Wheat Diseases I
Michigan State University
Cooperative Extension Service
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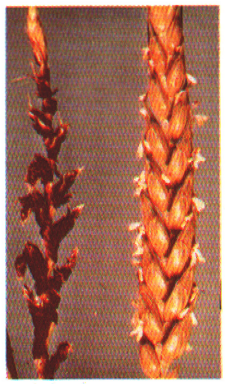
June 1980
2 pages

WHEAT DISEASES I

1. Black head molds

2. Botrytis head mold

3. Common bunt or stinking smut



4. Loose smut. R, healthy head

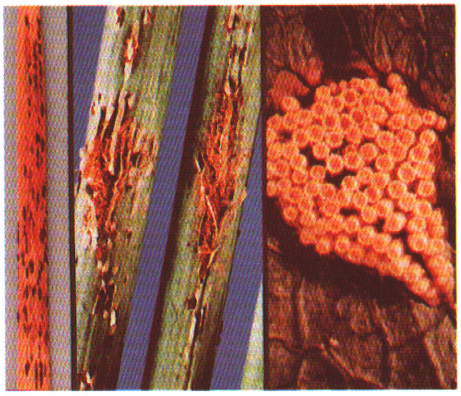
5. White heads *(Fusarium)*

6. Foot rot *(Fusarium culmorum)*

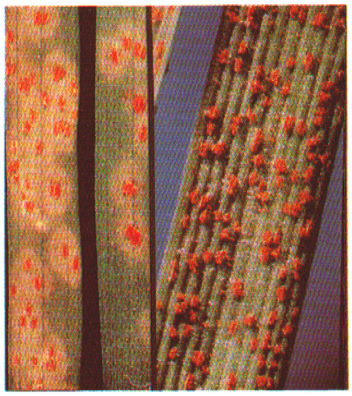
7. Scab or head blight

8. Black chaff. L, leaf and R, glume symptoms

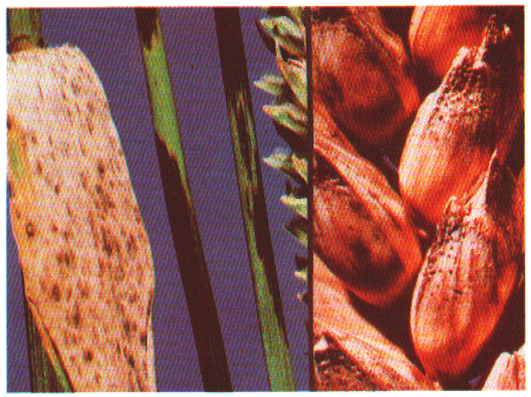
9. Septoria leaf blotch. R, pycnidia of *Septoria tritici* in leaf lesion



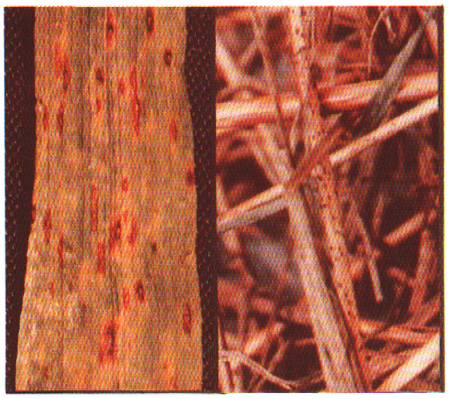
10. Stem rust. L, telial stage; C, uredial stage; R, aecial stage on barberry leaf



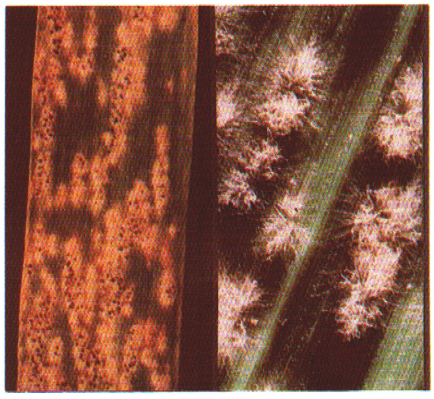
11. Leaf rust



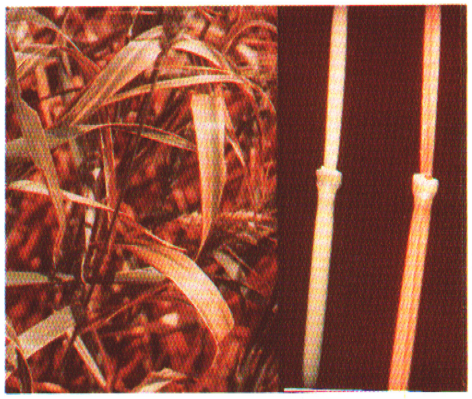
12. Septoria leaf and glume blotch *(S. nodorum)*. L, leaf and R, glume symptoms



