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DEVELOPMENT OF BLACK SPOT RESISTANT ROSE CULTIVARS

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Background. The black spot fungus (*Diplocarpon rosae* Wolf) is the most damaging rose disease in the world. It is more widespread and causes more damage than mildew or rust, two other common rose diseases. The rose has been one of the most important commercial ornamental species for centuries, but the number of plants sold in the United States has decreased steadily over the last 20 years. One of the major reasons for decreasing sales is the generally high inputs of fungicides and pesticides needed to grow roses in the landscape. Unfortunately, the vast majority of the commercially available rose cultivars are susceptible to several important diseases.

Commercial rose cultivars are complex interspecific hybrids which are tetraploids. Although a few commercial cultivars have some resistance to black spot, the sources of resistance originally come from the diploid species which, due to the difference in chromosome numbers, do not cross readily with commercial tetraploid rose cultivars. Several sources of immunity to this disease exist among the diploid species.

The objectives of this long term research program are:

1. To assess the usefulness of amphidiploidy as the mechanism of incorporating diploid germplasm into the tetraploid breeding population.
2. Develop efficient screening techniques for black spot resistance of rose cultivars and species.

Current Information. The diploid species which are resistant or immune to black spot come from seven sections of the genus *Rosa*. These, when crossed, produce a diploid hybrid which is sterile, but fertility is restored upon doubling the chromosome number of the sterile interspecific hybrid. Preliminary results have demonstrated that these amphidiploids are cross fertile with the cultivated tetraploids.

Breeding research is planned which will determine the cross compatibilities among the important diploid rose species by doing hand pollinations among the possible combinations of these rose species. The primary diploid interspecific hybrids are not useful due to total sexual sterility and the fact that they are not on the same ploidy level as the cultivated germplasm. The doubling of the chromosome number of these diploid hybrids solves both of these problems. Unfortunately, the success of doubling the chromosome number of rose has been low. An *in vitro* system will be developed to overcome this impediment. Finally, with the use of the three

amphidiploids developed thus far, the cross compatibility of these amphidiploids with each other and with a wide range of cultivated tetraploid rose cultivars will be determined.

Previous work and field observations in Texas confirm the high susceptibility of most tetraploid rose cultivars to black spot. In spite of this, some resistance has been seen in some commercial cultivars such as 'Sunflare', 'Sunbright', 'Sunsprite', and 'Red Radiance' and in diploid species such as *Rosa rugosa, R. multiflora, R. wichuraiana, R. banksiae, R. roxburghii, R. bracteata,* and *R. laevigata.* Studies involving two aspects of resistance are planned. First, efficient screening procedures for field plots and greenhouse conditions will be developed to be able to differentiate between race specific and race nonspecific resistance. The other phase of this work will focus on the mechanism of resistance for black spot. Possible mechanisms include leaf morphology such as cuticle thickness, waxy layers, and pubescence and biochemical characteristics of the leaf. Correlation studies will be done to identify possible associations between black spot resistance and leaf traits.

Application. The development of black spot resistant rose cultivars will decrease the use of fungicides in rose culture and increase the demand of rose plants for garden and landscape use.

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