Table 2. Symptoms of Verticillium wilt in pistachio trees in September, 2001 in a trial in *Verticillium*-infested soil at the West Side Field Station.[a]

Rootstock	Strike symptom	Thin-leaf symptom	Free of Verticillium-like symptoms in 2001	Died before 2001[b]	Statistical group[c]
	Percentage of trees				
P. integerrima	0	0	100	0	a
P. atlantica	11	0	75	14	b
PGII	3	5	81	11	b
UCB I	0	0	100	0	a

[a] Sixty four trees per rootstock were planted in 1992.
[b] All appear to have died from Verticillium wilt.
[c] Based on pairwise comparisons, rootstocks followed by the same letter were not significantly different ($P<0.05$) by Fisher's exact test for categorical data.

Table 3. Yield of split nuts/tree in 2001 from surviving female pistachio trees in a trial in *Verticillium*-infested soil at the West Side Field Station[a]

Rootstock	Kg of split nuts/tree
P. ntegerrima	7.1 ab
P. atlantica	5.6 bc
PGII	4.8 c
UCB-1	8.3 a

[a] Values within a column followed by the same letter did not differ by Duncan's multiple range test ($\alpha=0.05$). Note that yield loss due to tree death is not included in this data.

Table 4. Cumulative and average annual yield of split nuts per tree from 1998 through 2001 from surviving female pistachio trees in a trial in *Verticillium*-infested soil at the West Side Field Station[a]

Rootstock	Kg of split nuts/tree	1998 – 2001 Annual average yield
P. integerrima	18.9 b	6.3 b
P. atlantica	18.6 b	6.2 b
PGII	13.2 c	4.4 c
UCB-1	21.0 a	7.0 a

[a] Values within a column followed by the same letter did not differ by Tukey's multiple range test ($\alpha=0.05$). Note that yield loss due to tree death is not included in this data.

Conclusions and Practical Applications

Based on the results thus far it is unclear whether or not *P. integerrima* is more resistant to Verticillium than UCB-1. However, in this orchard with moderate disease pressure, in terms of nut yield and quality, UCB-1 is doing as well as P. integerrima. *P. atlantica* is susceptible, and PGII is the most susceptible of the four rootstocks to Verticillium.

This trial is demonstrating the most common symptom of Verticillium wilt is poor vigor, rather than the more definitive "strike" symptom. If this observation continues is valid, then orchards with poor yield histories, particularly those on susceptible rootstocks, may have Verticillium wilt.

In this relatively weed-free field, the concentration of *Verticillium* inoculum dropped 10-fold in just 5 years and has remained at a relatively low but stable concentration of two microsclerotia per gram of dried soil thereafter. This suggests that while specific pistachio rootstocks are quite susceptible to Verticillium they are not a particularly good host and do not build-up a population of Verticillium.

Due to the variability in yields, we want to extend the trial past the early-bearing years. When yields have "stabilized," we plan to remove one-half of the trees, assess each tree above and below the graft union for signs of Verticillium wilt, and then determine if there's a correlation between yield of each individual tree over time with infection or tree appearance.

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