Integrated Pest Management
University of Missouri
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Integrated Pest & Crop Management

The Appearance of Southern Rust

Kaitlyn Bissonnette

Southern rust (*Puccinia polysora*) is a relatively common, annually occurring disease of corn that can result in significant yield loss if infection is severe. Generally, it is observed in many, if not all, of our neighboring southern states before appearing in Missouri fields. This year is an exception. On Tuesday (July 10th), the University of Missouri Plant Diagnostic Clinic confirmed the presence of southern rust in a sample collected from West Central Missouri (**Figures 1 and 2**). It is the first confirmed report of southern rust in the United States this season.

Figure 1 Southern rust confirmed in Vernon County. Note the densely packed, orange-tan pustules on the upper leaf surface. *Photo capture by sample submitter.*

Figure 2 Spores of Puccinia polysora magnified 400 times. These spores are found in the rust pustules that break through the leaf surface and are responsible for the orange-tan color. *Photo by Kaitlyn Bissonnette.*

Since southern rust is a "tropical" disease that requires a living host to survive, it does not overwinter in Missouri but rather in warmer climates. The spores are blown north on wind currents into the corn producing states each year. The unseasonably warm daytime temperatures that have been occurring across much of the state also mean warmer nighttime temperatures when relative humidity is at its highest. These conditions create the ideal environment for the development of southern rust, when spores are present. The overall incidence (percent of plants affected) and severity (percent of an infected plant that is affected) of the disease is relatively low. However there are a few things to keep in mind when scouting for or managing this disease.

Puccinia polysora favors temperatures around 80°F with high relative humidity for four or more hours. As the fungus multiplies in the host tissue, raised structures (pustules) form and masses of spores erupt through the leaf tissue. The circular (or oval) pustules are orange to tan in color, commonly form on the upper leaf surface, and are densely clustered. As the season progresses, the pustules can change from orange-tan to a brown or black color. Rust is often initially observed in the mid to upper plant canopy along field borders or at the ends of rows where spores can easily land on the leaf surfaces. Southern rust can be easily confused with other leaf diseases of corn such as Common rust (**Figure 3**) or Physoderma brown spot (**Figure 4**). It is important to properly diagnose southern rust so as to not make unnecessary (and often costly) fungicide applications. Suspected southern rust samples can be sent to the MU Plant Diagnostic Clinic (**http://plantclinic.missouri.edu/**) for confirmation.

Figure 3 Common rust pustules that can be confused with southern rust. *Photo by Craig Grau.*

Figure 4 Physoderma brown spot of corn. Can be mistaken for southern rust of corn, but leaf tissue remains intact. *Photo by Daren Mueller.*

Management of southern rust is dependent upon the crop stage when it is first detected and the environmental conditions. Up to R3 (milk stage), there can be benefit from applying a preventative fungicide application. However, it is important not to apply a fungicide prematurely. Infection in the early R stages can result in more substantial yield losses than in the later R stages. Take note of the current distribution of southern rust in the area (through the iPIPE website: **http://ext.ipipe.org/ipipePublic/index.php**), the growth stage of the crop, and the environmental conditions as they are the most important factors to take into consideration when making decisions to apply fungicides. With no other confirmed reports of southern rust in Missouri (or any other state) to date, disease pressure is relatively low, so exercise caution when making costly management decisions.

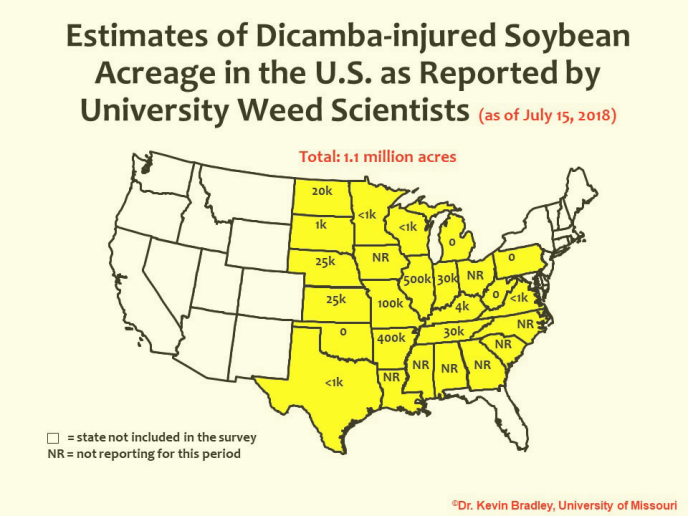
More information on Southern rust, look-alikes, and its management can be found at the Crop Protection Network: **https://cropprotectionnetwork.org/encyclopedia/corn-disease-management/foliar-diseases/southern-rust/**

