Nuts and Bolts Breakout Session

2022 National FHB Forum

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Welcome

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Fusarium graminearum isolates and FHB inoculum production

- Develop a collection of isolates: hosts, years, locations
  - Collect and isolate
    - Komada agar – a selective media used for isolating *fusarium graminearum* from collected samples.
    - Potato dextrose agar – used for transferring single spores.
  - Storage of isolates
    - Carnation Leaf - used for verifying *fusarium graminearum*. Transfer from CLA to silica or soil for long-term storage
    - Water Agar - Single spore production from CLA.
  - After storage spore production:
    - Mung bean agar – used for large production of macroconida.
    - Carrot agar – used for large production of ascospores.

Nursery Inoculation Methods

- Ascospores
  - Apply infected corn kernels from tillering through boot
- Conidia
  - Head emergence/anthesis apply 1 -2 applications
  - Use 50,000 to 200,000 spore/ml
  - Concentrations are Weather Dependent

Mist Irrigation Systems and other notes

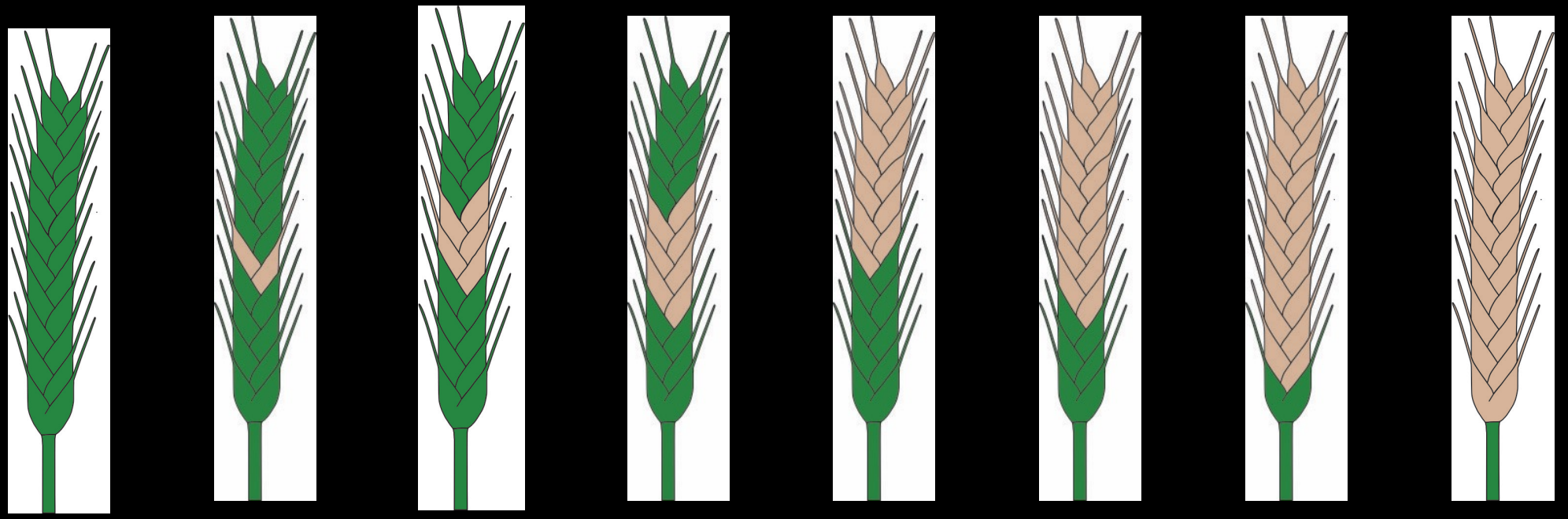
- Pumps, pipe, nozzles, design (adequate coverage across nursery)
- Misting Regimes – Amount, frequency, duration, pressure
- Planting of Rye Grass
- Corn spawn requires irrigation
- **PLAN AHEAD!!!!! Expect the unexpected**

Rating FHB

- Types of resistance
  - Type I: Resistance to initial infection
  - Type II: Resistance to disease spread within a spike
  - Type III: Resistance to deoxynivalenol accumulation

- **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***).

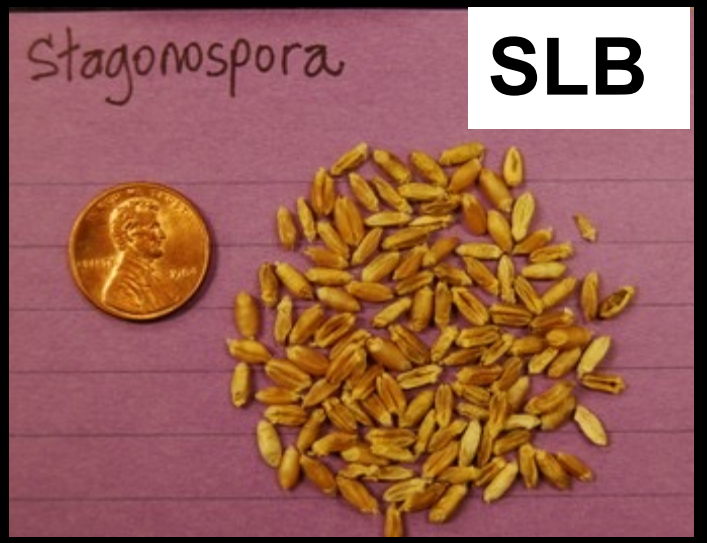
Rating FHB – Severity (%)



