

PLANT DISEASE MANAGEMENT

Authors

Tamra A. Jackson-Ziems



Section Lead
Extension Plant
Pathologist
Department of Plant
Pathology
Lincoln – 402-472-2559
tjackson3@unl.edu

Area of Responsibility: Disease management of corn, sorghum, and soybean

Robert M. Harveson



Extension Plant
Pathologist
Panhandle Research and
Extension Center
Scottsbluff – 308-632-1239
rharveson2@unl.edu

*Areas of Responsibility: Dry
bean, sugar beet, and sun-
flower disease management*

Stephen N. Wegulo



Extension Plant
Pathologist
Department of Plant
Pathology
Lincoln – 402-472-8735
swegulo2@unl.edu

*Area of Responsibility:
Wheat disease management*

Melissa Bartels



Extension Educator
Eastern Nebraska
Research and
Extension Center
David City
- 402-367-7410
mbartels6@unl.edu

*Areas of Responsibility:
Butler, Polk Counties*

Amy Timmerman



Extension Educator
Eastern Nebraska
Research and
Extension Center
O'Neill - 402-336-2760
atimmerman2@unl.edu

*Area of Responsibility: Holt,
Boyd Counties*

Sarah Sivits



Extension Educator
West Central Research
and Extension Center
Lexington - 308-324-5501
sarah.sivits@unl.edu

*Area of Responsibility:
Dawson, Buffalo, and
Hall Counties*

Kyle Broderick



Coordinator
Plant & Pest Diagnostic Clinic
Department of Plant Pathology
Lincoln – 402-472-2559
kbroderick2@unl.edu

Resources

Extension Publications

The Nebraska Extension Publications website at extensionpubs.unl.edu offers more than 75 publications on plant disease identification and management. Browse by topic or use the search engine to locate specific information.

CropWatch.unl.edu/plantdisease

This section of CropWatch offers disease identification and management guides organized by crop, including characteristic symptoms to assist with disease diagnosis and current disease management information, observations, and forecasts. The site also includes reports of the latest disease management field trials and contact information for UNL extension plant pathologists.

Written by UNL Extension specialists and educators from across the state, CropWatch.unl.edu is a one-stop resource for crop production and pest management information for Nebraska.



CropWatch.unl.edu/plantdisease

© The Board of Regents of the University of Nebraska–Lincoln. All rights reserved.

Diagnostic Services

UNL Plant and Pest Diagnostic Clinic
448 Plant Science Hall
1875 North 38th Street
Lincoln, NE 68583-0722
(402) 472-2559

The Plant and Pest Diagnostic Clinic was formally organized in 1994 and provides diagnostic services in plant pathology, entomology, horticulture, and weed science. In addition to accurate diagnosis of pest problems, it provides the most current information and recommendations.

The Panhandle Plant Disease Diagnostic Lab at UNL's Panhandle Research and Extension Center at Scottsbluff was organized in 1999. This lab focuses its diagnostic service only on plant disease identification. While most samples are sugar beets or soil samples from sugar beet fields, diagnostic services are provided for any plant disease in the Panhandle. See <http://CropWatch.unl.edu/plantdiagnosticclinics>.

Plant and Pest Diagnostic Clinic



University of Nebraska–Lincoln Extension

CropWatch.unl.edu/plantdiagnosticclinics

Symptoms of Common Diseases

Corn



Bacterial Leaf Streak



Gray Leaf Spot



Southern Rust

Soybeans



Bacterial Blight

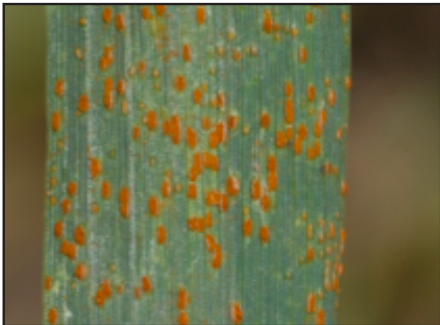


Frogeye Leaf Spot



Septoria Brown Spot

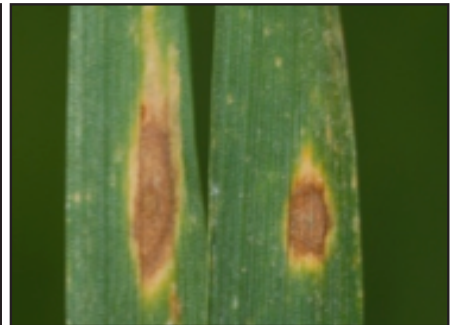
Wheat



Leaf Rust



Stripe Rust



Tan Spot

Specialty Crops



Aphanomyces Root Rot (Sugar Beet)



Bacterial Brown Spot (Dry Bean)



Downy Mildew (Sunflower)

Source for all photos: UNL Department of Plant Pathology

Disease Management for Field Crops

Fungicides are an important component of the pesticide program for some Nebraska fields. While not all fields of corn, dry bean, sorghum, soybean, sugar beet, sunflower, and wheat will require a fungicide application, it's critical that you know the correct product for the disease in your field when you do need it.

- **Identification.** The first step with any disease management program is to make sure you have correctly identified the problem. Identification is critical as there are many bacterial diseases with symptoms similar to fungal diseases and fungicides will have no activity on them.

For help identifying crop diseases, visit the Plant Disease section of UNL's CropWatch at <http://cropwatch.unl.edu/plantdisease>.

- **Timing.** The second step is to ensure accurate timing of the application. With some diseases it is critical to apply the fungicide before there is significant disease development.

Fungicides are plant protection compounds, but have some of the same restrictions as many other pesticides, such as preharvest intervals and post-application field reentry restrictions. Read and carefully follow all label directions.

Resistance

The use of pesticides, including fungicides, has resulted in the development of organisms that are resistant to their effects. Currently, the only major field crop pathogen with known resistance is *Cercospora sojina* (Frogeye leaf spot of soybean) with resistance to the strobilurin (QoI) fungicide group. This has been identified in other parts of the U.S. and not in Nebraska as of 2016. Misuse of products may result in the development of other resistant populations and jeopardize the benefits that are provided by those products and other closely related fungicides.

Resistance can develop after the repeated use of products with the same modes of action, particularly with single-site modes of

action. Also, organisms vary in their ability to become resistant and the frequency that they develop resistant strains. The Fungicide Resistance Action Committee (FRAC) is responsible for ranking the risk for resistance development in fungal pathogen populations. FRAC assigns codes to each fungicide class based on its mode of action (MOA) and likelihood that its use could lead to the development of resistant strains. Rotating the use of products with different or mixed modes of action and avoiding repeated applications can help prevent the development of resistant populations. It's important to carefully read and follow the directions described in the most recent version of the product label in an attempt to avoid the development of resistant populations.

Using this Resource

When crop diseases become a problem, use the following section to assist with the decision-making process for fungicide applications.

Fungicide Modes of Action

FRAC Code	Code Number	Mode of Action	Site of Action	Common Name	Chemical Group
Group 1	B1 β-tubulin assembly in mitosis	MBC (Methyl Benzimidazole Carbamates)	mitosis and cell division	thiabendazole	benzimidazoles
				thiophanate-methyl	thiophanates
Group 2	E3 MAP/Histidine Kinase in osmotic signal transduction (os-1, Daf1)	Dicarboximides	signal transduction	chlozolinate	dicarboximides
				dimethachlone iprodione procymidone vinclozolin	
Group 3	G1 C14-demethylase in sterol biosynthesis	DMI (DeMethylation Inhibitors)	sterol biosynthesis in membranes	cyproconazole	triazoles
				difenoconazole	
				flutriafol ipconazole metconazole myclobutanil propiconazole tebuconazole tetraconazole triticonazole	
				imazalil	imidazoles
				prothioconazole	triazolinthione
Group 4	A1 RNA polymerase I	PA (PhenylAmides)	nucleic acids synthesis	mefenoxam metalaxyl	acylalanines
Group 7	C2 complex II: succinate-dehydrogenase	SDHI (Succinate DeHydrogenase Inhibitors)	respiration	Boscalid	Pyridine-carboxamides
				carboxin	oxathiin-carboxamides
				fluopyram	pyridinyl-ethyl-benzamides
				Penthiopyrad, Fluxapyroxad	Pyrazole-carboxamides
Group 9	D1 methionine biosynthesis	AP (Anilino-Pyrimidines)	amino acids and protein synthesis	cyprodinil mepanipyrim pyrimethanil	anilino-pyrimidines
Group 11	C3 complex III: cytochrome bc1 (ubiquinol oxidase) at QoI site	QoI (Quinone Outside Inhibitors)	respiration	azoxystrobin	methoxy-acrylates
				picoxystrobin	
				fluoxastrobin	dihydro-dioxazines
				pyraclostrobin	methoxy-carbamates
				trifloxystrobin	oximino-acetates

Fungicide Modes of Action (*continued*)

FRAC Code	Code Number	Mode of Action	Site of Action	Common Name	Chemical Group
Group 12	E2 MAP/Histidine-Kinase in osmotic signal transduction	PP (PhenylPyrroles)	signal transduction	fludioxonil	phenylpyrroles
Group 14	F3 lipid peroxidation (proposed)	AH (Aromatic Hydrocarbons)	lipids and membrane synthesis	chloroneb PCNB tolclofos-methyl	aromatic hydrocarbons
Group 21	C4 complex III: cytochrome bc1 (ubiquinone reductase) at Qi site	QII (Quinone inside Inhibitors)	respiration	cyazofamid	cyano-imidazole
				amisulbrom	sulfamoyl-triazole
				fenpicoxamid	picolinamides
Group 22	B3 β -tubulin assembly in mitosis	thiazole carboxamide	mitosis and cell division	ethaboxam	ethylamino-thiazole-carboxamide
Group 28	F4 cell membrane permeability, fatty acids (proposed)	carbarnates	lipid synthesis or transport/membrane integrity or function	iodocarb propamocarb prothiocarb	carbarnates
Group 29	C5 uncouplers of oxidative phosphorylation	unknown	respiration	fluazinam	2,6-dinitroanilines
Group 30	C6 inhibition of oxidative phosphorylation, ATP synthase	organo tin compounds	respiration	triphenyltin hydroxide	triphenyltin compounds
Group 40	H5 cellulose synthase	CAA (Carboxylic Acid Amides)	cell wall biosynthesis	dimethomorph flumorph pyrimorph	cinnamic acid amides
				benthiavalicarb iprovalicarb valifenalate	valinamide carbarnates
				mandipropamid	mandelic acid amides
Group M1	multi-site contact activity	inorganic	multi-site contact activity	copper	inorganic
Group M3	multi-site contact activity	dithiocarbarnates and relatives	multi-site contact activity	mancozeb thiram	dithiocarbarnates and relatives
Group M4	multi-site contact activity	phthalimides	multi-site contact activity	captan	phthalimides
Group M5	multi-site contact activity	chloronitriles	multi-site contact activity	chlorothalonil	chloronitriles
Group 49 (previously Group U15)	oxysterol binding protein homologue inhibition (OSBPI)	lipid synthesis or transport/membrane integrity or function	F9 lipid homeostasis and transfer/storage	oxathiapiprolin	piperidiny-thiazole-isoxazolines

*Based on Fungicide Resistance Action Committee (FRAC) information on the Web at <http://www.frac.info/publications/downloads>.

Alfalfa

Foliar Fungicide and Bactericide Product Information

Fungicides				Application				
Class	Trade name Active ingredient (%)	Rate/A (fl oz) ¹	Formulation ²	Aerial	Chemigation	Ground	REI (Hours)	PHI (Days)
SDHI Carboxamides (Group 7)	Fontelis Penthiopyrad 20.4%	14-24	SC	2 gpa minimum	Allowed	15 gpa minimum	12	14
	Endura Boscalid 70.0%	6.5	WDG	5 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	14
QoI Strobilurins (Group 11)	Headline Pyraclostrobin 23.6%	6.0-9.0	EC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	14
	Headline SC Pyraclostrobin 23.3%		SC					
	Quadris Flowable Azoxystrobin 22.9%	6.0-15.5	SC	Adequate for coverage and canopy penetration	Allowed, 0.1-0.25" application	Adequate for coverage and canopy penetration	4	14
	Approach Picoxystrobin 22.5%	6-12	SC	Adequate for coverage and canopy penetration	Allowed	Adequate for coverage and canopy penetration	12	14
Inorganics (Group M1)	Kocide 2000 Copper hydroxide 53.8%	1.5 lb	DF	3 gpa minimum	Allowed	20 gpa minimum	48	14
	Kocide 3000 Copper hydroxide 46.1%	0.75 lb	DF					
	Kocide HCu Copper hydroxide 77.0%	1.0 lb	EC					
	Badge SC Copper oxychloride 16.81% + Copper hydroxide 15.36%	0.75-1.5 pt	SC	3 gpa minimum	Allowed	Adequate for coverage and canopy penetration	48	14
	Badge X ₂ Copper oxychloride 23.82% + Copper hydroxide 21.49%		DF					
	Champ Formula 2 Flowable Copper Hydroxide 37.5%	1 1/3 pt	F	3 gpa minimum	Allowed	Adequate for coverage and canopy penetration	48	14
	Champ DP Copper hydroxide 57.6%	1 1/3 lb	DP					
Champ WG Copper hydroxide 77.0%	1 lb	WDG						
Mixed Modes of Action 7 + 11	Priaxor Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	4-6.9	SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	14
	Pristine Pyraclostrobin 12.8% + Boscalid 25.2%	12-18	WDG	5 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	14

¹ Rate is fluid ounces per acre unless otherwise noted

² Formulations: DF=Dry Flowable; DP=Dry Prill; EC=Emulsifiable Concentrate; F=Flowable; SC=Suspension Concentrate; WDG=Water Dispersible Granule

Corn

Fungicide Efficacy for Control of Foliar Diseases

The Corn Disease Working Group (CDWG) developed ratings for how well fungicides control major corn diseases in the United States. The CDWG determined efficacy ratings for each fungicide listed in the table by field testing the materials over multiple years and locations. Ratings are based on the product's level of disease control and does not necessarily reflect yield increases obtained from product application. A product's efficacy depends upon proper application timing, rate, and application method as determined by the product label and overall disease level in the field at the time of application. Differences in efficacy among each fungicide product were determined by directly comparing products in field tests using a *single application* of the labeled rate. For application timing and use considerations, please contact your local cooperative extension service. The table includes marketed products available that have been tested over multiple years and locations. The table is not intended to be a list of all labeled products. Additional fungicides are labeled for disease on corn, including contact fungicides such as chlorothalonil. Other fungicides may be available for diseases not listed in the table, including Diplodia, Gibberella and Fusarium ear rots. Many products have specific use restrictions about the amount of active ingredient that can be applied within a period of time or the amount of sequential applications that can occur. Read and follow all use restrictions prior to applying any fungicide.

Efficacy categories: NR=Not Recommended; P=Poor; F=Fair; G=Good; VG=Very Good; E=Excellent; NL = Not Labeled for use against this disease; U = Unknown efficacy or insufficient data to rank product

Fungicide(s)			Diseases						
Class	Product/Trade name	Active ingredient (%)	Anthraxnose leaf blight	Common rust	Eyespot	Gray leaf spot	Northern corn leaf blight	Southern rust	Tar spot
DMI Triazoles (Group 3)	Tilt 3.6 EC Multiple Generics	Propiconazole 41.8%	U	VG	E	G	G	F	NL
	Proline 480 SC	Prothioconazole 41.0%	U	VG	E	U	VG	G	NL
	Folicur 3.6 F Multiple Generics	Tebuconazole 38.7%	NL	U	NL	U	VG	F	NL
	Domark 230 ME	Tetraconazole 20.5%	U	U	U	E	VG	G	NL
QoI Strobilurins (Group 11)	Quadris 2.08 SC Multiple Generics	Azoxystrobin 22.9%	VG	E	VG	E	G	VG	NL
	Headline 2.09 EC/SC	Pyraclostrobin 23.6%	VG	E	E	E	VG	VG	NL
	Approach 2.08 SC	Picoxystrobin 22.5%	VG	VG-E	VG	F-VG	VG	G	NL
Mixed modes of action	Quilt Xcel 2.2 SE Multiple Generics	Azoxystrobin 13.5% Propiconazole 11.7%	VG	VG-E	VG-E	E	VG	VG	U ¹
	Trivapro 2.21 SE	Benzovindiflupyr 2.9% Azoxystrobin 10.5% Propiconazole 11.9%	U	U	U	E	VG	E	U
	Approach Prima 2.34 SC	Cyproconazole 7.17% Picoxystrobin 17.94%	U	U	U	E	VG	G	NL
	Fortix 3.22 SC Preemptor 3.22 SC	Flutriafol 19.3% Fluoxastrobin 14.84%	U	U	U	E	VG-E	VG	NL
	Delaro 325 SC	Prothioconazole 16.0% Trifloxystrobin 13.7%	VG	E	VG	E	VG	VG	U
	Miravis Neo 2.5 SE	Pydiflumetofen 7.0% Azoxystrobin 9.3% Propiconazole 11.6%	U	U	U	E	VG-E	VG	U
	Priaxor 4.17 SC	Pyraclostrobin 28.58% Fluxapyroxad 14.33%	U	VG	U	VG	VG-E	VG	U
	Headline AMP 1.68 SC	Pyraclostrobin 13.6% Metconazole 5.1%	U	E	E	E	VG	G	U
	Stratego YLD 4.18 SC	Trifloxystrobin 32.3% Prothioconazole 10.8%	VG	E	VG	E	VG	G	NL
	Affiance 1.5 SC	Tetraconazole 7.48% Azoxystrobin 9.35%	U	G-VG	U	G-VG	G-VG	G	NL

¹ A 2ee label is available for several fungicides for control of tar spot, however efficacy data are limited

This information is provided only as a guide. It is the applicator's legal responsibility to read and follow all current label directions. Reference in this publication to any specific commercial product is for general information only, and does not constitute an endorsement or recommendation by the CDWG. Individuals using such products assume responsibility for their use in accordance with current directions of the manufacturer. Members or participants in the CDWG assume no liability resulting from the use of these products.

Corn

Foliar Fungicide and Bactericide Product Information

Fungicides / Bactericides				Application			REI (hours)	PHI (days)	Labeled Corn ³
Class	Trade Name Active Ingredient (%)	Rate ¹ (per acre)	Formulation ²	Aerial	Chemigation	Ground			
DMI Triazole (Group 3)	Bumper 41.8 EC Propiconazole 41.8%	2.0-4.0	EC	2 gpa minimum	Allowed, 0.1-0.25'' application	10 gpa minimum	12	30 14 (SW)	F, P, SD, SW
	Bumper ES Propiconazole 40.85%	2.0-4.0	EC	2 gpa minimum	Allowed, 0.1-0.25'' application	10 gpa minimum	12	30 14 (SW)	F, P, SD, SW
	Domark 230 ME Tetraconazole 20.5%	4.0-6.0	EC	2 gpa minimum	Allowed	10 gpa minimum	12 72 (SD)	Do not apply after R3 (milk)	F, P, SD
	Fitness Propiconazole 41.8%	2.0-4.0	EC	2 gpa minimum	Allowed, 0.1-0.25'' application	10 gpa minimum	12	30 14 (SW)	F, P, SD, SW
	Monsoon Tebuconazole 38.7%	4.0-6.0	F	5 gpa minimum	Not allowed	10 gpa minimum	12 456 (SW)	36 7 (SW)	F, P, SD, SW
	Orius 3.6F Tebuconazole 38.7%	4.0-6.0	EC	5 gpa minimum	Not allowed	10 gpa minimum	12 456 (SW)	36 (F, P, SD) 7 (SW)	F, P, SD, SW
	Proline 480 SC Prothioconazole 41.0%	5.7	SC	3 gpa minimum	Allowed, 0.125- 0.5'' application	10 gpa minimum	12	14	F, P, SD
	PropiMax EC Propiconazole 41.8%	2.0-8.0	EC	2 gpa minimum	Allowed, 0.1-0.25'' application	10 gpa minimum	12	30 14 (SW)	F, P, SD, SW
	Prosaro 421 SC Prothioconazole 19.0% + Tebuconazole 19.0%	6.5	SC	2 gpa minimum	Allowed 0.125- 0.5'' application	10 gpa minimum	12	36 7 (SW)	F, P, SD, SW
	TebuStar 3.6L Tebuconazole 38.7%	4.0-6.0	F	5 gpa minimum	Not Allowed	10 gpa minimum	12 456 (SW)	36 7 (SW)	F, P, SD, SW
	Tebuzol 3.6F Tebuconazole 38.7%	4.0-6.0	EC	5 gpa minimum	Not Allowed	10 gpa minimum	12 456 (SW)	36 7 (SW)	F, P, SD, SW
	Tilt Propiconazole 41.8%	2.0-4.0	EC	2 gpa minimum	Allowed, 0.1-0.25'' application	10 gpa minimum	24	30 14 (SW)	F, P, SD, SW
	Topguard Flutriafol 11.8%	7.0-14.0	SC	2 gpa minimum	Not allowed	10 gpa minimum	120 (SD, P)	7	F, P, SD
SDHI Carbox- amides (Group 7)	Vertisan Penthiopyrad 20.6%	10.0-24.0	EC	2 gpa minimum	Allowed	15 gpa minimum	12	7	F, P, SD, SW

¹Rate is fluid ounces per acre unless otherwise noted

²Formulations: DF=Dry Flowable; EC=Emulsifiable Concentrate; F=Flowable; SC=Suspension Concentrate; SE=Suspo-Emulsion; ; G=Granule; WP=Wettable Powder

³Type of Corn: F = field or dent corn; P = popcorn; SD = seed corn; SW = sweetcorn

