

Pest Management **FAST FACTS**

Nutrient and Pest Management Program (NPM)
Integrated Pest Management Program (IPM)

University of Wisconsin-Extension, University of Wisconsin-Madison

Avoid Herbicide Resistance in Weeds

Use herbicides only when necessary to prevent economic loss. Base herbicide use on the species present or expected, and their density.

Rotate or tank mix herbicides. Rotate herbicides among different modes of action or use tank mixtures of different modes of action.

Rotate crops. Where possible use crops with different life cycles. For example, rotate annual corn with winter wheat (a winter annual) or alfalfa (a perennial).

Use mechanical weed control methods. Rotary hoe and cultivate to complement herbicide treatments.

Scout fields regularly for weeds. Respond quickly to increases in weeds with suspected herbicide resistance.

Signs of Herbicide Resistant Weeds

1. Only one species has escaped control.
2. There were no herbicide application errors.
3. The environment was favorable for good herbicide performance.
4. Respraying did not control the weed.

Resistant Weeds in Wisconsin 2009

Weed species	Mode of action (herbicide*)
Velvetleaf	Photosystem II (atrazine)
Smooth pigweed	Photosystem II (atrazine)
Common lambsquarters	Photosystem II (atrazine)
Kochia	Photosystem II (atrazine) & ALS inhibitors (Oust)
Common ragweed	ALS inhibitors (FirstRate)
Common waterhemp	ALS inhibitors (Pursuit)
Green foxtail	ALS inhibitors (Raptor)
Shattercane	ALS inhibitors (Accent)
Giant ragweed	ALS inhibitors (FirstRate)
Eastern black nightshade	ALS inhibitors (Pursuit, Raptor)
Large crabgrass	ACCase inhibitors (Fusilade, Poast)
Giant foxtail	ACCase (Fusilade, Poast) & ALS inhibitors (Pursuit, Accent)

* References to pesticide products in this publication are for your convenience and are not an endorsement of one product over other similar products.

Adjuvant Rate Conversions

Adjuvant rate	Amount/100 gallons	Spray volume (GPA)		
		20	15	10
		Adjuvant rate per acre		
2%	2 gallons	3.2 pints (51.2 ounces)	2.4 pints (38.4 ounces)	1.6 pints (25.6 ounces)
1%	1 gallon	1.6 pints (25.6 ounces)	1.2 pints (19.2 ounces)	0.8 pint (12.8 ounces)
0.5%	2 quarts	0.8 pint (12.8 ounces)	0.6 pint (9.6 ounces)	0.4 pint (6.4 ounces)
0.25%	1 quart	0.4 pint (6.4 ounces)	0.3 pint (4.8 ounces)	0.2 pint (3.2 ounces)
0.125%	1 pint	0.2 pint (3.2 ounces)	0.15 pint (2.4 ounces)	0.1 pint (1.6 ounces)

Field sprayer calibration equations

$$\text{Speed (MPH)} = \frac{\text{Distance (in feet)} \times 60}{\text{Time (in seconds)} \times 88}$$

$$\text{GPA} = \frac{5,940 \times \text{GPM (per nozzle)}}{\text{MPH} \times W^*}$$

*W = nozzle spacing for broadcast application

*W = spray width for single nozzle or band applications

Websites with pest management information:

UW Wisconsin Crop Manager newsletter:
<http://ipcm.wisc.edu/wcm>

UW Plant Disease Diagnostics Clinic:
<http://www.plantpath.wisc.edu/pddc>

DATCP Wisconsin Pest Bulletin newsletter:
<http://pestbulletin.wi.gov>

Crop Data Management Systems, labels and MSDSs:
<http://www.cdms.net>

Conversions for small liquid volumes

- 1 tablespoon = 0.5 fluid oz
- 2 tablespoons = 1.0 fluid oz
- 32 fluid ounces = 1 quart
- 128 fluid ounces = 1 gallon

Conversions for general calculations

- 1 sq mile = 640 acres
- 1 acre = 43,560 sq ft
- 1 mile = 5280 feet
- 1 mile/hour = 88 feet/min
- Celsius = (F - 32) x .55

NPM and IPM are administered by the University of Wisconsin-Extension and the College of Agricultural and Life Sciences at UW-Madison.



