

SCREENING AND EVALUATION OF NEW ROOTSTOCKS WITH RESISTANCE TO *PHYTOPHTHORA CINNAMOMI*

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PROJECT OBJECTIVE: To collect, select, breed and develop avocado germplasm which exhibits resistance to *Phytophthora* root rot of avocado.

1. Collection and selection of germplasm

No new collections of avocado germplasm were imported this year.

We are still trying to locate one last avocado species, the Aguacate de Anise from Costa Rica, to test its resistance to avocado root rot.

Attempts are still being made to force budwood from the Rocky tree in San Diego County. It shows excellent field resistance.

2. Breeding program

We have screened 5466 seeds from the Witney, Bergh and Martin breeding program for resistance to *Phytophthora cinnamomi*. The number of available seeds is increasing each year and there may be up to 12,000 seed for next year. While we believe we can handle large numbers of seed, we may begin to reduce the numbers of seed tested from certain trees which are providing the bulk of the seed at this time.

It appears that the different rootstocks in the breeding blocks bloom at different times. Thomas, Toro Canyon, Barr Duke, Duke 7 and UC 2011 bloom early. Persea steyermarkii, CRI-71, G810 and G755A bloom late. D9, G6 and G874-5 are intermediate in their bloom time. We have implemented girdling of the late varieties and spraying of the early varieties with Uniconazole-P to induce crossing between varieties which flower at different times.

From the material screened this year, we retained 22 seedlings which showed excellent resistance to *P. cinnamomi* in the initial screening. Thomas and D9 are the parents most often represented in *P. cinnamomi*-resistant seedlings. In order to reduce the time between identification of resistant rootstocks and field testing, we are now grafting promising material onto sucker shoots from cut stumps in the field to rapidly increase budwood for testing. We now have 12 possible crosses from the breeding program which have shown a high degree of resistance to *P. cinnamomi* after extensive testing.

New budwood has been generated from three of these new crosses and two of them are slated for field testing in 1997. The other 9 will be grafted for increasing new budwood in 1996.

We are cooperating with Dr. Clegg to determine how many of our rootstocks from the breeding blocks are actually crosses and how many are selfs. We are also determining the complete parentage of the 12 rootstocks from the breeding blocks which show a high degree of resistance.

The breeding plots are now made up of G755A, Thomas, G1033, Toro Canyon, Barr Duke, UC2001, CR1-71, Duke 7, G6, D9, UC2011, and *P. steyermarkii*.

3. Screening and greenhouse evaluation of rootstocks

Extensive greenhouse evaluations were done on clonals G755A (*P. schiedeana* x *P. americana* - Guatemala), Latas (So. Africa), Kidd Duke (Australia), Kidd (Australia), and Talalt (So. Africa). Thomas served as a resistant control. When grown without *P. cinnamomi*, Thomas, Kidd and Kidd Duke all gave plants of similar size and health. Talalt, Latas and G755A produced smaller plants with less healthy roots. However, when grown with *P. cinnamomi*, Thomas produced the largest plants and the other varieties were not significantly different in size. In the presence of *P. cinnamomi* Latas, Thomas and Kidd Duke produced the greatest number of healthy roots and the greatest root length. Kidd, Talalt and Kidd-Duke all appeared to have high levels of *P. cinnamomi* infection, while Latas and G755A showed considerable resistance to *P. cinnamomi* infection. Of the new rootstocks, Latas, although a slow grower, appears to possess characteristics which would merit field testing. Although G755 grew slowly in this greenhouse test, because of its resistance to *P. cinnamomi*, it will also be tested in the field. Rootstocks selected for intensive testing in 1996 include W-14 (South African), UC 2076 (Avocate mico from Guatemala), Poly-N (haploid avocado from UCLA) and CR-4 (West Indian from Costa Rica).

4. Field Evaluations

In a plot at South Coast under fairly heavy pressure by *P. cinnamomi*, Hibbard and CRI-80 are not performing well and will be dropped from the program. Thomas is performing best, followed closely by UC2011, Queretaro. D9 and Duke 7 are intermediate in performance.

In a second trial at South Coast, some trees are now showing symptoms of avocado root rot, but damage is still relatively light. Only CRI-71 is growing poorly and will be dropped from the program. Ranking the trees based on yield indicates Duke 7 is performing the best followed by UC 2003, Dusa, Spencer and Thomas. D9, Borchard, Queretaro, UC 2011 and CRI-71 are not yielding as well. Borchard, which was near the top one year ago, has dropped significantly indicating root rot is beginning to have an impact.

In a third five-year-old trial at South Coast, damage due to *P. cinnamomi* is very light despite the plot having been inoculated with *P. cinnamomi* three times. Based on yield, Parida, UC2002, UC2001 and Thomas are the best, with Toro Canyon and UC 2002 yielding the least. Parida exhibits periodic chlorosis, but all of the other rootstocks appear to be performing well.

In a one-year-old plot in a heavy, *P. cinnamomi*-infested soil in Ventura Co., Evstro and Thomas are performing the best. Velvick and Aguacate de Mico are performing poorly, while Golden, Duke 7 and Topa Topa are intermediate.

In a one-year-old, Phytophthora-infested plot in Somis CA, Thomas performed better than UC 2011 and Duke 7 in an unmulched soil. However, under mulched conditions UC2011 performed as well as Thomas.

In a second mulch trial infested with Phytophthora cinnamomi near Somis CA, Toro Canyon, performed best. Thomas and Duke 7 were intermediate in performance, while Zutano seedlings grew very poorly.

Avocado rootstock infection by *Phytophthora cinnamomi*

