



This presentation is about emerald ash borer, a beetle that feeds on ash trees. It is invasive in the U.S., originating from East Asia.

## Overview

- Native to East Asia
- Detected in continental United States in 2001 in Allentown, Pennsylvania
- Spread to 38 states
- Causes major damage to fruit and ornamental crops



Brown marmorated stink bugs on a fruit  
Photo: Gary Bernon, USDA APHIS, Bugwood.org#1113016

Brown marmorated stink bugs are native to China, Japan, Korea, Myanmar, Taiwan, and Vietnam. In 2001, this species was first detected in the United States in Allentown, Pennsylvania. Although the means of introduction is not certain, they were likely introduced by accident via imported cargo from China, Japan, or Korea. Since then they have spread throughout the country and are now established in at least 18 states and have been found in an additional 22 other states.

In 2010, populations of this invasive species increased dramatically, causing widespread injury to many crops throughout the mid-Atlantic region. Trees and stone fruit were particularly affected and some growers lost entire crops. Total losses for apple growers in the mid-Atlantic (for the 2010 apple crop) totaled over 37 million dollars.

[*Halyomorpha halys* (Stal) (Hemiptera: Pentatomidae)]

Information sources:

Leskey, T. C. and G. C. Hamilton. 2011. Brown marmorated stink bug working group meeting, June 2011 report

accessed 8/7/2013-

<http://projects.ipmcenters.org/Northeastern/FundedProjects/ReportFiles/Pship2010/Pship2010-Leskey-FinalReport-Meeting-June-2011-237195.pdf>

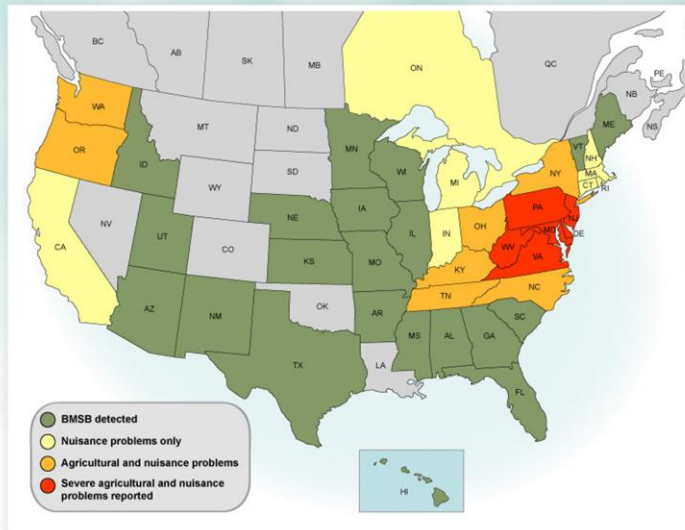
United States Apple Association. 2010. Asian pest inflicting substantial losses, raising alarm in eastern apple orchards. *Apple News* 41(8): 488.

United States Apple Association News Release. 2011. Losses to Mid-Atlantic Apple Growers at \$37 million from Brown Marmorated Stink Bug.  
accessed 1/8/2014 –  
<http://www.usapple.org/PDF/Media/BMSBDamageMidAtlantic.pdf>

Yang, Z.-Q., Y.-X. Yao, L.-F. Qiu, and Z.-X. Li. 2009. A new species of *Trissolcus* (Hymenoptera: Scelionidae) parasitizing eggs of *Halyomorpha Halys* (Heteroptera: Pentatomidae) in China with comments on its biology. *Ann. Entomol. Soc. Am.* 102(1): 39-47.

Yu, G., and J. Zhang. 2007. The brown-marmorated stink bug, *Halyomorpha halys* (Heteroptera: Pentatomidae) in P.R. China. *International Workshop on Biological Control of Invasive Species of Forests*. 1: 70-74.

## U.S. Distribution



In 2001, this species was first detected in the United States in Allentown, Pennsylvania and identified by Karen M. Bernhard, an extension entomologist with the Lehigh County Cooperative Extension office. Although the means of introduction is not certain, it is thought to have been accidentally introduced into the United States via imported cargo from China, Japan, or Korea.

Since 2001, established populations by survey or consensus (red color) have been found in parts of Delaware, Indiana, Illinois, Kansas, Kentucky, Maryland, Michigan, Minnesota, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, Tennessee, Utah, Virginia, Wisconsin and Washington.

It has also been intercepted or detected, but not known to be established (yellow color) in parts of Alabama, Arizona, California, Colorado, Connecticut, Florida, Georgia, Idaho, Iowa, Maine, Massachusetts, Mississippi, Missouri, New Hampshire, New York, Nebraska, New Mexico, Rhode Island, South Carolina, Texas, Vermont and West Virginia.

Brown marmorated stink bugs are highly mobile and are considered a hitchhiker pest. They are capable of dispersing over large distances by sheltering in shipping containers and cars.

Information sources:

Hamilton G.C. 2009. Brown marmorated stink bug. *Am. Entomol.* 55: 19–20.

National Agricultural Pest Information System (NAPIS). Purdue University. 2013. "Survey Status of Brown Marmorated Stink Bug - *Halyomorpha halys* (2010 to present)." Accessed: 11/1/2013.

<http://pest.ceris.purdue.edu/map.php?code=IQAQQKA&year=3year>.

Watanabe M., R. Arakawa, Y. Shinagawa, and T. Okazawa. 1994. Anti-invading methods against the brown marmorated stink bug, *Halyomorpha mista*, in houses. *The Japan Soc. Med. Entomol. Zool.* 45: 311–317.

Yang, Z.-Q., Y.-X. Yao, L.-F. Qiu, and Z.-X. Li. 2009. A new species of *Trissolcus* (Hymenoptera: Scelionidae) parasitizing eggs of *Halyomorpha halys* (Heteroptera: Pentatomidae) in China with comments on its biology. *Ann. Entomol. Soc. Am.* 102(1): 39-47.

Yu, G., and J. Zhang. 2007. The brown-marmorated stink bug, *Halyomorpha halys* (Heteroptera: Pentatomidae) in P.R. China. *International Workshop on Biological Control of Invasive Species of Forests.* 1: 70-74.

## Host Plants



Photos: (Top Row) - David R. Lance, USDA APHIS PPQ, [www.bugwood.org](http://www.bugwood.org), #UGA1460052 (corn); #UGA1460051 (apple); Gary Bernon, USDA APHIS, [www.bugwood.org](http://www.bugwood.org), #UGA1113010 (cotton). (Bottom Row) - Wikimedia Common, Friedrich Böhringer (walnut); Quadel (beets); Schwäbin (peach).

The brown marmorated stink bug is a highly polyphagous plant feeder with a wide range of host plants. The nymphs will typically feed on the leaves and stems of host plants, while the adults will feed on the leaves and stems as well as the fruit and seeds.

