
2023
NATIONAL FHB FORUM
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2023 NUTS & BOLTS SESSION

Welcome!

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Fusarium graminearum Isolates

Develop a collection of the isolates

- Collect infected heads
- Surface sterilizing the infected kernels
- Medias: KOMADA, Potato Dextrose Agar and Carnation Leaf Agar
- Storage of single spore isolates on soil or silica gel

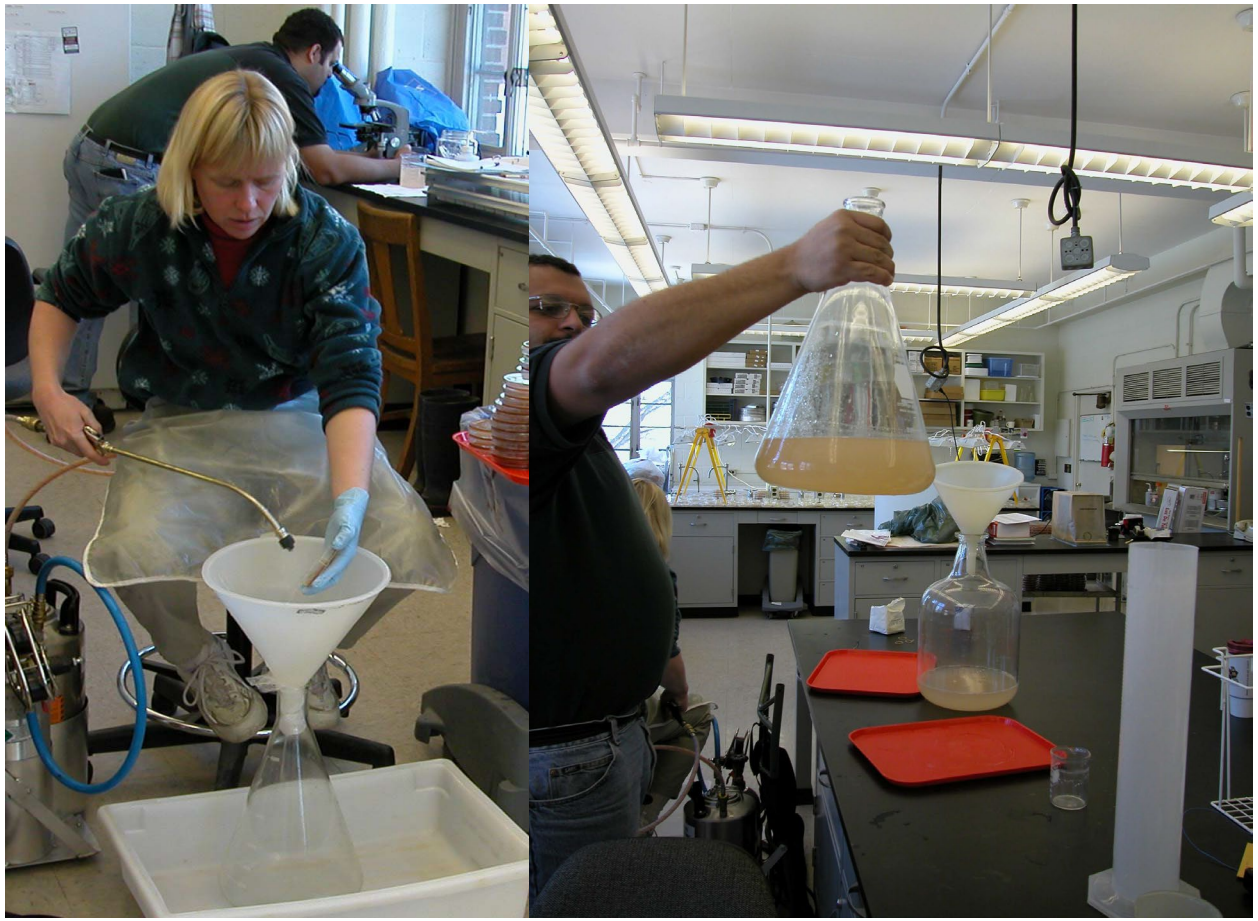
Inoculum Production

Macroconidial Suspension Inoculum

- Select the isolates(s)
- Grow isolates on Mung Bean Agar
- Wash the plates
- Count the spore concentration using a hemocytometer

