On the Web at:
www.kingcorn.org/talks/2001/stalkrot.html

Stalk Rots & Lodging in Corn

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Image source: Nielsen, Purdue Univ.

Outline

- Methods of infection
- Fungal causes
- Relationship with plant stresses
- Ways to minimize stalk rot risk

Acknowledgements:

G. Shaner, Purdue Univ.

L. Sweets, Univ. of Missouri

P. Lipps, Ohio State Univ.

G. Munkvold, Iowa State Univ.

Several fungi often involved

- All are part of the complex of microorganisms in the soil that decompose dead plant material.
- Survive from one season to the next in
  - The soil, or
  - Infested corn plant residues

Entry into the corn plant

- Fungal spores blown into base of leaf sheath germinate and grow directly into the stalk tissue
- Fungal spores enter directly through wounds (hail, ECB, mechanical injury)
- Infect root system directly, causing root rot, later stalk rot

Image source: Nielsen, Purdue Univ.

Fungal causes

- Anthracnose (*Colletotrichum*)
  - Usually most evident at stalk nodes
  - Lesions initially tan to reddish-brown, but become shiny black later in the season
  - Stalk pith may also be discolored and may disintegrate later in the season
  - Often also associated with 'top die-back' of corn plants during grain filling period.

Image source: Yang & Munkvold, Iowa State Univ.

Fungal causes (II)

- Fusarium & Gibberella
  - Similar in-field symptoms
  - Pink to red discoloration of diseased tissue
  - Small amounts of white mycelium may be visible at diseased nodes
  - Stalk pith usually shredded & discolored

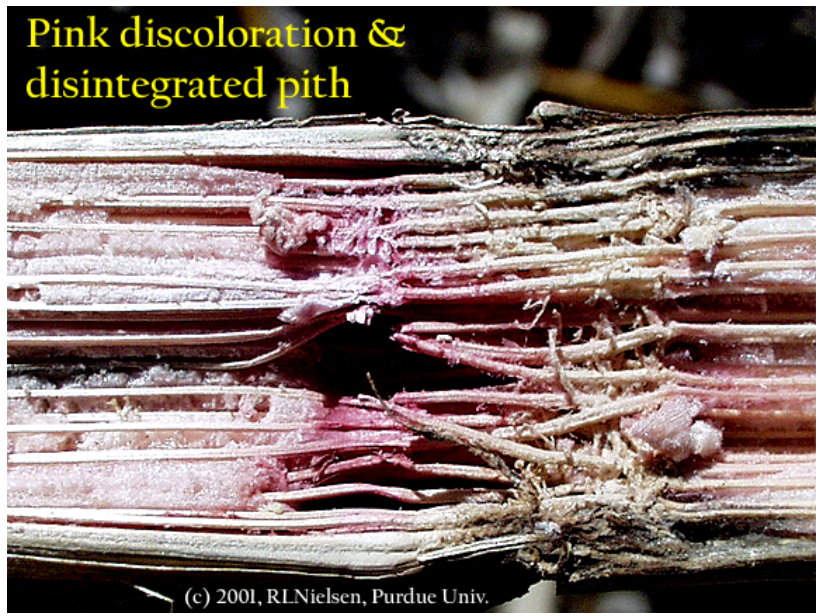


Image source: Nielsen, Purdue Univ.

Fungal causes (III)

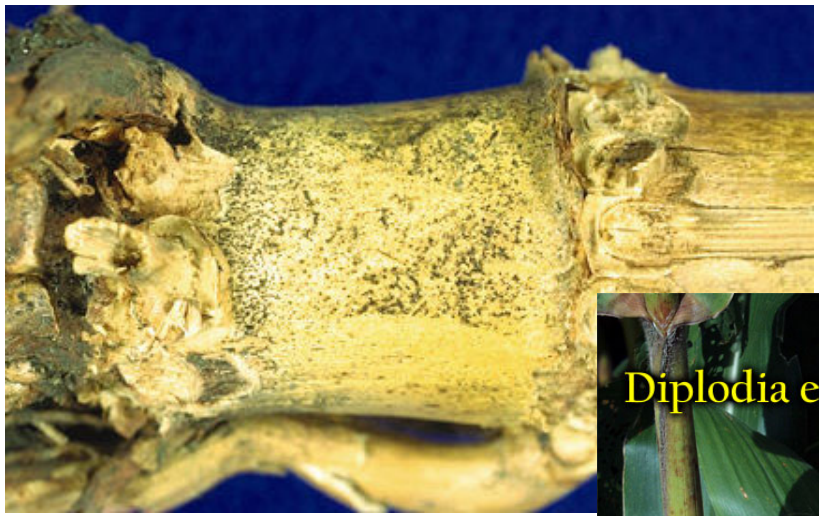


Image source: Munkvold, Iowa State Univ.

