Deciduous Orchard Diseases—Chemical Control

Increased Nitrogen Fertilizer Makes Nectarine Susceptible to Brown Rot Disease

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Keywords: brown rot, nitrogen, nectarine

A study to determine the influence of five different nitrogen fertilization levels of 'Fantasia' nectarines on brown rot disease was initiated in 1991. Natural infections of both 'Fantasia' and 'Flavortop' nectarines by the brown rot fungus were significantly greater for the high nitrogen levels than for the low nitrogen levels with fruit from the unfertilized control trees having the lowest incidence of infections. After inoculating mature fruit by spraying spore suspensions of *M. fructicola,* we found that more fruit from trees from the high nitrogen levels were infected and developed a greater number of decay lesions per fruit than fruits from the low nitrogen levels (Table 1). Furthermore, fruits from the unfertilized trees showed the lowest incidence of (greatest resistance to) infections. In addition, incubation and latent periods (time required for symptom expression and sporulation development, respectively) were shorter on fruit from the high nitrogen levels than from the low nitrogen levels, indicating that spores of *M. fructicola* require longer time to cause a successful infection in fruit from the unfertilized trees or those fertilized with low rates of nitrogen. Furthermore, once infection takes place, it progresses slower in fruit from the unfertilized trees than in fruit from trees fertilized with the high nitrogen levels.

In the spring of 1992, we inoculated blossoms and then green fruits periodically on trees from the various treatments in the field and found that blossoms of trees fertilized with high nitrogen levels were infected in significantly greater rates than blossoms of trees with the low nitrogen levels (Table 1). Similarly, inoculated green fruit on trees fertilized with the high nitrogen levels were infected in higher levels than fruit from the low levels of nitrogen. Fruits from the unfertilized control trees showed the lowest rates of infection, indicating that clearly nitrogen fertilization affects the development of latent infections (infections of green fruit) in the field and subsequently the development of natural infections of mature fruit during harvest and storage.

Presently, the mechanism of resistance to brown rot of blossoms from unfertilized or low-nitrogen-fertilized trees is not known. However, differences observed in cuticle thickness of fruits from trees fertilized with different levels of nitrogen explain partially the differences in fruit susceptibility to the disease. The different amounts of elemental nitrogen determined, after analyzing fruit tissues, cannot explain entirely fruit differences in the susceptibility to the fungus.

Studies to determine the effect of nitrogen fertilization on the overwintering phase (mummies hanging on the trees) of the pathogen are in progress. We believe this information will be useful to the stone fruit growers because, once the effects of the various treatments of nitrogen fertilization and sustainable management systems are determined and the mechanisms

of resistance to brown rot are defined, proper recommendations could follow. Perhaps management of the disease could be possible by a careful use of nitrogen fertilizers or an appropriate sustainable agricultural system. This could lead to less use of pesticides for control of brown rot and less contamination of underground water with nitrates.

Publications

1. Michailides, T.J. and R.S. Johnson. 1991. Effects of nitrogen fertilization on brown rot susceptibility in stone fruits. Pg. 58. In: Sustainable Agriculture in Sierra Foothills. University of California Sustainable Agric. Research and Education Program. Placerville, California, March 13, 1991.
2. Michailides, T.J., R.S. Johnson and D.P. Morgan. 1992. Effect of nitrogen fertilization on brown rot *(Monilinia fructicola)* susceptibility in nectarines. (Abstr.) Phytopathology 82:1064.

Table 1. Effect of nitrogen fertilization rates on infection of blossoms and mature fruits of Fantasia nectarine after inoculation with *Monilinia fructicola*.

Nitrogen (kg/ha)	Infection (%)[1]	Lesions per fruit[1]	Stamens infected (%)[2]
0	68c[3]	9.4c	18.3d
112	87b	12.3c	27.1c
175	88b	20.4b	42.7a
280	96a	20.8b	42.0a
360	98a	25.3a	34.9b

[1]Average of nine 12-fruit replications (results of 1990).
[2]Average of nine 5-blossom replications (results of 1992).
[3]Numbers in each column followed by different letters are significantly different according to Duncan's Multiple Range Test at $P<0.05$.