The Performance of Chenin blanc Grafted onto Different Rootstock Cultivars on a Dundee Soil in the Montagu District

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The performance of Chenin blanc grafted onto 15 different rootstock cultivars and clones, established on a sandy alluvial soil in the Montagu district, was investigated. Over the eleven years of the trial, the highest mean yields were obtained with 99 Richter (Clone: RY 13), Constantia Metallica, Dog Ridge, Ramsey and 101-14 Mgt. The mean yield of 99 Richter (Clone: RY 13) was significantly higher than that of the other 99 Richter clones and selections. The highest pruning masses were found with 143-B Mgt, Dog Ridge, Constantia Metallica and Ramsey. The crop-to-pruning-mass ratio of 143-B Mgt was, however, lower than that of the other graft combinations, which suggests that this graft combination was undercropped and that potentially higher yields could have been obtained. Moderate growth was obtained with the cultivars 101-14 Mgt and 3306 Coucere. These cultivars showed potential as growth-limiting cultivars as they consistently produced relatively high yields with satisfactory grape composition, associated with low pruning masses.

The grafting of Vitis vinifera L. cultivars onto various rootstocks is recommended in all the viticultural regions of the Western Cape, owing to the presence of the grapevine phylloxera (Daktulosphaira vitifoliae Fitch) and various nematode species in the soils. These viticultural regions are characterised by a wide diversity of soil types and climatic factors. Consequently cultivation practices and rootstock preferences also differ within the different regions (Zeeman, 1978), which implies that a wide diversity of rootstock cultivars is necessary.

At present no rootstock cultivar is equally well adapted to the wide range of conditions found in the viticultural regions of South Africa. Although a large number of rootstock cultivars are available in South Africa, only three, namely 99 Richter, 101-14 Mgt and Ramsey, are extensively used and contribute to 77% of all grafted commercial plantings (Kriel, 1985). For example, 99 Richter is well adapted to a wide variety of soil types but highly susceptible to infection by the soilborne pathogenic fungus Phytophthora cinnamomi P. (Marais, 1978; Loubscher, Ferreira & De Klerk, 1987). Furthermore, 101-14 Mgt has poor affinity with certain scion cultivars, and the growth of Ramsey is often too vigorous and it is difficult to graft (Pongracz, 1983).

Approximately 3 350 hectares are currently under grapevines in the Montagu district (Anon., 1988), the majority of the vineyards being planted on Dundee and Hutton soil types, with a smaller percentage on Longlands, Oakleaf, Shortlands and Mispah soil types (McVicar et al., 1977). This district is characterised by a relatively low annual rainfall (350mm) and high summer temperatures (Mean temperature throughout the growing season = 20,2°C) and can be classified as being in region IV (Winkler et al., 1974; Le Roux, 1974).

In the past, the majority of the winegrapes in this area were either ungrafted, or grafted onto Jacquez, Rupestris du Lot, 143-B Mgt and 101-14 Mgt (Pongracz, 1969; Beukmann 1976). Statistics indicate however, that the popularity of the first three cultivars has declined, whereas that of 101-14 Mgt has increased (Anon., 1988). According to Ambrosi et al., (1966), 101-14 Mgt performed best on the relatively deep, brackish, sandy-loam soils found in this area, whereas 99 Richter was not very popular owing to instances where grapevines grafted onto this rootstock suddenly died. The latter problem was subsequently found to be the result of infection by the pathogenic fungus Phytophthora cinnamomi.

Generally, the predominant problems facing the winegrape producer in this area are the re-establishment of old vineyards, relatively saline soils and an insufficient supply of water for irrigation. The aim of this trial was, therefore, to establish which rootstock cultivars perform best on an alluvial soil type in the Montagu district, thus presenting the producer with a broader rootstock choice.

MATERIALS AND METHODS

The trial was established during 1974 using a randomized block design with four replicates and 10 vines per plot. Chenin blanc was used as the scion cultivar and was grafted

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onto 15 rootstock cultivars or clones (Table 1). Of these rootstocks, 99 Richter, 101-14 Mgt, Ramsey, 110 Richter and 143-B Mgt were found to be free of known virus diseases.

**TABLE 1**

Rootstocks included in the field trial at Montagu.

