OARDC Field Crops Day

July 26, 2012

Northwest Agricultural Research Station

4240 Range Line Road

Custar, OH 43511

Phone: 419-257-2060

Proceedings

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FREE AND OPEN TO THE PUBLIC

FIELD CROPS DAY

THURSDAY, JULY 26, 2012 • 6-8:30 P.M.

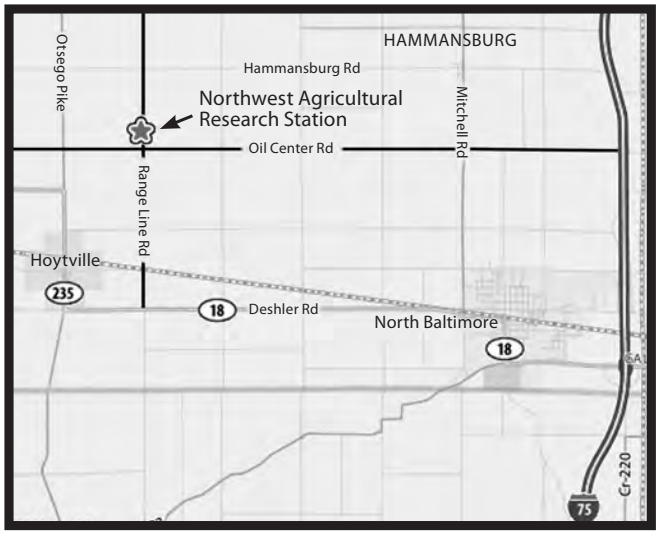
Northwest Agricultural Research Station
of the Ohio Agricultural Research and Development Center
4240 Range Line Road
Custar, Ohio 43511

Program

- "Soybean Disease Management and Seed Treatments,"
  Anne Dorrance, Plant Pathology
  OARDC and OSU Extension
- "Sprayer Tank Water Quality,"
  Bruce Clevenger, OSU Extension Educator,
  Defiance County
- "Weed Resistance Management and Late Season Control Strategies,"
  Tony Dobbels, Horticulture & Crop Science
  OARDC and OSU Extension
- "Insect Challenges Facing Producers in the 2012 Growing Season,"
  Ron Hammond, Entomology
  OARDC and OSU Extension

Driving directions

About one-half mile northeast of Hoytville at the corner of Range Line and Oil Center roads.



For more information

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The Ohio State University:
OARDC, OSU Extension

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THE OHIO STATE UNIVERSITY
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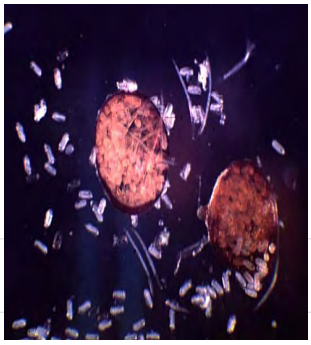
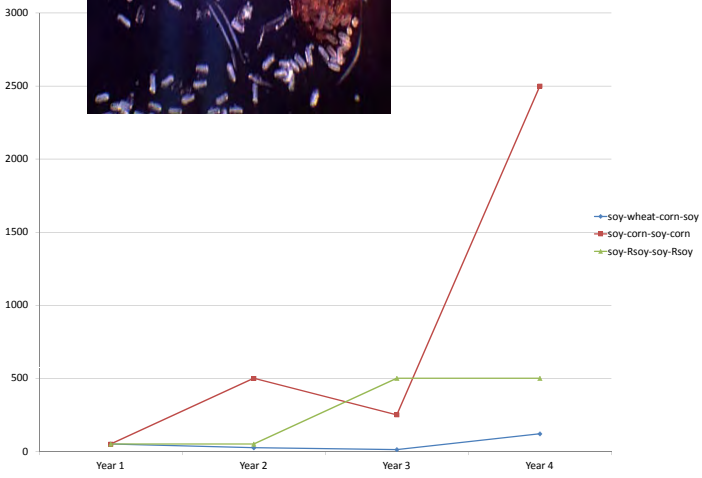
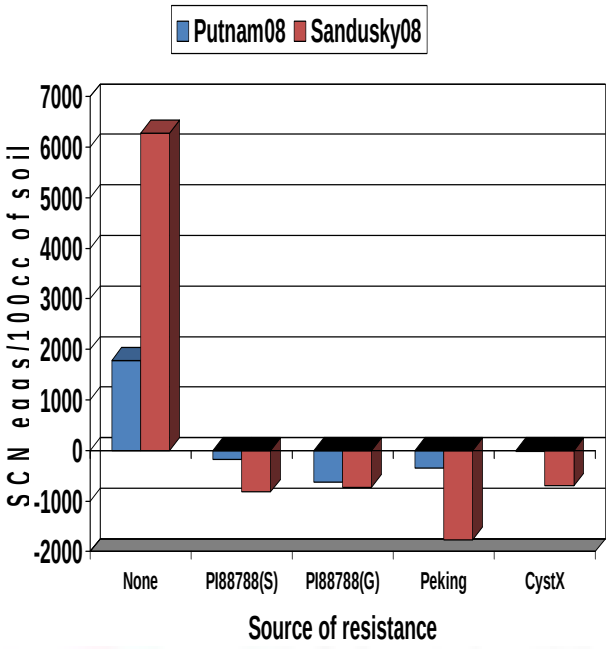
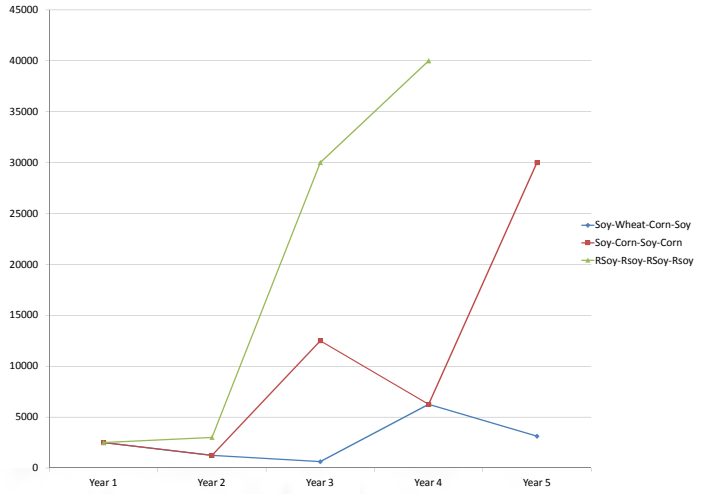
EXTENSION

