Rootstock performance in stonefruit

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Rootstock selection at crop establishment governs tree performance and orchard production potential.

Worldwide there are few rootstock breeding programs for stonefruit. In Australia, Nemaguard is the current industry standard rootstock for peach and nectarine.

Scion vigour induced by rootstocks is an important criterion for orchard management and directly influences tree growth and development, precocity, yield and fruit quality. Other agronomic characteristics of rootstocks include adaptability to soil type (physical properties, pH) and tolerance/resistance to abiotic (drought, heat, salinity, waterlogging) and biotic (nematode, virus, bacterial, fungal) stress.

Research at Tatura into rootstocks for peach and nectarine using dwarfing, semi-dwarfing and high vigour stocks found rootstock-induced vigour effects on tree growth and development, yield and fruit quality.

Rootstock vigour types

The agronomic performance of dwarfing, semi-dwarfing and vigorous rootstocks were compared at the Tatura Stonefruit Experimental Orchard on peach 'September Sun' and nectarine 'Rose Bright' (Table 1). The rootstock/scion study was established in 2013 on Shepparton fine sandy loam with tree spacing of 4.5 m x 2 m (1,111 trees per hectare), trained as open vase and drip irrigated.

Nemaguard is a very common and vigorous rootstock and represents the current industry standard for peach and nectarine in Australia.

Table 2 shows comparison of rootstock traits. Some key features of each rootstock are:

Nemaguard – prefers sandy soil,

Elberta – used in heavier soils,

Krymsk® 1 – a new dwarfing rootstock,

Krymsk® 86 – a new semi-vigorous rootstock tolerant to drought and wet soil,

Cadaman – prefers well drained soils, and

Cornerstone – tolerant of saline and high pH soils, new stock meant to offer greater vigour and disease resistance.

Table 1. Rootstock/scion combinations at Tatura Stonefruit Experimental Orchard

Scion	Rootstock
Nectarine 'Rose Bright'	Cornerstone
	Elberta
	Krymsk® 1
	Krymsk® 86
	Nemaguard
Peach 'September Sun'	Cornerstone
	Elberta
	Cadaman
	Krymsk® 86
	Nemaguard

Table 2. Characteristics of rootstocks.												
Rootstock	**Pedigree (Country of origin)**	**Vigour**	**Anchorage**	**Soil conditions**	**Drought tolerance**	**Iron induced chlorosis**	**Crown Rot**	**Root knot Nematode**	**Root lesion nematode**	**Crown Gall**	**Oak root fungus**	**Bacterial canker**
Nemaguard	Prunus persica x Prunus davidiana (USA)	High	Good	Sandy loam, sensitive to wet soil conditions and calcareous soils	Moderate	Susceptible	Susceptible	Resistant	Susceptible	Moderately susceptible	Susceptible	Susceptible
Cornerstone	Prunus dulcis x Prunus persica (USA)	Very high	Excellent	Good in heavy soils, tolerant to saline and high pH soils	High	Resistant	Susceptible	Strong resistance	Susceptible	Moderate resistance	Unknown	Susceptible
Cadaman	Prunus persica x Prunus davidiana (France, Hungary)	High	Good	Sandy loam, tolerant to alkaline soils and wet conditions	Unknown	Tolerant	Unknown	Resistant	Susceptible	Unknown	Unknown	Unknown
Krymsk® 1	Prunus tomentosa x Prunus cerasifera (Russia)	Dwarfing	Good	Sandy loam, tolerant to alkaline soils and wet conditions	Unknown	Unknown	Susceptible	Susceptible	Tolerant	Susceptible	Unknown	Susceptible
Krymsk® 86	Prunus persica x Prunus cerasifera (Russia)	Semi-vigorous	Good	Tolerant to alkaline soils and wet conditions	Unknown	Unknown	Unknown	Moderately susceptible	Moderate tolerance	Moderate resistance	Tolerant	Unknown
Elberta	Prunus persica (USA)	High	Good	Unknown	Unknown	Susceptible	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

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Rootstock performance: tree growth

Early-season nectarine 'Rose Bright'

Relative to Nemaguard, Krymsk® 1 exhibited dwarfing characteristics, having reduced tree size and vegetative growth. Krymsk® 1 trees produced less pruning biomass, smaller main branch size, a lower level of canopy light interception and reduced shoot length. From an orchard management perspective, Krymsk® 1 grew an excessive level of suckers each season.

Krymsk® 86 trees showed semi-dwarfing traits: lower canopy light interception compared to Nemaguard. Suckering on Krymsk® 86 trees was greater than Nemaguard.

Elberta and Cornerstone rootstocks showed similar tree growth and development metrics compared to Nemaguard on early-season nectarine 'Rose Bright'.

Late-season peach 'September Sun'

Compared to Nemaguard, Krymsk® 86 trees exhibited semi-dwarfing characteristics: less pruning biomass, smaller main branch size and less canopy light interception. Tree survival in establishment years was lowest on Krymsk® 86. Suckering on Krymsk® 86 trees was greater than Nemaguard.

Cadaman, Elberta and Cornerstone rootstocks showed similar tree growth and development metrics compared to Nemaguard on late-season peach 'September Sun'.

Rootstock performance: yield and fruit quality

Early-season nectarine 'Rose Bright'

Cornerstone rootstock increased average fruit weight and fruit red skin coverage compared to Nemaguard. Krymsk® 1 trees produced equivalent fruit weight and sweetness (°Brix) and improved skin red colour coverage relative to Nemaguard. Yield and fruit quality on Elberta and Krymsk® 86 were similar to Nemaguard for nectarine 'Rose Bright'.

Late-season peach 'September Sun'

Relative to Nemaguard, Cornerstone and Elberta trees increased fruit weight and skin red coverage.

Krymsk® 86 trees produced similar yield, fruit weight and sweetness (°Brix) to Nemaguard; however, fruit red skin coverage was improved. Yield and fruit quality on Cadaman trees were similar to Nemaguard for peach 'September Sun'.

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