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Managing Foliar Diseases of Winter Wheat with Fungicides

Treatment Criteria, Profitability and Products

By John E. Watkins, Extension Plant Pathologist

The Diseases

Leaf rust, stripe rust, powdery mildew, tan spot, Septoria leaf blotch and occasionally stem rust comprise the primary foliar diseases of wheat in the central Great Plains. In southeast and south central Nebraska, leaf and stripe rusts, powdery mildew and Septoria leaf blotch are the most common and important foliar diseases. Tan spot predominates in the dryland wheat-fallow-wheat or ecofallow cropping systems found in the west central, southwest and Panhandle areas of Nebraska. The increase in irrigated wheat acreage across the entire state elevates the significance of managing foliar diseases in maximizing yields.

These diseases are most damaging when severity on the upper leaves reaches a high level by mid-June. This causes early loss of these leaves, which shortens the grain filling period and results in reduced yields and lower test weights. Statewide, generally foliar diseases reduce yields about 1 percent, but in the last four years stripe rust has reduced yields on susceptible varieties as much as 30 percent. When May and June temperatures are moderate and precipitation is at or above normal, these diseases, particularly the rusts, pose an even greater threat. Overcast humid weather, as occurred in 2004, promotes the development of powdery mildew; however, if temperatures remain moderate and key rains occur during grain fill, wheat may still produce acceptable yields in the presence of moderate disease pressure.

Treatment Criteria

How likely are you to have significant damage from foliar diseases? Irrigated wheat that is intensively managed is at greatest risk because the moisture necessary for infection is often supplied by the irrigation. The greatest risk for having a tan spot or Septoria leaf blotch problem is when wheat is drilled into or next to standing wheat stubble. Monitoring the rust epidemics in the southern Great Plains and the local powdery mildew and leaf spot development beginning in early May and continuing into late May or early June gives a good indication of the potential for foliar diseases becoming a significant production factor in a field. Use the following criteria in deciding whether to treat:

- **Variety planted:** What is the level of resistance to rust diseases? Varieties that are moderately resistant or resistant to stripe and leaf rusts don't need to be treated with fungicides unless powdery mildew or one of the leaf spot diseases is becoming severe on the lower half of the plant. However, varieties that are moderately susceptible or susceptible to one or both of the rusts need to be watched closely.
- **Stand quality:** In April assess the quality of the stand coming out of dormancy. In order to justify fungicide treatment dryland wheat should have a yield potential of 40-50 bu/ac and irrigated wheat a yield potential of 75-85 bu/ac.
- **Rust epidemics in the southern plains:** If either or both stripe or leaf rust are developing rapidly in Texas and Oklahoma during April or in Kansas during May, the probability is high that Nebraska will have a rust problem.
- **Earliness or lateness of the crop:** If cool weather slows maturity, the window for disease development is extended and the impact on the crop will be greater than if the crop were maturing early.

Table I. The potential net profit of foliar fungicide treatment of wheat based on a $3.00 or $3.50 per bushel selling price at the elevator[1].

Yield in bushels per acre	*Potential loss in:*		*$ loss based on a wheat price of:*		*Net profit ($) at a $15 treatment cost, based on a wheat price of:*		*Net profit ($) at an $18 treatment cost, based on a wheat price of:*	
	%	*bu/ac*	*$3.00*	*$3.50*	*$3.00*	*$3.50*	*$3.00*	*$3.50*
45	5	2.3	6.8	7.90	-8.25	-7.10	-11.25	-10.10
45	10	4.5	13.5	15.75	-1.50	+0.75	-4.50	-2.25
45	20	9.0	27.0	31.50	+12.00	+16.50	+9.00	+13.50
45	30	13.5	40.5	47.25	+25.50	+32.25	+22.50	+29.50
60	5	3.0	9.0	10.50	-6.00	-4.50	-9.00	-7.50
60	10	6.0	18.0	21.00	+3.00	+6.00	0.00	+3.00
60	20	12.0	36.0	42.00	+21.00	+27.00	+18.00	+24.00
60	30	18.0	54.0	63.00	+39.00	+48.00	+36.00	+45.00
75	5	3.8	11.3	13.13	-3.75	-1.70	-6.75	-4.70
75	10	7.5	22.5	26.25	+11.25	+11.25	+4.50	+8.25
75	20	15.0	45.0	52.50	+30.00	+48.70	+31.50	+42.75
75	30	22.5	67.5	78.75	+52.50	+63.50	+49.50	+60.75
90	5	4.5	13.5	16.80	-1.50	+0.75	-4.50	-2.30
90	10	9.0	27.0	31.00	+12.00	+16.50	+9.00	+13.50
90	20	18.0	54.0	63.00	+39.00	+48.00	+36.00	+45.00
90	30	27.0	81.0	94.50	+66.00	+79.50	+63.00	+76.50

[1]The net profit does not reflect the government subsidies for wheat as outlined in the farm bill.

