STINK BUGS
OF SOYBEAN IN THE NORTH CENTRAL REGION

FIELD GUIDE

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 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 specific guidelines contact your state extension specialist (page 37).

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

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INTRODUCTION

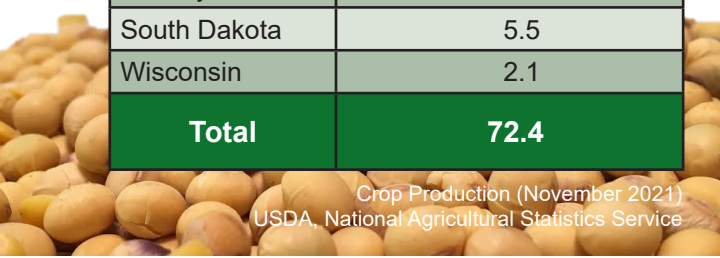
Around 80% of soybean harvested in the U.S. are grown in the North Central Region, which accounts for approximately 72 million acres. For this vital crop in the North Central Region, it is important to have proper pest management tools to identify pests, mitigate damage and assist with pest management decision-making process.

Stink bugs are common pests of soybean that may significantly decrease yield and quality without proper pest management, which includes correct identification, understanding pest biology and proper scouting practices.

INTRODUCTION

Soybean harvested (millions of acres) from each state in the North Central Region in 2021

State	Area harvested in 2021 (millions of acres)
Illinois	10.6
Indiana	5.7
Iowa	10.0
Kansas	4.8
Michigan	2.1
Minnesota	7.6
Missouri	5.7
Nebraska	5.6
North Dakota	7.3
Ohio	4.8
Pennsylvania	0.6
South Dakota	5.5
Wisconsin	2.1
Total	**72.4**



Crop Production (November 2021)
USDA, National Agricultural Statistics Service

INTRODUCTION

This field guide, developed by land grant universities, the USDA and the Soybean Checkoff will assist soybean producers and scouts identify and monitor stink bugs in the North Central Region.

This field guide will discuss 11 pest stink bug species including:

- Green stink bug
- Brown marmorated stink bug
- Brown stink bug
- Dusky stink bug
- Onespotted stink bug
- Redshouldered stink bug
- Rice stink bug
- Twice-stabbed stink bug
- Say stink bug
- *Mormidea lugens*
- *Banasa* spp.

INTRODUCTION

Two beneficial stink bugs are also discussed including:

- Spined soldier bug
- Twospotted stink bug

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

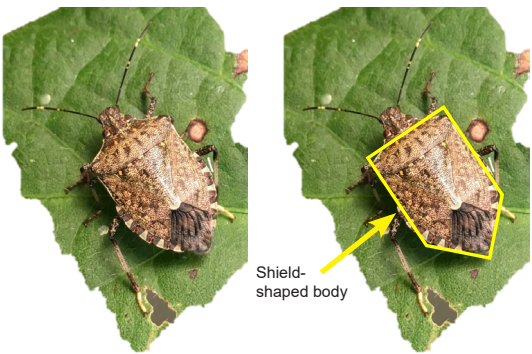
Spined soldier bug 5th instar feeding on a pest stink bug species.

For a more detailed review of stink bug biology and management, refer to the publication by Koch et al. 2017 (page 35).

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.

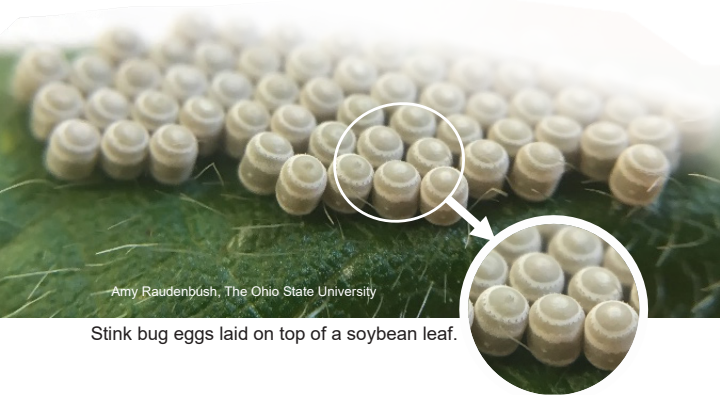


Amy Raudenbush, The Ohio State University

Left to right: adult brown marmorated stink bug (BMSB); yellow outline highlighting the characteristic stink bug shape.

