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Popular Article

Rootstock for grape production

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Rootstocks play a crucial role in determining orchard efficiency in fruit crops. Combining the desirable attributes of two different plants by budding or grafting can produce different growth effects. The effect of rootstock on fruit quality in terms of physical traits and internal chemical compositions is well demonstrated in temperate fruit crops (Apple, Pears, Cherry etc.) as compared to tropical and subtropical fruit crops. This difference can be illustrated by comparing the relative importance of rootstocks for precocity, yield, and tree size control, and through contrasts in annual phenological cycles, fruit respiratory behavior, crop load and canopy management techniques. But these effects on physiological, biochemical and molecular fronts are still not understood.

The rootstock is an important factor controlling vigor and equilibrium between yield and quality, but evidently that is not the only vine grower can use, Indeed the training system, via canopy management, density of planning and pruning level, is an important parameters of which the interactions with the rootstock ate analyzed

The introduction in Europe, at the end of the last century, of the grafting of Vinifera cultivars onto rootstocks belonging to North American Vitis species, had solved the problems caused by the Phylloxera and therefore had allowed viticulture to be saved. This is the first successful example of biological control. The own-rooted vines are more or less quickly attacked and automatically decline after a more or less long time. The experience shows that growing *Vitis vinifera* grapes required

grafting onto phylloxera tolerant rootstocks. Most of the *Vitis vinifera* cultivars were also susceptible to nematodes, but few species, such as *V. Solonis, V.Champini, V. Doaniana* showed moderate to high resistance.

The Riparia x Berlandieri hybrids 420A and 161-49, were recommended as the most suitable stocks for agrillo-silliceous and Calcareous-silliceous soil, while Rupestris x Berlandieri hybrids 99 and 110, Aramon X Rupestris X Berlandieri hybrids 150-15, and Farncox X Rupestris XBerlandieri hybrids were preferred on calcareous soils; The rootstock 125AA is susceptible to frost compared with 8B and 5C ; the solonis 1616 was found suitable for saline and wet soil and, the salt Creek is suitable for light soil in Mildura area. while the rootstock Riparia-Rupestris 101-14 and Berlandieri-Riparia 420A were found susceptible to drought and poor drainage.

In Portugal, the rootstocks Corriola or Alves do Bairro were found resistant to phylloxera. The rootstock Temple is resistant to Pierce's disease, anthracnose, downy mildew and tolerant to *Meloidogyne spp* and susceptible to Isariopsis leaf blight and grape leaf folders.

Need for Rootstocks

The rootstocks is an important factor to controlling vigor and equilibrium between yield and quality, but evidently that is not only one vine grower can use. The introduction in Europe, at the end of the last century, of the grafting of *Vinifera* cultivars onto rootstocks belonging to North American *Vitis* species, had solved the problems caused by the Nematodes. The own rooted vines are more or less quickly attacked and automatically decline after a more or less long time. Most of the *Vitis vinifera* cultivars were also susceptible to nematodes, but few species, such as *V. solonis, V. champini* and *V. doaniana* shows moderate to high resistance.

Rootstocks have so far not been employed in commercial viticulture in India However, with the increasing problems of soil salinity, drought, nematodes and poor fruit fullness of varieties, the need for rootstocks has been felt in Indian viticulture during the past few years. Rootstocks have not only potential tool for manipulating the vine growth and productivity. Extensive research has been carried out on grapes rootstocks in the USA and Australia during the last century. Now rootstocks have been identified for various problems by studying effects on vine growth longevity, fruit yield and quality. Even though horticultural practices like mulching. green manuring, leaching of salts and application of soil amendments have been employed by growers to overcome these adverse situations, the benefits realized by these practices are not satisfactory. Hence, the usage of rootstocks

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to sustain the productivity of grapes under adverse situation is gaining popularity.

