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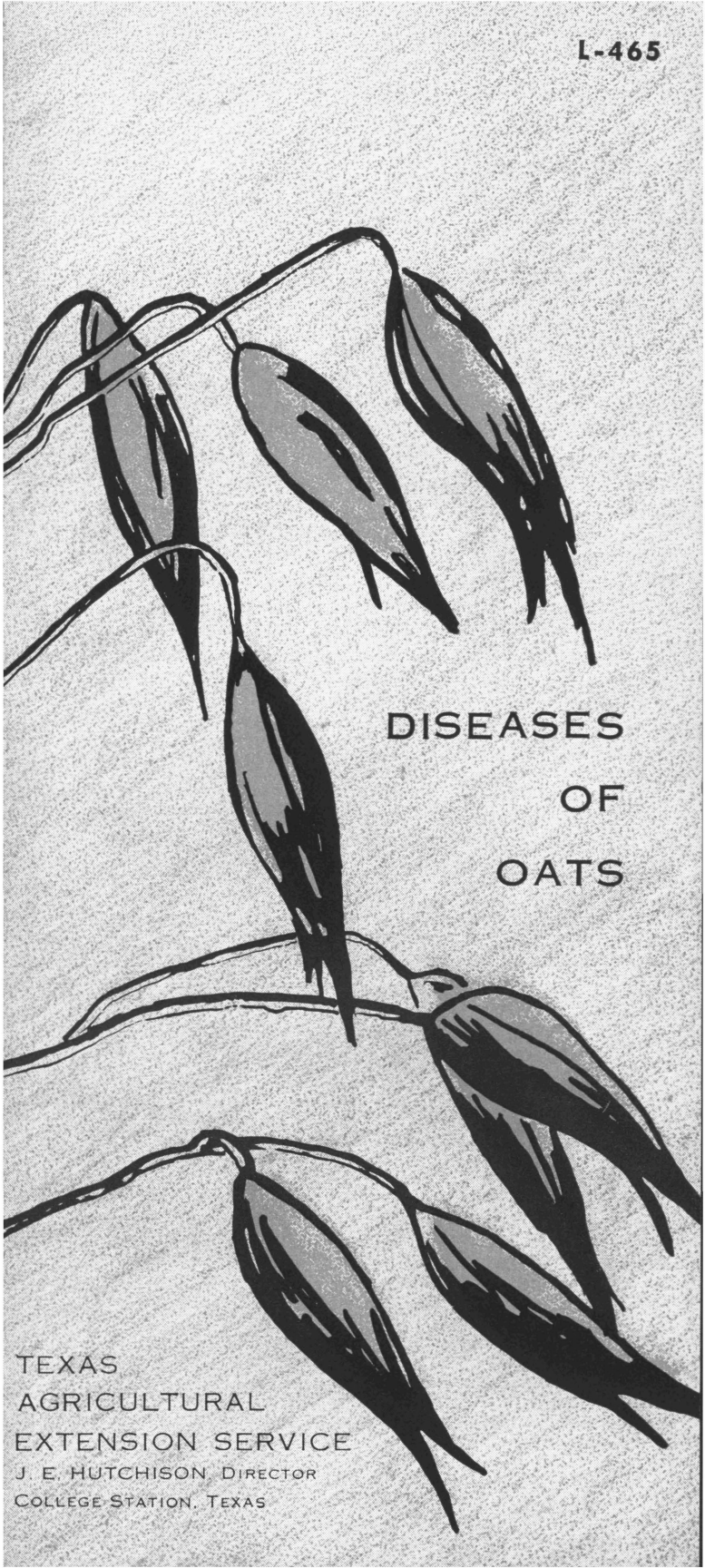

DISEASES OF OATS

TEXAS
AGRICULTURAL
EXTENSION SERVICE
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DISEASES OF OATS

(Cooperative investigations, Texas Agricultural and Mechanical College System and Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture.)

