

changes. A period of favorable prices is followed by an upward trend in acreage and this in turn is followed by a reverse trend when prices decline again.

Since 1928 the harvested acreage has not dropped below 100,000 and has gone as high as 167,000 acres. Approximately 75 percent of the total harvested acreage is grown in the five counties of Pembina, Walsh, Grand Forks, Traill, and Cass.

All Tame Hay

Ninety-five percent and more of the tame hay crop is fed on the farms. The acreage increased very gradually after settlement began and did not reach the half million mark until 1911.

Another 13 years had to pass before the acreage reached a million at about which point it leveled off, with the exception of several drought years in which a large amount of grain was salvaged as hay, bringing the acreage well above the million mark. The peak acreage was recorded in 1931 at 1,847,000 acres.

Almost 1,100,000 acres of this was grain hay. There is some relationship between the tame and wild hay acreages. In seasons when wild hay is a good crop, the tame hay acreage drops off somewhat. The last two years are examples of this.

The tame hay acreage in this State is made up of varying proportions of alfalfa, sweet clover, grain hay, millet, sudan, crested wheat, and brome grass.

Common Head Disease of Wheat

By

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WHEAT AND OTHER GRAINS are attacked by a number of head blights. Some of these blights may be minor diseases in most years, but occasionally one or more of them may cause excessive damage. Some of the newer wheats appear to be very susceptible to certain blight diseases. When susceptible wheats are grown from year to year, the diseases may accumulate in the soil or in the seed, and after a few crops showing little infection are grown, the disease may suddenly appear to become of major importance. Wet seasons favor the development of certain blights. The growing season of 1943 was wet, and wheat in the Red River Valley underwent considerable damage from the diseases commonly known as scab and black chaff. Other blights, caused by the fungi *Helminthosporium* and *Septoria*, were prevalent in many fields also.

Wheat Scab: During the recent dry years wheat scab was of minor importance in this region, contrasted with the major injury caused by this blight in the last two years. Scab is a doubly destructive disease because it attacks not only the heads, but also the roots of

wheats and other grains. One seldom notices the work of the scab organism on the roots of wheat, but the symptoms are quite obvious on the heads, which often become infected, generally resulting in a shrivelled condition of most of the grain. In minor infections, only a

few spikelets, or often the tips of the heads, become blighted. There is a short period of time when a pinkish mold may be observed at the base of the spikelets and along the margins of the chaff. This condition develops while scab is in its prime. Earlier or later in the season the fungus remains obscure. The presence of scab is often difficult to detect when the pinkish fungus is not visible, requiring expert knowledge of the blight diseases. An outstanding result of scab is severe shrivelling of the grain. Infected kernels, which may or may not be shrivelled, often are sown. Such kernels develop a type of seedling blight or root rot, killing or severely damaging the plants.

Scab is one of the most difficult wheat diseases to control. The infections may originate from the soil, from the seed, or be borne to the heads by insects or winds. Secondary infections develop and spread from plant to plant continuously during the heading season. The fungus may infect other grains and often is very destructive on barley and corn. The organisms survive over winter on corn stalks. In years when scab develops extensively, the corn stalks and stubble become infected. The following year the fungus continues its development on this rubbish, producing spores which finally lodge on the heads of wheat and other grain. For this reason wheat or barley sown on land which produced corn the previous season may develop severe scab damage. Crops such as oats and flax could better be grown on corn ground. In the corn belt fairly good control of scab has been obtained by thorough coverage of the corn stalks when plowing, and by carefully planned rotations.

Black Chaff: This, unlike most diseases of wheat is caused by a bacterium. In North Dakota damage has been only slight, although it has occurred frequently and sometimes becomes extensive in restricted

sections. Many wheats are susceptible to this blight. Those without beards frequently are more severely damaged than the bearded wheats.