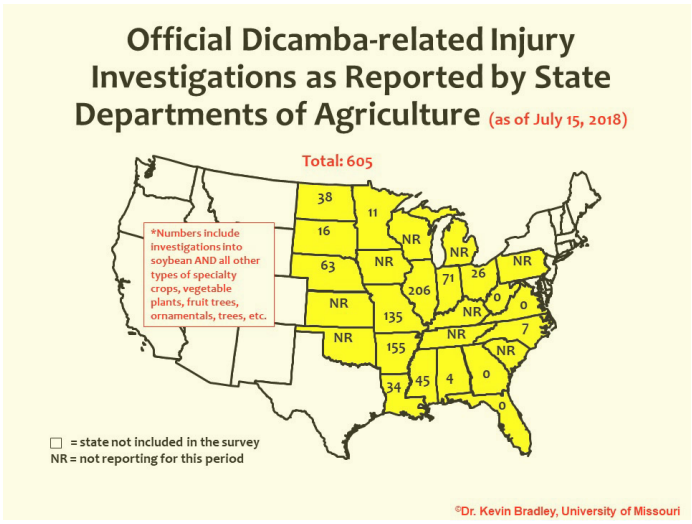
July 15 Dicamba injury update. Different Year, same questions

Kevin Bradley

As explained in previous articles from this season (Dicamba Injury Mostly Confined to Specialty Crops, Ornamentals and Trees so Far, Dicamba Injured Crops and Plants Becoming more Evident: June 15th Update), I have attempted to provide updates as to the extent of dicamba injury throughout the United States, either in the form of official dicamba-related cases that are currently under investigation by the state Departments of Agriculture, or as estimates of dicamba-injured soybean acreage from university weed scientists. Herein, I provide the maps below as an update of the situation as of July 15th.

Because there seems to be great confusion and/or controversy over the maps, I just want to explain once again what these maps contain. First, university weed scientists estimate to what extent they are seeing dicamba injury in their respective states. It is an estimate. My colleagues use extension agents and other trusted sources throughout their state to generate these estimates just like I do in my own state. Hopefully everyone on all sides of this issue can appreciate that much more happens than what actually gets turned into the state Departments of Agriculture; that is the reason for the map of estimates.





The second map contains the number of actual dicamba-related injury investigations that are being conducted by the various state Departments of Agriculture. These are ongoing investigations and are not final. Given the significant strain that has been placed on these agencies who are now dealing with 2 to 3 times the number of investigations as in the past (usually without any added personnel or funding), I doubt these cases will be able to be finalized any time soon.

As for the information within the maps, as a point of reference, last season the first time we published any U.S.-wide information was on July 25th (Ag Industry, Do we have a problem yet?). At that time, there were 1,411 dicamba-related injury investigations being conducted by the various state Departments of Agriculture while university weed scientists estimated approximately 2.5 million acres of soybean had been injured with dicamba. To date, at about the same time in 2018, we have somewhere around 600 cases being investigated by the state departments of agriculture and approximately 1.1 million acres of soybean estimated with dicamba injury by university weed scientists. This information, of course, is only as good as the source and it should be noted that these totals do not reflect what has happened in those states who were unwilling to participate and provide information for this survey. I would also be remiss if I did not mention that these numbers are reflective of what has happened after tighter label restrictions, cut-off dates in certain states, and mandatory training which were not in place in 2017.

As I've said from the beginning on this whole issue, there are great differences in perspective about the extent of this problem and what constitutes success with this technology. Unfortunately, one's perspective on this issue within agriculture seems to be closely linked to the company you work for or the type of seed you buy; a fact which I must confess disappoints me greatly and in my opinion is incredibly short-sighted.

In the first draft of this article, I started to go on and "wax eloquent" here about all of those issues again but upon re-reading, I deleted all of it. The truth is, as I was looking back to that first 2017 report (Ag Industry, Do we have a problem yet?), I stumbled onto the last two paragraphs of that article which contained two questions that, for the most part, I had pretty much forgotten about. One year later, I realized the most productive way I could end this article is to leave you with these same (modified) questions:

> First, does 605 official dicamba-related injury investigations and/or approximately 1.1 million acres of dicamba-injured soybean constitute a problem for U.S. agriculture?
>
> Second, can you look at the scale and the magnitude of the problem on these maps and really believe that all of this can collectively be explained by some combination of physical drift, sprayer error, failure to follow guidelines, temperature inversions, generic dicamba usage, contaminated herbicides, and improper sprayer clean out, but that volatility is not also a factor?

Spider Mites

Kevin Rice

Spider mite populations increase under hot dry conditions and can cause economic damage in Missouri field crops. Several groups of insect predators effectively control spider mites. However, these natural enemies are more susceptible to insecticides, therefore, chemical control targeting early season pests such as Japanese beetles, may exasperate spider mite damage later in the season. Furthermore, imidacloprid applied as a systematic soil treatment or as a foliar spray can increase mite fecundity.

Spider mites are small (1/60 of an inch) and typically occur on the undersides of leaves making detection difficult. Identification can be accomplished using a 10-20 X hand lens. In soybean, chemical control is warranted when spider mites are present, and foliage yellowing reaches 20% before pod set, or foliage yellowing reaches 10% after pod set. Most pesticides do not kill spider mite eggs, therefore additional applications are sometimes necessary 5 days after the initial treatment. Spider mites occur on numerous species of weeds along field borders. Weed control can reduce overwintering success and infestations in crops the following year.

