



# Role of Fenamidone in the Management of potato early blight-*Alternaria solani*

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# Early Blight: Cause and Effect

- Caused by *Alternaria solani*; brown spot caused by *A. alternata* but a weaker parasite
- Early blight is the most serious and economically damaging foliar disease in the Midwestern USA
- *A. solani* is endemic, and the disease is chronic
- Most commercially acceptable cultivars vary in susceptibility; from susceptible to very susceptible
- Tuber infections can be important in some cultivars
- Senescing plants, low nitrogen or plants weakened by other diseases are extremely susceptible











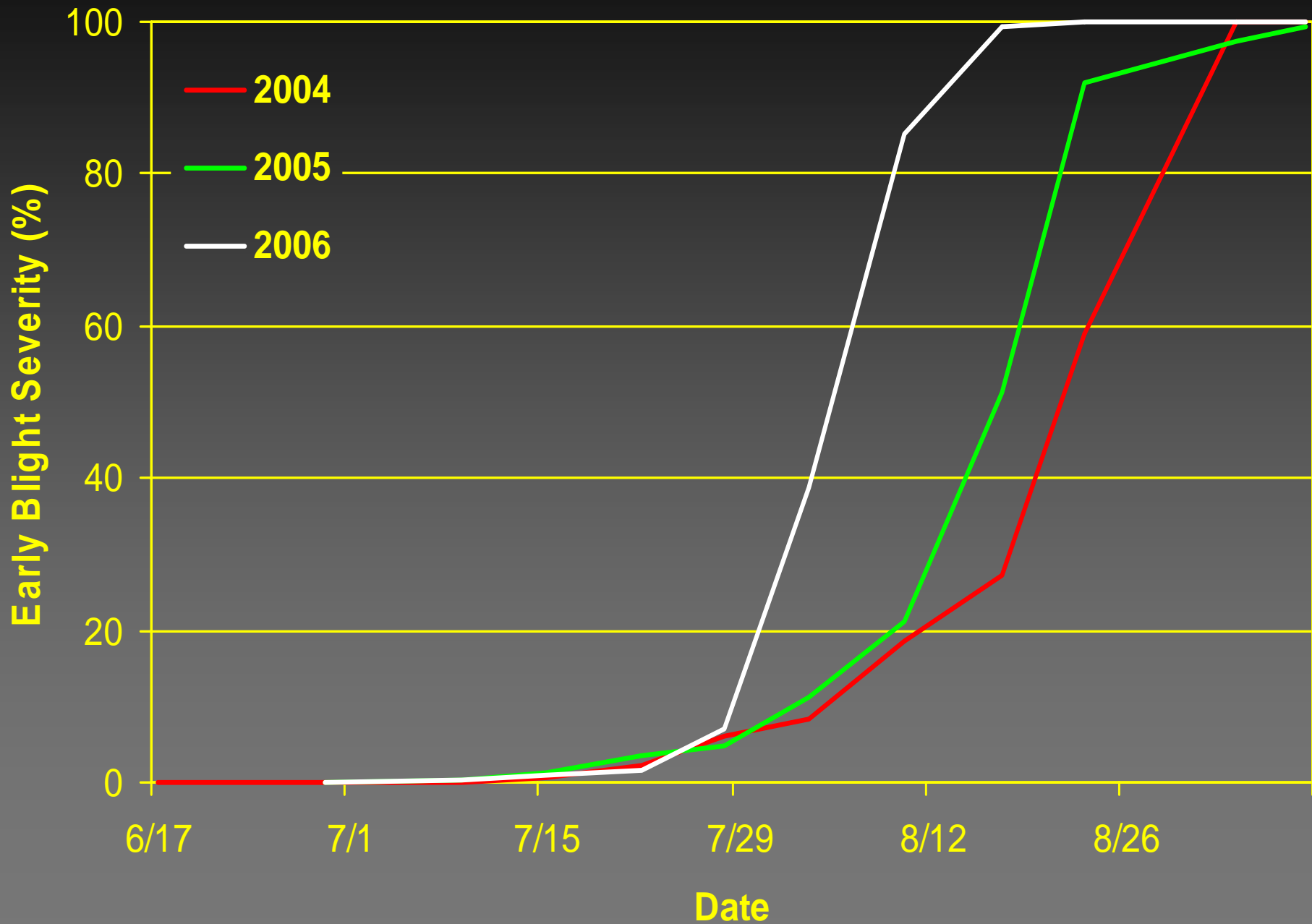




# Early Blight: Factors Affecting Disease Development

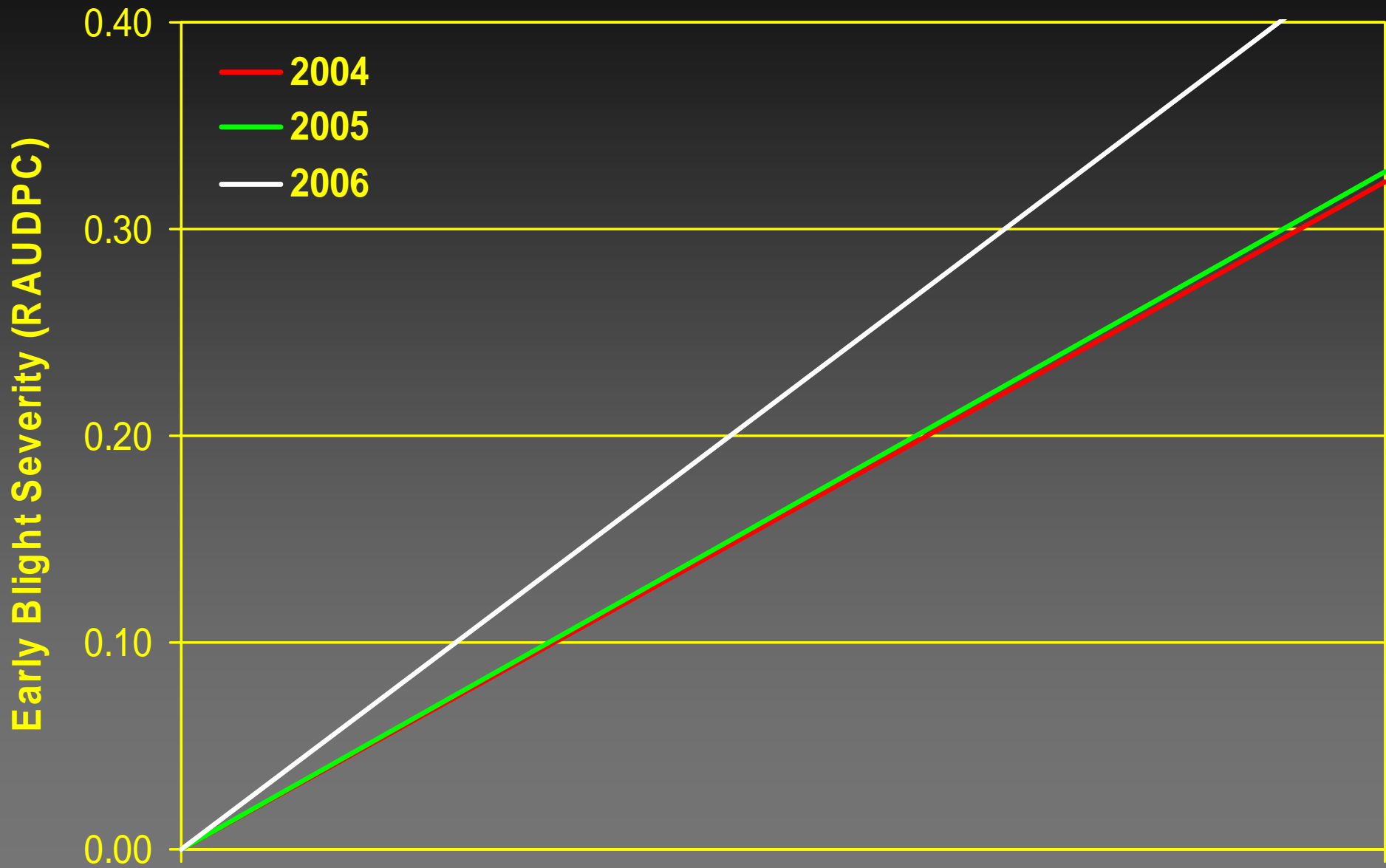
- Spores carried by wind, highest numbers near source, previous potato crop or other host (*S. sarrachoides*)
- Alternating wet/dry periods favor spore formation and disease development; provided by dew and/or irrigation
- Irrigated potato soils are light-textured, sandy, low in organic matter and very susceptible to N leaching
- Environmental conditions in Midwestern USA ideal for development of early blight epidemics
- Early blight lesions in top ½ of canopy denotes high crop susceptibility

