STINK BUGS

on Soybean in the

North Central Region

NCSRP

North Central Soybean Research Program

This publication is a regional cooperative effort between land-grant universities, the USDA, and the North Central Soybean Research Program.

Information in this field guide is intended for general stink bug management in the North Central Region of the United States. Management recommendations in other regions may differ. For more specific guidelines contact your state extension entomologist. See page 39 for contact information.

This publication is funded by the North Central Soybean Research Program.

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INTRODUCTION

Each year, approximately 67 million acres of soybean are harvested in the North Central Region. This comprises around 80% of U.S. soybean acreage. For this vital crop in the North Central Region, it is important to have proper pest management tools to identify pests, mitigate injury and assist with the pest management decision-making process.

Stink bugs are soybean pests that may decrease yield and quality significantly without proper management. Pest management of stink bugs involves correct identification and understanding the biology and scouting practices.

INTRODUCTION

State	Area harvested 2016 (millions of acres)
Illinois	10.05
Indiana	5.64
Iowa	9.45
Kansas	4.01
Michigan	2.06
Minnesota	7.50
Missouri	5.54
Nebraska	5.15
North Dakota	6.00
Ohio	4.84
South Dakota	5.17
Wisconsin	1.95
Total	**67.36**

Crop production 2016 summary (January 2017)
USDA, National Agricultural Statistic Service.

INTRODUCTION

This field guide was developed by Land Grant Universities, the USDA, and the Soybean Checkoff to assist soybean producers and scouts identify and monitor stink bugs in the North Central Region.

This field guide will discuss nine commonly encountered pest species including:

- Green stink bug
- Brown stink bug
- Dusky stink bug
- Onespotted stink bug
- Brown marmorated stink bug
- Redshouldered stink bug
- Rice stink bug
- Twice-stabbed stink bug
- Say stink bug

INTRODUCTION

In addition, two beneficial stink bugs are discussed that may be encountered:

- Spined shouldered bug
- Twospotted stink bug

These stink bugs are predators of crop pests and should not be included in calculations for monitoring and treatment.

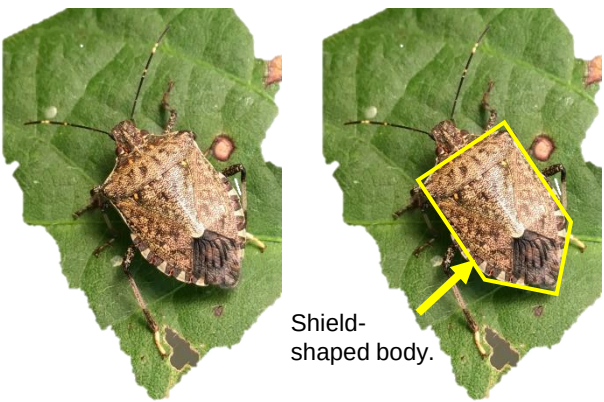
Spined shouldered stink bug nymph feeding on caterpillar.

For a more detailed review of stink bug biology and management, see the publication by Koch et al. 2017. Refer to page 37 for more details.

https://doi.org/10.1093/jipm/pmx004

STINK BUG BIOLOGY

Stink bugs belong to the insect order Hemiptera and family Pentatomidae. Stink bugs can be many different colors and variable sizes. Adults have a classic shield-shaped body that helps with identification.

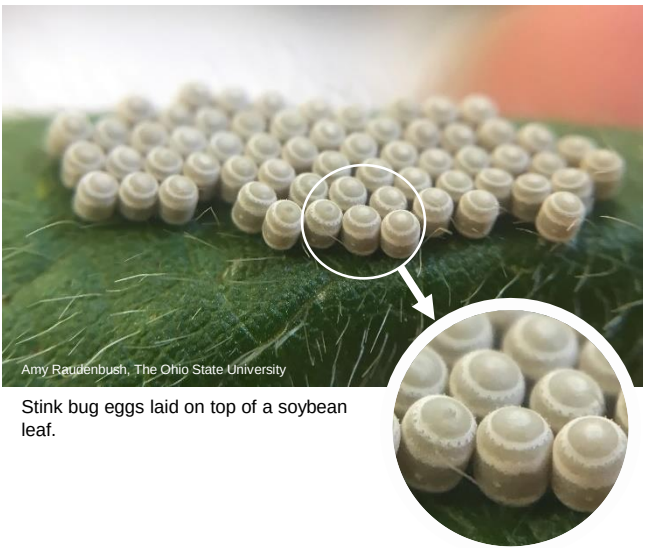


Amy Raudenbush, The Ohio State University

Left to right: adult brown marmorated stink bug; yellow outline around stink bug shield highlighting the characteristic stink bug shape.

