DAKOTA FLAX AND RUST IN 1949[1]

by

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In 1948 rust was found in a few late sown fields of Dakota flax.[4] Until then no rust had been found on Dakota and this variety was considered immune to the races of rust occurring in the midwest flax growing region. Finding these rusted plants, and being able to transfer this rust to plants of known Dakota growing in the greenhouse, proved that there now was in this area a race of rust not previously observed, with which we would have to contend in the future. The rust infestation was found readily in at least three widely separated fields, permitting the carry-over of considerable inoculum (rust spores) of the new races which could increase and spread widely in 1949, should environmental conditions be favorable.

Such favorable conditions for rust development did occur during a portion of the growing season in 1949. As a result, a light to heavy infestation of rust developed in many fields of Dakota, especially in the eastern and northern sections of the state. Only in a few instances was the rust sufficiently heavy to result in serious injury to the flax yield. However, its presence over a rather wide area, and in the amounts observed, leads to the conclusion that we are rapidly being faced with a changing rust situation and that Dakota does not offer sufficient protection against the races of rust now increasingly prevalent. For these reasons Dakota can no longer be recommended for areas where much rust is likely to develop. Conditions favoring rust development occur more frequently in the eastern and northern sections of the state than elsewhere.

In the absence of rust, Dakota would still be a satisfactory variety. It has characteristics that appeal to many growers. It matures relatively early, yields and handles well and is adapted to a wide range of conditions. Consequently it has been well received by many growers, and is extensively grown over a wide area. This extensive use invites the rapid increase and spread of the new races to which the variety lacks resistance. On this basis a diversification of varieties in a region, deriving their disease resistance from different sources, can be helpful in retarding the increase and spread of a new disease or a new race.

Rust resistance in Dakota (Renew x Bison) was derived from a variety called Newland, one of the parents of Renew (Newland x Bison). All varieties now in use which trace their factors for rust resistance to Newland are lacking in resistance to the races now attacking Dakota. These varieties, in addition to Dakota and Renew include Arrow and Custer.

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Varieties not Rusting

Fortunately we have other rust resistant varieties now in distribution whose factors for resistance trace to other sources. Sheyenne (Ottawa 770B x Buda) derives its resistance from Ottawa 770B and continues to be immune to all races now known in North America. This is also true of B 5128 ("Golden" x Rio) which derives its resistance from the Rio parent. Other varieties immune to all known domestic races include "Golden" (Viking) and Crystal. Victory is not pure as to plant type. About 60 per cent of its plants are immune, the other plants present in its makeup are susceptible to some races. Other varieties now grown and considered moderately resistant to rust include Minerva, Rocket and Royal.

Since some of these varieties presumably must eventually take over much of the acreage now in Dakota, information showing how they differ in important characteristics may be helpful in choosing the variety most suitable for the conditions and specific circumstances with which individual growers must contend.

Sheyenne ripens earlier than Dakota and other varieties now grown, grows to good height, has blue flowers and brown seed, which is slightly smaller than Bison and Dakota. The variety has good resistance to wilt and fair tolerance to pasmo. Ripening early, Sheyenne does not yield as high in some years and under favorable conditions as varieties that ripen later and have a higher capacity for yield. However, Sheyenne may yield more dependably on the lighter soils, in areas where earliness is desirable in order to "escape" high summer temperature and late summer drouths, or under conditions where flax sowing must be deferred until late in the spring.

B 5128 ripens late, but has capacity for high yields. It can best realize its high yields when grown under relatively favorable conditions. These favorable conditions are most likely to occur in the eastern and northern sections of the state. Sowing early, so as to permit the variety to develop and reach the blossoming and early ripening stage before late summer drouths or excessive ripening temperatures are likely to occur, is recommended. B 5128 grows tall, has blue flowers, and large brown seed. The variety has fair resistance to wilt and only fair tolerance to pasmo.

"Golden" (or Viking) is an excellent yielding variety, but grows short, affording less competition for weeds. This variety has a pink blossom, yellow seeds, is moderately resistant to wilt but very susceptible to pasmo. A selection from common Golden (R 522, C. I. 977), now in limited production, grows taller and matures later. This also is an excellent yielding variety under favorable conditions but susceptible to pasmo.

Crystal like the three previously mentioned varieties, is immune to the races of rust known to exist in this area. Crystal is moderately resistant to wilt, has good tolerance to pasmo, grows mid-tall, has a small white blossom, ripens mid-late, producing a greenish yellow seed. In North Dakota comparisons with this variety it has not been outstanding in yield, usually not equal to other varieties.

Victory is a mid-late ripening variety with large white blossoms and large brown kernels. Victory is moderately resistant to wilt, rather susceptible to pasmo, but in the absence of serious infection usually yields very well.

Koto has about the height and maturity of Dakota, blue flowers, brown seed, good resistance to wilt and fair tolerance to pasmo. Koto is immune to many races of rust, though susceptible to some races now prevalent in this area, is capable of yielding well and is a satisfactory variety when not damaged from rust. It is not recommended for areas where serious rust may develop.

Royal is only moderately resistant to rust and wilt and rather susceptible to pasmo. Royal has blue flowers, medium large brown seed, grows about as tall as Dakota but requires longer to ripen and is somewhat susceptible to lodging. In comparable tests and in farm practices yields of Royal have been more erratic than Dakota, yielding well in many instances but disappointingly in others. Royal appears to be somewhat more resistant to frost in the spring than most varieties. Where the rust hazard may be considerable, Royal would not be a good choice.

Minerva has excellent wilt resistance, moderate rust resistance and fair tolerance to pasmo. It grows to good height, has a blue blossom, ripens mid-late and produces a large dark yellow seed high in oil yield. Minerva yields have been satisfactory, but not outstanding in variety comparison to date.

Rocket. A Canadian variety, has distinctly more resistance to rust than Royal but like Royal is only moderately resistant to wilt. Rocket has blue blossoms, brown seed, grows to satisfactory height, maturing later than Dakota but slightly earlier than Royal. In a limited number of comparisons to date Rocket has been satisfactory but not outstanding in yield.

Control of Rust

Races of flax rust are identified by the reaction of selected flax varieties, each of which possesses different rust conditioning genes (hereditary units) or gene combinations. It is the genes that a flax inherits from its parents that determine whether or not it is resistant to races of rust prevalent in a particular region. Once present in an area, the rust organism winters over on stubble and trash from the diseased flax crop, where it germinates again the following spring, producing new spores to infect new flax plants.

If stubble and trash of a diseased flax crop could be completely destroyed, as by fall or early spring burning, or completely buried by plowing, so that over-wintering spores could not germinate, the sources of infection would be greatly reduced. However, since this is not practical, when considered for an extensive flax growing area, the use of varieties resistant to the races prevalent offers the best insurance against serious rust injury.