- **Weather conditions:** These diseases need moist conditions, so if the long range forecast for May and June predicts above average rainfall, the disease risk is higher. Dry conditions lessen the threat to dryland wheat but may increase it for irrigated wheat because of more frequent irrigation.
- **Estimated price of wheat:** If wheat is selling for $3.50/bu or above, treatment is more economical than if it is selling below $3.00/bu.

In general, if trace amounts of rust, powdery mildew or leaf spot are present on the flag leaf in the early boot stage of development, and infection below the flag leaf is moderate or moderately severe, the likelihood is high that severe infection of the flag leaf will occur and applying a fungicide should be cost effective.

Profitability of Treatment

Applying a foliar fungicide to wheat does not guarantee higher yields. Consider it equivalent to health or home insurance. You pay a premium for protection that you may or may not need. If you get seriously ill or your house is severely damaged, the premiums paid out were worth the cost, but if you don't file any claims or the claims are small, then you will have paid out more in premiums that you received from claims. This same logic applies to treating wheat. In the event of serious disease pressure, timely application with the right product will protect yields, thus the investment was worth the cost. But if you treat the field and the disease levels never develop beyond light or moderate, the return on your investment will be less and could result in a breakeven or a loss scenario.

The cost of treatment will range from $15 to $18 per acre depending on the product and application method. Many producers growing wheat under irrigation for maximum yield or for seed feel this investment is justified. However, justifying treatment with a dryland cropping system is not as clear cut, and using the above criteria becomes even more critical to decision-making.

Table I illustrates the potential net profit of treating wheat if various yield losses were to occur. In general if potential losses were to exceed 10 percent and potential yields are greater than 45 bu/ac, treatment with a foliar fungicide would be cost effective. The potential net profit illustrated in *Table I* relates to common sale prices of wheat. Farmers also need to consider the crop yield effect on loan deficiency payments

Table II. Fungicides registered for use on wheat to control foliar diseases.[1]

Product[2]	*Target diseases*	*Product rate/acre*	*Application timing*
Headline (BASF)	Leaf rust Stem rust Stripe rust Tan spot Septoria leaf spot Septoria glume blotch Powdery mildew Spot blotch	6.0-9.0 fl oz	Up to Feekes 10.5 (late head emergence) plant stage
Quadris (Syngenta)	Leaf rust Stripe rust Stem rust Septoria leaf blotch Septoria glume blotch Tan spot Powdery mildew	6.2-10.8 fl oz	Feekes 6 (immediately after jointing) to 10.5 (late head emergence)
Quilt (Syngenta)	Leaf rust Stem rust Stripe rust Tan spot Septoria glume blotch Septoria leaf blotch Powdery mildew Spot blotch Helminthosporium leaf blight	7.0-14.0 fl oz	Up to Feekes 9 (ligule of flag leaf just visible)
Stratego (Bayer)	Leaf rust Stripe rust Stem rust Septoria leaf blotch Tan spot Powdery mildew	10.0 oz	Feekes 8 (emerging flag leaf)
Tilt (Syngenta)	Leaf rust Stripe rust Stem rust Septoria leaf spot Septoria glume blotch Tan spot Powdery mildew	4.0 fl oz	Feekes 10.5 (full head emergence)
PropiMax EC (Dow AgroSciences)	Leaf rust Stripe rust Stem rust Septoria leaf spot Septoria glume blotch Tan spot Powdery mildew	4.0 fl oz	Feekes 10.5 (full head emergence)
Manzate 75DF (Griffin L.L.C.)	Leaf rust Septoria glume blotch Septoria leaf spot Tan spot	2.0 lb	Feekes 10 (boot) and again at 10.5 (late head emergence)
Dithane DF F-45 M-45 (Dow AgroSciences)	Leaf rust Septoria glume blotch Septoria leaf spot Tan spot	2.1 lb 1.6 qts 2.0 lb	Feekes 10 (boot) and again at 10.5 (late head emergence)
Penncozeb 80WP 75DF (Elf Atochem)	Leaf rust Septoria glume blotch Septoria leaf spot Tan spot	1.0-2.0 lb	Feekes 10 (boot) and again at 10.5 (late head emergence)

[1]This list is presented for information only and no endorsement is intended for products listed nor criticism meant for products not listed. Consult the product label before buying and using a specific fungicide. Read and follow all label directions and restrictions.
[2]Most of the products listed in *Table II* recommend adding a spreader sticker and must be applied in sufficient water to ensure good coverage.

and crop insurance coverage and the indirect effects on farm program direct and counter-cyclical payments. These factors may make treatment a more favorable option.

Treatment Products and Timing

Fungicides currently registered for leaf disease control on wheat include: Headline (pyraclostrobin), Quadris (azosystrobin), Quilt (azoxystrobin + propiconazole), Stratego (propiconazole + trifloxystrobin), Tilt (propiconazole), PropiMax EC (propiconazole), Manzate 75 DF (mancozeb), Dithane DF, F-45, M-45 (mancozeb) and Penncozeb (mancozeb) *(Table II)*.

File under: PLANT DISEASE
C-21, Field Crops
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