# Early Blight Disease Progress in Non-Treated Plots





# Early Blight Disease Progress in Non-Treated Plots

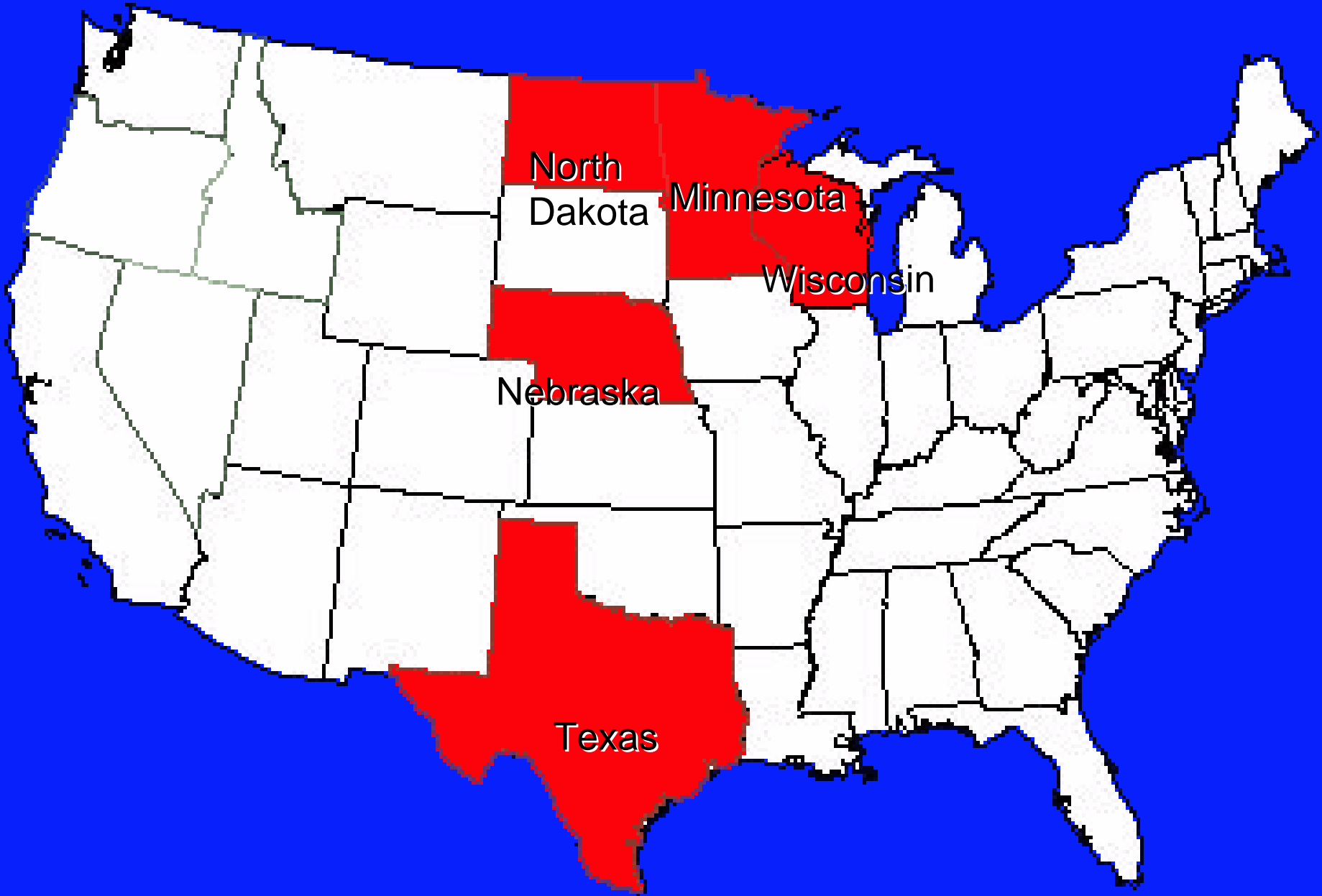


# Sensitivity of *A. solani* to Qols

## History:

- Azoxystrobin granted EPA registration in 1999
- Excellent disease control in 1999
- Fields with poor early blight control observed in 2000 in NE
- Fields sampled in ND, MN, NE, and TX in 2001 - widespread reduced sensitivity





