

GRAPEVINE ROOTSTOCKS

INFLUENCE ON VIGOUR

Some rootstocks give more vigour to the scion (fruiting variety) than others. Depending on the location and the type of the fruit variety, this vigour can be useful or detrimental. Vigour as a general term consists of two parts.

1. **RATE OF GROWTH**

The vigour of the vine increases with the intensity of respiration and the corresponding increase in protein synthesis and the production of growth hormones.

2. **THE CAPACITY**

Capacity refers to the total amount of wood and fruit the vine is capable of producing.

For wine grape varieties producing ordinary wine, one generally chooses the most vigorous rootstock that is suited to the soil in order to obtain the maximum yield. However, with some varieties an excess of vigour leads to poor fruit set and consequently lower yields. Excessive vigour can also cause poor colour in table and wine grapes.

In more southerly regions or at high altitudes, one must choose a less vigorous rootstock in order not to delay maturity. Likewise, when growing grapes for premium wines or early ripening table grapes, one would generally choose a less vigorous rootstock unless the vineyard is situated in a region where grapes and wood ripen well despite a vigorous stock.

The detrimental effects of delayed maturity, poor colour in table grapes and poor fruit set caused by excessive vigour of the rootstock can be overcome to a certain extent by the use of a very wide trellis (1.5m to 1.8m). A high and wide trellis enables a vigorous vine to grow to its full potential by permitting sunlight penetration to all fruiting wood. Sunlight is not only essential for maturing the current season's fruit, but also for forming next seasons crop.

The choice of rootstock must be very carefully studied since the life and financial success of the vineyard depends on it.

NEMATODE RESISTANCE

In the past few years, the important role that different types of nematodes may play in the vineyard has become increasingly clear. Certain types of nematodes are responsible for the transmission of some virus diseases in the vine. However, other nematodes can cause considerable root damage by forming galls which decrease the plants efficiency in the uptake of water and nutrients.

ACTIVE LIME TOLERANCE

Many vineyard soils have a high lime content, which leads to iron deficiency or lime induced chlorosis in the vine. Lime content of the soil may be an important factor to take into consideration when choosing a rootstock. There is a method of determining the amount of active lime in the soil (which is not directly proportional to the total lime content). Using this method we can rank rootstocks according to their degree of tolerance.

SOIL HUMIDITY

Excess water during the growing season is undoubtedly an obstacle of the success of grape growing. Not all rootstock are equally affected by the presence of stagnant water in the soil.

SALT TOLERANCE

The sale concentration that a rootstock can tolerate is usually measured in grams of Sodium Chloride per kilogram of earth.

CHOOSING SCION / ROOTSTOCK COMBINATIONS

RELATIVE TO SOIL TYPES IN THE LOWER MURRAY - DARLING BASIN

Uniform canopy vigour enables maximum operating efficiency in modern mechanised vineyards. Mechanised operations such as pruning, pest and disease control and harvesting all require machines to be set at the beginning of a row and maintain optimum efficiency throughout the entire vineyard of any one variety.

Grapevine rootstocks can be grouped into three levels of inherent vigour. That is high vigour, medium vigour and low vigour.

Grapevine fruiting varieties (Scions) can also be grouped into the three basic levels of inherent vigour.

So too soil types can be graded in three levels of vigour to plants whilst loam's impart relatively high vigour with sandy loam's in between the two.

Therefore when planting a vineyard over soils of varying types, it is possible to choose scion / rootstock vigour to marry with the natural imparted vigour of varying soil types. Judicious rootstock selection can result in uniform canopy vigour which in turn leads to uniform mechanisation.

ROOTSTOCK VARIETIES

Based on the Department of Primary Industries Selection of Grapevine Rootstocks and Clones

3309 COUDERC

- Low to moderate vigour
- Moderate to good yields
- Suits deep well drained soils
- Not suitable for dry, shallow soils unless well supplied with water

This rootstock is suited for varieties with poor fruit set. It performs well in deep, well drained soils in a cool climate which is well irrigated.

101 – 14 MILLARDET

- Moderate Vigour
- Relatively high yields in deep soil in hot irrigated areas
- Moderate yields in cooler areas with shallow soil
- Not suited to dry, shallow soils without adequate irrigation

This rootstock has produced high yields of both red and white varieties in trials. It also appears to improve fruit set, advance grape maturity and has higher colour than other medium to high yielding rootstocks. Requires moist, deep soils and has a moderate tolerance to lime and high soil salinity.

SCHWARZMANN

- Moderate Vigour
- Moderate yields under good growing conditions
- Poor yields in dry conditions
- Advances maturity under good conditions

Schwarzmann does best in deep, moist soils and should not be planted where summer drought is common or where moderate to high water stress is generated to manipulate grape quality.

SO 4

- Moderate to high vigour
- High yields
- Avoid using in deep, fertile, humid soils
- Ensure sufficient irrigation if used in dry, shallow soils

This stock is well adapted to a wide range of soils, but does best in light, well drained soils of low fertility with adequate humidity. SO4 has a high phylloxera resistance, and a good resistance to a range of nematodes.

5BB KOBER / 5A TELEKI

- Relatively high vigour in deep soils
- Generally a moderate to high yielding rootstock across a wide range of sites
- May produce larger berries than other stocks
- Avoid sites likely to induce high vigour

This stock has moderate to high growth and yield in irrigated areas, with a short vegetative cycle. It has a shallow root system, tolerates high lime in the soil, and although it has no salt tolerance, it is one of the best rootstocks for humid, compact, calcareous soils.