Corn

Foliar Fungicide and Bactericide Product Information *(continued)*

Fungicides / Bactericides				Application			REI (hours)	PHI (days)	Labeled Corn ³
Class	Trade Name Active Ingredient (%)	Rate ¹ (per acre)	Formulation ²	Aerial	Chemigation	Ground			
QoI Strobilurins (Group 11)	Aftershock Fluoxastrobin 40.3%	2.0-5.7 2.0-3.8 (SW)	F	5 gpa minimum	Allowed, < 0.4" application	10 gpa minimum	12	30 7 (SW)	F, SD, SW
	Approach Picoxystrobin 22.5%	3.0-12.0	SC	Adequate for coverage and canopy penetration	Allowed	Adequate for coverage and canopy penetration	12	7	F, P, SD, SW
	Evito 480 SC Fluoxastrobin 40.3%	2.0-5.7 2.0-3.8 (SW)	SC	2 gpa minimum	Allowed, < 0.4"	10 gpa minimum	12	30 7 (SW)	F, SD, SW
	Headline Pyraclostrobin 23.6%	6.0-12.0	EC	1 gpa minimum	Allowed, < 0.5" application	Adequate for coverage and canopy penetration	12	7	F, P, SD, SW
	Quadris Flowable Azoxystrobin 22.9%	6.0-15.5	SC	Adequate for coverage and canopy penetration	Allowed, 0.1-0.25" application	Adequate for coverage and canopy penetration	4	7	F, P, SD, SW
	Satori Azoxystrobin 22.9%	6.0-15.5	SC	Adequate for coverage and canopy penetration	Allowed, 0.1-0.25" application	Adequate for coverage and canopy penetration	4	7	F, P, SD, SW
Dithiocarbamates (Group M3)	Dithane F-45 Rainshield Mancozeb 37.0%	1.2 qt	F	2 gpa minimum	Allowed, <0.25" application	Adequate for coverage and canopy penetration	24	40 (SD, F) 7 (SW, P)	F, P, SD, SW
	Dithane M-45 Mancozeb 80.0%	1.5 lb	WP	2 gpa minimum	Allowed, <0.25" application	Adequate for coverage and canopy penetration	24	40 7 (SW, P)	F, P, SD, SW
	Penncozeb Mancozeb 75.0%	1.0-1.5 lb	DF	2 gpa minimum	Allowed, 0.1- 0.25" application	Adequate for coverage and canopy penetration	24	40 7 (P, SW)	F, P, SD, SW
	Penncozeb 80WP Mancozeb 80.0%	1.0-1.5 lb	WP	2 gpa minimum	Allowed, 0.1- 0.25" application	10 gpa minimum	24	40 (F, SD) 7 (P, SW)	F, P, SD, SW
Inorganics (Group M1)	Badge SC Copper oxychloride 16.81% + Copper hydroxide 15.36%	0.5-2.5 pt	SC	3 gpa minimum	Allowed	Adequate for coverage and canopy penetration	48	0	F, P, SD, SW
	Kocide 2000 Copper hydroxide 53.8%	1.0-3.0 lb	G	3 gpa minimum	Allowed	20 gpa minimum	48	0	F, P, SD, SW
	Kocide 3000 Copper hydroxide 46.1%	0.5-1.75 lb	G	3 gpa minimum	Allowed	20 gpa minimum	48	0	F, P, SD

¹Rate is fluid ounces per acre unless otherwise noted

²Formulations: DF=Dry Flowable; EC=Emulsifiable Concentrate; F=Flowable; SC=Suspension Concentrate; SE=Suspo-Emulsion; G=Granule; WP=Wettable Powder

³Type of Corn: F = field or dent corn; P = popcorn; SD = seed corn; SW = sweetcorn

Corn

Foliar Fungicide and Bactericide Product Information (continued)

Disease Management: Corn

Fungicides / Bactericides				Application			REI (hours)	PHI (days)	Labeled Corn ³	
Class	Trade Name Active Ingredient (%)	Rate ¹ (per acre)	Formulation ²	Aerial	Chemigation	Ground				
Mixed Modes of Action	3+7	Lucento Flutriafol 26.5% Bixafen 15.6%	3.0-5.5	SC	2 gpa minimum	Allowed	10 gpa minimum	120 (SD)	30 10 ⁷	F, P, SD
		Absolute Maxx Tebuconazole 22.63% + Trifloxystrobin 22.63%	5.0-6.0	SC	2 gpa minimum	Allowed, 0.125- 0.5" application	10 gpa minimum	12 456 (SW)	36 7 (SW)	F, P, SD, SW
	Affiance Azoxystrobin 9.35% + Tetraconazole 7.48%	10.0-17.0	SC	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12 72 (SD)	7 21 ⁴	F, P, SD	
	Approach Prima Picoxystrobin 17.94% + Cyproconazole 7.17%	3.4-6.8	SC	Adequate for coverage and canopy penetration	Allowed	Adequate for cover- age and canopy penetration	12	30 21 ⁴	F, SD	
	Delario Prothioconazole 16% +Trifloxystrobin 13.7%	4.0-12.0 8 (SW)	SC	2 gpa minimum	Allowed, 0.125- 0.5" application	10 gpa minimum	12	14 0 (SW)	F, P, SD, SW	
	Evito T Fluoxastrobin 18.0% + Tebuconazole 25.0%	4.0-9.0	SC	3 gpa minimum	Allowed, <0.4" application	10 gpa minimum	12 456 (SW)	36 7 (SD)	F, SD, SW	
	Fortix / Preemptor Fluoxastrobin 14.84% + Flutriafol 19.3%	4.0-6.0	SC	2 gpa minimum	Not allowed	10 gpa minimum	12 120 (SD)	30	F, SD	
	Headline AMP Pyraclostrobin 13.64% + Metconazole 5.14%	8.0-14.4	SC	2 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	20 (F,P) 7 (SD, SW)	F, P, SD, SW	
	Quilt Azoxystrobin 7.0% + Propiconazole 11.7%	7.0-14.0	SE	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	30 14 (SW)	F, P, SD, SW	
	Quilt Xcel Azoxystrobin 13.5% + Propiconazole 11.7%	10.5-14.0	SE	2 gpa minimum	Allowed, 0.125-0.25" application	10 gpa minimum	12	30 (F, P,SD) 14 (SW)	F, P, SD, SW	
	Stratego YLD Prothioconazole 10.8% + Trifloxystrobin 32.3%	2.0-5.0 4.0-5.0 (SW)	SC	2 gpa minimum	Allowed	10 gpa minimum	12	14 0 (SW)	F, P, SD, SW	
	Topguard EQ Azoxystrobin 25.3% + Flutriafol 18.6%	5.0-7.0	SC	2 gpa minimum	Not allowed	10 gpa minimum	12 (F,P) 120 (SD)	7	F, P, SD	
	Veltyma Mefentrifluconazole 17.56% Pyraclostrobin 17.56%	7.0-10.0	SC	2 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	21	F, P, SD, SW	
	Zolera FX Fluoxastrobin 17.76% + Tetraconazole 17.76%	4.4-6.8	EC	2 gpa minimum	Adequate for coverage and canopy pene- tration	10 gpa minimum	12 480 (SD)	30	F, SD	
	7+11	Priaxor Xemium Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	4.0-8.0	SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	21 7 (SW)	F, P, SD, SW

¹Rate is fluid ounces per acre unless otherwise noted

²Formulations: DF=Dry Flowable; EC=Emulsifiable Concentrate; F=Flowable; SC=Suspension Concentrate; SE=Suspo-Emulsion; G=Granule; WP=Wettable Powder

³Type of Corn: F = field or dent corn; P = popcorn; SD = seed corn; SW = sweetcorn

⁴PHI days for silage

⁵A more extensive list of products that includes more generic products can be found at: <https://cropwatch.unl.edu/UNL-EC130Disease-mgmt-prods-2019.pdf>

⁶Except detassellers REI is 5 days

Corn

Foliar Fungicide and Bactericide Product Information *(continued)*

Fungicides / Bactericides				Application			REI (hours)	PHI (days)	Labeled Corn ³	
Class	Trade Name Active Ingredient (%)	Rate ¹ (per acre)	Formulation ²	Aerial	Chemigation	Ground				
Mixed Modes of Action	3+7+11	Miravis Neo Propiconazole 11.6% Pydiflumetofen 7.0% Azoxystrobin 9.3%	10.0-13.7	SE	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	14 (SW)	30	F, P, SD, SW
		Revytek Mefenfluoconazole 11.61% Pyraclostrobin 15.49% Fluxapyroxad 7.74%	8.0-15.0	SC	2 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	21	F, P, SD, SW
		Trivapro Benzovindiflupyr 2.9% + Azoxystrobin 10.5% + Propiconazole 11.9%	13.7	SE	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	30 14 (SW)	F, P, SW
		Trivapro Co-Pack Trivapro A Benzovindiflupyr 9.63%	4.0 -10.5	EC	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	30 (F, P) 14 (SW)	F, P, SD, SW
		Trivapro B Azoxystrobin 13.5% + Propiconazole 11.7%	10.5 -14.0	SE						

¹Rate is fluid ounces per acre unless otherwise noted

²Formulations: DF=Dry Flowable; EC=Emulsifiable Concentrate; F=Flowable; SC=Suspension Concentrate; SE=Suspo-Emulsion; G=Granule; WP=Wettable Powder

³Type of Corn: F = field or dent corn; P = popcorn; SD = seed corn; SW = sweetcorn

⁴PHI days for silage

⁵A more extensive list of products that includes more generic products can be found at: <https://cropwatch.unl.edu/UNL-EC130Disease-mgmt-prods-2019.pdf>

⁶Except detasslers REI is 5 days

⁷PHI 10 for forage

Dry Bean

Foliar Fungicide and Bactericide Product Information

Fungicides / Bactericides				Application			REI (hours)	PHI (days)
Class	Trade Name Active Ingredient (%)	Rate ¹ (per acre)	Formulation ²	Aerial	Chemigation	Ground		
MBC Thiophanates (Group 1)	Topsin 4.5FL Thiophanate-methyl 45.0%	20.0-40.0	F	5 gpa minimum	Allowed, <0.4" application	20 gpa minimum	72	28
	Topsin M WSB Thiophanate-methyl 70.0%	1.0-2.0 lb	WSB	5 gpa minimum	Allowed, <0.4" application	20 gpa minimum	72	28
DMI Triazoles (Group 3)	Orius 3.6F Tebuconazole 38.7%	4.0-6.0	F	5 gpa minimum	Not allowed	10 gpa minimum	12	7
	Proline 480 SC Prothioconazole 41.0%	5.7	SC	2 gpa minimum	Allowed, 0.125-0.5" application	10 gpa minimum	12	7
	Tebuzol 3.6F Tebuconazole 38.7%	4.0-6.0	F	5 gpa minimum	Allowed	10 gpa minimum	12	14
SDHI Carboximides (Group 7)	Endura Boscalid 70.0%	8.0-11.0	WDG	5 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	21
	Vertisan Penthiopyrad 20.6%	14.0-20.0	EC	2 gpa minimum	Allowed	15 gpa minimum	12	21
QoI Strobilurins (Group 11)	Aproach Picoxystrobin 22.5%	6.0-12.0	SC	Adequate for coverage and canopy penetration	Allowed	Adequate for coverage and canopy penetration	12	14
	Headline Pyraclostrobin 23.6%	6.0-9.0	EC /	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	21
	Headline SC Pyraclostrobin 23.3%		SC					
	Quadris Flowable Azoxystrobin 22.9%	6.0-15.5	SC	Adequate for coverage and canopy penetration	Allowed, 0.1-0.25" application	Adequate for coverage and canopy penetration	4	14
Inorganics (Group M1)	Badge SC Copper oxychloride 16.81% Copper hydroxide 15.36%	1.0-2.0 pt	SC	3 gpa minimum	Allowed	Adequate for coverage and canopy penetration	48	0
	Champ Formula 2 Flowable Copper hydroxide 37.5%	0.66-2.0 pt	F	3 gpa minimum	Allowed	Adequate for coverage and canopy penetration	48	0
	Kocide 2000 Copper hydroxide 53.8%	0.75-2.25 lb	DF	3 gpa minimum	Allowed	20 gpa minimum	48	0
	Kocide 3000 Copper hydroxide 46.1%	0.5-1.25 lb	DF	3 gpa minimum	Allowed	20 gpa minimum	48	0
Mixed Modes of Action	7+11 Priaxor Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	4.0-8.0	SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	21
	3+7 Propulse Fluopyram 17.4% + Prothioconazole 17.4%	8.0-10.3	SC	5 gpa minimum	Allowed	10 gpa minimum	48	14
	11+M5 Quadris Opti Azoxystrobin 4.6% + Chlorothalonil 46.0%	1.6-2.4	SC	5 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	14

¹Rate is fluid ounces per acre unless otherwise noted

² Formulations: DF=Dry Flowable; EC=Emulsifiable Concentrate; F=Flowable; SC=Suspension Concentrate; WDG=Water-Dispersible Granules; WSB=Water-Soluble Bag

Potato Seed Treatment Product Information

Class		Trade Name Active Ingredient (%)	Rate/cwt	Application
Thiophanate Methyl (Group 1)		ST-Methyl 540 FS Thiophanate-methyl 46.2%	0.5–0.7 fl oz	On-farm application, water-based slurry or mist
SDHI Carboxamides (Group 7)		Vibrance Sedaxane 43.7%	0.05–0.08 fl oz	On-farm applied, water-based slurry
QoI Strobilurins (Group 11)		Dynasty Azoxystrobin 9.6%	0.10–3.75 fl oz	On farm applied, water-based slurry
		Reason Fenamidone 44.4%	0.15 fl oz	Commercial or on farm applied, diluted spray solution
Phenylpyrroles (Group 12)		Maxim 4FS Fludioxonil 40.3%	0.08 fl oz	On farm applied, specific equipment required
		CruiserMaxx® Potato Insecticide and Fungicide Fludioxonil 7.00% + Thiamethoxam 28.00% (I)	0.19–0.27 fl oz dependent on seeding rates	Commercial or on farm applied, water-based slurry or mist
Chemicals with Multi-site Activity– Contact Activity (Group M3)		Manzate Flowable Mancozeb 37.0%	1 qt/50 gal water	On farm applied, water-based slurry (whole or cut tubers are dipped)
		Manzate Pro-Stick Fungicide Mancozeb 75%	1.25 lbs/50 gal water	On farm applied, water-based slurry (whole or cut tubers are dipped)
		Penncozeb 80WP Mancozeb 80%	1.25 lbs/50 gal water	On farm applied, water-based slurry (whole or cut tubers are dipped)
Mixed Modes of Action	3 + 12	CruiserMaxx® Potato Extreme Fludioxonil 5.21% + Difenoconazole 10.27% + Thiamethoxam 20.83% (I)	0.31 fl oz	On-farm applied with approved equipment for applying liquid, slurry or mix
	7 + 3	Emesto Silver Penflufen 9.35% + Prothioconazole 1.68%	0.31 fl oz	On farm applied, diluted spray slurry
	12 + M3	Maxim MZ Fludioxonil 0.50% + Mancozeb 5.70%	0.5 lb	On farm applied, Dust
	3 + 7 + 12	Cruiser®Maxx Vibrance Potato Fludioxonil 3.34% + Difenconazole 6.69% + Sedaxane 6.69% + Thiamethoxam 13.40% (I)	0.5 fl oz	On-farm applied with approved equipment for applying liquid, slurry or mix

¹ Groundwater Advisory: These products are known to leach through soil into groundwater if used in areas where soils are permeable, particularly where the water table is shallow.

Potato Products for Soil Application

Class	Trade Name Active Ingredient (%)	Rate/1000 ft of row (fl oz) ¹	Application
PA Acylalanines (Group 4)	Ultra Flourish Mefenoxam 25.1%	0.84	In-furrow, 3 gal/A
SDHI Carboxamides (Group 7)	Moncut Flutolanil 70%	0.50–1.1 lbs	In-furrow, 3 gal/A minimum
	Vertisan Penthiopyrad 20.6%	0.7–1.6	In-furrow
QoI Strobilurins (Group 11)	Equation Azoxystrobin 22.8%	0.40–0.80	Banded or in-furrow, 3–15 gal/A at planting
	Evito 480 SC Fluoxastrobin 40.3%	0.16–0.24	Banded or in-furrow, 3–20 gal/A at planting
	Headline Pyraclostrobin 23.6%	0.40–0.80	Banded or in-furrow, minimum of 5 gal/A at planting
	Satori Azoxystrobin 22.9%	0.40–0.80	Banded or in-furrow, 3–15 gal/A at planting
	Tetraban Azoxystrobin 22.9%	0.40–0.80	Banded or in-furrow, 3–15 gal/A at planting

¹ Rate is fluid ounces per acre unless otherwise noted

Potato Products for Soil Application *(continued)*

Class		Trade Name Active Ingredient (%)	Rate/1000 ft of row (fl oz) ¹	Application
QiI-Fungicides (Group 21)		Ranman 400SC Cyazofamid	0.42 2.75 fl oz/A	In furrow Lay-by/Hilling, minimum of 20 gallons of finished spray solution
Mixed Modes of Action	4 + 11	Quadris Ridomil Gold Azoxystrobin 22.9% + Mefenoxam 45.3%	0.82	In-furrow spray, 3–15 gal water/A at planting
	7 + 11	Elatus Azoxystrobin 30.0% + Benzovindiflupyr 15.0%	0.34–0.5	In-furrow
		Priaxor Xemium Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	0.5–0.6	Banded or in-furrow, 2.5 gal/A at planting

¹ Rate is fluid ounces per acre unless otherwise noted

Potato Products for Control of Foliar Diseases

Fungicides				Application			REI (Hours)	PHI (Days)
Class	Trade Name Active Ingredient (%)	Rate/A (fl oz) ¹	Formulation ²	Aerial	Chemigation	Ground		
MBC Thiophanates (Group 1)	Topsin M WSB Thiophanate-methyl 70.0%	1.0–1.5 lbs	WP	6 gpa minimum	Allowed, <0.4" application	20 gpa minimum	48	21
	Incognito 85 WDG Thiophanate-methyl 85.0%	0.8–1.2	WDG	Not Allowed	Allowed, 0.1–1.25" application	Adequate for coverage and canopy penet- ration	48	21
Dicarboximides (Group 2)	Rovral 4 Flowable Fungicide Iprodione 41.6%	1.0–2.0 pt	F	Not Allowed	Allowed, 0.1–0.4" application	Adequate for coverage and canopy penet- ration	24	14
DMI- fungicides (Group 3)	Quash Methconazole 50%	2.5–4.0	WDG	5 gpa minimum	Allowed, 0.1–0.25" application	10 gpa minimum	12	1
SDHI Carboximides (Group 7)	Endura Boscalid 70%	3.5–10	WDG	5 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penet- ration	12	10
	Vertisan Penthiopyrad 20.6%	10–24	EC	2 gpa minimum	Allowed	15 gpa minimum	12	7
PA Acylalanines (Group 4)	Ultra Flourish Mefenoxam 25.1%	6.4	F	5 gpa minimum	Allowed, 0.5–1.0" application	20 gpa minimum	48	14
Anilino- rimidine (Group 9)	Scala Pyrimethanil 54.6%	7.0	SC	5 gpa minimum	Not Allowed	15 gpa minimum	12	7

¹ Rate is fluid ounces per acre unless otherwise noted

² Formulations: DF=Dry Flowable; EC=Emulsifiable Concentrate; F=Flowable; OD=Oil Dispersion; SC=Suspension Concentrate; SE=Suspo-Emulsion; G=Granule; WG=Water Dispersible Granule; WP=Wettable Powder

³ A more extensive list of products that includes more generic products can be found at: <https://cropwatch.unl.edu/potato/diseases>

Potato

Products for Control of Foliar Diseases *(continued)*

Fungicides				Application			REI (Hours)	PHI (Days)
Class	Trade Name Active Ingredient (%)	Rate/A ¹	Formulation ²	Aerial	Chemigation	Ground		
QoI Strobilurins (Group 11)	Equation Azoxystrobin 22.8%	6.0–15.5	SC	5 gpa minimum	Allowed, <0.5" application	10 gpa minimum	4	14
	Evito 480 SC Fluoxastrobin 40.3%	2.0–3.8	F	5 gpa minimum	Allowed, <0.4" application	10 gpa minimum	12	7
	Gem Trifloxystrobin 25.0%	6.0–8.0	SC	Not Allowed	Not Allowed	10 gpa minimum	12	7
	Headline Pyraclostrobin 23.6%	6.0–12.0	EC	5 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	3
	Reason 500 Fenamidone 44.4%	5.5–8.2	SC	5 gpa minimum	Allowed,	15 gpa minimum	12	14
QI-fungicides (Group 21)	Ranman 400SC Cyazofamid 34.5%	1.4–2.75	F	5 gpa minimum	Not allowed	5 gpa minimum	12	7
Carbamates (Group 28)	Previcur Propamocarb hydrochloride 66.5%	0.7–1.2 pt	SC	6 gpa minimum	Allowed	15 gpa minimum	12	14
2,6-dinitro-anilines (Group 29)	Omega 500F Fluazinam 40.0%	5.5	SC	5 gpa minimum	Allowed	5 gpa minimum	12	14
CCA-fungicides (Group 40)	Forum Dimethomorph 43.5%	4.0–6.0	SC	5 gpa minimum	Allowed, <0.5" application	20 gpa minimum	12	4
	Revus Mandipropamid 23.3%	5.5–8.0	SC	5 gpm minimum	Allowed, 0.1-.025" application	10 gpa minimum	4	14
Inorganics (Group M1)	Champ Formula 2 Flowable Copper hydroxide 37.5%	0.66–2.66 pt	F	3 gpa minimum	Allowed	5 gpa minimum	48	0
	Kocide 2000 Copper hydroxide 53.8%	0.75–3 lb	G	3 gpa minimum	Allowed	20 gpa minimum	48	0
	Kocide 3000 46.1%	0.5–1.75 lb	G	3 gpa minimum	Allowed	20 gpa minimum	48	0
	Badge X ₂ Copper oxychloride 23.82% Copper hydroxide 21.49%	1.0–4.0 lb	DF	3 gpa minimum	Allowed	20 gpa minimum	48	0
Chemicals with Multi-site Activity-Contact Activity (Group M3)	Diathane DF Rainshield Mancozeb 15.0%	1.0–2.0 lb	DF	2 gpa minimum	Allowed, <0.25"	Adequate for coverage and canopy penetration	24	14
	Diathane F-45 Mancozeb 37.0%	0.4–1.6 qt	F	2 gpa minimum	Allowed, <0.25"	Adequate for coverage and canopy penetration	24	14
	Dithane M45 Mancozeb 80%	0.5–2 lb	WP	2 gpa minimum	Allowed, <0.25"	Adequate for coverage and canopy penetration	24	14
Chloronitriles (Group M5)	Bravo 720 Chlorothalonil 54%	0.75–1.5 pt	SC	5 gpa minimum	Allowed	5 gpa minimum	12	7
	Bravo 825 Chlorothalonil 82.5%	0.75–1.36 lb	WDG	5 gpa minimum	Allowed	5 gpa minimum	12	7

