

Laboratory Testing for Virus in our Dahlia Gardens

The American Dahlia Society has taken on a leadership role in tackling the problem of virus in dahlias. The early stages of that project came as a result of a donation to Washington State University from the estate of Evie Gullikson and matching funds from ADS member societies in the mid 1990's. Professor Hanu Pappu became the leader of the project in 2003. The early observations in the academic work led to the suggestion that all dahlias have virus. That led many ADS members to conclude that there was little hope for virus-free dahlia gardens. That also led to lower enthusiasm for support of the research project at WSU. In contrast to those early observations, Professor Pappu, through his research, found that some dahlia plants do not have virus! While many of us missed that conclusion, Professor Carl Chuey, Professor of Biology at Youngstown State University and dahlia enthusiast, recognized the significance of that change. Fortunately for the ADS, Carl's commitment to the WSU project led Jim Chuey to make a large donation to WSU from their Scheetz-Chuey Foundation. That donation has reinvigorated interest in the project.

This article presents the results of a large virus testing program that examined the presence of virus in a number of dahlia gardens in Northeast Ohio. In general, each of the five gardens involved in the tests followed the guidelines presented in the brochure distributed with the ADS Bulletin in June, 2015. That is, if the foliage on the plants in the garden exhibited the characteristics identified in that brochure, the plants were removed from the garden and destroyed. In some cases, that generalization was more true early in the season, when replacement plants were available, than it was later in the season when the stock of extra, clean plants was exhausted and some plants with poor foliage were left in the garden. When the leaf samples were finally removed from the plants for the tests in September, there was a large range in the appearance of the leaves from very clean to a few that exhibited foliage very much like the leaves in the brochure.

The bottom line of this effort, detailed below, is that there is a very good correlation between the appearance of the leaves and the presence of virus in the plants.

While dahlias could be experimentally infected with about ten viruses, six of them are known to infect them under natural conditions and their relative incidence varies from year to year and region to region. At the start of this project, the samples were tested for the five most commonly found viruses. It became clear, however, that some of the samples with the worst appearance did not have any of those five viruses. Consequently, the samples were also tested for that sixth naturally occurring virus and all but one of the samples with poor foliage did test positive for the sixth virus.

The samples were gathered from the local Ohio gardens in a single day and shipped overnight to get to Prof. Pappu's lab the next day. Samples were chosen among the plants in four of the gardens based on gathering leaves from both the healthy looking and least healthy looking plants. In addition, where possible, samples of the same cultivar were collected from the different gardens. In the fifth garden, each of the approximately 100 plants were tested. Photographs were taken of most of the samples gathered and a rating system evolved in which perfectly healthy appearing foliage was rated as 10 and the worst of the foliage illustrated in the June ADS Brochure was rated 0. The rating was adjusted downward if the plant appeared to be stunted.

It is impractical to present the individual test results in the printed Bulletin format. Those individual test results will be available on the website. Only the general conclusions will be presented here.

1. The key conclusion was that there was a very good correlation between the appearance of symptoms on the foliage and the detection of at least one of the six viruses tested. That is, the appearance of the leaves of a plant in our gardens is a reliable indicator of the presence and/or the absence of virus in our plants.
2. Virus was detected in varying amounts in each of the gardens. Garden b, where every plant was tested, was found to have the greatest level of virus at about 1/3 of the plants. It was also the only garden that exhibited a substantial number of plants with virus other than dahlia mosaic virus (DMV). The other gardens, where only selected plants were tested and basically only DMV was detected, showed virus in less than ¼ of the samples tested. The key point in any case is that none of the six naturally occurring viruses were detected in most of the plants in each of the five gardens! It makes clear that the original observation at WSU that all dahlias have virus was incorrect.
3. There were very clean, virus-free plants immediately adjacent to plants with the worst foliage observed. That observation is consistent with Dr. Pappu's perspective that our tools can be more responsible for spreading virus than insects.

These conclusions very much support the strategy outlined in the brochure distributed in June: *If in doubt, throw it out!* The results confirm that the appearance of the foliage is a good indicator of the presence of virus in our dahlia plants. The fact that the great majority of the plants tested did not show the presence of the common viruses reaffirms Prof. Pappu's findings that not all dahlias have virus. The most important conclusion is that rigorous adherence to the "throw it out" strategy over several years should be very effective in leading to dahlia gardens that are substantially free of virus.

Ron Miner and Prof. Hanu Pappu extend their sincere appreciation to Jim Chuey, Tony Evangelista, Jerry Moreno, and Randy Foith for their numerous important contributions to this project.