STINK BUG BIOLOGY

Stink bug eggs are barrel shaped with a ring of hairs on top of the egg. Typically, the eggs are laid on the underside of soybean leaves but can be found on other parts of the plant.



Stink bug eggs laid on top of a soybean leaf.

Stink bug eggs are a variety of colors, ranging from clear to pale green to tan, depending on the species of stink bug and the maturity of the eggs.

STINK BUG BIOLOGY

Immature stink bugs are called nymphs and they develop through 5 stages (called instars) before becoming adults. Nymphs are smaller and rounder than the adults, and lack fully developed wings thus cannot fly. In 4th and 5th instars small wing pads begin to form. Within a species, the different instars may vary in color.

Enlarged image of brown marmorated stink bug 2nd instar.

Enlarged image of brown marmorated stink bug 5th instar; arrow indicates developing wing pads.

STINK BUG BIOLOGY

Both adults and nymphs feed on soybean pods and seeds with their piercing-sucking mouthparts (a straw-like structure located on the underside of the stink bug). These mouthparts allow the insect to puncture the soybean pod and feed directly from the bean, resulting in shriveled, deformed, and discolored seeds. On pest species, the mouthparts are similar thickness to the antenna; whereas, beneficial species' mouthparts are double the thickness of the antenna.

Stink bug piercing-sucking mouthpart.

Stink bug mouthparts on a brown marmorated stink bug.

STINK BUG SCOUTING

All life stages of stink bugs (nymphs and adults) can be present on soybean plants at the same time; however, early instars do not cause as much damage as the larger 5th instars and adults. Begin scouting for stink bugs when the soybean plant reaches the R2 stage. The R2 stage is defined as full bloom, which is when the plant has an open flower on one of the two upper-most nodes. Scouting should be performed once a week and continue throughout the season as pods develop and seeds fill. Stink bug feeding can cause economic loss from the R3 stage (pod set) to the R6 stage (full seed set). See page 35 for soybean growth stage chart.

Soybean plant in full bloom (R2).

STINK BUG SCOUTING

Sampling recommendations vary in the North Central Region; therefore, checkoff funded research is currently being conducted to optimize sampling methods. Our current recommendation is the following:

Using a sweep net, sample in at least 5 locations in smaller fields, more in larger fields. Stink bugs tend to be more numerous on field edges so sample throughout the field for the overall picture.

Sweep net sampling a soybean field.

STINK BUG SCOUTING

At each location take a set of 10 sweeps, taking a step with each sweep of the vegetation. Count the number of stink bugs captured in your sweep net for each 10 sweep set. All pest stink bug species, both adults and nymphs, should be counted together.

Stink bug threshold levels

Seed usage	Average / 10 sweep set
Food grade or seed	2
Grain	4

Green stink bugs collected by sweep net sampling.