¹ Rate is fluid ounces per acre unless otherwise noted

² Formulations: DF=Dry Flowable; EC=Emulsifiable Concentrate; F=Flowable; OD=Oil Dispersion; SC=Suspension Concentrate; SE=Suspo-Emulsion; G=Granule; WG=Water Dispersible Granule; WP=Wettable Powder

³ A more extensive list of products that includes more generic products can be found at: <https://cropwatch.unl.edu/potato/diseases>

Potato

Products for Control of Foliar Diseases (continued)

Disease Management: Potato

Fungicides				Application			REI (Hours)	PHI (Days)	
Class	Trade Name Active Ingredient (%)	Rate/A ¹	Formulation ²	Aerial	Chemigation	Ground			
OSBPI (Group 49)	Orondis OD Oxathiapiprolin	1.6–4.8	OD	2 gpa minimum	Allowed	15 gpa minimum	4	5	
Mixed Modes of Action	3 + 11	Quadris Top Azoxystrobin 18.2% + Difenoconazole 11.4%	8.0–14.0	SC	5 gpa minimum	Allowed, 0.1–0.25" application	10 gpa minimum	12	14
		Quadris Top SBX Azoxystrobin 19.8% + Difenoconazole 19.8%	7.0–7.5	SC	5 gpa minimum	Allowed, 0.1–0.25" application	10 gpa minimum	12	14
		Veltyma Mefentrifluconazole 17.56% Pyraclostrobin 17.56%	5–10	SC	2 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	7
	3 + 40	Revus Top Mandipropamid 21.9% + Difenoconazole 21.9%	5.5–7.0	SC	5 gpa minimum	Allowed, 0.1–0.25" application	10 gpa minimum	12	14
	4 + M3	Ridomil Gold MZ WG Mefenoxam 4.0% + Mancozeb 64.0%	2.5 lbs	DF	5 gpa minimum	Allowed, 0.1–0.25" application	10 gpa minimum	48	14
	4 + M5	Ridomil Gold Bravo SC Mefenoxam 3.3% + Chlorothalonil 33.1%	2.5 pt	SC	5 gpa minimum	Allowed, <0.5" application	20 gpa minimum	48	14
	7 + 9	Luna Tranquility Fluopyram 11.3% + Pyrimethanil 33.8%	8.0–11.2	SC	2 gpa minimum	Allowed	Adequate for coverage and canopy penetration	12	7
	7 + 11	Priaxor Xemium Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	4.0–8.0	F	2 gpa mini- mum	Allowed, 0.25" application	Adequate for coverage and canopy penetration	12	7
	11 + M3	Cabrio Plus Pyraclostrobin 5.0% + Metiram 55.0%	2.0–2.9 lb	WDG	5 gpa mini- mum	Allowed, <0.33" application	15 gpa mini- mum	24	14
	11 + M5	Quadris Opti Azoxystrobin 4.6% + Chlorothalonil 46%	1.6 pt	SC	5 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	14
	22 + M3	Gavel 75 DF Zoxamide 8.3% + Mancozeb 66.7%	1.5–2.0 lb	DF	2 gpa minimum	Allowed, <0.25" application	10 gpa mini- mum	48	14
	22 + M5	Zing Zoxamide 6.8% + Chlorothalonil 40.0%	24–34	SC	2 gpa minimum	Allowed, <0.25" application	5 gpa mini- mum	12	7
	33 + M5	Catamaran Potassium phosphite 38.9% + Chlorothalonil 16.7%	4.5–5.5 pt	EC	Adequate for coverage and canopy penetration	Allowed	Adequate for coverage and canopy penetration	12	7
	M3 + M1	Mankocide Mancozeb 15.0% + Copper hydroxide 46.1%	1.5–5 lb	WDG	3 gpa minimum	Not Allowed	Adequate for coverage and canopy penetration	48	14
	M3 + M5	Elixir Mancozeb 62.5% + Chlorothalonil 12.5%	1.5–2.4 lb	DF	2 gpa minimum	Allowed	20 gpa minimum	24	14

¹ Rate is fluid ounces per acre unless otherwise noted

² Formulations: DF=Dry Flowable; EC=Emulsifiable Concentrate; F=Flowable; OD=Oil Dispersion; SC=Suspension Concentrate; SE=Suspo-Emulsion; G=Granule; WG=Water Dispersible Granule; WP=Wettable Powder

³ A more extensive list of products that includes more generic products can be found at: <https://cropwatch.unl.edu/potato/diseases>

Sorghum

Foliar Fungicide Product Information

Fungicides			Application				REI (hours)	PHI (days)	
Class	Active Ingredient (%)	Rate ¹ (per acre)	Formulation ²	Aerial	Chemigation	Ground			
QoI Strobilurins (Group 11)	Approach Picoxystrobin 22.5%	6.0-12.0	F	Adequate for coverage and canopy penetration	Allowed	Adequate for coverage and canopy penetration	12	Do not apply after flowering	
	Headline Pyraclostrobin 23.6%	6.0-12.0	EC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	Apply no later than 25% flowering	
	Headline SC Pyraclostrobin 23.3%	6.0-12.0	SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	Apply no later than 25% flowering	
	Quadris Flowable Azoxystrobin 22.9%	6.0-15.5	SC	Adequate for coverage and canopy penetration	Allowed, 0.1-0.25" application	Adequate for coverage and canopy penetration	4	14	
	Bumper ES Propiconazole 40.85%	3.0-4.0	EC	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	21	
	Topguard Flutriafol 11.8%	7-14	G	2 gpa minimum	Not allowed	10 gpa minimum	12	30	
SDHI Carboxamides (Group 11)	Vertisan Penthiopyrad 20.6%	10.0-24.0	EC	2 gpa minimum	Allowed	15 gpa minimum	12	30	
Mixed Modes of Action	3+7	Lucento Flutriafol 26.5% Bixafen 15.6%	3-3.5	SC	2 gpa minimum	Allowed	10 gpa minimum	12	30
		Topguard EQ Azoxystrobin 25.3% + Flutriafol 18.6%	5-7	SC	2 gpa minimum	Not allowed	10 gpa minimum	12	30
	3+11	Quilt Azoxystrobin 7.0% + Propiconazole 11.7%	7.0-14.0	EC	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	30
		Quilt Xcel Azoxystrobin 13.5% + Propiconazole 11.7%	10.5-14.0	EC	2 gpa minimum	Allowed, 0.125-0.25" application	10 gpa minimum	12	30
	3+7+11	Nexicor Fluxapyroxad 2.81% Pyraclostrobin 18.76% Propiconazole 11.73%	7.0-13.0	EC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	30

¹Rate is fluid ounces per acre unless otherwise noted

²Formulations: DF=Dry Flowable; EC=Emulsifiable Concentrate; F=Flowable; SC=Suspension Concentrate; SE=Suspo-Emulsion; G=Granule

Soybean Fungicide Efficacy for Control of Soybean Seedling Diseases

The members of the Identification and Biology of Seedling Pathogens of Soybean project funded by the North Central Soybean Research Program and the United Soybean Board, and the North Central Regional Committee on Soybean Diseases (NCERA-137) have developed the following ratings for how well fungicide seed treatments control seedling diseases of soybeans in the United States. Efficacy ratings for each fungicide active ingredient listed in the table were determined by field-testing the materials over multiple years and locations by the members of this group, and include ratings summarized from national fungicide trials published in Plant Disease Management Reports (and formerly Fungicide and Nematicide Tests) by the American Phytopathological Society at <http://www.apsnet.org>. Each rating is based on the fungicide's level of disease control, and does not necessarily reflect efficacy of fungicide active ingredient combinations and/or yield increases obtained from applying the active ingredient.

The list includes the most widely marketed products available. It is not intended to be a list of all labeled active ingredients and products. Additional active ingredients may be available, but have not been evaluated in a manner allowing a rating. Products listed are the most common products available as of the release date of the table; all available products may not be listed. Additional active ingredients may be included in some products for insect and nematode control, however; only active ingredients for pathogen control are listed and rated.

Many active ingredients and their products have specific use restrictions. Read and follow all use restrictions before applying any fungicide to seed, or before handling any fungicide-treated seed. This information is provided only as a guide. It is the applicator's and users legal responsibility to read and follow all current label directions. Reference in this publication to any specific commercial product, process, or service, or the use of any trade, firm, or corporation name is for general informational purposes only and does not constitute an endorsement, recommendation, or certification of any kind by members of the group, or by the North Central Soybean Research Program. Individuals using such products assume responsibility for their use in accordance with current directions of the manufacturer. Efficacy categories: E = Excellent; VG = Very Good; G = Good; F = Fair; P = Poor; NR = Not Recommended; NS = Not Specified on product label; U = Unknown efficacy or insufficient data to rank product. Ratings of NR may mean that the fungal group listed is not a target of the specific fungicide active ingredient.

Please note: Efficacy ratings may be dependent on the rate of the fungicide product on seed. A number of different species of *Pythium* and *Fusarium* impact seed and seedling health in soybean. Therefore, wide ranges in efficacy may be observed in fungicide active ingredients listed in the table. This is why several fungicide active ingredients are combined in seed treatments to provide protection to a broader spectrum of pathogens. Contact your local Extension plant pathologist for recommended fungicide product rate information for your area.

Fungicides		Diseases					
Class	Active Ingredient	<i>Pythium</i> sp. ¹	<i>Phytophthora</i> Root Rot	<i>Rhizoctonia</i> sp.	<i>Fusarium</i> sp. ^{1,3}	Sudden death syndrome (SDS) (<i>Fusarium virguliforme</i>)	<i>Phomopsis</i> sp.
MBC Benzimidazoles (Group 1)	Thiabendazole	NR	NR	NS	NS	P	G
DMI Triazoles (Group 3)	Ipconazole	P	NR	F-G	F-E	NR	G
	Prothioconazole	NR	NR	G	G	NR	G
PA Acylalanines (Group 4)	Mefenoxam	E ²	E	NR	NR	NR	NR
	Metalaxyl	E ²	E	NR	NR	NR	NR
SDHI Carboxamides (Group 7)	Carboxin	U	U	G	U	NR	U
	Fluopyram	NR	NR	NR	NR	VG	NR
	Fluxapyroxad	U	U	E	G	NR	G
	Penflufen	NR	NR	G	G	NR	G
	Sedaxane	NR	NR	E	NS	NR	G
QoI Strobilurins (Group 11)	Azoxystrobin	P-G	NS	VG	F-G	NR	P
	Pyraclostrobin	P-G	NR	F-G	F	NR	G
	Trifloxystrobin	P	P	F-E	F-G	NR	P-F
Phenylpyrroles (Group 12)	Fludioxonil	NR	NR	G	F-VG	NR	G
Aromatic Hydrocarbons (Group 14)	PCNB	NR	NR	G	U	NR	G
Thiazole Carboxamides (Group 22)	Ethaboxam	E	E	NR	NR	NR	NR
OSBPI (Group 49)	Oxathiapiprolin	P-G	E	NR	NR	NR	NR

¹ Products may vary in efficacy against different *Fusarium* and *Pythium* species.

² Areas with mefenoxam or metalaxyl insensitive populations may see less efficacy with these products.

³ Listed seed treatments do not have efficacy against *Fusarium virguliforme*, causal agent of sudden death syndrome.

Soybean

Seed Treatment Fungicide Product Information

Fungicides		Rate (oz per 100 lbs) ¹	Application	Comments	
Class	Trade Name Active Ingredients (%)				
MBC Benzimidazoles (Group 1)	Mertect 340-F Thiabendazole 42.3%	0.08-0.16	Commercially applied, slurry		
PA Acylalanines (Group 4)	Acceleron DX-309 Metalaxyl 28.35%	0.75-1.5	Commercially applied, slurry	Insecticide and additional treatments can be added to base fungicide	
	Acquire Metalaxyl 29.99%	0.75-1.5	Commercially applied, slurry	Acquire comes with Charter seed treatment	
	Allegiance Dry Metalaxyl 12.5%	1.5-2.0	On farm application, planter box		
	Allegiance FL Metalaxyl 28.35%	0.75-1.5	Commercially applied, slurry		
	Allegiance LS Metalaxyl 17.7%	1.2-2.4	Commercially applied, slurry	Use higher rate for Phytophthora control	
	Apron XL Mefenoxam 33.3%	0.16-0.64	Commercially applied, slurry	Use higher rate for Phytophthora control	
SDHI Carboxamides (Group 7)	Acceleron DX-612 Fluxapyroxad 28.7%	0.24-0.47	Commercially applied, slurry	Insecticide and additional treatments can be added to base fungicide	
	ILeVO Fluopyram 48.4%	1.18-1.97 oz per 140,000 seed	Commercially applied, slurry	Specific seed treatment for Sudden Death Syndrome and nematodes	
	Kickstart VP Carboxin 14.0% + Permethrin 10.42% (I) ²	3.0	On farm application, planter box	Contains insecticide (Group 3A)	
	Saltro Pydiflumetofen 41.7%	1.52	Commercially applied, slurry	Add CruiserMaxx, CruiserMaxx Advanced, CruiserMaxx EZ, CruiserMaxx Plus, or UpShot Soybean for Pythium, Phytophthora and Rhizoctonia control	
	Vibrance Sedaxane 43.7%	0.075-0.16	Commercially applied, slurry	Add Apron XL to improve Phytophthora control	
QoI Strobilurins (Group 11)	Acceleron DX-109 Pyraclostrobin 18.4%	0.4-1.5	Applied commercially or on farm, slurry	Insecticide and additional treatments can be added to base fungicide	
	Dynasty Azoxystrobin 9.6%	0.153-0.459	Commercially applied, slurry		
Phenylpyrroles (Group 12)	Maxim 4FS Fludioxonil	0.08-0.16	Commercially applied, slurry		
Aromatic Hydrocarbons (Group 14)	Rizolex Tolclofos-methyl 42.0%	0.3	Commercially applied		
OSBPI Oxysterol binding protein homologue inhibition (Group 49)	Lumisena Oxathiapiprolin 18.7%	0.0074-0.0148	Commercially applied, slurry	Specific seed treatment for Phytophthora control	
Mixed Modes of Action	3+4	Inovate Ipconazole 0.72% + Metalaxyl 1.153% + Clothianidin 14.34% (I)	4.74	Commercially applied	Add additional metalaxyl or mefenoxam in high Phytophthora pressure areas. Contains insecticide (Group 4A).
		Inovate Pro Ipconazole 1.203% + Metalaxyl 0.965% + Clothianidin 24.03% (I)	2.81	Commercially applied, slurry	Contains insecticide (Group 4A).
	4+M3	Protector-L-Allegiance Metalaxyl 1.61% + Thiram 14.29%	6.7	Application in hopper box or on farm application seed treatment equipment	
	4+12	ApronMaxx RFC Fludioxonil 2.31% + Mefenoxam 3.46%	1.5	Applied commercially or on farm, slurry	Add Apron XL to improve Phytophthora control
		ApronMaxx RTA Fludioxonil 0.73% + Mefenoxam 1.1%	5.0	On farm application, slurry	Add Apron XL to improve Phytophthora control
		ApronMaxx RTA + Moly Fludioxonil 0.68% + Mefenoxam 1.02%	5.0	On farm application, slurry	

Soybean

Seed Treatment Fungicide Product Information (continued)

		Fungicides			
Class	Trade Name Active Ingredients (%)	Rate (oz per 100 lbs) ¹	Application	Comments	
Mixed Modes of Action	4+12	Warden RTA Fludioxonil 0.72% + Mefenoxam 2.21%	5.0	On farm application, slurry	
		Trilex 2000 Metalaxyl 5.69% + Trifloxystrobin 7.12%	1.0	Commercially applied, slurry	Specific seed treatment for Phytophthora control
		CruiserMaxx Fludioxonil 1.12% + Mefenoxam 1.7% + <i>Thiamethoxam</i> 22.61% (I) ²	3.0	Commercially applied, slurry	Add Apron XL to improve Phytophthora control. Contains insecticide (Group 4A).
		CruiserMaxx Advanced Fludioxonil 1.07% + Mefenoxam 3.21% + <i>Thiamethoxam</i> 21.5% (I)	3.2	Commercially applied, slurry	Add Apron XL to improve Phytophthora control. Contains insecticide (Group 4A).
		CruiserMaxx EZ Fludioxonil 1.15% + Mefenoxam 3.46% + <i>Thiamethoxam</i> 23.1% (I)	3.15	Commercially applied, slurry	Add Apron XL to improve Phytophthora control. Contains insecticide (Group 4A).
		CruiserMaxx Plus Fludioxonil 1.07% + Mefenoxam 3.21% + <i>Thiamethoxam</i> 21.5% (I)	3.2	Commercially applied, slurry	Add Apron XL to improve Phytophthora control. Contains insecticide (Group 4A).
		UpShot Soybean Seed Treatment Fludioxonil 1.15% + Mefenoxam 3.46% + <i>Thiamethoxam</i> 23.1% (I)	2.94	Commercially applied, slurry	Add Apron XL to improve Phytophthora control. Contains insecticide (Group 4A).
	4+14	Catapult XL Chloroneb 30.0% + Mefenoxam 1.95%	5.5-7.0	On farm application, RTA	
	3+4+7	EverGol Energy SB Metalaxyl 5.74% + Penflufen 3.59% + Prothioconazole 7.18%	1.0	Commercially applied	Add Allegiance FL in high Phytophthora pressure areas
	3+4+22	Intego Suite Soybeans Ethaboxam 2.97% + Iaconazole 0.99% + Metalaxyl 0.79% + <i>Clothianidin</i> 20.0% (I)	3.37	Commercially applied	Contains insecticide (Group 4A).
	4+7+M4	Bean Guard / Allegiance Captan 24.45% + Carboxin 12.5% + Metalaxyl 3.75%	3.3	On farm application, planter box	
	4+7+12	CruiserMaxx Vibrance Fludioxonil 1.04% + Mefenoxam 3.13% + Sedaxane 1.04% + <i>Thiamethoxam</i> 21.5% (I)	3.22	Commercially applied, slurry	Add Apron XL to improve Phytophthora control. Contains insecticide (Group 4A).
		Warden CX Fludioxonil 1.0% + Mefenoxam 5.99% + Sedaxane 1.0% + <i>Thiamethoxam</i> 20.0% (I)	3.38	Commercially applied, slurry	Contains insecticide (Group 4A).
4+7+14	Prevail Carboxin 15.0% + PCNB 15.0% + Metalaxyl 3.12%	2.0-4.0 oz per bushel	Applied commercially or on farm		

¹Rate is fluid ounces per 100 pounds of seed unless otherwise noted

² Insecticide components are italicized with (I) for designation.

Soybean

Fungicide Efficacy for Control of Foliar Diseases

The North Central Regional Committee on Soybean Diseases (NCERA-137) has developed the following information on foliar fungicide efficacy for control of major foliar soybean diseases in the United States. Efficacy ratings for each fungicide listed in the table were determined by field-testing the materials over multiple years and locations by the members of the committee. Efficacy ratings are based upon level of disease control achieved by product, and are not necessarily reflective of yield increases obtained from product application. Efficacy depends upon proper application timing, rate, and application method to achieve optimum effectiveness of the fungicide as determined by labeled instructions and overall level of disease in the field at the time of application. Differences in efficacy among fungicide products were determined by direct comparisons among products in field tests and are based on a single application of the labeled rate as listed in the table, unless otherwise noted. For application timing and use considerations, please contact your local cooperative extension service. Table includes systemic fungicides available that have been tested over multiple years and locations. The table is not intended to be a list of all labeled products¹. Efficacy categories: NR=Not Recommended; P=Poor; F=Fair; G=Good; VG=Very Good; E=Excellent; NL = Not Labeled for use against this disease; U = Unknown efficacy or insufficient data to rank product efficacy.

