

Unirrigated establishment in a drought: Growth of vines in their second leaf and trials with cuttings

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Introduction

A previous paper (Due, 1994) describes the growth of 100 Viognier rootlings established without any irrigation, but with shelters and plastic film mulch. This paper follows the progress of those vines through their second leaf, still unirrigated, in the drought season 1994/95. Although total rainfall over the year from April '94 was only 373 mm, the young vines grew more than 1.5 metres, averaging 7.3 mm/day over the growing season.

This paper also describes a small trial with cuttings of Viognier planted direct into the field in spring 1994 and left unirrigated. Survival rates in the two best treatments were 7/7 and 14/20 - noteworthy given such dry conditions.

Weather conditions

Rainfall and mean monthly maximum temperatures are shown in Fig. 1. In the 1994/95 drought, the average maximum temperatures were high and included 'heat waves' with maxima over 35°C for several days in a row. In the entire year of 1994/95 (May-April), total rainfall was only 373 mm (long term average 649 mm). Only 179 mm of rain fell over the period May to September inclusive (long term average 359 mm). There were only three months with more than 50 mm of rain.

Growth of rootlings in their second leaf

The planting of these rootlings was described previously (Due, 1994). As can be seen from Fig.2, the vines reached the fruiting wire (900 mm) in mid-December 1993. By the end of the 1993/94 season they were about 600 mm along the wire.

In winter 1994 all the young vines were pruned back flush with the fruiting wire and all but the top two buds were carefully removed with a knife. Apart from weed control by herbicide, the only treatment was the regular tying of the new shoots onto the wire.

Growth peaked in early December in both years and then flattened out to about 5 mm/day in the latter half of each season (Fig.2). The peak in the second (drought) season was measured at 16 mm/day over the 17 days prior to 7 December - which compares favourably with the 23 mm/day measured in the previous (normal) season. The slight increase in growth (from 5 mm/day to 8 mm/day) in the February of the second season may have been in response to 82 mm of rain which fell in January.

At the end of the 1994/95 drought season, the average total shoot length was nearly 2.5 m - about 1.6 m on the wire - and the growth rate over the drought season had averaged 7.3 mm/day.

Establishment of cuttings

Cuttings were planted on two different dates:

22/10/94: Ordinary basal cuttings of Viognier which had been stored in a refrigerator were planted at about 15 cm under black plastic mulch and were equipped with a shelter.

4/12/94: In winter 1994, mallet cuttings (i.e., cuttings including part of the old cane from which they grew) of Viognier were buried upside down with their basal ends at a depth of 30 cm. The basal ends were exposed and inspected occasionally as spring progressed. On 4/12/94 callus and young roots were seen, indicating that soil conditions at that depth (30 cm - planting depth) were suitable for root growth and it was time to plant. The cuttings were dug up, washed and carefully disbudded to suit planting in shelters (apical buds, being deeper and cooler, had not burst). The prepared cuttings were then planted with a shelter but without plastic mulch at two depths:

- at a normal depth - about 15 cm.
- at a depth of about 30 cm.

As would be expected in a severe drought, there was not much growth (although a few vines grew shoots 0.5 m long).

Table 1. Growth and survival of cuttings planted at Euroa over the drought season 1994/95.

Planted	Treatment	Survival	Shoot length of survivors
22/10	plastic mulch	7/7	20 cm
4/12	15 cm deep	6/21	8 cm
4/12	30 cm deep	14/20	25 cm

Table 1 shows that treatments had a marked effect on survival: vines planted 15 cm deep and without mulch on 4/12/94 had 6/21 survivors with an average shoot length of only 8 cm; by contrast, vines planted deep on the same date (but also without mulch) had 14/20 survivors with an average shoot length of 25 cm. This latter survival rate is remarkable because the average maximum temperature in the month of planting was over 30°C, and the next two

months were almost as hot; temperatures inside the shelters would have often exceeded 45°C. The treatment with plastic mulch was very effective: 7/7 vines survived to produce an average shoot length of 20 cm.

Conclusion

Critics have proposed that vines which have spent their first year in shelters have poor root development. Similar concerns have been expressed about vines started under plastic mulch (Trenhaile, 1992). The results presented here plainly contradict these assertions: a poor root system could not have allowed the young vines to continue as well as they did in such dry conditions.