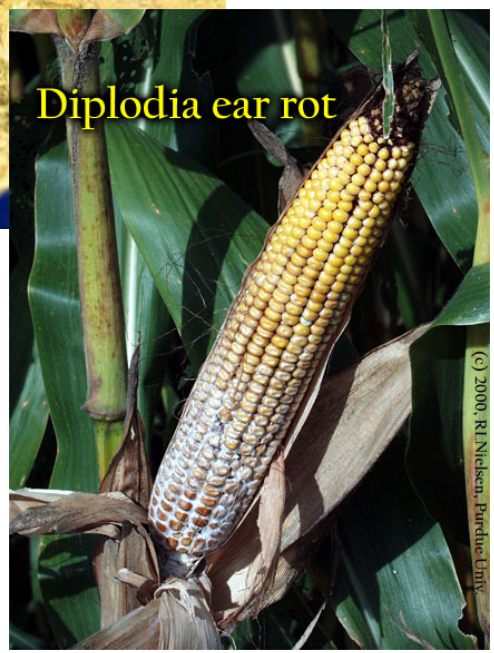


Image source: Nielsen, Purdue Univ.

- Diplodia
  - Begins as brown to tan internode discoloration
  - Stalk pith disintegrates, leaving only the vascular tissues
    - Mats of white fungal growth often visible on diseased plant tissue
    - Small black fruiting bodies may be evident
  - Last year's ear rot outbreak left a lot of inoculum for this year.

A disease of 'old age'

- Fungi typically don't infect corn at early stages of development.
  - Yet, fungi are present in soil and plant residues 12 months out of the year.
- Rather, develop at mid- to late grain fill stages
  - Early August to early September

Why 'old age' disease?

- Young, healthy roots and stalks are fairly resistant to fungal infection.
- Susceptibility to rots increases as …
  - Cell maintenance & repair diminishes due to lack of carbohydrate replenishment
  - Carbohydrates remobilize from stalk tissue to fulfill demands of developing ear
  - The incidence of both increases during the course of grain fill

Carbohydrate availability

- For most of today's corn hybrids, the carbohydrates necessary for the grain filling process are manufactured 'on the fly' by photosynthesis.
  - If the photosynthetic 'factory' is hindered by plant stresses, carbohydrate output will also be restricted.

Photosynthetic stresses

- Any plant stress occurring any time during the season can affect the photosynthetic productivity of the plant 'factory' during grain fill.
  - But, especially stresses that occur during the grain fill, including
    - Hail, leaf diseases, cloudy conditions, soggy soils, dry soils, extreme heat, nutrient deficiencies, ECB or SWCB infestation

Plant's response to stress?

- When the carbohydrate demands of the plant cannot be met by the photosynthetic output of the 'factory',
  - Developing ears take priority and root & stalk cell maintenance suffers
    - Fungal infection of roots (root rots) soon follows
  - Plant may cannibalize carbohydrate reserves stored in lower stalk tissue.