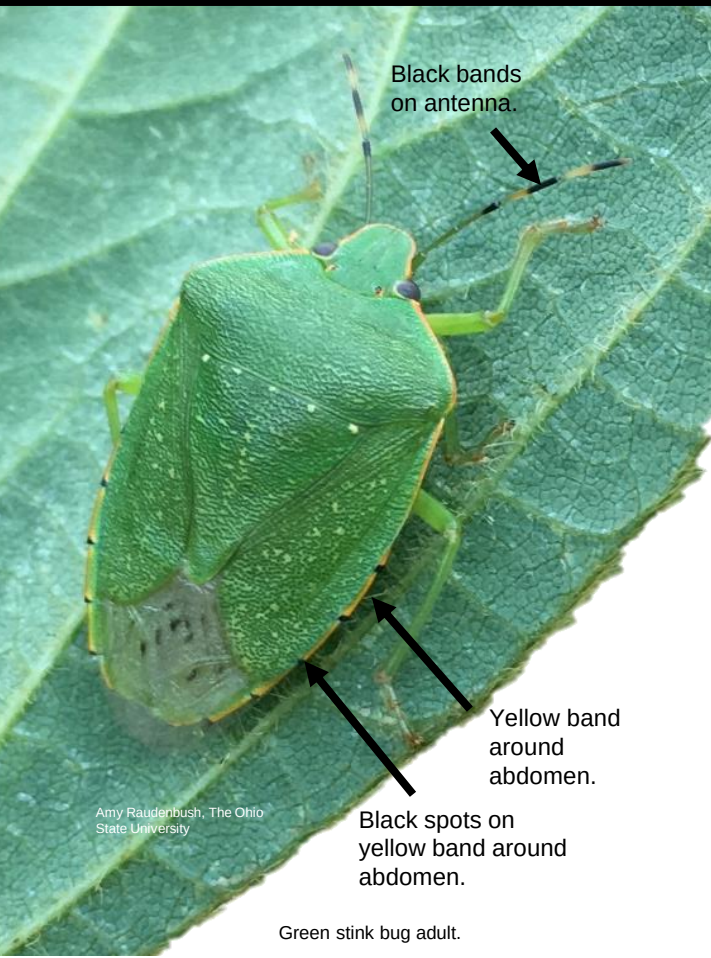
STINK BUG MANAGEMENT

If your soybean field is at threshold level, pesticides are an effective method for controlling stink bugs from pod set (R3) to full seed set (R6). Applications prior to or after this time are not necessary. Always follow the label guidelines and use appropriate rates for stink bugs in soybean.

If you have questions regarding an insecticide label or rate, contact your local extension office for up-to-date advice. A list of field crop extension specialists is provided on the last page of this field guide (page 39).

After an insecticide treatment has been made, be sure to scout the field to ensure stink bug populations remain under threshold level.

GREEN STINK BUG
CHINAVIA HILARIS



Green stink bug adult.

GREEN STINK BUG
CHINAVIA HILARIS

Green stink bug nymphs.

Key identification characteristics:

- Adults are green with black bands on antennae and a yellow outline with black spots around the abdomen
- Early instars are round, black with orange, yellow and white markings
- Later instars have black wing pads and a green abdomen or are green with a yellow margin around the abdomen

Green stink bug 5th instar.

BROWN STINK BUG
EUSCHISTUS SERVUS SPP.

Brown stink bug 1st instars.

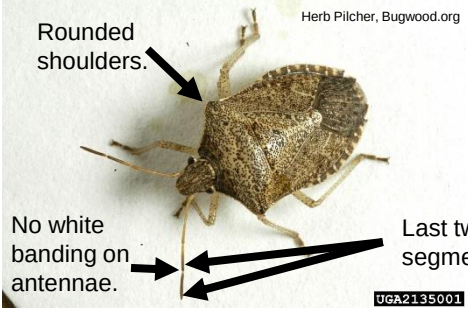
Brown stink bug nymphs.

Key identification characteristics:

- Adults have rounded shoulders with a small row of spines and no white banding on the antennae
- Adult underside of abdomen is yellowish-green or pink
- Early instars are round and brown
- Late instars are green with dark stippling on wing pads and brown triangle on abdomen

Brown stink bug 5th instar.

BROWN STINK BUG
EUSCHISTUS SERVUS SPP.



Brown stink bug adult.

There are 2 subspecies and a hybrid of *E. servus* in the North Central Region:

Euschistus servus servus

- Last two segments of antennae are yellowish/reddish brown
- Edge of abdomen not covered by wings

Euschistus servus euschistoides

- Last two segments of antennae dark brown
- Edge of abdomen covered by wings

Euschistus servus hybrid

- Hybrid species as a result of *E. servus servus* and *E. servus euschistoides* mating

DUSKY STINK BUG
EUSCHISTUS TRISTIGMUS SPP.

Key identification characteristics:

- Adults are brown with pointed shoulders, and males have spots on underside of abdomen

Dusky stink bug adults; female adult (left) and male adult (right).