Crop hosts include apple (*Malus* spp.), apricot (*Prunus armeniaca*), asparagus (*Asparagus* spp.), bean (*Phaseolus* spp.), cherry (*Prunus avium*), corn (*Zea mays*), cotton (*Gossypium hirsutum*), fig (*Ficus carica*), grape (*Vitis vinifera*), mulberry (*Morus* spp.), orange (*Citrus* spp.), peach (*Prunus persica*), pear (*Pyrus* spp.), persimmon (*Diospyros kaki*), plum (*Prunus domestica*), pomegranate (*Punica granatum*), raspberry (*Rubus idaeus*), soybean (*Glycine max*), spinach (*Basella rubra*), walnut (*Juglans* spp.), and wheat (*Triticum aestivum*).

Other hosts include argyi wormwood (*Artemisia argyi*), basswood (*Tilia* spp.), beet (*Beta vulgaris*), black locust (*Robinia pseudoacacia*), black nightshade (*Solanum nigrum*), blue bean shrub (*Decaisnea fargesii*), bushkiller (*Cayratia japonica*), butterfly-bush (*Buddleia* spp.), camphor tree (*Cinnamomum camphora*), catalpa (*Catalpa* spp.), Celosia (*Celosia argentea*), chaste tree (*Vitex negundo*), Chinese parasol tree (*Firmiana platanifolia*), Chinese white poplar (*Populus tomentosa*), Chinese wisteria (*Wisteria sinensis*), Chinese wolfberry (*Lycium barbarum*), Eastern redbud (*Cercis canadensis*), elm (*Ulmus* spp.), hawthorne (*Crataegus pinnatifida*), hibiscus (*Hibiscus rosa-sinensis*), hollyhock (*Althaea rosea*), honey locust (*Gleditsia triacanthos*), honeysuckle (*Lonicera* spp.), Japanese Angelica-tree (*Aralia elata*), Japanese hop (*Humulus scandens*), Japanese rose (*Rosa rugosa*), Japanese spindle

tree (*Euonymus japonicas*), Japanese stewartia (*Stewartia pseudocamellia*), Japanese tobacco (*Nicotiana glauca*), jujube (*Ziziphus jujuba*), lilac (*Syringa* spp.), maple (*Acer* spp.), mum (*Chrysanthemum morifolium*), nasturtium (*Tropaeolum majus*), oak (*Quercus* spp.), orchid (*Brassia* spp.), paulownia tree (*Paulownia* spp.), oriental arborvitae (*Platycladus orientalis*), serviceberry (*Amenlanchier* spp.), spider flower (*Cleome* spp.), staghorn sumac (*Rhus typhina*), sunflower (*Helianthus annuus*), sycamore (*Platanus* spp.), tea plant (*Camellia sinensis*), tea-oil camellia (*Camellia oleifera*), tulip tree (*Liriodendron tulipifera*), weeping scholar tree (*Sophora japonica*), yellowwood (*Cladrastis kentukea*), and zelkova (*Zelkova serrata*).

#### References:

- Hoebeker, E. R., and M. E. Carter. 2003. *Halyomorpha halys* (Stål) (Heteroptera: Pentatomidae): a polyphagous plant pest from Asia newly detected in North America. *Proc. Entomol. Soc. Wash.* 105: 225-237.
- Nielsen, A. L., G. C. Hamilton, and D. Matadha. 2008. Developmental rate estimation and life table analysis for *Halyomorpha halys* (Hemiptera: Pentatomidae). *Environ. Entomol.* 37 (2): 348-355.
- Sargent, C., G. Dively, C. Hooks, M. Raupp, S. Sardanelli, P. Shrewsbury, D. Clement, and M. Malinoski. 2010. Brown Marmorated Stink Bug, *Halyomorpha halys* Stål (Hemiptera: Pentatomidae). University of Maryland Fact Sheet.
- Wermelinger, B., D. Wyniger, and B. Forster. 2008. First records of an invasive bug in Europe: *Halyomorpha halys* Stål (Heteroptera: Pentatomidae), a new pest on woody ornamentals and fruit trees? *Bulletin Soc. Entomol. Suisse* 81: 1-8.
- Yu, G., and J. Zhang. 2007. The brown-marmorated stink bug, *Halyomorpha halys* (Heteroptera: Pentatomidae) in P.R. China. *International Workshop on Biological Control of Invasive Species of Forests.* 1: 70-74.