5C TELEKI

- Moderate vigour
- Moderate to good yields across many sites
- Tends to produce larger berry weights
- Avoid growing in shallow, dry soils

5C Teleki has moderate vigour and is suited to well drained, fertile soils. Good for clay and clay - loam soils.

420a MILLARDET AND DE GRASSET

- Low to medium vigour
- Low to medium yields
- Does not like waterlogging

420a Millardet has a shallow growing, and well branched root system that is well suited to poorer, heavy textured soils. It is vulnerable to drought, does not like waterlogging, has good lime resistance but is prone to potassium deficiency. Vines grow very slowly and have a tendency to overcrop in the early years of vine development.

1103 PAULSEN

- Low to medium vigour
- Relatively low yield
- Has fewer berries per bunch than other stocks

This rootstock is moderate to vigorous in growth and it has a deep growing, strongly developed root system. It does well in acid soils and it has moderate tolerance to salt.

RICHTER 99

- Moderate to high vigour
- Moderate to high yields
- Suited to a wide range of soils
- Not suited to poorly drained soils

Richter 99 is suited to a wide range of soils, except for wet, poorly drained conditions. It is drought tolerant and performs well in acid soils. It does not tolerate salt, but will tolerate high levels of lime.

RICHTER 110

- Low vigour across a wide range of soils and site conditions
- Low to medium yields
- Good drought tolerance

Richer 110 is suited to all kinds of soils. It is highly resistant to phylloxera and moderately resistant to nematodes.

RUGGERI 140

- Relatively high vigour
- Mostly good yields
- Good drought tolerance
- Good for saline soils

Ruggeri 140 is considered tolerant to high soil salinity but is moderately susceptible to spring water logging. The rootstock performs well in shallow, dry, calcareous soils, and is very drought tolerant.

RAMSEY

- High vigour in deep, sandy soils
- Moderate vigour in dry, shallow soils
- Sometimes results in poor colour where vines are vigorous
- Moderate to high yielding rootstock

Mostly a moderate to high yielding rootstock and has never been low yielding. It is extremely resistant to nematodes and has good resistance to phylloxera.

ROOTSTOCK CHARACTERISTICS

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Suitability of phylloxera resistant rootstocks in different environmental situations

GROUP	ROOTSTOCK	SCION VIGOUR	VEGETATIVE CYCLE	NEMATODES	LIME	ACID SOIL	SALINITY	MAG. UPTAKE	DROUGHT	WATER LOGGING
A	101-14	M-L	SHORT	□□	□	X	□□	X	X	□
	SCHWARZMAN	M-L	SHORT	□□	□	X	□	X	X	□
	3309	M-L	MEDIUM	X	□	X	X	□□	X	X
B	S04	M	MEDIUM	□	□□	X	X	X	X	□
	5C TELEKI	M	MEDIUM	□	□□	X	X	?	X	X
	5BB KOBER	M-H	MEDIUM	□	□□	X	X	?	□	X
C	110 RICHTER	M	VERY LONG	□	□□	□	□	X	□□	□
	1103 PAULSEN	M-H	LONG	□	□□	□	□□	□□	□□	□
	99 RICHTER	M-H	MEDIUM	□	□□	□	□	X	□	X
	140 RUGGERI	H-M	VERY LONG	?	□□	□□	□□	□□	□□	X
D	K51-32	M-H	LONG	□□	□	?	□	?	□□	?
	K51-40	M-H	LONG	□□	□	?	X	?	X	?

ADDITIONAL INFORMATION

PHYLLOXERA – the above rootstocks generally have high resistance to phylloxera, but K51-40 has not been tested.

KEY TO TABLE – V. riparia x V. rupestris crosses, B = V. berlandieri x V. crosses, C = V. berlandieri x V. rupestris crosses, D = V. champini x V. riparia crosses and F = V. champini

ROOTSTOCK – note older S04 plantings now identified as 5C Teleki and older 5A Teleki plantings identified as 5BB Kober

SCION VIGOUR – given as a guide only as relative vigour of rootstocks varies in different environments e.g., different soil types or water availability.

VEGETATIVE CYCLE – indicates comparative length of growing season, which affects time of scion wood maturity and may influence time of grape maturity.

NEMATODES – refers to root-knot nematode resistance. Note that the menatode populations of the same species can vary in aggressiveness in different regions. Also populations can develop in a vineyard which gradually overcome resistance.

LIME – Group A only tolerate about 10% active lime. 140 Ruggeri has higher tolerance than others in Groups B and C.

ACID SOIL – choice may change if lime is applied prior to planting. More local trial data required to better define suitability.

SALINITY – indicates performance in saline soil. Interaction with drought is not considered here (rootstocks susceptible to drought may have higher salt uptake in drought situation).

MAGNESIUM UPTAKE – low magnesium uptake by some rootstocks, especially S04, in some soils may cause bunch stem necrosis, particularly with Cabernet Sauvignon and Merlot.

DROUGHT – Group B is slightly more tolerant than Group A

WATERLOGGING – refers to spring waterlogging of vines several years old. Note that some rootstocks e.g., 101-14 may be susceptible to waterlogging in early years, but more tolerant in later years. sales@sunraysianurseries.com.au

COMPATIBILITY – incompatibility is rare, but the rootstocks 3309, 101-14 and 5BB Kober is more susceptible than others to compatibility problems, particularly where scion wood contains virus. Ramsey is incompatible with Muscat Gordo.

This table has been prepared as a guide for selecting a suitable rootstock. It summarises information from local experience and many other sources and will be modified as more local trials are assessed.