
Screening and Evaluation of New Rootstocks with Resistance to *Phytophthora cinnamomi*

Greg W. Douhan
UC Riverside

Cooperators: Brandon McKee – UC SRA, Elinor Pond – UC SRA, Mary Lu Arpaia – UCCE Gary Bender – UCCE, Ben Faber – UCCE

Ultimately, the control of Avocado root rot will be accomplished with resistant rootstocks. Our goal is to find rootstocks that will eliminate *Phytophthora cinnamomi* as a serious pathogen on avocado. Our ability to find such a rootstock has been enhanced as a result of our breeding blocks where we focus on crossing already resistant rootstocks. Our objectives over the life of this project have been to collect, select, breed and develop avocado germplasm that exhibits resistance to *Phytophthora* root rot of avocado. This project has already produced several new tolerant rootstocks (Zentmyer, Uzi, and Steddom), which are greatly improving the yields of avocado on land infested with *Phytophthora cinnamomi* (Figure 1). Releasing this germplasm for California avocado growers is a high priority that I am currently working on with the UC Administration.



Figure 1. A) Zentmyer rootstock grafted to Hass (left) growing vigorously in root rot infested soil in South Africa next to unknown, but susceptible rootstocks, grafted to Hass. B) Uzi rootstock grafted to Hass (left) growing vigorously in root rot infested soil in Southern California next to Spencer rootstock grafted to Hass that is showing symptoms of *Phytophthora* root rot.

Since this is a long-term ongoing project, I have included in this 2007 report a general timeline that is followed throughout the year so that the growers, Board Members, and PRC Members have a feel for what goes into this program (Table 1). Last years January Freeze did have a slight impact on the program but most plots have recovered well. We only lost a total of three plots and there did not seem to be any significant variety differences with respect to freeze tolerance except that Hass plants grafted to Dusa seemed to be more susceptible to the frost than any other variety. However, this would take further experimental work in order to truly address. However, this line of research may be needed to pursue since Dusa is the most popular clonal rootstock that is available to California growers at this time.

The January freeze also meant that yield data could not be collected on our experimental plots except for one plot. However, based on the data from last year and the proceeding years, some of our advance lines are yielding significantly greater than our control rootstock Thomas. Table 2 shows an example from one of the plots. This demonstrates that this program has truly moved rootstock development forward and will continue in the future. We hope to one day be able to have multiple rootstocks with different characters beside root rot tolerance, such as dwarfing and salt tolerance, that California growers can choose from that will be suitable for the area and soil type in which they grow avocados.

Table 1. Yearly timeline for research involved in this project.

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	
Screening seeds	█										█		
Planting new plots				█									
Harvest plots			█										
Plot rating		█											
Pick breeding block seeds							█						
Order clonal trees (Brokaw)											█		
Order clonal trees (C & M)			█										
Apply phos. acid				█					█				
Stump graft breeding blocks				█									
Contact new growers	█												

Table 2. Esc ondi do Harve st, April 2006; 3 yea r old plot. Note yield data on advanc ed lines compa red to the contr ol Thomas.

Rootstock	Total fruit weight per tree (kg)	Individual fruit we ight (kg)
Lata s	26.34a	0.233a
Steddo m	23.7 6ab	0.233a
Toro Canyon	22.90ab	0.241a
VC207	20.95ab	0.232a
Uzi	18.86b	0.229a
VC225	12.93c	0.234a
Afek	9.52cd	0.229a
VC241	6.33de	0.224a
Thomas	4.33de	0.242a
VC44	2.85e	0.242a

Four new plots were set up this year that included three new rootstocks that have not been tested. We plan on testing up to eight new rootstocks for next year's trials. However, we still have many more rootstocks that have made it through the two years of greenhouse screening that still need to be field-tested. We were also going to implement molecular markers to evaluate resistant rootstocks this year and work on some molecular methods for quantifying the pathogen in the soil but the budget cut this past year prevented that from happening. However, I do plan on utilizing this type of technology in the future to move this project forward and currently have a student working on this aspect of the project.