

Introduction

Plant parasitic nematodes can cause extensive damage to grapevine roots that are not resistant to them. Nematodes thrive in the sandy soils in the San Joaquin Valley amplifying this problem. Vineyards in the SJV are usually located on sites where grapes or other nematode hosts have been previously grown, which further increase nematode populations or select for particularly virulent nematode biotypes. The combination of these effects can significantly harm San Joaquin Valley vineyards.

New nematode resistant rootstocks have been bred by UC Davis and the USDA. These rootstocks have minimal information regarding their general viticultural traits. Other rootstock selections have been shown to affect vine growth and yields, nutrition status and fertilization efficacy, and berry characteristics and fruit chemistry. Before these rootstocks can be widely adapted for use in the San Joaquin Valley, it is important to understand what effects these nematode resistant rootstocks have on the scion.

Methods

Trials took place at two separate vineyard sites.

Trial 1 is in Madera California. This trial includes experimental rootstocks GRN1, GRN2, GRN3, GRN4, GRN5, RS3 and RS9, as well as 1103P and Freedom as standard rootstocks. This trial was planted in Spring 2009 with Petite Verdot as the scion on 8' x 10' spacing to a 72" single high wire trellis system. Each replicate in this trial consisted of an 8-vine panel with 5 replicates per rootstock.

Data collected at Trial 1 focused on canopy growth and vine water stress. Initial canopy growth was assessed through shoot counts. During the growing season overall canopy size was assessed by using a Paso Panel to calculate the amount of shading underneath the vine. Vine water stress was determined by collecting midday leaf water potential.

Trial 2 is north of Merced California. This trial includes experimental rootstocks GRN2, GRN3, GRN4, RS3, and RS9, as well as 1103P as a standard rootstock. The trial was planted in September of 2016 with Malbec as the scion on 5' x 11' spacing to a single 60" single high wire trellis system. Each replicate in this trial is a full row of 388 plants with 4 replicates per rootstock.

Data collected at Trial 2 focused on fruit quality. From each row 15 clusters were collected from both sides. The pH, TA, and Brix were assessed independently on each set of clustered prior to being averaged from both sides of the same row prior to statistical analysis.