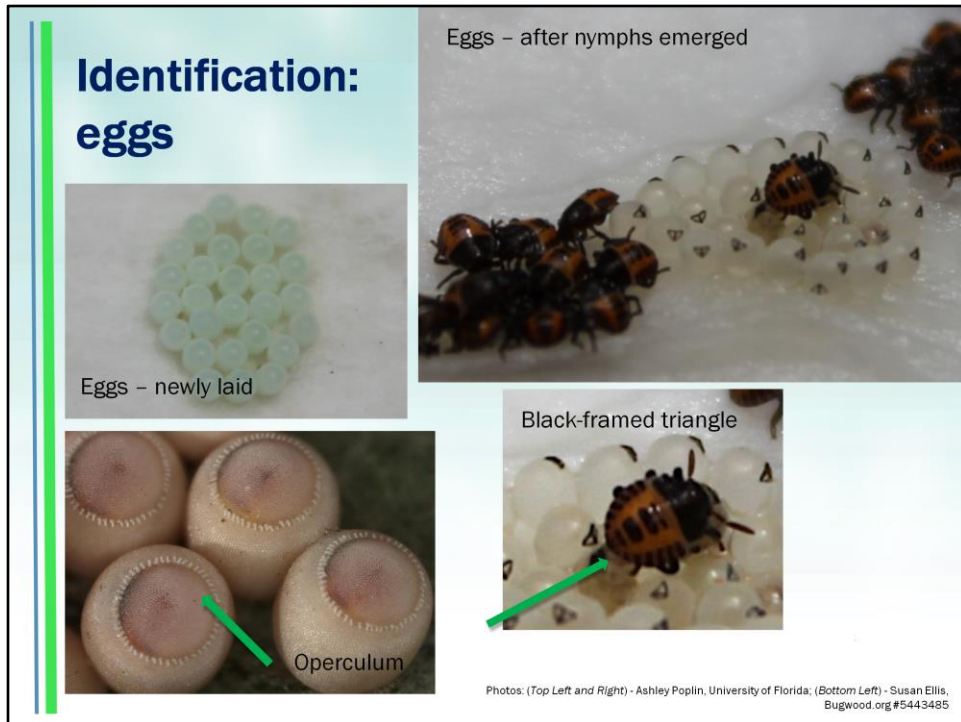


# Partial Host List

Abelia x grandiflora (André) Rehd	Cryptomeria spp.	Morus spp.	Solanum nigrum L.
Acer campestre L.	Cucumis sativus L.	Paulownia tomentosa (Thunb.) Siebold & Zucc. ex Steud.*	Solanum spp.
Acer palmatum Thunb.	Cupressus spp.	Phaseolus lunaius Linn.	Solanum spp.*
Acer platanoides L.	Decaisnea fargesii Franch.	Phaseolus spp.*	Sorbus spp.
Acer pseudoplatanus L.	Diospyros kaki L.	Phaseolus vulgaris L.	Spiraea spp.
Acer rubrum L.	Diospyros kaki Thunb.	Pisum sativum L.	Stewartia pseudocamellia Maxim.
Amelanchier spp.	Diospyros spp.*	Platanus occidentalis L.	Symphytum spp.
Arctium minus Bernh.	Elaeagnus angustifolia L.	Prunus armenica L.	Syringa spp.
Asparagus officinalis L.*	Euonymus alatus (Thunb.) Siebold	Prunus avium L.	Tilia americana L.
Basella rubra Linn.	Ficus spp.	Prunus domestica L.	Tilia spp.*
Beta vulgaris L.	Fraxinus americana L.	Prunus domestica L.	Triticum aestivum L.
Betula spp.	Glycine max Merrill	Prunus grayana Maxim.	Tropaeolum majus L.
Buddleja davidii Franch.	Gossypium spp.	Prunus mume Sieb. et Zucc	Ulmus spp.
Camellia oleifera C. Abel	Helianthus spp.	Prunus persica Batsch	Viburnum opulus var. americanum Ait.
Capsicum annuum L.*	Hibiscus rosa-sinensis L	Pyracantha coccinea M. Roem	Viburnum prunifolium L.
Caragana arborescens Lam.	Hibiscus spp.	Pyrus prifolia Nakai	Viburnum setigerum Hance
Carya spp.	Ilex opaca Ait.	Pyrus pyrifolia (Burm. f.) Naki	Viburnum spp.
Catalpa spp.*	Ilex spp.*	Pyrus spp.*	Vigna sesquipedalis L.
Celastrus spp.	Ilex verticillata (L.) A. Gray	Rhamnus spp.	Vitis spp.*
Celosia argentea L.	Juglans nigra L.*	Rhodotypos scandens (Thunb.) Makino	Vitis vinifera L.
Celtis occidentalis L.	Koelreuteria spp.	Rhus spp.	Zea mays L.*
Cercis canadensis L.	Ligustrum spp.	Rosa rugosa Thunb.	
Cleome spp.	Lonicera spp.	Rosa spp.	
Citrus spp.*	Lycopersicon spp.	Rubus spp.*	
Cornus racemosa Lam.	Magnolia stellata (Siebold & Zucc.) Maxim.	Salix spp.	
Cornus sericea L.	Malus domestica L. (or Brokh)*	Sambucus spp.	
Corylus colurna L.	Malus spp.	Sicyos angulatus L.	
Crataegus spp.			







Egg masses are deposited in triangular clusters of 20 – 30 eggs on the underside of leaves.

Eggs are small (about 1mm diameter), pale green to white in color, and spherically shaped.

After the nymphs emerge, the eggs are opaque and white in color. The top of the eggs have a circular operculum (green arrow) and a black-framed triangle (red arrow) at the top used by the nymphs to burst out of the egg.

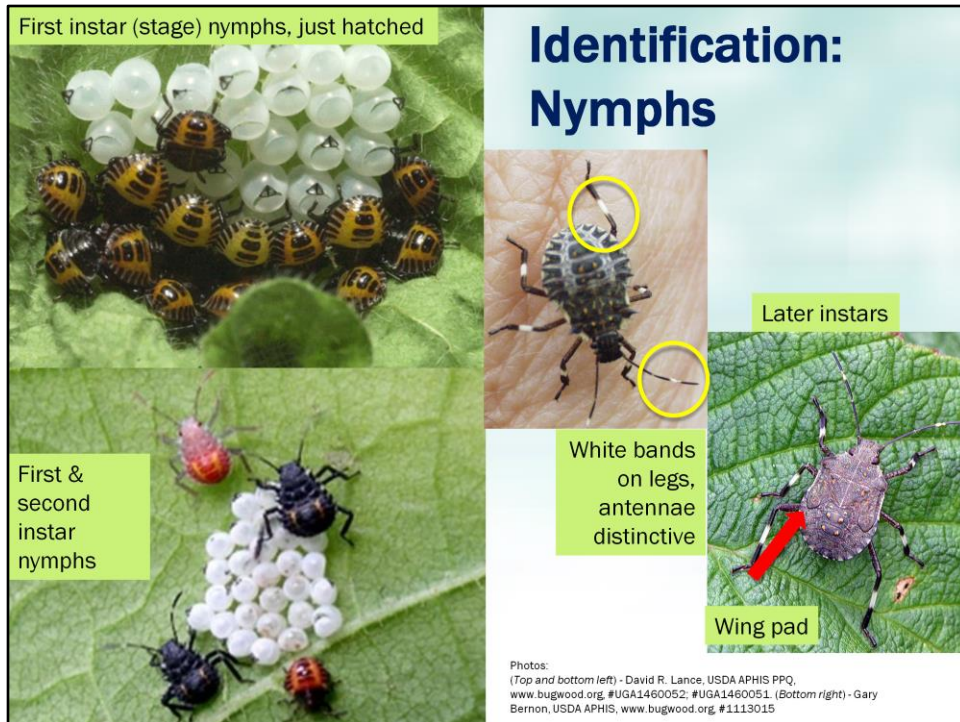
Information sources:

Gyeltshen, J., G. Bernon, A. Hodges, S. Stocks, and J. Brambila. 2011. Brown marmorated stink bug, *Halyomorpha halys* (Stål). Featured Creatures.

Retrieved August 23, 2011

[http://entnemdept.ufl.edu/creatures/veg/bean/brown\\_marmorated\\_stink\\_b  
ug.htm](http://entnemdept.ufl.edu/creatures/veg/bean/brown_marmorated_stink_bug.htm).

Nielsen, A. L., and G. C. Hamilton. 2009. Life history of the invasive species *Halyomorpha halys* (Hemiptera: Pentatomidae) in northeastern United States. *Ann. Entomol. Soc. Am.* 102 (4): 608-616.



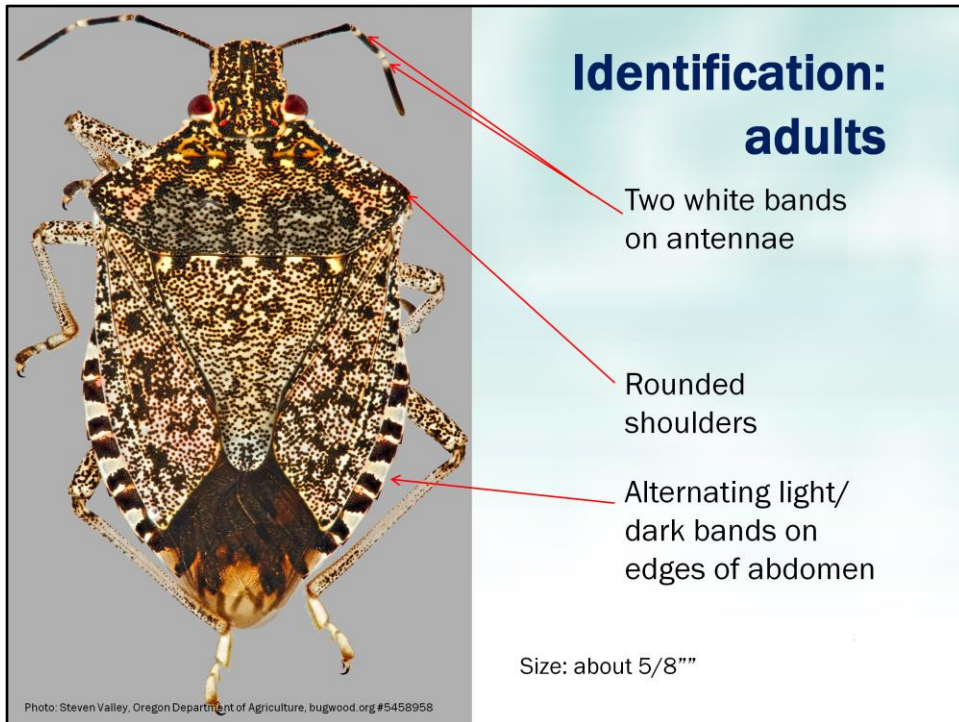
First instar nymphs are typically black with orange abdomens and aggregate around the egg mass until molting into second instars.

