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Fungicides: Terminology

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Fungicides: Terminology

Abstract

Many growers have never used foliar-applied fungicide for management of field crop diseases, especially on soybean. At this time, foliar-applied fungicides are the only effective option for managing Asian soybean rust. In the following weeks, there will be a series of articles to help producers understand fungicides and how they affect their production practices. Some of the commonly used terms are defined below:

Keywords

Plant Pathology

Disciplines

Agricultural Science | Agriculture | Plant Pathology

Consider an early-season insecticide

For managing bean pod mottle virus, which is the pathogen transmitted by bean leaf beetles, our studies indicate that an early-season, foliar insecticide is critical for suppressing virus incidence under high bean leaf beetle pressure. It is important to apply this insecticide as soon as beetles are present in your soybean field.

Consider a mid-season insecticide

Additionally, our studies indicate that although a mid-season insecticide by itself can not prevent an increase in bean pod mottle virus, it seems necessary to improve seed quality. Furthermore, if combined with an early-season insecticide, the two treatments give an added positive effect on yield and seed quality.

Scout 1st generation beetles

Finally, continue to scout your field 1 week following the predicted 1st generation emergence (1212 degree days, base 46 °F) to determine if your field is at risk for 2nd generation beetle damage. More information will be published in *Integrated Crop Management* later this summer regarding these management recommendations. If you are already following a virus-management plan, bean leaf beetles may not rebound in your field and a third insecticide may not be necessary; however, scouting would be good insurance.

We will continue to keep you informed regarding the progress of the bean leaf beetle population this summer.

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Plant Diseases

Fungicides: Terminology

by Daren Mueller, Department of Plant Pathology

Many growers have never used foliar-applied fungicide for management of field crop diseases, especially on soybean. At this time, foliar-applied fungicides are the only effective option for managing Asian soybean rust. In the following weeks, there will be a series of articles to help producers understand fungicides and how they affect their production practices. Some of the commonly used terms are defined below:

*First
in a
series*

Fungicide: a chemical or physical agent that kills or inhibits the growth of fungi. Fungicides have at least three names, all of which can be found on the label:

Chemical name: the name of the active ingredient (a.i.) in a fungicide (e.g., methyl (E)-2-[2-[6-(2-cyanophenoxy) pyrimidin-4-yloxy]phenyl]-3-methoxyacrylate).

Common name: a less technical term for the active ingredient (e.g., azoxystrobin).

Trade name: the patented name under which a product is commercially available (e.g., Quadris).

Active ingredient (a.i.): the active component of a fungicide. A single active ingredient may be marketed under several different trade names.

Fungicide resistance: the reduction in sensitivity to a fungicide by an individual fungus. Fungicides with single-site modes of action are at relatively high risk for resistance development compared to those with multi-site mode of action.

Classification of fungicides

Fungicides can be classified a number of different ways, including (1) mobility in the plant, (2) role in protection of plants, (3) breadth of activity, (4) mode of action, and (5) chemical group.

(1) Mobility in the plant

Contact fungicide: a fungicide that remains on the surface where it is applied but does not go deeper; these fungicides have no after-infection activity. Repeated applications are needed to protect new growth of the plant and to replace material that has been washed off by rain or irrigation, or degraded by environmental factors such as sunlight.

Systemic fungicide: a fungicide that is absorbed into plant tissue and may offer some after-infection activity. Very few fungicides are truly systemic (i.e., move freely throughout the plant); however, some are upwardly systemic (i.e., move only upward in the plant through xylem tissue), and some are locally systemic (i.e., move into treated leaves and redistribute to some degree within the treated portion of the plant).

(2) Role in protection (some fungicides can fall into more than one of these categories)

Preventative activity: occurs when a fungicide is present on the plant as a protective barrier before the pathogen arrives or begins to develop so that it prevents infection from occurring (also referred to as a protective activity).

Early-infection activity: occurs when the active ingredient of a fungicide can penetrate the plant and stop the pathogen in the plant tissues, usually most effective 24 to 72 hours after infection occurs, depending on the fungicide. Most fungicides that have early-infection activity also have preventative activity and are most effective when applied before infection occurs. (also referred to as a curative activity, although we are going to avoid this term because many of these fungicides do not “cure” the plant).

Eradication: the ability to stop disease development after symptoms have developed. Very few fungicides have this capability, and growers must not rely on this as a means of disease control.

Anti-sporulant activity: the ability to prevent spores from being produced. In this case, disease continues to develop (e.g., lesions continue to expand), but spores are not produced or released, so the amount of inoculum available to infect surrounding plants is reduced.

(3) Breadth of activity

Single-site fungicide: fungicide active against only one point in one metabolic pathway in a fungus or against a single critical enzyme or protein needed by the fungus. These fungicides are less toxic to plants and tend to have systemic properties.

Multi-site fungicide: fungicide that affects a number of different metabolic sites within the fungus.

(4) Mode of action

Mode of action: how a fungicide acts on a target fungus, which is the specific process in the metabolism of the target fungus that is affected by a fungicide. Examples are damaging cell membranes, inactivating critical enzymes or proteins, or interfering with key processes such as energy production or respiration.

(5) Chemical group or class

Chemical group or class: the name given to a group of chemicals that share a common biochemical mode of action and may or may not have similar chemical structure. Fungicides approved for use on field crops in Iowa fall into a few different groups: QoI fungicides (which include strobilurins), triazoles, and a few miscellaneous others.

| | | | |
|--------------------------------|--------------------|---|---------------------------------|
| Trade name | Quadris | Alto | Dithane Manzate Penncozeb |
| Active ingredient | azoxystrobin | cyproconazole | mancozeb |
| Mode of action | Qo Inhibitor (QoI) | DeMethylation Inhibitor (DMI) | Multi-site contact activity |
| Chemical group or class | Strobilurins | Triazoles | Dithiocarbamates |
| Mobility in plant | Locally systemic | Upwardly systemic | Contact |
| Role in protection | Protectant | Protectant Early infection Anti-sporulant | Protectant |
| Breadth of activity | Single-site | Single-site | Multi-site |

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