

# ASTER YELLOWS



ADULT

## what's ahead for '58

● by J. T. Schulz

The 6-Spotted Leafhopper is a carrier of Aster Yellows and is reported from some sections as a carrier of Purple Top of potatoes.

During the crop season of 1957, growers in the eastern third of North Dakota experienced severe losses in flax and potato acreages. This loss primarily was attributable to a high incidence of the virus disease, aster yellows. At the same time flax growers in western North Dakota also experienced heavy crop losses, although these were primarily due to drouth and high temperature conditions. The incidence of aster yellows in western North Dakota was very low during 1957.

Since many questions have been raised concerning aster yellows, this article has been prepared to answer these inquiries relative to its method of transmission, life history of the vector and susceptibility of host plants.

Symptoms of this virus in flax are manifested in chlorotic appearing leaves, the presence of secondary shoots from leaf axils, flowers appearing as rosettes and imperfectly formed bolls, if any are set at all. In potatoes, aerial portions of the plant are purple in color, and tubers from such plants are weak and susceptible to early sprouting.

In North Dakota the primary means of transmission is by the six-spotted leafhopper. The adult insect is light greenish-yellow in color and has six black dots arranged in pairs on the head. The leaf-hopper inserts its beak directly into the vascular system of the plant when it feeds, enabling it to be a very efficient carrier of the disease. Leafhoppers can pick up the virus from infested plants in about one hour, though less than 1 percent of those feeding that time become infected.

In 10 to 12 hours of feeding on infected plants, about 75 percent of the leafhopper population becomes infected. The virus requires an incubation period of 10 to 30 days in the insect before it can be transmitted; a similar period is required in the plant before disease symptoms are expressed. This is the reason why growers observed the large number of leafhoppers in May and early June, but did not notice the disease symptoms until mid or late July.

While the leafhopper can overwinter in this state in the egg stage, it is not this overwintering population that is of primary concern. Rather it is the migrating population that enters the state, usually in middle to late May, that is the major source of the early transmission of the virus. This migrating population comes from the Ozark regions of Arkansas and Missouri, leaving that area as small grain crops reach maturity in late May and early June.

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These migrating populations have been studied intensively by Dr. R. K. Chapman, University of Wisconsin. He has made yearly trips to the Ozark region since 1952 and has followed the migration into this area. In his studies Dr. Chapman observed that at the time of heading of the grain in the Ozark region, prevailing winds were from the southwest. Such prevailing winds enabled the leafhoppers to move quite rapidly from that area to the northern regions of the country. It is for this reason that large numbers of leafhoppers were suddenly observed in fields in which there had been no prior indication of their presence.

Chapman has further discovered that in most years about 6 percent of this migrating population of leafhoppers are viruliferous, or capable of disease transmission. Within the population which migrated in 1957, his studies indicated this figure to be 14 percent. Accompanying this was the added factor of a greater than usual population of leafhoppers which migrated into the state. Because of these abnormal situations, the incidence of yellows in flax was the greatest on record; in potatoes the greatest since 1947.

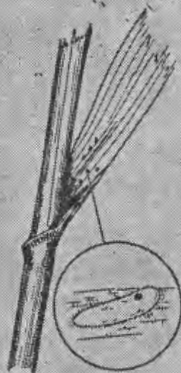
Overwintering leafhoppers hatch in late June and may also become infected by feeding on diseased plants. Because of this late development, however, we believe these leafhoppers to be of minor importance in disease transmission. Also, the virus is not transmitted from one insect generation to another through the egg, nor can it be spread from plant to plant except by leafhoppers carrying the virus.

Over 200 species of garden plants, weeds and flowers are susceptible to aster yellows virus, but susceptibility varies greatly. A single infected leafhopper, for example, is capable of transmitting the virus to an aster plant, a highly susceptible species, while it may require from 100 to 200 infected leafhoppers per plant on potatoes to transmit the same degree of infection. Flax probably falls into the same category as potatoes in its susceptibility to the virus.

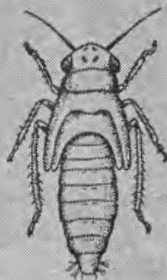
The Department of Agronomy, in tests conducted during 1957, found all commercial varieties of flax susceptible to the virus, and differences, if any, appeared slight. Very early seeded fields resulted in a lower percentage of totally infected plants in 1957 than those seeded after early May. This was possibly attributed to maturity of the plant at the time of infection, since generally more mature plants appeared to have slightly greater resistance to becoming infected, or to have produced bolls and seed before the infection became fully infective.

At present, control of leafhoppers with chemicals is not economically feasible for flax growers, since two or more weekly applications are required to obtain maximum benefit. However, the certified potato seed grower may find such a program necessary.

What's ahead for 1958? The probability of high disease incidence in 1958 depends entirely upon the magnitude of the migrating population, the percentage of viruliferous leafhoppers in that population and the earliness of the migration from the south. The probability of a repetition of conditions experienced in 1957 appears unlikely. It is possible but, if experience with other migrating insects can be used as a criteria, is not probable.



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