Cannibalization

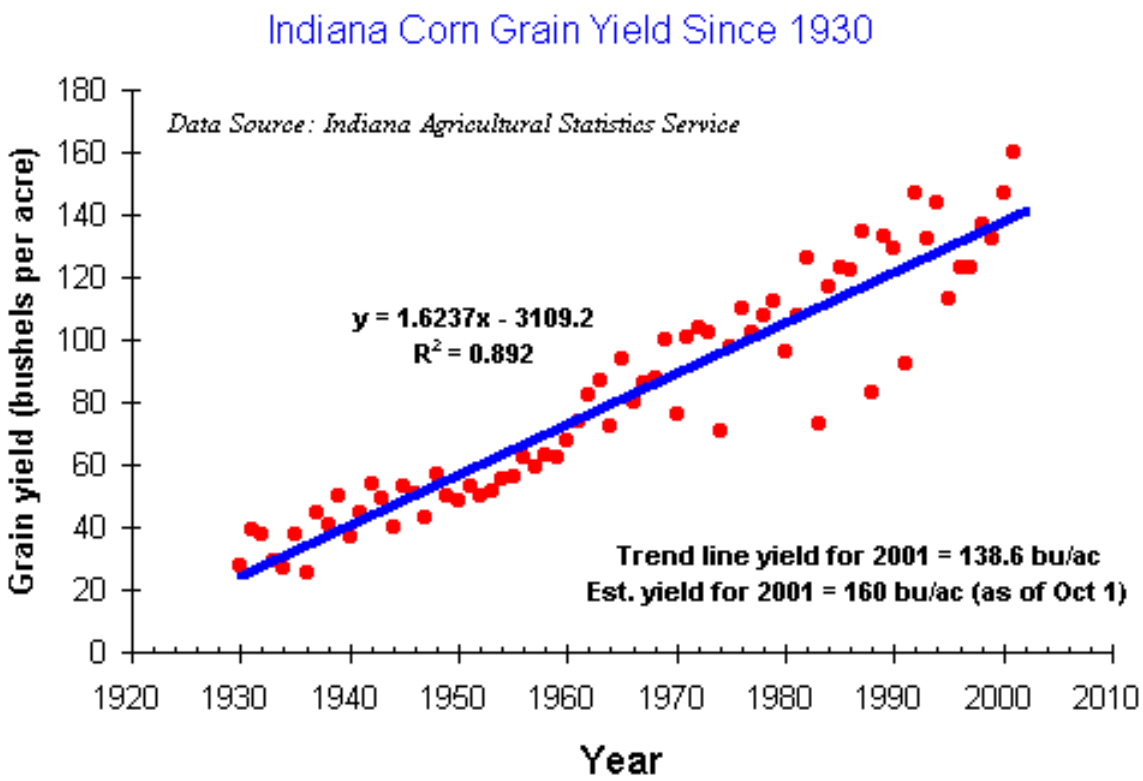
- Refers to the remobilizing of stored carbohydrates from stalk tissues and transport to the developing ear.
  - Weakens the physical integrity of stalk
  - Increases susceptibility to stalk rots
- Especially likely when plant stresses occur
  - From early to mid-grain fill and/or
  - When potential ear size (yield) is large

Plant stresses this year?

- Excessively dry soils at times
- Excessively wet soils at times
- Periods of cloudy weather
- European or SW Corn Borer infestations
- Some leaf diseases, especially late
  - GLS, anthracnose, NCLB
- High yield potential itself

Good corn yields this year?

- Highest statewide yields ever!



Minimizing risk of stalk rots

- Hybrid selection
  - ‘Stay-green’ trait infers less cannibalization
  - Stalk strength characteristics
  - Disease tolerance, esp. leaf diseases
  - Bt trait where ECB or SWCB are prevalent
  - Stress tolerance in general
  - Avoid excessively high populations

Minimizing risk of stalk rots

- Minimize risk of stress
  - Always use best agronomic practices
  - Avoid/alleviate soil compaction
  - Avoid nutrient deficiencies
  - Attend church regularly!
- Avoid continuous corn rotation
  - Residue conducive for inoculum developmt
- Use tillage where appropriate
  - Esp. helps avoid diplodia and anthracnose

Late-season scouting

- Beginning in early August, scout fields or areas within fields that are likely to be at high risk for stalk rots
  - Susceptible hybrids
  - Severe drought or soggy soil stress
  - Severe nutrient deficiency
  - Severe insect or leaf disease infestations
  - Exceptionally high yields

Read your newsletters:

Nielsen, P&C Newsletter, 16 Aug 2001

Late-season scouting

- Pinch or slice lower stalks for evidence of disintegrating stalk tissue
- Dig up plants and inspect roots for health and integrity
- Schedule high risk fields for early harvest
- Continue scouting during harvest
  - Stalk health condition can change rapidly
    - Gibberella stalk rot favored by October rainy period 2001

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Eastern Corn Belt corn & soybean farmers