

SUGGESTED GUIDELINES

*for Using Fungicides*

————— To Manage Soybean Rust —————

Mississippi State  
UNIVERSITY  
**Extension**  
SERVICE

Asian Soybean Rust (SBR) was first reported in the continental United States in November 2004 in a soybean field near Baton Rouge, Louisiana. A few days later, SBR was identified at several locations in Mississippi, including late-planted soybeans in Adams, Warren, Holmes, Jefferson, and Washington counties. Fortunately, the arrival of SBR very late in the growing season had little to no yield impact on the overall soybean crop in Mississippi, because most of the crop was already harvested. But this shows how a wind-borne pathogen can cover a large area quickly. This publication will help you develop detection and management strategies for future growing seasons. The following are guidelines based on information currently available on product efficacy, economics, response to foliar fungicides in the absence of rust, and resistance management. Recommendations are likely to change as we learn more about soybean rust and the products used for control. Always follow the manufacturer's label for rates, compatibility with other products, sprayer setup, spray volumes, spray intervals, use of adjuvants, and other pertinent information.

## **D E T E C T I O N   S T R A T E G I E S**

Indicator crops, or sentinel plots, are effective as an early detection system in some areas of the world. In Africa, one-half- to one-acre sentinel plots are planted about one month before the commercial crop and are established regionally every 20 to 100 miles. They are surveyed daily for SBR after flowering begins. This strategy protects most of the commercial crop because SBR can be detected at sentinel locations before the commercial crop is planted or reaches the most susceptible growth stage, which is flowering or later. First sprays are made after SBR is detected in sentinel plots and later applications are made on 3-week (21-day) intervals. Waiting until SBR was found in grower fields to trigger applications often resulted in yield loss.

This strategy may prove more effective in Mississippi because the majority of our soybean crop is grown in the northern half of the state. Strategically located sentinel plots planted from late February through mid April should serve as an effective detection tool because the anticipated path of SBR

movement will be northward from overwintering sites in the south. We used sentinel plots during the 2004 growing season and did not detect SBR at any location. All sentinel sites matured before rust detection in November, but these sites effectively ruled out the presence of SBR during the primary part of the growing season.

Sentinel plots have been established at approximately 20 locations throughout Mississippi in 2005. Planting began in late February, and sites are located along the Gulf Coast to the Mississippi River, northward to North Sunflower County and throughout central and north Mississippi. If we positively identify rust, we will notify producers and other agricultural professionals via multiple media sources, including television, radio, websites (msucares, soyrust), and popular press. We will also notify all county Extension offices.

Producers should intensively scout all fields, especially after flowering begins. Symptoms generally start in the lower canopy, so scout lower leaves first. Send suspect samples to the Plant Disease and Nematology Diagnostics Laboratory at Mississippi State University (9 Bost Hall, Mississippi State, MS 39762). Since there may be a large number of samples to be processed, you may have to pay a fee for each sample you submit. You may want to place plant samples in a sealable plastic bag with a dry paper towel, and keep the bag at room temperature. If rust is present on the sample, spores should begin to form in 1 to 3 days. Actively sporulating rust pustules are fairly easy to identify, using diagnostic tools and a 20X hand lens.

Early detection is essential. Yield losses may have already occurred, with as little as 10 percent disease incidence in the lower canopy.

## C O N T R O L

No commercial soybean varieties are resistant to soybean rust. Fungicides are the only control currently available. Table 1 lists fungicides active against soybean rust. Some have a full Section 3 federal label, some will be registered via Section 18 (emergency exemption) labeling, and other product registration is pending.

Fungicides for rust control fall into three general categories: triazoles, strobilurins, and chlorothalonil. Mixtures of triazoles and strobilurins are also available. Triazoles offer some curative properties and can be used before or after rust detection. But all products are BEST used PREVENTATIVELY. In addition, triazoles offer varying levels of residual protection that generally last 14 to 20 days, depending on the product and rate.

