The Story of Sheyenne Flax

By
H. L. Walster, Director

A NEW variety of flax or of any other crop rarely develops as a result of an accident. Instead, there is usually a long background of careful planning and cooperation. The story of the development of Sheyenne flax, a variety of flax immune to all the races of rust known to exist in the United States, is such a story.

The story begins with an appropriation of $5,000 by the North Dakota legislative assembly of 1931 which enabled the Agricultural College to build a greenhouse with accompanying head house containing a small office, a small laboratory and special research equipment. With this greenhouse and equipment provided, the North Dakota Agricultural Experiment Station invited the cooperation of the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture. They located one of their ablest plant pathologists, Dr. H. H. Flor, in the State and assigned to him the task of developing a rust resistant flax. Bison flax which had been developed by this Station and which was highly wilt resistant had proven to be highly susceptible to flax rust, a disease which was beginning to become more and more serious. A rust resistant flax easily handled by the growers had become a major need.

Dr. Flor approached the problem of creating a new rust resistant flax by first finding out how many physiologic races of flax rust he was likely to encounter. He then proceeded to study the inheritance of disease susceptibility in a cross between different physiologic races of flax rust and ultimately that led to studies of the inheritance of rust reaction of crosses between different varieties of flax. His first scientific paper on flax rust appeared in the Journal of Agricultural Research in 1935, four years after he began his first studies. This paper was entitled, "Physiologic Specialization of Rust On Flax". This was followed in 1940 by another paper describing "New physiologic races of flax rust", also published in the Journal of Agricultural Research. In 1941 two more papers appeared. One was concerned with the crossing of physiologic races of flax rust and the other was a popular general description of flax rust which was published in Volume 3, No. 6, page 79, 1941, of the Bimonthly Bulletin of this Station and also another paper on the "Inheritance of the rust reaction in the cross between the two flax varieties, Buda and J.W.S." In 1942 two more papers on the genetics of inheritance of flax rust resistance were published in the Journal of Phytopathology. In 1944 still another paper appeared in Phytopathology on the "Relation of rust damage on seed flax to seed size, iodine value, and oil content". The two more recent papers, still in press, submitted to the Journal of

Agricultural Research contain discussions and findings on the inheritance of resistance to flax rust on flax plants.

While carrying on his scientific work on the inheritance of susceptibility to flax rust Dr. Flor began to do something about creating a variety of flax highly resistant to the rust disease. In the spring of 1938 he made a cross between Ottawa 770B and Buda, a variety of flax selected by Professor H. L. Bolley of this Station. The first generation from the seed from this cross was grown in the field in 1938, the second generation in the greenhouse the same year. By 1939, he was able to take the third generation to the field and to make single plant selections. A single plant selection increased in 1940 was the beginning of Sheyenne flax. It was increased in rod rows in 1941-1942. The increases obtained in 1942 were sent to California to be grown there in the winter of 1942-1943 so that by the spring of 1943 it was possible to grow seven acres of this new variety of flax in North Dakota.

By the spring of 1945 Sheyenne had been increased to 687 bushels which amount was released to 46 farmers. The increase which they made, plus the increase made by the Experiment Station, made available for distribution in 1946 about 10,000 bushels. In 1946 about 75 percent of this increase of 10,000 bushels was made available to more than 300 other farmers and it is estimated that about 18,000 acres of Sheyenne flax were seeded in North Dakota in 1946.

Two articles descriptive of Sheyenne flax have appeared in the Bimonthly Bulletin. Two short paragraphs in Volume 7 No. 4, for March-April, 1945, and a longer article in Volume 8, No 2, November - December, 1945 The particular merits of Sheyenne flax are that it is early ripening, wilt and rust resistant and has a fair degree of tolerance to Pasmo disease. It grows nearly as tall as Bison, has blue flowers and brown seed. Sheyenne seed is slightly smaller than Bison and its oil yield is slightly under Bison but the iodine number of the oil is better than Bison.

In the course of these cooperative investigations on flax rust Dr. H. H. Flor has published the following scientific papers as joint contributions from the Division of Cereal Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture and the North Dakota Agricultural Experiment Station.

1. Physiologic specialization of Melampsora lini on Linum usitatissimum.* Journ. Agri. Res. 51: 819-837. 1935.

2. New physiologic races of flax rust. Jour. Agr. Res. 60: 575-591. 1940.

3. Flax rust. North Dakota Agr. Exp. Stat. Bimonthly Bul. 3: 7-9. 1941.

4. Pathogenicity of aeciospores obtained by selfing and crossing known physiologic races of Melampsora lini.** Phytopathology, 31: 852 - 854. 1941.

5. Inheritance of rust reaction in a cross between the flax

* Linum usitatissimum is the Latin name for flax.
**Melampsora lini is the Latin name for flax rust. Latin names for plants and their diseases are used by plant scientists as an internationally understood language.

varieties Buda and J.W.S. Jour. Agr. Res. 64: 369-388. 3 pp. Oct., 1941.

6. Inheritance of pathogenicity in a cross between physiologic races 22 and 24 of Melampsora lini. Phytopathology 32: 5. 1942 (Abstract).

7. Inheritance of pathogenicity in Melampsora lini. Phytopathology 32: 653-669. 1942. (illus.)

8. Relation of rust damage in seed flax to seed size, oil content, and iodine value of oil. Phytopathology 34: 348-349. 1944.

9. The genetics of pathogenicity in Melampsora lini. Manuscript submitted to Journ. Agr. Res. in 1945.

10. Analytical key for the identification of physiologic races of Melampsora lini. 20 pp. Mimeographed. 1945.

11. Inheritance of reaction to rust in flax. Manuscript submitted to Journ. Agr. Res. Jan., 1946.

NEWS NOTES FOR BIMONTHLY BULLETIN

Experiments recently reported by Wileman and Ullstrup of Purdue University Agricultural Experiment Station (Indiana) prove that the higher the moisture content of corn at the time it is put into the drying bins for drying by artificial heat, the lower must be the drying temperature in order to avoid injury to germination. They tested drying temperatures of 100° F., 110° F., 120° F., 130° F., and 140° F. with corn in which the moisture content of **the kernels** ranged from less than 20 percent to over 35 percent at the beginning. They found that although it was safe to dry corn with 20 percent or less moisture at 130° F., that when the kernels contained more than 20 percent moisture temperatures of 130° F. or above reduced the germination.

Their general and most important conclusion is that "Seed corn with an initial moisture content exceeding 25 percent should not be dried at air temperatures above 110° F. Where the moisture content is 25 percent or less a drying temperature of 120° F. can be used with safety. This extra 10° will reduce by one-fifth the time required to dry the corn to a moisture level necessary for safe storage." (A review of Bulletin 509, Purdue University, Agr. Exp. Sta., 1945. Reviewed by H. L. Walster.)