

The Economics of Applying Fungicides to Wheat to Control Leaf Rust

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I. ECONOMIC PRINCIPLE: Maximizing PROFIT in a *Risky Environment*:

A. **Principle:** Continue to apply more of a crop input until the expected marginal benefit from the crop input equals the marginal cost of applying it.

B. The Two (2) Sides of Maximizing Profit:

1. **Maximizing Revenue:** Focus on generating the most revenue possible given cost of production
2. **Minimizing Cost:** Focus on minimizing cost of production given expected revenues
3. *Whether a person inherently leans toward either “Maximizing Revenue” or “Minimizing Costs” will strongly influence whether they apply fungicides to wheat*

C. Attitude Toward Bearing Risk:

1. How **RISK AVERSE** are farm decision makers?
2. The more **RISK AVERSE** a farmer is toward spending money on **CROP INPUTS**, the **LESS** likely they are to be willing to do something like applying **FUNGICIDES** to treat for potential **LEAF RUST YIELD LOSSES** in dryland wheat. (& vice verse)

II. CRITICAL MEASURE OF CROP RISK:

- **Potential Average Yield Losses of 30%** if Leaf Rust is not controlled at **flowering**
 - Range of potential yield losses from Leaf Rust Infections: 15% - 50%
 - Source: K-State Extension Plant Pathology
- **Critical Issue:** How likely is a yield loss of **Plus/Minus 30%** from Leaf Rust in Northwest Kansas in any given year **IF** the Leaf Rust Infection is present?

II. COST OF TREATMENT:

- A. **Industry estimates:** \$18-\$20 /acre to commercially apply a wheat fungicide (product + application)
- A1. K-State Estimates (early 2007): \$20-25 per acre for commercial application
- Note: Lower cost for farmer applied
- A2. **Assume \$20 / acre cost for product and application**

III. KEY QUESTION: WHAT AMOUNT OF YIELD INCREASE is needed to COVER THE COST of the Leaf Rust Fungicide Treatment?

A. Current Cash Forward Contract Price for 2007 Wheat ≈ \$4.65 / bushel

A1. [$\$20 / \text{fungicide cost (applied)}$] \div [$\$4.65 / \text{bu}$] = 4.3 bu. / acre

A2. Result: Need at least 4 bu. /acre benefit from fungicide treatment to be profitable

B. Alternative Scenario: \$2.90 County Wheat Loan Rate (Representative of NW KS)

B1. [$\$20 / \text{fungicide cost (applied)}$] \div [$\$2.90 / \text{bu}$] = 6.9 bu. / acre

B2. Result: Need at least 7 bu. /acre benefit from fungicide treatment to be profitable

IV. COMPARING BREAK EVEN YIELD INCREASES NEEDED TO AVERAGE POTENTIAL of 30 % YIELD LOSSES

(Question#1): How much do wheat yields have to benefit from the fungicide treatment to cover the cost of the treatment?

Wheat Yield Scenarios	“High” Wheat \$ (\$4.65 / bu)	Loan Rate \$ (\$2.90 / bu)
20 Bu / Acre	20% Yield \uparrow Needed (4 bu / ac)	35% Yield \uparrow Needed (7 bu / ac)
30 Bu / Acre	13% Yield \uparrow Needed (4 bu / ac)	23% Yield \uparrow Needed (7 bu / ac)
40 Bu / Acre	10% Yield \uparrow Needed (4 bu / ac)	18% Yield \uparrow Needed (7 bu / ac)

(Question #2) How these minimum required % yield increases to cover cost compare to the potential 30% yield losses from the leaf rust disease?

- At \$4.65 / bu. New Crop 2007 Wheat price, potential 30% losses are markedly greater than the minimum amount of benefit needed to make the treatment profitable [30% Potential Loss > Cost of Treatment (bushels)]*
- At \$2.90 / bu County Wheat Loan Rate (2007), potential 30% losses are markedly greater than the minimum amount of benefit needed to make the treatment profitable at 40 bu / acre yields, but closer to breakeven for the 30 and 20 bu. / per acre yields.*

V. SUMMARY

- Yield increase needed to Cover \$20 /acre Treatment Cost...**
 - At 2007 New Crop Forward Contract \$4.65 / bu – 4 bu / acre
 - At 2007 Wheat Loan Rate – 7 bu / acre
- With Potential 30% Yield Losses from Leaf Rust, Is it profitable to Treat?**
 - At \$4.65 /bushel wheat, likely yes at 40 bu/acre (even 30 & 20 bu)
 - At wheat \$Loan Rate, likely yes at 40 bu/acre, but questionable at 30, 20 bu /acre