Strobilurins are not curative. Only use them alone, PREVENTATIVELY, before rust occurs in the area. Strobilurins offer good residual control of soybean rust if you apply them before you detect rust. They also offer broad-spectrum control of many other diseases. Yield responses ranging from 4.4 to 5.9 bu/A have been documented in Mississippi with strobilurin-based fungicides applied between the R3 and R5 soybean growth stages with no soybean rust. We strongly encourage strobilurin-based fungicide sprays at the R3 growth stage, even when there is no soybean rust. Little to no yield responses have been documented with applications made before R3 where there is no soybean rust.

Preventative spray programs have been used effectively in other countries where soybean rust is a problem. These programs generally involve a fungicide application at flowering followed by a second application approximately 20 days later. Preventative spray programs are generally used in areas of the world where soybean rust is present year round. In the United States, soybean rust will likely have to reenter on wind currents each year from areas in the South where rust overwinters. These preventative programs probably will not be widely needed at first but probably will become a common practice in the future.

It is critical that producers initiate spray programs when soybean rust is detected in the region. Significant yield losses are likely to occur if we let soybean rust develop before spraying.

Tables 2 and 3 help determine critical intervals of soybean development under several different production situations. Table 4 describes each growth stage. If rust is present, residual control from fungicides will likely be needed through the R6 growth stage. Tables 2 and 3 will help you match the length of product residual with various soybean growth stages.

Canopy coverage is essential for good disease control. As a general rule of thumb, you should spray at least 5 gallons per acre (GPA) by air and 15 GPA by ground. Refer to specific product labels for guidelines. Adjuvants may improve disease control and coverage, especially with strobilurin fungicides. Droplet sizes of (285 to 335) microns are best for most fungicide applications. Refer to nozzle manufacturer's specifications and set up sprayers to obtain this droplet size.

## **U S I N G   C O N T R O L   O P T I O N   S H E E T S**

Find the situation below that best fits your scenario. Selection "A" should be considered the best option. If choice one is unavailable, you should move down to the next choice. If that choice is unavailable, move to the next, and so forth. When you have selected a product for your first application, move to the right for your second and third (only if needed) application choices. Use this same elimination method to select the appropriate fungicide type for second and third applications.

**Rust NOT detected in field, vicinity, or sentinel plots. Soybeans have NOT reached R3 growth stage.**

**OPTION 1: Do nothing.**

**OPTION 2: Use this preventative spray program:**

<b>First Application</b>	<b>Second Application</b>	<b>Third Application</b>
<p>At flowering, R1 to R2 growth stage. Some Triazoles provide good residual activity and are likely more economical than strobilurins at this growth stage. Yield responses to strobilurins and triazoles applied before R3 have been limited where there is no rust. Indeterminate soybeans will have significant vegetative growth remaining at this stage. Determinates will have already produced most of their vegetative growth, so strobilurins may be better on determinates at this growth stage (not documented).</p>	<p>14 to 21 days later. Refer to specific product labels for suggested spray interval. Should coincide with R3-R4 growth stages. Strobilurin-based programs used at this timing increase the likelihood of yield increases from control of diseases other than rust. Triazoles control rust but are generally less effective on other diseases.</p>	<p>Only if rust persists and pod fill is not complete. Refer to specific product labels for suggested spray interval. Late applications may improve seed quality and protect against weathering events. Check pre-harvest intervals.</p>
<p><b>A. Triazole:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Strobilurin:</b> ONLY if rust has still NOT been detected.</p>	<p><b>A. Triazole</b> <b>B. Strobilurin – Triazole Mixture</b></p>
	<p><b>B. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Triazole</b> <b>B. Strobilurin – Triazole Mixture</b></p>
	<p><b>C. Triazole:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Triazole:</b> Use different triazole than used in previous two sprays. <b>B. Strobilurin – Triazole Mixture</b> <b>C. Strobilurin:</b> ONLY if rust has still NOT been detected.</p>

