

Three virus diseases of wheat in Kansas

This year the wheat crop in Ellis County, and from my understanding, the Western half of Kansas, have experienced wheat viruses such as Wheat Streak Mosaic Virus (WSMV). There is more than one wheat virus in the Central Plains growing region. WSMV is the most common and prevalent, but there are two additional viruses as well, which are the High Plains Virus (HPV), and the Triticum Mosaic Virus (TriMV).

The symptoms of all three viruses are similar and include yellowing, desiccation of foliage, and leaf death. Stunting is also a typical symptom and can range from severe (if infection occurred in the fall or early spring) to mild (if infection occurred later in the spring). It is not difficult to determine that plants have symptoms of these viral diseases in the field, but laboratory testing is required to identify the specific viruses present.

All three are virus diseases are transmitted by the wheat curl mite (WCM). All three of these diseases can affect wheat in Kansas by causing yield reductions ranging from insignificant to total loss. WSMV and HPV also can impact corn and other crops, and TriMV can impact barley.

The WCM is tiny (1/100 inch long), sausage-shaped with two pair of legs and can best be seen with the aid of a 20X magnifier. WCMs are usually found in protected areas of the host plant such as a curled leaf, a leaf whorl, or between leaf veins. Without question, volunteer wheat is the most important epidemiological source of both WSMV and the WCM vector. Native or weedy grasses do not appear significant in developing large-scale epidemics of WSMV, but may be important in small local outbreaks. They may also be important in preserving mites and virus during adverse conditions.

Possibly some important host plants are corn, volunteer oats, volunteer barley, volunteer rye, green foxtail, sandbur, barnyardgrass, crabgrass, stinkgrass, common witchgrass, hairy grama and proso millet. Plants that might be of minor importance as a host plant are smooth brome, western wheatgrass, yellow foxtail and buffalograss.

The disease WSMV, HPV, and TriMV are similar. WCMs infected with these viruses survive on volunteer wheat, corn, or other grasses and spread to fields of wheat or corn on wind currents. This can occur in the fall or spring, but the impact of these diseases on winter wheat is most severe when infection occurs in the fall. This often occurs as the result of virus-carrying WCMs spreading from volunteer wheat growing in the field from the previous crop. Such volunteer wheat is called a "green bridge" as it allows WCMs to spread to the planted crop of wheat. After infection, the virus lives and replicates inside the host. Symptoms of any of these viral diseases typically do not appear until the spring whether infection occurred in the fall or spring. As temperature increases in the spring, symptoms become more severe. WCMs and the viruses are thought to over-summer by surviving on volunteer wheat and alternative hosts.

Limiting losses from WSMV, HPV, and TriMV are related to limiting WCM infestations. Hence, destruction of volunteer wheat and/or corn reduces the chance of mite infestations. Mites have a life

span of 14 days, so destruction of volunteer wheat or corn at least 14 days or more prior to emergence of seedling wheat is imperative to help limit infections by these viruses in the fall. A late planting Oct. 1st or later in our area, and mowing/killing grassy weeds and grasses in field corners and borders also can help limit infestation by virus-carrying mites in the fall. It is also imperative to be a good neighbor and control volunteer wheat or corn that is adjacent to a commercial wheat field to help limit these diseases in neighboring wheat fields.

There are a few available wheat varieties that have WSMV resistance that are adapted to our growing area. Oakley CL is a Hard Red Winter Wheat (HRW), Clara CL, and Joe are both Hard White Wheats. Also RonL and T163 are older HRW varieties that have WSMV resistance. The WSMV resistance mechanism of Clara CL and RonL is effective only under cool temperatures (average of daytime highs and nighttime lows below 70 degrees). Moderately resistant varieties are TAM 112 and TAM 204.

It is very difficult to rate varieties for WSMV. There are three separate virus diseases in the Central Plains that can all occur, separately or in combination: WSMV, HPV, and TriMV. If two or more of these diseases occur together, all of these varieties become susceptible. If a variety that is supposed to be resistant or moderately resistant to WSMV appears to have the disease, it is probably due to TriMV or HPV.

Laboratory testing for the viral diseases can be done at the KSU Plant Pathology Lab in Manhattan with samples being dropped off at the local Extension office or sent directly in to KSU Plant Pathology Lab in Manhattan. The Agricultural Research Center – Hays (ARCH) did testing for their wheat breeding program and revealed that 37% of their samples had two diseases present, including both WSMV and TriMV. Additionally, their findings revealed that 1.5% of samples had all three viral diseases.

In summary it is important to recognize that there is more than one virus that can infect wheat in the Central Plains. There are a few wheat varieties that have resistance to WSMV, however they are susceptible to TriMV and HPV. The most important aspect of reducing the spread of wheat viruses is to destroy all volunteer wheat at least two weeks before planting wheat, to break the “green bridge”.

If you have any questions, please contact your local K-State Research & Extension Office.