Lesson 1

Introduction to Case Study:
Karnal Bunt
What is Karnal Bunt?

Karnal Bunt is a disease of wheat, durum wheat, and triticale, a hybrid of wheat and rye. It is caused by the fungus *Tilletia indica*.

Source: APAHIS/PPQ Fact Sheet
How does the fungus affect crops?

*Flour made from bunted kernels is discolored and has an unpleasant, though harmless, odor and taste.*

**Examples of bunted wheat kernels**

A. Healthy wheat kernel  
B. “Tip” infection  
C. Advanced tip infection  
D. Advanced infection  
E. “Canoe” symptom; hollowed out interior

Source: APHIS/PPQ
Case History

- Disease first reported in India in 1931
- By 1982, Karnal bunt became well-established in northwestern Mexico
- APHIS regulations excluded wheat from countries where Karnal bunt was present, such as Pakistan, Iraq, Afghanistan, part of South Africa, and Mexico

At the time, U.S. seemed more concerned about protecting exports than about yield or quality losses

Source: NAPIS; R. Dunkle
The first confirmed case in the U.S. was in Arizona in 1996.

Shortly thereafter, Karnal bunt was discovered in New Mexico, Texas, and California.

APHIS instituted emergency actions notices (EANs) to stop movement of infected seed.

Select areas of AZ, TX, NM & CA are currently restricted.

Sources: TX Ag Department; NAPHIS
Emergency quarantines were instituted on

- infected properties
- seed
- farm equipment
- planted wheat
- soil associated with the infected wheat

APHIS restrictions now aim at preventing the spread of disease into non-infected areas as well as protecting U.S. exports.

Sources: TX Ag Department; APHIS
Do you know?

Under what conditions does APHIS institute restrictions?
An area will be **restricted** if . . .

- Field was planted with seed from a lot found to contain a bunted wheat kernel
- Areas around field were found to contain a bunted wheat kernel
  - Currently a 3-mile buffer zone is implemented
- Areas are in proximity to a field where spores are detected
  - Based on projections of how spores may spread
  - Availability of suitable environment for disease to become established & survive

Source: APHIS
APHIS will release areas . . .

. . .if detection & delineation surveys show the areas to be free of bunted wheat and spores.

These actions relieve restrictions on producers’ fields when the restrictions are no longer warranted in order to return the field to full production.

Source: APHIS
Illustrative Examples of USDA/APHIS Activities and Actions:

1997: USDA participated in international forum on preventing future outbreaks

1999: APHIS simplified restrictions into one category

2000: USDA proposed equipment must be disinfected ONLY if used with crops that tested positive for Karnal bunt


2002: USDA worked with Mexico to lift ban on Illinois wheat

2003: Interim rule pertaining to fungicide treatment of seed was amended

2004: Additional areas in AZ were restricted; some restrictions in CA were lifted

Source: NAPIS
Do you know?

What are the potential ramifications of a widespread epidemic in the U.S.?
Possible ramifications:

- Millions of acres across the Midwest and Plains States could be infected if not controlled
  - Yields would diminish

- Other countries would refuse wheat from U.S.
  - Due to poor quality of wheat
  - For fear of importing the disease

The U.S. is the world’s leading wheat exporter with exports valued at $3 billion in 2001

Source: APHIS
Next steps for this case study:

Now return to Lesson One and complete the following case study readings:

► Read this fact sheet from the Texas Department of Agriculture
  ■ http://ceris.purdue.edu/napis/a-facts/fskbqa.html

► Study this chart on the Karnal Bunt Life Cycle
  ■ http://ceris.purdue.edu/napis/pests/kb/life.html

► Study this map of the 2003 regulated areas
FYI: Presentation References

Karnal Bunt: A Fungal Disease of Wheat [electronic fact sheet] Texas Department of Agriculture


What we can learn from past and current epidemics in plants (2003) Dr. James Schoelz, University of Missouri-Columbia

Karnal Bunt; Regulated Areas USDA/APHIS 7 CFR Part 301 [Federal Register January 5, 2004 V. 69, No. 2 pp 245-247].

Karnal Bunt Case Study (2003) by Dr. Richard Dunkle, Chief Plant Protection Officer United States of America

Karnal Bunt Overview [electronic fact sheet] APHIS/PPQ