13. Tan or yellow leaf spot. R, pseudothecia of *Pyrenophora trichostoma* on straw



14. Powdery mildew. L, black specks (cleistothecia) in older colonies



15. Cephalosporium stripe. L, leaf and R, culm symptoms (left culm is healthy)

MICHIGAN STATE UNIVERSITY
COOPERATIVE EXTENSION SERVICE

EXTENSION BULLETIN E-1420
JUNE 1980
FILE 27.323

WHEAT DISEASES I

1. **Black Head Molds** are species of *Cladosporium* and *Alternaria* and to a lesser extent *Stemphylium*, *Epicoccum*, and *Sporobolomyses*. These fungi, often called "sooty molds," give an olive-brown to black appearance to the glumes and grain. These molds infect during damp weather at or near grain maturity, and are most severe when harvest is delayed. Plants prediposed to other diseases, shading, nutrient deficiency, and lodging are most susceptible. The fungi survive mosty in plant refuse.

2. **Botrytis Head Mold**, caused by the fungus *Botrytis cinerea*, is a minor, late season disease. Warm, wet weather at or near harvest increases the incidence of this disease. Infected glumes and kernels are blue-gray to black due to growth of the fungus. Plants weakened by disease or other disorders are most susceptible. The fungus has a wide host range and survives on plant debris.

3. **Common Bunt or Stinking Smut** is caused by two closely related fungi, *Tilletia caries* and *T. foetida*. The fungi produce plump "smut balls" that replace the kernels and cause the glumes to spread apart. These balls have a fishy odor and crush at harvest to release a cloud of dark spores (teliospores or chlamydospores). Infected plants are slightly stunted and the heads usually remain green longer than those on healthy plants. Cool soil temperatures favor seedling infection. The fungus overseasons as teliospores on seed and in soil.

4. **Loose Smut** is caused by the fungus *Ustilago tritici*. Unlike Common Bunt (3), Loose Smut does not affect seed quality. The smutted heads, with the kernels replaced by black masses of spores, are clearly visible shortly after they emerge. At harvest, only a naked rachis remains of a smutted head. Wheat plants are only susceptible to infection for about a week at flowering time. The fungus invades the embryo of the developing seed, remains dormant until the kernel germinates, and then colonizes the terminal growing point.

5. **White Heads**—the blasting and killing of inflorescences— is a symptom common to many disorders including Fusarium Foot Rot (6), Cephalosporium Stripe (15), Eyespot, Rhizoctonia Sharp Eyespot, Take-all, copper deficiency and insects such as the stem maggot (*Meromyza americana*) and stem sawflies (*Cephus* spp.). Species of *Fusarium* and other fungi are splashed into the upper leaf sheaths during rainy weather and colonize nodal areas. Under moisture stress, infected stem tissue inhibits the upward flow of water resulting in death of the head.

6. **Foot Rot**, caused by the soil-borne fungus *Fusarium culmorum*, is economically important in many areas of the USA, especially in warmer soils. Plants under moisture or nutritional stress or insect injury are very susceptible. Light-brown to reddish-brown lesions develop on subcrown internodes, coleoptiles and primary roots. Above ground plant parts can become infected from stubble-produced spores which incite irregular tan blotches on the leaves or White Heads (5). The greatest yield loss comes from stands thinned by foot and crown infections which are often lethal to seedlings. The fungus overseasons on plant refuse, seed and in soil.

7. **Scab or Head Blight** is caused by species of *Fusarium*, primarily *F. roseum* f. sp. *cerealis* (perfect stage, *Gibberella zeae*). One or more spikelets per head turn prematurely straw-colored when glumes on healthy spikelets are still green. Infected spikelets are usually sterile or contain bleached to grayish-brown, shriveled and rough kernels. A pink to orange mold often grows at the base of diseased spikelets. Black perithecia of *G. zeae* develop **on** old wheat heads. Scab is most serious when warm moist weather occurs from flowering time to near maturity. Diseased grain contains mycotoxins that are poisonous when fed to swine, horses, dogs, and humans. The fungi overseasons on and in seed and soil plus cereal, grass and corn residues.

8. **Black Chaff**, caused by the bacterium *Xanthomonas translucens* f. sp. *undulosa*, appears as dark brown to black or olive-green, interveinal blotches and streaks on the glumes, awns, leaves, sheaths, necks, and stems. Slime or tiny droplets appear on the lesions in wet weather and dry into minute yellow scales. Diseased heads mature late, may be sterile if infected before flowering, or produce kernels that are shrunken at their bases. The bacterium overseasons in seed, living and dead plants, and soil.

