

START CLEAN, STAY CLEAN!

Established in 2015, the National Clean Plant Network for Roses works to keep our roses healthy by ensuring they begin their life as a plant free of the major detrimental viruses that can affect their growth and ability to produce abundant high quality flowers for you. Starting Clean and Staying Clean is their motto for the main steps to virus-free roses.

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One of the keys to having a high quality rose plant is to ensure that the plant begins its life healthy and free of deleterious viruses and other pathogens. Having virus-free, tested, propagation and rootstock material available to commercial nurseries plays an important role in minimizing rose viruses, and eliminating the loss of rose plants to viruses.

Why focus on viruses?

Only 14 of the 26 rose viruses reported throughout the world are in the USA. These viruses cause a range of symptoms such as yellow blotches or mosaic of the leaf, leaf and flower deformations, development of rosettes, slower plant growth and in some cases, plant death. All the major rose viruses are spread efficiently during propagation. Roses are propagated vegetatively by budding or by rooting cuttings to produce new plants. This process depends on taking a part of the mother plant (a bud or stem piece) to make a new plant. Thus if the original mother plant is infected with the virus, so will the plants propagated from it. The best way to avoid this issue is to start with mother plants that do not have the viruses. This is the first part of the slogan: Start Clean.

A virus is very different from many other organisms as it can only live within the cell of another organism. It is basically composed of its genetic information (DNA or RNA) that is protected by a protein coat. Most other organisms have a cytoplasm in which they function but the virus does not. It functions by entering a cell and hijacking the cell's cytoplasm to reproduce.

Once the plant is infected by the virus, the virus moves throughout the plant. In other words, it is a systemic disease. As a systemic disease, it cannot be controlled with pesticides as can many other diseases and pests. The plant is infected for life unless extraordinary methods such as meristem culture are used. Thus, once the plant is infected in your garden, the recommended control is to eliminate the infected plant.





So how do you Start Clean?

For a rose to be entered into the NCPN Rose Clean Plant or G1 Collection, the rose plant is tested for six viruses in the laboratory. In addition to these laboratory tests, the rose is bud-grafted to ‘Burr’s Multiflora’ and ‘Shirofugen’ cherry that are virus-sensitive indicator plants. Once budded, these plants are observed for any virus symptoms over a two-year period. If all the laboratory tests are negative and no symptoms appear in the biological tests, the rose enters into the Clean Plant Collection and is made available to the commercial rose industry.

What happens when a rose does not pass all of the tests?

As previously noted, the virus is a systemic pathogen that spreads throughout the plant, lives within the cells and consequently cannot be eliminated by applying a pesticide like can be done with diseases like black spot or pests such as thrips. Luckily for us, although the virus does move throughout the plant, it lags a little behind in the constantly growing shoot tip. Thus the approach to get the rose free of virus is to take a small slice (1-2 mm) off the meristem (actively growing portion) of the shoot tip and grow it in tissue culture in the laboratory. This protocol is difficult for some roses and research is ongoing to make it more reliable.

How about the second part: Stay Clean?

Normally this is not a problem as most of the common viruses do not easily pass among plants in the garden setting. Unfortunately there is one important exception: the rose rosette virus. This virus is transmitted via a small mite that can walk from plant to plant and launch itself into the air to float longer distances. Thus, if you are in the regions where the rose rosette disease is found, you will need to actively

protect your roses from this virus. This includes eliminating any infected plants as soon as detected, controlling the vector mite, and designing gardens to obstruct the movement of mites. At this point, there are no commercial roses developed to be resistant to this disease although this work is in progress. For more information on RRD management read the article entitled, “Managing Rose Rosette in the Landscape” (*American Rose*, December 2016) and the Combating Rosette Disease website at <https://roserosette.org/>.

The National Clean Plant Network for Roses (<http://ucanr.edu/sites/ncpnrose/>) is a government-industry partnership that supplies virus-tested propagation material to the rose industry. The first virus-tested collection was established in the 1960s in response to widespread rose mosaic infections in commercial roses. The National Clean Plant rose collection is maintained by the Foundation Plant Services (http://ucanr.edu/sites/ncpnrose/Clean_Plant_Centers/Foundation_Plant_Services_UC_Davis/) and contains more than 700 rose cultivars and nine rose rootstocks. With the establishment of the NCPN-Roses in 2015, it has been renovated, is being expanded to include old garden roses and other non-patented roses and has undergone more testing to ensure it remains free of major rose viruses. This program benefits the rose community tremendously. It works best when gardeners buy roses only from reputable sources that sell plants grown from virus-tested stock.

FAR LEFT: Technician cutting off the meristem using a microscope. LEFT: The growth chamber used to grow the meristems into plants. TOP LEFT: The National Clean Plant Collection is maintained by the Foundation Plant Services and includes more than 700 commercially important rose cultivars. TOP: Rose bundles; ABOVE: ‘Dainty Bess.’ The Foundation also maintains a Rose Encyclopedia that documents their rose collection at fps.ucdavis.edu/roses. All photos courtesy of the Foundation Plant Services, University of California, Davis, California.