North  
Dakota

Dakota

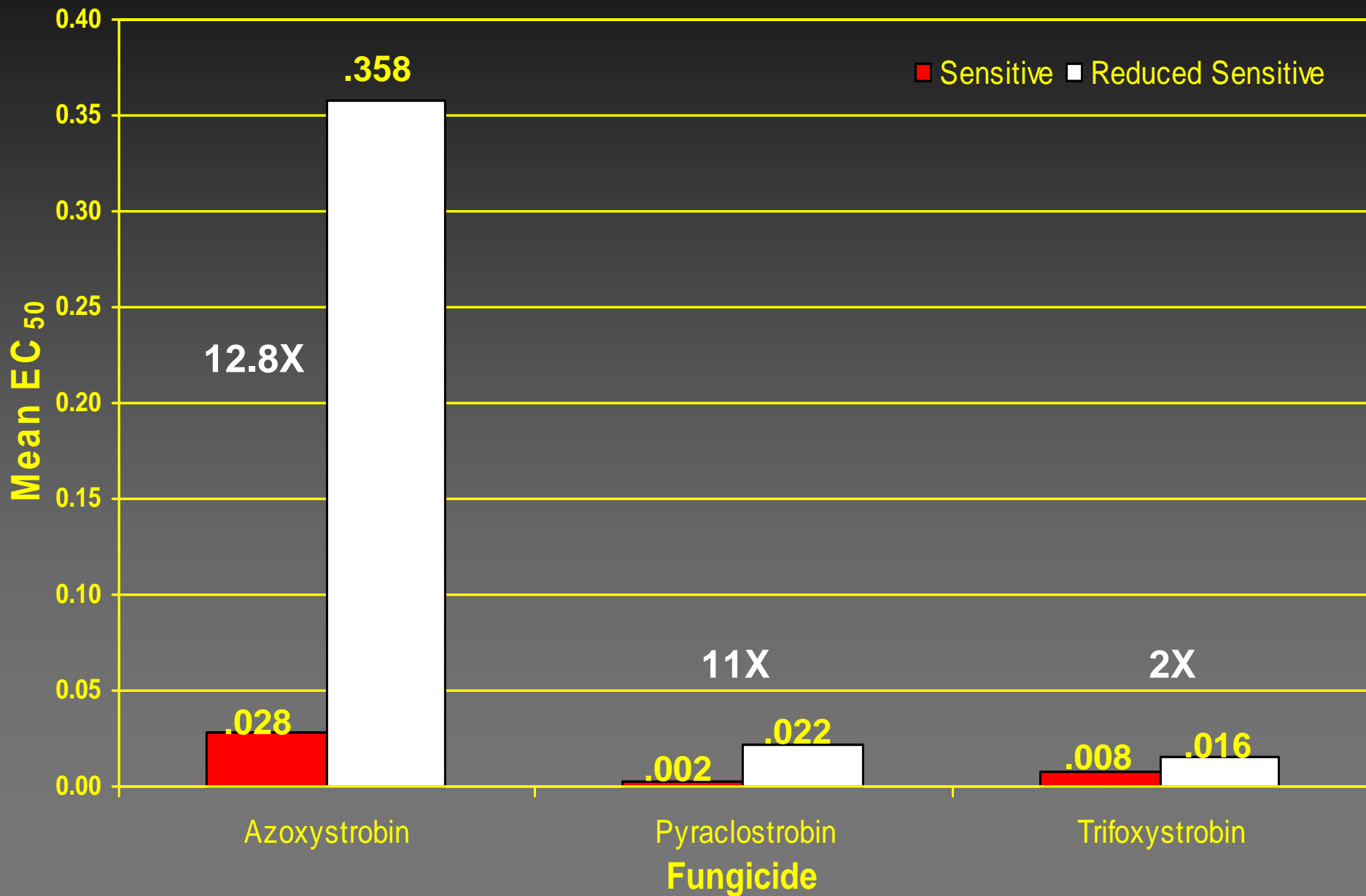
Minnesota

Wisconsin

Nebraska

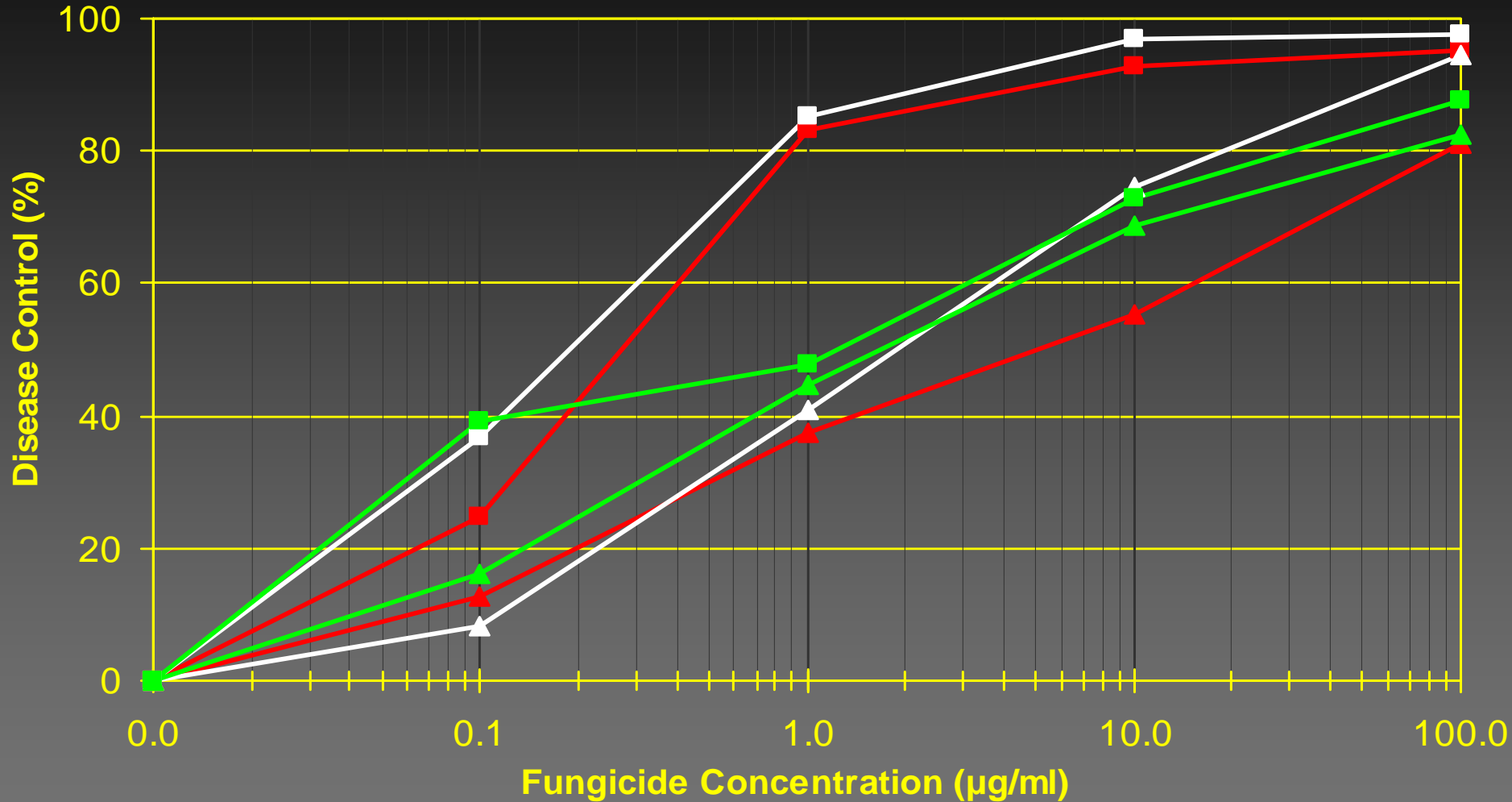
Texas

# Sensitivity of Baseline and 2001 *A. solani* Isolates to Strobilurin Chemistries





# In vivo % Disease Control Among Sensitive and Reduced Sensitive Populations of *A. solani*



■ Azoxystrobin Sensitive