9. **Septoria Leaf Blotch** is caused by the fungus *Septoria tritici*. Small, light green-to-yellow spots on the leaves and sheaths enlarge and merge to form irregular, tan-to-reddish-brown blotches with gray-brown to ash-colored centers often partly surrounded by a yellow margin. Black specks (pycnidia) form in older lesions or at stem nodes. Affected leaves often turn yellow, wither and die early. The fungus survives in living and dead wheat plants and in seed.

10. **Stem Rust**, caused by the long-cycled rust fungus *Puccinia graminis* f. sp. *tritici*, occurs on stems, leaves, sheaths, and heads. When severe, grain may be shriveled and light weight. The oblong, reddish-brown uredial pustules are tattered with fragments of wheat epidermis. The pustules release masses of dusty urediospores that reinfect wheat. As the wheat matures, the pustules gradually turn black when telia and teliospores develop. To complete its life cycle an alternate host, common barberry (*Berberis vulgaris, B. canadensis, B. fendleri*) or species of *Mahonia*, is required. The teliospores germinate in early spring to produce basidiospores which infect nearby alternate hosts and form orange-to-yellow leaf spots called pycnia. Later, on the opposite side of the same leaf, aecial "cluster cups" develop containing golden aeciospores. These spores infect nearby wheat plants completing the disease cycle. The fungus overwinters on wheat stubble and in the uredial stage on living plants in the southern USA and Mexico. The wind-borne urediospores spread northward as the season progresses.

11. **Leaf Rust**, caused by the fungus *Puccinia recondita* f. sp. *tritici*, appears as small, round-to-oval, orange-yellow dusty pustules (uredia) on the leaves and sheaths, sometimes the stems, and occasionally the glumes and awns. On a resistant wheat only small yellow flecks or spots without uredia develop. As wheat matures, glossy, dark gray-to-black covered telia are produced. The alternate host, species of meadow rue (*Thalictrum*), is infected in Europe but this is rare in the USA. The rust fungus overwinters in the uredial stage on living wheat plants in the southern USA and Mexico. The wind-borne urediospores spread northward as the season progresses.

12. **Septoria Leaf and Glume Blotch** is caused by *Septoria nodorum* (perfect stage, *Leptosphaeria nodorum*), closely related to the Septoria Leaf Blotch fungus (9). *S. nodorum* infects the leaves, sheaths and stems producing symptoms very similar to *S. tritici*. Enlarging, grayish or brownish blotches, which later turn chocolate-brown, form on the glumes. The centers turn grayish-white and are studded with black pycnidia. The fungus overwinters in living and dead plants and in seed.

13. **Tan or Yellow Leaf Spot**, caused by the fungus *Pyrenophora trichostoma* (imperfect stage, *Helminthosporium tritici-repentis*), can be serious where no-till is practiced. Diseased leaves often turn yellow, wither and die early. Small, yellow-to-tan-brown flecks enlarge to lens-shaped brown lesions, up to 12 mm long, with a yellow border. In the fall, raised, black pseudothecia form on wheat stubble. These structures mature in winter and spring to produce ascospores that infect the next wheat crop.

14. **Powdery Mildew** is caused by the fungus *Erysiphe graminis* f. sp. *tritici*. White-to-light gray, powdery patches form on the leaves, sheaths, stems and floral bracts. Black, speck-sized cleistothecia form in the mildew growth as the crop matures. Where severe, infected leaves wither and die early. The fungus overseasons on living and dead plants.

15. **Cephalosporium Stripe**, caused by the fungus *Cephalosporium gramineum* (imperfect stage, *Hymenula cerealis*) is associated with wet soils and more or less continuous cultivation of winter wheat. Yellow then brown stripes develop on the stems and often continue the length of the leaf. One to four stripes form per leaf. Older leaves gradually turn yellow and die. Diseased plants are stunted and produce white, poorly filled heads with shriveled kernels. The fungus overseasons in crop debris and soil near the surface.

For chemical control suggestions, a listing of resistant varieties, and other control measures, consult the Extension Plant Pathologist at your land-grant university, or your county extension office.

Photo credits: BASF (1, 2, 5, 9, 10C, 11, 14R), University of Wisconsin (3), R. W. Samson (4), The American Phytopathological Society (6, 14L), T. M. Sjulin (7, 10L), University of Nebraska (8L, 13), M. G. Boosalis (8R), J. A. Browning (10R), and unknown (15L).