Soybean Cyst Nematode Rotation-Rotation-Rotation

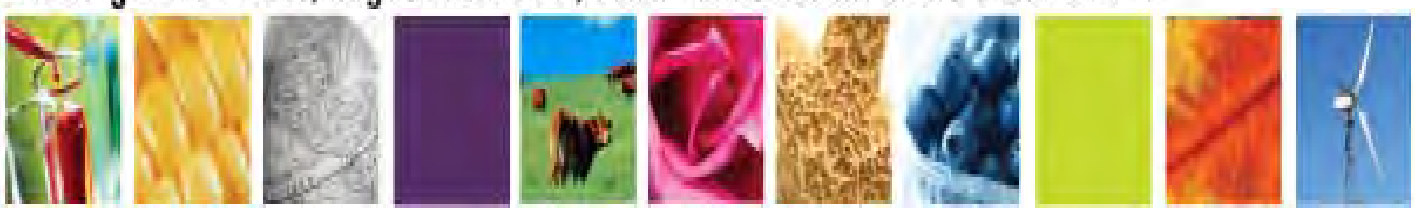








Dr. Anne Dorrance, Professor
College of Food, Agricultural, and Environmental Sciences
THE OHIO STATE UNIVERSITY

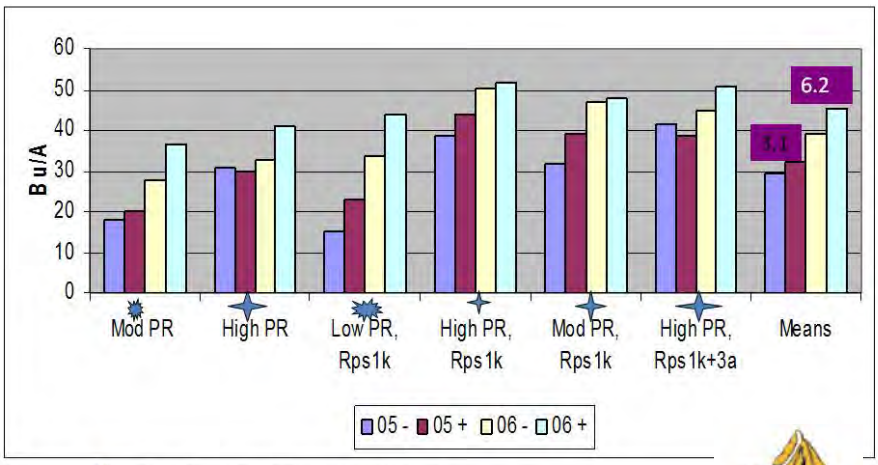


Phytophthora stem rot

1. **Variety Selection**
- **Choose Varieties with Rps genes**
- **Choose varieties with High partial resistance – tolerance – field resistance**