Second instar nymphs are darker than first instar nymphs and may resemble a tick due to the small size and lack of wings.

Third, fourth, and fifth instars are dark colored and larger in size with visible wing pads on the thorax (red arrow) .

Information sources:

Gyeltshen, J., G. Bernon, A. C. Hodges, S. Stocks, and J. Brambila. 2013. Brown Marmorated Stink Bug. UF & FDACS/DPI. Featured Creatures #EENY-346.



Adults have a dark marbled brown color on the dorsal side, a pale color on the ventral side, and are typically 12 – 17 mm in length. The most distinguishing feature is the two light colored bands on the fourth and fifth segments of the antennae. The sides of the pronotum, often referred to as the “shoulders”, are rounded and smooth. Alternating light and dark bands occur along the lateral edges of the abdomen. The same banding is often present on the legs as well.

Information sources:

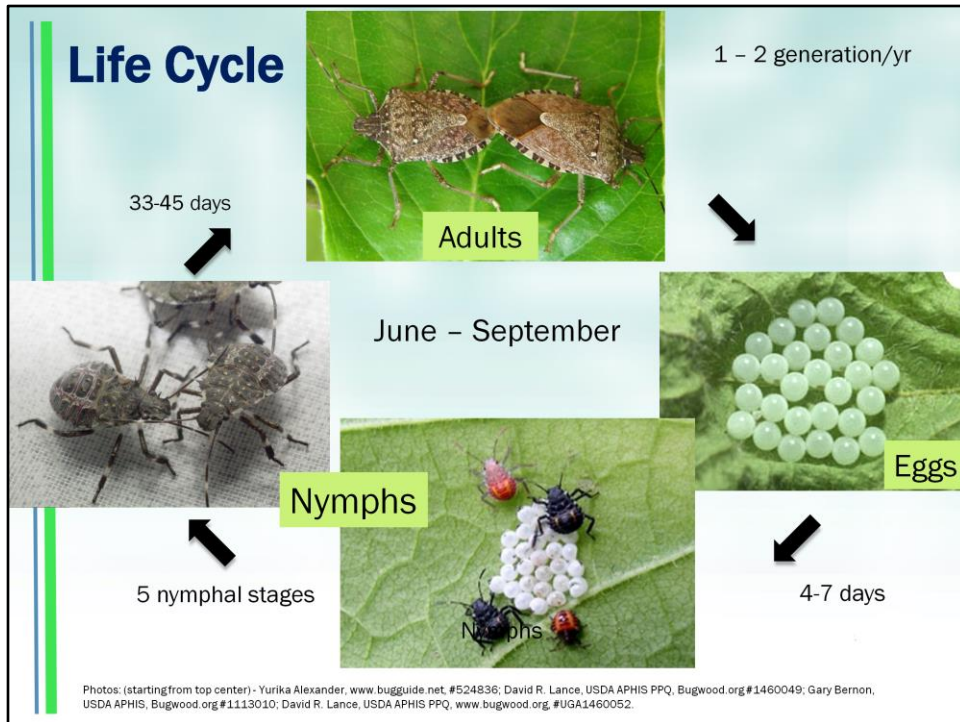
Halbert, S., and G. S. Hodges. 2011. The brown marmorated stink bug, *Halyomorpha halys* (Stål).

Retrieved March 26, 2012

<http://www.freshfromflorida.com/content/download/23899/486244/halyomorpha-halys.pdf>

Hoebeker, E. R., and M. E. Carter. 2003. *Halyomorpha halys* (Stål) (Heteroptera: Pentatomidae): a polyphagous plant pest from Asia newly detected in North America. Proc. Entomol. Soc. Wash. 105(1): 225-237.

Sargent, C., G. Dively, C. Hooks, m. Raupp, S. Sardanelli, P. Shrewsbury, D. Clement, and M. Malinoski. 2010. Brown marmorated stink bug, *Halyomorpha halys* Stål (Hemiptera: Pentatomidae). University of Maryland Fact Sheet.



In much of the U.S., including Mid-Atlantic states, Pennsylvania and Minnesota, brown marmorated stink bugs have one generation per year. But, two complete generations have been observed further south in West Virginia, and in tropical climates they can have up to five generations per year.

Overwintering adults emerge from diapause in March-April. Between June and September adult females oviposit clusters of 20 – 30 eggs on the underside of leaves. First instar nymphs hatch four or five days after the eggs are deposited.

Like many stink bug species, they grow through five nymphal instars each lasting five to ten days. Sexual maturity is reached 2 weeks after the final molt. Nymphs are present during summer and molt into adults. Autumn adults feed until September-October, and then seek overwintering sites

Information sources:

Gyeltshen, J., G. Bernon, A. Hodges, S. Stocks, and J. Brambila. 2011. Brown marmorated stink bug, *Halyomorpha halys* (Stål). Featured Creatures.

Retrieved August 23, 2011

[http://entnemdept.ufl.edu/creatures/veg/bean/brown\\_marmorated\\_stink\\_b  
ug.htm](http://entnemdept.ufl.edu/creatures/veg/bean/brown_marmorated_stink_bug.htm)