Inoculum Production

- Dilute inoculum to get desired spore concentration
- Inoculum can be stored in the freezer in 1 L plastic bottles for future use or in small vials for greenhouse inoculation



Inoculum Production

Colonized Corn Inoculum

- Grow the isolates on Mung Bean Agar
- Mix 1 kg of corn with 1 L of water in a pan
- Autoclave the pan one hour, 2 times
- Inoculate the sterile grain media with 4-5 plates

of *Fusarium graminearum* cultures using sterile technique

- Check the pans after 2-3 weeks of incubation
- Use immediately or store the pans in a cold room

until used for inoculation or you can dry the colonized grain down

Inoculation Methods

1- Spray Inoculation

- Head emergence/anthesis
- apply 1 -2 applications
- Use 50,000 to 200,000 spore/ml

Inoculation Methods

2- Applying infected corn kernels

- Apply infected corn kernels from tillering through boot
- Inoculation Rate varies by location, dependent on environmental variables.
- You will likely need to adjust the inoculation rate according to your experience over time .
- Dry inoculum will take longer to produce mature spores compared to fresh inoculum.

Mist Irrigation System

- **Misting design**
  Pumps, pipes, nozzles
- **Misting schedule**
  Frequency, duration

Stay vigilant!

FHB Rating

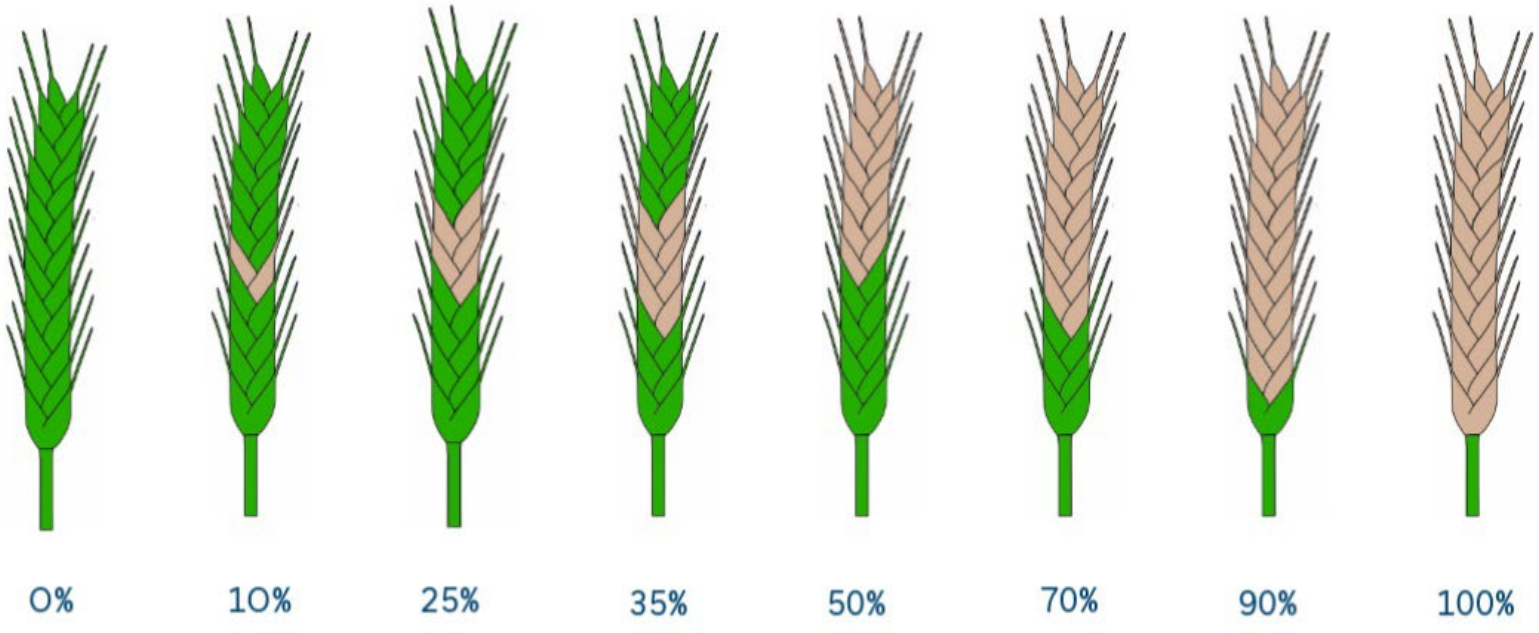
- **Types of resistance**

Type I: Resistance to initial infection
Type II: Resistance to disease spread within a spike

