs/m<sup>2</sup> can be maintained (Keizer and Zuurbier). However, note that these thresholds are given as examples

## Sanitation

Crop hygiene, in particular removal of old crops and destruction of weeds of the family Brassicaceae prevents population build-up.

## Hand picking

Handpicking and destruction of the bugs helps to reduce damage. This is particularly important in the early stages of the crop. Hand picking is only practical in small plots.

## Cultivation

Eggs laid in the soil are readily killed by cultivation, so frequent light cultivation (once or twice a week) of the vegetable beds will help in controlling this pest (Keizer and Zuurbier; Horticultural Research Program, Botswana).

## Irrigation

Watering and overhead irrigation disturb the bugs discouraging them from feeding on the crop. However, note that use of sprinkler irrigation may lead to increase of diseases such as black rot and downy mildew.

# Cultural Practices

**Bagrada eggs laid in soil are more difficult to control. Covering well irrigated bare soil with a thin sheet of clear plastic for several weeks during warm weather will control hatching nymphs and may also control eggs if the soil temperature is high enough.**





# Biological pest control

Eggs of bagrada bugs are parasitized by tiny wasps. Bugs are parasitized by flies of *Alophora* sp. (hover flies)



**Hover Fly, *Alophora hemiptera***

**a parasite of Stink-bugs (Pentatomidae), very variable in size and pattern**

# Scellionidae Wasps: Egg Parasites



Photo by Jack Kelly Clark



Photo by Patrick Coquillard

Adult Scellionoid wasps are internal parasitoids of insect and spider eggs, esp. those of true bugs ( Hemiptera) and moths (Lepidoptera). *Telenomus* and *Trissolcus* are important genera for biological control. To date no parasitism Or predation on Bagrada bugs have been observed in CA or AZ



Photo by Bilule

Wasps emerging from parasitized eggs

# Biopesticides and physical methods

## Plant extracts

A mixture of chilli, soap, garlic and paraffin has shown to be an effective control method in trials in Namibia (Keizer and Zuurbier).

## Natural products

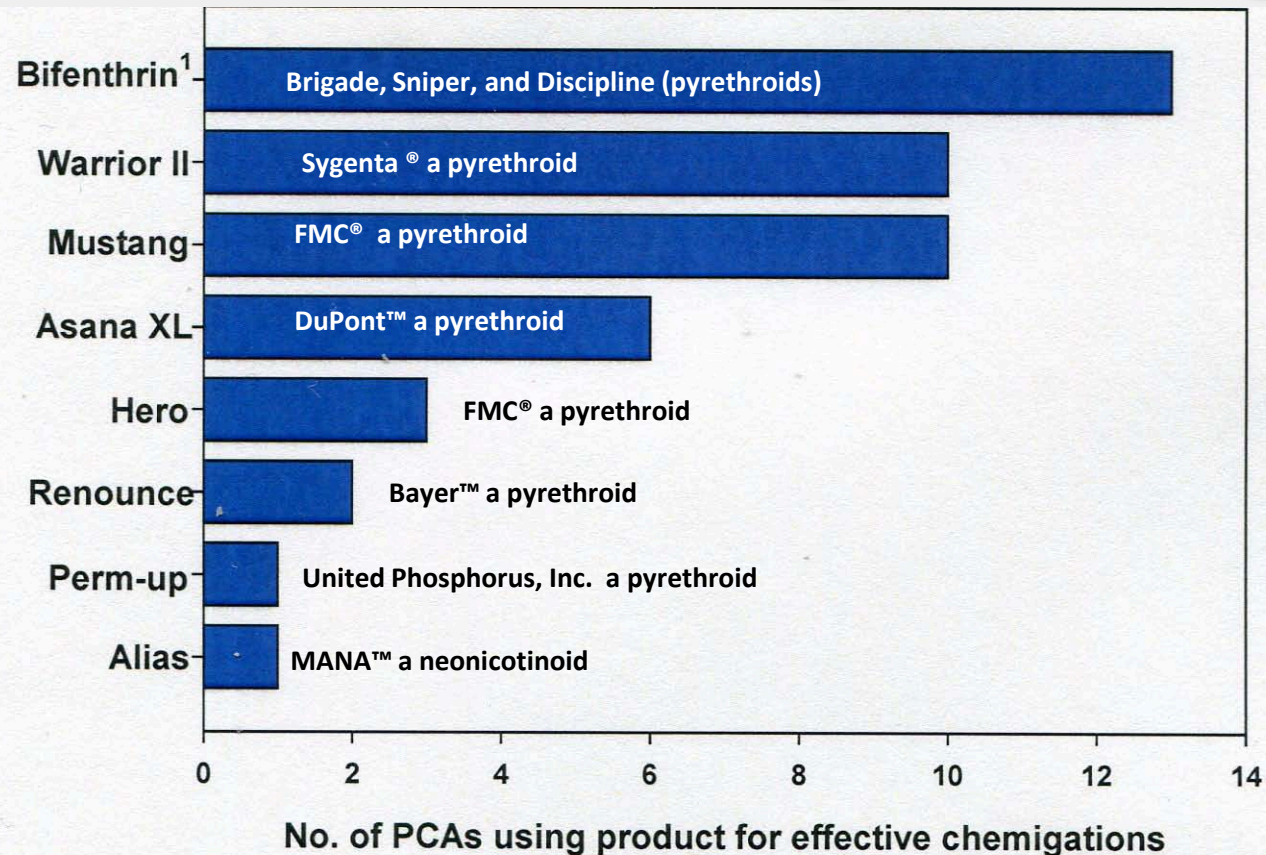
In Namibia there are reports that sprinkling the plants with crushed bagrada bugs repels other bugs. This can be used effectively in combination with frequent soil cultivation (Keizer and Zuurbier). Soap solution

Spraying plants with a soapy solution (bar soap) has been found effective against bagrada bugs. It helps to wash off young bugs (Dobson et al, 2002; Elwell and Maas, 1995).





# Pesticide Control of *Bagrada* bugs



**Figure 3.** Insecticides reported as effective against *Bagrada* bug adult infestations when applied as chemigations on cole crops in Yuma and Imperial Valley in 2010.

<sup>1</sup> several formulations including Brigade (7), Sniper (5) and Discipline (1).



# Acknowledgments

There is not a great deal of literature or scientific investigations regarding *Bagrada hilaris*. My many thanks to Gevork Arakelian, Ph.D., senior biologist, Los Angeles County, Department of Agricultural Commissioner/ Weights and Measures. Dr. Arakelian first discovered the Bagrada bug in Los Angeles County in 2008 and published the first pest alert on this invasive insect.



Also a pioneer in the study of the Bagrada bug is John C. Palumbo, Ph.D., an entomologist with the University of Arizona at the Yuma Agricultural Center. Many thanks to Dr. Palumbo for his work on the biology and control of the Bagrada bug.



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