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Oats are widely grown in Texas, but diseases reduce forage and grain yields of this crop particularly in the humid areas. Oat diseases caused a 28 percent crop loss in 1957. Lowered grain production was only a part of the loss since test weights, market price and germination were also reduced. Lodging of the straw caused by diseases increased the cost of harvesting.

Crown rust, stem rust, Helminthosporium blights and the smuts are major diseases of oats in Texas. Powdery mildew, Septoria leaf blotch and virus diseases are minor diseases but may be important in local areas. Oat diseases caused by parasites often are confused with mineral deficiencies and damages from abnormal climatic conditions. The organisms that cause parasitic diseases are small and frequently overlooked. Many diseases can be controlled by the use of resistant varieties, seed treatment and crop rotation. The control of plant diseases increases yields and net profits at the end of the crop year.

Crown (Leaf) Rust

Crown (leaf) rust is the most destructive disease of oats in Texas, Figure 1. It reduces the yield of grain per acre and causes severe lodging in plants. This

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Fig. 1. A field of oats destroyed by crown rust in 1957 at College Station.

disease is caused by a fungus that attacks the leaves principally, but may occur on other above-ground parts of the oat plant. The fungus produces small, bright orange-red, dust-like particles in pustules. Microscopic examination reveals that these particles are round spores and are easily rubbed off on the hands and clothing. They are spread by wind. Temperatures of 70 to 80 degrees F. are favorable for the development of this disease. However, once the disease is established on plants, temperatures can drop below freezing and the fungus remains dormant; but the disease will develop during the next warm-weather period. The orange-red pustules turn black as the oat plant ripens.

Heavy leaf-rust infections kill oat plants prematurely, especially in South Texas, where oats are grown for pasture. New races of the rust attacked the Alamo, Mustang and Victorgrain varieties in South Texas in 1958, killing oat plants in pastures in early April. Pastures in this area had produced forage until the middle of May or early June in years when rust infections were light.

CONTROL — The best prevention of crown rust is to grow varieties that are resistant or tend to escape the disease. However, no commercial variety is resistant to all races of leaf rust. Suregrain and Moregrain are resistant to a number of races. Alber, New Nortex and Camellia produce some grain and forage even when rust is present. Research is underway to develop new, improved, disease-resistant varieties.

Stem Rust

Stem rust occurs throughout Texas on oats and some grasses. This rust is caused by a fungus which produces small, brick-red, oblong pustules on the leaves and stems, Figure 2. As the oats ripen, pustules turn black. Thou-

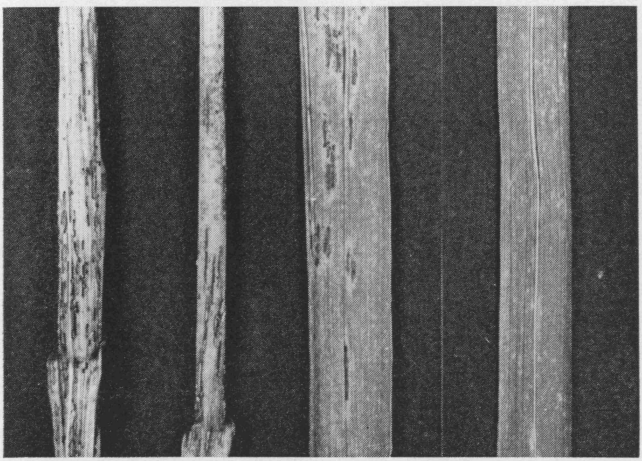

Fig. 2. A normal leaf of oats is shown at the left in contrast with a leaf and stem of oats infected with stem rust.

Fig. 3 A healthy head of oats (left) compared with one infected with covered smut and two infected with loose smut. The smut spores have been washed or blown off the one at right.

sands of spores are produced in each pustule and spread by wind. Plants are killed prematurely and yields are reduced greatly by this disease. Plants in pasture fields in South Texas have been killed in early stages by this disease in years when stem rust was heavy.