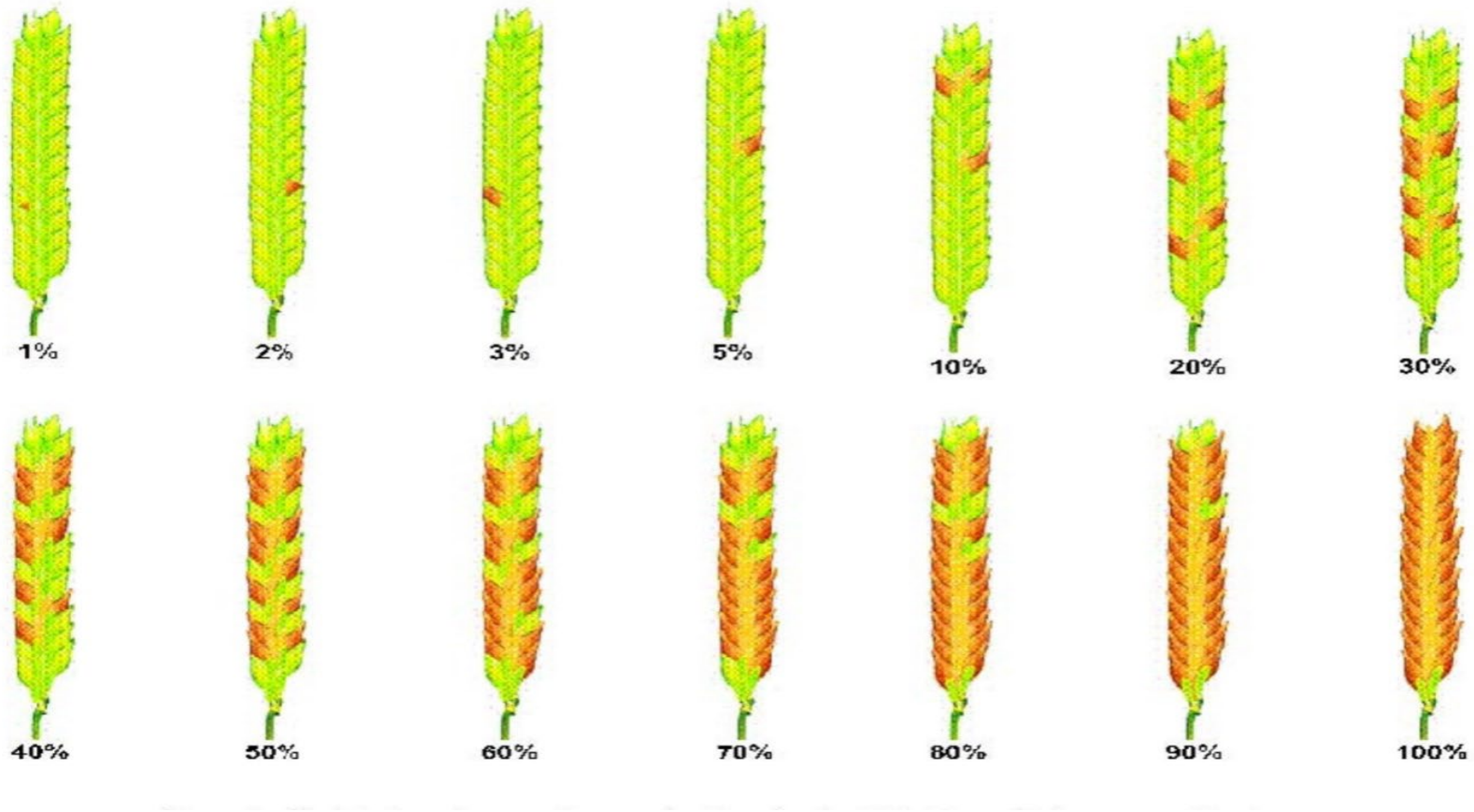
Incidence/ Severity/ FHB Index

- **Incidence -** proportion of diseased spikes (number of spikes with nonzero severity divided by the total number of spikes sampled).
- **Severity -** average proportion of diseased spikelets per spike on ***diseased spikes***.
- **FHB Index -** (Scale of 0 to 100 or 0 to 9) - average proportion of diseased spikelets per spike (sum of the proportion of diseased spikelets per spike divided by the total number of spikes sampled, ***including those with zero severity*****).**