STINK BUG BIOLOGY

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



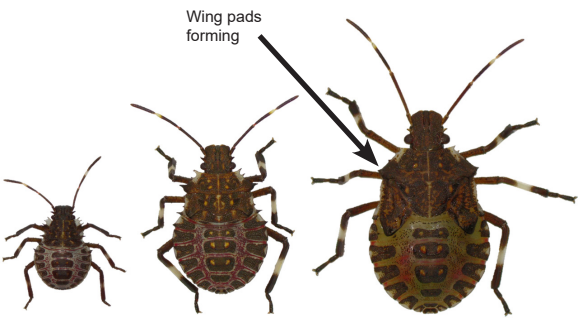
Stink bug eggs laid on top of a soybean leaf.

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 (called instars, or nymphs) develop through 5 stages before becoming adults.

Instars are smaller and rounder in shape 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.



Amy Raudenbush, The Ohio State University

Left to right: 3rd instar brown marmorated stink bug (BMSB), 4th instar BMSB, 5th instar BMSB.

STINK BUG BIOLOGY

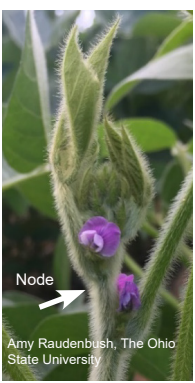
Both adults and instars feed on soybean pods and seeds with their piercing-sucking mouthparts (a straw-like structure located on the underside of the stink bug). These mouthparts allow the insect to puncture the soybean pod and feed directly from the bean, resulting in shriveled, deformed, and discolored 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 mouthparts on a brown marmorated stink bug (BMSB).

STINK BUG SCOUTING

Adults and 5th instars cause more feeding damage than earlier instars; however, all life stages of stink bugs can be present on soybean plants at the same time.

Begin scouting for stink bugs when the soybean plant reaches the R2 stage (full bloom, when the plant has an open flower at one of the two upper-most nodes on the main stem). 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 pages 38 - 39 for soybean development information.



Soybean plant in full bloom (R2).

STINK BUG SCOUTING

Sampling recommendations will vary based off of your location in the North Central Region. Checkoff funded research is currently being conducted to optimize samplings. Our general recommendation is the following:

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

Sweep net sampling a soybean field.

STINK BUG MANAGEMENT

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 instars, should be counted together.

Stink bug sweep net threshold levels

Seed usage	Average # of stink bugs / 10 sweeps
Food grade or seed	2
Grain	4

Counting stink bugs recovered in a sweep net sample.

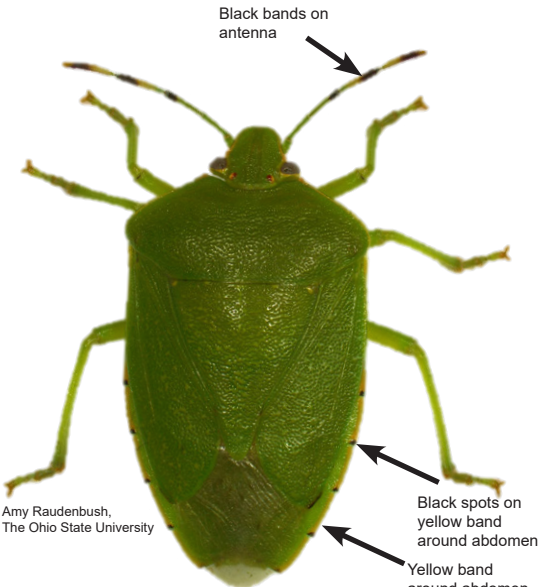
STINK BUG SCOUTING

Thresholds vary based on seed usage. If your soybean field is at threshold level, pesticides are an effective method for controlling stink bugs from pod fill (R3) to seeds fully forming (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 a label or rate, contact your local extension office for up-to-date information. A list of field crop specialists is provided on page 37 of this field guide.

After an insecticide application has been made, be sure to re-scout the field to ensure stink bug populations remain below threshold level.

GREEN STINK BUG
CHINAVIA HILARIS



Green stink bug adult.