Fungicide(s)				Diseases								
Class	Product/Trade name	Active ingredient (%)	Rate/A (fl oz)	Aerial web blight	Anthracnose	Brown spot ²	Cercospora leaf blight ³	Frogeye leaf spot ⁴	Diaporthe (Pod and stem blight)	Soybean rust	Target spot	White mold ⁵
MBC Thiophanates Group 1	Topsin-M Multiple Generics	Thiophanate-methyl	10.0–20.0	U	U	U	F	VG	U	G	U	F
DMI Triazoles Group 3	Alto 100SL	Cyproconazole 8.9%	2.75–5.5	U	U	VG	F	F	U	VG	U	NL
	Topguard 1.04 SC	Flutriafol 11.8%	7.0–14.0	U	VG	VG	P-G	VG	U	VG-E	P	F
	Tilt 3.6 EC Multiple Generics ⁷	Propiconazole 41.8%	4.0–6.0	P	VG	G	NL	F	NL	VG	U	NL
	Proline 480 SC ⁸	Prothioconazole 41.0%	2.5–5.0	NL	NL	NL	NL	G-VG	NL	VG	U	F
	Domark 230 ME	Tetraconazole 20.5%	4.0–5.0	NL	VG	VG	P-G	G-VG	U	VG-E	P	F
SDHI Carboxamides	Endura 0.7 DF	Boscalid 70%	3.5–11.0	U	NL	VG	U	P	NL	NL	U	VG
QoI Strobilurins Group 11	Quadris 2.08 SC Multiple Generics ⁷	Azoxystrobin 22.9%	6.0–15.5	VG	VG	P-G	P	P	U	G-VG	P-F	P
	Aftershock 480 SC Evito 480 SC	Fluoxastrobin 40.3%	2.0–5.7	VG	G	P-G	P	P	U	U	U	NL
	Approach 2.08 SC	Picoxystrobin	6.0–12.0	VG	G	P-G	P	P	U	G	U	G-VG ¹¹
	Headline 2.09 EC/SC	Pyraclostrobin 23.6%	6.0–12.0	VG	VG	P-G	P	P	U	VG	P-F	NL
2,6-dinitro-anilines Group 29	Omega 500 DF	Fluazinam 40.0%	0.75–1.0 pints	NL	NL	NL	NL	NL	NL	NL	U	G
Mixed mode of action	Topguard EQ 4.29 SC	Azoxystrobin 25.3% Flutriafol 18.63%	5.0–7.0	U	U	VG	U	G-VG	U	U	P	U
	Quadris Top 2.72 SC	Azoxystrobin 18.2% Difenoconazole 11.4%	8.0–14.0	U	U	G-VG	P-G	VG	F-G	VG	P	NL

Soybean

Fungicide Efficacy for Control of Foliar Diseases (*continued*)

Fungicide(s)				Diseases								
Class	Product/Trade name	Active ingredient (%)	Rate/A (fl oz)	Aerial web blight	Anthracnose	Brown spot ²	Cercospora leaf blight ³	Frogeye leaf spot ⁴	Diaporthe (Pod and stem blight)	Soybean rust	Target spot	White mold ⁵
Mixed mode of action	Quadris Top SBX 3.76 SC	Azoxystrobin 19.8% Difenoconazole 19.8%	7.0–7.5	U	U	G-VG	P-G	VG	F-G	VG	F-G	U
	Quilt 1.66 SC Multiple Generics ⁷	Azoxystrobin 7.0% Propiconazole 11.7%	14.0–20.5	U	U	G	F	F	U	VG	U	NL
	Quilt Xcel 2.2 SE	Azoxystrobin 13.5% Propiconazole 11.7%	10.5–21.0	E	VG	G	F	F	U	VG	P	NL
	Trivapro	Benzovindiflupyr 2.9% Azoxystrobin 10.5% Propiconazole 11.9%	13.7–20.7	E	U	VG	P-G	G	G	VG-E	U	NL
	Approach Prima 2.34 SC	Cyproconazole 7.17% Picoxystrobin 17.94%	5.0–6.8	U	U	G	P-G	F-G	U	VG	F-G	NL
	Propulse ⁹ 3.34 SC	Fluopyram 17.4% Prothioconazole 17.4%	6.0–10.2	NL	NL	U	NL	U	U	U	NL	G
	Fortix SC Preemptor SC	Flutriafol 19.3% Fluoxastrobin 14.84%	4.0–6.0	U	U	G-VG	P-G	VG	U	U	P	U
	Delaro 325 SC	Prothioconazole 16.0% Trifloxystrobin 13.7%	8.0–11.0	U	U	VG	U	G-VG	U	U	NL	NL
	Priaxor 4.17 SC	Pyraclostrobin 28.58% Fluxapyroxad 14.33%	4.0–8.0	E	VG	G-VG	P-G	P-F	U	VG	F-G	P
	Priaxor D 4.17 SC 1.9 SC	Pyraclostrobin 28.58% Fluxapyroxad 14.33% Tetraconazole 20.50%	4.0 (each component)	U	U	VG	P-G	G-VG	G	VG-E	U	P
	Stratego YLD 4.18 SC ¹⁰	Trifloxystrobin 32.3% Prothioconazole 10.8%	4.0–4.65	VG	VG	GG	F	F-G	U	VG	P	NL
	Affiance 1.5 SC	Tetraconazole 7.48% Azoxystrobin 9.35%	10.0–14.0	U	VG	VG	F	G-VG	U	U	U	U
	Zolera FX 3.34 SC	Tetraconazole 17.76% Fluoxastrobin 17.76%	4.4–6.8	U	U	U	U	G-VG	U	U	U	U
	Acropolis	Thiophanate-methyl 21.3% Tetraconazole 4.2%	20.0–23.0	NL	U	U	U	VG	U	VG-E	U	U

¹ Multiple fungicides are labeled for soybean rust only, powdery mildew, and Alternaria leaf spot, including tebuconazole (multiple products) and Laredo (myclobutanil). Contact fungicides such as chlorothalonil may also be labeled for use.

² In areas where QoI-fungicide resistant isolates of the brown spot pathogen are present, QoI fungicides may result in poor disease control.

³ Cercospora leaf blight efficacy relies on accurate application timing, and standard R3 application timings may not provide adequate disease control.

Fungicide efficacy may improve with earlier or later applications; however, efficacy has been inconsistent with some products. Fungicides with a solo or mixed QoI or MBC mode of action may not be effective in areas where QoI or MBC resistance has been detected in the fungal population that causes Cercospora leaf blight.

⁴ In areas where QoI-fungicide resistant isolates of the frogeye leaf spot pathogen are not present, QoI fungicides may be more effective than indicated in this table.

⁵ White mold efficacy is based on R1-R2 application timing, and lower efficacy is obtained at R3 or later application timings, or if disease symptoms are already present at the time of application.

⁶ Harvest restrictions are listed for soybean harvested for grain. Restrictions may vary for other types of soybean (edamame, etc.) and soybean for other uses such as forage or fodder.

⁷ Multiple generic products containing this mode of action may also be labeled in some states.

⁸ Proline has a supplemental label (2ee) for white mold in NY.

⁹ Propulse is not labeled for use on soybean in all states as of January 2019.

¹⁰ Stratego YLD has a supplemental label (2ee) for white mold on soybean only in IL, IN, IA, MI, MN, NE, ND, OH, SD, WI.

¹¹ Rating is based on two applications of a 9 fl oz/A rate of Approach at R1 and R3.

Many products have specific use restrictions about the amount of active ingredient that can be applied within a period of time or the amount of sequential applications that can occur. Please read and follow all specific use restrictions prior to fungicide use. This information is provided only as a guide. It is the responsibility of the pesticide applicator by law to read and follow all current label directions. Reference to products in this publication is not intended to be an endorsement to the exclusion of others that may be similar. Persons using such products assume responsibility for their use in accordance with current directions of the manufacturer. Members or participants in the NCERA-137 group assume no liability resulting from the use of these products.

Soybean

Foliar Fungicide Product Information

		Fungicides			Application			REI (hours)	PHI (days)
Class	Trade Name Active Ingredient (%)	Rate ¹ (per acre)	Formulation ²	Aerial	Chemigation	Ground			
MBC Thiophanates (Group 1)	Topsin 4.5FL Thiophanate-methyl 45.0%	10.0-20.0	F	5 gpa minimum	Allowed, <0.4" application	20 gpa minimum	24	21	
	Topsin M WSB Thiophanate-methyl 70.0%	0.5-1.0 lb	WSB	5 gpa minimum	Allowed, <0.4" application	20 gpa minimum	24	21	
DMI Triazoles (Group 3)	Alto 100SL Cyproconazole 8.9%	2.75-5.5	SC	2 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	30	
	Bumper 41.8 EC Propioconazole 41.8%	4.0-6.0	EC	2 gpa minimum	Not allowed	10 gpa minimum	12	Do not apply after R5 (pod fill)	
	Bumper ES Propioconazole 40.85%	4.0-6.0	EC	2 gpa minimum	Not allowed	10 gpa minimum	12	Do not apply after R5 (pod fill)	
	Domark 230 ME Tetraconazole 20.5%	4.5-5.0	ME	2 gpa minimum	Allowed	10 gpa minimum	12	Do not apply after R5 (pod fill)	
	Proline 480 SC Prothioconazole 41.0%	2.5-5.0	SC	2 gpa minimum	Allowed, 0.125-0.5" application	10 gpa minimum	12	21	
	Tilt Propiconazole 41.8%	4.0-6.0	EC	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	Do not apply after R5 (pod fill)	
	Topguard Flutriafol 11.8%	7.0-14.0	SC	5 gpa minimum	Not allowed	10 gpa minimum	12	21	
SDHI Carboximides (Group 7)	Endura Boscalid 70.0%	3.5-11.0	WDG	5 gpa mini- mum	Allowed	Adequate for coverage and canopy pene- tration	12	21	
	Vertisan Penthiopyrad 20.6%	10.0-30.0	EC	2 gpa minimum	Allowed	15 gpa minimum	12	14	
QoI Strobilurins (Group 11)	Aftershock / Evito 480 SC Fluoxastrobin 40.3%	2.0-5.7	SC	2 gpa minimum	Allowed, <0.4" application	10 gpa minimum	12	30	
	Approach Picoxystrobin 22.5%	6.0-12.0	SC	Adequate for coverage and canopy penetration	Allowed	Adequate for coverage and canopy pene- tration	12	14	
	Headline Pyraclostrobin 23.6% Headline SC Pyraclostrobin 23.3%	6.0-12.0	EC / SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy pene- tration	12	21	
	Quadris Flowable / Satori Azoxystrobin 22.9%	6.0-15.5	SC	Adequate for coverage and canopy penetration	Allowed, 0.1-0.25" application	Adequate for coverage and canopy pene- tration	4	14	
2, 6-dinitro-ani- lines (Group 29)	Omega 500F Fluazinam 40.0%	12.0-16.0	SC	2 gpa minimum	Not Allowed	10 gpa minimum	12	Do not apply after R3	
Mixed Modes of Action	1+3	Topsin XTR2 Tebuconazole 7.5% + Thiophanate-methyl 37.5%	20	SC	5 gpa minimum	Not Allowed	20 gpa minimum	24	21
		3+7	Lucento Flutriafol 26.5% Bixafen 15.6%	3-5.5	SC	2 gpa minimum	Allowed	10 gpa minimum	12
	3+11		Affiance Azoxystrobin 9.35% + Tetraconazole 7.48%	10.0-14.0	SC	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12
		Approach Prima Cyproconazole 7.17% + Picoxystrobin 17.94%	5.0-6.8	SC	Adequate for coverage and canopy penetration	Allowed	Adequate for coverage and canopy pene- tration	12	30

Soybean

Foliar Fungicide Product Information (continued)

Disease Management: Soybean

Class		Fungicides			Application			REI (hours)	PHI (days)
		Trade Name Active Ingredient (%)	Rate ¹ (per acre)	Formulation ²	Aerial	Chemigation	Ground		
Mixed Modes of Action	3+11	Avaris / Quilt Azoxystrobin 7.0% + Propiconazole 11.7%	14.0-20.5	SE	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	Apply up to R6 (full seed)
		Delaro Prothioconazole 16.0% + Trifloxystrobin 13.7%	7.0-11.0	SC	2 gpa minimum	Allowed	10 gpa minimum	12	21
		Evito T Fluoxastrobin 18.0% + Tebuconazole 25.0%	4.0-6.0	SC	3 gpa minimum	Allowed, <0.4" application	10 gpa minimum	12	30
		Fortix / Preemptor Flutriafol 19.3% + Fluoxastrobin 14.84%	4.0-6.0	SC	5 gpa minimum	Not allowed	10 gpa minimum	12	30
		Quadris Top SB Azoxystrobin 18.2% + Difenconazole 11.4%	8.0-14.0	SC	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	14
		Quadris Top SBX Azoxystrobin 19.8% + Difenconazole 19.8%	7.0-7.5	SC	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	24	14
		Quadris Xtra Azoxystrobin 18.2% + Cyproconazole 7.3%	4.0-6.8	SC	2 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	30
		Quilt Xcel Azoxystrobin 13.5% + Propiconazole 11.7%	10.5-21.0	SE	2 gpa minimum	Allowed, 0.125-0.25" application	10 gpa minimum	12	Do not apply after R5 (pod fill)
		Stratego YLD Prothioconazole 10.8% + Trifloxystrobin 32.3%	4.0-4.65	SC	2 gpa minimum	Allowed, 0.125- 0.5" application	10 gpa minimum	12	21
		Topguard EQ Azoxystrobin 25.3% + Flutriafol 18.6%	5.0-7.0	SC	2 gpa minimum	Not Allowed	10 gpa minimum	12	21
		Veltyma Mefentrifluconazole 17.56% Pyraclostrobin 17.56%	7-10	SC	2 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	21
	Zolera FX Fluoxastrobin 17.76% + Tetraconazole 17.76%	4.4-6.8	SC	2 gpa minimum	Allowed	10 gpa minimum	12	Do not apply after R5 (pod fill)	
	7+11	Priaxor Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	4.0-8.0	SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penet- ration	12	21
	3+7+11	Miravis Neo Propiconazole 11.6% Pydiflumetofen 7.0% Azoxystrobin 9.3%	13.7-20.8	SE	5 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	14
Priaxor D Component A Fluxapyroxad 14.33% + Pyraclostrobin 28.58%		4.0	SC	2 gpa mini- mum or 5 gpa minimum for white mold and Asian soybean rust	Not allowed	10 gpa minimum	12	21	
Component B Tetraconazole 20.5%		4.0	ME						
Revytek Mefentrifluconazole 11.61% Pyraclostrobin 15.49% Fluxapyroxad 7.74%		8-15	SC	2 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	21	
Trivapro Benzovindiflupyr 2.9% + Azoxystrobin 10.5% + Propiconazole 11.9%		13.7-20.7	SE	2 gpa minimum	Allowed	10 gpa minimum	12	14	
Trivapro Co-Pack Trivapro A Benzovindiflupyr 10.27%		4.0	EC	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	14	
Trivapro B Azoxystrobin 13.5% + Propiconazole 11.7%	10.5	SE							

¹ Rate is fluid ounces per acre unless otherwise noted

² Formulations: EC=Emulsifiable Concentrate; F=Flowable; ME=Microencapsulated; SC=Suspension Concentrate; SE=Suspo-Emulsion; WDG=Water-Dispersible Granules; WSB=Water-Soluble Bag

Sugar Beet

Foliar Fungicide and Bactericide Product Information

Fungicides				Application			REI (hours)	PHI (days)	
Class	Trade Name Active Ingredient (%)	Rate ¹	Formulation ²	Aerial	Chemigation	Ground			
DMI Triazoles (Group 3)	Caramba Metconazole 8.6%	9.0-14.0	EC	5 gpa minimum	Allowed, <0.5" application	5 gpa minimum	12	14	
	Eminent VP Tetraconazole 11.6%	8.0-13.0	ME	10 gpa mini- mum	Allowed, 0.1-0.25" application	Adequate for coverage and canopy pene- tration	12	14	
	Proline 480 SC Prothioconazole 41.0%	5.0-5.7	SC	2 gpa minimum	Allowed, 0.125- 0.5" application	10 gpa minimum	12	7	
	Tilt Propiconazole 41.8%	4.0	EC	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	21	
	Topguard Flutriafol 11.8%	10.0-14.0	SC	5 gpa minimum	Not allowed	10 gpa minimum	12	21	
SDHI Carboxamides (Group 7)	Vertisan Penthiopyrad 20.6%	14.0-30.0	EC	2 gpa minimum	Allowed	15 gpa minimum	12	7	
QoI Strobilurins (Group 11)	Headline Pyraclostrobin 23.6% Headline SC Pyraclostrobin 23.3%	9.0-12.0	EC / SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy pene- tration	12	7	
	Quadris Flowable Azoxystrobin 22.9%	6.0-15.5	SC	2 gpa minimum	Allowed, 0.1- 0.25" application	Adequate for coverage and canopy pene- tration	4	0	
Organo Tin Com- pounds (Group 30)	Super Tin 80WP Triphenyltin hydroxide 80%	2.5-5.0	WP	5 gpa minimum	Not Allowed	15 gpa minimum	48	21	
Inorganics (Group M1)	Badge SC Copper oxychloride 16.81% Copper hydroxide 15.36%	0.5-2.5 pt	SC	3 gpa minimum	Allowed	Adequate for coverage and canopy pene- tration	48	0	
	Champ Formula 2 Flowable Copper hydroxide 37.5%	0.66-2.0 pt	F	3 gpa minimum	Allowed	Adequate for coverage and canopy pene- tration	48	0	
	Kocide 2000 Copper hydroxide 53.8%	1.5-3.74 lbs/ acre	DF	3 gpa minimum	Allowed	20 gpa minimum	48	0	
	Kocide 3000 Copper hydroxide 46.1%	0.75-2.0 lbs/ acre	DF	3 gpa minimum	Allowed	20 gpa minimum	48	0	
Dithiocarbamates (Group M3)	Penncozeb 75DF Mancozeb 75.0%	1.0-2.0 lb	DF	2 gpa minimum	Allowed, 0.1-0.25" application	Adequate for coverage and canopy pene- tration	24	14	
	Penncozeb 80WP Mancozeb 80.0%	1.0-2.0 lb	WP	2 gpa minimum	Allowed, 0.1-0.25" application	Adequate for coverage and canopy pene- tration	24	14	
Mixed Modes of Action	3+11	Delaro Prothioconazole 16.0% +Trifloxystrobin 13.7%	8.0-11.0	SC	2 gpa minimum	Allowed	10 gpa minimum	12	21
		Veltyma Mefentrifluconazole 17.56% Pyraclostrobin 17.56%	7.0-10.0	SC	2 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	21
	7+11	Priaxor Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	6.0-8.0	SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy pene- tration	12	7
		Propulse Fluopyram 17.4% + Prothioconazole 17.4%	8.55	SC	Not allowed	Allowed	10 gpa minimum	48	7

¹ Rate is fluid ounces per acre unless otherwise noted

² Formulations: EC=Emulsifiable Concentrate; F=Flowable; ME=Micro Emulsion; SC=Suspension Concentrate; WP=Wettable Powder

Sunflower

Foliar Fungicide Product Information

Fungicides				Application			REI (hours)	PHI (days)
Class	Trade Name Active Ingredient (%)	Rate ¹	Formulation ²	Aerial	Chemigation	Ground		
DMI Triazoles (Group 3)	Monsoon or Onset 3.6L or Orius 3.6F Tebuconazole 38.7%	4.0-6.0	F	5 gpa minimum	Not allowed	20 gpa minimum	12	50
	Muscle 3.6F Tebuconazole 38.7%	6.0	F	5 gpa minimum	Not allowed	20 gpa minimum	12	50
	TebuStar 3.6L or Tebuzol 3.6F or Toledo 3.6F Tebuconazole 38.7%	4.0-6.0	F	5 gpa minimum	Allowed	20 gpa minimum	12	50
SDHI Carboxamides (Group 7)	Vertisan Penthiopyrad 20.6%	10.0-30.0	EC	2 gpa minimum	Allowed	15 gpa minimum	12	14
QoI Strobilurins (Group 11)	Headline Pyraclostrobin 23.6% Headline SC Pyraclostrobin 23.3%	6.0-12.0	EC / SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	21
	Quadris Flowable Azoxystrobin 22.9%	6.0-15.5	SC	Adequate for coverage and canopy pene- tration	Allowed, 0.1-0.25" application	10 gpa minimum	4	30
Mixed Modes of Action	7+11 Priaxor Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	4.0-8.0	SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	21

¹ Rate is fluid ounces per acre unless otherwise noted

² Formulations: EC=Emulsifiable Concentrate; F=Flowable; SC=Suspension Concentrate

Wheat

Seed Treatment Fungicide Product Information

Class		Trade Name Active Ingredients (%)	Rate (per 100 lb)*
MBC Benzimidazoles (Group 1)		LSP Thiabendazole 30.0%	2.0-4.0 oz
		Mertect 340-F Thiabendazole 42.3%	0.17-3.19 oz
DMI Triazoles (Group 3)		Charter Triticonazole 2.4%	3.1 oz
		Raxil Tebuconazole 28.3%	0.1 oz
PA Acylalanines (Group 4)		Allegiance Dry Metalaxyl 12.5%	1.5-2.0 oz
		Allegiance FL Metalaxyl 28.35%	0.1-0.375 oz
		Allegiance LS Metalaxyl 17.7%	1.175-0.66 oz
		Apron XL Mefenoxam 33.3%	0.0425-0.085 oz
		Dyna-Shield Metalaxyl Metalaxyl 28.35%	0.1-0.375 oz
		Dyna-Shield Metalaxyl 318 FS Metalaxyl 30.14%	0.1-0.375 oz
SDHI Carboxamides (Group 7)		Vibrance Sedaxane 43.7%	0.08-0.16 oz
		Vitavax-34 Carboxin 34.0%	2.0-3.0 oz
QoI Strobilurins (Group 11)		Dynasty Azoxystrobin 9.6%	0.153-0.382 oz
Phenylpyrroles (Group 12)		Dyna-Shield Fludioxonil Fludioxonil 40.3%	0.08-0.16 oz
		Maxim 4FS Fludioxonil 40.3%	0.08-0.16 oz
Dithiocarbamates (Group M3)		Dithane F-45 Rainshield Mancozeb 37.0%	1.6 qt/ac
		Dithane M-45 Mancozeb 80.0%	2.0 lb
		Grain Guard Mancozeb 50.0%	3.3 oz
		Penncozeb 75DF Mancozeb 75.0%	2.3-3.5 oz
		Penncozeb 80WP Mancozeb 80.0%	2.2-3.3 oz
Mixed Modes of Action	3+3+4	Proceed Metalaxyl 2.75% + Prothioconazole 6.88% + Tebuconazole 1.38%	1.0-1.5 oz
		Raxil MD Extra Imazalil 1.0% + Metalaxyl 0.58% + Tebuconazole 0.43%	5.0 oz
		Raxil MD Extra-W Imazalil 0.965% + Metalaxyl 0.56% + Tebuconazole 0.415% + Imidacloprid 1.384% (I) ^o	5.14 oz
	3+4	Charter F2 Metalaxyl 0.79% + Triticonazole 1.32%	5.4 oz
		CruiserMaxx Cereals Difenoconazole 3.36% + Mefenoxam 0.56% + Thiamethoxam 2.8% (I)	5.0 oz
		Dyna-Shield Foothold Metalaxyl 0.668% + Tebuconazole 0.499%	5.0-6.5 oz
		Dyna-Shield Foothold Extra Metalaxyl 0.607% + Tebuconazole 0.455% + Imidacloprid 11.374% (I)	3.4-5.0 oz

*All rates are units per 100 lbs of seed unless otherwise noted

^oInsecticide components are italicized with (I) for designation.

