Characteristics of Selected Seed-borne Fungi

Karnal Bunt

(*Neovossia indica*, syn. *Tilletia indica*)

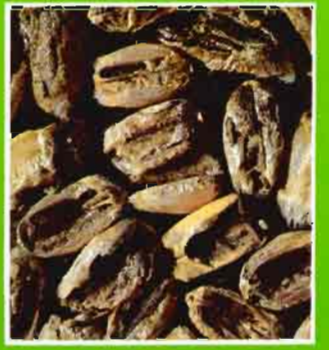
Healthy seed showing no infection.

Point or trace infection at the embryo end.

10% infection; slight disease progress along crease.

30% infection; disease has progressed about ⅓ along crease.

50% infection; disease has progressed about ½ along crease.

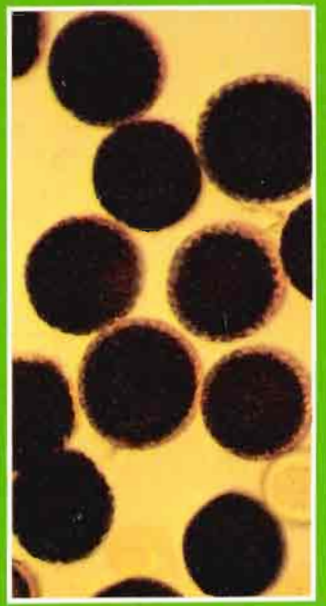


100% infection; endosperm totally replaced by fungal spores.

Crops affected:
Karnal bunt, also known as partial bunt, is primarily a disease of bread wheat. Durum wheat and triticale are also susceptible, though to a lesser extent than bread wheat.

Symptoms:
Disease symptoms are difficult to detect in the field but become obvious in threshed grain. Infection begins at the embryo-end of the seed and, depending upon the environmental conditions during grain maturation, proceeds along the crease of the seed. Infected seeds usually retain at least a partial pericarp; the disease is confined to the endosperm of the seed and converts it to a mass of dry, black teliospores. These teliospores often emit a fishy odor, similar to other bunt diseases.

Spore morphology:
The teliospores of *Neovossia indica* are comparatively large (25-30 μm in diameter), more or less spherical, black (immature teliospores are lighter in color) and have a slightly reticulate surface.



Neovossia indica (10 x 40)

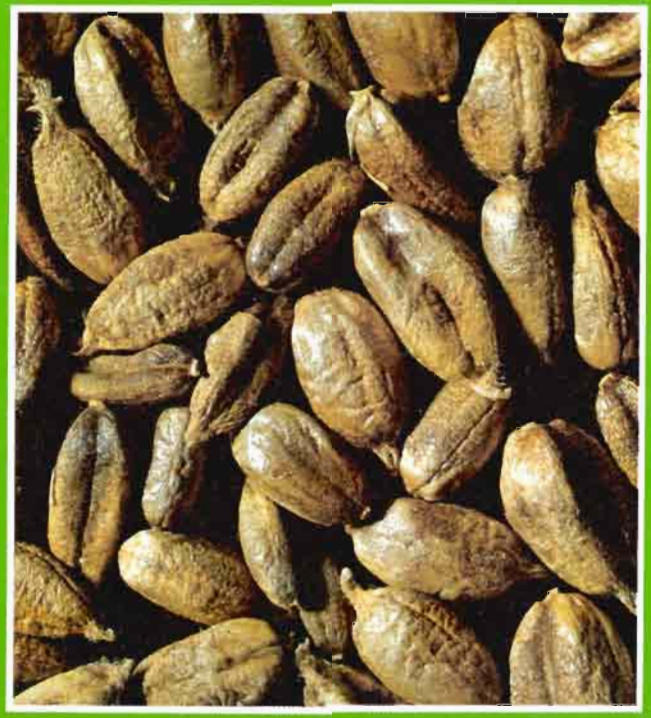
Common Bunt

(*Tilletia caries; T. foetida*)

Crops affected:
Common bunt, also know as hill bunt or stinking smut, can attack all small grain cereal crops but is most severe on bread wheat.

