Clean Stock Offense 2023

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Dahlia foliage exhibiting symptoms of viral infection.

Above: Tomato Spotted Wilt Virus
Middle: Tobacco Streak Virus
Bottom: Dahlia Mosaic Virus

Fifteen local ADS Clubs participated in the Clean Stock Offense in 2023. The results are summarized in the figure below. No Cucumber Mosaic Virus (CMV) was detected in any samples. Tomato Spotted Wilt Virus (TSWV) was detected in samples from only 3 of the clubs.

That particular virus tends to produce strong symptoms and to persist over winter storage. Plants with TSWV and the tubers that came from them should be destroyed. Tobacco Streak Virus (TSV) was detected in each of the clubs from as low as 13% of the plants to as high as 65%. This is one of the most problematic of the viruses in that it virtually always survives winter storage. Plants and their tubers with TSV need to be removed. Impatiens Necrotic Spot Virus (INSV) was absent in almost half the clubs. It is the least problematic of the viruses because it usually does not survive winter storage. Symptomatic plants need to be removed but we consider asymptomatic plants safe to keep.

Dahlia Mosaic Virus (DMV) and Dahlia Common Mosaic Virus (DCMV) were the problem viruses again this year. The WSU test was designed to detect either virus inasmuch as they are very similar and can be considered to be variants of the same virus. Once again the extensive presence of these viruses spoiled the clubs' objective of identifying clean stock for spring sales. The level of DMV in the clubs tended to range from about 80% to 100% positive. You will note that the Monterey Bay (MBDS) and Greater Cincinnati (CDS) clubs did better. More on that later.

We have continued to gather pictures of tested samples and correlate the pictures with the virus diagnoses. Attached here are what we consider to be good examples of the appearances of the various viruses. Please be aware, however, that there is a wide range of appearances of each (except for INSV, more on that below). A more complete set of pictures can be found on Linda's Flickr page (Linda Taylor's albums | Flickr). There is no

picture of INSV included here because there have been little or no symptoms seen in INSV-positive plants. INSV is considered to be a major problem in many species of plants in greenhouse production so it is interesting it has not seemed to cause problems in dahlias. If you have symptomatic plants that have been tested positive for only INSV, we would like to hear from you! We consider it safe to keep tubers and asymptomatic INSV-positive plants.

The high portion of plants testing positive for DMV suggested that the virus might actually be integrated into the plant genome. The WSU team successfully sequenced the DMV and DCMV genomes from several different virus populations around the country and found that they should be considered as strains of the same parent virus. Further, testing showed that these viruses were not consistently present in all parts of a plant or in their seedlings. The conclusion was that they behaved as complete viruses, not as segments integrated into the dahlia genome.

DMV is basically different from the other viruses in that it is a DNA virus; the others are RNA viruses. Another difference is that it is not spread by thrips. Rather, the key insect vector for DMV is aphids. Further, dahlias are the only known natural host for DMV. Controlling aphids and the plants that support their populations could help reduce the spread of DMV among the dahlias.

The field work by the Virus Team and the results of some of the vendors have provided additional knowledge of the DMV viruses. Perhaps the most interesting and encouraging result is that the virus is not carried forward through seedlings. That is, the seedlings grown from DMV-positive parent plants do not initially have the virus. This is at least part of the reason that the Monterey Bay results were so much better than the others. A substantial portion of their analyzed plants were seedlings.

The results of most of the vendors were very similar to those of the clubs. It is obvious, however, that several vendors were far more successful than others. We are still in the process of figuring out how they were so successful. It is clear that there are three basics that certainly contribute to their success. First is rigorous adherence to the practices we've previously recommended for producing clean stock: "If in doubt, throw it out," "Clean between," and "Start with Clean Stock." (One of the successful vendors is a self-declared "fanatic" in implementing those practices.) The second basic is extensive testing of their stock, starting very early in the season on cuttings, for example. The third factor is that seedlings don't carry the virus from the parents—one of the successful vendors focuses specifically on seedlings. One of the larger contributors to the Greater Cincinnati club samples was another one of the successful vendors. That is part of the reason for their good performance among the clubs.