<b>B. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.	<b>A. Strobilurin:</b> ONLY if rust has still NOT been detected.	<b>A. Triazole</b>
	<b>B. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.	<b>B. Triazole</b>
	<b>C. Triazole :</b> Can be used before or after initial infection and signs of disease.	<b>A. Triazole</b> <b>B. Strobilurin – Triazole Mixture</b> <b>C. Strobilurin:</b> ONLY if rust has still NOT shown up.
<b>C. Strobilurin :</b> Must be used BEFORE the onset of disease.	<b>A. Strobilurin – Triazole Mixture :</b> Can be used before or after initial infection and signs of disease.	<b>A. Triazole</b>
	<b>B. Triazole:</b> If rust has been detected.	<b>A. Triazole</b> <b>B. Strobilurin – Triazole Mixture</b>
<b>D. Chlorothalonil:</b> Will provide only short-lived leaf surface protection. The interval between this application and the second application may be shorter than with other products because of limited residual. Refer to label.	<b>A. Strobilurin:</b> ONLY if rust has still NOT been detected.	<b>A. Triazole</b> <b>B. Strobilurin – Triazole Mixture</b>
	<b>B. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.	<b>A. Triazole</b> <b>B. Strobilurin – Triazole Mixture</b> <b>C. Strobilurin:</b> ONLY if rust has still NOT shown up.
	<b>C. Triazole:</b> Can be used before or after initial infection and signs of disease.	<b>A. Triazole:</b> <b>B. Strobilurin – Triazole Mixture</b> <b>C. Strobilurin:</b> ONLY if rust has still NOT shown up.

**Rust NOT detected in field, vicinity, or sentinel plots. Soybeans have reached R3 growth stage.**

**OPTION 1: Do nothing.**

**OPTION 2: Use this preventative spray program:**

<b>First Application</b>	<b>Second Application</b>	<b>Third Application</b>
<p>Apply at beginning pod (R3 to R4 growth stage). Strobilurin-based programs used at this growth stage will protect against rust and likely increase yields by controlling other diseases. Triazoles control rust but are generally less effective on other diseases.</p>	<p>14 to 21 days later. Refer to specific product labels for suggested spray interval. Seed fill (R5-R6 growth stage) should be underway. Some triazoles may provide enough residual protection to make it thorough pod fill at a fairly economical cost. Strobilurins used where there is no rust at this growth stage provide good protection, may still improve yields, and may improve seed quality. But they may be more expensive.</p>	<p>This application will likely NOT be needed. The second application should provide enough residual to make it through pod fill, but the residual of products varies. Under high yield situations and heavy rust pressure, this application may be warranted. Refer to label for suggested spray intervals. Fungicides applied at this growth stage will likely enhance seed quality. Check preharvest intervals.</p>
<p><b>A. Strobilurin:</b> Must be used BEFORE the onset of soybean rust.</p>	<p><b>A. Triazole:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Triazole</b> <b>B. Strobilurin – Triazole Mixture</b></p>
	<p><b>B. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Triazole</b></p>
	<p><b>C. Strobilurin :</b> ONLY if rust has still NOT been detected.</p>	<p><b>A. Triazole</b></p>

<b>B. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.	<b>A. Triazole:</b> Can be used before or after initial infection and signs of disease.	<b>A. Triazole</b> <b>B. Strobilurin – Triazole Mixture</b> <b>C. Strobilurin:</b> ONLY if rust has still NOT been detected.
	<b>B. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.	<b>A. Triazole</b>
	<b>C. Strobilurin:</b> ONLY if rust has still NOT been detected.	<b>A. Triazole</b>
<b>C. Triazole :</b> Can be used before or after initial infection and signs of disease.	<b>A. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.	<b>A. Triazole:</b>
		<b>B. Strobilurin – Triazole Mixture</b>
		<b>C. Strobilurin:</b> ONLY if rust has still NOT been detected.
	<b>B. Strobilurin:</b> ONLY if rust has still NOT been detected.	<b>A. Triazole</b>
		<b>B. Strobilurin – Triazole Mixture</b>
	<b>C. Triazole:</b> Can be used before or after initial infection and signs of disease.	<b>A. Triazole:</b> Use different triazole than used in previous two sprays.
<b>B. Strobilurin – Triazole Mixture</b>		
<b>C. Strobilurin:</b> ONLY if rust has still NOT been detected.		