Figure 1. Percent Shading Under Canopy

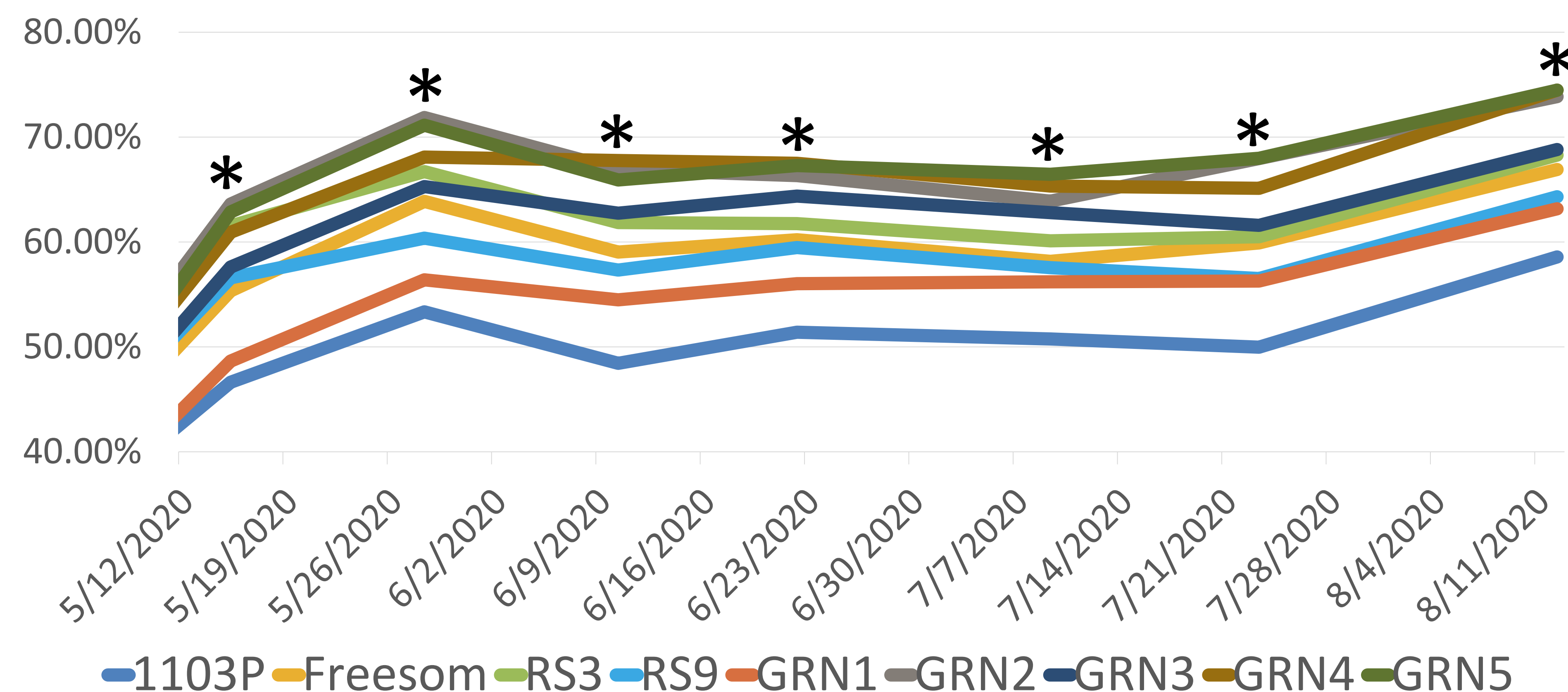


Figure 1. Percent Shading Under Canopy collected by Paso Panel. Dates marked by asterisk(*) have statistically significant differences between rootstocks. GRN2, GRN4 and GRN5 all produce the largest canopies. GRN3, RS3, and Freedom, along with RS9 and GRN1 have canopy sizes in the middle. 1103P has a much smaller canopies than the other rootstocks

