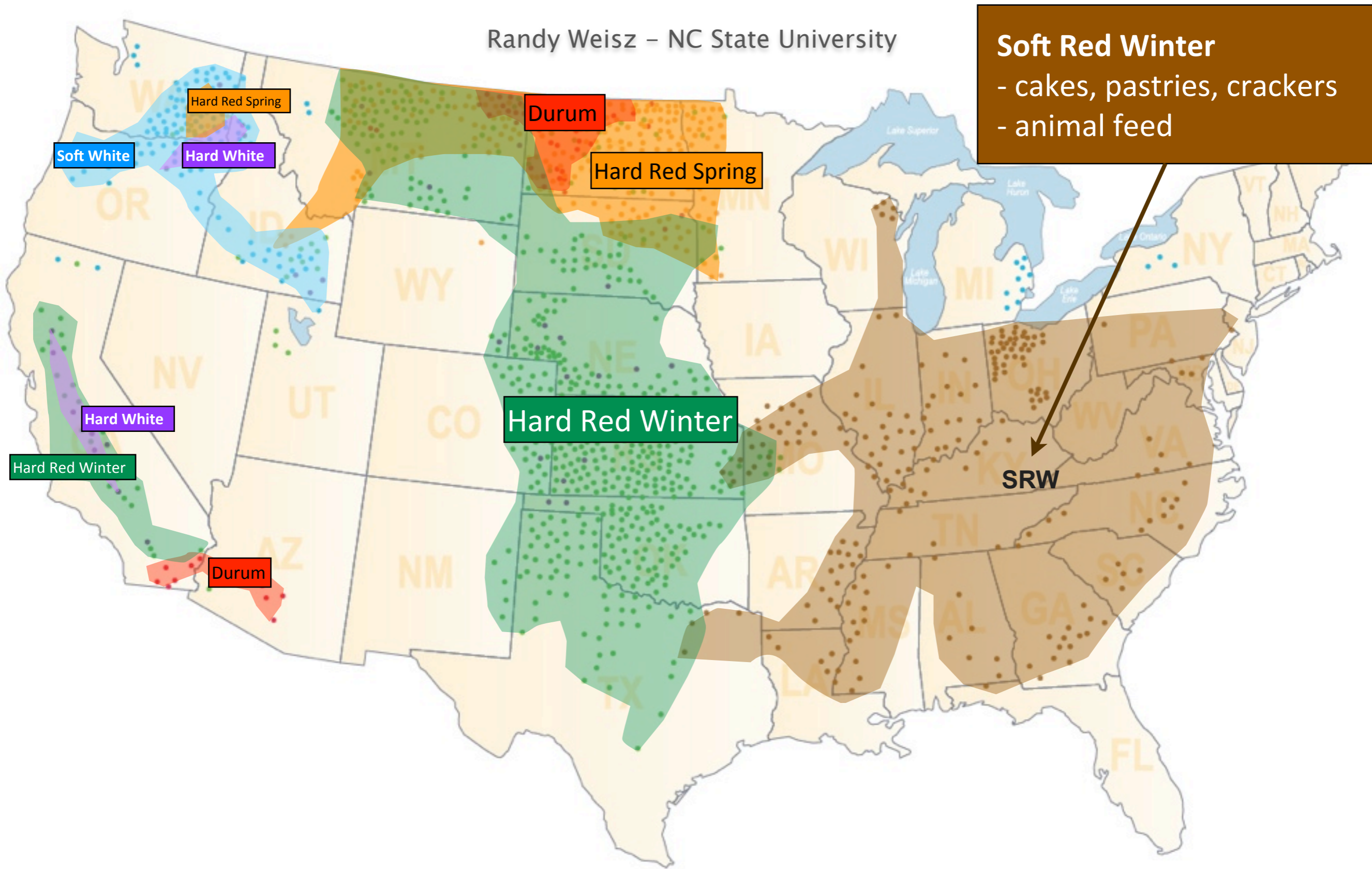


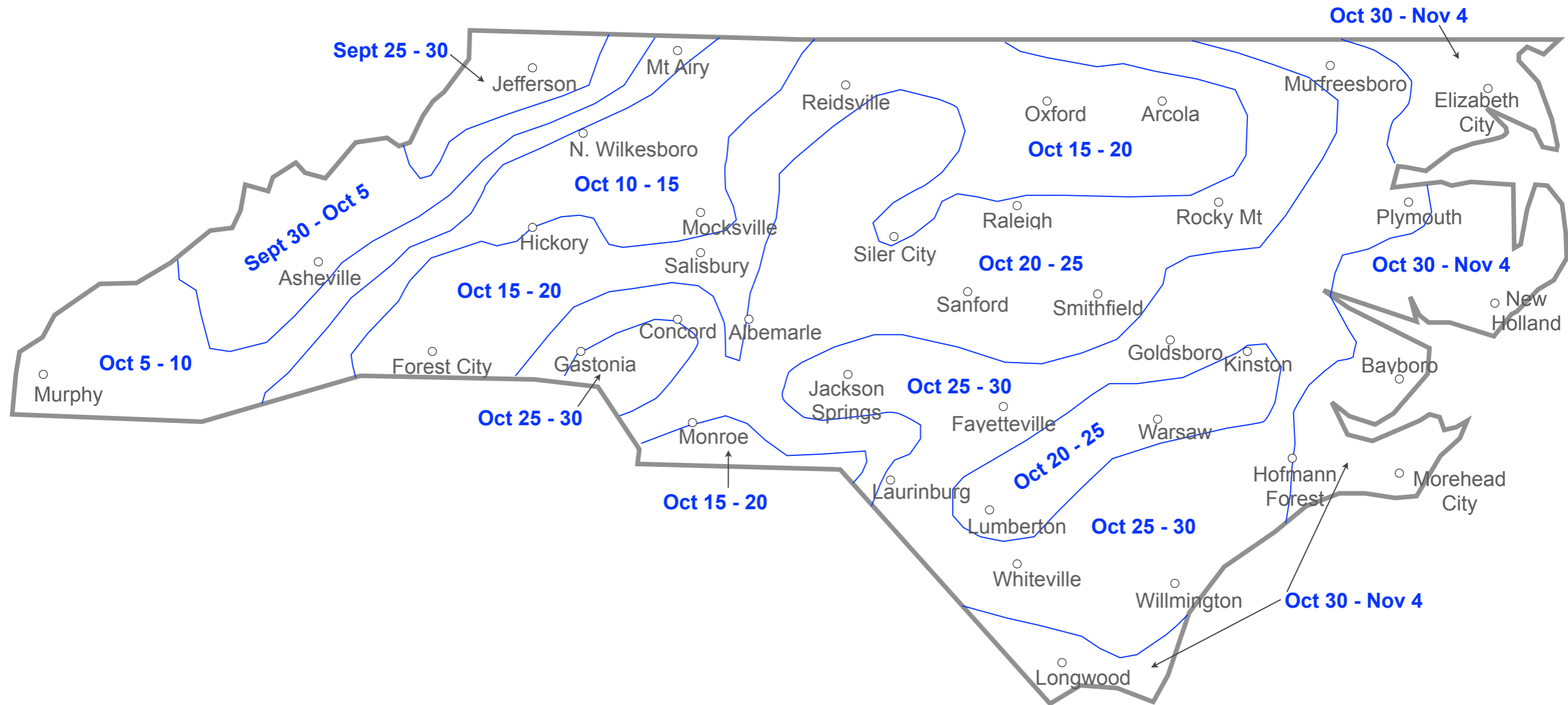
# Southeastern Wheat Production

Randy Weisz - NC State University



**Soft Red Winter**  
- cakes, pastries, crackers  
- animal feed

SRW



**Planting - 7 days from the first frost**

# Pre-Plant Soil Fertility

- Full amounts:
  - Phosphorus
  - Potassium
  - Sulfur
  - Lime
- Small amount of Nitrogen



# Pre-Plant Soil Fertility

- Full amounts:
  - Phosphorus
  - Potassium★
  - Sulfur★
  - Lime
- Small amount of Nitrogen★



Highly leachable soils!