**RUST DETECTED in field, vicinity, or sentinel plots. Soybeans have not yet reached R3.**

**Use the curative/protective program below. Less than 10% disease incidence in lower canopy. If disease in the mid-canopy or greater than 10% incidence, yield losses will occur, and you must make decisions to spray based on yield potential of field.**

<p style="text-align: center;"><b>First Application</b></p> <p>At flowering, R1 to R2 growth stage. Some Triazoles provide good residual activity and are likely more economical than strobilurins at this growth stage. Yield responses to strobilurins and triazoles applied prior to R3 on have been limited in the absence of rust. Indeterminate soybeans will have significant vegetative growth remaining at this stage. Determinates will have already produced most of their vegetative growth. Therefore, strobilurins may be more beneficial on determinates at this growth stage (not documented).</p>	<p style="text-align: center;"><b>Second Application</b></p> <p>14 to 21 days later. Refer to specific product labels for suggested spray interval. Should coincide with R3-R4 growth stages. Strobilurin-based programs used at this timing increase the likelihood of yield increases due to control of diseases other than rust. Triazoles will control rust but are generally less effective on other diseases.</p>	<p style="text-align: center;"><b>Third Application</b></p> <p>Only if rust persists and pod fill is not complete. Refer to specific product labels for suggested spray interval. Late applications may improve seed quality and protect against weathering events.</p>
<p><b>A. Triazole:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Triazole</b></p>
	<p><b>B. Triazole:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>B. Strobilurin – Triazole Mixture</b></p> <p><b>A. Triazole:</b> Use different triazole than used in previous two sprays.</p>
<p><b>B. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Triazole</b></p>
	<p><b>B. Triazole:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>B. Strobilurin – Triazole Mixture</b></p>

**RUST DETECTED** in field, vicinity, or sentinel plots. Soybeans at R3 growth stage or later.

Curative/protective program as outlined below. Less than 10% disease incidence in lower canopy. If disease in the mid-canopy or greater than 10% incidence, yield losses will occur, and you must make decisions to spray based on yield potential of field.

<p style="text-align: center;"><b>First Application</b></p> <p>Apply between beginning pod (R3) and full seed (R6) growth stages. Strobilurin-based programs used at these growth stage will provide protection against rust and likely produce yield increases or improvements in seed quality by controlling other diseases. Triazoles control rust but are generally less effective on other diseases.</p>	<p style="text-align: center;"><b>Second Application</b></p> <p>14 to 20 days later. Refer to specific product labels for suggested spray interval. Seed fill (R5-R6 growth stage) should be underway. Some triazoles may provide enough residual protection to make it thorough pod fill at a fairly economical cost. Strobilurin mixes provide good curative and protection, but will likely cost more.</p>	<p style="text-align: center;"><b>Third Application</b></p> <p>This application will likely NOT be needed. The second application should provide enough residual to make it through pod fill, but the residual of products varies. Refer to label for suggested spray intervals. Fungicides applied at this growth stage will likely enhance seed quality. Check preharvest intervals.</p>
<p><b>A. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Triazole :</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Triazole</b> <b>B. Strobilurin – Triazole Mixture</b></p>
	<p><b>B. Strobilurin – Triazole Mixture :</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Triazole:</b></p>
<p><b>B. Triazole :</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Strobilurin – Triazole Mixture:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Triazole</b> <b>B. Strobilurin – Triazole Mixture</b></p>
	<p><b>B. Triazole:</b> Can be used before or after initial infection and signs of disease.</p>	<p><b>A. Triazole :</b> Use different triazole than used in previous two sprays. <b>B. Strobilurin – Triazole Mixture</b></p>