Wheat

Seed Treatment Fungicide Product Information (continued)

Class	Trade Name Active Ingredients (%)	Rate (per 100 lb)	
Mixed Modes of Action	Dyna-Shield Small Grains Metalaxyl 0.64% + Tebuconazole 0.48%	5.0-6.5 oz	
	Incentive RTA Difenoconazole 3.21% + Mefenoxam 0.27%	2.5-10.0 oz	
	NipsIt Suite Cereals Metalaxyl 0.88% + Metconazole 0.44% + Clothianidin 2.93% (I)	5.0-7.5 oz	
	Rancona Crest Ipconazole 0.421% + Metalaxyl 0.562% + Imidacloprid 14.1% (I)	5.0-8.33 oz	
	Rancona Pinnacle Ipconazole 0.434% + Metalaxyl 0.579%	5.0-8.33 oz	
	Raxil MD Metalaxyl 0.64% + Tebuconazole 0.48%	5.0-6.5 oz	
	Raxil MD-W Metalaxyl 0.615% + Tebuconazole 0.461% + Imidacloprid 1.538% (I)	5.0 oz	
	Raxil XT Wettable Powder Metalaxyl 20.0% + Tebuconazole 15.0%	0.16-0.2 oz	
	3+4	CruiserMaxx Vibrance Cereals Difenoconazole 3.34% + Mefenoxam 0.86% + Sedaxane 0.72% + Thiamethoxam 2.78% (I)	5.0-10.0 oz
		EverGol Energy Metalaxyl 5.74% + Penflufen 3.59% + Prothioconazole 7.18%	1.0 oz
		Rancona V RTU FS Carboxin 12.58% + Ipconazole 0.47% + Metalaxyl 1.26%	4.6 oz
		Vibrance Extreme Difenoconazole 5.86% + Mefenoxam 1.46% + Sedaxane 1.22%	2.8-5.6 oz
	3+7	Rancona V 100 Pro FS Carboxin 35.52% + Ipconazole 2.22%	0.9-1.5 oz
	3+M3	Charter PB Thiram 12.5% + Triticonazole 1.25%	5.5 oz
		Raxil Thiram Tebuconazole 0.6% + Thiram 20.0%	3.5-4.6 oz
	4+7+14	Prevail Carboxin 15.0% + PCNB 15.0% + Metalaxyl 3.12%	1.5-3.0 oz per bushel
	4+12	Maxim XL Fludioxonil 21.0% + Mefenoxam 8.4%	0.167-0.334 oz
	MI+M3	ManKocide Copper Hydroxide 46.1% + Mancozeb 15.0%	4.0 oz

Wheat

Fungicide Efficacy for Control of Foliar Diseases

The North Central Regional Committee on Management of Small Grain Diseases (NCERA-184) has developed the following information on fungicide efficacy for control of certain foliar diseases of wheat for use by the grain production industry in the U.S. Efficacy ratings for each fungicide listed in the table were determined by field testing the materials over multiple years and locations by the members of the committee. Efficacy is based on proper application timing to achieve optimum effectiveness of the fungicide as determined by labeled instructions and overall level of disease in the field at the time of application. Differences in efficacy among fungicide products were determined by direct comparisons among products in field tests and are based on a single application of the labeled rate as listed in the table. This table includes most widely marketed products, and is not intended to be a list of all labeled products.

Efficacy of fungicides for wheat disease control is based on appropriate application timing

Fungicides			Powdery Mildew	Stagonospora Leaf/ Glume Blotch	Septoria Leaf Blotch	Tan Spot	Stripe Rust	Leaf Rust	Stem Rust	Head Scab ⁴	
Class	Trade Name	Active Ingredient(s) (%)									
DMI Triazoles (Group 3)	Caramba	Metconazole 8.6%	VG ¹	VG	U	VG	E ²	E	E	G	
	Folicur / Multiple Generics ³	Tebuconazole 38.7%	NL	NL	NL	NL	E	E	E	F	
	Proline 480 SC	Prothioconazole 41.0%	U	VG	VG	VG	VG	VG	VG	G	
	Tilt / Multiple Generics ⁴	Propiconazole 41.8%	VG	VG	VG	VG	VG	VG	VG	P	
QoI Strobilurins (Group 11)	Approach SC	Picoxystrobin 22.5%	G	U	VG	VG	E	VG	VG	NL	
	Evito 480 SC	Fluoxastrobin 40.3%	G	VG	U	VG	U	VG	U	NL	
	Headline SC	Pyraclostrobin 23.3%	G	VG	VG	E	E	E	G	NL	
Mixed Modes of Action	3+3	Prosaro 421 SC	Prothioconazole 19.0% + Tebuconazole 19.0%	G	VG	VG	VG	E	E	E	G
		3+11	Absolute Maxx SC	Tebuconazole 22.63% + Trifloxystrobin 22.63%	G	VG	VG	VG	VG	E	U
	Approach Prima		Cyproconazole 7.17% + Picoxystrobin 17.94%	VG	VG	VG	VG	E	VG	U	NR
	Delaro		Prothioconazole 16.0% + Trifloxystrobin 13.7%	G	VG	VG	VG	VG	VG	VG	NL
	Preemptor		Flutriafol 19.3% + Fluoxastrobin 14.84%	U	U	VG	VG	E	VG	U	NL
	Quilt Fungicide / Multiple Generics ⁵		Azoxystrobin 7.0% + Propiconazole 11.7%	VG	VG	VG	VG	E	E	VG	NL
	Quilt Xcel		Azoxystrobin 13.5% + Propiconazole 11.7%	VG	VG	VG	VG	E	E	VG	NL
	Stratego YLD		Prothioconazole 10.8% + Trifloxystrobin 32.3%	G	VG	VG	VG	VG	VG	VG	NL
	TwinLine		Metconazole 7.4% + Pyraclostrobin 12.0%	G	VG	VG	E	E	E	VG	NL
	7+11	Priaxor	Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	G	VG	VG	E	VG	VG	G	NL
	3+7+11	Trivapro SE	Benzovindiflupyr 2.9% + Propiconazole 11.9% + Azoxystrobin 10.5%	VG	VG	VG	VG	E	E	VG	NL
Nexicor EC		Fluxapyroxad 2.8% + Pyraclostrobin 18.7% + Propiconazole 11.7%	G	VG	VG	E	E	E	VG	NL	

¹ Efficacy categories: NL=Not Labeled; NR=Not Recommended; P=Poor; F=Fair; G=Good; VG=Very Good; E=Excellent; U=Unknown efficacy or insufficient data.

² Efficacy may be significantly reduced if solo strobilurin products are applied after stripe rust infection has occurred.

³ Multiple generic products containing the same active ingredients also may be labeled in some states. Products containing tebuconazole include: Embrace, Monsoon, Muscle 3.6 F, Onset, Orius 3.6 F, Tebucon 3.6F, Tebustar 3.6 F, Tebuzol 3.6 F, Tegrol, and Toledo.

⁴ Multiple generic products containing the same active ingredients also may be labeled in some states. Products containing propiconazole include: Bumper 41.8 EC, Fitness, Propiconazole E-AG, and PropiMax 3.6 EC.

⁵ Multiple generic products containing the same active ingredients also may be labeled in some states. Products containing azoxystrobin + propiconazole include: Avaris 200 SC.

Wheat

Foliar Fungicide Product Information

Fungicides				Application			REI (hours)	PHI (days)
Class	Trade Name Active Ingredient (%)	Rate ¹ (per acre)	Formulation ²	Aerial	Chemigation	Ground		
DMI Triazoles (Group 3)	Alto 100SL Cyproconazole 8.9%	1.5-5.5	SC	2 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	30
	Bumper 41.8 EC Propioconazole 41.8%	2.0-4.0	EC	2 gpa minimum	Not allowed	10 gpa minimum	12	Apply no later than Feekes 10.5
	Bumper ES Propioconazole 40.85%	2.0-4.0	EC	2 gpa minimum	Not allowed	10 gpa minimum	12	Apply no later than Feekes 10.5
	Caramba Metconazole 8.6%	10.0-17.0	EC	2 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	30
	Folicur 3.6F <i>or</i> Monsoon <i>or</i> Muscle 3.6F <i>or</i> Orius 3.6F <i>or</i> Tebuconazole 38.7%	4.0	F	5 gpa minimum	Not allowed	10 gpa minimum	12	30
	Proline 480 SC Prothioconazole 41.0%	4.3-5.7	SC	2 gpa minimum	Allowed, 0.125-0.5" application	10 gpa minimum	12	30
	TebuStar 3.6L <i>or</i> Toledo 3.6F Tebuconazole 38.7%	4.0	F	5 gpa minimum	Allowed	10 gpa minimum	12	30
	Tebuzol 3.6F Tebuconazole 38.7%	2.0-4.0	F	5 gpa minimum	Allowed	10 gpa minimum	12	30
	Tilt Propiconazole 41.8%	2.0-4.0	EC	2 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	Apply no later than Feekes 10.5
SDHI Carboxamides (Group 7)	Vertisan Penthiopyrad 20.6%	10.0-24.0	EC	2 gpa minimum	Allowed	15 gpa minimum	12	Apply no later than Feekes 10.5
QoI Strobilurins (Group 11)	Approach Picoxystrobin 22.5%	3.0-12.0	SC	Adequate for coverage and canopy penetration	Allowed	Adequate for coverage and canopy penetration	12	45
	Evito 480 SC Fluoxastrobin 40.3%	2.0-4.0	SC	2 gpa minimum	Allowed, <0.4" application	10 gpa minimum	12	40
	Headline Pyraclostrobin 23.6% Headline SC Pyraclostrobin 23.3%	6.0-12.0	EC / SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	Apply no later than Feekes 10.5
	Quadris Flowable Azoxystrobin 22.9%	4.0-12.0	SC	Adequate for coverage and canopy penetration	Allowed, 0.1-0.25" application	10 gpa minimum	4	Apply no later than Feekes 10.5
	Satori Azoxystrobin 22.9%	4.0-12.0	SC	Adequate for coverage and canopy penetration	Allowed, 0.1-0.25" application	Adequate for coverage and canopy penetration	4	Apply no later than Feekes 10.5
Inorganics (Group M1)	Champ Formula 2 Flowable Copper hydroxide 37.5%	1.0-1.33 pt	F	3 gpa minimum	Allowed	Adequate for coverage and canopy penetration	48	0

Wheat

Foliar Fungicide Product Information *(continued)*

		Fungicides			Application			REI (hours)	PHI (days)
Class	Trade Name Active Ingredient (%)	Rate ¹ (per acre)	Formulation ²	Aerial	Chemigation	Ground			
Mixed Modes of Action	3+7	Lucento Flutriafol 26.5% Bixafen 15.6%	3-5.5	SC	2 gpa minimum	Allowed	10 gpa minimum	12	30
		Miravis Ace Propiconazole 11.4% Pydiflumetofen 13.7%	13.7	SE	5 gpa minimum	Allowed, 0.1-0.25" application	10 gpa minimum	12	14
	3+11	Absolute Maxx 500 SC Tebuconazole 22.63% + Trifloxystrobin 22.63%	5.0	SC	5 gpa minimum	Allowed, 0.125-0.5" application	10 gpa minimum	12	35
		Approach Prima Cyproconazole 7.17% + Picoxystrobin 17.94%	3.4-6.8	SC	Adequate for coverage and canopy penetration	Allowed	Adequate for coverage and canopy penetration	12	45
		Delaro SC Prothioconazole 16.0% + Trifloxystrobin 13.7%	8.0	SC	2 gpa minimum	Allowed	10 gpa minimum	12	35
		Evito T Fluoxastrobin 18.0% + Tebuconazole 25.0%	4.0-6.0	SC	3 gpa minimum	Allowed, <0.4" application	10 gpa minimum	12	Apply no later than Feekes 10.5
		Preemptor Fluoxastrobin 14.84% + Flutriafol 19.3%	2.0-6.0	SC	2 gpa minimum	Not allowed	10 gpa minimum	12	40
		Quilt Azoxystrobin 7.0% + Propiconazole 11.7%	7.0-14.0	SE	2 gpa minimum	Allowed, 0.125-0.25" application	10 gpa minimum	12	Apply no later than Feekes 10.5
		Quilt Xcel Azoxystrobin 13.5% + Propiconazole 11.7%	7.0-14.0	SE	2 gpa minimum	Allowed, 0.125-0.25" application	10 gpa minimum	12	Apply no later than Feekes 10.5
		Stratego Propiconazole 11.4% + Trifloxystrobin 11.4%	10.0	SC	2 gpa minimum	Allowed, 0.125-0.5" application	10 gpa minimum	12	35
		Stratego YLD Prothioconazole 10.8% + Trifloxystrobin 32.3%	4.0	SC	2 gpa minimum	Allowed, 0.125-0.5" application	10 gpa minimum	12	35
		Topguard EQ Azoxystrobin 25.3% + Flutriafol 18.6%	4.0-7.0	SC	2 gpa minimum	Not allowed	10 gpa minimum	12	30 ³
		TwinLine Metconazole 7.4% + Pyraclostrobin 12.0%	6.0-9.0	EC	5 gpa minimum	Allowed, <0.5" application	10 gpa minimum	12	Apply no later than Feekes 10.5
		7+11	Priaxor Fluxapyroxad 14.33% + Pyraclostrobin 28.58%	4.0-8.0	SC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12
	3+7+11	Nexicor Fluxapyroxad 2.81% Pyraclostrobin 18.76% Propiconazole 11.73%	7.0-13.0	EC	2 gpa minimum	Allowed, <0.5" application	Adequate for coverage and canopy penetration	12	Apply no later than Feekes 10.5
		Trivapro Benzovindiflupyr 2.9% Azoxystrobin 10.5% Propiconazole 11.9%	9.4 - 13.7	SE	2 gpa minimum	Allowed	10 gpa minimum	12	Apply no later than Feekes 10.5.4
		Trivapro Co-Pack Trivapro A Benzovindiflupyr 10.3%	4.0	EC	2 gpa minimum	Allowed	10 gpa minimum	12	Apply no later than Feekes 10.5.4
	Trivapro B Propiconazole 11.7% Azoxystrobin 13.5%	10.5	SE						
	M1+M3	ManKocide Copper hydroxide 46.1% + Mancozeb 15.0%	1.7 lb	DF	3-10 gpa minimum	Allowed	25 gpa minimum	48	26

¹ Rate is fluid ounces per acre unless otherwise noted

² Formulations: DF=Dry Flowable; EC=Emulsifiable Concentrate; F=Flowable; SC=Suspension Concentrate; SE=Suspo-Emulsion

³ PHI 15 days for hay, 7 days for forage

Nematicides for Field Crops

Nematicides Active Ingredients (concentration)	Registered Nebraska Crops	Application	Rate
Acceleron HX-209 Harpin alpha beta protein (1.0%)	Corn (field, popcorn, silage, sweet) dry bean, soybean	Seed treatment	Corn (0.75 oz per 100 lb seed) Soybean (0.25 oz per 100 lb seed)
Acceleron NemaStrike ST Tioxazafen (45.9%)	Corn (field), soybean	Seed treatment	Commercially applied
Avicta 500 FS Abamectin (46.3%)	Soybean	Seed treatment	Commercially applied
Avicta Complete Beans 500 Abamectin (22.2%) + Thiamethoxam (11.1%) + Mefenoxam (1.67%) + Fludioxonil (0.55%)	Soybean	Seed treatment	Commercially applied
Avicta Complete Corn 250 Thiamethoxam (11.7%) + Abamectin (10.3%) + Thiabendazole (2.34%) + Fludioxonil (0.3%) + Mefenoxam (0.23%) + Azoxystrobin (0.12%)	Corn (field, popcorn, seed, sweet)	Seed treatment	Commercially applied
Avicta Complete Corn 500 Thiamethoxam (23.1%) + Abamectin (10.2%) + Thiabendazole (2.31%) + Fludioxonil (0.3%) + Mefenoxam (0.23%) + Azoxystrobin (0.12%)	Corn (field, popcorn, seed, sweet)	Seed treatment	Commercially applied
Avicta Duo Corn Abamectin (12.4%) + Thiamethoxam (28.1%)	Corn (field, popcorn, seed, sweet)	Seed treatment	Commercially applied
AzaGuard Azadirachtin (3.0%)	Corn (field, popcorn), sorghum (grain), soybean, wheat	Ground, aerial, chemigation	15.0 fl oz / A
Clariva pn <i>Pasteuria nishizawae</i> - Pn1 (15.0%)	Soybean, sugar beet	Seed treatment	0.9-33.8 fl oz/100 lb seed
Counter 15G Smartbox Terbufos (15.0%)	Corn (field, popcorn, seed, sweet) sorghum (grain), sugar beet	Soil-applied granule (banded or in-furrow)	Corn (< or = 8.7 lb / A) Sorghum (grain) (< or = 11.3 lb / A) Sugar beet (< or = 13.1 lb / A)
Counter 20G Lock'n Load Terbufos (20.0%)	Corn (field, popcorn, seed, sweet) sorghum (grain), sugar beet	Soil-applied granule (banded or in-furrow)	Corn (< or = 6.5 lb / A) Sorghum (grain) (< or = 8.4 lb / A) Sugar beet (< or = 9.8 lb / A)
Counter 20G Smartbox Terbufos (20.0%)	Corn (field, popcorn, seed, sweet) sorghum (grain), sugar beet	Soil-applied granule (banded or in-furrow)	Corn (< or = 6.5 lb / A) Sorghum (grain) (< or = 8.4 lb / A) Sugar beet (< or = 9.8 lb / A)
Ecozin Plus 1.2% ME Azadirachtin (1.2%)	Corn, sorghum, soybean, wheat	Ground, aerial, chemigation, soil drench	25.0-56.0 fl oz / A
ILeVO Fluopyram 48.4%	Soybean	Seed treatment	Commercially applied
N-Hibit Gold CST Harpin alpha beta protein (1.0%)	Corn, (field, popcorn, silage, sweet) soybean	Seed treatment	Commercially applied
Poncho VOTiVO Clothianidin (40.3%) + <i>Bacillus firmus</i> I-1582	Corn (field, popcorn, sweet), soybean	Seed treatment	Commercially applied
Telone C-17 1,3-dichloropropene (81.2%) + Chloropicrin (16.5%)	All field crops	Soil fumigation	10.8-17.1 gal / A
Telone C-35 1,3-dichloropropene (63.4%) + Chloropicrin (34.7%)	All field crops	Soil fumigation	13.0-20.5 gal / A
Telone II 1,3-dichloropropene (97.5%)	All field crops	Soil fumigation	9.0-12.0 gal / A

Nematicides for Field Crops *(continued)*

Nematicides Active Ingredients (concentration)	Registered Nebraska Crops	Application	Rate
Temik 15G Lock'n Load aldicarb (15.0%)	Sugar beet	Soil-applied granule (banded or in-furrow)	27.0-33.0 lb/A

Biological Products for Crop Disease Management

Trade name Active Ingredients (concentration)	Registered Crops	Applications & Rate	Comments
Actinovate AG <i>Streptomyces lydicus</i> WYEC 108	Corn, dry bean, dry peas, root/ tuber crops, tomatoes	Soil drench, in-furrow, in irrigation, seed treatment or as foliar spray. 1-12 fl oz/acre depending on crop	Biofungicide against many soilborne diseases and some foliar pathogens
Afla-Guard GR <i>Aspergillus flavus</i> (0.0094%)	Corn, field corn, popcorn	Ground and aerial applications. Apply 10-20 lb/acre	Biofungicide - competes to reduce aflatoxin contamination
Clariva pn <i>Pasteuria nishizawae</i> - Pn1 (15.0%)	Soybean, sugar beet	Seed Treatment 0.9-33.8 fl oz/100 lb seed	Nematicide
Ethos XB Biofungicide <i>Bacillus amyloliquefaciens</i> strain D747 (5%) + Bifenthrin (I) ¹	Corn	3.4-17.0 oz per acre. Product con- tains 1.5 lb bifenthrin per gal plus <i>B. amyloliquefaciens</i> at 1 x 10 ¹⁰ cfu per ml	Biofungicide
Integral <i>Bacillus subtilis</i> MBI600 (0.18%)	Soybean	Applied in-furrow, soil/growing media, pre-plant/commercial seed	Liquid biological fungicide, alternate brand name is Subtlex NG
Majestene <i>Burkholderia</i> sp strain A396 heat-killed cells	Alfalfa, apples, corn, potatoes, soybean, tomatoes, and wheat.	1-2 gallon per acre	Bionematicide
Poncho/VOTiVO <i>Bacillus firmus</i> I-1582 (8.10%) + Clothianidin (40.3%)	Corn (field, popcorn, sweet), sorghum, soybean, sugar beet	Seed treatment. Commercially applied	Soybean cyst nematode
PRESTOP WG <i>Gliocladium catenulatum</i> J1446 (93%)	Greenhouse or field grown vegetables, ornamentals, cereals, legumes, fruits, and turf	Foliar spray, drench, and mixing with growth substrate. Rates may vary, see label	Biofungicide against seed-borne and soil-borne fungal diseases in- cluding damping-off, root and stem rot, and wilt
Regalia Rx <i>Reynoutria</i> spp. extract	Corn, soybean	Tank-mixed with leading fungicides 10.5 oz/acre.	Biofungicide - induced systemic resistance against some fungi and bacteria. Promotes plant growth
SabrEx <i>Trichoderma</i> spp. (3.5% w/w)	Corn, wheat, sorghum, soybean, rye and oats	Seed treatment Rates may vary, see label	Induce resistance against diseases. Enhanced nutrient use
Serenade Opti <i>Bacillus subtilis</i> QST 713 (26.2%)	Soybean, dry beans, potatoes	Foliar spray or soil drench. Rates may vary, see label	White mold, gray mold, bacterial leaf spot, etc.
Xanthion <i>Bacillus subtilis</i> MBI600 (9.9%) + Pyraclostrobin (2.09 lb ai/gal)	Corn (all types), soybean, sun- flower, sugar beet	In-furrow treatment at a rate of 0.6 to 1.2 oz per acre	Biological fungicide to be used with chemistry

¹ Insecticide components are followed by (I) for designation.