Make N & K management difficult!

# Fall



**Growing leaves**

# Fall



**Growing tillers**

# Fall



**Growing tillers to grow yield! ★**



Common chickweed



Henbit



Wild garlic

Most growers apply herbicides from December to early February to control these weeds



These weeds  
compete with tillers  
and hurt yield!



Common chickweed

Henbit

Wild garlic

Most growers apply herbicides from December to early February to control these weeds

Wild garlic  
doesn't compete  
with tillers, doesn't  
hurt yield. So why  
do we care?



Common chickweed

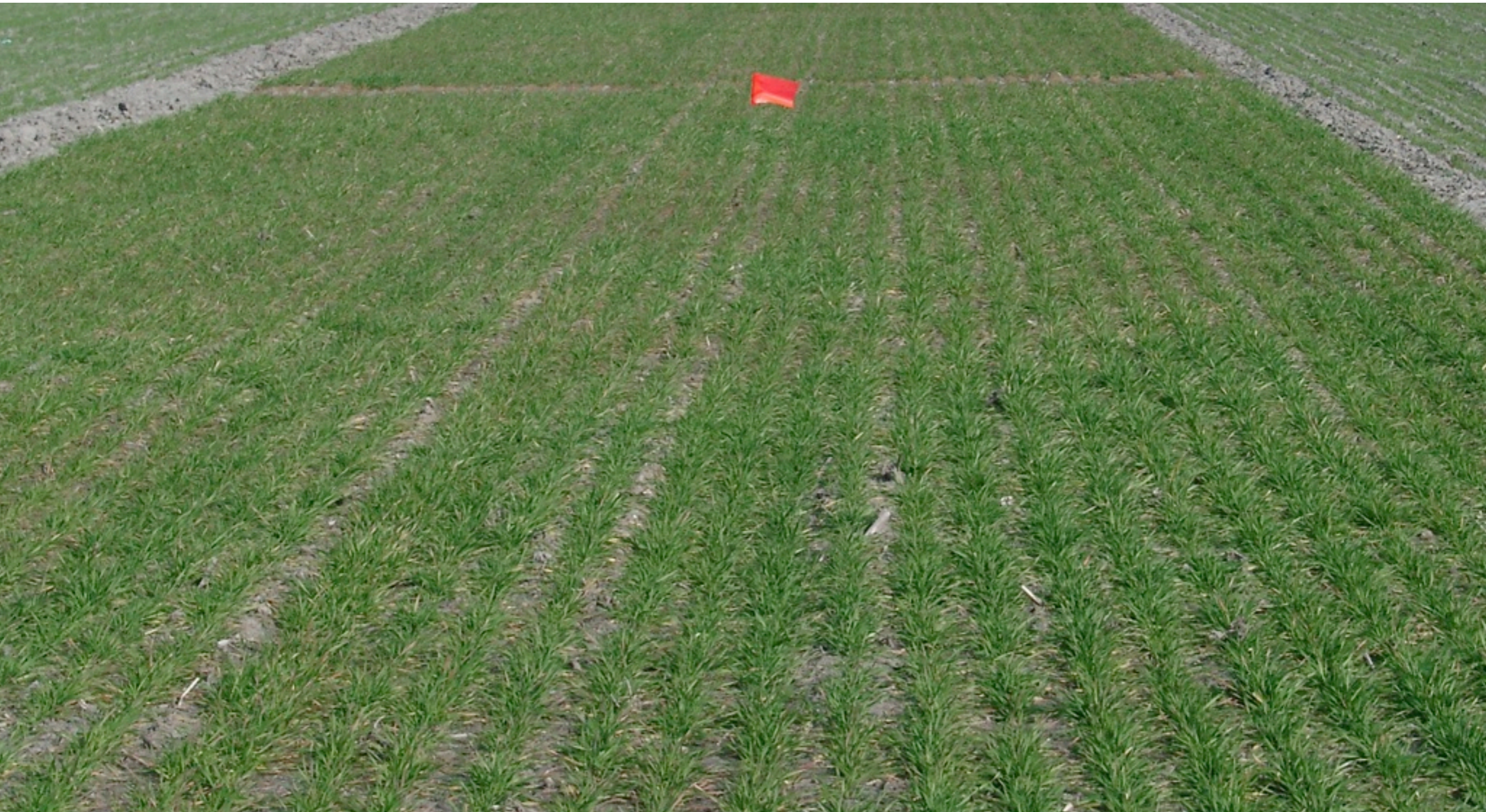


Henbit



Wild garlic

Most growers apply herbicides from December to early February to control these weeds



**Winter – tillering stops... wheat vernalizes**



Timely planted lots of fall tillers!  
Ideal time for N application  
is March!

Planted late needs spring tillers,  