<table>
<thead>
<tr>
<th>CULTIVAR (Clone)</th>
<th>GENETIC ORIGIN</th>
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<tbody>
<tr>
<td>101-14 Mgt (KWV)</td>
<td>V. riparia Mich. x V. rupestris Sch.</td>
</tr>
<tr>
<td>101-14 Mgt (VORI)</td>
<td>V. riparia x V. rupestris</td>
</tr>
<tr>
<td>De Waal</td>
<td>V. labrusca Mich. x V. vinifera L.</td>
</tr>
<tr>
<td>110 Richter</td>
<td>V. Berlandieri Pl. x V. rupestris Sch.</td>
</tr>
<tr>
<td>Jacquez</td>
<td>V. aestivalis Mich. x V. cinerea Engel x V. vinifera L.</td>
</tr>
<tr>
<td>143-B Mgt</td>
<td>V. rupestris x V. riparia</td>
</tr>
<tr>
<td>Constantia Metallica</td>
<td>V. rupestris</td>
</tr>
<tr>
<td>3306 Couderc</td>
<td>V. riparia x V. rupestris</td>
</tr>
<tr>
<td>Dog Ridge</td>
<td>V. Champini Planch.</td>
</tr>
<tr>
<td>Ramsey</td>
<td>V. Champini</td>
</tr>
<tr>
<td>Rupestris du Lot</td>
<td>V. rupestris</td>
</tr>
<tr>
<td>99 Richter (RY 13)</td>
<td>V. Berlandieri x V. rupestris</td>
</tr>
<tr>
<td>99 Richter (RY 30)</td>
<td>V. Berlandieri x V. rupestris</td>
</tr>
<tr>
<td>99 Richter (2/2/10)</td>
<td>V. Berlandieri x V. rupestris</td>
</tr>
<tr>
<td>99 Richter (VORI)</td>
<td>V. Berlandieri x V. rupestris</td>
</tr>
</tbody>
</table>

The soil of the experimental plot is classified as a Dundee soil type according to the system of McVicar *et al*, 1977. It can be described as a sandy, alluvial soil, typical of approximately 45% of the irrigated vineyard soils in the Montagu district when the trial was established. The vines were spaced 2.4 m x 1.2 m and were trained onto a 1.5 m slanting trellis. Initially, during the establishment of the trial, the vines were spur pruned to a budload of 15 nodes/kg pruning mass. With the availability of more irrigation water of a better quality during 1982, more irrigation water of a better quality during 1982, however, this pruning norm was found to be unsatisfactory and was adjusted to 30 nodes/kg pruning mass, which subsequently appeared to be too high. Consequently, from 1984 onwards, a pruning norm of 25 nodes/kg pruning mass was maintained.

**RESULTS AND DISCUSSION**

When assessing rootstock performance, the main criterion is a consistent production of relatively high yields of grapes of satisfactory grape composition, coupled with adequate growth over the economic lifespan of the grapevine. In this trial both the rootstock cultivar and the clone showed marked effects on the performance of Chenin blanc. The results are given in Table 2.

**Yield:** The highest mean yields were obtained with Chenin blanc grafted onto 99 Richter (Clone: RY 13), Constantia Metallica, Dog Ridge, Ramsey and 101-14 Mgt, all of which produced more than 25 t/ha and did not differ significantly, whereas De Waal produced the poorest mean yield (Table 2).

The annual fluctuation in the yield of the graft combinations could be the consequence of seasonal trends or climatic conditions. The yields of the graft combinations increased from 1982 relative to the preceding years (Fig. 1). At this stage more irrigation water of a higher quality was available and the resulting increase in the growth of the vines, measured as pruning mass, prompted an adjustment in the pruning norm was found to be too high, however, as indicated by the high crop:pruning mass ratios (Mean for...
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all rootstocks greater than 12.6), and it was therefore maintained at 25 nodes/kg pruning mass from 1984 onwards.

The mean yield of 99 Richter (Clone: RY 13) was significantly higher than the yields of the other 99 Richter clones and selections. The mean sugar content of the former graft combination was generally lower than that of all the other graft combinations, albeit not always significantly (Table 2), which could be the result of phenological differences as all the rootstocks were harvested on the same date.