Key identification characteristics:

- Adults are green with black bands on antennae
- The abdomen has a yellow outline with black spots
- Adults are larger than most other stink bug species

GREEN STINK BUG
CHINAVIA HILARIS

Amy Raudenbush, The Ohio State University

Green stink bug instars.

Key identification characteristics:

- 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

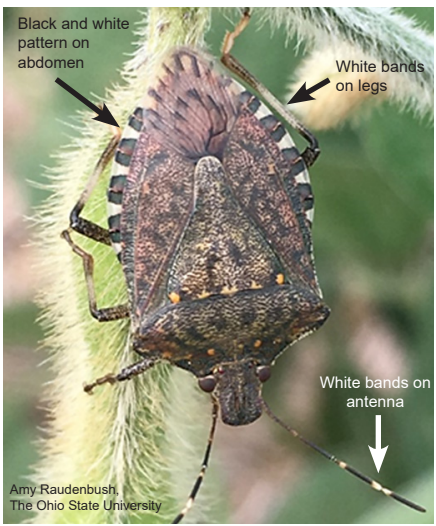
Amy Raudenbush, The Ohio State University

Color variations of green stink bug 5th instars.

BROWN MARMORATED STINK BUG *HALYOMORPHA HALYS*

The brown marmorated stink bug (BMSB) is an invasive species that has become increasingly common in some states.

BMSB adults are known to overwinter indoors, making them a nuisance to homeowners.



Brown marmorated stink bug (BMSB) adult.

Key identification characteristics:

- Adults are brown with white bands on antennae, and black and white banding on abdomen
- Adult wing veins are outlined in black

BROWN MARMORATED STINK BUG *HALYOMORPHA HALYS*

Amy Raudenbush, The Ohio State University

Left to right: brown marmorated stink bug (BMSB), 3rd, 4th , and 5th instars.

Key identification characteristics:

- 1st instars are orange and black
- 2nd instars are black with white banding on antennae and legs
- 4th and 5th instars are brown with white banding on antennae and legs and wing pads become visible

Newly molted BMSB adult.

Newly molted stink bugs may also be seen in the field. These are a similar shape, but lighter in color. The color will darken when the outer surface hardens.

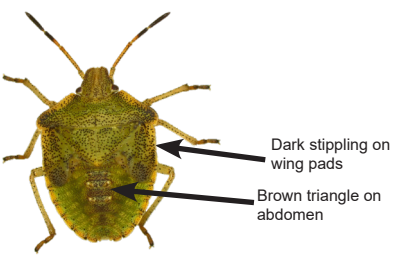
BROWN STINK BUG
EUSCHISTUS SERVUS SSP.

Brown stink bug 1st instars.

Brown stink bug instars.

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



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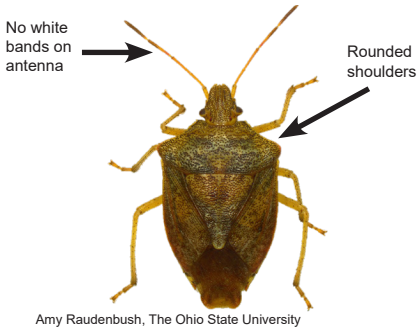
Brown stink bug 5th instar.

BROWN STINK BUG *EUSCHISTUS SERVUS* SSP.



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Brown stink bug adult.

There are 2 subspecies and a hybrid of *E. servus*:

Euschistus servus servus

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

Euschistus servus euschistoides

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

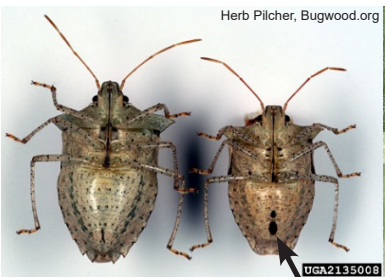
***Euschistus servus* hybrid**

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

DUSKY STINK BUG
EUSCHISTUS TRISTIGMUS SSP.