CONTROL — The only practical means of control is to grow resistant varieties. Alamo is the only resistant variety. Early-maturing varieties sometime escape damage by the fungus.

Smuts

The panicles or grain of oats infected by smut are replaced by a mass of black smut spores, Figure 3. These spores are blown to healthy plants in the field. They are spread to healthy seed when the grain is threshed. The smut infects the seed when planted and grows inside the plant unobserved until the plant heads. There are two types of smut: loose and covered. The differences in these smuts are shown in Figure 3.

CONTROL — Both types of smuts can be prevented by treating seed with organic mercury compounds. Most commercial seed-treating establishments have equipment for applying fungicides. Seed treatment is recommended for all planting seed. Even in the absence of smuts, seed treatment improves germination by controlling a wide range of other disease-producing fungi.

Helminthosporium Blights

Three different types of Helminthosporium blight occur in Texas. The most damaging is the Victoriae blight on varieties of Victoria parentage. These varieties are Alamo, Mustang and Victorgrain. Seedling plants of these varieties are sometimes blighted and killed shortly after they emerge. In other cases, the disease may cause stunting of the plants, reddening and eventual death of the leaves. The crown and stem parts of the plant rot and yields are greatly reduced. If the disease becomes severe under pasture conditions, the amount of forage is greatly reduced and plants cease to produce forage early in the spring as temperatures soar. The disease is more severe in warm seasons. The effect of Helminthosporium blight on the oat plants is shown in Figure 4.

CONTROL — The following varieties are resistant to Victoriae blight; Alber, Camellia, Arkwin, Midsouth, New Nortex and Suregrain. Crop rotation with the oats grown one year out of three will give adequate control. Seed treatment with organic mercury compounds will control seedling blight and prevent the disease from being seed-transmitted but will not control the disease when oats are planted year after year in heavily infested soils.

The second type of Helminthosporium blight is a leaf blight. Oblong, linear blotches appear on the leaves. The blotches are light yellow at first, later turning red to brown. In severe cases the entire leaf is blighted. Overall damage caused by this disease is relatively light in Texas.

Fig. 4. A normal plant of oats (left) contrasted with plants affected in vary degrees with Helminthosporium blight.

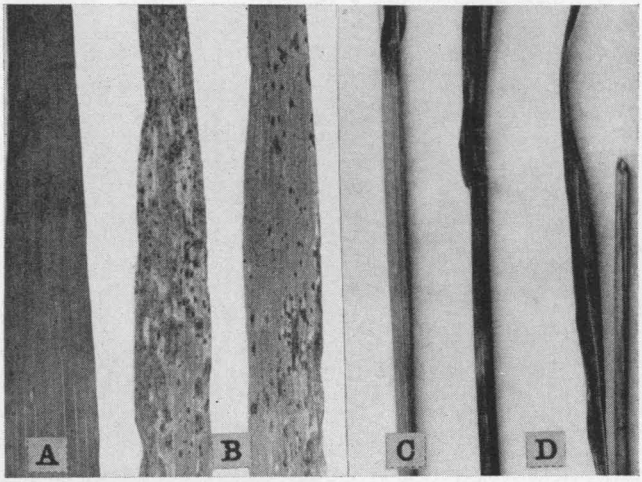

Fig. 5. A. A normal leaf of oats compared with B., Septoria-infected leaf; C., Normal culm of oats compared with D., Septoria-infected culm.

CONTROL — Seed treatment with organic mercury compounds will prevent the disease from being carried over from one crop season to another on the seed.

The third type of Helminthosporium blight is a basal stem and crown rot. This disease was first found in Texas in 1957, and little is known about its control. The reaction of commercial varieties to this disease is not known.