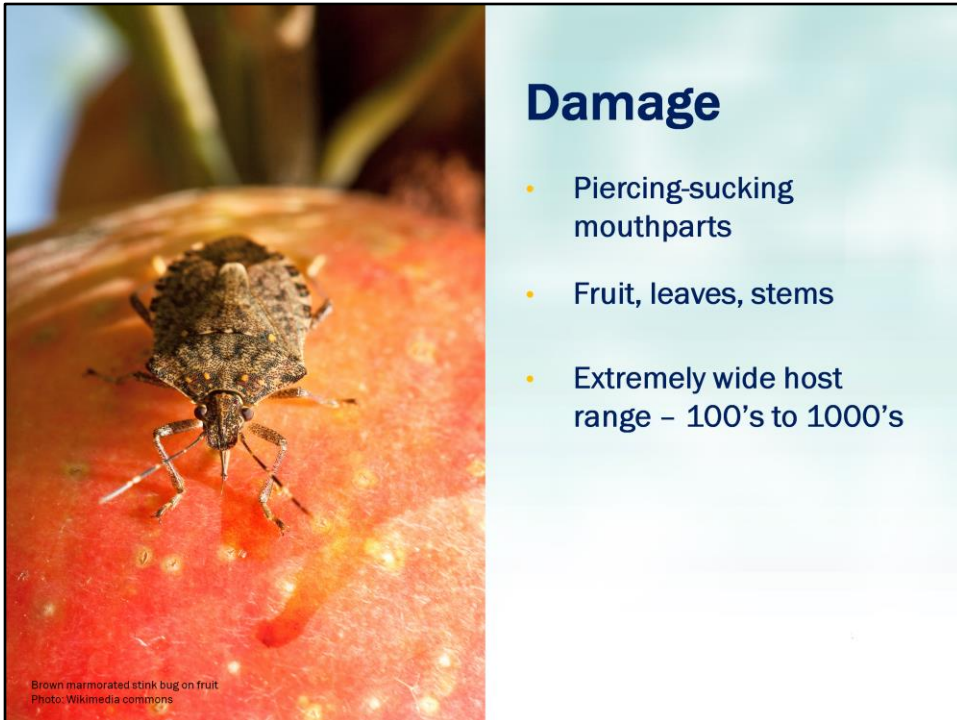
Hoebeker, E. R., and M. E. Carter. 2003. *Halyomorpha halys* (Stal) (Heteroptera: Pentatomidae): a polyphagous plant pest from Asia newly detected in North America. *Proc. Entomol. Soc. Wash.* 105(1): 225-237.

Leskey, T. C., S. E. Wright, B. D. Short, and A. Khrimian. 2012. Development of behaviorally-based monitoring tools for the brown marmorated stink bug (Heteroptera: Pentatomidae) in commercial tree fruit orchards. *Journal of Entomological Science* 47: 76-85.

Minnesota Department of Agriculture. Brown marmorated stink bug.  
Accessed 26 July 2013.  
<https://www.mda.state.mn.us/plants/insects/stinkbug.aspx>.

Nielsen, A. L., and G. C. Hamilton. 2009. Life history of the invasive species *Halyomorpha halys* (Hemiptera: Pentatomidae) in northeastern United States. *Ann. Entomol. Soc. Am.* 102 (4): 608-616.





Plant damage is typically confined to fruiting structures as adults feed mostly on fruit. However, nymphs tend to feed on leaves, stems, petioles, flowers, and seeds. Feeding damage to fruit crops is obvious visually, and is characterized by brown and white spots caused by the saliva injected into the fruiting body.

In the U.S., damage to host plants ranges from mild with no impact on yield, to severe with complete crop loss.

Additionally, BMSB are considered a nuisance pest because they overwinter on manmade structures in large aggregations. Adults aggregate in large numbers on the side of buildings, eventually entering attics, garages and other structures to overwinter.

Information sources:

ARS. 2010. Action Plan: Brown Marmorated Stink Bug. USDA-ARS, Kearneysville, WV. 4 pp.

McPherson, J. E., and R. M. McPherson. 2000. Stink Bugs of Economic Importance in America North of Mexico, Boca Raton, FL. 253 pp.

Welty, C., D. Shetlar, R. Hammond, S. Jones, B. Bloetscher, and A. Nielsen. 2008. Brown Marmorated Stink Bug. The Ohio State University Extension. Fact Sheet.

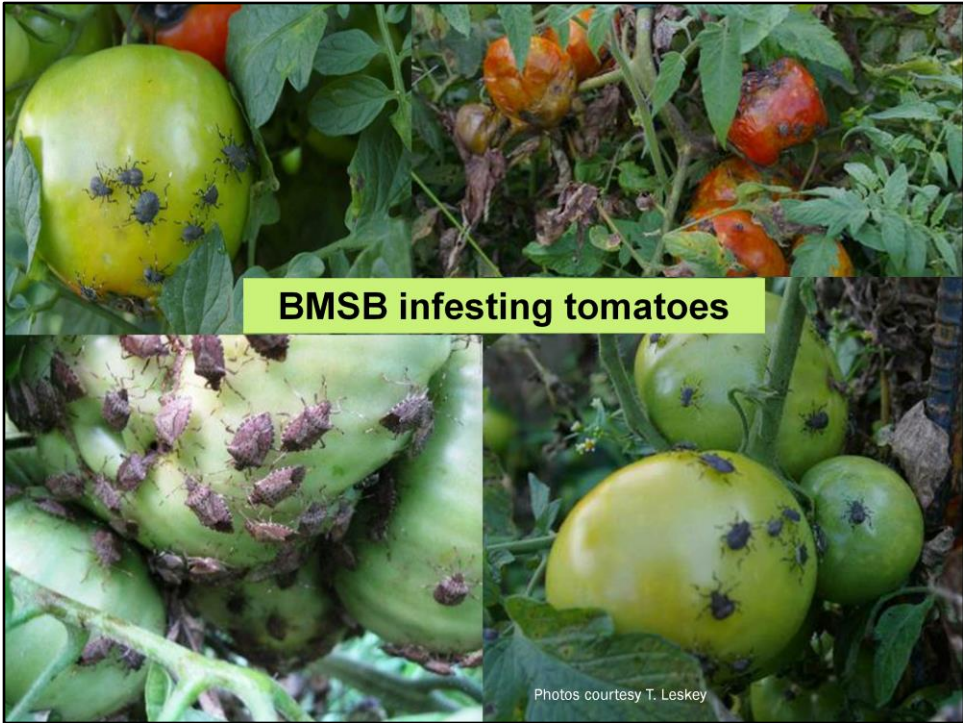
Agriculture and Natural Resources (FS-3824-08):3 pgs.



## BMSB Late-Season Injury on Apple



Photos courtesy T. Leskey



**BMSB infesting tomatoes**

Photos courtesy T. Leskey



BMSB damage to pepper



Photo D. Gilrein



## Damage to corn



Photos courtesy T. Leskey



BMSB and injury to *Paulownia* foliage



Photo: G. Bernon, USDA APHIS

Injury also noted on  
*Prunus serotina*,  
*Buddleja*



**Damage to *Catalpa***

Courtesy G. Hamilton, Rutgers





## Pathways movement in RV



Courtesy R.  
Lehman

**Monitoring and Management**

**Traps – monitoring, not control**

- Attractant (aggregation pheromone)
  - Methyl (2E, 4E, 6Z)-decatrienoate
- Blacklight traps

**Insecticides**

**Biological controls**

*Research ongoing in all areas*

Photos courtesy T. Leskey, USDA-ARS

Black or yellow pyramid-shaped traps baited **Methyl (2E, 4E, 6Z)-decatrienoate and black light traps** can be used for monitoring adults and nymphs of BMSB. The BMSB pheromone has been identifying by researchers in order to improve monitoring tools.

