

Pasmo Disease of Flax¹

By

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PASMO," A DISEASE OF FLAX, has increased greatly in destructiveness in North Dakota during the last three years.

In 1943, it was present in all flax producing regions of the state, with heaviest losses sustained in the southeastern and eastern counties. In fields where the infection was especially heavy it was estimated that yields were reduced more than 50 percent.

Pasmo is not a new disease of flax, it having been first described in Argentina in 1911. It apparently was introduced into North Dakota with Argentine flaxseed prior to 1916. Brentzel² found it present throughout the major flax growing areas of Minnesota, North Dakota, and South Dakota as early as 1922. The disease has been present during the intervening years and, when moisture and temperature conditions have been favorable, has caused some injury.

Pasmo is dependent for its destructiveness upon the interaction of a number of factors, the most important of which are: (1) abundant inoculum (2) favorable environmental conditions for its rapid increase, and (3) the use of susceptible varieties. The increase in flax acreage during the period 1940 to 1942 coupled with favorable moisture and temperature conditions that permitted the building up of an abundance of inoculum, and the increase in the acreage of the very susceptible Golden or Viking flax have contributed to the heavy pasmo infection of 1943.

Symptoms

Brown areas developing in the field shortly before harvest are usually the first indication the grower has of pasmo infection. These areas of infested plants may enlarge rapidly and cover a considerable part or the entire field. However, studies of the disease have shown that the cotyledons of young plants may be infected and that the older leaves on the lower portion of the stem often bear pasmo spots long before the brown areas develop in the fields. Stems of young

plants are rarely attacked. The lesions on the leaves are circular and vary in color from greenish-yellow in the early stages to dark brown in the advanced stages of development. Minute black pycnidia, in which the spores are produced, develop abundantly in the older lesions.

Stem lesions are at first small and usually occur on the lower portions. Depending upon the susceptibility of the variety, these enlarge more or less rapidly, extending both up and down and

¹Cooperative investigations between the North Dakota Agricultural Experiment Station and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

²Brentzel, W. E. The Pasmo Disease of Flax, Jour. Agr. Res. 32:25-37, 1926

around the stem. The brown infected portions, alternating with irregular bands of uninfected green portions, is a striking characteristic of the development of the disease on the stems. As the plants ripen, often prematurely, the brown infected lesions coalesce, and the stems become entirely brown.

If the disease attacks late in the season when the crop is approaching maturity, the yield of seed may not be materially reduced. If the attack comes early, the plant is prematurely defoliated, the flowers may be blighted, the bolls do not develop, the stem is weakened and then breaks over readily, and the seeds are off-color and shrunken.

The Pathogen

Pasmo is caused by a fungus organism, **Septoria linicola** (Speg.) Gar. It overwinters on diseased straw and may be carried from one locality to another with seed containing bits of diseased straw or as spores on the seed-coat. Spores are produced in the minute black pycnidia that form abundantly in the older diseased tissues. In moist weather, great numbers of spores are exuded from these pycnidia in gelatinous threads, and are then spread by wind and rain. Temperatures near 70° F have been found most favorable for germination of the spores and for vegetative development of the organism so that periods of moist, warm weather favor the disease. Because a high degree of moisture favors the disease, low lying and lodged portions of fields often show earliest and most severe attack.

Control

At the present time no control measures are known that will assure against loss from pasmo. However, losses may be reduced by the following practices:

(1) Grow a less susceptible variety

(2) Crop rotation and field sanitation

(3) Seed treatment

Because of extensive damage to Bison by rust during recent years there has been a shift to rust resistant varieties. Unfortunately, some of these rust resistant sorts have certain undesirable qualities among which is susceptibility to pasmo. Most varieties now being grown in Minnesota, North Dakota and South Dakota are sufficiently susceptible to pasmo to be injured when conditions are especially favorable for the development of the disease. There are, however, varieties of flax that appear to possess some pasmo resistance and projects are under way to develop varieties having this character as well as other features such as resistance to wilt and rust, desirable agronomic type, high yield, a high oil content, and an oil of good quality.

An exact evaluation of the susceptibility of the different varieties to pasmo is difficult to make since they vary in earliness and all varieties appear to become more susceptible as they approach maturity. The relative susceptibility of the more widely grown varieties and some of the selections recently released is approximately as follows:

Highly susceptible—

Viking or Bolley Golden
Rio
Argentine

Susceptible—

Walsh
Victory
Renew
Royal
B5128

Moderately susceptible—

Bison
Biwing
Redwing
Koto
Buda

Cultural and sanitary practices only serve to reduce injury and in

regions where a large acreage of flax is grown may not be very effective in preventing losses from pasmo. Since straw and stubble from the infested crop of the previous year is the principal source of inoculum for pasmo, flax should not follow flax. It is advisable to have the flax field removed as far as possible from those sown to flax the preceding year. If it is necessary to sow flax adjacent to a field on which flax was grown the previous

year, the stubble should be thoroughly destroyed by plowing or burning. Manure containing diseased flax straw should not be spread on the field that is to be sown to flax.

In regions where pasmo is not prevalent careful cleaning of the seed and seed treatment with New Improved Ceresan at the rate of $\frac{1}{2}$ ounce per bushel may help to delay the establishment of pasmo and reduce losses.

North Dakota Farm Prices

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THE AUGUST 15, 1943 North Dakota farm prices as reported by the Federal Agricultural Statistician were generally lower than prices received by farmers a month earlier. All grains were reported at a lower level while potatoes showed no change from that of a month earlier. Hogs were 20 cents higher, but cattle and sheep were each 20 cents lower and lambs were 40 cents lower. There was no change for the month in wool and butterfat prices. Chickens and eggs were up a fraction of a cent. After remaining at 161 for the past three months the North Dakota farm price index has declined 2 points in August to 159.

North Dakota farm prices, in spite of a seasonal decline, are generally higher in 1943 than they have been for a number of years. As a matter of fact, all of the 14 commodities have, during at least one of the first eight months of 1943, reached a price higher than they have for a number of years. The May and June price for potatoes, the June and July price for wheat, and the July price for rye was the highest since 1937. The May 1943 price for sheep was the highest since 1929. The August price for eggs was the highest since 1930 while it is necessary to go back to 1924 to find a butterfat price as high as March, April and May of this year. It is necessary to go back to 1920 to find prices as high as the April price for flaxseed, the July price for oats and for barley, and the July and August price for wool. The March 1943 North Dakota farm price for hogs was the highest since 1920, and the March and April price for lambs the highest since 1918. A search of the records back to January 1910 does not reveal a North Dakota farm price as high as the March 1943 price for cattle nor the June and August price for chickens.