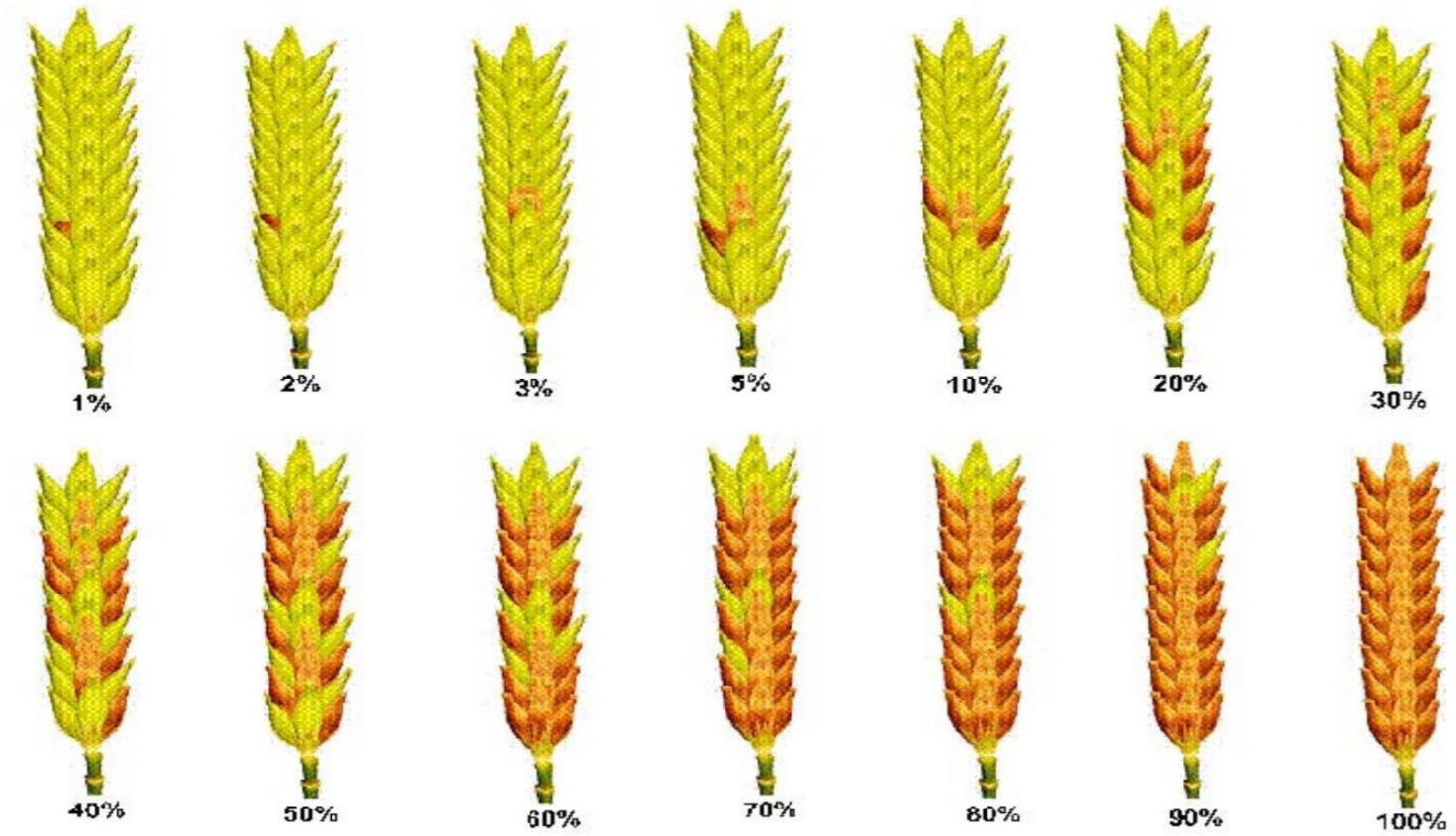
Rating FHB- Severity (%) Wheat



Rating FHB- Severity (%)
2-row Barley



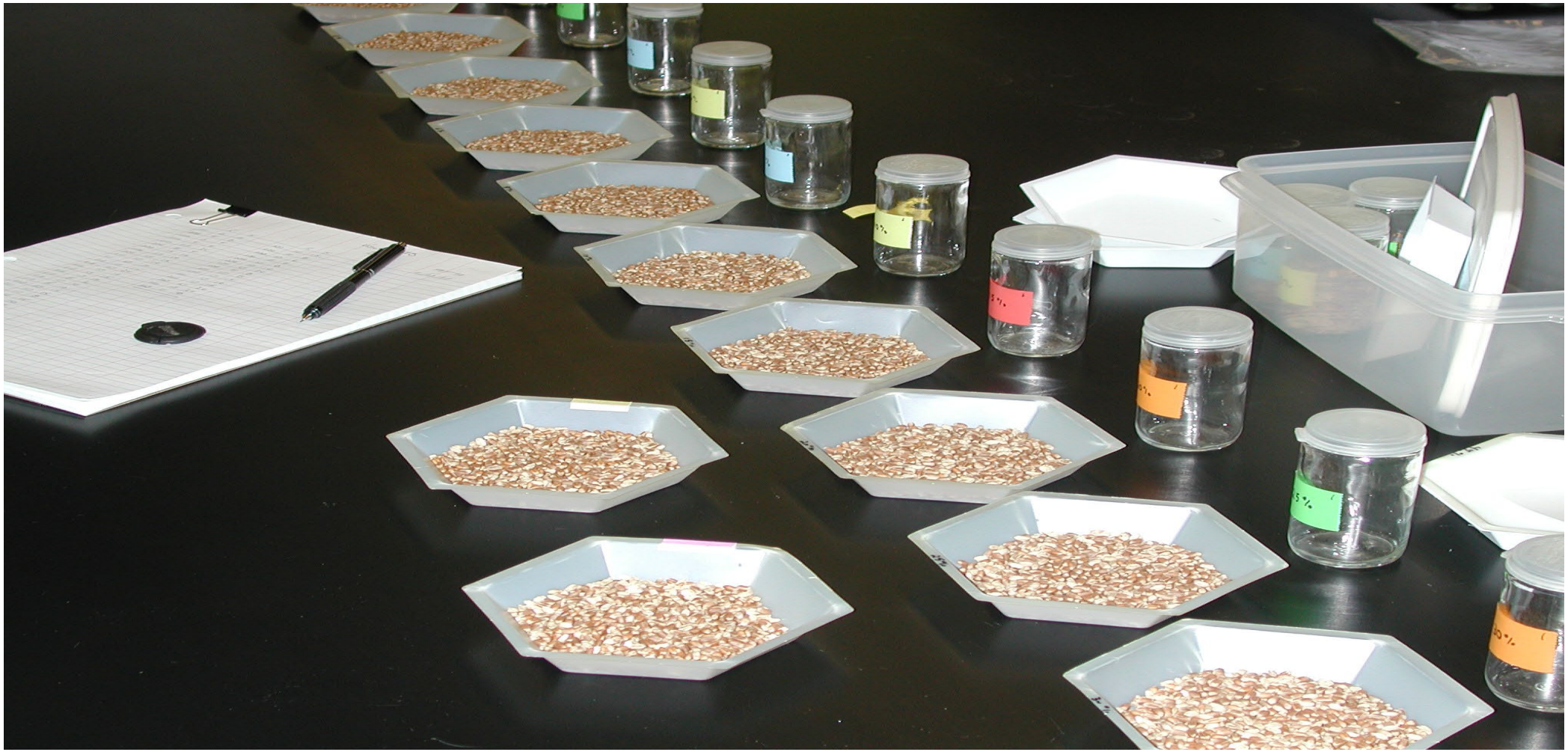
Rating FHB- Severity (%)