that means N fertilizer  
in February & again in March



# Transition Growth

- Late Feb to early March
  - vernalization is over
  - tillering ends
  - plants transition to reproductive growth
    - need high rate of N
      - take up most N in 4 weeks
    - highly sensitive to freeze



# Start of Reproductive Growth

- March
  - stems elongate
  - grain head form inside the stems
  - growers change from “making a crop” to “protecting the crop”



# Boot Stage

- April
  - grain head swells inside the stem
  - stem extends into the boot



# Heading

- April – May
  - boot splits
  - grain heads emerge






# Grain Fill

- May – June
  - plant moves carbohydrates and protein into the grain

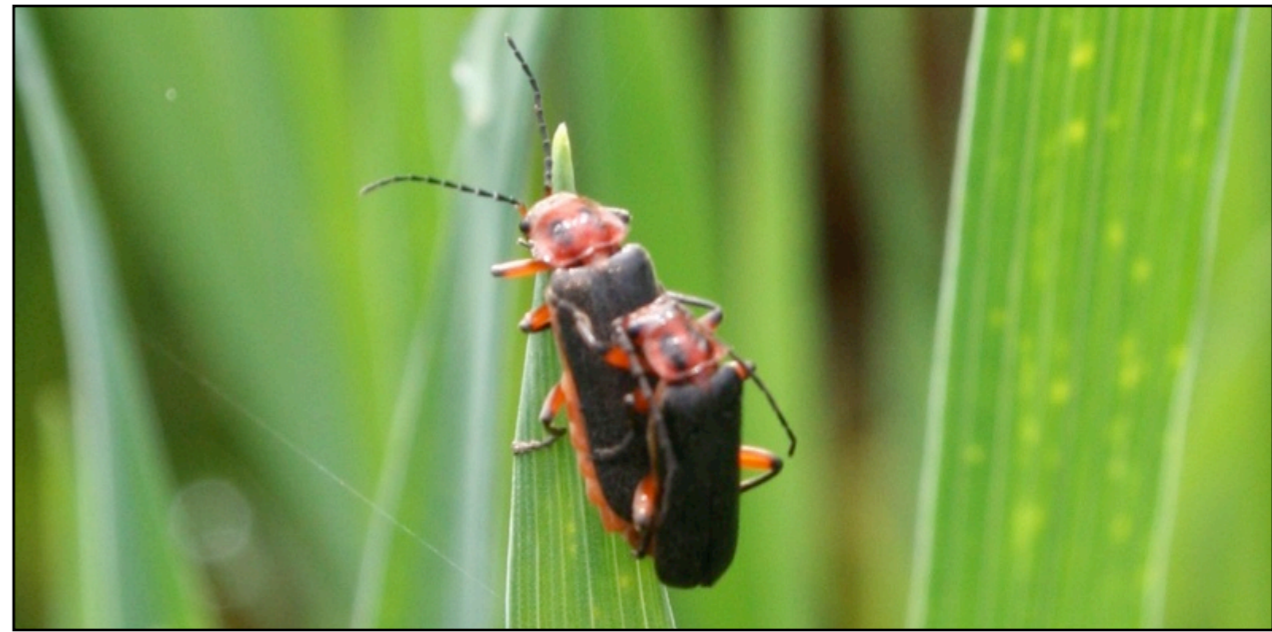


# Harvest

- June
  - plants die
  - grain dries
  - when it reaches 15% moisture
    - it's time to harvest 