2. **Seed Treatments**

Yield – Flood at planting



Significantly different both years
Significant one year of study

Dr. Anne Dorrance, Professor

THE OHIO STATE UNIVERSITY College of Food, Agricultural, and Environmental Sciences

Seed and Seedling Diseases

Sudden Death Syndrome

Pythium, Phytophthora, Rhizoctonia, Fusarium

Dr. Anne Dorrance

Fusarium graminearum

Pythium & Phytophthora

Mid to Late Season Diseases

Sclerotinia stem rot
White Mold

Frogeye
Leafspot

Downy
mildew

Powdery
mildew

Spray Tank Water Quality

Wm. Bruce Clevenger, OSU Extension Educator Defiance County
Ohio State University Crop Observation and Recommendation Network (C.O.R.N.) Newsletter
2012-20, July 2, 2012 - July 9, 2012

Water often comprises ninety-five percent (or more) of the spray solution. What affect might it have on product performance? Research clearly shows that the quality of water used for spraying can affect how pesticides perform. There are two main water characteristics that can negatively impact the effectiveness of a pesticide application; water hardness and pH. Pesticides includes: insecticide, herbicides, fungicides, etc. If the pest is properly identified, the correct product is selected, equipment calibrated, but yet the water quality in the spray tank is poor, the application can be less effective.

Ultimately, the pesticide label is the first place to start to find warnings about spray tank water quality. For example, the 5 Lb. Dimethoate systemic insecticide (Helena Chemical Co.) label warns: "DO NOT ADD DIMETHOATE TO WATER WITH PH VALUES BELOW 4.0 OR ABOVE 7.0." Another example, "The additional of dry ammonium sulfate (AMS)…may increase the performance of this product particularly under hard water conditions. When using AMS, apply this product at rates directed…lower rates will result in reduced performance.

Numerous water-testing kits are commercially available for both spontaneous and scheduled testing. The kits are readily available, reasonably priced, easy to use and interpret, and reliable. The majority of the test kits use color-changing, sensitive paper to document water hardness, pH, and iron levels. The pesticide label may be very specific as to the water conditioner and application rate to be used.

In an era of resistant pests to some pesticides, the quality of the spray water needs to be managed to maximize the effectiveness of the product. It is unknown how often poor pesticide performance is blamed on poor water quality. By testing water sources used for pesticide application for hardness and pH, water quality can be eliminated or considered as a reason for poor pesticide performance.

The Impact of Water Quality on Pesticide Performance – Purdue Extension

http://www.ppp.purdue.edu/Pubs/PPP-86.pdf

Sprayer Tank Water Quality

Wm. Bruce Clevenger
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Defiance County
clevenger.10@osu.edu or 419-782-4771

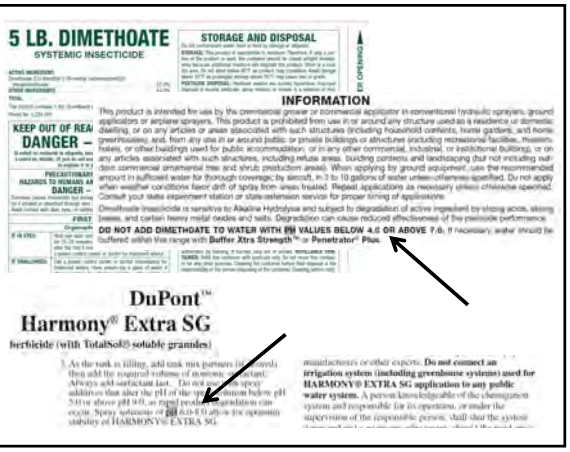
OARDC Field Crops Day – July 26, 2012

Factors Effecting Pesticide Performance

- Product selection
- Equipment calibration
- Application rate/acre
- Application timing
- Weather
- Resistance
- Water quality → Water Hardness and pH

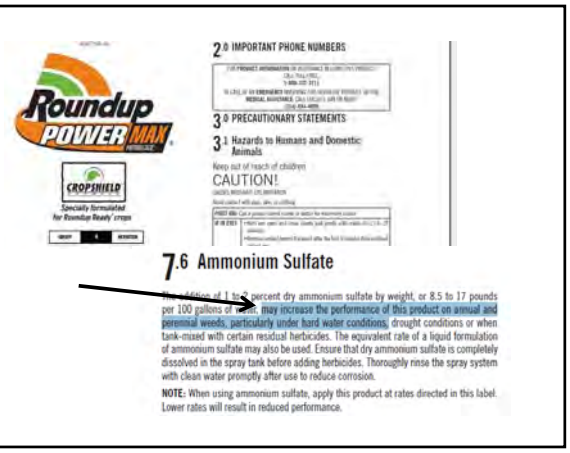
Application delays…Does pH Matter?

