Weeds as Source of Inoculum for *Rhodococcus*

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**Abstract**

*Rhodococcus fascians* is a gram positive bacterium that can infect a variety of plants and is known to cause Pistachio Bushy Top Syndrome. *Rhodococcus* sp. causes numerous symptoms in pistachio plants such as stunting, excess adventitious bud production, twisted and shortened roots and shortened internodes. The pathogen can be found on the outside surfaces of the plant (epiphyte) and inside (endophyte) affected plants. There is no cure for *Rodococcus*-infected plants; therefore, symptomatic plants must be removed in order to prevent further transmission within the orchard. Because it takes 7 years for a new orchard to enter economic productivity, the removal of infected plants and subsequent replanting comes at a large economic cost for growers. The potential sources of residual inoculum at replant sites are unknown. Direct contact with other infected plants is an obvious way to spread infection. We analyzed weeds in known infested Pistachio Bushy Top orchards to see if they could be sources of inoculum in replant sites. We assessed 8 weed species and found one to harbor *Rhodococcus* species.

**Procedure**

We collected weed samples from a PBTS-infested orchard in Lemoore, CA. Samples were gathered, using surface-disinfested shears, and weeds were collected from both within and outside the grow tubes surrounding affected plants. Weed samples were surface sterilized in 0.5% NaOCl for 20 s and 70% ethanol for 1 min and then rinsed three times in sterile deionized water. The samples were then macerated in 2 mL Eppendorf tubes containing 1 ml sterile deionized water. Then samples were vortexed and 200 μl of each sample were plated on D2 selective medium. Based on colony color and morphology, putative *Rhodococcus* sp. were subcultured and their identity confirmed by diagnostic PCR.

**Results and Discussion**

*Rhodococcus sp* was confirmed from *Chenopodium murale* (Nettleleaf Goosefoot). The *C. murale* specimen yielding *Rhodococcus* sp. was in direct contact with a symptomatic pistachio plant. The results of our study demonstrate that *Rhodococcus* gained entrance to the weed and was not just surviving on the surface. This raises the question of whether *Rhodococcus* sp. may serve as a pathogen of this weed species or rather serve as a harmless endophyte in this weed. If weeds are a host or carrier of the pathogen pistachio growers will have to be more vigilant with weed removal in pistachio bushy top affected orchards. More experimentation is necessary to determine how long the bacterium may survive in weeds and whether the bacterium causes disease on weeds.

**Conclusion**

*Rhodococcus sp* was isolated from one weed species, *C. murale*, that was in direct contact with a pistachio bushy top affected pistachio plant. Our finding suggests that the pathogen was transmitted by direct contact between the weed and the infected pistachio. The results suggest that weeds can serve as a source of inoculum for *Rhodococcus sp* if left in orchards with healthy pistachio plants.

**Select Reference**


**Acknowledgments**

- Ruth Logsdon, Pistachio grower, PBTS orchard
- Randall Lab, diagnostic PCR analysis, New Mexico State University
- Lindcove Research and Extension Center
- University of California Cooperative Extension, Tulare County

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**Scientific Name**

- *Chamomilla suaveolens* - Pineapple Weed
- *Sonchus asper* - Spiny Sowthistle
- *Cyperus esculentus* - Yellow Nutsedge
- *Chenopodium album* - Common Lambquaters
- *Chenopodium murale* - Nettleleaf Goosefoot
- *Melilotus officinalis* - Yellow Sweetclover
- *Polypogon monspeliensis* - Rabbitfoot polygogen
- *Coronopus didymus* - Lesser Swinecress

**Weeds Collected**

**Figure 2**: Figure 2A shows weeds growing out of the tubing and surrounding the pistachio plant. Figure 2B shows weeds surrounding the base of the tubing and emerging from the top of the tubing. Figure 2C shows a variety of weed species inside a single tube.

**Figure 1**: Symptoms of PBTS; figure 1A) twisted roots, 1B) cracking, 1C) galls, 1D) stunted growth.

**Objective**

- Determine whether weeds in indirect or direct contact with the symptomatic pistachio plants may become infected by the pathogen and serve as a reservoir of inoculum.