Relative to the other rootstocks, Dog Ridge showed consistent improvement and stability in yield from the start of the trial. Conversely, relatively high yields were obtained with Jacquez at the start of the trial, but its yield was surpassed by that of other graft combinations in subsequent years. This decline occurred despite the absence of phylloxera nematodes in the soil and could be the consequence of overcropping early in the trial and/or nematode damage. No rootknot nematode species were found in the soil, and although the citrus nematode (Tylenchulus semipenetrans) was present in the soil samples, its populations were lower than those at which they affect the grapevine (J Loubser - personal communication).

In the literature it is stated that the performance of 143-B Mgt and Constantia Metallica tends to decline in the long term (Orffer, 1966; Carstens, Burger & Kriel, 1981; Archer, 1986). Despite a considerable fluctuation in the yield, however, particularly with 143-B Mgt, no general decline in the performance of these two rootstocks was observed in this trial, which could be the consequence of improved plant material. Whether their relatively good performance will be maintained for the next 10 years is yet to be established.

Pruning mass: The mean pruning mass of 143-B Mgt was significantly higher than that of any other rootstock, while that of Dog Ridge, Constantia Metallica and Ramsey was more than 2.65 t/ha over the 11 years of the trial (Table 2). These graft combinations had significantly higher mean pruning masses than Jacquez, 101-14 Mgt (VORI selection), 3306 Couderc, De Waal and all the clones and selections of 99 Richter, with the exception of 99 Richter (Clone: RY 13).

The mean crop:pruning mass ratio of Chenin blanc grafted onto 143-B Mgt was significantly lower than that of all the other graft combinations, with the exception of De Waal and Rupestris du Lot (Table 2). This, associated with its high mean pruning mass, suggests that this graft combination was undercropped and that higher yields could possibly have been obtained by allocating more nodes per vine.

Similarly to the yield, the pruning masses of all the graft combinations improved from 1981 as the result of the improvement in irrigation in the subsequent years (Fig. 2). Although the pruning masses of Dog Ridge, Ramsey and Constantia Metallica were relatively high, satisfactory yields were obtained with these graft combinations (Table 2). This suggests that the maintenance of a crop:cane mass ratio of 9
to 10 is suitable for these graft combinations. This ratio is higher than that suggested by Zeeman (1978) for the Robertson area, but in this trial no detrimental effects on performance or on the composition of the grapes were discernible.

The improvement in plant material and improved cultivation techniques have resulted in excessive growth in certain areas and consequently a renewed interest in growth limiting rootstocks. Ideally such a rootstock should consistently produce relatively high yields associated with a high crop:cane mass ratio. In this trial moderate growth was obtained with Chenin blanc grafted onto 101-14 Mgt (VORI selection) and 3306 Coudrec. The crop:cane mass ratio of the former graft combination was significantly higher than for the majority of the other rootstocks, and 101-14 Mgt produced consistently higher than average yields from 1979 to 1988, with relatively high sugar concentrations, which suggests that this cultivar meets with the requirements of a growth limiting cultivar. The crop:cane mass ratio of 3306 Coudrec was also relatively high, and its mean yield was comparable to that of 101-14 Mgt but tended to vary considerably in the later years of the trial. Its potential as a rootstock in areas of excessive growth, however, should not be overlooked.

The mean pruning mass of 99 Richter (Clone: Ry 13) was significantly higher than that of the other clones of 99 Richter, namely Ry 30 and 2/2/10, and the VORI selection, which emphasises the importance of using the correct clonal material. Whether the same clone will perform similarly in other areas with respect to the other clones cannot, however, be deduced from these results.

CONCLUSIONS

The rootstock cultivars 99 Richter, Constantia Metallica, Dog Ridge, Ramsey and 101-14 Mgt appear to be well adapted to a Dundee soil in the Montagu district. Constantia Metallica and 143-B Mgt, however, have the reputation of deteriorating in the long term, and this aspect has to be clarified with the continuation of the trial over the next ten years.

The performance of the different clones of 99 Richter included in this trial differed markedly, both the yield and growth of clone Ry 13 being consistently higher than those of the other clones of 99 Richter, which emphasises the importance of using the correct clonal material. Whether these differences are similar for all areas cannot be concluded from these results.

Since 101-14 Mgt consistently produced high yields with relatively low cane masses, this cultivar shows potential as a growth limiting rootstock.

The yield of Dog Ridge improved continually over the trial period and it was one of the highest producers in the later years.
years of the trial; consequently it merits more attention despite its poor rooting ability.

LITERATURE CITED


