Wheat Yield Components

- Head Size – Feekes 3 (tillering)
- # of Heads and Kernels - Feekes 6 (jointing)
- Kernel Size – Feekes 8
Wheat Development

• Emergence – Tillering
  – Feekes 1 - 5
Wheat Development

• Vernalization
  – Wheat shifts from vegetative to reproductive
  – 3 – 6 weeks of cold temp
  – $37^0$ to $46^0$
Wheat Development

• Stem Extension
  – Feekes 6 – 10
  – Feekes 6
    • 2,4-D cutoff
  – Feekes 7
    • N uptake
  – Feekes 8
    • Flag leaf makes up 75% of leaf area of plant
  – Feekes 10
    • Boot
Wheat Development

• Heading
  — Feekes 10.1 – 10.5
Cultural Management

• Field Selection
  – Well drained soils

• Selecting Varieties
  – University of Missouri Variety Testing
  – Characteristics
  – Maturity

• Soil Test
Cultural Management

• Seeding Rate
  – Pure Live Seeds/A vs. Bushels/A
  – Ideal: 1.5 million seeds/A, 22 seeds/lin. ft. on 7.5 inch rows, 35 seeds/sq. ft.
  • Yield loss below 25 seeds/sq. ft.
Cultural Management

- Planting Options
  - Drilled
    - 15” Row Planter
      - 8% - 10% yield penalty (Lee, KY)
  - Broadcast
    - Stand issues, depth inconsistency, lack of firm bed
  - Aerial Application
    - Significant increase in seeding rate needed
    - More of an option for cover
Cultural Management

• Planting Depth
  – 1” to 1.5”
    • Too shallow (< 1/2”) – heaving/winter kill
    • Too deep (> 2”) – delayed emergence/poor tiller dev.

• Planting Date
  – October
  – Wiggle Room: Late Sept. – Early Nov. (40 deg. F)
    • Too early – insect pressure; spring freeze
    • Too late – poor emergence, poor tiller # (bump seeding)
Residue Management

• Tillage vs. No-Till – On Average: No difference in yield
  • Weather more of factor year to year
  • Start Clean in either system

– No-Till Corn residue
  • Avoid rotary mowing
  • Increase seeding rate 10-15%
  • Planting at an angle improved slightly
Tiller Management

• Wheat can compensate THIN uniform stand with tillers, but not every tiller will yield.
• Main plant numbers: 25 to 35/sq. ft.
• How thin?
  – 15 main plants/sq. ft. – 75% Yield Potential
Tiller Management

• Tiller numbers: 2 to 3/main plant
  – Feekes 2 – tiller initiation
  – Feekes 3 – tillers formed
  – Fall tillers yield more

• Count all stems w/ 3+ leaves: January – early Feb.
  – Goal: 70 – 100 stems/sq. ft.
Management Challenges

• Does not tolerate wet “feet”
• Max yields = intense management (scouting)
• Environmental
  – Wet fall, late fall harvest
  – Wet spring
• Management time overlaps with other crops
Vomitoxin
Topics

- Scab – how it happens
- Control options
- Feeding
- Saving seed
Fusarium Head Blight
A.K.A. Scab

- Gibberellia zeae or Fusarium roseum
- Vomitoxin or deoxynivalenol (DON)
- Zearalenone

- Feed refusal factor
- Low germ
- Seedling blight
Scab initial infection
Scab – advanced infection
Scab – advanced infection
Scab

- Shriveled, shrunken kernels
- Lightweight, bleached or tombstone kernels
- Kernels have pinkish cast
Scabby kernels
Fusarium ear rot
Fusarium Stalk Rots
Scab is favored by:

• Extended periods of wetness
• Prolonged high humidity
• Temperatures of 77-86 F

• Especially during and after heading
Management that encourages scab

- Planting wheat after corn
- Planting wheat after wheat
- No-till or reduced till
- Susceptible varieties
- Irrigation
Scab control options

• Variety resistance – quite variable
  – Use variety testing information
• Fungicides labeled for scab
  – Caramba 0.75 SL
  – Proline 480 SC
  – Prosaro 421 SC
  – Folicure 3.6 F
Scab control options

• Scab suppression (Paul et.al., 2008. Phytopathology)
  – Prosaro – 52%
  – Caramba – 50%
  – Proline – 48%
  – Folicure – 40%

• DON suppression
  – 42% to 45%
Effects of toxins

• Vomitoxin not really poisonous
• Causes vomiting, feed refusal
• Swine more affected than cattle
Effect of toxins

• Zearalenone – estrogenic mycotoxin
• Disrupt estrus cycle
• Swine more sensitive than cattle
• Does not cause abortion
Advisory Levels for DON

• 1 ppm for finished grain products for human consumption
• No standard for raw grain going into milling process
• Cattle: over 4 months old, 10 ppm (providing grain at that level doesn’t exceed 50% of diet)
Advisory Levels for DON