1. Nematode resistant rootstocks

a. **1613:** It is compatible with all wine, raisin and table grape varieties of California, suited for all soils except very light soils. Cuttings root easily, Bud/ graft take is very high. It has poor suckering habit.

b. **Dog ridge:** It imparts very high vigor to the scions. It is recommended for use in higher and less fertile sandy soils. It gives best results with heavy - bearing varieties and intensive cultivation. Rooting is poor. Bud graft take is high. It has profuse suckering habit.

c. **Salt creek (Ramsay):** It is a variety of *Vitis champini* and different from true salt creek which belongs to *V. doaniana*.. It is closely related to Dog ridge. This also imparts great vigor to its scions. It performs well with vine and raisin varieties of California in light sandy soils of low fertility. Rooting is poor but bud/ graft take is high. It produces less suckers.

d. **Harmony:** A cross between a selected seedling of 1613 and Dog ridge. It also imparts great vigor to scions. It has greater resistance to root knot nematode. It roots readily and takes any bud / graft easily. Suited for all soils except very light ones.

e. **Freedom:** A cross between 1613 and Dog ridge. It imparts more vigor than Harmony. In terms of root knot nematode resistance, it behaves similarly to Harmony. It roots readily. Bud / graft take is very high.

2. Phylloxera resistant rootstocks

Rootstocks play a great role in the resistance to phylloxera, an aphid. Resistant rootstocks reported are ST. George, Ax R1, 1202, 99-R, 3306, 3309, Riparia Glorie, Teleki 5-A, Selection Oppenheim No.4.

Salinity Tolerant rootstocks

Ramsay, Dogridge, 1613, Rupestris du hot and 99-R.

Drought tolerant rootstocks

110 Richter, 140 Ruggeri	- Highly tolerant
Panlsen, SO4 and 99 Richter	**- Tolerant**
Rupestries due hot (St. George)	- Less tolerant

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Riparia Glorie - Susceptible

The rootstock Temple is reistsant to anthracnose, downy mildew and tolerant to Meloidogyne spp and sucesptible to leaf blight and leaf folder.

Table 1. Relative tolerance of grape rootstock for drought

Level of tolerance	Rootstocks
Highly tolerant	110 Richter, 140 Ruggeri
Tolerant	1103 Panlsen, So4 and 99 Richter
Less tolerant	3309 Couderc, 420 Millardet and de grasset, 5 BB Kober, Rupestris due lot (St. George), 101 Millardet and de grasset
Susceptible	*Riparia glorie*

Table 2. Recommended Grape rootstock for different situation

Water shortage	1103P, 140RU, 110R, 420A, S04, 99R
Soil EC> 2mmhos/cm And water EC> 1mmhos/cm	Ramsay, Dogridge B, 140RU, 99R, 110R
Soil ESP > 15% and water SAR >8%	140RU, 1613, Ramsay and Dogridge
Free Ca content of the soil is >12 %	Fercal 140RU, 420A, SO4
Chloride content of water is >4meq/lit	Ramsay, Dogridge B, 140RU, teleki-5c
Poor vigrou of the variety without any soil and water problem	Ramsay, Dogridge B, 140RU
For increased Nitrogen and Phosphorus uptake	Dogridge, St. George, 34 EM Ramsay
For increased bud break	1613

In situ grafting in grapes

For grafting, a mature scion stick of at least 8 mm diameter is to be used. Shoot growth, being slow and weak, Dog ridge rootstock takes more than a year to attain the graftable thickness at a desired height of 20-24 when raised in nursery bed/ polybag. Hence, it is advisable to plant rootstock and graft in *situ*.

The planted rootstocks can be trained and pruned to two strong shoots to attain maturity and graftable size of 8 mm. healthy and matured scion of desired variety from healthy, high yielding plants/ garden with 6-7 buds, can be collected and wedge grafting can be done. The plastic strip used to secure the graft joint can be untied and retied fairly tight. Otherwise, a construction below the graft joint will form and the stem will become weak. The grafted vine cane be trained to cover the entire canopy in instalments.

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