	Product Half-Life		
	pH 9	pH 7	pH 5
Brand X Herbicide	10 minutes	17 hours	16 days
Brand X Fungicide	2 minutes	3 hours	10 hours
Brand X Insecticide	24 hours	10 days	stable

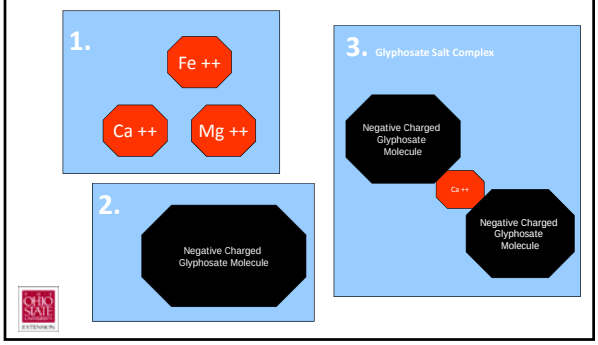


Water Hardness from Dissolved Minerals

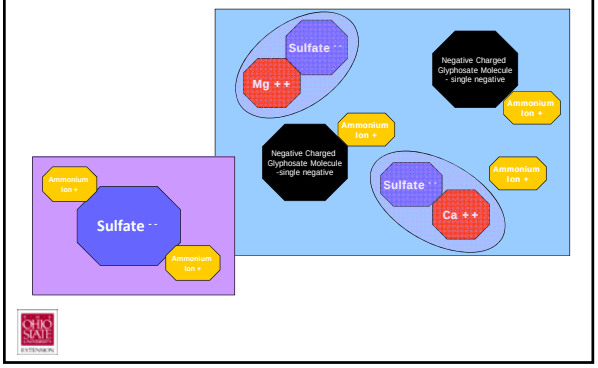
Total Hardness in Parts Per Million (ppm)	Water Classification
0 – 100	Soft
100 – 400	Moderately Hard
400 – 800	Hard
800 +	Extremely Hard



What does hardness look like?



Ammonium Sulfate



Conclusion…

- **Water quality impacts performance of some products.**
- **Where to find warnings? Label**
- **Low use rates require better water.**
- **Check each water source once.**
- **Conditioning may be required**
- **pH and water hardness are unrelated.**
- **$1.50 to $2.00 acre**

Credit: The Impact of Water Quality on Pesticide Performance – Purdue Extension Publication PPP-86
Fred Whitford, Coordinator,
Purdue Pesticide Programs

Wm. Bruce Clevenger, OSU Extension Educator
Defiance County, clevenger.10@osu.edu, 419-782-4771

Management of Herbicide Resistant Horseweed in Ohio

Tony Dobbels

NorthWest Agronomy Research Station

Field Crops Day

July 26, 2012

Glyphosate - 0.75 lb ae/A

Marestail with resistance to glyphosate and ALS inhibitors 28 DAT

Glyphosate + FirstRate 0.75 lb + 0.3 oz/A

FirstRate - 0.3 oz/A

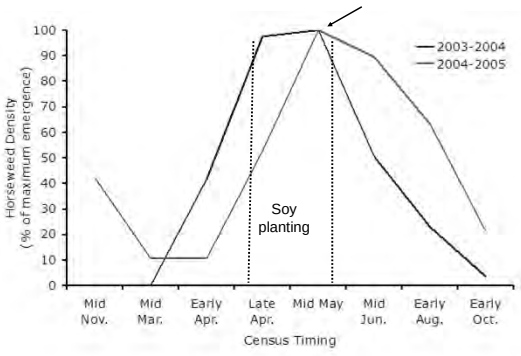
Gly- + ALS-R marestail - Xenia
3 weeks after initial glyphosate @ 0.75 lb ae/A

ALS + gly-R Marestail surviving treatment with glyphosate + 2,4-D ester + Valor XLT
2010 – Mt Orab

Things to know about marestail

- Two broad periods of emergence
  - Late summer into fall
  - Early spring into early summer
- Low-growing rosette until end of April, followed by stem elongation
  - Most easily controlled in rosette stage
  - Try to always treat when less than 4 inches tall
- Can have resistance to one or both of these
  - Glyphosate
  - ALS inhibitors - chlorimuron, cloransulam, etc
- Easily controlled with tillage
- Almost impossible to control with POST herbicides

Marestail Population Density
(new emergence plus natural mortality)