# Protecting The Crop



# Hessian fly

- Biology

- Fall

- adults move onto seedlings
    - lay eggs
    - maggots move into leaf whirl & feed
      - injure and kill tillers

- Winter

- pupa form
    - most die
    - life cycle usually ends





- Hessian fly
  - Resistance
    - Very important
    - Not a lot known
      - improvement is needed

# Aphids

- Feed on seedlings
  - usually kept in check by
    - Frost
    - insect predators
  - do little damage
  - but vector YDV





- Resistance

- Very important
- Not a lot known
  - improvement is needed





# Cereal Leaf Beetle

- Usually the only insect pest of concern in small grains



# Cereal Leaf Beetle

- Biology
  - adults arrive in March
    - do little to no damage
    - lay eggs



# Cereal Leaf Beetle

- Biology
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  - larvae hatch in April
    - begin feeding



# Cereal Leaf Beetle

- Biology
  - adults arrive in March
    - do little to no damage
    - lay eggs
  - larvae hatch in April
    - begin feeding
    - defoliate crop
    - severe crop loss
  - need resistant varieties



# Powdery Mildew

- Most common NC disease



# Powdery Mildew

- Cycle

- resistant variety released

- it yields well, growers plant it

- mildew is defeated

- 99.999% of the time

- 0.001% of the time a mutation survives and grows

- in a few years mildew is back

- on a local basis

- then regionally!

- the wheat variety is defeated



# Powdery Mildew

- serious problem
- if left unchecked
  - potentially eliminate regional wheat production



# Powdery Mildew

- Keeping wheat viable
  - State program
    - University programs to find new sources of resistance
      - wild grasses like goat grass
      - Afghanistan, Iran, Iraq, Pakistan, Syria, Turkey, Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan
      - move these genes into modern wheat
      - release to breeders worldwide





# Powdery Mildew

- Keeping wheat viable
  - Federal program
    - USDA here at NCSU
      - monitor wheat fields in SE
      - track mildew strains
      - monitor shifts in genetics
      - inform breeders when specific resistance genes fail



# Powdery Mildew

- without government programs private companies could not keep up
- wheat industry would be wiped out





Head Scab



## Scab

- Infected kernels are shriveled, white and/or pink
- Called “tombstones”
- Tombstones contain mycotoxin (DON)
- High levels of DON and growers can not sell their grain



Flowering Heads

# Managing scab and DON: A full-court press....

- There is no simple fix for avoiding scab!
- Scab management involves multiple steps



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But now this has  
little effect!





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  - Incorporate or chop old crop residues
  - **Plant resistant varieties**
    - best single measure there is!



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    - best single measure there is!

But we don't have any  
with full resistance!

And, resistance to powdery  
mildew is more important!



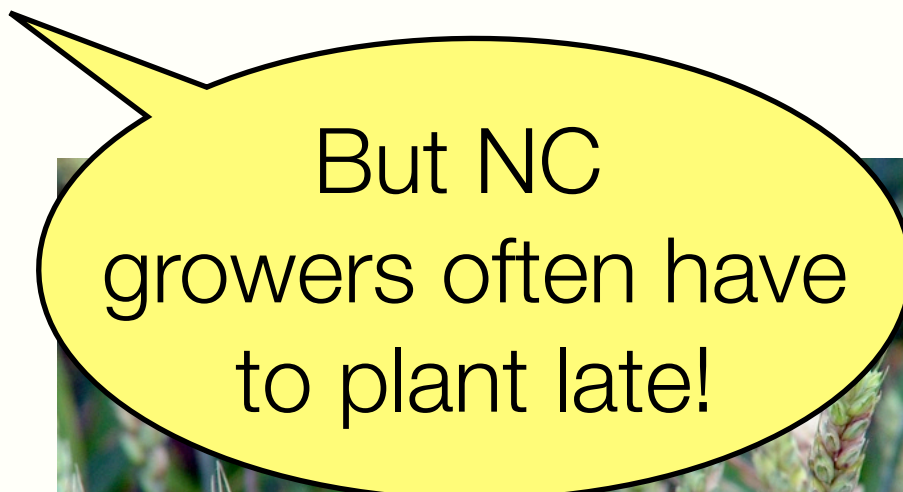
# Managing scab and DON: A full-court press....