If BMSB infestations are overwhelming, chemical control might be considered. Several insecticides with ingredients: Acetamiprid,  $\beta$ -cyfluthrin, Cyfluthrinare, Bifenthrin, Cyfluthrin, Deltamethrin, Dinotefuran, Fenpropathrin, and A-cyhalothrin caused significant mortality against BMSB in laboratory bioassays.

Following label instructions with proper application procedures may be effective against BMSB. **Be sure to check with your local county agent to see which chemical can be used and for which crop it can be used for.**

Behaviorally based management strategies including attract-and kill and biological control programs are underway to reduce the insecticides use. In Asia, several species of parasitoid wasps and tachinid flies are thought to be natural enemies of BMSB, parasitizing eggs and adults, respectively. *Ophiocordyceps nutans*, an entomopathogenic fungus, was reported to cause BMSB infection in Japan. Biological controls using these Asian natural enemies above may provide the long-term

solutions for reduction of BMSB populations.

Information sources:

Leskey, T. C., S. E. Wright, B. D. Short, and A. Khimian. 2012. Development of behaviorally-based monitoring tools for the brown marmorated stink bug (Heteroptera: Pentatomidae) in commercial tree fruit orchards. *Journal of Entomological Science* 47: 76-85.

Leskey, T. C., et al. (22 authors). 2012. cc. Outlooks on pest management. October: 218-226. DOI: 10.1564/23oct07

Accessed 10/30/2013.

<http://pemaruccicenter.rutgers.edu/assets/PDF/publications/2012-BMSB-LeskeyS7-2305%20pdf.pdf>

Rutgers extension. Pesticide Control for the Brown Marmorated Stink Bug.

Accessed 11/3/2013

<http://njaes.rutgers.edu/stinkbug/pesticides.asp>



If stink bugs enter the home, look for the openings where the insects can come in and out such as under or behind baseboards, around window and door trim, and around exhaust fans or lights in ceilings. These openings should be sealed with caulk or other appropriate materials to prevent the insects from entering in. A vacuum cleaner can be used to remove both live and dead stink bugs from inside of the home but the smell of stink bugs may remain for a period of time.

Once the insects have gained access to the wall voids or attic areas, it is not recommended to apply an insecticide inside. Although insecticidal dust applied to these voids may kill the bugs, carpet beetles feeding on the dead stink bugs may attack woolens, stored dry goods or other natural products in the home.

Aerosol-type pyrethrum foggers will kill stink bugs gathered on ceilings and walls in living areas but it will not be effective to prevent more of the insects from coming into the house after the room is aerated. Therefore, use of these materials including spraying insecticides into the openings is not recommended for a good long-term solution.

Information sources:

Jacobs, Steve. 2013. Brown Marmorated Stink Bug, *Halyomorpha halys*. Penn State University Fact Sheet.

Retrieved October 21, 2013

<http://ento.psu.edu/extension/factsheets/brown-marmorated-stink-bug#section-5>



# Monitoring and Management

## Black and yellow pyramid traps

### Bait

- Methyl (2E, 4E, 6Z)-decatrienoate lure
- Research on better bait is ongoing

### Black light traps

### Chemical management

### Biological controls



Pyramid trap  
Photo: Daren Mueller, Iowa State University,  
Bugwood.org #5471628

Black or yellow pyramid-shaped traps baited **Methyl (2E, 4E, 6Z)-decatrienoate and black light traps** can be used for monitoring adults and nymphs of BMSB. The BMSB pheromone has been identifying by researchers in order to improve monitoring tools.

If BMSB infestations are overwhelming, chemical control might be considered. Several insecticides with ingredients: Acetamiprid,  $\beta$ -cyfluthrin, Cyfluthrinare, Bifenthrin, Cyfluthrin, Deltamethrin, Dinotefuran, Fenpropathrin, and A-cyhalothrin caused significant mortality against BMSB in laboratory bioassays.

Following label instructions with proper application procedures may be effective against BMSB. **Be sure to check with your local county agent to see which chemical can be used and for which crop it can be used for.**

Behaviorally based management strategies including attract-and kill and biological control programs are underway to reduce the insecticides use. In Asia, several species of parasitoid wasps and tachinid flies are thought to be natural enemies of BMSB, parasitizing eggs and adults, respectively. *Ophiocordyceps nutans*, an entomopathogenic fungus, was reported to cause BMSB infection in Japan. Biological controls using these Asian natural enemies above may provide the long-term

solutions for reduction of BMSB populations.

Information sources:

Leskey, T. C., S. E. Wright, B. D. Short, and A. Khimian. 2012. Development of behaviorally-based monitoring tools for the brown marmorated stink bug (Heteroptera: Pentatomidae) in commercial tree fruit orchards. *Journal of Entomological Science* 47: 76-85.

Leskey, T. C., et al. (22 authors). 2012. cc. Outlooks on pest management. October: 218-226. DOI: 10.1564/23oct07

Accessed 10/30/2013.

<http://pemaruccicenter.rutgers.edu/assets/PDF/publications/2012-BMSB-LeskeyS7-2305%20pdf.pdf>

Rutgers extension. Pesticide Control for the Brown Marmorated Stink Bug.

Accessed 11/3/2013

<http://njaes.rutgers.edu/stinkbug/pesticides.asp>



## Prevention and Management in the Home

- Caulk windows
- Install weather strip/ sweeps on doors
- Remove by hand picking
- Once inside, insecticides/insecticidal dust treatments/aerosol-type pyrethrum foggers are not advised



Brown marmorated stink bugs on a leaf. Photo: Gary Bernon, USDA APHIS, Bugwood.org #1113007

If stink bugs enter the home, look for the openings where the insects can come in and out such as under or behind baseboards, around window and door trim, and around exhaust fans or lights in ceilings. These openings should be sealed with caulk or other appropriate materials to prevent the insects from entering in. A vacuum cleaner can be used to remove both live and dead stink bugs from inside of the home but the smell of stink bugs may remain for a period of time.

Once the insects have gained access to the wall voids or attic areas, it is not recommended to apply an insecticide inside. Although insecticidal dust applied to these voids may kill the bugs, carpet beetles feeding on the dead stink bugs may attack woolens, stored dry goods or other natural products in the home.

