

## Smut and Ergot Diseases



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## Smut Diseases

- Smut = “to smudge or blacken”
- Black, dusty masses of teliospores  
= sorus (pl. sori)
- Subdivision Basidiomycotina  
Order Ustilaginales
- All obligate parasites
- Mostly attack monocots-Poaceae

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## Economically important smut pathogens :

- Ustilago nuda* and *U. tritici* (loose smut- barley and wheat)
- Tillietia tritici* and *T. laevis* (common bunt)
- Tilletia controversa* (dwarf bunt of wheat)
- Ustilago maydis* (corn smut)
- Tilletia indica* (Karnal bunt of wheat)

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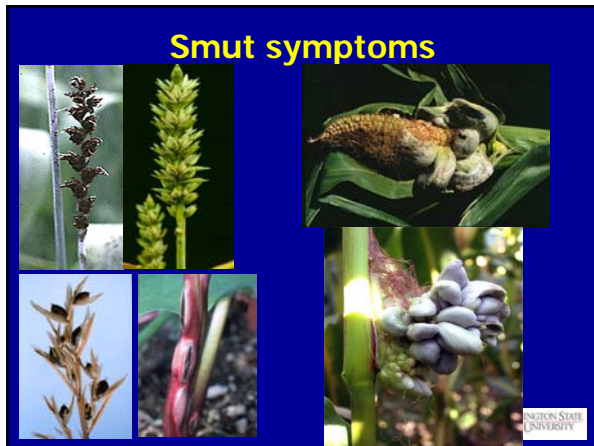
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### Smut Diseases

1) Floral-infecting	<b>systemic in host</b>
2) Seedling-infecting	
3) Local-infecting	<b>non systemic in host</b>

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### Floral-infecting Smuts

Loose smut of barley and wheat

*Ustilago nuda* - barley  
*Ustilago tritici* - wheat

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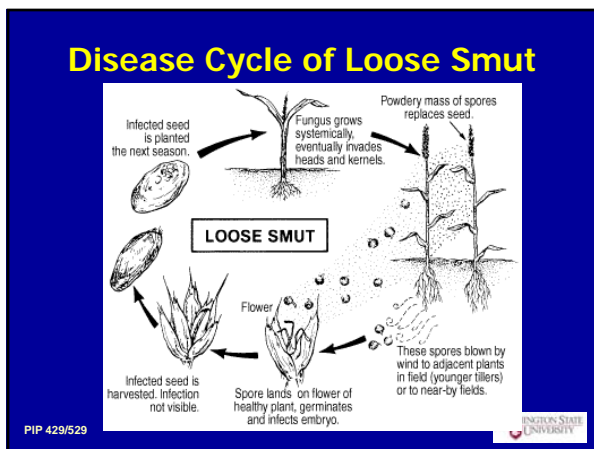
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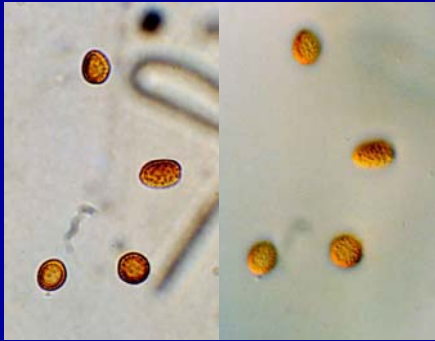
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### Teliospores of *Ustilago nuda*



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### Seedling-infecting Smuts

Common bunt / Stinking smut of wheat

*Tilletia tritici*, *T. laevis*

Dwarf bunt of wheat

*Tilletia controversa*

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### Stinking Smut of Wheat



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## Stinking Smut of Wheat



“covered” smut

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*T. tritici*



*T. laevis*



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## Dwarf Bunt

*Tilletia controversa*



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## Teliospores of *Tilletia controversa*



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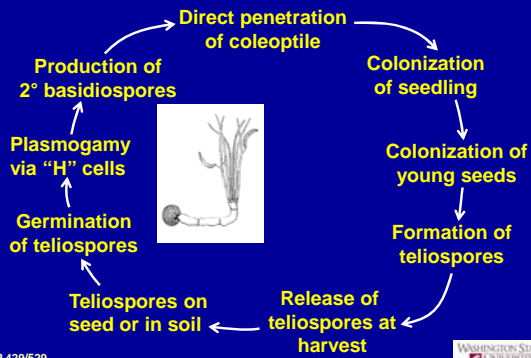
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## Disease Cycle of Stinking Smut



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## Local-infecting Smuts

- Not systemic in the host
- Can infect vegetative and reproductive tissues
- Common smut of corn  
*Ustilago maydis*

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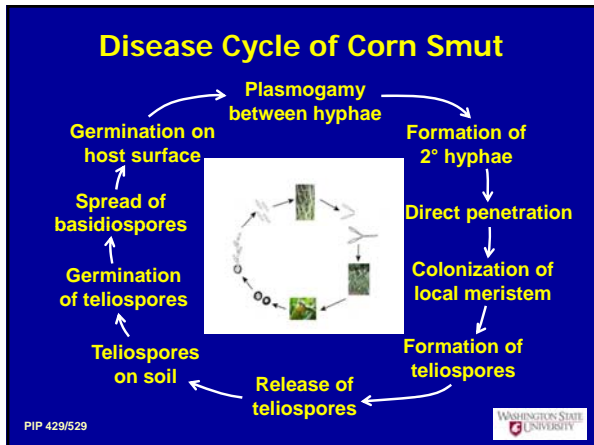
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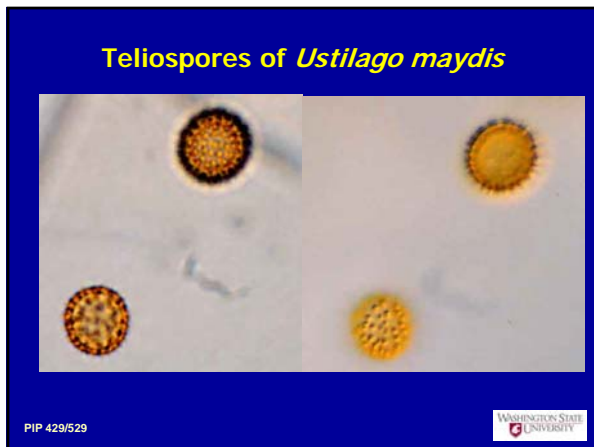
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## Smut Diseases