Spots on male.

Top to bottom: dusky stink bug nymphs; dusky stink bug adult.

There are two subspecies of *E. tristigmus* in the North Central Region:

Euschistus tristigmus luridus

- Rounded shoulders
- Red / black antennae

Euschistus tristigmus tristigmus

- Spiny shoulders
- Brown / pale antennae

ONESPOTTED STINK BUG
EUSCHISTUS VARIOLARIUS

Key identification characteristics:

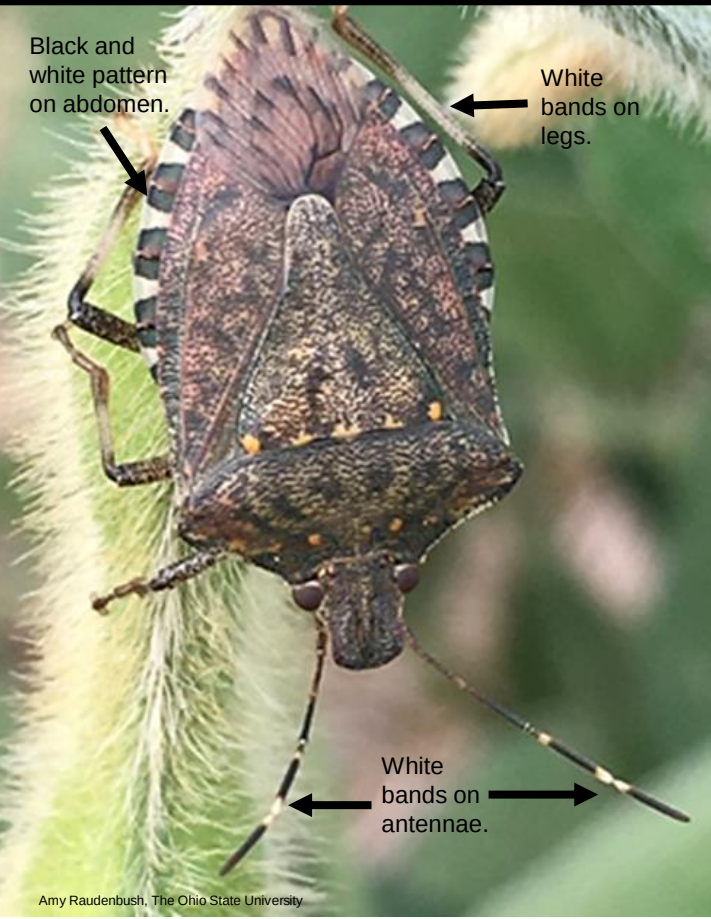
- Adults are brown with pointed shoulders
- Adult males have one spot on the lower part of the underside of abdomen
- Antennae and legs do not have white bands
- Legs are tan and stippled with brown

Pointed shoulders.

Spot on underside of male abdomen.

Top to bottom: Onespotted stink bug adult; male onespotted stink bug with spot on underside of abdomen.

BROWN MARMORATED STINK BUG *HALYOMORPHA HALYS*



Brown marmorated stink bug adult (BMSB).

BROWN MARMORATED STINK BUG *HALYOMORPHA HALYS*

Key identification features:

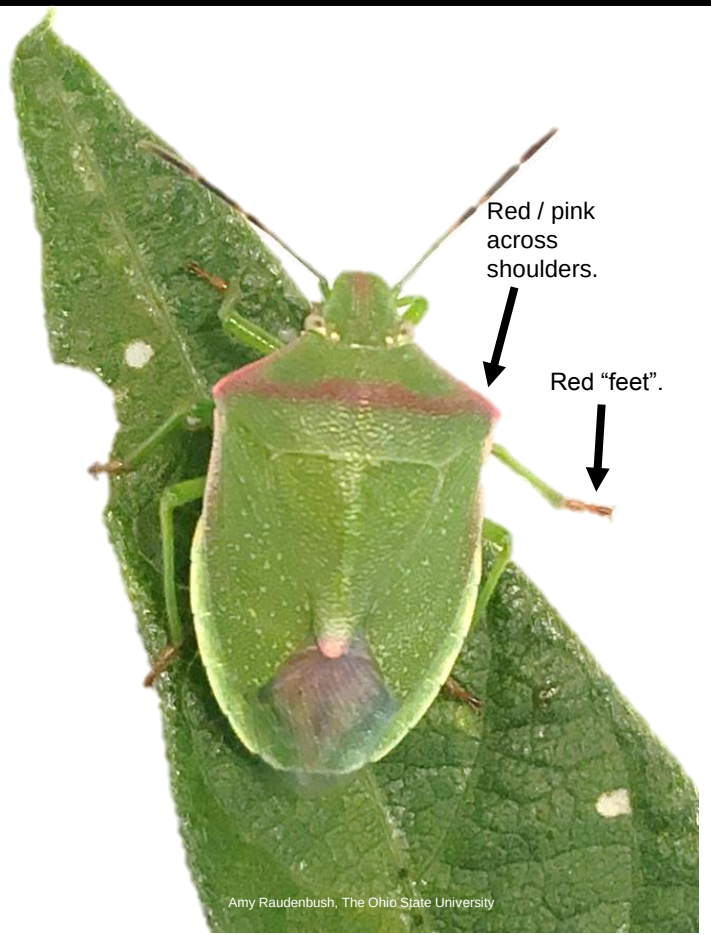
- Adults are brown with white bands on antennae, and black and white banding on abdomen
- Adult wing veins are outlined in black
- 1st instars are orange and black
- 2nd instars are black with white banding on antennae and legs
- 4th and 5th instars are brown and wing pads become visible

Top to bottom: BMSB 1st instars around egg mass; 2nd instar; 5th instar.

The brown marmorated stink bug (BMSB) is a recent invasive species and increasingly common in some states.

BMSB adults overwinter indoors, making it a nuisance to homeowners.

REDSHOULDERED STINK BUG
THYANTA CUSTATOR

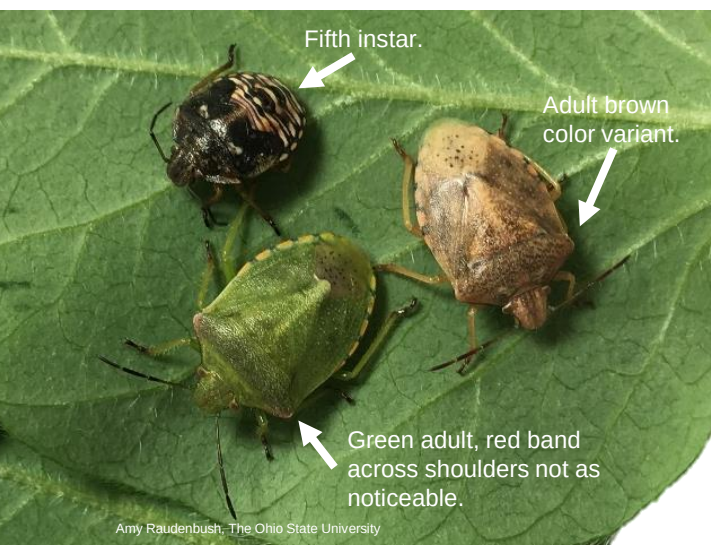


Redshouldered stink bug adult.

REDSHOULDERED STINK BUG
THYANTA CUSTATOR

Key identification characteristics:

- Adults are green or brown
- Green adults may have a red/pink band across the shoulders
- The brown color variant of adults is common in the fall
- Nymphs are tan and black with thin red stripes on the abdomen



Redshouldered stink bug adults (green and brown) and a 5th instar from the same egg mass.

RICE STINK BUG
OEBALUS PUGNAX

Key identification characteristics:

- Adults are yellow/tan
- The abdomen is elongated and not as wide as other stink bug species
- Shoulders have spines that point towards head

Rice stink bug adult.

TWICE-STABBED STINK BUG
COSMOPEPLA LINTNERIANA

Key identification characteristics:

- Adults are black with red marking across shoulders and two red marks on shield over the abdomen
- Black antennae and legs
- Smaller than other stink bug species

Twice-stabbed stink bug adult.

SAY STINK BUG
CHLOROCHROA SAYI

Say stink bug adults mating.