COLLEGE OF AGRICULTURAL & LIFE SCIENCES
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Treatment Thresholds and Scouting for Pests of Soybean

Soybean Insects

Soybean Aphid

Use an action threshold of 250 aphids per plant for fields with an actively increasing population. This economic threshold is based on an average of 250 aphids per plant over 20-30 plants sampled throughout the field. Regular field visits are required to determine if soybean aphid populations are actively increasing.

In replicated university research trials over several years, in Wisconsin and the North Central Region, this threshold applies at R1 (beginning bloom) through R5 (beginning seed) soybeans. The threshold incorporates a 5 to 7 day lead-time between scouting and treatment to make spray arrangements or handle weather delays. Treating at or beyond R6 has not been documented to increase yield.

Insect	Treatment Threshold
Grasshoppers, green cloverworms, woolly bear caterpillars, and thistle caterpillars	Treat when defoliation reaches 30% in vegetative stage soybean or 20% in reproductive stage soybean. See soybean leaf defoliation guide below.
Green stinkbug	Treat when adults and/or nymphs reach one per foot of row during pod fill.
Two-spotted spider mite	Treat when yellowing of the leaves is evident, several leaves have active colonies and damage occurs prior to R6.5-7.0 stages.
Potato leafhoppers	2 per plant with ≤ 3 trifoliolate leaves; 6 per plant on flowering soybean (R1-R2); 13 per plant on soybean at full pod (R4).
Seed corn maggot	No acceptable thresholds at this time.

Bean leaf beetle early-season treatment thresholds for soybean defoliation.

Growth stage	Crop value (\$/bu)	Treatment cost/acre (insecticide + application costs)					
		\$6.00	\$7.00	\$8.00	\$9.00	\$10.00	\$11.00
VC	\$5.00	2.4	2.8	3.2	3.6	4.0	4.4
	\$6.00	2.0	2.3	2.7	3.0	3.4	3.7
V1	\$5.00	3.7	4.4	5.0	5.6	6.2	6.8
	\$6.00	3.1	3.6	4.1	4.7	5.2	5.7
V2	\$5.00	5.9	6.8	7.8	8.8	9.8	10.7
	\$6.00	4.9	5.7	6.5	7.3	8.1	8.9

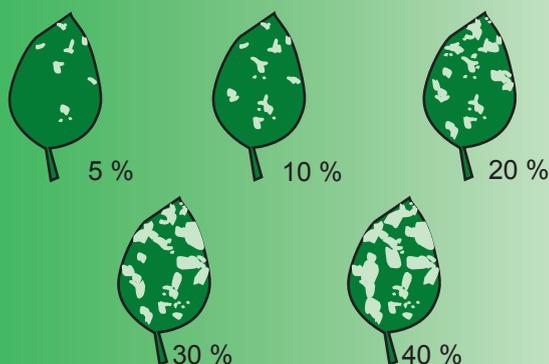
2nd generation bean leaf beetle thresholds in reproductive stage soybean.*

Crop value (\$/bu)	Treatment cost/acre (insecticide + applications costs)								
	\$7	\$8	\$9	\$10	\$11	\$12	\$13	\$14	\$15
----- Number of beetles per foot of row -----									
\$5.00	5.5	6.3	7.1	7.9	8.7	9.5	10.3	11.0	11.8
\$6.00	4.6	5.2	5.9	6.5	7.2	7.8	8.5	9.2	9.9
\$7.00	3.9	4.4	5.0	5.6	6.1	6.7	7.3	7.8	8.4
\$8.00	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5
----- Number of beetles per sweep -----									
\$5.00	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5
\$6.00	2.9	3.3	3.7	4.1	4.5	5.0	5.4	5.9	6.3
\$7.00	2.4	2.8	3.1	3.5	3.8	4.2	4.5	4.9	5.2
\$8.00	2.2	2.5	2.8	3.2	3.5	3.8	4.2	4.5	4.8