As the name indicates more or less, black stripes appear on the chaff. Frequently, dark stripes may develop on the culms just below the heads. These are sometimes mistaken for black stem rust. When infection develops early in the season, it may spread and affect most of the heads in the field. The base of the glumes or chaff may be penetrated by the bacteria which later infect the kernels. Under this condition, considerable shrivelling of the grain develops. Black chaff bacteria are carried over winter either in or on the seed. Treating the seed with a suitable disinfectant will destroy the bacteria on the seed, but may not have much effect on those within. All light weight shrivelled seed should be removed from seed grain before treating, as these grains may harbor the black chaff bacteria.

Helminthosporium: The disease caused by the fungus **Helminthosporium** is very common in this region. It is somewhat similar in its nature and destruction to scab. Generally, it is less destructive on the heads, although more destructive on the roots than the scab organism. It affects not only wheat, but also other grains and grasses. Infected wheat may be more or less dwarfed, with the number of head per plant reduced.

Symptoms, as they appear on the heads, are of two types. When the roots become severely affected, white heads, due to premature killing of the plants, often develop. These may be mistaken for the work of insects. When the fungus attacks the parts above ground, spots or lesions develop on the leaves, glumes, and kernels. These lesions appear as elongated, irregular shaped spots. The disease attracts attention by the leaf spot development. Often the entire base of the spikelets become black as well as

the tips of the kernels. **In threshed grain the familiar black pointed kernels are the result of infected heads.**

Seeds affected by the black point disease develop diseased plants, which may die early in the seedling stage or they may live on in an unhealthy condition to the end of the growing season. It is not known definitely to what extent the fungus may live from year to year in the soil.

Shrivelled and light weight seed follow the infection. Any grain which is intended for seeding purposes should be thoroughly cleaned to remove these kernels. Treating the seed with an organic mercury compound, such as Cerasan, is recommended as a control measure. The treatment will not destroy all of the infection but will kill most of it and greatly improve the germination.

Basal Glume Rot: Another bacterial disease sometimes confused with black chaff is basal glume rot. This head blight occurs each year to some extent in this region and occasionally may cause considerable damage. It attacks the leaves, heads, and grain of wheat. On the heads the base of the glume or chaff commonly becomes discolored. Sometimes the discoloration may occur over almost all of the surface of the glume, but more often the lower part is affected. In this respect the disease may be distinguished from black chaff which occurs in streaks not only on the glumes, but on the stems as well. The bacteria penetrate through the glumes and attack the germs of the grain. Because of the minor importance of this blight, control measures have not been developed, although without doubt the bacteria are carried to some extent by seed and the same practice recommended for the black chaff disease should prove beneficial in the control of basal glume rot.

Septoria blights: There are two distinct diseases produced by different species of the *Septoria* fungus. These have been known to occur in this region, although we have no record of either causing severe damage except in local sections. One of the septoria blights is confined largely to the leaves of the wheat plant. The other form may attack almost any part of the plant, but is most often noticed on the glumes where it may be confused with black chaff or basal glume rot.

The septoria fungus may attack the nodes of wheat, causing a discoloration and a more or less deformed stem. The fungus has often been associated with crooked stems. Like the other blights of the heads of wheat, the infection may produce shrivelled kernels. Cleaning, grading, and disinfecting the seed are recommended control measures.

Rare-Diseases: Several other diseases, some of which may be destructive in other sections of the United States or other countries are rarely found in this region. Among these may be mentioned anthracnose, yellow striped rust, flag smut, and powdery mildew. No one of these diseases has attracted much attention during the past several years, but changing weather conditions, and the frequent importation of seeds from other regions may serve to bring about destruction from any of these now obscure diseases. Mildew has seldom developed on our wheat, probably because of the relatively dry conditions which generally prevail when the grain is nearing maturity. In some states mildew causes considerable destruction each year. Yellow stripe rust has caused considerable destruction in Europe, but is rarely observed in this country. Flag smut has been a problem in several foreign countries, but its occurrence has been rare in the United States.