Photo credit: Johnny Rosecrans, Cal Poly University

Advanced Avocado Rootstock Selections Move to Commercial-Scale Field Trials

By Tim Spann, PhD
Spann Ag Research & Consulting

Over the past several years, the California Avocado Commission (CAC) has been changing its approach to funding the rootstock breeding program. Through numerous discussions with University of California, Riverside (UCR) researchers, and independent program reviewers, it became clear to CAC that the program as it existed was not meeting the California avocado industry's needs.

There was a backlog of rootstock selections that had been made over the years, some going as far back as the 1970s, that had never been fully evaluated, some of which showed significant promise. CAC tasked Dr. Patricia Manosalva, who took over the leadership of the rootstock breeding program in 2015, to select the most promising candidate rootstocks from the backlog and move them to commercial-scale trials to determine which, if any, are worthy of commercial release.

The Candidate Rootstocks

Using historical data from lab, greenhouse, and small-scale (five to 10 trees) field trials, and supplementing with new trials where needed, Dr. Manosalva developed a list of five candidate rootstocks. These five rootstocks were selected because they have phytophthora root rot tolerance equal to or better than 'Dusa' and some showed degrees of salinity tolerance as well as other desirable characteristics. The five rootstocks and their characteristics are shown in the accompanying table.

Although all these rootstocks are listed as having phytophthora root rot resistance and most are tolerant of salinity, it is important to understand these traits are not set in stone because they are based on limited data. Some of the data used to characterize these rootstocks is from greenhouse screenings or field trials where good quality water was "adulterated"

University of California, Riverside avocado rootstocks and their known traits that have been selected for commercial-scale field trials and potential commercial release.	
Rootstock	**Traits**
PP35	Resistance to PRR and tolerant to salinity. Possibly some heat tolerance.
PP40	Resistance to PRR and tolerant to salinity. Possibly some heat tolerance.
PP80	Resistance to PRR. Possibly some salinity and heat tolerance.
PP42	Resistance to PRR and moderate salinity tolerance. Possibly some heat tolerance.
PP45	Resistance to PRR but sensitive to salinity. Possibly some heat tolerance.
***PRR = phytophthora root rot**	

to approximate known saline water profiles, and all with limited numbers of trees. There is nothing like giving trees to commercial avocado growers to really put them to the test under real world conditions. After all, for these rootstocks to be successful they will need to stand up to and perform under commercial field conditions.

Trial Sites

Because of limited budwood supply for some of the rootstock selections, these trials have been planted over the past two years (2019 and 2020) with one additional round of plantings (two sites) to be established in 2021. All rootstocks are grafted to 'Hass' and all are planted alongside 'Dusa' control trees except the two sites established in 2019, and a minimum of 100 trees of a given rootstock are planted at any given site. The goals in selecting sites were to have plantings distributed across avocado growing regions, and to have the trees planted in groves with phytophthora root rot infested soil, water salinity issues, or both. We also looked to work with established growers with good production practices — sorry, no newbies allowed.

Seven trials are now established in Temecula (two sites), Camarillo, Ventura, Carpinteria, Goleta and San Luis Obispo. All these sites are with commercial avocado growers except San Luis Obispo. The San Luis Obispo site is on the campus of Cal Poly on radio tower hill. Although not a commercial grower, the Cal Poly groves are managed to commercial standards. This site will allow easy access for grower field days in the north, and Dr. Lauren Garner, Cal Poly Professor of Horticulture, who is overseeing this site, has numerous students interested in helping with the trial — they helped plant the trees. We believe that any time we can engage the next generation in avocado research and production it is a win-win situation. There was strong local support for this site as well, with C&M Nursery, Righetti Ranch and Del Rey Avocado Company contributing to make the trial possible.

The Ventura site was selected to serve as a control. This site had no detectable phytophthora root rot and relatively good quality water. Although sites like this are increasingly rare, it is important to know these rootstocks will perform well under good conditions and not just when stressed.

Evaluation and Release

Dr. Manosalva and her team will evaluate the trees three to four times per year at each site. This will include growth measurements, tree health evaluation and continuous monitoring of soil and water conditions. In addition, each grower shares their full fertility program and other management practices with the team. Within about three years a clear picture will start to emerge as to the rootstocks' ability to tolerate the phytophthora and salinity conditions at each site. Yield data also will need to be collected to make sure there are no detrimental affects on yield. We anticipate that within five years, decisions will begin to be made on the fate of these rootstocks and the University will begin the process of commercial release of the best ones.

CAC thanks all the grower cooperators who have planted trials on their property to help advance the California avocado industry.

Westfalia Releases Two New Avocado Rootstocks

The Westfalia Fruit Group of South Africa has recently released two new avocado rootstocks, 'Leola' and 'Zerala'. Both rootstocks are jointly owned by Westfalia and the South African Avocado Growers' Association (SAAGA).

Westfalia reports these new rootstocks offer higher yields under a variety of conditions. These new rootstocks have been evaluated in various countries under a range of production conditions over the past two decades.

'Leola' was shown to outperform 'Dusa' and 'Duke 7' under heavy phytophthora infection pressure. 'Zerala', in addition to having high yield characteristics, is said to perform well under salinity stress.

Both rootstocks are available in the U.S. from Brokaw Nursery.