Symptoms:
Infected plants are often reduced in height and display increased tillering. Diseased spikes are bluish green to dark green and the glumes tend to spread slightly apart to accommodate the bunt balls that replace the seed. Bunt balls approximate the shape of normal kernels but tend to be more spherical and are a dull grey-brown to grey-black color. Bunt ball pericarps are fragile and often rupture during threshing, releasing numerous teliospores. When crushed, bunt balls emit a strong fishy odor.

Spore morphology:
The teliospores of *Tilletia caries* are globose, brownish black in color, have reticulate walls and measure 15-23 μm in diameter. The teliospores of *T. foetida* are also dark in color, globose to elongate with smooth walls, and measure 17-22 μm in diameter.



T. caries (10 x 40)

T. foetida (10 x 40)

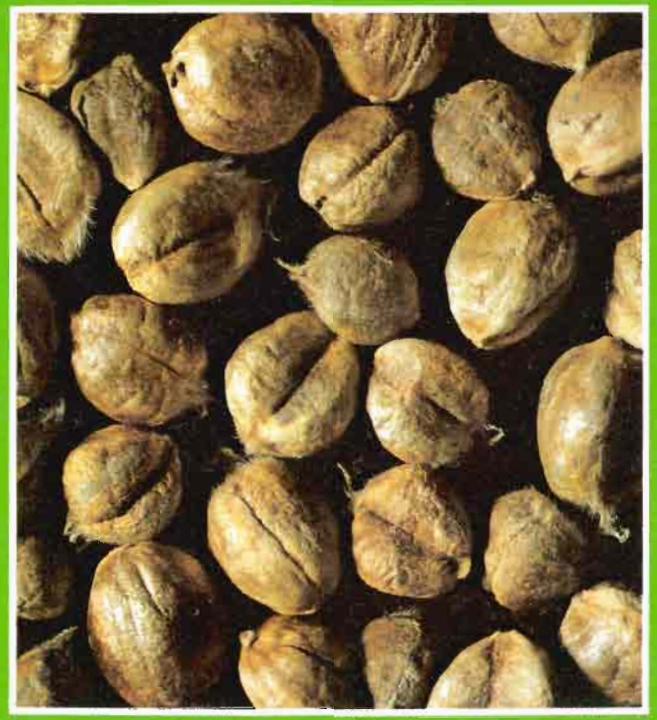
Dwarf Bunt

(*Tilletia controversa*)

Crops affected:
Dwarf bunt, like common bunt, affects all small grain cereals but is most severe on bread wheat. The disease is restricted to regions where snow covers the soil for extended periods of time.

Symptoms:
The fungus causes more severe stunting than common bunt. The glumes of infected spikes spread slightly apart to accomodate the bunt balls produced by the pathogen. These bunt balls are similar in shape, size and color to those produced by *Tilletia caries*. They resemble the seeds they replace, but tend to be more spherical and are a dull grey-brown to grey-black color. When crushed they emit a strong fishy odor.

Spore morphology:
The teliospores of *T. controversa* are morphologically similar to those of *T. caries;* they are globose, brownish black in color, have reticulate spore walls and are 15-23 μm in diameter.



T. controversa (10 x 40)

Black Point

(*Helminthosporium sativum; Alternaria* spp.)

Crops affected:
Black point is common on all small grain cereals. It is most commonly caused by *Helminthosporium sativum* and several *Alternaria* species.

Symptoms:
Black point is difficult to identify in the field, but can readily be seen in threshed grain. The disease develops as a dark staining of the embryo end of the seed.

Spore morphology:
The conidiospores of *H. sativum* are olive brown, oblong, tapered toward the distal end, slightly curved with smooth walls, and have a prominent basal scar. They measure 60-120 μm x 12-20 μm and have three to nine septa. The conidiospores of *Alternaria* species develop in chains, are ovoid or elipsoidal, often taper at one end, and are medium brown to dark brown. They have smooth to slightly roughened cell walls, several transverse, longitudinal or oblique septa and measure 20-90 μm x 8-20 μm.

H. sativum (10 x 40)

Alternaria spp. (10 x 40)

Healthy Seed

This is a sample of CIANO 79 bread wheat seed that is free of disease. Healthy seed, free of the bunt, smut, or black point diseases are judged by a number of criteria. Seed should be uniformly colored, the pericarp intact, no evidence of shrivelling, and it should have a high germination percentage.

CIMMYT

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