

PROGRESS IN THE STUDY OF VIRUS IN DAHLIAS

In 2015 the ADS reinvigorated the study of virus in dahlias at Washington State University (WSU). Research activities by Professor Hanu Pappu at the University promised to provide key directions for the reduction of virus in our dahlia gardens. Financial support by the Scheetz-Chuey Foundation made it possible to significantly grow the research activities at the University and to provide the basis for practical field research activities studying the behavior of dahlia viruses in our member home gardens. A great deal of knowledge has evolved over the last six years of effort. This article will focus on the practical, home garden, ramifications of that knowledge.

Clean Stock – The best source for clean plants and a clean garden in 2022 will be the plants that were tested in 2021 and found to be free of virus. In 2017, the field research focused on testing clean plants from 2016. Thirty-eight percent of those plants were found to have virus in '17. We were disappointed in that result but we at the same time found that 52.8% of the plants that had not been tested in '16 were positive for virus in '17 and literally 100% of the plants that were positive in '16 were also positive in '17. ("If in doubt, throw it out" is still a good strategy.) It became clear in subsequent years that the disappointingly high 38% number could at least partially be explained in terms of the absence of disinfecting of the tools in many gardens.

The ADS will continue to provide support for a Clean Stock initiative for member clubs across the country. The project provides the opportunity for each ADS society to send samples for testing at WSU, with the idea that the stock found to be free of virus will be used for propagation and sale in 2023. ADS members should encourage their clubs to take advantage of this way to make valuable, clean dahlia stock available to their clubs. Details for this offense are available on the ADS website, dahlia.org.

Different Behaviors for Different Dahlia Viruses – It would be convenient if each of the known viruses that affect dahlias behaved the same. The field work has shown, however, different results for the different viruses. One key observation has been that Dahlia Mosaic Virus, Dahlia Common Mosaic Virus, and Cucumber Mosaic Virus have been virtually absent from test results over the last 4 or 5 years. We do not understand why that is the case; research work at WSU shows that we would still be able to detect those viruses if they were present – that is, the absence is not a "false" negative. Another striking difference among the viruses is in their persistence in the stock from one year to the next. Tobacco Streak Virus, TSV, is almost always retained from one year into the next. Tomato Spotted Wilt Virus, TSWV, is frequently present in the subsequent

generation. Impatiens Necrotic Spot Virus, INSV, on the other hand, is almost always absent in the plants in the subsequent generation. Thus, while it is always best to discard all plants that test positive, one could argue that there is a minimal risk in continuing to grow plants that test positive for INSV.

Symptomology – Each of the three viruses commonly found in our dahlia gardens, TSV, INSV, and TSWV, exhibit a wide range of symptoms. On the one extreme, they can all exist in plants that are completely asymptomatic. On the other extreme, they can cause obvious stunting of the plant and strong spotting, streaking, and yellowing of the foliage. Symptomatic plants should, of course, be removed from the garden. Flickr files (<https://www.flickr.com/photos/141837887@N08/albums>) from Linda Taylor provide extensive documentation of those symptoms.

Spreading Viruses – Thrips are the insect uniquely responsible for spreading the three viruses commonly found in our dahlia gardens. (See Prof. Pappu's article in the March 2018 ADS Bulletin.) A myriad of plants serve as hosts to thrips, including dahlias and a number of weeds. It is virtually impossible to anticipate the extent to which thrips will be responsible for the presence of virus in any individual garden. Those with 'thrips-friendly' weeds and plants in the near vicinity could be substantially affected by thrips. Other gardens could be less affected. Professor Pappu summarized potential procedures for controlling thrips in our gardens in an article in the March, 2019, ADS Bulletin. The article is also available on the ADS website, www.dahlia.org.

You and I and our gardening friends are the other likely "vector" for spreading virus in our gardens. One of our field research experiments in 2019 demonstrated that a single cut on a clean dahlia with a set of cutters that had not been disinfected after working on a virused plant caused the clean dahlia to become virused. Published literature from research on this topic shows that as many as 20 subsequent clean plants could be infected from a single cut on a plant with virus – if the cutters aren't disinfected. Inasmuch as plants with virus can be completely asymptomatic, it is essential that we disinfect tools after working on every single plant.

Start Clean, Get Clean, Stay Clean – Unless – One important result of the field research work is that it has demonstrated that in situations where tool disinfection practices are rigorously followed and thrips activity is not a problem, a clean garden can basically stay clean. It is also clear that a thrips problem can carry virus into that clean garden. We do not know how to determine whether thrips activity will cause a virus problem in your garden. However, it is clear that starting with clean stock and rigorous disinfection practices are essential practices for achieving that

clean garden. Clean stock and good disinfecting practices are essential but may not be sufficient!

University Research Results – In addition to the extensive virus testing activities required to support the foregoing field work, extensive progress has been made by Prof. Pappu's team on several fronts at WSU. One area of effort that will come to impact us home gardeners in a significant way is the development of the technology required to be able to use tissue culture procedures to grow tiny fragments of clean dahlias into tuber-producing, virus-free plants. That success will provide the basis for the development of a "bank" of clean dahlias available to our members. Their work also continues, of course, to expand basic knowledge of virus in dahlias and other important plant species.

Ron Miner, Professor Hanu Pappu, and the virus team: Brad Freeman, Nick Weber, Jerry Moreno, and Linda Taylor.