Marestail management principles

- Field must be free of weeds at time of planting
  - Use tillage or a comprehensive preplant herbicide mixture
  - Do not rely on glyphosate alone
- Need residual control for 6 to 8 weeks after planting
  - Apply residual (PRE) herbicides in spring
  - Broad-spectrum products containing active rates of flumioxazin (Valor), sulfentrazone (Authority), or metribuzin
- Goal = not having to control with POST herbicides
- Best strategy = LibertyLink soybeans
  - POST control with Ignite

Marestail management principles

- Fall herbicide applications
  - Will control marestail that emerged in late summer, fall
  - Can get some residual control into spring, but fall treatments will not usually control marestail through soybean canopy
  - Save most of the residual herbicide for spring
  - Even use of non-residual in fall can make the spring burndown + residual work better

Suggested marestail residual programs Preplant - fall + spring

Option 1
- Fall herbicides - no residual
  - Glyphosate (0.56 to 0.75 lb) + 2,4-D ester (0.5 to 1 lb)
- Spring herbicide
  - Residual + burndown

Option 2
- Fall herbicides - low rate residual
  - 2,4-D (0.5 to 1 lb) + Canopy/Cloak EX (1 oz) or DF (2 oz)
  - Save the Valor/sulfentrazone/metribuzin for spring
- Spring herbicide
  - Residual + burndown
  - Can use Canopy, Valor XLT, or Envive, but do not exceed maximum allowed rate of chlorimuron

Spring marestail burndown in soybeans

- Glyphosate (1.5 lbs/A) + 2,4-D ester
  - 2,4-D rates as high as possible based on days until planting
  - Up to 0.5 lb - 7 days before planting
  - 0.5 to 1 lb - 15 to 30 days, depending upon product
- Gramoxone (3 to 4 pts/A) + 2,4-D ester + metribuzin (8 oz/A)
- Ignite (32 to 36 oz)
- Ignite (29 to 36 oz) + metribuzin (4 to 8 oz/A)
- Sharpen (1 oz) or Optill (2 oz)
  + MSO + glyphosate or Ignite
- Adding one of these can improve burndown if ALS-sensitive
  - Authority First, Authority XL, Canopy, Envive, FirstRate, Gangster, Sonic, or Valor XLT

Spring marestail burndown in soybeans

- Glyphosate (1.5 lbs/A) + 2,4-D ester
  - $6 - $8
- Gramoxone (3 to 4 pts/A) + 2,4-D ester + metribuzin (4 to 8 oz/A)
  - $18 - $24
- Ignite (32 to 36 oz)
  - $11 - $13
- Ignite (29 to 36 oz) + metribuzin (4 to 8 oz/A)
  - $15 - $19
- Sharpen (1 oz) + glyphosate + MSO
  - $11 - $13
  - If Optill (2 oz) = $18 - $20
- Sharpen (1 oz) + Ignite (22 oz) + MSO
  - $18
  - If Optill (2 oz) = $25

Herbicides for residual control of marestail

- ALS-resistant (or not sure)
  - Authority products, Valor products, metribuzin, Gangster, Envive, Sonic, Spartan
  - Canopy DF + metribuzin
- Not ALS-resistant
  - Canopy DF/EX, Python
- Note on Sharpen and Optill
  - Not much residual control of marestail
  - Cannot mix with products that contain Valor or Authority

PRE soybean herbicides - residual broadleaf control

Most broad-spectrum	Valor XLT/Envive
	Gangster
	Authority XL
	Sonic/Authority First
	Canopy DF, Scepter
	Canopy EX
	Authority Assist
	Valor, Optill
Least broad-spectrum	Pursuit, metribuzin, Python, Spartan

Marestail – residual herbicide considerations

- How much is enough Valor or sulfentrazone (Authority) where marestail is ALS-resistant?
- Valor – 2.5 oz?
  - Valor XLT = 4.3 oz
    - RR rate = 3 – 3.5 oz
  - Envive = 4.4 oz
    - RR rate = 3 – 3.5 oz
  - Gangster = 3 oz
    - RR rate = 1.8 – 2.4 oz

Marestail – residual herbicide considerations

- How much is enough Valor or sulfentrazone (Authority) where marestail is ALS-resistant?
- sulfentrazone – 0.25 lb ai?
  - Authority XL = 6.6 oz
    - RR rate = 3.2 – 5 oz
  - Sonic/Authority First = 6.2 oz
    - RR rate = “as low as 3 oz”
  - Authority Assist = 9.6 oz
    - RR rate = 4 – 6 oz

Soybean yield loss from marestail
OSU, South Charleston, 2010

	Yield (bu/A)	$ lost @$12/bu
Poor control from burndown	51	$168
Effective burndown, no residual	57	$96
Effective burndown + residual	65	