▲ Azoxystrobin Reduced Sensitive

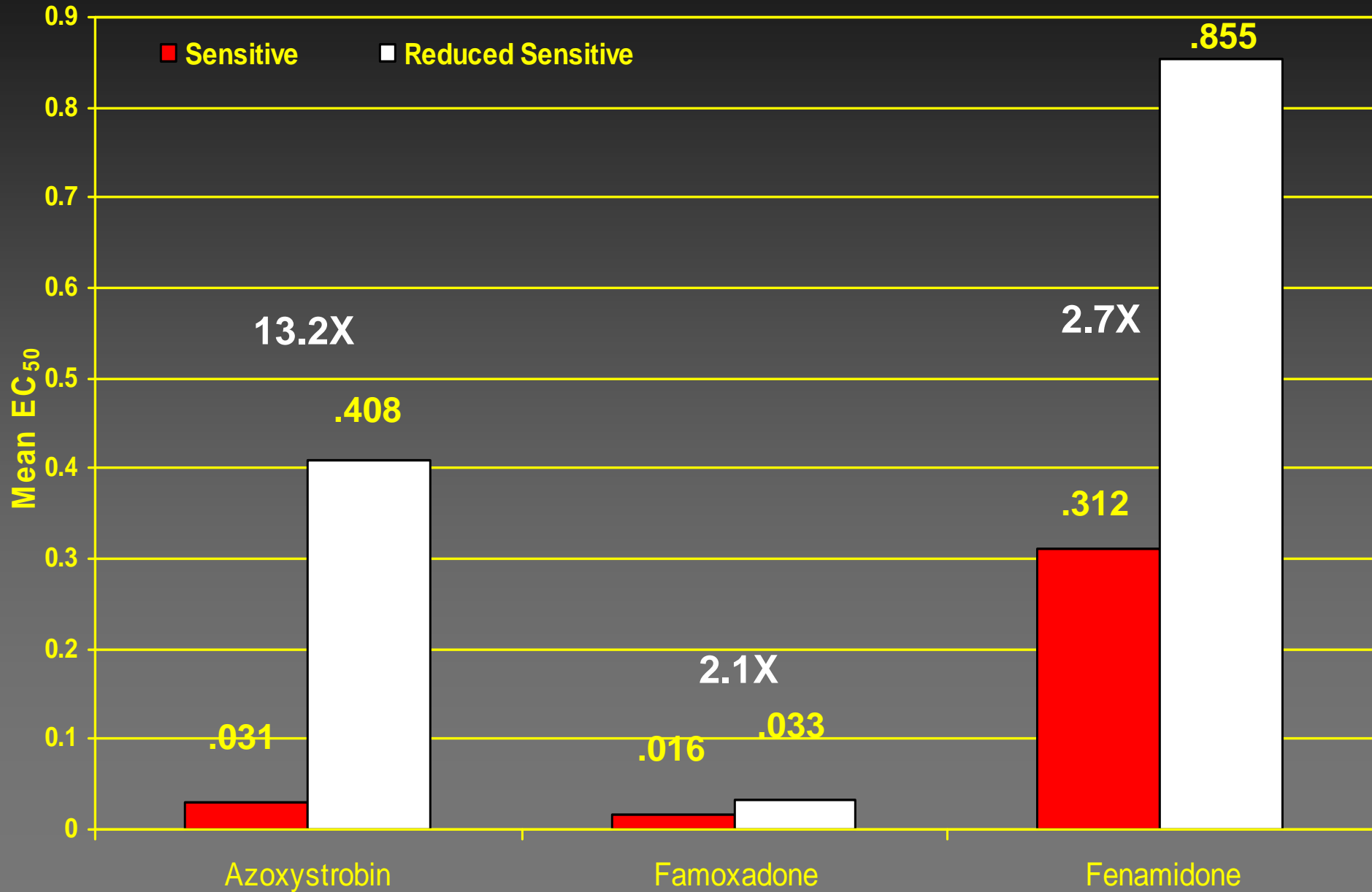
■ Pyraclostrobin Sensitive

▲ Pyraclostrobin Reduced Sensitive

■ Trifloxystrobin Sensitive

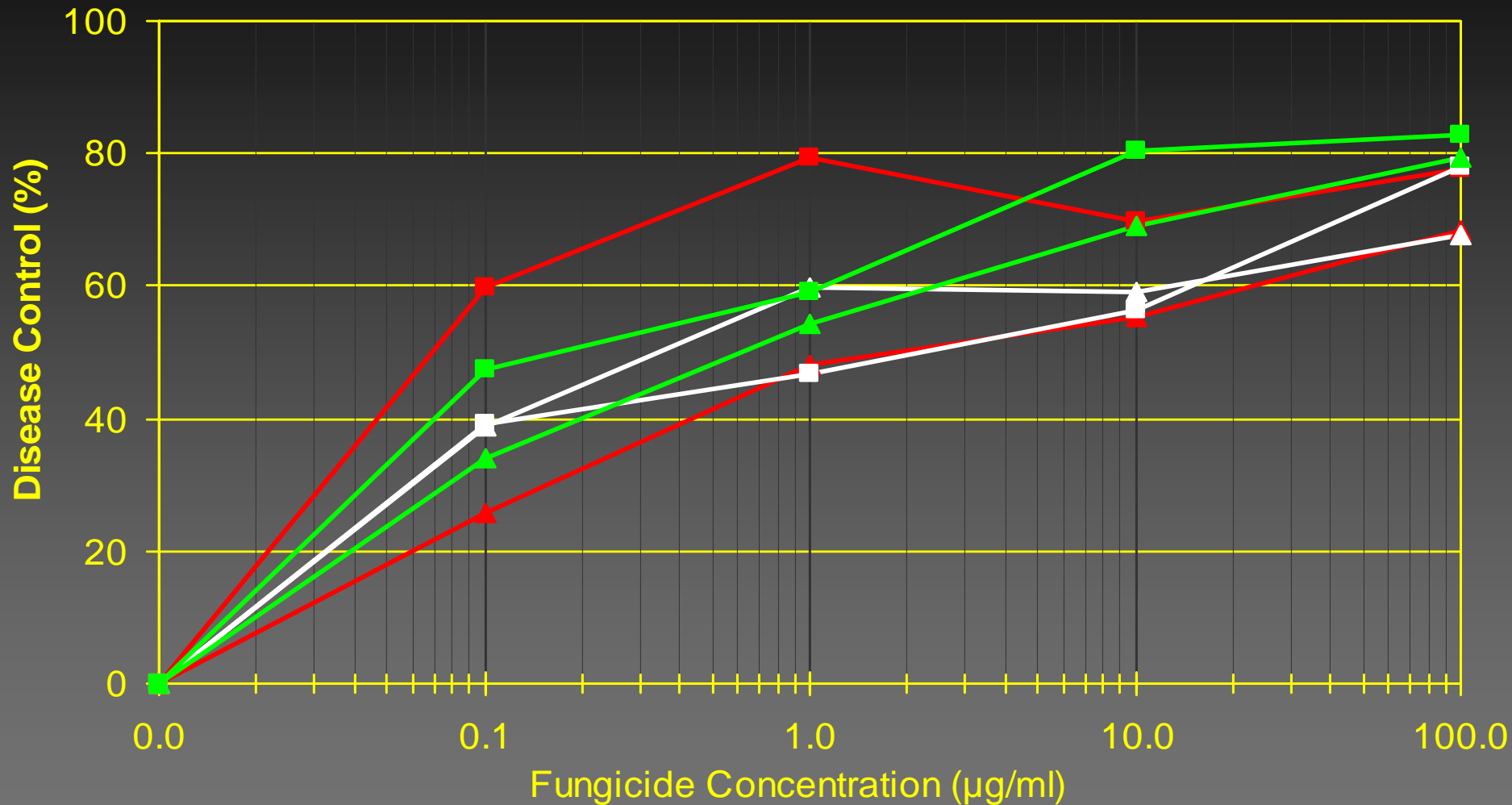
▲ Trifloxystrobin Reduced Sensitive

# Sensitivity of Baseline and 2001 *A. solani* Isolates to QoI Chemistries





# In vivo % Disease