Source: Marlin Rice, Iowa State University, 2000

* Economic thresholds are based on a row spacing of 30 inches and a plant population of eight plants per foot of row. For narrow-row soybean (8-inch rows) and a plant population of three plants per foot of row multiply the above economic threshold by 0.70

Soybean Defoliation Guide



Soybean yield loss from weed competition.*

Weeds	PREDICTED YIELD LOSS				
	Lambs-quarters	Giant Foxtail	Velvetleaf	Crabgrass	Giant Ragweed
Soybean stage	----- 50 plants /100 ft ² -----				10 plants /100 ft ²
VE - V1	41%	31%	23%	8%	42%
V2 - V3	28%	19%	14%	6%	30%
V4 - V5	13%	9%	7%	3%	14%
R1 or greater	6%	4%	3%	1%	6%

*Effect of soybean stage of development on predicted yield loss from weeds competing for the rest of the season; assuming 2-4 inch weed height.

Collecting a soil sample for Soybean Cyst Nematode (SCN)

1. Use a soil probe or narrow-bladed trowel or shovel. Take cores close to plants at a depth of 8 to 10 inches. Discard the upper 2 inches of soil, especially if it is dry. Be sure to include plant roots.
2. Submit one sample for a 10-acre field, or for a suspected area within the field. Sample from plants in the margins of suspected areas, and not from their centers. Collect in a zigzag pattern across the field. Collect from areas of similar soil texture and cropping history. If different crops were grown, or there is markedly different soils within a field, sample separately.
3. Take soil and roots from 12 to 20 plants and mix into one sample (1 to 2 pints of soil). Place in a sturdy plastic bag (or soil sample bag), fasten the open end securely, and label accurately with an indelible marker. Keep the samples out of the sun and don't let them dry out.
4. Mail as soon as possible, and early in the week to avoid delays in transit. Mail to the Plant Disease Diagnostic Clinic, 1630 Linden Drive, University of Wisconsin-Madison, Madison, WI 53706. The cost of the analysis is \$22 per sample. Consult with your county extension agent about private laboratories that conduct SCN analyses.

Treatment Thresholds for Pests of Field Corn, Alfalfa, and Small Grains

Field Corn Insects

Insect	Treatment Threshold			
Armyworm	1 or more armyworms on 75% of the plants or 2 armyworms on 25% of the plants. Average armyworm length must be less than or equal to ¾" to merit treatment.			
Cutworms	5% of plants damaged and larvae are sixth instar or less. See Head Capsule Gauge .			
Corn leaf aphids	50% or more of the plants have more than 50 aphids per plant. Plants are in the late-whorl to early tassel stages.			
Corn rootworm beetles	Pollination Protection: Treat before 70% silking if silks are clipped to within ½" of husk. Root Protection: Following corn, when counts average 0.75 beetles per plant during the egg laying period of mid-August to early September of the previous year. Following soybean, treat corn if yellow sticky trap catches average more than 5 Western corn rootworm beetles/trap/day during the egg laying period of August to early September.			
European corn borer (ECB)	ECB has two generations per year in most of Wisconsin. Peak spring moth flights occur at 631 GDD. Peak summer moth flights occur at 1733 GDD. Use the worksheets provided in UWEX publication A3646, <i>Pest Management in Wisconsin Field Crops</i> , to determine if treatment for ECB is justified.			
Two-spotted spider mite	Active mite colonies on one-third of the leaves on 50% of the plants, or if 15-20% of the leaf area is covered with mites or their damage. Resample the field in 4-5 days after the initial spray to look for adults and nymphs. Respraying may be necessary.			
Stalk borer	Percent infested corn at three corn prices to justify treatment			
	Corn leaf stage	\$2.00/bu	\$3.00/bu	\$4.00/bu
	V1	10%	7%	5%
	V2	12%	8%	6%
	V3	15%	10%	7%
	V4	16%	11%	8%
	V5	17%	12%	9%
	V6	34%	23%	17%
V7	100%	100%	100%	
	Thresholds based on \$13.00/acre control costs and 80% control with insecticides. (source: Iowa State University)			
Western bean cutworm (WBC)	Scout 20 consecutive corn plants at five locations in a field to obtain a representative field sample. Treatment is justified when 8% of sampled plants have egg masses and/or small larvae.			
Seed corn maggot, white grubs, wireworms, hop vine borer and slugs: No acceptable thresholds at this time.				