### Control:

- Fungicide seed treatment
  - Carboxin, difenoconazole
- Sanitation
  - Certified, uninfected seed, removal of maize ears with immature corn smut galls
- Disease resistance
- Crop Rotation

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## Ergot

- Pathogen: *Claviceps purpurea* (Ascomycota)
  - Tissue replacement disease
    - Pathogen colonizes ovaries and replaces host tissue with a sclerotium
  - Characteristic symptoms & signs:
    - golden-colored honeydew in flowers
    - dark-colored sclerotia emerging from flowers
- Sclerotia contains different alkaloids which are toxic to human as well as other animals**

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## Ergot of Rye

Sclerotia of *Claviceps* sp.



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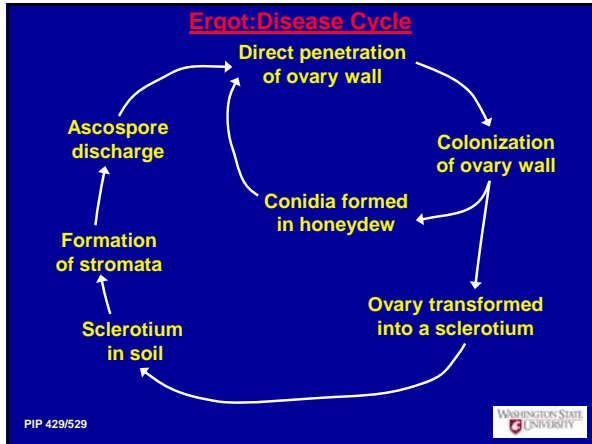
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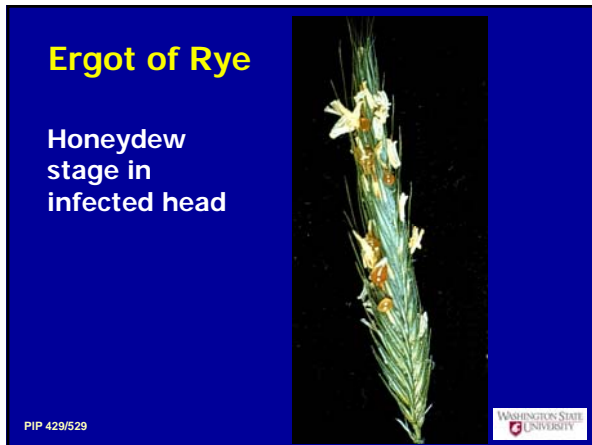
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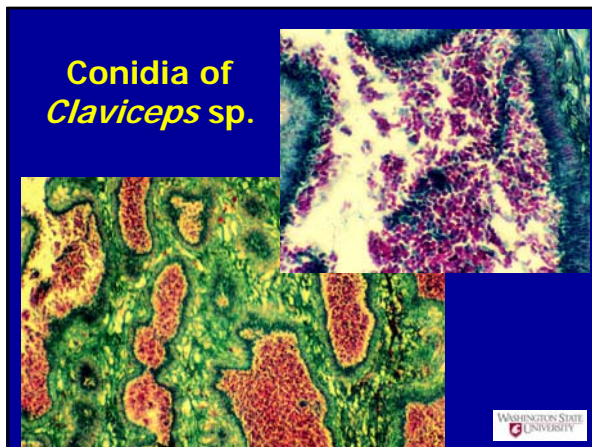
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**Germinating sclerotium**

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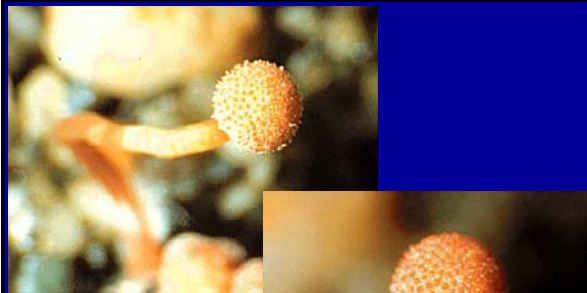
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**Stroma of *Claviceps* sp.**

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**Stroma of *Claviceps* sp. with perithecia**



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## Ergot

### Control:

- Ergot-free seed
- Crop rotation
- Deep plowing
- Removal of other hosts near fields

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## Today's Exercises

- 1) Observe signs and symptoms of smut diseases on plants – smell them
- 2) Observe germinating teliospores – look for promycelium, basidiospores (sporidia), "H"-bodies – compare *U. maydis* to *T. tritici*
- 3) Make slides of at least 3 different teliospores from the infected plants – note differences in surface features of spores
- 4) Observe dry specimens of ergot-infected rye and other grasses
- 5) Observe prepared slides of sclerotia, stroma, and perithecia

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