Bottom line:
Failing to burndown = 21% yield loss

Effective burndown but
fail to use residual = 12% yield loss

Control of Marestail in No-till Soybeans

Mark Loux
OSU Weed Science
The Ohio State University
http://agcrops.osu.edu/specialists/weeds

Bill Johnson
Purdue Extension Weed Science
www.btny.purdue.edu/weedscience

For Free Herbicide Labels Go to

www.cdms.net
or
www.greenbook.net

Information listed here is based on research and outreach Extension programming at Purdue University, Ohio State University, and elsewhere. The use of trade names is for clarity to readers of this publication and does not imply endorsement of a particular brand nor does exclusion imply non-approval. Always consult herbicide labels for the most current and up-to-date precautions and restrictions. Copies, reproductions, or transcriptions of this document or its information must bear the statement "Produced and prepared by Purdue University or Ohio State University Extension Weed Science" unless approval is given by the author.

Marestail Biology

- Marestail (aka horseweed) has two primary periods of emergence - from late summer into fall, and from late March through June. Spring-emerging marestail has been the most problematic to manage in the southern half of Ohio and Indiana, especially the plants that emerge in May and June.
- Marestail plants remain in the low-growing rosette stage through late April, followed by stem elongation (bolting) and growth to an eventual height of 3 to 6 feet. Plants that emerge the previous fall will start stem elongation earlier than spring-emerging plants.
- Marestail competes with the soybeans throughout the growing season, and reduces crop yield. Marestail matures in late summer or early fall, late enough to interfere with soybean harvest.

Herbicide activity and resistance in marestail

- Herbicide programs must consist of a spring burndown to ensure that the field is free of marestail at the time of soybean planting, and residual (PRE) herbicides to control marestail for another 6 to 8 weeks. Failure to follow these guidelines can result in poor control and reduced soybean yield. We observed the following soybean yields in a 2010 OSU marestail study:

  51 bu/A average where the burndown treatment failed to control emerged plants
  57 bu/A average where the burndown treatment was effective, but there was no residual herbicide
  65 bu/A average where the burndown was effective and residual herbicides were used

- Marestail is most easily controlled when in the seedling or rosette stage, and spring burndown herbicides should be applied when plants are less than 4 inches tall if possible.
- Marestail populations with resistance to glyphosate or ALS inhibitors (e.g. Classic, FirstRate) are widespread throughout Ohio and Indiana, and many populations have multiple resistance to both of these sites of action. Growers should therefore not expect to obtain effective POST control with combinations of glyphosate plus Classic, Synchrony, or FirstRate, except in fields with no history of herbicide resistance or POST control problems.

LibertyLink soybeans are the most effective control strategy

- LibertyLink soybeans are the most effective tool for management of herbicide-resistant marestail, especially in fields with high marestail populations.
- Use burndown and residual herbicides as outlined on the next page. Apply Liberty POST (29 oz/A) before marestail plants exceed 6 inches in height. Liberty can be applied POST at rates up to 36 oz/A for taller plants or plants that have survived previous herbicide treatments.

Steps for effective management of marestail

1. Use fall herbicide treatments in fields with a history of problems or where marestail seedlings are observed in the fall. **The primary goal of a fall treatment is control of emerged plants, and it is not a substitute for a spring preplant herbicide treatment. An application of burndown and residual herbicides is still required in the spring in fields that were treated in the fall.** Products containing chlorimuron can provide residual control into the spring if the marestail population is not ALS-resistant, but do not expect a fall herbicide treatment to adequately control marestail that emerges in May or June. Authority, Valor, and metribuzin products and mixtures should be applied in the spring, not in the fall. Where a fall application is necessary, we suggest minimizing costs by applying one of the following:

- glyphosate + 2,4-D; or dicamba + 2,4-D; or 2,4-D + a low rate of Canopy/Cloak EX or DF

2. Apply effective burndown herbicides in spring. Do not plant into existing stands of marestail. Start weedfree at the time of planting by using one of the following preplant herbicide treatments, applied when marestail plants are less than 4 inches tall. Note - tillage also effectively removes marestail.

- 2,4-D ester plus glyphosate (1.5 lb ae/A)
- 2,4-D ester plus Gramoxone (3 to 4 pts/A) plus a metribuzin-containing herbicide
- Liberty (29 to 36 oz/A) or Liberty plus a metribuzin-containing herbicide
- Saflufenacil product (Sharpen, Optill, or Verdict) plus MSO (1% v/v) plus either glyphosate or Ignite

- The mixture of glyphosate and 2,4-D ester has become more variable for control of marestail over time in some fields. Plants should be in the rosette stage at the time of application for best results. In fields where this mixture has previously failed to provide effective control, use one of the other burndown treatments listed above (2,4-D ester can be added to any of these).
- Use the highest rate of a 2,4-D ester product that is allowed, based on the interval between application and soybean planting. For all 2,4-D ester products, rates up to 0.5 lb active ingredient/A must be applied at least 7 days before planting. Rates between 0.5 and 1.0 lb/A should be applied at least 30 days before planting, with the the exception of several products (E-99, Salvo, and Weedone 650) that allow 1 lb/A to be applied 15 days before planting.
- In ALS-sensitive populations, the activity of any of the above can be improved with the addition of a herbicide that contains chlorimuron (Canopy/Cloak/Fallout, Valor XLT, Envive, Authority XL) or cloransulam (Gangster, Sonic, Authority First).