6-row Barley



VSK Assessment

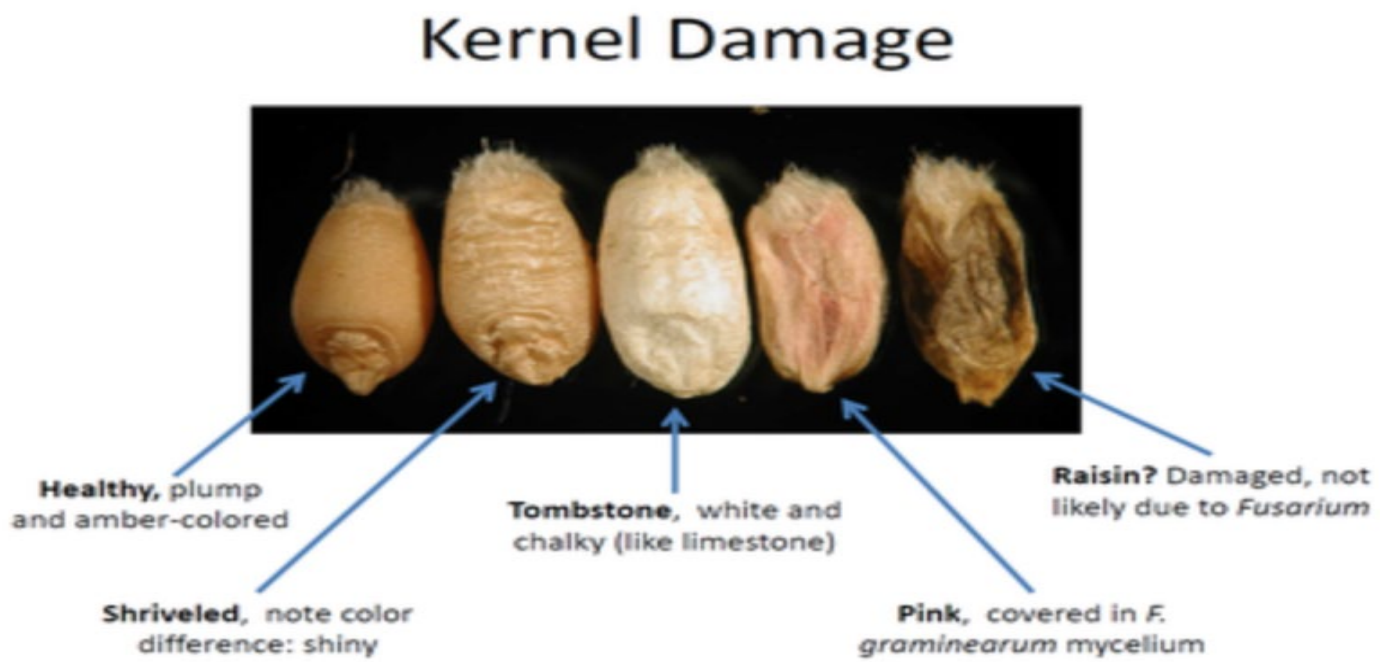
- Wait one week after harvest before scoring (allows grain to dry)
- Mix the grain before subsampling as damaged kernels tend to rise to the top
- Scoop subsample into a petri dish or weighing boat and fill till top is level
- 2 or 3 people should do the assessment and compare the results