2020 Approximate Retail Price (\$) Per Unit of Selected Fungicides for Field Crops

Survey price estimates in August 2019

Product	2020 Price (\$) per Unit
Affiance	160.00/gal
Allegiance FS (FL)	480.00/gal
Alto 100SL	210.00/gal
Apron XL	980.00/gal
ApronMaxx RFC	390.00/gal
ApronMaxx RTA	125.00/gal
Bumper ES	85.00/gal
Captan Gold	25.00/gal
Captan 80WDG	6.00/lb
Caramba	170.00/gal
Cruiser 5SF Wheat	870.00/gal
CruiserMaxx Vibrance Beans	600.00/gal
CruiserMaxx Vibrance Cereals	125.00/gal
CruiserMaxx Beans	630.00/gal
Custodia	180.00/gal
Dithane F-45 Rainshield	35.00/gal
Domark 230 ME	210.00/gal
Equus 720	50.00/gal
Evito	9.50/oz
Headline AMP	330.00/gal
Incognito 4.5	60.00/gal
Manzate Max	40.00/gal
Manzate Pro-Stick	5.00/lb
Mastercop	65.00/gal

Product	2020 Price (\$) per Unit
Maxim 4FS Potato	20.00/oz
Mertect 340-F	420.00/gal
Penncozeb 75DF	5.00/lb
Proline 480SC	690.00/gal
PropiMax EC	105.00/gal
Prosaro SC	340.00/gal
Quadris	230.00/gal
Quadris Top	390.00/gal
Quilt	160.00/gal
Quilt Xcel	220.00/gal
Raxil Pro Shield	135.00/gal
Raxil PRO MD	80.00/gal
Stamina F3 Cereals	105.00/gal
Stratego YLD	580.00/gal
Stratego 250 EC	200.00/gal
Tebuzol 3.6L	65.00/gal
Tilt	100.00/gal
Toledo	80.00/gal
Topguard	190.00/gal
Trilex 2000	370.00/gal
Twinline	240.00/gal
Vibrance Extreme	125.00/gal
Warden Cereal	120.00/gal

Disease Management Dictionary

See page 217 for a guide to reading dictionary entries. Number/letters in brackets in the Disease Management Dictionary correspond to the product Mode(s) of Action listed on pages 255-256 and are provided by the Fungicide Resistance Action Committee (FRAC).

Absolute[®] [tebuconazole (2.18 lb ai/gal) + trifloxystrobin (2.18 lb ai/gal)]. For control of certain diseases on wheat. Bayer CropScience. EPA Reg. No. 264-849. 11/2010. {3+11}.

Absolute[®] **Maxx** [tebuconazole (2.18 lb ai/gal) + trifloxystrobin (2.18 lb ai/gal)]. For control of certain diseases on corn and wheat. Bayer CropScience. EPA Reg. No. 264-849. 2015. {3+11}.

Acceleron[®] **DC-309** [metalaxyl (2.6 lb/gal)]. For control of Pythium and Phytophthora damping off in corn. Monsanto. EPA Reg. No. 264-935-524. 2009. {4}.

Acceleron[®] **DC-509** [ipconazole (3.77 lb/gal)]. For control of Rhizoctonia, Fusarium, and Phomopsis seedling diseases in corn. Monsanto. EPA Reg. No. 264-988-524. 2009. {3}.

Acceleron[®] **DX-109** [pyraclostrobin (1.67 lb/gal)]. Registered for control of Rhizoctonia damping off and suppression of *Pythium* spp. and *Fusarium* spp. in soybeans. Monsanto. EPA Reg. No. 7969-266-524. 2010. {11}.

Acceleron[®] **DX-309** [metalaxyl (2.6 lb/gal)]. Registered for control of Pythium and Phytophthora damping off in soybeans. Monsanto. EPA Reg. No. 264-935524. 2010. {4}.

Acceleron[®] **DX-612** [fluxapyroxad (2.72 lb/gal)]. Registered for control of seed and seedling *Rhizoctonia solani* damping off and suppression of *Fusarium* spp. in soybeans. Monsanto. EPA Reg. No. 7969-308-524. 2012. {7}.

Acceleron[®] **DX-709** [trifloxystrobin (22%)]. Protects corn seedlings against *Rhizoctonia solani* and *Fusarium* spp. Monsanto. EPA Reg. No. 264-989-524. 2010. {11}.

Acceleron[®] **HX-209** [harpin alpha beta (1%)]. A seed treatment for nematode egg production suppression in corn, dry bean, and soybean. Monsanto. EPA Reg. No. 71771-3-524.

Acquire[®] [metalaxyl (2.65 lb/gal)]. Seed treatment controlling Pythium and Phytophthora damping off in soybean, sorghum, sunflower, small grains, turfgrass, canola, corn, and millet. BASF. EPA Reg. No. 71532-22-7969. 2010. {4}.

Actinovate[®] **AG** [*Streptomyces lydicus* WYEC 108]. A biofungicide against many soilborne diseases and some foliar pathogens. For use in corn, dry bean, dry peas, root/tuber. Delivered as soil drench, in-furrow, in irrigation, seed treatment or as foliar spray at 1-12 fl oz/acre depending on crop. Novozymes-Monsanto BioAg. EPA Reg. No. 73314-1.

Affiance[™] [tetraconazole (0.66 lb ai/gal) + azoxystrobin (0.834 lb ai/gal)]. A broad spectrum foliar fungicide for leaf spot, blight, and rust control in corn and soybean. Gowan. EPA Reg. No. 10163-332. {3 + 11}.

Afla-Guard[®] **GR** [*Aspergillus flavus* (0.0094%) + Inert ingredients (99.0096%)]. A biofungicide, which the active ingredient competes to reduce aflatoxin contamination from a pathogen. For use with corn, field corn, and popcorn. Delivery through ground and aerial applications at a rate of 10-20 lb/acre. Syngenta. EPA Reg. No. 75624-2-100

Aftershock[™] [fluoxastrobin (4.0 lb ai/gal)]. Broad spectrum fungicide for the control of certain plant diseases in various crops, including corn, soybean, and wheat. Loveland Products, Inc. EPA Reg. No. 66330-64-34704. 2010. {11}.

Allegiance[®] **Dry** [metalaxyl (12.5%)]. For control of Pythium and Phytophthora damping off in soybean, sorghum, sunflower, small grains, turfgrass, and corn. Chemtura. EPA Reg. No. 264-1014400. {4}.

Allegiance[®] **FL** [metalaxyl (2.6 lb/gal)]. For control of Pythium and Phytophthora damping off in soybean, sorghum, sunflower, small grains, turfgrass, canola, corn, wheat, and millet. Bayer CropScience. EPA Reg. No. 264-935. 09/2007. {4}.

Allegiance[®] **LS** [metalaxyl (1.63 lb ai/gal)]. To aid in the control of seed decay and damping off caused by *Pythium* in corn, dry beans, sorghum, soybean, sugar beet, sunflower and wheat. Bayer. EPA Reg. No. 264-956. {4}.

Alto[®] [cyproconazole (0.83 lb ai/gal)]. Broad spectrum foliar fungicide for control of plant diseases in soybean. Syngenta. EPA Reg. No. 100-1226. 2008. {3}.

Approach[®] [picoxystrobin (2.08 lb ai/gal)]. A foliar fungicide for the control of certain diseases in alfalfa, corn, dry bean, sorghum, soybean and wheat. DuPont. EPA Reg. No. 352-840. 11/2012. {11}.

Approach[®] **Prima** [picoxystrobin (1.67 lb ai/gal) + cyproconazole (0.67 lb ai/gal)]. A foliar fungicide for the control of certain diseases in corn, soybean, and wheat. DuPont. EPA Reg. No. 352-883. {3 + 11}.

Apron XL[®] [mefenoxam (3.0 lb/gal)]. For control of Pythium and Phytophthora damping off in small grains, field corn, sweet corn, popcorn, forage grasses, millet, sorghum, soybean, sunflower, wheat, and turfgrass. Syngenta. EPA Reg. No. 100-799. 08/2009. {4}.

Apron Maxx[®] **RFC** [fludioxonil (0.21 lb/gal) + mefenoxam (0.31 lb/gal)]. Registered for control of Pythium, Phytophthora, Fusarium, and Rhizoctonia seedling diseases in soybean and dry edible beans. Syngenta. EPA Reg. No. 100-1195. 10/2009. {12 + 4}.

Apron Maxx[®] **RTA**[®] [fludioxonil (0.064 lb/gal) + mefenoxam (0.096 lb/gal)]. Ready to apply formulation of ApronMaxx. Registered for control of Pythium, Phytophthora, Fusarium, and Rhizoctonia seedling diseases in soybean and dry edible beans. Syngenta. EPA Reg. No. 100-946. 08/2009. {12 + 4}.

Disease Management Dictionary (continued)

Avicta® 500FS [abamectin (4.17 lb ai/gal)]. A seed treatment to protect soybean seedlings from early-season nematode damage. Syngenta. EPA Reg. No. 100-1204.

Avicta® Complete Beans 500 [abamectin (22.2%) + thiamethoxam (11.1%) + mfenoxam (1.67%) + fludioxonil (0.55%)]. A seed treatment to protect soybean seedlings from early-season nematode damage, including soybean cyst nematode, and insects, plus control of *Pythium*, *Phytophthora*, *Fusarium*, and *Rhizoctonia* seedling diseases. Syngenta. EPA Reg. No. 100-1457. {4+12}.

Avicta® Complete Corn 250 [abamectin (10.3%) + thiamethoxam (11.7%) + thiabendazole (2.34%) + mfenoxam (0.23%) + fludioxonil (0.3%) + azoxystrobin (0.12%)]. A seed treatment to protect corn seedlings from early-season nematode, insect, and damping off and seedling blight disease damage from *Pythium*, *Fusarium*, and *Rhizoctonia*. Syngenta. EPA Reg. No. 100-1405. {1 + 4 + 12 + 11}.

Avicta® Complete Corn 500 [abamectin (10.2%) + thiamethoxam (23.1%) + thiabendazole (2.31%) + mfenoxam (0.23%) + fludioxonil (0.3%) + azoxystrobin (0.12%)]. A seed treatment to protect corn seedlings from early-season nematode, insect, and damping off and seedling blight disease damage from *Pythium*, *Fusarium*, and *Rhizoctonia*. Syngenta. EPA Reg. No. 100-1405. {1 + 4 + 12 + 11}.

Avicta® Duo Corn [abamectin (12.4%) + thiamethoxam (28.1%)]. A seed treatment to protect corn seedlings from early-season nematodes and insects. Syngenta. EPA Reg. No. 100-1321.

AzaGuard™ [azadirachtin (0.28 lb ai/gal)]. Registered for controlling and repelling insects and nematodes in various crops including corn, dry bean, sorghum, soybean, sugar beet, sunflower, and wheat. BioSafe Systems. EPA Reg. No. 70299-17.

Azoxystrobin. An active ingredient in Affiance, Dynasty, Quadris, Quadris Opti, Quadris Top, Quadris Top SB, Quadris Xtra, Quilt, Quilt Xcel, and Satori. [11].

Bacillus amyloliquefaciens. A biological (bacterial) active ingredient in Ethos XB Biofungicide.

Bacillus firmus. A biological (bacterial) active ingredient in Poncho/VOTiVO.

Bacillus subtilis. A biological (bacterial) active ingredient in Serenade ASO, Serenade Opti, and Xanthion.

Badge SC® [copper oxychloride + copper hydroxide (2.27 lb/gal metallic copper)]. A fungicide/bactericide for disease control in alfalfa, corn, dry bean, potato, sugar beet, and wheat. Gowan. EPA Reg. 80289-3-10163. {M1}.

Badge® X₂ [Copper oxychloride (23.82%) + Copper hydroxide (21.49%)]. A fungicide/bactericide for diseases control in alfalfa, corn, dry bean, potato, sugar beet, and wheat. Gowan. EPA Reg. No. 80289-12-10163. {M1}.

Bean Guard®/Allegiance® [carboxin (12.5%) + metalaxyl (3.75%) + captan (24.45%)]. Registered to control certain seed and seedling diseases, including *Pythium* and *Rhizoctonia*, in soybeans. Chemtura. EPA Reg. No. 400-561. {7 + 4 + M4}.

Boscalid. An active ingredient in Endura. {7}.

Bravo® Weather Stik [chlorothalonil (6 lb/gal)]. For the control of various diseases in dry beans, corn, potato, and soybean. Syngenta. EPA Reg. No. 50534-188-100.

Bumper® 41.8 EC [propiconazole (3.6 lb ai/gal)]. A foliar fungicide for the control of certain diseases in corn, sorghum, soybean, and wheat. Makhteshim Agan of North America, Inc. EPA Reg. No. 66222-42. 04/2009. {3}.

Cabrio® Plus [pyraclostrobin (5.0%) + metiram (55%)]. For disease control and plant health in potato. BASF. EPA Reg. No. 796-321.

Captan. An active ingredient in Captan 400 and Captan 400-C. {M4}.

Catamaran® [potassium phosphite (3.17 lb/gal) + chlorothalonil (2.1 lb/gal)]. A combination fungicide for the control and prevention of diseases on potato. Luxembourg-Pamol Inc. EPA Reg. No. 42519-31.

Caramba® [metconazole (0.75 lb ai/gal)]. For use in disease control in sugar beet and wheat. BASF. EPA Reg. No. 7969-246. 2008. {3}.

Carboxin. Active ingredient in Kickstart VP, Prevail, RTU-Vitavax-Thiram, Vitavax-34, and Vitavax 200. {7}.

Catapult™ XL [chloroneb (2.9 lb/gal) + mfenoxam (0.19 lb/gal)]. Registered for control of *Phytophthora*, *Pythium*, and *Rhizoctonia* seedling diseases in soybean and dry edible beans. Winfield Solutions, LLC. EPA Reg. No. 1381-183. {14 + 4}.

Champ® Dry Prill [Copper hydroxide (57.6%)]. A fungicide for control of specified diseases on alfalfa, potato, sugarbeet and wheat. Nufarm. EPA Reg. No. 55146-57. {M1}.

Champ® Formula 2 Flowable [copper hydroxide (4.5 lb ai/gal)]. A fungicide/bactericide for control of certain diseases of alfalfa, dry bean, potato, sugar beet, and wheat. Nufarm. EPA Reg. No. 55146-64. {M1}.

Champ® WG [Copper hydroxide (77.0%)]. A fungicide for control of specified diseases on alfalfa, potato, sugarbeet and wheat. Nufarm. EPA Reg. No. 55146-1. {M1}.

Charter® [triticonazole (0.213 lb/gal)]. Registered for control of seed-borne diseases in wheat and barley. BASF. EPA Reg. No. 7969-386. 02/2010. {3}.

Charter® PB [triticonazole (0.12 lb/gal) + thiram (1.2 lb/gal)]. For control of seed-borne diseases in wheat and barley with the addition of thiram fungicide. BASF. EPA Reg. No. 7969-387. 02/2010. {3 + M3}.

Charter® F² [triticonazole (0.12 lb ai/gal) + metalaxyl (0.07 lb ai/gal)]. Liquid seed treatment for control or suppression of certain seed-borne and soil-borne diseases in cereals including wheat. BASF. EPA Reg. No. 7969-295. 2010. {3}.

Disease Management Dictionary (continued)

Clariva™ pn [*Pasteuria nishizawae* (15%)]. A biological seed treatment product for protection against cyst nematodes on soybean and sugar beet. Syngenta. EPA Reg. No. 100-1524.

Cloroneb. Active ingredient in Catapult XL. {14}.

Clothianidin. An active ingredient in Inovate System, NipsIt SUITE Cereals OF, Poncho/VOTIVO. {4A}.

Copper Hydroxide. Active ingredient in Badge, Champ, Champ Formula 2, Kocide 2000, Kocide 3000 and ManKocide. {M1}.

Copper oxychloride. An active ingredient in Badge SC, Badge X2. {M1}.

Counter® 15G Smartbox [terbufos (15%)]. Insecticide/nematicide for use in corn, sugar beet, and grain sorghum. AMVAC. EPA Reg. No. 5481-545. RUP. {Insecticide 1B}.

Counter® 20G Lock'n Load and Counter® 20G Smartbox [terbufos (20%)]. Insecticide/nematicide for use in corn, sugarbeet, and grain sorghum. AMVAC. EPA Reg. No. 5481-562. RUP. {Insecticide 1B}.

Cruiser Maxx® [thiamethoxam (2.15 lb ai/gal) + mefenoxam (0.16 lb ai/gal) + fludioxonil (0.11 lb ai/gal)]. Protects against soil-borne and seed-borne diseases (*Pythium*, *Phytophthora*, *Fusarium*, and *Rhizoctonia*) in dry beans and soybeans. Syngenta. EPA Reg. No. 100-1247. 2014. {4 + 12}.

Cruiser Maxx® Advanced [thiamethoxam (2.06 lb ai/gal) + mefenoxam (0.31 lb ai/gal) + fludioxonil (0.10 lb ai/gal)]. Protects against damage from soil-borne and seed-borne diseases (*Pythium*, *Phytophthora*, *Fusarium*, and *Rhizoctonia*) in soybeans. Syngenta. EPA Reg. No. 100-1283. 2014. {4 + 12}.

CruiserMaxx® Beans [thiamethoxam (2.15 lb/gal) + mefenoxam (0.16 lb/gal) + fludioxonil (0.11 lb/gal)]. ApronMaxx product with the addition of an insecticide for control of early season insect pests on soybean and dry edible beans. Syngenta. EPA Reg. No. 100-1247. 12/2009. {Insecticide 4A + 4 + 12}.

CruiserMaxx® Cereals [thiamethoxam (0.26 lb/gal) + mefenoxam (0.05 lb/gal) + difenoconazole (0.31 lb/gal)]. Registered for control of *Fusarium*, *Pythium*, and *Rhizoctonia* damping off diseases on winter wheat, spring wheat, barley, and triticale. Also contains an insecticide for wireworm, aphid, and Hessian fly control. Syngenta. EPA Reg. No. 1001305. 2009. {Insecticide 4A + 4 + 3}.

Cruiser Maxx® EZ [thiamethoxam (2.17 lb ai/gal) + mefenoxam (0.33 lb ai/gal) + fludioxonil (0.11 lb ai/gal)]. Protects against damage from soil-borne and seed-borne diseases (*Pythium*, *Phytophthora*, *Fusarium*, and *Rhizoctonia*) in soybeans. Syngenta. EPA Reg. No. 100-1427. 2014. {4 + 12}.

CruiserMaxx® Plus [thiamethoxam (2.06 lb/gal) + mefenoxam (0.31 lb/gal) + fludioxonil (0.10 lb/gal)]. CruiserMaxx Beans product with additional mefenoxam for enhanced *Phytophthora* control. Syngenta. EPA Reg. No. 100-1283. {Insecticide 4A + 4 + 12}.

CruiserMaxx® Potato Extreme [thiamethoxam (2.08 lb/gal) + fludioxonil (0.52 lb/gal) + difenoconazole (1.03 lb/gal)]. A seed treatment product for protection against certain insects and diseases on potato. Syngenta. EPA Reg. No. 100-1444.

CruiserMaxx® Potato Insecticide and Fungicide [thiamethoxam (2.86 lb/gal) + fludioxonil (0.73 lb/gal)]. A seed treatment product for protection against damage from certain insects and diseases in potatoes. Syngenta. EPA Reg. No. 100-1248.

CruiserMaxx® Vibrance™ Cereals [sedaxane (0.0667 lb/gal) + difenoconazole (0.308 lb/gal) + mefenoxam (0.079 lb/gal) + thiamethoxam (0.256 lb/gal)]. A seed treatment product for protection against damage from certain insects and diseases in cereals including wheat. Syngenta. EPA Reg. No. 100-1383. 2012. {Insecticide 7 + 3 + 4 + 4A}.

Cruisermaxx® Vibrance Potato [thiamethoxam (1.28 lb/gal) + fludioxonil (0.32 lb/gal) + difenoconazole (0.64 lb) + sedaxane (0.64 lb/gal)]. A seed treatment product for protection against certain insects and diseases on potato. Syngenta. EPA Reg. No. 100-1556.

Cyproconazole. An active ingredient in Alto, Aproach Prime and Quadris Xtra. {3}.

Delaro™ 325 SC [prothioconazole (1.49 lb ai/gal) + trifloxystrobin (1.27 lb ai/gal)]. Broad spectrum fungicide for the control of certain diseases of chickpea, corn, dry peas, lentils, soybean, sugar beets, and wheat. Bayer. EPA Reg. No. 264-1055. 2018. {3+11}.

Difenoconazole. An active ingredient in CruiserMaxx Cereals, CruiserMaxx, Quadris Top SB, Vibrance Cereals, Dividend Extreme, Dividend XL RTA, Incentive RTA, Quadris Top, and Vibrance Extreme. {3}.

Dithane® F-45 Rainshield [mancozeb (4.0 lb ai/gal)]. A foliar fungicide used for the control of certain diseases in corn, potato, and wheat. Dow AgroSciences. EPA Reg. No. 62719-396. 01/2007. {M3}.

Dithane® M-45 [mancozeb (80%)]. A foliar fungicide used for the control of certain diseases in corn, potato, and wheat. Dow AgroSciences. EPA Reg. No. 62719-387. 01/2007. {M3}.

Dividend Extreme® [difenoconazole (0.77 lb/gal) + mefenoxam (0.19 lb/gal)]. Used for control of many seed-borne diseases in barley, sweet corn, wheat, and triticale. Syngenta. EPA Reg. No. 100-1141. 07/2010. {3 + 4}.

Dividend® XL RTA® [difenoconazole (0.31 lb/gal) + mefenoxam (0.025 lb/gal)]. RTA formulation of Dividend Extreme for use on barley and wheat. Syngenta. EPA Reg. No. 100-826. 09/2009. {3 + 4}.

Domark® 230 ME [tetraconazole (1.9 lb ai/gal)]. For control and/or suppression of certain diseases in corn, soybean, and sugarbeets. Gowan. EPA Reg. No. 80289-7-10163. 3/14 or 80289-711/14. {3}.

Dyna-Shield® Fludioxonil [fludioxonil (4.0 lb ai/gal)]. A seed treatment for controlling seed-borne and soil-borne diseases such as seedling blight and damping off in various crops including corn, dry bean, sorghum, soybean, sugar beet, sunflower, and wheat. Loveland. EPA Reg. No. 34704-1074. {12}.

Disease Management Dictionary (continued)

Dyna-Shield® Foothold™ [tebuconazole (0.042 lb ai/gal) + metalaxyl (0.056 lb ai/gal)]. A seed treatment that aids in control of seed, seedling, and soil-borne diseases in wheat. Loveland. EPA Reg. No. 34704-1049. {3 + 4}.

Dyna-Shield® Foothold™ Extra [tebuconazole (0.042 lb ai/gal) + metalaxyl (0.056 lb ai/gal) + imidacloprid (1.0 lb ai/gal)]. A seed treatment for early season insects; aids in control of seed, seedling, and soil-borne diseases in wheat. Loveland. EPA Reg. No. 34704-1046. {3 + 4 + 4A}.

Dyna-Shield® Metalaxyl [metalaxyl (2.54 lb ai/gal)]. A seed treatment for control of seed rot and damping off diseases of certain crops including corn, dry bean, sorghum, soybean, sugar beet, sunflower, and wheat. Loveland. EPA Reg. No. 34704-942. {4}.