It has also been suggested that unirrigated establishment is risky even after a good winter because drought in the second season might kill the young vines. But drought in the second season did not stop growth in this trial. Accordingly:

Unirrigated establishment using rootlings planted in shelters and with mulch is reliable whenever winter rainfall has provided adequate soil moisture levels in the spring of planting.

The results with cuttings suggest that 'adequate' soil moisture may be surprisingly low - especially for rootlings.

Deep planting of cuttings was effective because the method of storing and planting the cuttings ensured that conditions at planting depth were suitable for strong root

growth as soon as the cuttings were planted. Plastic mulch was also effective, probably because it raised soil temperatures and conserved moisture. The combination of shelters, plastic mulch and precallused mallet cuttings offers great promise and should be tried. Most varieties can be expected to perform better than Viognier.

Acknowledgement

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Literature cited

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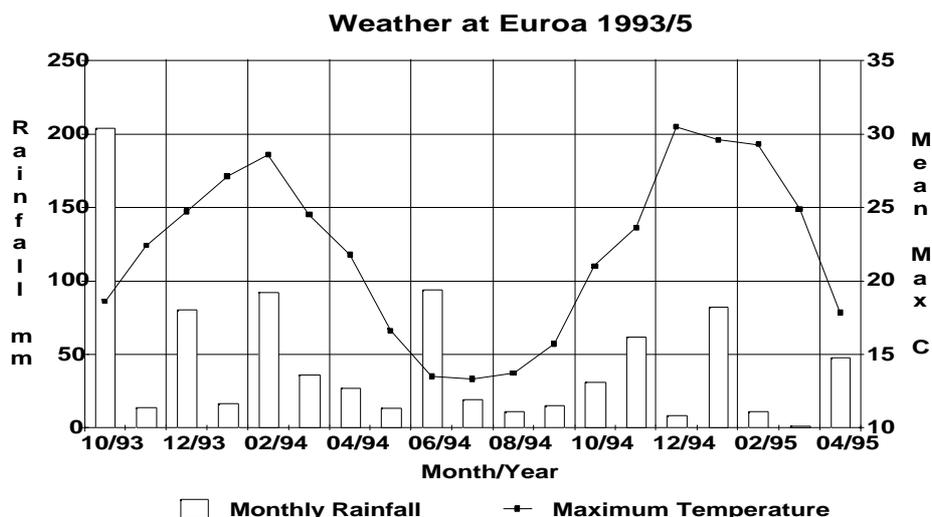


Fig.1. Weather conditions at Euroa over the period October 93 to April 95. The season May 94 to April 95 was hot and dry: December, January and February had average maximum temperatures of about 30°C and total rainfall for the 12 months was only 373 mm.

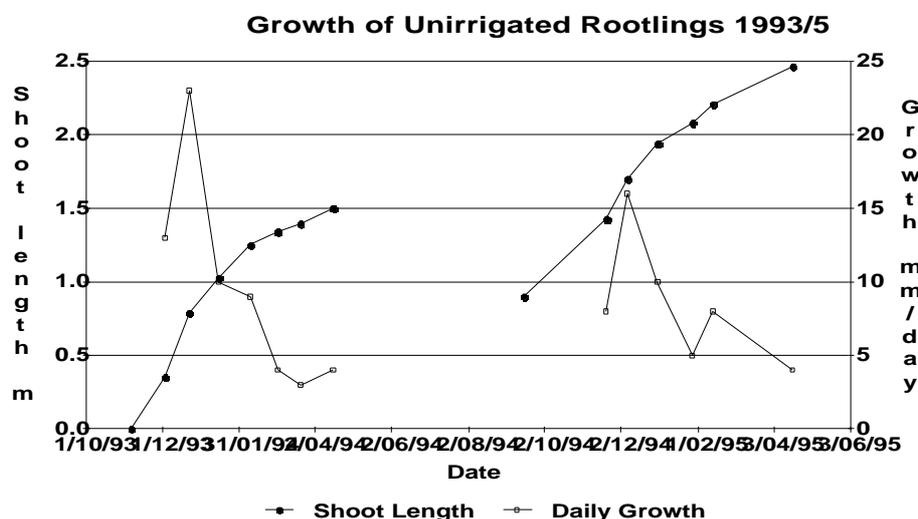


Fig.2. Shoot length (in m - left axis) and daily growth (in mm/day - right axis) of unirrigated Viognier rootlings planted in November 1993. We vines were pruned back to 0.9 m (wire height) over winter 1994.