Missouri State Approved Soil Testing Labs

Manjula Nathan

The Missouri Soil Testing Association (MSTA) Approval Program is designed to assure that results provided by participating public and private labs serving the citizens of Missouri agree with allowable statistical limits. This is accomplished by evaluating the soil testing laboratories in their performance through inter-laboratory sample exchanges and a statistical evaluation of the analytical data. Based on this premise, soil test results from MSTA approved labs will be accepted by the U.S. Department of Agriculture, Farm Service Agency (FSA) and Department of Natural Resources and Conservation Services (NRCS) in federally assisted cost share programs and nutrient management plans in the state of Missouri.

In order to be approved by the Missouri State program, the participating labs should participate in all four quarter exchanges of the NAPT program and submit the MO State data release form each year to the NAPT coordinator. The NAPT coordinator in return sends soil test data from quarterly sample exchanges of the labs participating in MSTA program to the Missouri state coordinator. The MU Soil Testing Lab director serves as the state program coordinator and performs statistical analysis of the data as specified in the MSTA program. If a lab's results fall within the allowable limits, the lab will be placed on the Farm Service Agency's (FSA) list of approved labs. A lab that is not approved may re-apply after a year. An updated listing of Missouri State Approved Soil Testing lab list can be found at: http://soilplantlab.missouri.edu/soil/msta.aspx

List of Missouri State Approved Soil Testing Labs July 1, 2018 to June 30, 2019

MU Soil & Plant Testing Lab
University of Missouri
23 Mumford Hall
Columbia, MO 65211
Telephone: 573-882-3250
Fax: 573-884-4288

MU Delta Soil Testing Lab
Univ. of Missouri, PO Box 160
Portageville, MO 63873
Telephone: 573-379-5431
Fax: 573-379-3383

Custom Ag Labs
PO Box 274
Duenweg, MO 64841
Telephone: 417-553-8510

Perry Agricultural Lab
PO Box 418
State Highway 54 East
Bowling Green, MO 63334
Telephone: 573-324-2931
Fax: 573-324-5558

Ag Source Laboratories
300 Speedway Circle #2
Lincoln NE 68502
Tel: 402-476-0300
Fax: 402-476-0302

American Agricultural Lab
700 W D St
McCook, NE 69001
Telephone: 308.345.3670
Fax: 308-345-7880

Midwest Laboratories, Inc.
13611 B St.
Omaha, NE 68144-3693
Telephone: 402-334-7770
Fax: 402-334-9121

Ward Laboratories
4007 Cherry Ave.
PO Box 788, Kearney, NE 68848
Telephone: 308-234-2418
Fax: 308-234-1940

Ag Source Laboratories
1532 Dewitt, Ellsworth, IA 50075
Telephone: 515-836-4444
Fax: 515-836-4541

Solum Lab Inc.
615 S. Bell Avenue, Ames, IA 50010
Telephone: 515-505-1036

Waypoint Analytical Iowa, Inc.
111 Linn St., PO Box 455
Atlantic, IA 50022
Telephone: 901-213-2400
Fax: 901-213-2440

Ingram's Soil Testing Center
13343 Fitschen Road
Athens, IL 62613
Tel: 217-636-7500
Fax: 217-636-7500

SGS-Toulon Labs
117 East Main St.
Toulon, IL 61483-0518
Telephone: 309-286-2761
Fax: 309-286-6251

Waypoint Analytical Illinois Inc.
2906 Clark Road, Champaign, IL 61822
Telephone: 217-359-7680

A&L Great Lakes Laboratory
3505 Conestoga Drive
Fort Wayne, IN 46808
Telephone: 260-483-4759
Fax: 260-483-5274

MVTL Laboratories-New Ulm
1126 North Front St.
New Ulm, MN 56073-0249
Telephone: 507-354-8517
Fax: 507-359-2890

Brookside Lab Inc.
200 White Mountain Drive
New Bremen OH 45869
Telephone: 419-977-2766
Fax: 419-977-2767

Spectrum Analytical
1087 Jamison Road, PO Box 639
Washington Court House, OH 43160
Telephone: 740-335-1562
Fax: 740-335-1104

Waters Agricultural Laboratories
257 Newton Highway
PO Box 382, Camilla, GA 31730
Telephone: 229-336-7216
Fax: 229-336-0977

Waters Agricultural Laboratories
2101 Old Calhoun Road
Owensboro, KY 42301
Telephone: 270-685-4039
Fax: 270-685-3989

Waypoint Analytical Inc.
2790 Whitten Road
Memphis, TN 38133
Telephone: 901-213-2400
Fax: 901-213-2440

Ag Source Cooperative Services
106 N. Cecil St. PO Box 7
Bonduel, WI 54107
Telephone: 715-758-2178
Fax: 715-758-2620

Note: Approval of soil analysis does not imply approval of fertilizer and limestone recommendations by the individual labs. The approval allows the clients to use the University of Missouri soil fertility recommendations as required by the federal and state agencies for cost share and nutrient management planning programs. In order to use the University of Missouri soil fertility recommendations and get meaningful results, it is recommended that the labs use the soil test procedures required by the MSTA program.