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*:

Euschistus tristigmus luridus
- Rounded shoulders
- Red / black antennae

Euschistus tristigmus tristigmus
- Spiny shoulders
- Brown / pale antennae

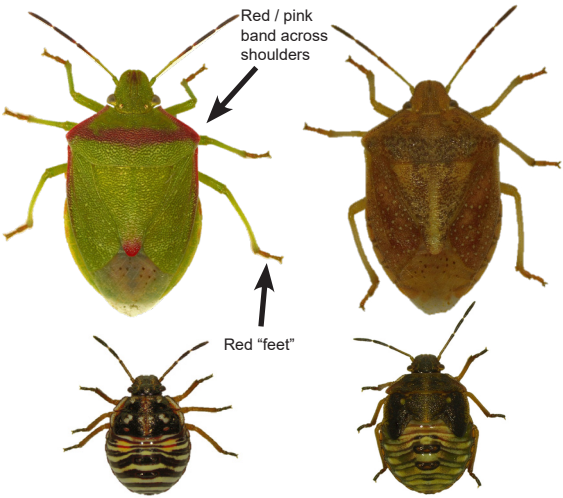
ONESPOTTED STINK BUG
EUSCHISTUS VARIOLARIUS

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

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

REDSHOULDERED STINK BUG
THYANTA CUSTATOR



Amy Raudenbush, The Ohio State University

Red shouldered stink bug adults and instars. Top left: green variation; top right: brown variation; bottom left 4th instar; bottom right: 5th instar.

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

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.

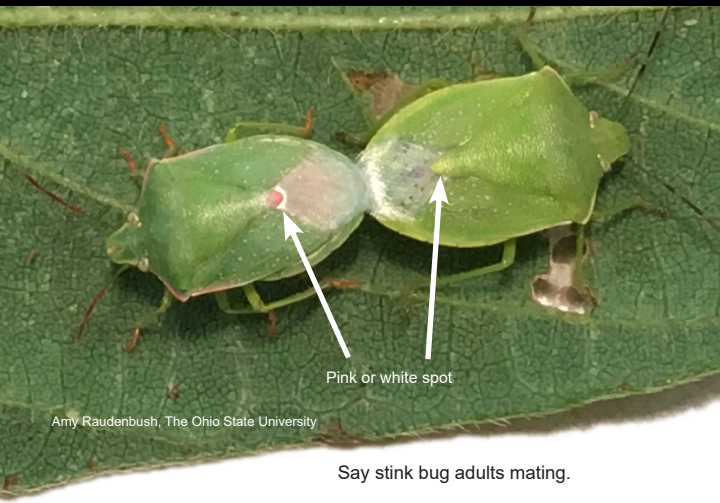
TWICE-STABBED STINK BUG
COSMOPEPLA LINTNERIANA

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.

MORMIDEA LUGENS

Key identification characteristics:

- Adults are dark brown with a light triangle outlined
- Legs are light brown
- Smaller than other stink bug species

BANASA SPP.

Key identification characteristics:

- Adults are green with dark marking across shoulders and two dark marks on the wing pads over the abdomen
- Green legs
- Smaller than other stink bug species

SPINED SOLDIER BUG
PODISUS MACULIVENTRIS

The spined soldier bug is a predatory insect found in the field. These species feed on other soft bodied insects including pest stink bugs species. **Do not include beneficials in your threshold counts.**

Amy Raudenbush, The Ohio State University

Spined soldier bug adults. Left: side view showing mouthparts. Right: dorsal view.

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
- Later instars are an orange-brown color with a cream colored abdomen with red lines

Spined soldier bug 5th instar feeding on pest stink bug.

TWOSPOTTED STINK BUG
PERILLUS BIOCULATUS

Twospotted stink bug is a predatory insect found in the field. These species feed on other soft bodied insects including pest stink bugs species. **Do not include beneficials in your threshold counts.**

Key identification characteristics:

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

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

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 shaped
- 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 shaped
- Raised wheel structure on the back
- Thick piercing-sucking mouthparts

SOYBEAN DAMAGE

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 DAMAGE

Seed damage from feeding

Damage to soybean seed is caused by stink bugs feeding on the pods with their piecing-sucking mouthparts. Adults and 5th instars are known to cause more damage than earlier instars. From the outside of the pod, seed damage is difficult to see; however, in some cases it can cause noticeable discoloration. Seed damage is much more obvious inside the pod where damaged seeds appear shriveled, discolored or become aborted.

Soybean seed damage from stink bug feeding.