Our plan for testing in 2024 is not yet clear. We will be discussing the various potential opportunities for testing and weighing them against other priorities at WSU over the next couple months and will formulate the plan and post it on the ADS website as soon as possible.

Figure 1: *Percent of Plants with Virus, By Club*

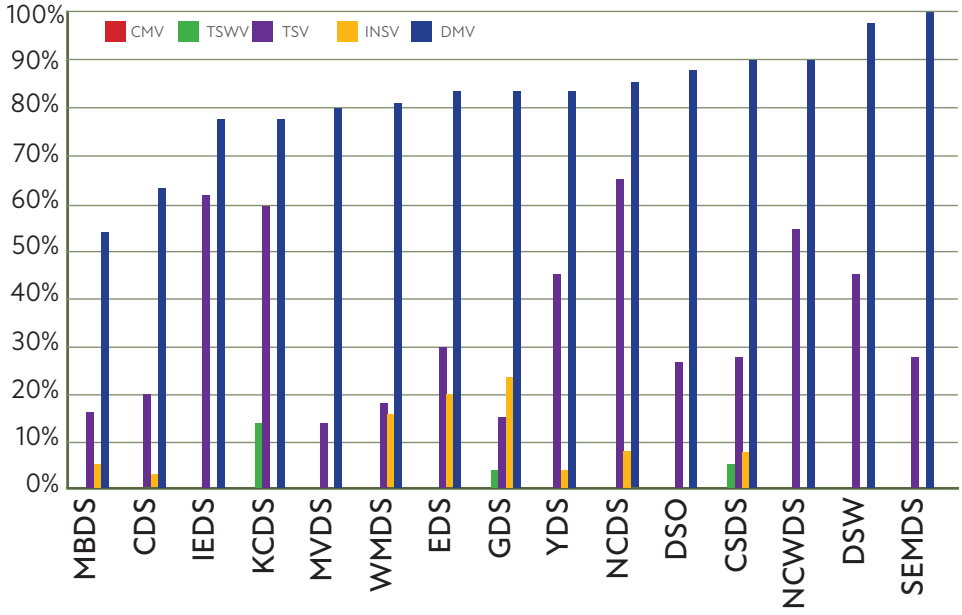

Figure 2: *Percent of Plants with Virus, By Vendor ID*

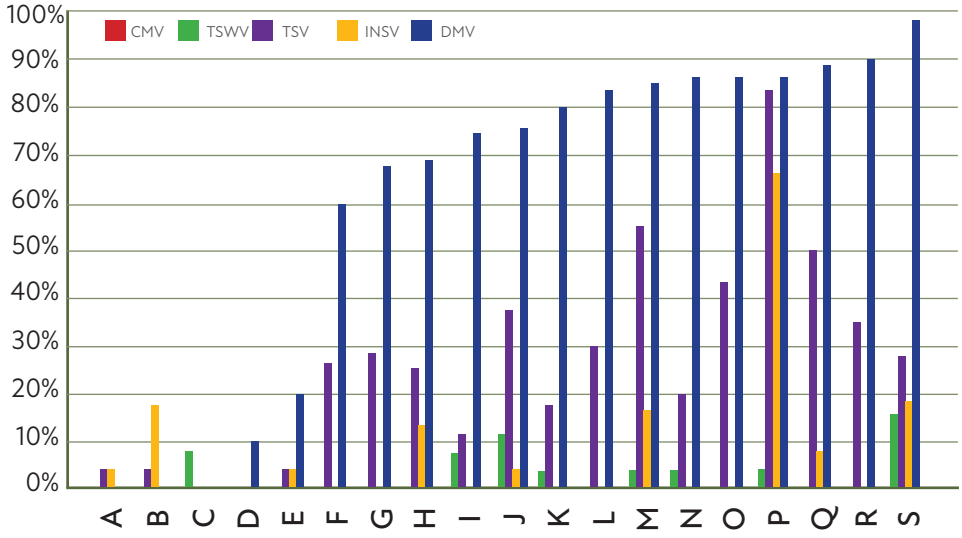

Photo courtesy Linda Taylor