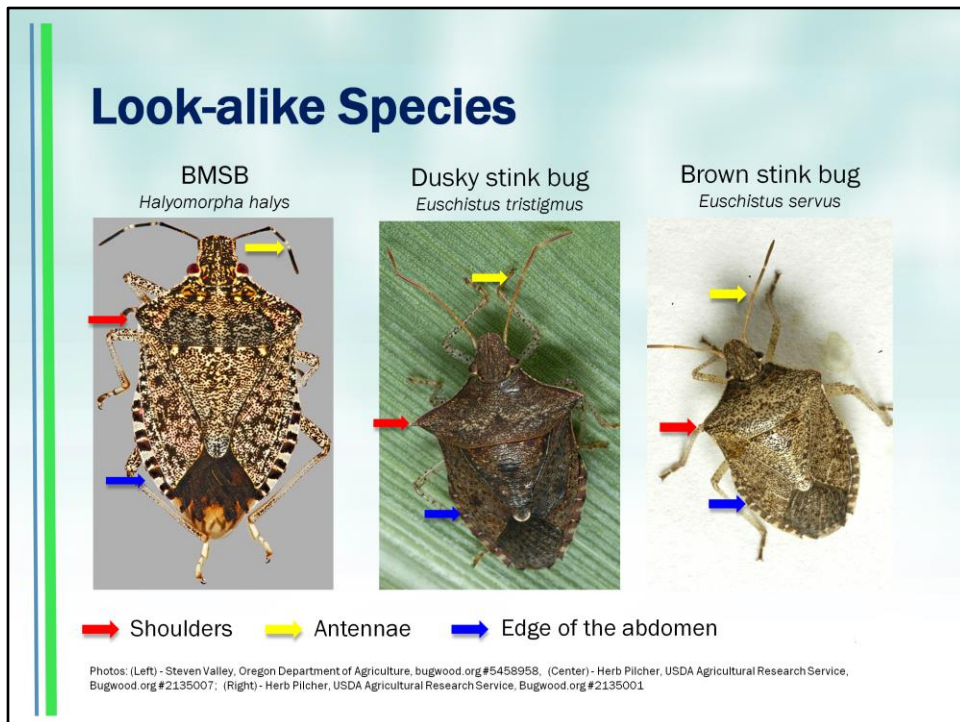
Aerosol-type pyrethrum foggers will kill stink bugs gathered on ceilings and walls in living areas but it will not be effective to prevent more of the insects from coming into the house after the room is aerated. Therefore, use of these materials including spraying insecticides into the openings is not recommended for a good long-term solution.

Information sources:

Jacobs, Steve. 2013. Brown Marmorated Stink Bug, *Halyomorpha halys*. Penn State University Fact Sheet.

Retrieved October 21, 2013

<http://ento.psu.edu/extension/factsheets/brown-marmorated-stink-bug#section-5>



Brown marmorated stink bugs can easily be confused with numerous other hemipterans in the United States, including: the dusky stink bug (*Euschistus tristigmus*), brown stink bug (*Euschistus servus*), rough stink bug (*Brochymena quadripustulata*) and the spined soldier bug (*Podisus maculiventris*).

Brown marmorated stink bugs have rounded and smooth shoulders, two light colored bands on the antennal segments, and alternating light and dark bands along the edges of the abdomen.

Dusky stink bugs have pointed shoulders but do not have two light colored bands on the antennal segments. They also have alternating light and dark bands along the edges of the abdomen.

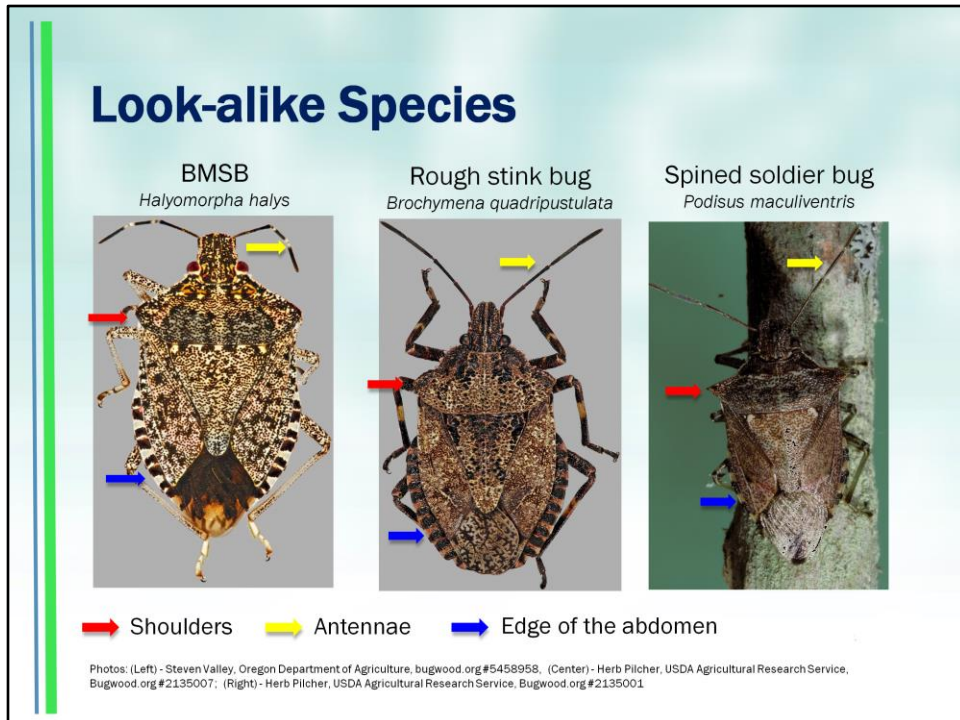
Brown stink bugs have rounded shoulders but do not have two light colored bands on the antennal segments. They also have alternating light and dark bands along the edges of the abdomen.

Information sources:

Gyeltshen, J., G. Bernon, A. C. Hodges, S. Stocks, and J. Brambila. 2013. Brown Marmorated Stink Bug. UF & FDACS/DPI. Featured Creatures #EENY-346.

Hoebeker, E. R., and M. E. Carter. 2003. *Halyomorpha halys* (Stal) (Heteroptera:

Pentatomidae): a polyphagous plant pest from Asia newly detected in North America.  
Proc. Entomol. Soc. Wash. 105(1): 225-237.



Brown marmorated stink bugs can easily be confused with numerous other hemipterans in the United States, including: the dusty stink bug (*Euschistus tristigma*), brown stink bug (*Euschistus servus*), rough stink bug (*Brochymena quadripustulata*) and the spined soldier bug (*Podisus maculiventris*).

Brown marmorated stink bugs have rounded and smooth shoulders, two light colored bands on the antennal segments, and alternating light and dark bands along the edges of the abdomen.

Dusky stink bugs have pointed shoulders but do not have two light colored bands on the antennal segments. They also have alternating light and dark bands along the edges of the abdomen.

Brown stink bugs have rounded shoulders but do not have two light colored bands on the antennal segments. They also have alternating light and dark bands along the edges of the abdomen.

Information sources:

Gyeltshen, J., G. Bernon, A. C. Hodges, S. Stocks, and J. Brambila. 2013. Brown Marmorated Stink Bug. UF & FDACS/DPI. Featured Creatures #EENY-346.

Hoebeker, E. R., and M. E. Carter. 2003. *Halyomorpha halys* (Stal) (Heteroptera:

Pentatomidae): a polyphagous plant pest from Asia newly detected in North America.  
Proc. Entomol. Soc. Wash. 105(1): 225-237.