SOYBEAN DAMAGE

Levels of seed damage resulting from stink bug feeding

No damage - round and tan seeds.

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

Severe damage – small shriveled and discolored seeds.

Andy Michel, The Ohio State University

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

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Whitney Cranshaw, Colorado State University, Bugwood.org, pg. 29

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Mary Gardiner, The Ohio State University, Bugwood.org, pg. 31

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Andy Michel, The Ohio State University, pg. 34

Russ Ottens, University of Georgia, Bugwood.org, pg. 30

Donald Owen California Department of Forestry and Fire Protection, Bugwood.org, pg. 31

Frank Peairs, Colorado State University, Bugwood.org, pg. 26

Herb Pilcher, USDA Agricultural Research Service, Bugwood.org, pgs. 20 & 22

Amy Raudenbush, The Ohio State University, pgs. 1, 7 - 10, 12 - 14, 16 - 21, 24, 26 - 29, 32 - 33, 36

Hanna Royals, Museum Collections: Heteroptera, USDA APHIS ITP, Bugwood.org, pg. 23

Louis Tedders USDA Agricultural Research Service, Bugwood.org, pg. 25

STATE CONTACTS

State	Contact	Email
Illinois	Nick Seiter	nseiter@illinois.edu
Indiana	John Obermeyer or Christian Krupke	obe@purdue.edu ckrupke@purdue.edu
Iowa	Erin Hodgson	ewh@iastate.edu
Kansas	Brian McCornack	mccornac@ksu.edu
Michigan	Chris DiFonzo	difonzo@msu.edu
Minnesota	Robert Koch	koch0125@umn.edu
Missouri	Kevin Rice	ricekev@missouri.edu
Nebraska	Tom Hunt or Justin McMechan	thunt@unl.edu justin.mcmechan@unl.edu
North Dakota	Janet Knodel	janet.knodel@ndsu.edu
Ohio	Andy Michel or Kelley Tilmon	michel.70@osu.edu tilmon.1@osu.edu
Pennsylvania	John Tooker	tooker@psu.edu
South Dakota	Adam Varenhorst	adam.varenhorst@sdstate.edu
Wisconsin	Russell Groves	groves@entomology.wisc.edu

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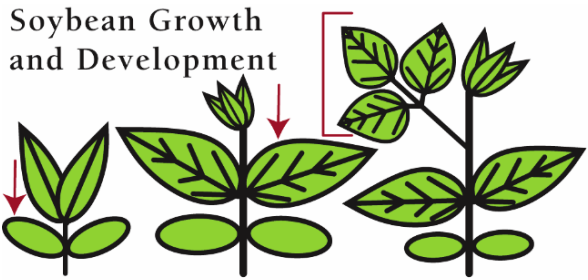
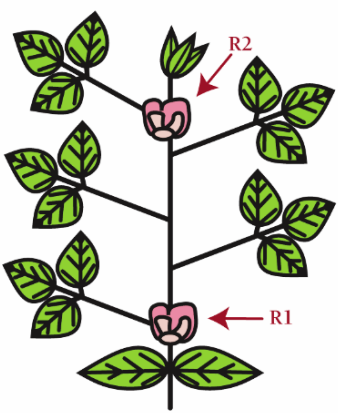




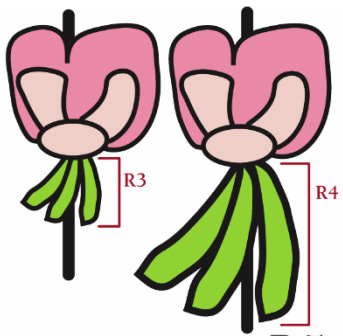
V(n)
The number of fully expanded trifoliolates

R1
Beginning bloom: open flower at any node on main stem

R2
Full bloom: open flower at one of the two uppermost nodes on main stem

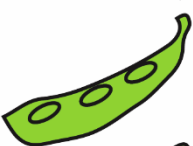
Erin Hodgson, Iowa State University

SOYBEAN STAGES



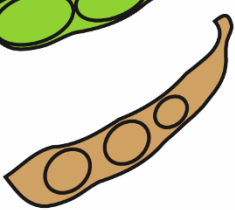
R3
Beginning pod set: pods <5/16 in. long at four uppermost nodes

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

Erin Hodgson, Iowa State University

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