**Table 1. Fungicides approved or pending approval in Mississippi for soybean rust control during 2005.**

<b>Trade Name</b>	<b>Active Ingredient</b>	<b>Type of Label</b>	<b>Rate Range</b>	<b>PHI</b>	<b>Activity</b>	<b>Chemistry</b>
Quadris	Azoxystrobin	Section 3 (Full)	6.2-15.4 fl oz/a	14 days	Preventative/ Systemic	Strobilurin
Headline	Pyraclostrobin	Section 3 (Full)	6-12 fl oz/a	21 days	Preventative/ Locally Systemic	Strobilurin
Tilt	Propiconazole	Section 18 (Emergency)	4-8 fl oz/a	No later than R6	Curative/ Penetrant	Triazole
Propimax	Propiconazole	Section 18 (Emergency)	4-8 fl oz/a	No later than R6	Curative/ Penetrant	Triazole
Bumper	Propiconazole	Section 18 (Emergency)	4-8 fl oz/a	No later than R6	Curative/ Penetrant	Triazole
Folicur 3.6F	Tebuconazole	Section 18 (Emergency)	3-4 fl oz/a	30 days	Curative/ Penetrant	Triazole
Laredo EC	Myclobutanil	Section 18 (Emergency)	4-8 fl oz/a	28 days	Curative/ Penetrant	Triazole
Laredo EW	Myclobutanil	Section 18 (Emergency)	4.8-9.6 fl oz/a	28 days	Curative/ Penetrant	Triazole
Stratego	Propiconazole + Trifloxystrobin	Section 18 (Emergency)	5.5-10 fl oz/a	No later than R6	Curative/ Preventative	Triazole + Strobilurin

Quilt	Propiconazole + Azoxystrobin	Section 18 (Emergency)	14-20.5 fl oz/a	No later than R6	Curative/ Preventative	Triazole + Strobilurin
Domark	Tetraconazole	Section 18 (Emergency)	4 - 6 fl oz/a	No later than R5	Curative/ Penetrant	Triazole
Headline SBR	Pyraclostrobin + Tebuconazole	Section 18 (Emergency)	7.8 fl oz/a	30 days	Curative/ Preventative	Triazole + Strobilurin
Orius 3.6F	Tebuconazole	Section 18 (Emergency)	3 -4 fl oz/a	30 days	Curative/ Penetrant	Triazole
Chlorothalonil has only limited activity against rust, but only as a topical protectant. Probably should be used in rotation with more effective products.						
Bravo Weather Stick	Chlorothalonil	Section 3 (Full)	1.5-2.25 pt/a	42 days	Preventative/ Leaf Surface Protectant	Chlorothalonil
Echo 720	Chlorothalonil	Section 3 (Full)	1.5-2.5 pt/a	42 days	Preventative/ Leaf Surface Protectant	Chlorothalonil
Echo 90DF	Chlorothalonil	Section 3 (Full)	1.25-2.0 lb/a	42 days	Preventative/ Leaf Surface Protectant	Chlorothalonil
Equus 720 SST	Chlorothalonil	Section 3 (Suppl.)	1.5-2.4 pt/a	42 days	Preventative/ Leaf Surface Protectant	Chlorothalonil
Equus DF	Chlorothalonil	Section 3 (Suppl.)	1.25-2.2 lb/a	42 days	Preventative/ Leaf Surface Protectant	Chlorothalonil

This table was modified by Mississippi State University and the Mississippi Department of Agriculture from a table prepared by University of Arkansas scientists. The University of Arkansas publication is titled "Asian Soybean Rust A Potential Threat to Arkansas Soybean Production" and can be found online at <http://www.uaex.edu>.

Table 2. Estimated number of days for the intervals from planting date to R1, R1 to R3, R3-R6, and R1-R6 for various maturity group soybeans at selected planting dates at Stoneville, Mississippi<sup>1</sup>.

Relative maturity	Planting Date	Interval			
		PD – R1	R1 – R3	R3 – R6	R1 – R6
		days			
3.9	3/15	48	14	37	51
	4/15	38	17	39	56
	5/15	34	18	38	56
	<b>Avg.</b>	<b>40</b>	<b>16</b>	<b>38</b>	<b>54</b>
4.4	3/15	53	15	41	56
	4/15	42	19	41	60
	5/15	37	20	39	59
	<b>Avg.</b>	<b>44</b>	<b>18</b>	<b>40</b>	<b>58</b>

<b>4.9</b>	3/15	58	17	43	60
	4/15	47	20	43	63
	5/15	41	20	41	61
	<b>Avg.</b>	<b>49</b>	<b>19</b>	<b>42</b>	<b>61</b>
<b>5.4</b>	3/15	64	17	45	62
	4/15	53	19	45	64
	5/15	46	20	42	62
	<b>Avg.</b>	<b>54</b>	<b>19</b>	<b>44</b>	<b>63</b>
<b>5.9</b>	4/15	58	22	50	72
	5/15	50	22	43	65
	<b>Avg.</b>	<b>54</b>	<b>22</b>	<b>47</b>	<b>69</b>

<sup>1</sup> Data were deducted from Zhang et al. (2004) Crop Management (doi:10.1094/cm-200-1025-01-RS).