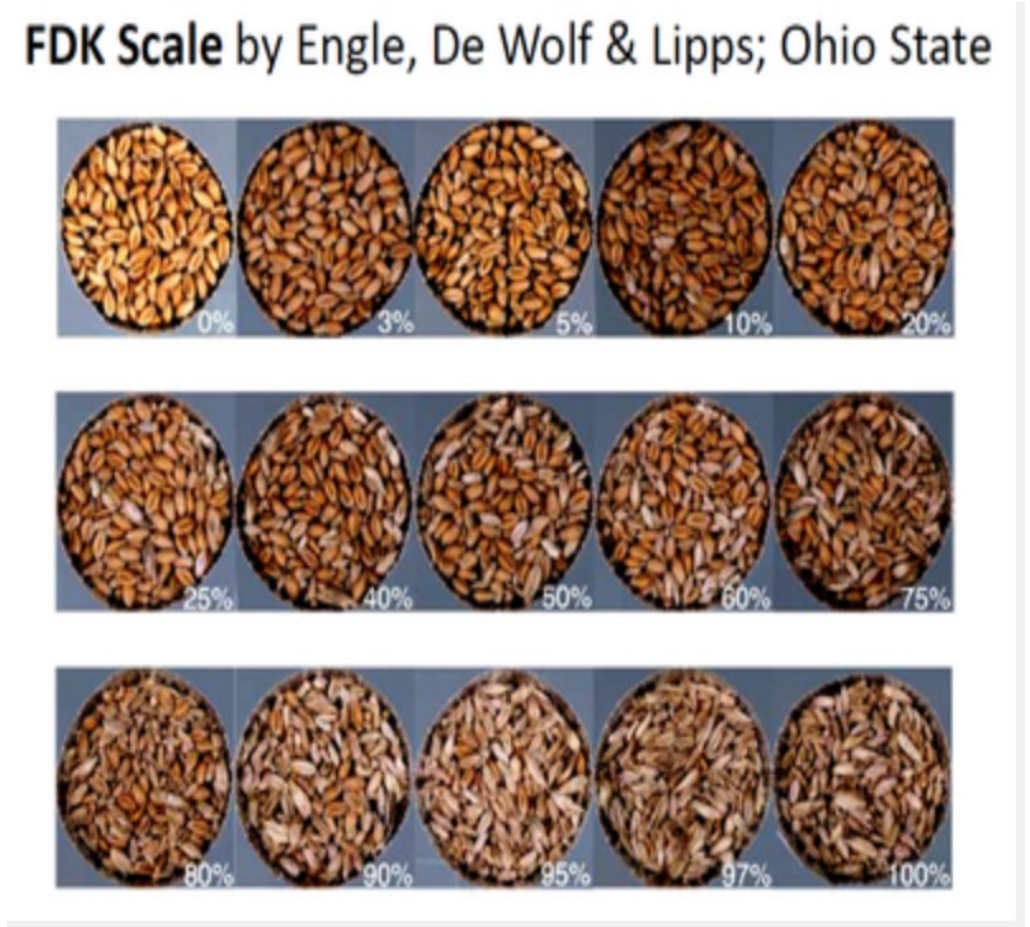
VSK Assessment



Scoring FDK

(Fusarium Damaged Kernels)





Greenhouse inoculation of *Fusarium graminearum*

- Point Inoculation
- Spray Inoculation

Toxin levels generally higher in the greenhouse than field.

Harvesting Samples

- Harvest 1-2 feet of row from center of plot
- Thresh harvested heads on belt thresher
- Clean the sample using a seed cleaner
- Obtain a 100g sample using a divider
- Send samples to a testing lab

Cleaning Samples

Belt Thresher

Kornservice seed cleaner

Toxin Analysis

- Obtain ~ 100 g of representative sample using a grain divider
- Clean the sample
- Grind the samples (10 to 100 grams)
- Send the samples to a testing lab for deoxynivalenol (don) measurement

Thank you!

Questions?

For follow-up questions, please contact:

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U.S. Wheat & Barley
Scab Initiative