• Poultry: 10 ppm (not to exceed 50% of diet)

• Swine: 5ppm (not to exceed 20% of ration)

• All other animals: 5ppm (providing grains don’t exceed 40% of diet)
DON toxin

• 2014 – The perfect storm
• Cold winter = delayed/prolonged maturity
• Most susceptible during flowering
• Cool and prolong rain period
• Low symptom expression
• High DON levels
Seed Options for 2014

• Plant disease free wheat

• If using harvested seed
  – thoroughly clean seed
  – run germination test and adjust seeding rate accordingly
  – use fungicide seed treatment labeled for Fusarium
Germination testing

• Clean seed first
• Wheat seed lots w/ thousand kernel weight > 30 grams improved fall tiller count and seedling vigor
Germination testing

• Sample Options:
  – Missouri Department of Agriculture
  – Missouri Seed Improvement Association
  – At Home
Missouri Department of Agriculture

- 1 pt. to 1 qt. seed
- June 1 to August 31 test free
- Sept. 1 to Nov. 1 $12 fee per sample limit
  4 samples per farm
- mda.mo.gov/plants/seeds
Missouri Seed Improvement Association

• 1 lb. seed
• $14.25
• Email moseed@aol.com or moseed.org
Home test

• 100 seeds
• In damp paper towel
• Paper towel in plastic bag
• Warm location out of sun
• 5 days
• Count number germinated with intact root and shoot
Germination

• 85% or better ideal
• Less than 75% questionable
Use a seed treatment fungicide when there is:

- a concern about a seed-borne disease
- a field with a history of a disease problem, i.e. likely to be a soil-borne disease
- a concern about conditions at planting
Seed treatment

- Protect seed from seed borne and soil borne diseases
- Lots of seed treatment options
- 67 listed in Pest Management Guide
  - http://extension.missouri.edu/p/M171
Aphid Management

• Early planted wheat (first green field in area)
  – Insecticide seed treatment
  – Scout early – first 30 DAE important w/ untreated seed
  – Avoid Complacency w/ seed treatment

• Untreated seed – fly free date/first frost
  – Insecticide application in late winter
  – Foliar can be co-applied with herbicide
  – Applications made before population build in spring.
True Armyworm

• Scout mid-April prior to flag leaf through heading in evening or early morning

• Nocturnal feeders
  – 4 worms/sq. ft.
  – 2% head clipping

• Pyrethroids
# Freeze Scale

Table 3-3. Freeze injury in wheat.

<table>
<thead>
<tr>
<th>Growth Stage</th>
<th>Feekes</th>
<th>Zadoks</th>
<th>Approx. Injurious Temp. (2 hrs)</th>
<th>Primary Symptoms</th>
<th>Yield Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tillering</td>
<td>1-5</td>
<td>20-29</td>
<td>12°F</td>
<td>Leaf chlorosis; burning of leaf tips; silage odor; blue cast to fields</td>
<td>Slight to moderate</td>
</tr>
<tr>
<td>Jointing</td>
<td>6-7</td>
<td>31-32</td>
<td>24°F</td>
<td>Death of growing point; leaf yellowing or burning; lesions, splitting, or bending of lower stem; odor</td>
<td>Moderate to severe</td>
</tr>
<tr>
<td>Boot</td>
<td>10</td>
<td>41-49</td>
<td>28°F</td>
<td>Floret sterility; spike trapped in boot; damage to lower stem; leaf discoloration; odor</td>
<td>Moderate to severe</td>
</tr>
<tr>
<td>Heading</td>
<td>10.1-.5</td>
<td>50-58</td>
<td>30°F</td>
<td>Floret sterility; white awns or white spikes; damage to lower stem; leaf discoloration</td>
<td>Severe</td>
</tr>
<tr>
<td>Flowering</td>
<td>10.51-.54</td>
<td>60-71</td>
<td>30°F</td>
<td>Floret sterility; white awns or white spikes; damage to lower stem; leaf discoloration</td>
<td>Severe</td>
</tr>
<tr>
<td>Milk</td>
<td>11.1</td>
<td>75</td>
<td>28°F</td>
<td>White awns or white spikes; damage to lower stems; leaf discoloration; shrunken, roughened, or discolored kernels</td>
<td>Moderate to severe</td>
</tr>
<tr>
<td>Dough</td>
<td>11.2</td>
<td>85</td>
<td>28°F</td>
<td>Shriveled, discolored kernels; poor germination</td>
<td>Slight to moderate</td>
</tr>
</tbody>
</table>

*a Information in this table assumes timely rainfall events occurring after the freeze event.
*b See Section 2 for more information about growth stages.
Closing Thoughts

• Soil Test
  – Fertility Management
• Timely Planting
• Seeding Rate – Critical
• Know the Growth Stages
• Monitor and control pests
• Scout early and often
  – No time – consider hiring a crop consultant