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    - the later you plant, the later the wheat will flower
    - when wheat flowers late, the weather is more likely to be warm
    - scab likes warm weather at flowering!



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But NC growers often have to plant late!



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But they  
are expensive & only  
about 50% effective!



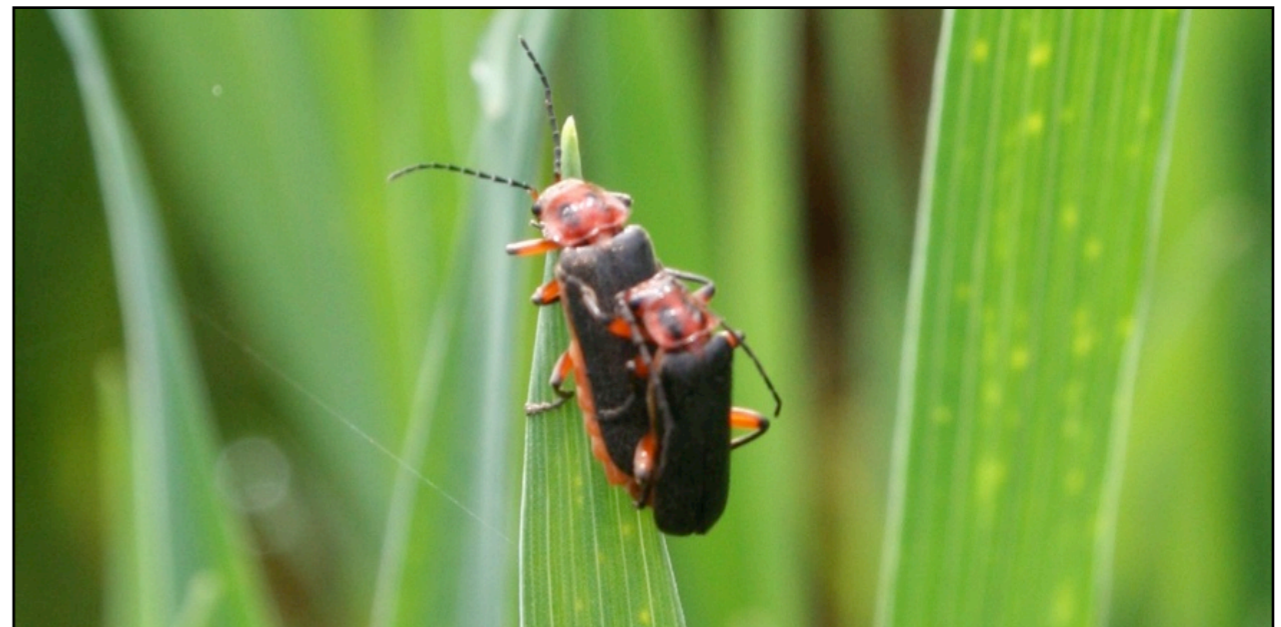
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- There is no simple fix for avoiding scab!
- Scab management involves multiple steps
  - Incorporate or chop old crop residues
  - Plant resistant varieties
  - Avoid planting very late
  - Monitor weather around flowering
- ***Scab management is problematic!***
  - ***We need better resistance***



# Areas For Improvement

- Variety resistance
  - Insect Pests
    - Hessian fly
    - YDV
    - Cereal leaf beetle





# Areas For Improvement

- Variety resistance
  - Powdery mildew
  - Head scab