Head Capsule Gauge (Black cutworm instar)

To determine the instar stage of larvae, hold the head between thumb and forefinger, and place on the closest corresponding ruler below.



Field corn yield loss from weed competition.*

Weeds	PREDICTED YIELD LOSS				
	Lambs-quarters	Giant Foxtail	Velvetleaf	Crabgrass	Giant Ragweed
Corn stage	----- 50 plants /100 ft ² -----				10 plants /100 ft ²
0-5"	18%	16%	14%	4%	11%
6-12"	13%	11%	9%	3%	7%
13-24"	7%	6%	5%	1%	4%
24"-Tassel	3%	3%	2%	1%	2%

*Effect of field corn stage of development on predicted yield loss from weeds competing for the rest of the season; assuming 2-4 inch weed height.

Alfalfa Insects

(Avoid insecticide applications within 7 days of cutting)

Insect	Treatment Threshold
Alfalfa blotch leafminer	30 - 40% of leaflets showing pinhole feeding.
Alfalfa weevil	1 st Crop: 40% or more of stems showing feeding. 2 nd Crop: 50% or more of stems showing feeding.
Meadow spittlebug	1 nymph per stem.
Pea aphid	100 aphids per sweep.
Alfalfa & Tarnished plant bug	3 per sweep on 3" or shorter alfalfa; 5 per sweep on alfalfa taller than 5".
Potato leafhopper	0.2/sweep on 3" alfalfa; 0.5/sweep on 6" alfalfa; 1/sweep on 8-11" alfalfa; 2/sweep on alfalfa taller than 12".