Control Among Sensitive and Reduced Sensitive Populations of *A. solani*



■ Azoxystrobin Sensitive

▲ Azoxystrobin Reduced Sensitive

■ Famoxadone Sensitive

▲ Famoxadone Reduced Sensitive

■ Fenamidone Sensitive

▲ Fenamidone Reduced Sensitive

# Overall Conclusions – In vitro / In vivo:

- F129L mutation affects azoxystrobin and pyraclostrobin more so than other QoI fungicides.
- The F129L mutation in *A. solani*: appears to reduce disease control of azoxystrobin and pyraclostrobin by ~ 50%.
- Shifts in sensitivity to QoI fungicides in the range of 2-3X do not appear to affect disease control.

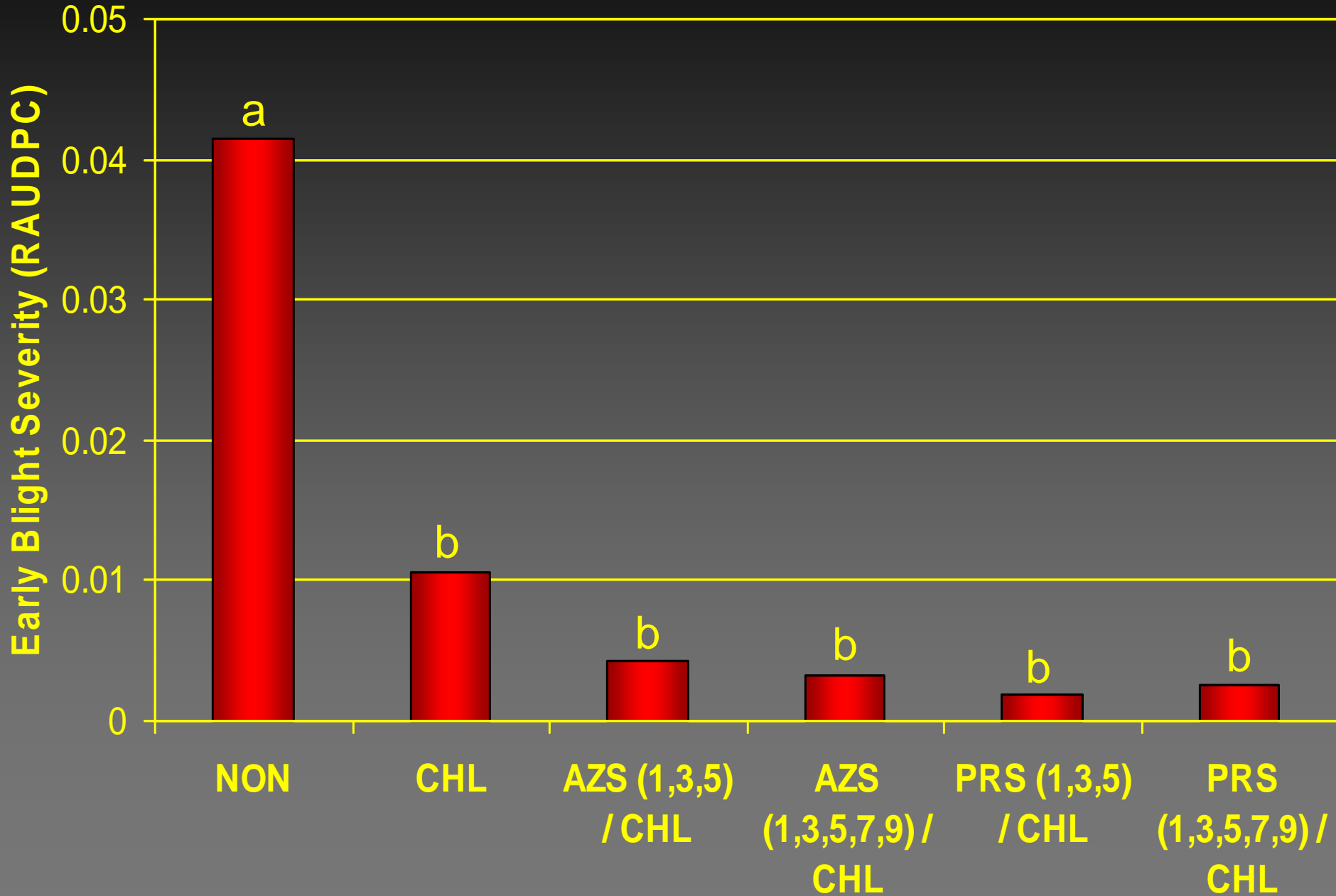
# Role of Fenamidone on Control of Potato Early Blight