Figure 2. Midday Leaf Water Potential

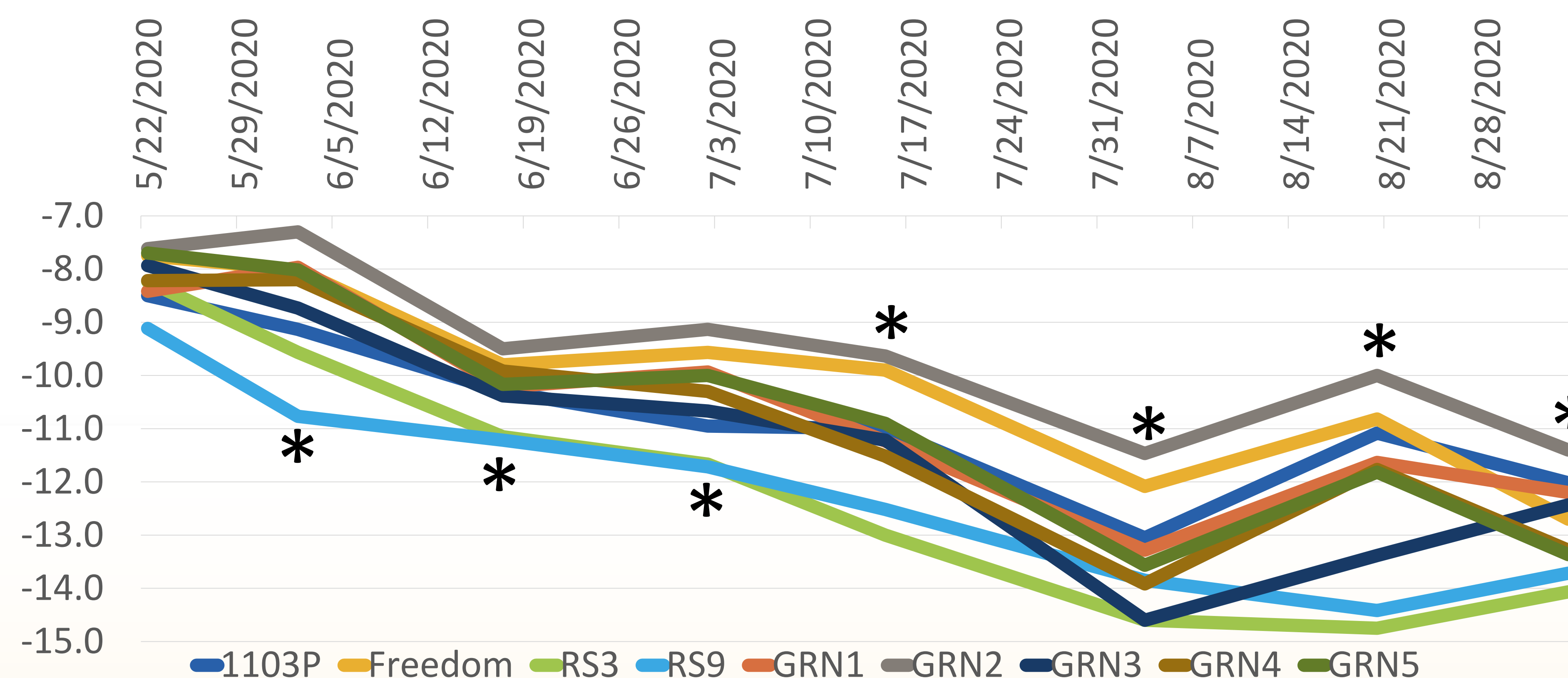


Figure 2. Midday leaf water potential. Dates marked by asterisk(*) have statistically significant differences between rootstocks. GRN2, despite its large canopy, along with Freedom maintain much lower water stress across most of the season. RS3 and RS9 show much higher level of plant water stress across the entire season. Post veraison in late July and early August the vineyard manager dries down the soil to increases water stress in order to achieve their desired fruit quality. While all rootstocks show an increased stress level, GRN3 jumps from being in the middle group for plant water stress, to being one of the most stressed rootstocks. While this isn't conclusive, it indicates an inability of this rootstock to handle in field drought conditions.

Table 1. Average Shoot Count

| Rootstock | Ave Shoot Count |
|-----------|-----------------|
| GRN2 | 244.4 A |
| GRN4 | 224.2 AB |
| GRN5 | 224.0 AB |
| GRN1 | 212.6 ABC |
| GRN3 | 202.6 ABC |
| Freedom | 199.6 ABC |
| RS3 | 187.2 BC |
| 1103P | 182.0 BC |
| RS9 | 173.2 C |

Table 1. Average Shoot Count. Numbers marked by the same letter can't be separated. Freedom, GRN1, GRN3, GRN4, GRN5, and especially GRN2 all start the season with a higher number of shoots. While RS3, 1003P and especially RS9 start with a lower number of shoots.

Table 2. Harvest Data

| Rootstock | Brix | pH | TA (g/100mL) |
|-----------|---------|---------|--------------|
| GRN4 | 26.9 A | 4.30 A | 0.381 |
| GRN2 | 26.7 AB | 4.28 A | 0.397 |
| GRN3 | 26.7 AB | 4.27 A | 0.387 |
| RS9 | 26.4 AB | 4.24 A | 0.378 |
| RS3 | 25.3 AB | 4.18 AB | 0.364 |
| 1103P | 25.1 B | 4.09 B | 0.395 |

Table 2. Harvest Data from Trial 2. GRN4, GRN2, GRN3, and RS9 are all a full degree Brix above RS3 and 1103P. pH shows a similar grouping with 1103P having the lowest overall pH. TA values did not separate for this year's data.

Conclusion

The rootstocks being examined here all show differences in canopy growth, plant water stress, and fruit quality characteristics. As this project continues it will add additional data that will allow vineyard managers to best select the rootstock that will give them advanced nematode resistance, as well as fit into their management requirements.