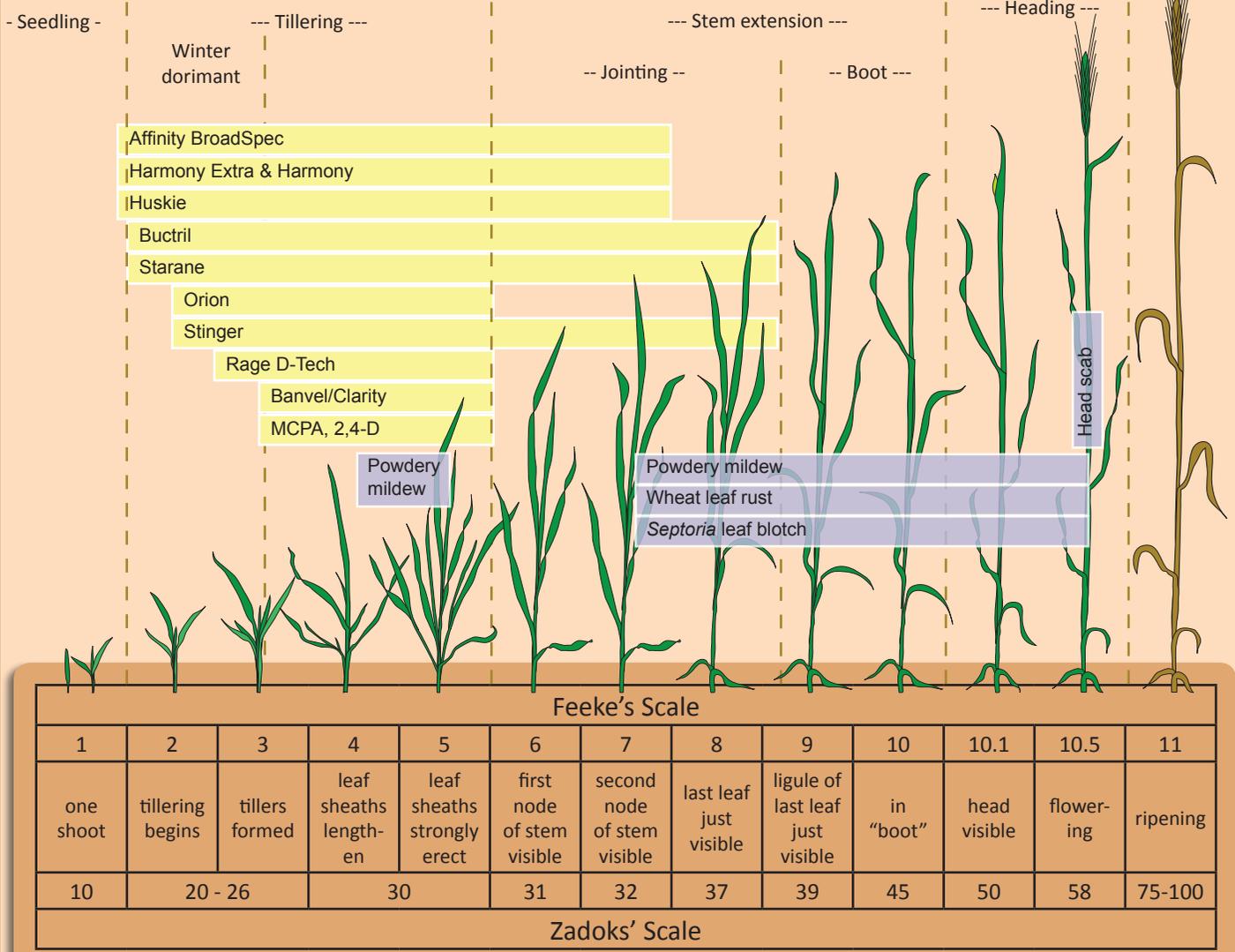
Other Small Grain Insects

Insect	Treatment Threshold
Aphids (Bird-cherry Oat, English grain and Corn leaf)	Delay planting until September 15th. Seedlings - 30 aphids per stem; Boot to heading - 50 aphids per stem.
Greenbug	Seedlings - 20 aphids per stem; Boot to heading - 30 aphids per stem.
Armyworm	3 armyworms per square foot.
Cereal leaf beetle & wireworms	No threshold established.
Grasshoppers	Treat if grasshoppers average 20/sq yard on field edges or 8/sq yard for a field average. Apply when grasshoppers are small for most effective control.

Wheat - Pesticide application periods at various growth stages

Timing for weed control shown by yellow boxes*, diseases shown by purple boxes.

- Ripening -



* References to pesticide products in this publication are for your convenience and are not an endorsement of one product over other similar products.

Avoid Fungicide Resistance in Field Crops

General guidelines for fungicide management

1. Plant disease resistant hybrids/varieties whenever possible.
2. Scout fields on a regular basis, noting incidence and severity of disease.
3. Tank-mix high-risk fungicides with fungicides that have different modes of action, are active on the targeted disease(s), and have similar lengths of residual activity.
4. Do not use reduced rates of fungicides.
5. Alternate or tank mix fungicides with different modes of action when multiple applications are required.
6. Apply fungicides preventatively or early in the disease cycle and when disease threat is warranted.
7. Avoid curative fungicide applications, especially with high-risk fungicides.

Always read and follow the pesticide label:

- for maximum number of sprays per season.
- for recommended application rates.
- for application timing for both target disease and plant growth stage.