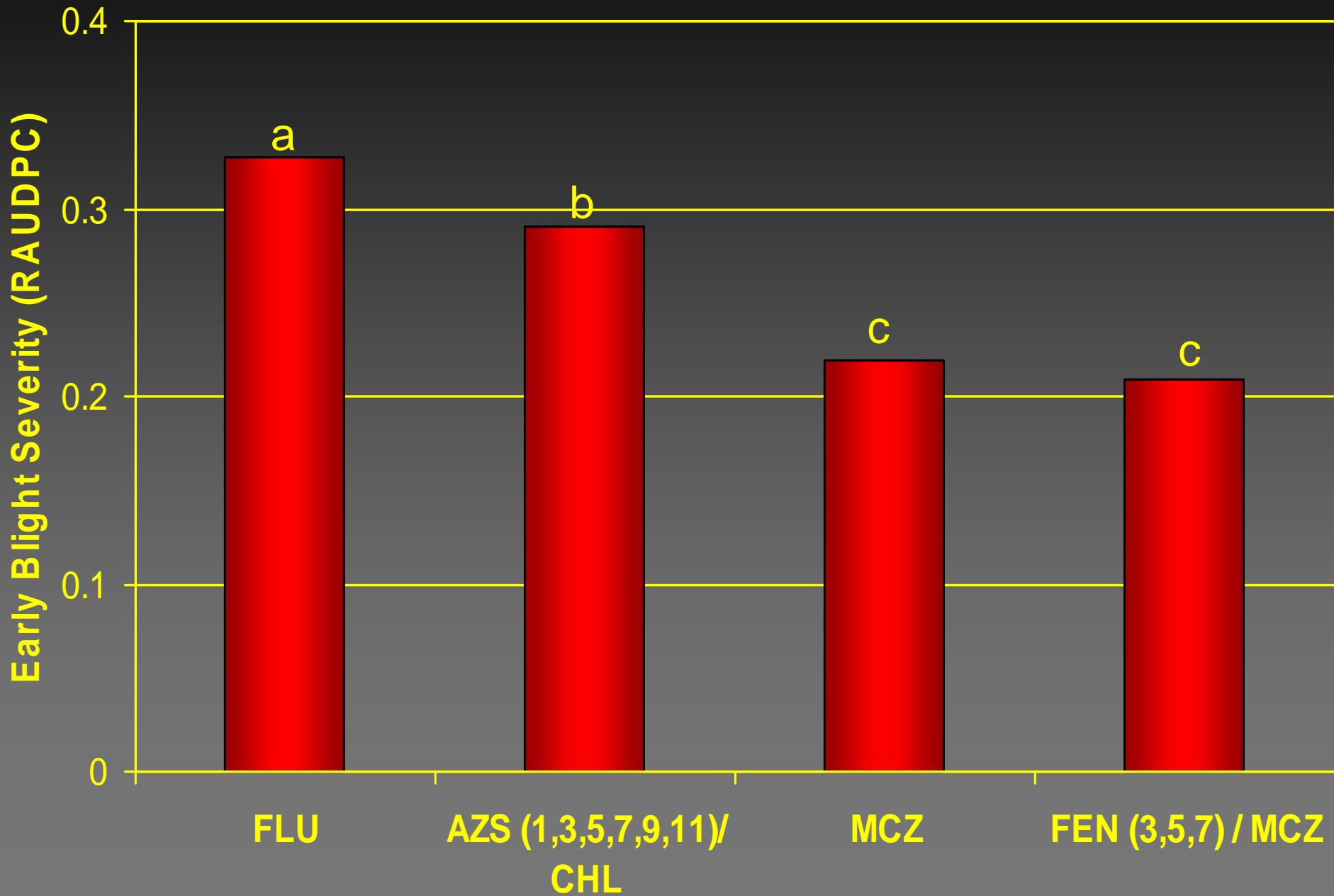
# Field Evaluation for Control of EB

- Typical fungicide program for EB uses 10 fungicide applications per season
- Trials conducted in 2000 performed with wild type *A. solani*; F129L mutation dominated in population after 2001
- QoI fungicides applied five times during season, alternated with chlorothalonil
- Chlorothalonil and/or mancozeb used as standard protectant fungicides for comparison in addition to untreated control
- Weekly disease ratings converted to AUDPC/RAUDPC

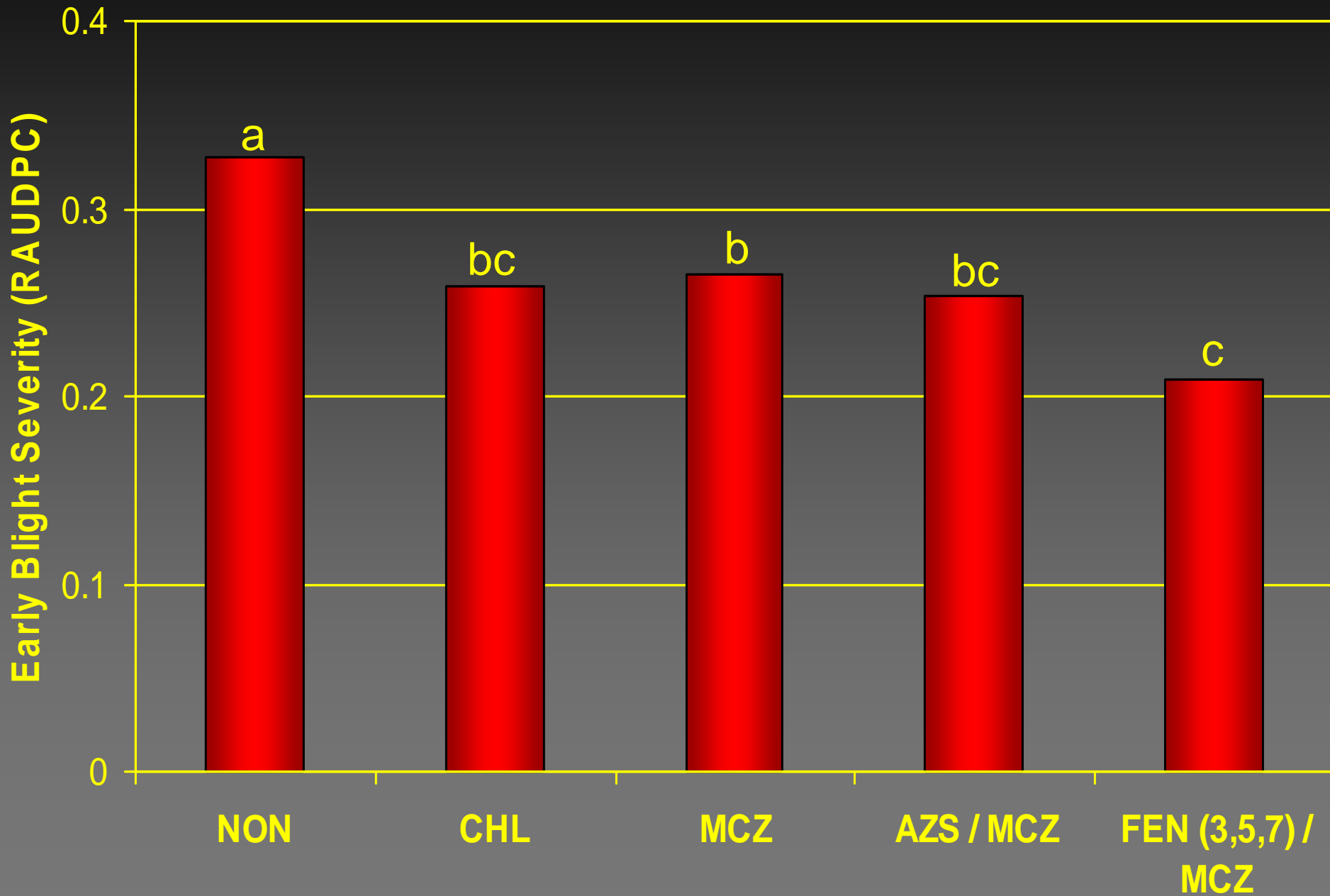
# Early Blight Severity in Central ND, 2001