**Table 3. Interval in days between successive reproductive growth stages by maturity group (MG) and planting date (PD) under field conditions at Stoneville, Mississippi.<sup>1</sup>**

MG	PD month/day	days									
		PD-R1	R1-R2	R2-R3	R3-R4	R4-R5	R5-R6	R6-R7	R7-R8	R1-R8	PD-R8
3.9	3/15	48	3	11	7	7	23	19	13	83	131
3.9	4/15	38	3	14	8	7	24	18	13	87	125
3.9	5/15	34	4	14	9	7	22	16	12	84	118
3.9	6/14	33	4	14	8	7	19	14	9	75	108
3.9	7/04	33	4	13	7	6	17	12	7	66	99
4.4	3/15	53	3	12	8	8	25	20	12	87	140
4.4	4/15	42	4	15	8	8	25	18	13	91	133
4.4	5/15	37	5	15	8	8	23	17	11	87	124
4.4	6/14	36	4	14	8	8	20	14	9	76	112
4.4	7/04	35	4	13	7	7	18	12	7	67	102
4.9	3/15	58	4	13	9	8	26	21	14	95	153
4.9	4/15	47	4	16	9	8	26	19	13	95	142
4.9	5/15	41	5	15	9	8	24	17	11	89	130
4.9	6/14	38	5	14	9	7	20	14	10	79	117

4.9	7/04	37	4	13	7	7	18	12	8	69	106
5.4	3/15	64	4	15	9	10	26	22	14	100	164
5.4	4/15	53	4	16	10	9	26	20	13	98	151
5.4	5/15	46	4	16	10	8	24	18	13	93	139
5.4	6/14	41	5	15	8	8	21	14	9	80	121
5.4	7/4	39	4	14	7	7	18	13	8	71	110
5.9	4/15	58	5	17	11	9	27	20	13	102	160
5.9	5/15	50	5	17	10	8	25	18	11	94	144
5.9	6/14	44	5	16	8	8	22	14	10	83	127
5.9	6/29	42	4	15	8	7	20	13	8	75	117

<sup>1</sup> Data were deducted from Zhang et al. (2004) Crop Management.

**Table 4. Vegetative and reproductive stages of a soybean plant<sup>1</sup>**

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<u>Growth stage</u>	<u>Description</u>
VE	Emergence
VC	Cotyledon
V1	First node
V2	Second node
V3	Third node
V(n)	Etc.
R1	Beginning bloom: One open flower at any node on the main stem.
R2	Full bloom: Open flower at one of the two uppermost nodes on the main stem with a fully developed leaf.
R3	Beginning pod: 3/16 inch pod at one of the four uppermost nodes on the main stem with a fully developed leaf.
R4	Full pod: 3/4 inch pod at one of the four uppermost nodes on the main stem with a fully developed leaf.
R5	Beginning seed: Seed is 1/8 inch long in the pod at one of the four uppermost nodes on the main stem with a fully developed leaf.
R6	Full seed: Pod contains a green seed that fills the pod cavity at one of the four uppermost nodes on the main stem with a fully developed leaf.
R7	Beginning maturity: One normal pod on the main stem that has reached mature pod color, normally brown or tan, depending on variety.
R8	Full maturity: 95% of the pods have reached their mature pod color. Five to 10 days of drying weather are generally required after R8 before the soybeans have less than 15 % moisture. This can occur more rapidly in early-planted soybean in the mid-South under very hot conditions.

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<sup>1</sup>How a Soybean Plant Develops, Special Report No. 53. Iowa State University Cooperative Extension Service. Ames, Iowa. June 1997.

## NOTES

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