Managing Fusarium head blight in winter wheat

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Fusarium head blight, commonly called scab, is the single most important disease of wheat. Risk of the disease cannot be totally avoided, but knowledge of the disease, and use of improved varieties and appropriately timed fungicides can substantially reduce the risk of financial losses

Fusarium head blight (FHB) can lead to a reduction in wheat yields. However, the greatest financial threat is when infected kernels produce a mycotoxin called deoxynivalenol (DON or vomitoxin) as a byproduct. Symptom of the disease include bleached spikelets. Within these discolored awns, the kernels may be shriveled, lightweight and, sometimes, chalky-white or pink in color. It should be noted, however, that kernels might exhibit little or no visual symptoms of FHB and yet contain the pathogen and a significant DON level.

Weather has the greatest influence on disease development. Damp conditions and moderately warm temperatures at the time of flowering are most advantageous to the pathogen. It is also favored by wet weather several days prior to flowering (encourages spore production and dissemination) and by damp weather during grain fill (favors both disease development and the production of DON). A FHB Risk Assessment Tool (www.wheatscab.psu.edu), based on a FHB forecast model, is available to help assess local risk to the disease.

Varieties can vary significantly in their susceptibility to scab. Plant breeding efforts have led to significant improvements in varietal resistance. In some cases, simply selecting a more FHB resistant variety could potentially reduce a particular field's level of FHB by half. The table on the back page provides susceptibility rating for some commonly grown varieties in Michigan. Scab and DON ratings are also available at Michigan State University's annual variety performance report and in a searchable data base. These sources also include ratings for foliar diseases.

Soft white and soft red wheat, as sub-classes, are generally comparable in their susceptibility to FHB. However, soft white has a disadvantage in that the market is more sensitive to DON levels due to end-use requirements. While market discounts for DON vary, soft white wheat value is often docked when levels exceed 1 ppm, whereas discounts for soft red often begin at 2 ppm.

FHB symptoms include a bleaching of a single floret or entire head

Crop rotations matter, as residues from the previously infected crop can harbor the Fusarium fungus and, thereby, increase the chance for infection. The greatest risk is associated with residue from corn and, to a lesser extent, wheat, barley and some hay crops. Using tillage to completely incorporate the residue from these crops will reduce the amount of inoculum generated within the field, although the risk of Fusarium spores from outside the immediate field remains.

Fungicides such as Caramba, Miravis Ace and Prosaro, often reduce the severity of FHB by 50 to 60 percent and DON levels by 30 to 50 percent, although the actual reductions are highly variable. Conversely, the use of strobilurin fungicides (e.g. Quadris, Headline, and Aproach), when used during heading stages, may lead to elevated DON levels. Using fungicides against FHB offers the additional benefit of boosting yields due to their activity against foliar diseases (e.g. leaf rust and leaf spots).

Flowering stage indicated by anthers protruding from florets.

Successful fungicide applications against FHB depend on the use of:

1) recommended fungicides (see table below). To date, the most effective products are Prosaro, Caramba, Proline and Miravis Ace. Tebuconazole (sold under various product names) is less effective on FHB but, because of lower product cost, might be considered where the risk of FHB is relatively low and yet the threat of foliar diseases remain.

2) proper application timing. For best results, apply fungicides for scab within 3 to 6 days following early flowering (early flower is when 50 percent of the florets on a head exhibit anthers).

Relative susceptibility of winter wheat varieties to Fusarium head scab

Soft white winter		*Soft red winter*					
variety	**rank***	**variety**	**rank***	**variety**	**rank***	**variety**	**rank***
Ambassador	*VS*	Pioneer 25R40	*S*	Branson	MS	MCIA Roane	MS
Skeet Safety	*VS*	Wellman 206	*S*	Red Devil	MS	Pioneer 25R50	MS
Jupiter	*S*	Hopewell	*S*	AgriMax 413	MS	Red Dragon	MR
AC Mountain	*S*	Shirley	*S*	DynaGro 9223	MS	DF 112R	MR
Aubrey	*S*	DynaGro 9243	*S*	Pioneer 25R39	MS	Pioneer 25R25	MR
Pioneer 25W36	*S*	Pioneer 25R47	*S*	DF 105R	MS	Agrimax 415	MR
E6012	*S*	Red Ruby	*S*	Sienna	MS	Steyer Hunker	MR
Venus	*S*	Pioneer 25R62	*S*	Rupp 907	MS	L334	MR
DynaGro 9242W	*MS*	Whale	*S*	Sunburst	MS	Rupp 972	MR
Pioneer 25W43	*MS*	DF 109R	*S*	DynaGro 9171	MS		
Syngenta 901	*MS*	Agrimax 438	*S*	AgriMax 444	MS		
Pioneer 25W31	*MS*	DF 045	*S*	DynaGro 9053	MS		
DynaGro 9353W	*MS*	SC1342	*S*	DynaGro 9042	MS		
		DynaGro 9522	*S*	Wellman 123	MS		

* the relative susceptibility of varieties are ranked as ***VS*** (very susceptible), ***S*** (Susceptible), ***MS*** (moderately susceptible), or ***MR*** (moderately resistant)

3) application adjustments (see Ground Application of Fungicide sheet):
   a. adjust boom height to target the wheat heads (generally 8 to 10 inches above heads);
   b. use dual flat fan nozzles configured both forward and backward, and 30 degrees down from horizontal [a single, forward directed spray may be sufficient at higher ground speeds];
   c. select flat fan nozzles that provide a droplet size between a large fine to small medium (300 to 350 microns); and
   d. calibrate sprayer to deliver 10 to 15 gallons of volume per acre.

Fungicide products for Fusarium head blight and selected leaf diseases on wheat[1]

Active ingredient (FRAC)[3]	Product	Rate/A (fl. oz)	Powdery mildew	Stag. leaf spot	Septoria leaf spot	Stripe rust	Leaf rust	Head scab	Harvest Restriction
metconazole 8.6% (3)	Caramba 0.75 SL	10.0 - 17.0	VG	VG	--	E	E	G	30 days
tebuconazole 38.7% (3)	*various*[2]	4	NL	NL	NL	E	E	F	30 days
pydiflumetofen 13.7% (7) propiconazole 11.4% (3)	Miravis Ace	13.7	G	VG	VG	VG	VG	G	Feekes 10.5.4
prothioconazole 41% (3)	Proline 480 SC	5.0 - 5.7	--	VG	VG	VG	VG	G	30 days
prothioconazole 19% (3) tebuconazole 19% (3)	Prosaro 421 SC	6.5 - 8.2	G	VG	VG	E	E	G	30 days

[1] Efficacy categories: NL=Not labeled; P=Poor; F=Fair; G=Good; VG=Very Good; E=Excellent.
[2] Multiple generic products be labeled, eg: Folicur, Embrace, Monsoon, Muscle, Onset, Orius, Tebucon F, Tebustar, Tebuzol, Tegrol, and Toledo
[3] FRAC code: 3 = demethylation inhibitors; 7 = succinate dehydrogenase inhibitors

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