Rose Rosette Disease: Occurrence and Properties©

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INTRODUCTION

Rose rosette disease (RRD) was first reported in Manitoba, Canada, and Wyoming in the 1940s on *Rosa multiflora* (RMF) Hartzler, 2003; Lehman, 1999). It was not until the mid 1960s that it was further noticed in parts of the Midwest, particularly Nebraska. Further investigations of the appearance of this disease showed that by 1999 the disease had progressed to Iowa, Kansas, Colorado, Utah, Missouri, Arkansas, Illinois, Indiana, Ohio, West Virginia, Tennessee, Pennsylvania, and an isolated outbreak in California. Although RRD and its natural vector are of North American origin (Lehman, 1999) in most cases RRD particularly affects *R. multiflora* (RMF). However in the more recent years it has begun to be problematic on other roses as well especially those with Asian origin. As of this writing, RRD has been found to attack hybrid tea roses, floribundas, grandifloras, and old fashioned cultivars. In many cases, particularly with respect to RMF, it is deadly. Decline from the onset of infection culminates in the death of a typical RMF plant in 2 to 5 years (Hartzler, 2003.). Casual field observations by this author show RMF to die completely after a 2-year infection. Rose rosette disease is so effective at decimating populations of *R. multiflora* that it is considered to be a suitable biocontrol agent for that invasive species (Epstein and Hill, 1999). Fortunately many of the native species of rose in North America are not generally affected by RRD. *Rosa woodsii, R. setigera, R. arkansana,* and *R. blanda* are only slightly affected. *Rosa californica, R. spinosissima, R. carolina,* and *R. palustris* are not at all affected by RRD. *Rosa bracteata* is not affected by transmission from natural vectors but can be infected by grafting. Hybrid tea roses vary considerably as to which ones are affected and which ones are not. 'Peace' and 'Chrysler Imperial' are minimally affected by RRD, where as *R.* 'Meidomonac', Bonica™ rose is not susceptible from natural vectors but can be infected via grafting (Epstein and Hill, 1999).

GENERAL BIOLOGY OF ROSE ROSETTE DISEASE

Rose rosette disease is thought to be caused by a virus or a micoplasma. Work by Rottonsinski et al. (2001) showed that the causal agent of infection can be transmitted partially to *Nicotiana sylvestris* under laboratory conditions by mechanical means.

In the natural environment the viroid type particle is transmitted to rose plants via an eriophyid mite, *Phyllocoptes fructiphilus* (Lehman, 1999). *Phyllocoptes* is host specific and only feeds on species of *Rosa.* Other members of the rose family such as *Prunus, Amelanchier, Crateagus, Malus,* and *Pyrus* are not affected by RRD or *Phyllocoptes*. *Rosa bracteata* and *R.* 'Meidomonac', Bonica™ rose are susceptible to RRD via grafting but are not susceptible to *Phyllocoptes* invasion; hence they are normally immune from the problem. Aphids and thrips have not been shown to be vectors of RRD (Epstein and Hill, 1999)

In the wild RRD manifests itself with significant formations of witch's brooms on infected plants. In the case of RMF a preliminary symptom is bright red pigmenta-

tion of the new growth, followed by the aberration of the witches' brooms. In the case of hybrid tea roses and related hybrids the new growth will often occur as lime green color as opposed to the bright red of RMF (Anonymous, 1999).

The root systems of infected plants are not under direct influence of RRD, however, since the viral mechanism disrupts the carbohydrate levels in the infected plants, the whole plant essentially starves to death. It is generally considered that only the arboreal portions of the plants are directly infected (Anonymous, 1999).

Observations by this author show that flowering on RMF is disrupted by RRD and results in severe die back of flowering stems. It seems logical to assume that flowering also exposes susceptible roses to possible invasion by the vector mite. In the case of hybrid garden roses such as *R.* 'Meikrotal', Scarlet Meideland™ rose, flowering does occur but the flowers are severely affected with both changes in form and in color. Flowers that are normally pure red can be mottled and streaked with white or pink. It also seems that in the case of *R.* 'Meikrotal', Scarlet Meideland™ rose the new growth can be tinted with the same red coloration as in RMF but it is muted. Whether this denotes a partial infection is not clear. Also, stems of *R.* 'Meikrotal', Scarlet Meideland™ rose that appear to be partially affected do bloom with blossoms that are irregular but not severely distorted. In addition those blossoms that appear to be under the influence of a partial infection will set seed, whereas blossoms of RMF that are infected will not set seed. However when a full blown infection occurs on *R.* 'Meikrotal', Scarlet Meideland™ rose they will not set seed either and follow the same pattern as exhibited by RMF.

CONTROL

Since the causal agent appears to be a virus or a micoplasm chemical control once an infection occurs is not feasible. Cultural preventive control should be exercised by judicious application of Cygon 2E, which will control the vector mite, *P. fructiphilus,* since this is a eriophyid mite the more common miticides are ineffectual (Anonymous, 1999). Researchers have shown that the disease can be spread by mechanical means to roses that are not normally affected by the vector mite. Extrapolation would suggest then that pruners, saws and other instruments that might carry plant matter or sap from an infected plant to a noninfected plant could result in further infections down the line. In this case sterilization of cutting tools with a disinfectant or alcohol between use different plants would seem to be prudent. Alternatively this might also serve as a quick and easy method to spread the disease from one infected RMF to another thereby hastening the decline of an undesirable RMF population.

It is generally thought that only the arboreal portions of the infected plants are susceptible to the problem and it does seem prudent that judicious pruning far below the point of infection may eliminate the problem, at least on a temporary basis. If a plant is severely infected complete removal is recommended along with spraying the general area with Cygon to stop transportation of the accompanying mites. This particular eriophyid mite does not fly and can only move about by wind or hitchhiking (Lehman, 1999). Further control is helped by the removal of all invasive volunteer RMF in the immediate area whether they are infected or not. The burning of the infected plants is strongly recommended to eliminate both the pathogen and the vector mites.

In Canada a thornless selection of *Rosa multifora* is in use as an understock and some Canadian nurseries maintain stock blocks to provide seed for this desirable

understock. Rose rosette disease may be a serious problem in these circumstances and extra care should be exercised to scout for the existence of this pathogen.

Replanting of the seed stock blocks in new uninfected areas is strongly recommended.

It is obvious that RRD could pose a significant problem to those nurseries that have large rose production programs. While the incidence for infection of commercially available roses in the landscape is limited, the occurrence of this pathogen in commercial production should be cause for increase diligence and concern.

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