Key identification characteristics:

- Adults are green with either a white or red/pink spot on shield over the abdomen
- White or pink outline around abdomen
- This species can also be black with an orange or white outline around abdomen

Say stink bug adult.

SPINED SHOULDERED BUG
PODISUS MACULIVENTRIS

Key identification characteristics:

- Adults are brown with pointy shoulders
- Legs yellowish to light brown
- Brown mark on tip of wings
- Thicker mouthparts than pest species, twice the thickness of the antenna

Spined shouldered bug adults.

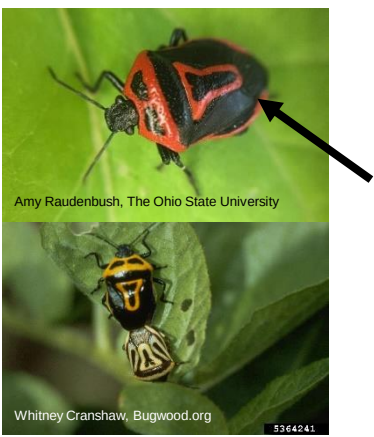
Monitoring: This is a beneficial stink bug to have in your field; it is a predatory species! **Do not include in threshold counts.**

Spined shouldered bug adult feeding on Colorado potato beetle larva.

TWOSPOTTED STINK BUG
PERILLUS BIOCULATUS

Key identification characteristics:

- Adults vary in colors from white, yellow orange and red with black legs
- Pattern on shield is similar despite color variation
- Mouthparts twice the thickness of the antenna



Pattern on shield similar despite color variations.

Top to bottom: adult red color variant of twospotted stink bug; orange and yellow color variants mating.

Monitoring: This is a beneficial stink bug to have in your field; it is a predatory species! **Do not include in threshold counts.**

STINK BUG LOOK-A-LIKES

While scouting your fields, you may encounter some other insects that are not stink bugs but look similar.

BURROWING BUG

- Adults are black with a white margin
- Oblong body shape
- Adults are smaller than most adult stink bug species
- Nymphs are red
- Not an economic pest of soybean

KUDZU BUG

- Greenish/brown color
- Globular body shape
- Currently not a known pest in the North Central Region

STINK BUG LOOK-A-LIKES

WESTERN CONIFER SEED BUG

- Elongated shield-shaped body
- Leaf like structures on legs
- Not often found in soybean fields

WHEEL BUG

- Adults are predatory
- Oval body shape
- Raised wheel structure on the back
- Thick piercing-sucking mouthparts

SOYBEAN INJURY

Green stem syndrome

Green stem syndrome occurs when soybean plants stay green at a time when the leaves should be maturing (yellowing) and dropping to the ground, thus resulting in delayed maturity. It is thought to be caused by disease, insect injury (such as feeding by stink bugs), and environmental stress during the reproductive stage of soybean plants. Since stink bugs are often found more densely on field edges, green stem syndrome is more prevalent on the edges, though the inner field may mature properly.

Soybean field exhibiting green stem syndrome symptoms.

SOYBEAN INJURY

Seed injury from feeding

Injury to soybean seeds is caused by stink bugs feeding on the pods with their piecing-sucking mouthparts. Adults and fifth instars are known to cause more injury than smaller instars. From the outside of the pod, seed injury is difficult to see; however, in some cases it can cause noticeable discoloration. Seed injury is much more obvious inside the pod where seeds will appear shriveled, discolored or be aborted.

Soybean seed injury from stink bug feeding.

