CONTROLLING ROSE ROSETTE DISEASE

Rose Rosette Disease (RRD) is emerging as one of the most devastating diseases of roses. The disease is of great concern to the nursery industry because it is known to be lethal to the wild Rosa multiflora and potentially to all cultivated roses, including shrub types, hybrid teas, miniature roses etc. Even cultivars that are known for their exceptional disease resistance, such as Knock Out roses, are susceptible to RRD. Losses can occur anywhere roses are grown, including nurseries, homes, landscapes, and botanical gardens. In recent years, the incidence of the disease has grown exponentially in the Midwest and Southern U.S. due to an increased use of mass plantings of shrub roses in residential and commercial landscapes.

Symptoms

Symptoms of RRD are many and highly variable, depending on the species or cultivar affected, the age of the plant, and environmental influences, which may complicate proper diagnosis. These include: the rapid elongation of newly formed shoots (Fig. 1 and 2); the prolific clustering of small branches, also known as witches' broom (Fig. 3); an abnormal red coloration of shoots and leaves that persists throughout the summer (Fig. 4); production of leaves that are distorted or dwarfed

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rosa multiflora

Figure 1: (top) Red elongated shoots of RRD-infected Rosa multiflora. Photo by Joe Boggs, OSU Extension
Figure 2: (bottom) Elongated shoots of RRD-infected Rosa multiflora. Photo by Joe Boggs, OSU Extension

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(Fig. 5 and 6); presence of deformed flowers with abnormal petal coloration (Fig. 7); an excessive thorn formation on noticeably thicker canes (Fig. 8); and a spiral pattern of cane growth (Fig. 9). In the early stages of the disease, symptoms may be subtle, go unnoticed, or be confused with other problems. By the time plants exhibit severe and recognizable symptoms, the disease may unfortunately have already spread to adjacent plants. The disease will cause rose bushes to begin declining and the entire plant will die in about 3-4 years.

The Vector

RRD is spread from plant to plant by the eryophyid mite Phyllocoptes fructiphilus. This mite, which is native to the Western U.S., is one of the smallest animals on earth, measuring approximately 180 x 50 microns (one thousand microns is about the thickness of a dime). P. fructiphilus can be observed with the aid of a 10 or 20x hand lens on the plant's new growth between the leaf petioles and axillary buds of infested roses. Adult females may overwinter in open buds, in partly developed shoots on stems, in clusters of foliage on canes, or under remnant scales of old leaves that dropped off the plant. Although P. fructiphilus is wingless, it can spread from plant to plant through air currents or via insects. The mite will acquire the virus by feeding on an infected plant and then transmit it by feeding on a healthy plant. The closer a rose is planted to a RRD-infected rose, the more likely it is to become infected with the virus.

History of the Disease

RRD was first reported in 1941 in California and Wyoming on a rose species native of the Rocky Mountains, Rosa woodsii. Between 1960 and 2002, year of the last documented study on the distribution of this disease, it spread through much of the wild, rural and urban rose populations of the Midwestern, Southern and Eastern United States. In recent years, the disease has also been found in a few western states. While it has been known to be present in the U.S. for more than 70 years, it was only in 2011 that the disease was proven to be caused by a virus, namely 'Rose Rosette Virus', a new member of the genus Emaravirus.

The spread of RRD is linked to the history of Rosa multiflora, which was introduced from Japan at the end of the 1800 to be used as a rootstock for ornamental roses. Beginning in the 1930s, the use of multiflora rose was promoted by the State Conservation Departments and recommended for a variety of uses, including erosion control, as living fences to confine animals, as food for birds, as highway barriers, and it was distributed as rooted cuttings to landowners free of charge. What was probably not taken into account is that multiflora rose produces millions of seeds and spreads so quickly that is now declared a noxious weed in many U.S. States.

Because multiflora rose is extremely susceptible to

RRD, the introduction of RRD-infected plants into areas infested by this invasive plant has been suggested as a way to reduce its spread. However, this is not recommended, as RRD can spread quickly from multiflora rose to cultivated roses and could represent a dangerous threat to nearby commercial nurseries.

abnormal effects

Figure 3: (top left) Witches' broom on Knockout rose. Photo by Joe Boggs, OSU Extension

Figure 4: (top right) Abnormal red coloration of shoots and leaves of Knockout rose infected with the RRD virus. Photo by Joe Boggs, OSU Extension

Figure 5: (bottom right) Distorted and dwarfed leaves of a cultivated rose infected with the RRD virus. Photo by Francesca Peduto Hand

Figure 6: (middle left) Distorted and dwarfed leaves on a cultivated rose infected with the RRD virus. Photo by Joe Boggs, OSU Extension

Figure 7: (bottom left) Deformed flowers with abnormal petal coloration. Photo by Francesca Peduto Hand

Control

Unfortunately, no cure is available for existing infected roses; every effort should be made in trying to prevent this disease by using a combination of approaches. Plants should be inspected regularly for symptoms. Symptomatic plants should be dug out, bagged, and removed as soon as possible, since infected plants may harbor large populations of eriophyid mites. When removing infected plants, make sure to remove all the roots from the soil as the virus can survive in living root tissue and serve as a reservoir for the disease.

Several articles and websites suggest that pruning out infected stems when symptoms are first noticed may stop the spread of the virus. It is important to point out that apparent success may be due to the long latent period of this disease, that allows roses to appear virus free for a considerable amount of time. Researchers at University of Tennessee are currently collecting long-term data to determine if this strategy may or may not be effective to eliminate the virus from infected plants.

Multiflora rose, which frequently serves as the source of inoculum for RRD, should be removed from the vicinity of rose nurseries and gardens. Moreover, the sites should be inspected for multiflora regrowth for up to one year.

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Figure 8: (above) Excessive thorn formation on noticeably thicker canes of Knockout roses infected with the RRD virus. Photo by Joe Boggs, OSU Extension

Figure 9: (right) Spiral pattern of cane growth of a cultivated rose infected with the RRD virus. Photo by Francesca Peduto Hand

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Spacing plants so that canes and leaves do not touch each other can make it more difficult for the wingless mite to move from plant to plant. Research at University of Tennessee also demonstrated that a barrier of Miscanthus sinensis might be useful in reducing incidence of RRD in rose plantings.

Controlling mites' population through the use of miticides has also been suggested to help reduce the spread of the virus. However, mites are very small and it can be difficult to get complete coverage. Use of miticides is recommended in conjunction with cultural control methods, e.g. focusing sprays on plants that surround spots where diseased plants have been removed.

Some species of roses, such as R. setigera, R. aricularis, R. arkansana, R. blanda, R. palustris, R. Carolina, and R. spinosissima have been reported to be resistant to RRD and several breeders and researchers are currently working to develop resistant varieties.

While it is certain that Rose Rosette will continue to spread into new areas in the upcoming years, many researchers and rose companies all over the country are working hard to develop effective management plans to reduce the impact of this disease.

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