Dyna-Shield® Metalaxyl 318 FS [metalaxyl (2.65 lb ai/gal)]. A seed treatment for control of *Pythium* seed rot, *Pythium* damping off, and *Phytophthora* diseases of certain crops including corn, dry bean, sorghum, soybean, sugar beet, sunflower, and wheat. Loveland. EPA Reg. No. 34704-942. {4}.

Dyna-Shield® Small Grains [tebuconazole (0.039 lb ai/gal) + metalaxyl (0.051 lb ai/gal)]. A seed treatment that aids in control of seed, seedling, and soil-borne diseases in wheat. Loveland. EPA Reg. No. 34704-933. {3 + 4}.

Dynasty® [azoxystrobin (0.83 lb/gal)]. For control of seed and soil-borne seedling diseases on corn, sunflower, barley, canola, dry edible beans, sorghum, soybeans, wheat, potato, and triticale. Syngenta. EPA Reg. No. 100-1159. 08/2010. {11}.

EcoZin® Plus 1.2% ME [azadirachtin (1.2%, or 0.1 lb ai/gal)]. For controlling and repelling insects and nematodes in various crops including corn, dry bean, sorghum, soybean, sugar beet, sunflower, and wheat. Amvac. EPA Reg. No. 5481-559.

Eminent® 125SL [tetraconazole (1.0 lb ai/gal)]. A foliar fungicide for the control of certain diseases in sugar beets. Sipcam Agro USA, Inc. EPA Reg. No. 60063-12. 03/2009. {3}.

Endura® [boscalid (5.632 lb ai/gal)]. A foliar fungicide for the control of certain diseases in alfalfa, dry bean and soybean. BASF. EPA Reg. No. 7969-197. 2012. {7}.

Ethaboxam. An active ingredient in Intego. {22}.

Ethos XBTM™ *Bacillus amyloliquefaciens* strain D747 + bifenthrin insecticide. A biofungicide that builds on FMC's in-furrow insect control product and provides additional seedling disease suppression for early season damping-off and seedling blights caused by *Pythium*, *Rhizoctonia*, *Fusarium*, and *Phytophthora*. Product contains 1.5 lb per gallon of bifenthrin plus *B. amyloliquefaciens* at 1×10^{10} cfu per milliliter. Use rate is 3.4-17.0 oz per acre (0.2-0.98 oz/1000 ft of row) for pests other than corn rootworm. FMC Corporation. EPA Reg No. 279-3473.

Evergol™ Energy [prothioconazole (0.64 lb ai/gal) + penflufen (0.32 lb ai/gal) + metalaxyl (0.51 lb ai/gal)]. For control of soilborne, seedborne, and early season postemergence diseases in various crops including soybean and wheat. Bayer CropScience. EPA Reg. No. 264-1123. 2012. {3 + 7 + 4}.

Evito® 480 SC [fluoxastrobin (3.98 lb ai/gal)]. A foliar fungicide for the control of certain diseases in corn, soybean, and wheat. Arysta LifeScience. EPA Reg. No. 66330-64. 2010. {11}.

Evito® T [fluoxastrobin (1.67 lb ai/gal) + tebuconazole (2.32 lb ai/gal)]. A broad spectrum fungicide for the control of certain diseases in various crops including corn and soybean. Arysta LifeScience. EPA Reg. No. 66330-383. 2010. {11+3}.

Fitness® [propiconazole (3.6 lb ai/gal)]. A foliar fungicide for the control of certain diseases in various crops including corn, soybean, sorghum, and wheat. Loveland Products, Inc. EPA Reg. No. 34704-1031. 2011. {3}.

Flutriafol. Active ingredient found in Fortix, Preemptor, and Topguard. {3}.

Fluoxastrobin. An active ingredient in Aftershock, Evito, Evito T, Fortix, Preemptor, and Topguard {11}.

Fludioxonil. Active ingredient in ApronMaxx RC, ApronMaxx RTA, CruiserMaxx, CruiserMaxx Advanced, CruiserMaxx EZ, CruiserMaxx Plus, Maxim 4FS, Maxim XL, Warden CZ, and Warden RTA. {12}.

Fluopyram. The active ingredient in ILeVO. {7}

Fluxapyroxad. Fluxapyroxad. An active ingredient in Nexicor and Priaxor. {7}.

Folicur® 3.6F [tebuconazole (3.6 lb ai/gal)]. A foliar fungicide providing control of rusts and suppression of head blight (scab) diseases in wheat. Bayer. EPA Reg. No. 264-752. {3}.

Fontelis® [Penthiopyrad (20.4%)]. A fungicide for control of specified diseases on alfalfa. DuPont. EPA Reg. No. 352-834. 2016. {7}.

Fortix® [fluoxastrobin (1.4 lb ai/gal) + flutriafol (1.82 lb ai/gal)]. A foliar fungicide for the control of certain diseases in corn and soybean. Cheminova. EPA Reg. No. 66330-409. {3 + 11}.

Grain Guard® [mancozeb (50%)]. For control of seed-borne bunts and smuts of wheat, oats, barley, rye, and sorghum. Chemtura. EPA Reg. No. 400-558. {M3}.

Headline® [pyraclostrobin (2.09 lb ai/gal)]. For use in disease control and plant health in alfalfa, corn, dry bean, sorghum, soybean, sugar beet, sunflower, and wheat. BASF. EPA Reg. No. 7969-186. 2009. {11}.

Headline® SC [pyraclostrobin (2.08 lb ai/gal)]. For use in disease control and plant health in alfalfa, corn, dry bean, sorghum, soybean, sugar beet, sunflower, and wheat. BASF. EPA Reg. No. 7969-289. 2013. {11}.

Headline AMP® [pyraclostrobin (1.22 lb ai/gal) + metconazole (0.46 lb ai/gal)]. For disease control and plant health in corn and dry bean. BASF. EPA Reg. No. 7969-291. 2009. {11 + 3}.

ILeVO® [fluopyram (5.0 lb ai/gal)]. Seed treatment for protection against early season pathogenic nematodes and seedling infections by *Fusarium virguliforme*, causal agent of Sudden Death Syndrome. Bayer CropScience. EPA Reg. No. 264-1167. 2015. {7}.

Disease Management Dictionary (continued)

Imazalil. Active ingredient in Raxil MD Extra and Raxil MD Extra W. {3}.

Incentive® RTA® [difenoconazole (0.31 lb/gal) + mefenoxam (0.025 lb/gal)]. Used for controlling seedborne diseases in barley and wheat. Winfield Solutions, LLC. EPA Reg. No. 100-826-1381. 09/2007. {3 + 4}.

Imidaclopid. Active ingredient in Raxil MD-W. {Insecticide 4A}.

Intego™ Suite Soybeans. [clothianidin (1.91 lb ai/gal) + ethaboxam (0.282 lb ai/gal) + ipconazole (0.094 lb) + metalaxyl (0.075 lb ai/gal)]. A fungicide and insecticide seed treatment providing systemic seed and seedling protection against seedling diseases and insects of soybeans. Valent. 2015. EPA Reg. No. 59639-205. {Insecticide 4A + 22 + 3 + 4}.

Inovate™ [clothianidin (1.34 lb ai/gal) + methalaxyl (0.108 lb ai/gal) + ipconazole (0.72 lb ai/gal)]. A fungicide and insecticide seed treatment providing systemic seed and seedling protection against early season seedling diseases and insects of soybeans. Valent. 2015. EPA Reg. No. 59639-176. {Insecticide 4A + 3 + 4}.

Inovate™ Pro. [clothianidin (2.27 lb ai/gallon) + ipconazole (0.1137 lb ai/gal) + metalaxyl (0.0912 lb ai/gal)]. A fungicide and insecticide seed treatment providing systemic seed and seedling protection against listed early season seedling disease and insects of soybeans. Valent. 2015. EPA Reg. No. 59639-195. {Insecticide 4A + 3 + 4}.

Integral® [*Bacillus subtilis* MBI 600]. Alternate brand name of Subtilex. A liquid biological fungicide for use in-furrow, as a growing media treatment, or as a pre-plant seed treatment. BASF and Becker Underwood, Inc. EPA Reg. No. 71840-5.

Ipconazole. Active ingredient in Inovate System. {3}.

Iprodione. An active ingredient in Rovral 4 {3}.

Kickstart® VP [carboxin (10.4%) + permethrin (14%)]. Planter box seed treatment for corn and soybeans for control of various seedling diseases and insects. Helena. EPA Reg. No. 42056-21-5905. {7 + Insecticide 3A}.

Kocide® 2000 [copper hydroxide (53.8%)]. A fungicide/bactericide for control of specified diseases on various crops including alfalfa, corn, dry bean, potato, sugar beet, and wheat. Certis USA, LLC. EPA Reg. No. 352-656. 01/2011. {M1}.

Kocide® 3000 [copper hydroxide (46.1%)]. A fungicide/bactericide for control of specified diseases on various crops including alfalfa, corn, soybean, potato, sugar beet, and wheat. DuPont. EPA Reg. No. 91411-2-7005. 01/2011. {M1}.

Kocide® HCu [copper hydroxide (77.0%)]. A fungicide/bactericide for control of specified diseases on various crops including alfalfa, corn, soybeans, potato, sugar beet, and wheat. Certis. EPA Reg. No. 91411-12-70051. {M1}.

Laredo® [myclobutanil (2.0 lb ai/gal)]. A foliar fungicide for the control of soybean rust in soybean. Dow AgroSciences. EPA Reg. No. 62719-412. 03/2007. {3}.

Lucento [Flutriafol (2.63 lb/gal) + Bixafen 1.54 lb/gal]. Broad spectrum fungicide for foliar control of troublesome diseases in corn, soybean, sheat, sugar beet, and sorghum. FMC Agricultural Solutions. EPA Reg. No. 279-3603. {3+7}.

Lumisena™ [oxathiapiprolin (1.67 lb ai/gal)]. Fungicide seed treatment product for early season protection against Oomycete pathogens in soybeans and sunflowers. DuPont. EPA Reg. No. 352-920. {49}.

Luna® Tranquility [fluopyram (1.04 lb/gal) + pyrimethanil (3.12 lb/gal)]. Broad spectrum fungicide for control of various plant diseases on potato. Bayer CropScience. EPA Reg. No. 264-1085.

Majestene™. Burkholderia sp strain A396 heat-killed cells. A bionematicide with application rate of 1-2 gallon per acre. Crops include alfalfa, apples, corn, potatoes, soybean, tomatoes, and wheat. Product can be used in-furrow, foliar applied or in chemigation. It is listed by the Organic Materials Review Institute (OMRI). Marrone Bio Innovations, Inc. EPA Reg No. 84059-14

ManKocide® [mancozeb (15%) + copper hydroxide (46.1%)]. For control of some seed-borne and foliar diseases in wheat, potato, sugar beet, and barley. DuPont. EPA Reg. No. 352-690. 06/2012. {M3 + M1}.

Mancozeb. An active ingredient in Dithane F-45, Rainshield, Dithane M-45, ManKocide, Penncozeb 75DF, and Penncozeb 80WP. {M3}.

Mantico™ LFR. [bifenthrin (1.33 lb ai/gal) + pyraclostrobin (0.67 lb ai/gal)]. An insecticide and fungicide combination for control of soil insect pests and soilborne/seedling disease and plant health used in-furrow for corn (all types). Can mix directly with liquid fertilizer. BASF. EPA Reg. No. 279-3478-7969.

Manzate® Flowable [mancozeb (4 lb/gal)]. A seed treatment or foliar fungicide for the control of certain diseases in potato. United Phosphorus, Inc. EPA Reg. No. 70506-236.

Manzate® Pro-Stick™ [mancozeb (0.75 lb)]. A seed treatment or foliar fungicide for the control of certain diseases in potato. United Phosphorus, Inc. EPA Reg. No. 70506-234.

Maxim® 4FS [fludioxonil (4 lb/gal)]. Registered for controlling seedborne and soilborne fungal diseases in barley, corn, millet, oats, rye, sorghum, triticale, wheat, canola, sunflower, potato, dry edible beans, and soybean. Syngenta. EPA Reg. No. 100-758. 2010. {12}.

Maxim® MZ [fludioxonil (0.005 lb) + mancozeb (0.057 lb)]. A seed treatment product for suppression of certain diseases of potatoes. Syngenta. EPA Reg. No. 100-1158.

Maxim® XL [fludioxonil (1.9 lb/gal) + mefenoxam (0.8 lb/gal)]. For control of seedborne and soilborne diseases in soybean, wheat, barley, rye, oats, triticale, millet, corn, alfalfa, edible beans, sorghum, sunflower, and turfgrass. Syngenta. EPA Reg. No. 100-916. 2010. {12 + 4}.

Disease Management Dictionary (continued)

Mefenoxam. Active ingredient in Apron XL, ApronMaxx RFC, ApronMaxx RTA, Catapult XL, CruiserMaxx, CruiserMaxx Advanced, CruiserMaxx Cereals, CruiserMaxx EZ, CruiserMaxx Plus, CruiserMaxx Vibrance Cereals, Dividend Extreme, Dividend RTA, Incentive RTA, Maxim XL, Warden CZ, and Warden RTA. {4}.

Mertect® 340-F. [thiabendazole (4.1 lb ai/gal)]. Soybean seed treatment for the control of Phomopsis. Syngenta. EPA Reg. No. 100-889. {1}.

Metalaxyl. Active ingredient in Acceleron, Acquire, Allegiance Dry, Allegiance FL, Allegiance LS, Evergol Energy, Inovate System, NipsIt SUITE Cereals OF, Prevail, Proceed MD, Raxil MD, Raxil MD Extra, Raxil MD Extra W, Raxil MD-W, Raxil XT Wettable Powder, and Trilex 2000. {4}.

Metconazole. An active ingredient in Caramba, Headline AMP, Quash and Twinline. {3}.

Miravis Ace [Propiconazole (11.4%) + Pydiflumetofen (13.7%)]. A foliar fungicide for control of diseases in small grains. Syngenta. EPA Reg. No. 100-1645. 2019. {3+7}.

Miravis Neo [Propiconazole (1.04 lb ai/gal) + Pydiflumetofen (0.63 lb ai/gal) + Azoxystrobin (0.83 lb ai/gal)]. A foliar fungicide for control of diseases in corn, dry bean, soybean. Syngenta. EPA Reg. No. 100-1605. 2018. {3+7+11}.

Moncut® Fungicide [flutolanil (0.70 lb)]. In-furrow fungicide to manage black scurf and suppress powdery scab in potato. Nichino America. EPA Reg. No. 71711-14.

Monsoon® [tebuconazole (3.6 lb ai/gal)]. A foliar fungicide for control of specified diseases on various crops including corn, potato, soybean, sunflower, and wheat. Loveland Products, Inc. EPA Reg. No. 34704-900. 2009. {3}

Muscle® [tebuconazole (3.6 lb ai/gal)]. For control of specified diseases on soybean, sunflower, and wheat. Sipcam Agro USA, Inc. EPA Reg. No. 60063-29. 06/2009. {3}.

Myclobutanil. An active ingredient in Laredo. {3}.

N-Hibit™ Gold CST [harpin alpha beta (1%)]. A seed treatment suppresses nematode egg production on soybean. Plant Health Care. EPA Reg. No. 71771-3.

Nexicor™ [fluxapyroxad (0.25 lb ai/gal) + pyraclostrobin (1.67 lb ai/gal) + propiconazole (1.04 lb ai/gal)]. For control of specified diseases on sorghum and wheat. BASF. EPA Reg. No. 7969-380.

NipsIt™ SUITE Cereals OF [clothianidin (2.93%) + metalaxyl (0.88%) + metconazole (0.44%)]. A seed treatment fungicide providing systemic seed and seedling protection against certain diseases in cereals including wheat. Valent. EPA Reg. No. 59639-183. 03/2012. [Insecticide 4A + 4 + 3].

Omega® 500F [fluazinam (4.17 lb ai/gal)]. Fungicide for the control of late blight and white mold in potato and white mold of soybean. Syngenta. EPA Reg. No. 71512-1-100. {29}.

Onset® [tebuconazole (3.6 lb ai/gal)]. For control of specified diseases on various crops including corn, soybean, sunflower, and wheat. Winfield Solutions, LLC. EPA Reg. No. 1381-203. 09/03/2009. {3}.

Orius® [tebuconazole (3.6 lb ai/gal)]. A foliar fungicide for control of certain diseases in corn, dry bean, soybean, sunflower, and wheat. Makhteshim Agan of North America, Inc. EPA Reg. No. 66222-117. {3}.

Orondis® 3.6F [oxathiapiprolin (08.83 lb/gal)]. Registered for the management of late blight and pink rot in potato. Syngenta. EPA Reg. No. 100-1572.

PCNB. Active ingredient in Prevail seed treatment. {14}.

Penflufen. An active ingredient in Evergol Energy. {7}.

Penncozeb® 75DF [mancozeb (75%)]. A foliar fungicide used for the control of certain diseases in corn, potato, sugar beet, and wheat. United Phosphorus, Inc. EPA Reg. No. 70506-185. {M3}.

Penncozeb® 80WP [mancozeb (80%)]. A foliar fungicide used for the control of certain diseases in corn, sugar beet, and wheat. United Phosphorus, Inc. EPA Reg. No. 70506-183. {M3}.

Penthiopyrad. An active ingredient in Vertisan {7}.

Permethrin. An active ingredient in Kickstart VP. {3A}.

Picoxystrobin. An active ingredient in Aproach and Aproach Prima. {11}.

Poncho®/VOTiVO® [clothianidin (4.17 lb ai/gal) + *Bacillus firmus* (0.84 lb/gal (8.1%))]. A systemic insecticide and seed treatment for use on corn, sorghum, soybean, and sugar beet for insect control and protection from various nematodes. Bayer. EPA Reg. No. 264-1109.

Preemptor™SC [fluoxastrobin (1.4 lb ai/gal) + flutriafol (1.82 lb ai/gal)]. A foliar fungicide for the control of certain diseases in corn and soybean. FMC Corporation. EPA Reg. No. 66330-409-279. {3 + 11}.

PRESTOP WG® [*Gliocladium catenulatum* J1446 (93%) + other ingredients (7%)]. A biofungicide for control of seed-borne and soil-borne fungal diseases including damping-off, root and stem rot, and wilt caused by *Bipolaris*, *Botrytis*, *Fusarium*, *Mycosphaerella*, *Phytophthora*, *Pythium*, *Rhizoctonia*, *Sclerotinia*, etc. Modes of action: competition, mycoparasitism, fungal cell wall degrading enzymes, and antibiosis. Used on greenhouse or field grown vegetables, ornamentals, cereals, legumes, fruits, and turf. Foliar spray, drench, and mixing with growth substrate. Danstar Ferment Ag/Lallemand Plant Care. EPA Reg. No. 64137-13.

Prevail® [carboxin (15%) + PCNB (15%) + metalaxyl (3.12%)]. Registered for control of damping off caused by *Pythium* and *Rhizoctonia* fungi in barley, oats, edible beans, corn, wheat, and soybeans. Chemtura. EPA Reg. No. 264-1015-400. 2007. {7 + 14 + 4}.

Previcur® Flex [propamocarb hydrochloride (6 lb/gal)]. For control of early blight and late blight of potato. Bayer CropScience. EPA Reg. No. 264-678.

Disease Management Dictionary (continued)

Priaxor® D [fluxapyroxad (1.39 lb ai/gal) + pyraclostrobin (2.78 lb ai/gal) + tetraconazole (1.9 lb ai/gal)]. For disease control and plant health in potato and soybean. BASF. EPA Reg. No. 7969-361. {3 + 7 + 11}.

Priaxor® Xemium® [fluxapyroxad (1.39 lb ai/gal) + pyraclostrobin (2.78 lb ai/gal)]. For use in disease control and plant health in alfalfa, corn, dry bean, potato, soybean, sugar beet, sunflower, and wheat. BASF. EPA Reg. No. 7969-311. 2012. {7 + 11}.

Pristine® [pyraclostrobin (12.8%) + boscalid (25.2%)]. A fungicide for control of specified diseases on alfalfa. BASF. EPA Reg. No. 7969-199. 2015. {7+11}.

Proceed™ Concentrate [prothioconazole (6.88%) tebuconazole (1.38%) + metalaxyl 2.75%]. A seed treatment that aids in control or suppression of seed, seedling, and soil-borne diseases in wheat. Bayer. EPA Reg. No. 264-1102. {3 + 4}.

Proceed™ MD [prothioconazole (0.128 lb/gal) + tebuconazole (0.025 lb/gal) + metalaxyl (0.052 lb/gal)]. Registered for control of smuts, Pythium damping off, root rots, and seedborne Fusarium scab in barley, wheat, and triticale. Bayer CropScience. EPA Reg. No. 264-1072. 09/2009. {3 + 3 + 4}.

Proline® 480 SC [prothioconazole (4.0 lb ai/gal)]. For control of specific diseases in corn, dry bean, millet, soybean, sugar beet, and wheat. Bayer CropScience. EPA Reg. No. 264-825. 2010. {3}.

Propamocarb hydrochloride. An active ingredient in Previcur. {28}.

Propiconazole. An active ingredient in Bumper, Fitness, PropiMax EC, Quilt, Quilt Xcel, Nexicor, and Tilt. {3}.

PropiMax® EC [propiconazole (3.6 lb ai/gal)]. For control of certain diseases in corn, wheat, sorghum, and cereal grains. Dow AgroSciences. EPA Reg. No. 62719-346. 08/14/2008. {3}.

Propulse [fluopyram (1.67 lb ai/gal) + prothioconazole (1.67 lb ai/gal)]. A fungicide for control of diseases in dried beans, peanut and sugar beet. Bayer. EPA Reg. No. 264-1084. {7+3}.

Prosaro® 421 SC [prothioconazole (1.76 lb ai/gal) + tebuconazole (1.76 lb ai/gal)]. For control of specified diseases in wheat and corn. Bayer CropScience. EPA Reg. No. 264-862. 2010. {3 + 3}.

Protector™-L-Allegiance® [thiram (14.29%) + metalaxyl (1.61%)]. Registered to reduce seed rot and seedling blight diseases including *Pythium* and *Rhizoctonia* in soybean. Chemtura. EPA Reg. No. 264-1018-400. 2010. {M3 + 4}.