## Western conifer seed bug

*Leptoglossus occidentalis*



Photo: D. Gilrein

Also invades homes in fall



# Squash Bug

*Anasa tristis*



Whitney Cranshaw, Colorado State University, Bugwood.org

# Authors

## Adapted for New York by

- Dan Gilrein, Extension Entomologist, Cornell Cooperative Extension of Suffolk County
- Ashley V. Poplin, Department of Entomology and Nematology, University of Florida
- Matthew D. Smith, Department of Entomology and Nematology, University of Florida
- Amanda Hodges, Department of Entomology and Nematology, University of Florida



Enhanced First Detector Training for New York State

# Reviewers

Brad Danner, Pest Survey Specialist, Cooperative  
Agricultural Pest Survey Program

Leroy Whilby, State Survey Coordinator, Cooperative  
Agricultural Pest Survey Program

Smriti Bhotika, Postdoctoral Associate, Department of  
Entomology and Nematology, University of Florida



Enhanced First Detector Training for New York State

## Collaborating Agencies

- U.S. Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS)
- Cooperative Agricultural Pest Survey Program (CAPS)
- Florida Department of Agriculture and Consumer Services (FDACS)
- National Plant Diagnostic Network (NPDN)
- Sentinel Plant Network (SPN)
- Protect U.S.
- University of Florida Institute of Food and Agricultural Sciences (UF-IFAS)



Enhanced First Detector Training for New York State

## References

- ARS. 2010. Action Plan: Brown Marmorated Stink Bug. USDA-ARS, Kearneysville, WV. 4 pp.
- Gyeltshen, J., G. Bernon, A. Hodges, S. Stocks, and J. Brambila. 2011. Brown marmorated stink bug, *Halymorpha halys* (Stål). Featured Creatures. Accessed 25 July 2013.  
[http://entnemdept.ufl.edu/creatures/veg/bean/brown\\_marmorated\\_stink\\_bug.htm](http://entnemdept.ufl.edu/creatures/veg/bean/brown_marmorated_stink_bug.htm)
- Halbert, S., and G. S. Hodges. 2011. The brown marmorated stink bug, *Halymorpha halys* (Stål). Retrieved March 26, 2012  
<http://www.freshfromflorida.com/content/download/23899/486244/halymorpha-halys.pdf>
- Hamilton G. C. 2009. Brown marmorated stink bug. *Am. Entomol.* 55: 19–20.
- Hoebcke, E. R., and M. E. Carter. 2003. *Halymorpha halys* (Stål) (Heteroptera: Pentatomidae): a polyphagous plant pest from Asia newly detected in North America. *Proc. Entomol. Soc. Wash.* 105(1): 225-237.
- Jacobs, Steve. 2013. Brown Marmorated Stink Bug, *Halymorpha halys*. Penn State University Fact Sheet. Accessed 21 October 2013.  
<http://ento.psu.edu/extension/factsheets/brown-marmorated-stink-bug#section-5>
- Leskey, T. C. and G. C. Hamilton. 2011. Brown marmorated stink bug working group meeting, June 2011 report, accessed 8/7/2013  
<http://projects.ipmcenters.org/Northeastern/FundedProjects/ReportFiles/Pship2010/Pship2010-Leskey-FinalReport-Meeting-June-2011-237195.pdf>
- Leskey, T. C., S. E. Wright, B. D. Short, and A. Khiraman. 2012. Development of behaviorally-based monitoring tools for the brown marmorated stink bug (Heteroptera: Pentatomidae) in commercial tree fruit orchards. *Journal of Entomological Science* 47: 76-85.
- Leskey, T. C., et al. (22 authors). 2012. Pest Status of the Brown Marmorated Stink Bug, *Halymorpha halys* in the USA. *Outlooks on pest management*. October: 218-226. DOI: 10.1564/23oct07
- McPherson, J. E., and R. M. McPherson. 2000. Stink Bugs of Economic Importance in America North of Mexico. Boca Raton, FL. 253 pp.
- Minnesota Department of Agriculture. Brown Marmorated Stink Bug. Accessed 26 July 2013.  
<https://www.mda.state.mn.us/plants/insects/stinkbug.aspx>
- National Agricultural Pest Information System (NAPIS). Purdue University. 2013. "Survey Status of Brown Marmorated Stink Bug - *Halymorpha halys* (2010 to present)". Accessed: 07/22/2013.  
<http://pest.ceris.purdue.edu/map.php?code=IQAQK&year=3year>
- Nielsen, A. L., and G. C. Hamilton. 2009. Life history of the invasive species *Halymorpha halys* (Hemiptera: Pentatomidae) in northeastern United States. *Ann. Entomol. Soc. Am.* 102 (4): 608-616.
- Nielsen, A. L., G. C. Hamilton, and D. Matadha. 2008. Developmental rate estimation and life table analysis for *Halymorpha halys* (Hemiptera: Pentatomidae). *Environ. Entomol.* 37 (2): 348-355.
- Rutgers extension. Pesticide Control for the Brown Marmorated Stink Bug. Accessed 11/3/2013  
<http://njaes.rutgers.edu/stinkbug/pesticides.asp>
- Sargent, C., G. Dively, C. Hooks, M. Raupp, S. Sardaneli, P. Shrewsbury, D. Clement, and M. Malinoski. 2010. Brown Marmorated Stink Bug, *Halymorpha halys* Stål (Hemiptera: Pentatomidae). University of Maryland Fact Sheet.
- United States Apple Association. 2010. Asian pest inflicting substantial losses, raising alarm in eastern apple orchards. *Apple News* 41(8): 488
- United States Apple Association News Release. 2011. Losses to Mid-Atlantic Apple Growers at \$37 million from Brown Marmorated Stink Bug. accessed 1/8/2014 --  
<http://www.usapple.org/PDF/Media/BMSBDamageMidAtlantic.pdf>
- Watanabe M., R. Arakawa, Y. Shinagawa, and T. Okazawa. 1994. Anti-invading methods against the brown marmorated stink bug, *Halymorpha mista*, in houses. *The Japan Soc. Med. Entomol. Zool.* 45: 311–317.
- Welby, C., D. Shetlar, R. Hammond, S. Jones, B. Bloetscher, and A. Nielsen. 2008. Brown Marmorated Stink Bug. The Ohio State University Extension. Fact Sheet, Agriculture and Natural Resources (FS-3824-08) 3 pgs.
- Wermelinger, B., D. Wnynger, and B. Forster. 2008. First records of an invasive bug in Europe: *Halymorpha halys* Stal (Heteroptera: Pentatomidae), a new pest on woody ornamentals and fruit trees? *Bulletin Soc. Entomol. Suisse* 81: 1-8.
- Yang, Z.-Q., Y.-X. Yao, L.-F. Qiu, and Z.-X. Li. 2009. A new species of *Trissolcus* (Hymenoptera: Scelionidae) parasitizing eggs of *Halymorpha halys* (Heteroptera: Pentatomidae) in China with comments on its biology. *Ann. Entomol. Soc. Am.* 102(1): 39-47.
- Yu, G., and J. Zhang. 2007. The brown-marmorated stink bug, *Halymorpha halys* (Heteroptera: Pentatomidae) in P.R. China. *International Workshop on Biological Control of Invasive Species of Forests*. 1: 70-74.