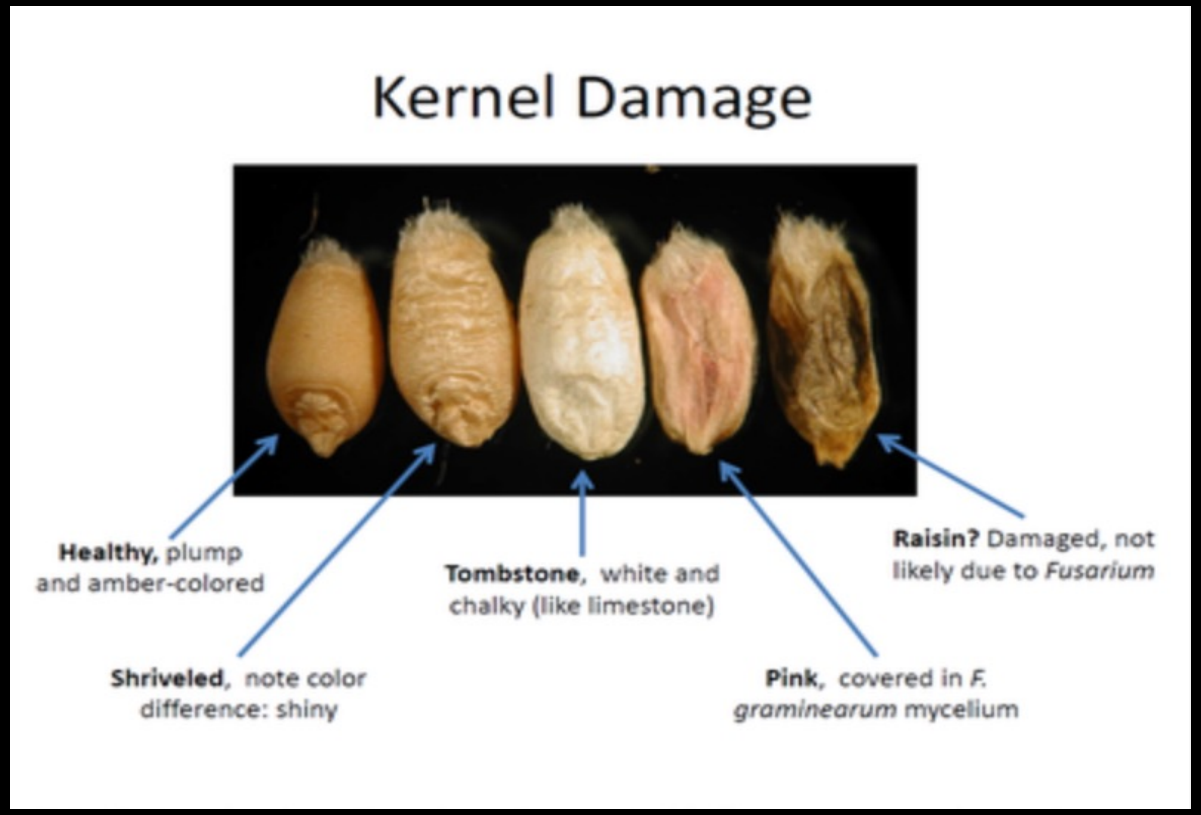
0% 10% 25% 35% 50% 70% 90% 100%

Scoring Fusarium Damaged Kernels

- Wait 1 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 and fill till top is level
- Rate, return seed to bag and repeat 2-5 times per grain bag



Scoring FDK


Kernel Damage
Healthy, plump and amber-colored
Shriveled, note color difference: shiny
Tombstone, white and chalky (like limestone)
Pink, covered in F. graminearum mycelium
Raisin? Damaged, not likely due to Fusarium


FDK Scale by Engle, De Wolf & Lipps; Ohio State
0%
3%
5%
10%
20%
25%
40%
50%
60%
75%
80%
90%
95%
97%
100%

DON Sampling

- 100g samples with from combined or hand harvested plots
  - Select representative sample

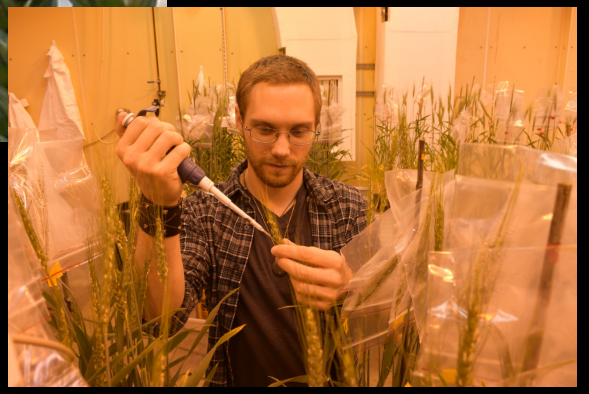
- Some prefer to grind the sample before sending, but you don’t have to. If you do though you should subsample after grinding
  - *Follow lab protocol (10g sample sent to lab from ground sample)*

- Check with the lab you are shipping to for guidelines on sample labeling and processing

Greenhouse Inoculations of *Fusarium graminearum*

- Point Inoculation
- Spray Inoculation

- Plants not harvested
- Toxin levels generally MUCH higher than field
- Most breeding programs rely on field nurseries



Data Collection/Formatting

- Sampling methods for plots (size, patterns, etc.)
- Replications
- Data formatting
- Responses (severity, incidence, index)
- Calculating index from incidence and severity ([inc * sev]/100)

Follow-up questions:

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U.S. Wheat & Barley

Scab Initiative