SOYBEAN INJURY

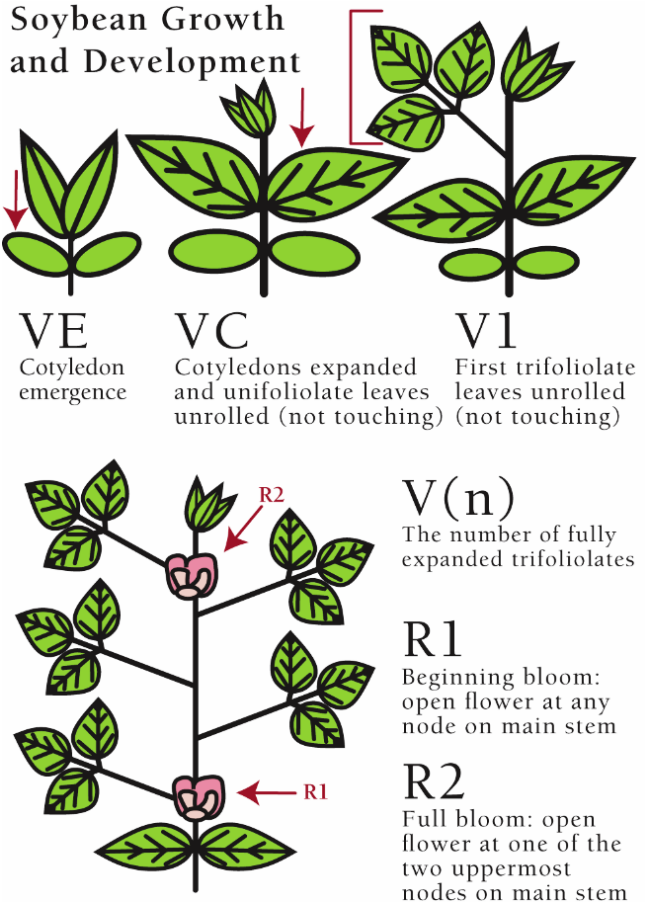
Levels of seed injury resulting from stink bug feeding

No injury - round and tan seeds.

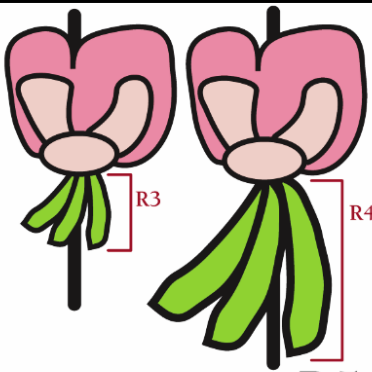
Moderate injury - noticeable shriveling, slight discoloration and deformation of seeds.

Severe injury - small shriveled and discolored seeds.

SOYBEAN STAGES



SOYBEAN STAGES

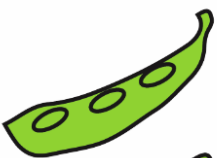


R3

Beginning pod set: pods <5/16 in. long at four uppermost nodes

R4

Full pod set: pods >3/4 in. long at four uppermost nodes

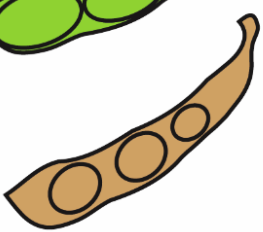


R5

Beginning seed set: seed is 1/8 in long at one of four uppermost nodes

R6

Full seed set: green seed that fills pod capacity at one of four uppermost nodes



R7

Beginning maturity: one pod on main stem has reached mature color

R8

Full maturity: 95% of pods have reached mature color

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USDA, National Agricultural Statistic Service. 2017. Crop production 2016 summary.

ACKNOWLEDGEMENTS

Written and edited by Amy Raudenbush, Andy Michel and Kelley Tilmon, The Ohio State University

Photo credits by photographer and page number:
Russ Ottens, University of Georgia, Bugwood.org, pp. 7, 30
Amy Raudenbush, The Ohio State University, pp. 8, 9, 12-14, 16, 17, 22-25, 27, 29, 32, 33
Susan Ellis, Bugwood.org, pp. 10, 11, 20
Herb Pilcher, USDA Agricultural Research Service, Bugwood.org, pp. 18-20
Hanna Royals, Museum Collections: Heteroptera, USDA APHIS ITP, Bugwood.org, pp. 21, 28
David R. Lance, USDA APHIS PPQ, Bugwood.org, p. 23
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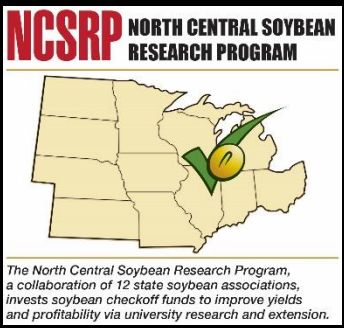

A reference for stink bug identification and management on soybean in the North Central Region.

December 2017