3. Include residual herbicides with the burndown treatment. Add one of the following herbicides or herbicide combinations to the burndown herbicides, for residual control of marestail until the soybean leaf canopy develops. Where a saflufenacil product is used for burndown, do not use a residual herbicide containing flumioxazin (Valor, Valor XLT, Envive, Enlite, Gangster) or sulfentrazone (Authority products).

- Valor, Valor XLT, Envive, Enlite, or Gangster
- Authority First, Sonic, Authority XL, Authority Broadleaf, or Spartan
- Canopy/Cloak DF + metribuzin (total metribuzin rate must be at least 0.38 lb ai/A)
- metribuzin (Metri DF, Tricor, etc) or Boundary (metribuzin rate must be at least 0.38 lb ai/A)

4. Herbicides for POST control. Liberty is the only consistently effective herbicide for POST control (for use only in LibertyLink soybeans). If marestail plants escape the measures outlined above and require POST control in Roundup Ready soybeans, try a combination of glyphosate plus Classic or FirstRate at the highest allowable rates. These combinations are likely to be variable in their effectiveness but may work in some fields.

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THE OHIO STATE UNIVERSITY EXTENSION

FACT SHEET

Agriculture and Natural Resources

FC-ENT-0024-09

Twospotted Spider Mite on Soybean

Ronald B. Hammond, Andy Michel, and **James B. Eisley**
Department of Entomology
The Ohio State University

Crop: Soybean
Crop Development: All Growth Stages from Late Spring to Late Summer
Scientific Name: *Tetranychus urticae*

Adult twospotted spider mites (TSSM) are very small (ca. 1/60 inch in length), eight-legged arthropods (nymphs have 6 legs) with a black spot on each side of their bodies (fig. 1). Color of the mites is variable ranging from white to light red. The eggs of the mites appear like small, clear or pale marbles when viewed through a good hand lens. The twospotted spider mite is widely distributed and a common pest of orchards and nursery plants. When environmental conditions are hot and dry, spider mites multiply rapidly and can become a major pest of soybeans. Problems on soybean have been increasing over the past 10 years.

Dispersal over a wide area occurs when spider mites are carried on a balloon of their webbing by the wind. If weather conditions are favorable for mite development and population increase in late spring during the growing season, TSSM are often found causing problems throughout the field. However, when environmental conditions do not become favorable for the mite until midsummer to late summer, we usually see infestations only

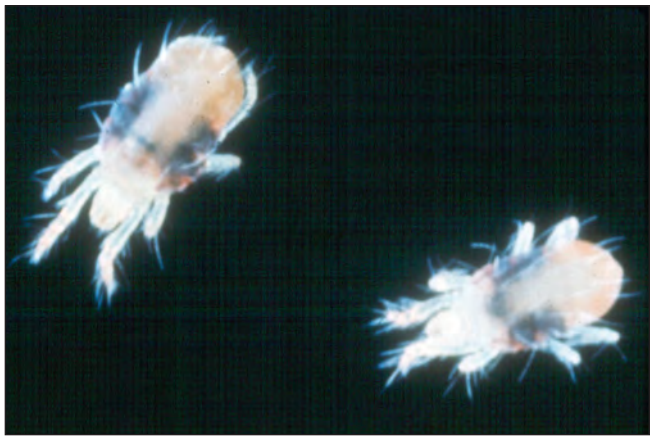

Figure 1. Twospotted spider mites

Figure 2. Mite injury on soybean field edge

Copyright © 2009, The Ohio State University

along field perimeters and corners (fig. 2). However, these are only general rules, and growers should monitor the entire field for identification of infestations.

Symptoms

TSSM feed on the underside of the foliage with sucking moth parts and may be very destructive when abundant. Under hot and dry field conditions favorable to mites, the TSSM thrives on plants that are under stress. The juices that the mites obtain from stressed plants are rich in nutrients and the mites multiply rapidly.

Soybean foliage infested with spider mites initially exhibits a speckled appearance (fig. 3). As plants become heavily infested, foliage turns yellow (fig. 4), then bronze (fig. 5), and finally the leaves drop off the plants as the effect of heavy feeding leads to dehydration and death of the plant.