Prothioconazole. An active ingredient in Evergol Energy, Proline, Proceed Concentrate, Prosaro, Proceed MD, and Stratego YLD. {3}.

Pyraclostrobin. An active ingredient in Acceleron DX-109, Headline AMP, Headline EC, Headline SC, Nexicor, Priaxor, Stamina, and Twinline. {11}.

Primethanil. An active ingredient in Scala. {9}.

Quadris® Flowable [azoxystrobin (2.08 lb ai/gal)]. Broad spectrum fungicide control of plant diseases in alfalfa, corn, dry bean, sorghum, soybean, sunflower, wheat, and potato. Syngenta. EPA Reg. No. 100-1098. 2009. {11}.

Quadris® Opti [azoxystrobin (0.5 lb ai/gal) + chlorothalonil (5.0 lb ai/gal)]. Broad spectrum fungicide for control of plant diseases in potato and dry bean. Syngenta. EPA Reg. No. 100-1171. 2010. {11 + M}.

Quadris Ridomil Gold® SL [azoxystrobin (2.08 lb/gal) + mefenoxam (4 lb/gal)]. A co-ack for broad-spectrum disease control in potatoes. Syngenta. EPA Reg. No. 100-1311.

Quadris Top® [azoxystrobin (1.67 lb ai/gal) + difenoconazole (1.05 lb ai/gal)]. Broad spectrum fungicide for the control of plant diseases in potato and soybean. Syngenta. EPA Reg. No. 100-1313. 2012. {11 + 3}.

Quadris Top® SB [azoxystrobin (1.67 lb ai/gal) + difenoconazole (1.05 lb ai/gal)]. Provides disease control of many leaf spots in soybean. Syngenta. EPA Reg. No. 100-1313. 2010. {11 + 3}.

Quadris Top® SBX [azoxystrobin (1.88 lb ai/gal) + difenoconazole (1.88 lb ai/gal)]. For broad spectrum disease control in soybean. Syngenta. EPA Reg. No. 100-1554. {3 + 11}.

Quadris® Xtra [azoxystrobin (1.67 lb ai/gal) + cyproconazole (0.67 lb ai/gal)]. Broad spectrum fungicide for control of plant diseases in soybean. Syngenta. EPA Reg. No. 100-1225. 2008. {11 + 3}.

Quash [metconazole (50%)]. For control and/or suppression of certain diseases in dry bean, field pea, potato and sunflower. Valent. EPA Reg. No. 59639-147.

Quilt® [propiconazole (1.04 lb ai/gal) + azoxystrobin (0.62 lb ai/gal)]. Broad spectrum fungicide for control of plant diseases in corn, sorghum, soybean, and wheat. Syngenta. EPA Reg. No. 100-1178. 2009. {3 + 11}.

Quilt Xcel® [propiconazole (1.02 lb ai/gal) + azoxystrobin (1.18 lb ai/gal)]. Broad spectrum fungicide for control of plant diseases in corn, sorghum, soybean, and wheat. Syngenta. EPA Reg. No. 100-1324. 2009. {3 + 11}.

Rancona® Crest [ipconazole (0.038 lb ai/gal) + metalaxyl (0.051 lb ai/gal) + imidacloprid (1.28 lb ai/gal)]. Seed protectant for the control of general seed rots and seedling blight of wheat, barley, oat, rye, and triticale. Chemtura. EPA Reg. No. 400-574. {3+4+Insecticide 4A}.

Rancona Pinnacle [ipconazole (0.038 lb ai/gal) + metalaxyl (0.051 lb ai/gal)]. Fungicide seed treatment that protects against a variety of diseases of barley, wheat, oats, rye, and triticale, including Fusarium, Cochliobolus sativus, Pythium, smuts, bunt, leaf stripe, and seed rot fungi such as Aspergillus and Penicillium. Chemtura. EPA Reg. No. 400-566. {3+4}.

Rancona® V RTU FS [carboxin (1.11 lb ai/gal) + metalaxyl (0.11 lb ai/gal) + ipconazole (0.04 lb ai/gal)]. A broad-spectrum, ready to use seed treatment fungicide containing carboxin, metalaxyl and ipconazole for the control of labeled diseases on barley, oats, wheat, soybeans, and dried shelled beans. MacDermid Agricultural Solutions. EPA Reg. No. 400-595. {7+4+3}.

Disease Management Dictionary (continued)

Ranman® 400 SC [cyazofmid (3.33 lb/gal)]. For the control of certain diseases caused by the Oomycete class of fungi in hops and potatoes. Summit Agro USA. EPA Reg. No. 71512-3-88783.

Raxil® 2.6F [tebuconazole (2.6 lb ai/gal)]. A seed treatment that aids in control or suppression of seed, seedling, and soil-borne diseases in corn and wheat. Bayer. EPA Reg. No. 264-964. {3}.

Raxil® MD [tebuconazole (0.039 lb/gal) + metalaxyl (0.051 lb/gal)]. Registered for use on wheat, barley, oats, and triticale for control of certain smuts, root rots, and damping off. Bayer CropScience. EPA Reg. No. 264-967. 9/21/05. {3 + 4}.

Raxil® MD Extra [tebuconazole (0.04 lb/gal) + metalaxyl (0.05 lb/gal) + imazalil (0.09 lb/gal)]. Controls various smuts, root rots, and damping off on wheat, barley, and triticale. Bayer CropScience. EPA Reg. No. 264-976. 9/21/05. {3 + 4 + 3}.

Raxil® MD-W [imidacloprid (1.54%) + tebuconazole (0.46%) + metalaxyl (0.62%)]. Raxil MD product with the addition of an insecticide for control of early season insects on wheat, barley, and triticale. Bayer CropScience. EPA Reg. No. 264-996. 6/22/05. [Insecticide 4A + 3 + 4].

Raxil®-Thiram [tebuconazole (0.055 lb/gal) + thiram (1.84 lb/gal)]. Controls various Septoria, Pythium, Rhizoctonia, and Fusarium seedling diseases in barley, oats, triticale, and wheat. Bayer CropScience. EPA Reg. No. 264-955. 9/21/05. {3 + M3}.

Raxil® XT [tebuconazole (15%) + metalaxyl (20%)]. Controls early season root rots and smuts on wheat, triticale, barley, and oats. Bayer CropScience. EPA Reg. No. 264-966. 9/23/05. {3 + 4}.

Reason® 500 SC [fenamidone (4.13 lb/gal)]. Product used to control early blight, late blight, and black dot in potato. It can be used as a seed-piece treatment or foliar application. Bayer CropScience. EPA Reg. No. 264-695.

Regalia® Rx [*Reynoutria* spp. extract]. A biofungicide that promotes plant growth and induces systemic resistance against some fungi and bacteria in corn and soybean. It can be tank-mixed with leading fungicides at the rate of 10.5 oz/acre. Marrone Bio Innovations.

Reynoutria spp. A biological (plant) active ingredient in Regalia Rx.

Revus® [mandipropamid (2.08 lb/gal)]. For the control of late blight in potato. Syngenta. EPA Reg. No. 100-1254

Revus Top® [mandipropamid (2.0 lb/gal) + difenoconazole (2.08 lb/gal)]. A broad spectrum fungicide for various diseases on potato. Syngenta. EPA Reg. No. 100-1278.

Revytek [mefentrifluconazole (1.11 lb ai/gal) + pyraclostrobin (1.48 lb ai/gal) + fluxapyroxad (0.74 lb ai/gal)]. A fungicide for control of diseases in corn and soybean. BASF. EPA Reg. No. 7969-406. 2019. {3+7+11}.

Ridomil Gold® MZ [mefenoxam (4%) + mancozeb (64%)]. For the control of certain diseases in potato and sugar beets. Syngenta. EPA Reg. No. 100-1269.

Ridomil Gold® Bravo® [mefenoxam (0.33 lb/gal) + chlorothalonil (3.334 lb/gal)]. For the control of early blight, late blight, pink rot and leak in potato. Syngenta. EPA Reg. No. 100-1221.

Rizolex® [tolclofos-methyl (4.17 lb ai/gal)]. A fungicide seed treatment providing seedling protection against rhizoctonia. Valent. 2015. EPA Reg. No. 59639-178.

Rovral® 4 [iprodione (4 lb/gal)]. Product can be used in management of early blight and white mold in potatoes. FMC. EPA Reg. No. 264-482.

SabrEx™ [*Trichoderma* sp. (3.5% w/w)]. Product enhances nutrient use and induce systemic resistance against diseases in cereals including corn, wheat, sorghum, rye and oats. It is a seed treatment inoculant. Advanced Biological Marketing (ABM).

Saltro® [pydiflumetofen (4.17 lb/gal)]. Seed treatment for use in corn, potato, soybean, sorghum, and wheat (small grains). Syngenta. 2019. EPA Reg. No. 100-1648. {7}.

Satori™ [azoxystrobin (2.08 lb ai/gal)]. Broad spectrum fungicide for control of plant diseases in corn, potato, soybean, and wheat. Loveland Products, Inc. EPA Reg. No. 34704-1068. 4/2013. {11}.

Scala® [pyrimethanil (5.0 lb/gal)]. Registered for the control of early blight, botrytis leaf spot and brown spot in potato. Bayer CropScience. EPA Reg. No. 264-788.

Sedaxane. An active ingredient in CruiserMaxx Vibrance Cereals, Vibrance, and Vibrance Extreme. {7}.

Serenade® ASO [*Bacillus subtilis* QST 713 (1.34%) + Other ingredients (98.66%)]. A broad spectrum fungicidal and bactericidal product for the control or suppression of many important plant diseases of cereal grains, hops, and soybean. It is delivered as a foliar spray or soil drench. Bayer. EPA Reg. No. 264-1152. {44}.

Serenade® Opti [*Bacillus subtilis* QST 713 (26.2%) + Other ingredients (73.8%)]. Product can be used in the management of white mold, gray mold, bacterial leafspot, etc in soybean, dry beans and potatoes. It is delivered as a foliar spray or soil drench. Bayer. EPA Reg. No. 264-1160.

Stamina® [pyraclostrobin (1.67 lb/gal)]. Registered for control of various seedling diseases on barley, corn, edible beans, rye, and wheat. BASF. EPA Reg. No. 7969-266. 2010. {11}.

ST-Methyl 540 FS [thiophanate-methyl (4.5 lb/gal)]. Registered for control of various seedling diseases on chickpea, dry beans, potatoes, soybeans and wheat. NUFarm Americas Inc. EPA Reg. No. 55146-127.

Stratego® YLD [prothioconazole (1.05 lb ai/gal) + trifloxystrobin (3.13 lb ai/gal)]. For control of certain diseases and plant health in corn and soybean. Bayer CropScience. EPA Reg. No. 264-1093. 5/28/2010. {3 + 11}.

Streptomyces lydicus. A biological (bacterial) active ingredient in Actinovate AG.

Disease Management Dictionary (continued)

Subtilex® L [*Bacillus subtilis* MBI 600]. Alternate brand name of Integral. A liquid biological fungicide for use in-furrow, as a growing media treatment, or as a pre-plant seed treatment. BASF and Becker Underwood, Inc. EPA Reg. No.

Super Tin® 80 WP [triphenyltin hydroxide (15 oz ai/18.75 oz pack)]. Fungicide for the control of *Cercospora* leaf spot of sugar beet and suppression of beet armyworm. DuPont. EPA Reg. No. 352-689. {30}.

Tebuconazole. An active ingredient in Absolute, Dyna-Shield Foothold, Dyna-Shield Foothold Extra, Dyna-Shield Small Grains, Evito T, Folicur, Monsoon, Muscle, Onset, Orius, Proceed Concentrate, Proceed MD, Prosaro, Raxil 2.6F, Raxil MD, Raxil MD Extra, Raxil MD-W, Raxil-Thiram, Raxil XT, TebuStar, Tebuzol, Toledo, and Topsin XTR2. {3}.

TebuStar® 3.6L [tebuconazole (3.6 lb ai/gal)]. Fungicide for control of specified diseases on corn, soybean, sunflower, and wheat. Albaugh, Inc. EPA Reg. No. 42750-99. {3}.

Tebuzol™ 3.6F [tebuconazole (3.6 lb ai/gal)]. For control of specific diseases in corn, dry bean, soybean, and wheat. United Phosphorus, Inc. EPA Reg. No. 70506-114. 03/04/2009. {3}.

Telone® II [1,3-dichloropropene (9.85 lb ai/gal)]. A multi-purpose liquid fumigant for preplant treatment of soil to control nematodes and certain other soil-borne pathogens and invertebrates affecting crops. Dow AgroSciences. EPA Reg. No. 62719-32. RUP. {Insecticide MoA 1B}.

Telone® C-17 [1,3-dichloropropene (8.6 lb ai/gal) and chloropicrin (1.75 lb ai/gal)]. A multi-purpose liquid fumigant for preplant treatment of soil to control nematodes and certain other soil-borne pathogens and invertebrates affecting crops. Dow AgroSciences. EPA Reg. No. 62719-12. RUP. {Insecticide MoA 1B}.

Telone® C-35 [1,3-dichloropropene (7.10 lb ai/gal) and chloropicrin (3.89 lb ai/gal)]. A multi-purpose liquid fumigant for preplant treatment of soil to control nematodes and certain other soil-borne pathogens and invertebrates affecting crops. Dow AgroSciences. EPA Reg. No. 62719-302. RUP. {Insecticide MoA 1B}.

Temik® 15G, Temik® 15G Lock N Load [aldicarb (15%)]. Soil-applied granules for control of certain insects, mites, and nematodes of sugar beet. EPA Reg. No. 264-330. RUP. {Insecticide MoA 1A}.

Tetraconazole. An active ingredient in Affiance, Domark, and Eminent 125SL. {3}.

Thiabendazole. Active ingredient in Mertect 340-F and LSP. {1}.

Thiamethoxam. An active ingredient in CruiserMaxx, CruiserMaxx Advanced, CruiserMaxx Cereals, CruiserMaxx EZ, CruiserMaxx Plus, CruiserMaxx Vibrance Cereals, and Warden CZ. {Insecticide 4A}.

Thiophanate-methyl. The active ingredient in Topsin M. {1}.

Thiram. Active ingredient in Charter PB, Raxil-Thiram and RTU-Vitavax-Thiram. {M3}.

Tilt® [propiconazole (3.6 lb ai/gal)]. Broad spectrum fungicide control of plant diseases in corn, soybean, sugar beet and wheat. Syngenta. EPA Reg. No. 100-617. 2009. {3}.

Toledo® [tebuconazole (3.6 lb ai/gal)]. For control of specific diseases in corn, soybean, and wheat. Rotam North America, Inc. EPA Reg. No. 83100-183979. 05/05/2009. {3}.

Topguard® [flutriafol (1.04 lb ai/gal)]. For control of various foliar diseases in corn, soybean, sorghum, and sugar beet. FMC. EPA Reg. No. 279-3557. {3}.

Topguard® EQ [flutriafol (1.82 lb ai/gal) + azoxystrobin (2.47 lb ai/gal)]. Fungicide for the control of several diseases of corn, grain sorghum, soybean, wheat, and triticale. FMC. EPA Reg. No. 279-3596. {3+11}.

Topsin® 4.5FL [thiophanate-methyl (45% ai)]. For broad spectrum disease control in dry bean, soybean, and wheat. United Phosphorus, Inc. EPA Reg. No. 73545-13-70506. {1}.

Topsin® M [thiophanate-methyl (70% ai)]. For broad spectrum disease control in various crops including potato and soybean. United Phosphorus, Inc. EPA Reg. No. 73545-11-70506. {1}.

Topsin® M WSB [thiophanate-methyl (70% ai)]. For foliar disease control in soybean. United Phosphorus, Inc. EPA Reg. No. 73545-16-70506. {1}.

Topsin® XTR2 [thiophanate-methyl (3.6 lb ai/gal) + tebuconazole (0.7 lb ai/gal)]. For broad spectrum disease control in dry bean, soybean, and wheat. United Phosphorus, Inc. EPA Reg. No. 73545-19-70506. {1 + 3}.

Trichoderma spp. A biological (fungal) active ingredient in SabrEx.

Trifloxystrobin. An active ingredient in Absolute, Acceleron DX-709, Stratego YLD, Trilex, and Trilex 2000. {11}.

Trilex® [trifloxystrobin (22%)]. Controls *Rhizoctonia* and *Fusarium* seedling diseases in corn, soybean, and edible beans. Bayer CropScience. EPA Reg. No. 264-989. 06/22/2007. {11}.

Trilex® 2000 [trifloxystrobin (0.64 lb/gal) + metalaxyl (0.51 lb/gal)]. Controls *Rhizoctonia*, *Fusarium*, and *Pythium* damping off diseases in corn, soybean, and edible beans. Bayer CropScience. EPA Reg. No. 264-1068. 06/12/2008. {11 + 4}.

Triticonazole. Active ingredient in Charter, Charter PB, and Charter F2. {3}.

Twinline® [pyraclostrobin (1.083 lb ai/gal) + metconazole (0.67 lb ai/gal)]. For use in disease control and plant health in wheat. BASF. EPA Reg. No. 7969-247. 2008. {11+3}.

Trivapro® [benzovindiflupyr (0.25 lb ai/gal) + azoxystrobin (0.92 lb ai/gal) + propiconazole (1.04 lb ai/gal)]. Broad-spectrum, preventative fungicide for the control of many important plant diseases, formulated as a suspension. Syngenta. EPA Reg. No. 100-1613. {3+7+11}.

Trivapro™A [benzovindiflupyr (0.83 lb ai/gal)]. For disease control in corn, soybean, and wheat. Syngenta Crop Protection. EPA Reg. No. 100-1471. {7}.

Trivapro™B [propiconazole (1.02 lb ai/gal) + azoxystrobin (1.18 lb ai/gal)]. Broad spectrum fungicide for control of plant diseases in corn, soybean, and wheat. Syngenta. EPA Reg. No. 100-1324. {3 + 11}.

Disease Management Dictionary (continued)

Ultra Flourish® [mefenoxam (2 lb/gal)]. For the control of certain diseases caused by the Oomycete class of fungi in alfalfa, hops, dry beans, potatoes, soybeans and sugar beets. NUFarm Americas Inc. EPA Reg. No. 55143-73.

UpShot™ Soybean Seed Treatment [thiamethoxam (2.17 lb ai/gal) + mefenoxam (0.33 lb ai/gal) + fludioxonil (0.11 lb ai/gal)]. For protection against damage from certain insects, seed-borne diseases and seedling diseases on soybean. FMC Corporation. EPA Reg. No. 100-1427-279. {Insecticide 4A + 4 + 12}.

Veltyma [mefentrifluconazole (1.67 lb ai/gal) + pyraclostrobin (1.67 lb ai/gal)]. A foliar fungicide for disease management in corn, potato, sorghum, soybean, and sugar beet. BASF. EPA Reg. No. 7969-409. 2019. {3+11}.

Vertisan™ [penthiopyrad (1.67 lb ai/gal)]. For broad spectrum control of foliar and seed-borne fungal diseases in corn, dry bean, potato, sorghum, soybean, sunflower, and wheat. DuPont. EPA Reg. No. 352-836. 02/29/2012. {7}.

Vibrance® [sedaxane (4.3 lb ai/gal)]. Seed treatment providing protection against seed decay and seedling blight and damping off caused by *Rhizoctonia solani* in various crops including corn, dry beans, potato, soybean, and loose smut in wheat. Syngenta. EPA Reg. No. 100-1374. 2014. {7}.

Vibrance® Extreme [sedaxane (0.115 lb ai/gal) + difenoconazole (0.552 lb ai/gal) + mefenoxam (0.138 lb ai/gal)]. Seed treatment providing protection against seed-borne, soil-borne, and early season foliar diseases in wheat. Syngenta. EPA Reg. No. 100-1382. 2012. {7 + 3 + 4}.

Vitavax®-34 [carboxin (34%)]. Registered to control certain smuts and bunts and other seedling diseases on barley, oats, wheat, triticale, corn, and soybeans. Chemtura. EPA Reg. No. 400-107. 2010. {7}.

Vitavax® CT [carboxin (5.7%) + thiram (5.7%)]. Ready-to-use formulation that controls various smuts, bunts, seed decays, and damping off on soybeans, barley, oats, wheat, and triticale. Helena. EPA Reg. No. 400-156-5905. 2002. {7 + M3}.

Warden® CX [thiamethoxam (1.9 lb ai/gal) + mefenoxam (0.57 lb ai/gal) + fludioxonil (0.09 lb ai/gal) + sedaxane (0.09 lb ai/gal)]. Provides protection against damping off and seed-borne rots due to Pythium, Phytophthora, Fusarium, and Rhizoctonia, and early season Phytophthora root rot in soybeans. WinField. EPA Reg. No. 100-1459-1381. {4 + 7 + 12}.

Warden® CZ [thiamethoxam (2.04 lb/gal) + mefenoxam (0.3 lb/gal) + fludioxonil (0.1 lb/gal)]. Seed treatment to protect soybeans from Pythium, Phytophthora, Fusarium, and Rhizoctonia seedling diseases and early season insects. Winfield Solutions, LLC. EPA Reg. No. 100-1283-1381. {Insecticide 4A + 4 + 12}.

Warden® RTA [mefenoxam (2.21%) + fludioxonil (0.72%)]. Registered for control of Pythium, Phytophthora, Fusarium, and Rhizoctonia seedling diseases in soybeans. Winfield Solutions, LLC. EPA Reg. No. 100-1146-1381. 09/2007. {4 + 12}.

Xanthion™ [*Bacillus subtilis* MBI 600]. + pyraclostrobin (2.09 lb ai/gal)]. A biofungicide for soilborne/seedling disease control and plant health used in-furrow corn ((all types), soybean, sunflower, sugar beet). BASF. EPA Reg. No. 7969-368.

Zing!® [zoxamide (0.71 lb/gal) + chlorothalonil (4.19 lb/gal)]. Registered for the management of botrytis vine rot, brown spot, late blight, black dot and early blight in potato. Gowan. EPA Reg. No. 10163-331.

Zolera™ FX [fluoastrobilin (1.67 lb ai/gal) + tetraconazole (1.67 lb ai/gal)]. For control of certain diseases in corn and soybean. Arysta Life Science. EPA Reg. No. 66330-424. {11+3}.