# Early Blight Severity in Central MN, 2004

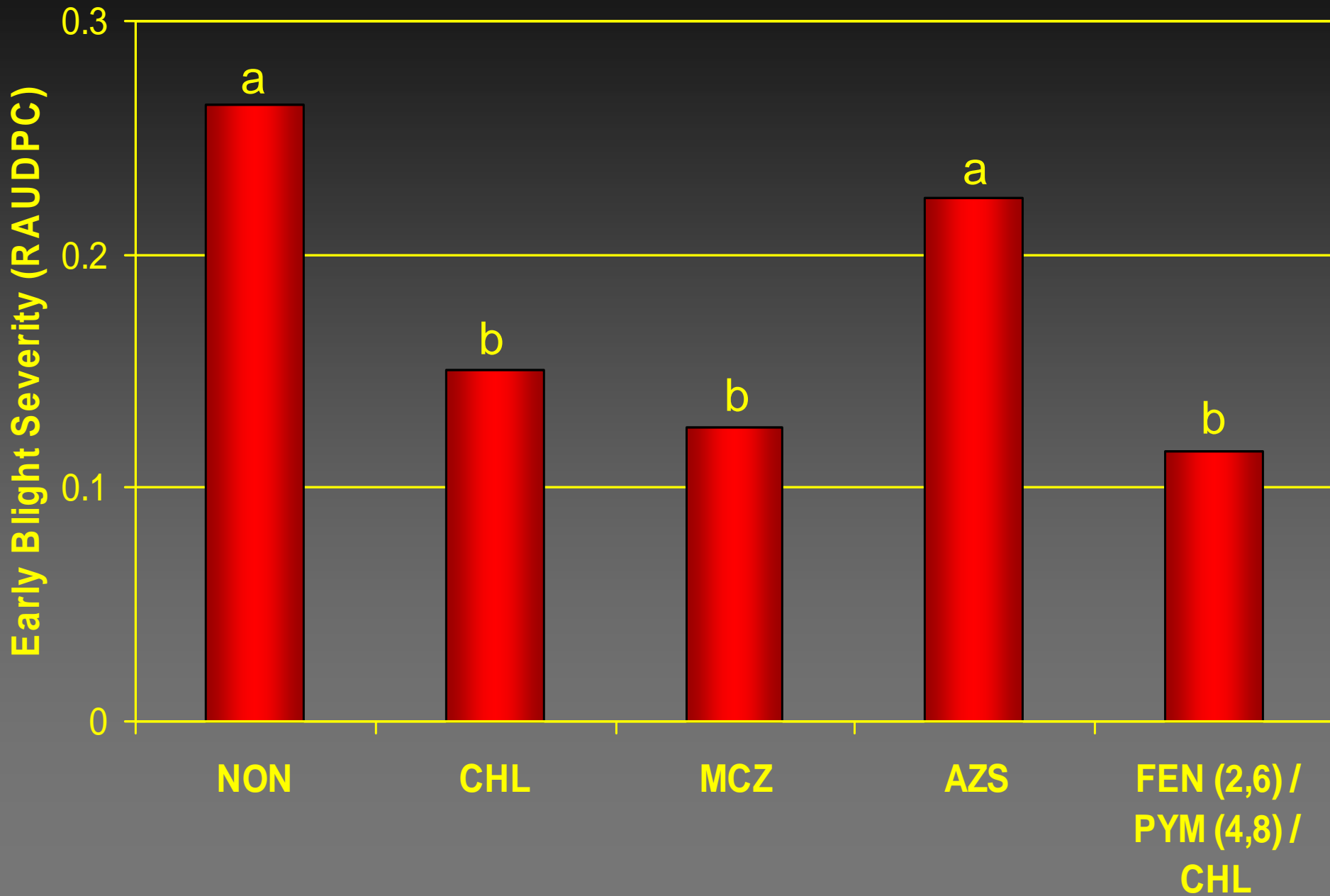


# Early Blight Severity in Central MN, 2005





# Early Blight Severity in Central MN, 2006



# Summary / Conclusions

- The F129L mutation is widespread in *A. solani* in Midwestern U.S.
- The F129L affects azoxystrobin and pyraclostrobin more so than other QoI fungicides
- Loss of disease control as a result of F129L makes azoxystrobin/pyraclostrobin equivalent to mancozeb and chlorothalonil
- Fenamidone has good efficacy against early blight, frequently better than azoxystrobin
- Fenamidone activity against late blight and early blight makes it an attractive option for control of both diseases