In a year of a spider mite outbreak, when mite populations are widespread and rapidly multiplying, a field warranting rescue treatment may appear relatively green and healthy. Severely infested fields appear discolored and a potential yield loss may have already occurred due to a loss in vigor of plant growth. Heavily infested stands will exhibit a loss in plant stand.

Scouting

Economic thresholds based on the number of mites per plant have not been established for spider mites on soybeans. However, a scheme for evaluating an infested field based on observations of the presence of mite and feeding injury has been developed. In making an assessment of a spider mite infested field, it is important that one recognize the early signs of mite feeding, which is the stippling or speckled effect that initially appears on the foliage when foliage is still green. In addition, it is essential that one use a good hand lens to view relative abundance of mites in egg, nymph, and adult stages (fig. 6). The following is a system that can be used to assess a field and determine the need for taking action.

1. Mites are barely detected on underside of leaves in dry locations or on edges of fields. Injury is barely detected. Non-economic population; do nothing.
2. Easily detected on underside of leaves along edges of fields or perhaps on leaves in dry areas throughout field. Most foliage is still green, but yellow stippling caused by mite feeding is becoming detectable on upper side of leaves with the underside showing mite feeding. Still non-economic; warrants close monitoring.

Figure 3. Soybean leaves showing speckling

Figure 4. Soybean leaves showing yellowing

Copyright © 2009, The Ohio State University

Figure 5. Soybean leaves showing bronzing and dying

Figure 6. Underside of soybean leaf showing mites

3. Many plants are infested when examined closely, with plants showing varying degrees of stippling. Possibly some speckling and discoloration of some of the leaves. These plants may be limited to field edges, but also might be found throughout field. Field edges might be showing signs of injury. Economic population developing; rescue treatment warranted. Consider entire field spray if mites are common throughout field.
4. All plants in area, whether along field edge or within field, are heavily infested. Plants are discolored with wilted leaves, usually obvious from a distance. Severe injury occurring. Economic population; rescue treatment will save field.
5. Extremely high TSSM densities, with much of the field discolored, stunted, with many plants dying down or already dead. Economic population; rescue treatment will only be beneficial if new growth occurs following late summer rain.

Management

When conditions are optimal for spider mite outbreaks, that is, hot and dry conditions, early detection facilitates timely and effective rescue treatment. If an infestation is detected early and is only along the field edge, growers can often obtain effective management of TSSM by making a field edge miticide treatment, spraying along the edge one or two passes with the spray boom into the field beyond noticeable mite infestation. If a grower determines that the mite infestation is throughout the field, the best course of action is a whole field miticide application. When rescue treatment is required for control of spider mites, the efficacy of a control treatment is improved significantly if the treatment is applied by ground rigs with sufficient carrier applied at high pressure in a manner to penetrate the foliage.

Since mite development is linked to host plant stress, cultural practices and varieties that limit plant stress in times of drought will also minimize the development of spider mites. Spider mite activity may be adversely affected by the onset of rains depending on the level of mite infestation established. Rains may have a negative effect on a minor infestation. However, well-established mite populations may tolerate significant rains, especially if host plants are already in a condition of stress.

Currently, there are only a few insecticides that are also miticides that are able to effectively control mites—two that are familiar, with a third being relatively new to soybean. The more common ones are dimethoate and chlorpyrifos; the

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latter being sold under different trade names, the most well known being Lorsban. Another miticide recently labeled on soybean is bifenthrin, which is available alone or in combination with other insecticides. Although a few of the pyrethroids are labeled for TSSM, they are listed as "suppression only"; because of this, we do not recommend them. When using a chlorpyrifos formulation, the label states that when large numbers of eggs are present, fields should be scouting again within 3 to 5 days. If newly hatched nymphs are present, a grower should make a follow-up application of a non-chlorpyrifos product that is effective against mite. The primary reason for using a non-chlorpyrifos product is that the label also states a specific use restriction of not making a second application of chlorpyrifos within 10 days of the first application.

See Ohio State University Extension Bulletin 545, *Control of Insect Pests of Field Crops*, for those miticides labeled for twospotted spider mites, or for all materials labeled on soybean. Bulletin 545 can be accessed at http://entomology.osu.edu/ag/.

This publication refers to pesticide recommendations in Bulletin 545 that are subject to change at any time. These recommendations are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The authors, Ohio State University Extension, and the Ohio Agricultural Research and Development Center assume no liability resulting from the use of these recommendations.

Additional information is available from your local OSU Extension office or The Ohio State University Entomology Agronomic Crops Insects web site (http://entomology.osu.edu/ag/).

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