Powery Mildew

Powdery mildew attacks oats occasionally under humid conditions in South Texas. Grayish-white powdery masses appear in spots on the oat leaves. The spots may join together and cover the entire leaf. As the oat plants mature the powdery masses become brown and may contain many tiny black bodies. The spores are spread by wind. Severely infected plants are stunted and the leaves turn yellow.

CONTROL — The common varieties grown in the State are resistant to the races that have appeared in Texas.

Septoria Leaf Blotch

Septoria leaf blotch occurs on oats and related grasses in Texas. The blotches are gray to dark brown and run together, Figure 5. Lesions on the stem are black and cause the plants to lodge, thus increasing the cost of harvest and reducing the quality and yield of the grain.

CONTROL — Seed treatment with organic mercury compounds will prevent the disease from being carried over on seed of susceptible varieties. Differences in varietal reactions are known. However, the reaction by Texas commercial varieties has not been studied.

Yellow Dwarf

Yellow dwarf is caused by a virus and is spread from plant to plant by insects. Disease-infected plants are dwarfed and take on a golden yellow or bright red color, depending on the variety infected. Yellow dwarf usually follows infestations of aphids or small grain greenbugs. Wild grasses probably serve as a source of infection for the oat plants, especially in South Texas during the winter.

Blast

Blasted heads are white and fail to develop grain. Blasting is caused by a physiologic disturbance in the plant which probably results from adverse weather conditions. Varieties vary greatly in the number of blasted heads they produce. Typical blasted heads are shown in Figure 6.

Seed Treatment

Prevention of losses from smuts and other seed-borne diseases is a problem which faces every farmer who grows oats. Seed treatment before planting is the best way to reduce losses from seed-borne diseases. All seed to be treated should first be cleaned carefully by fanning to remove weed seed, light weight grain and chaff. Unless the seed is cleaned before treatment the results from seed treatment may be unsatisfactory. Seed-treating chemicals when properly applied do not reduce germination.

Chemicals recommended: The latest formulations of Ceresan and Panogen should be used according to manufacturers' directions.

Fig. 6. Normal panicle of oats (left) contrasted with panicles damaged by blast.

Procedure: Add the preferred fungicide at the recommended rate to the seed; run the seed through the treater and place them in bags for storage.

Precautions: Chemical seed treatments call for special precautions. Most seed disinfectants are poisonous, and care should be taken not only to avoid breathing the fumes but also to prevent prolonged contact of the chemical with the skin.

Treating machines should be located in the building so that any flying dust will be carried outside quickly. Wear a clean, dry cloth or a filter mask over the nose and mouth. Change the cloth or filter pad often enough to maintain a clean filtering surface. The dust hazard is avoided when "slurry" and "wet" treatments are used.

Keep seed that have been treated away from animals. Treated seed not used in planting should be burned or buried; or if seed are to be saved for planting the following year, they should be labeled clearly and stored in a safe place.

Dry seed (containing 13 percent moisture or less) may be treated 2 to 3 months prior to planting and stored in a dry place. Treated seed should be held in sacks or in bulk for at least 24 hours before planting to permit the volatile gasses to penetrate the seed coat. Do not store treated seed in air-tight containers.

Certified Seed

Most certified seed are treated for control of disease organisms. Certified seed are produced under conditions where there will be a minimum of disease. Using certified seed that have been properly treated is one of the best disease control measures. Read the tag on the bag of seed to learn the kind and amount of treatment used.

Names of Causal Fungi

COMMON NAME	CAUSAL ORGANISM
Crown rust	**Puccinia coronata avenae**
Stem rust	**Puccinia graminis avenae**
Smuts	
Loose	**Ustilago avenae**
Covered	**Ustilago kolleri**
Helminthosporium blights	
Culm rot	**Helminthosporium sativum**
Victoriae blight	**Hedminthosporium victoriae**
Leaf blotch	**Helminthosporium avenae**
Septoria leaf blotch	**Septoria spp.**

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