

# **EVALUATION OF VARIOUS PRUNING METHODS FOR MAXIMUM PRODUCTION OF WINE GRAPE CULTIVARS IN SOUTHERN<sup>1</sup> ARIZONA**

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Arizona climate characteristics affect grapevine growth habits and subsequent production and grape berry quality characters. While the differences in climate do occur in contrast to other grape growing districts of the world, yield and berry quality characters have not been studied in relation to growth characteristics.

In addition, it is not clear how grapevines would respond to various pruning methods in relationship to yield and fruit quality characters. Arizona climate is one where spring frosts are a hazard in some years resulting in reduced yields from freezing death of shoots or primary buds. As a consequence secondary buds provide total vine production which is generally  $\frac{1}{2}$  to  $\frac{1}{3}$  of the primary bud potential production.

Growers using the spur pruning method have been leaving 4 bud spurs, to offset the potential loss of production resulting from freeze or frost damage. Another method of leaving additional buds would be to use the cane system of pruning. The concept of leaving excess buds can result in rather high yields which could be detrimental to vine growth and development. The objective of this experiment was to determine the effect of various pruning methods on the production and berry quality of 'Merlot' and 'Sauvignon Blanc' cultivars under Arizona high desert climatic conditions.

## **METHODS**

During the winter (pruning season) and growing season of 1994 and 1995, various pruning methods were established on the cultivars 'Merlot' (1994) and 'Sauvignon Blanc' (1995) in order to determine the best method to prune vines in relation to yield and berry quality characteristics. 'Merlot' trials were established in the Terra Rosa Vineyard near Elgin while the 'Sauvignon Blanc' trials were established in the Dos Cabezas Vineyard near Willcox. The 'Merlot' vines were about 4 years old but demonstrated good vigor. The 'Sauvignon Blanc' vines were approximately 12 years old with excellent vigor characteristics. Pruning treatments were as follows:

| <u>Pruning Methods</u> | <u>Description</u>          |
|------------------------|-----------------------------|
| - 2 Bud Spur           | 14 spurs/vine               |
| - 4 Bud Spur           | 14 spurs/vine               |
| - Cane                 | 14 buds/cane (2 canes/vine) |
| - Basal Buds           | No spurs                    |

The above pruning methods were utilized in ‘Merlot’ trial. The basal bud treatment was not utilized in the ‘Sauvignon Blanc’ trial, and the cane pruned treatment consisted of 4 or 5 canes with 12-14 buds per cane. The experimental design was a completely random design with 4 reps consisting of one vine per plot. Data collected included pruning weight, yield per vine, clusters per vine, cluster weight, and berry quality characteristics which included a must analysis consisting of pH, Brix and acid expressed as per cent tartaric.

## **RESULTS**

The data were collected for only one year for each trial due to vine loss in the Terra Rosa Vineyard and frost damage and deer depredation in the Dos Cabezas Vineyard.

For the ‘Merlot’ trial, the amount of wood removed during pruning (pruning weights)(table 1), was less for the 4 bud spur pruning method when compared to the other methods. This was to be expected. Also, the four bud method resulted in the greatest yield and the most clusters per vine which is directly related to the number of buds retained during pruning. There was very little difference in yield for the 2 bud spur, cane or basal bud pruning methods. The largest clusters accrued on vines from the two bud spur method (normal method) while the smallest clusters were from the 4 bud spur treatment.

Must analysis indicated the fruit produced solely from the basal buds had a high pH and acid content when compared to fruit produced from primary buds on a cane (other treatments)(table 2).

The ‘Sauvignon Blanc’ trial produced similar results with the exception that the cane pruning method produced the highest yields with the 2 bud spur treatment producing the lowest (table 3). In addition, the 2 bud spur method resulted in the lowest number and smallest clusters. There was no significant difference in Brix content of the grapes (table 4) from any pruning method.

## **SUMMARY AND CONCLUSIONS**

The ‘Merlot’ pruning trial resulted in expected results in that the greater number of primary buds left for fruit production (4 bud spur method) the greater the yield. Surprisingly this heavy yield did not affect cluster size (weight) or berry chemical content. However, in all probability this was the first true crop from these vines which means that the vines contained enough stored carbohydrates from previously years to properly mature a large crop. Subsequently yearly observations indicated that these vines were drained of carbohydrates resulting in poor crops or vine death.

This condition was not observed with the other pruning methods. The 4 bud spur treatment is

currently being used in several vineyards in the Elgin area. Based on these results it should not be used due to overcropping and vine weakening. The 2 bud spur method was superior to cane pruning in terms of yield and quality of clusters. The basal bud treatment revealed some very interesting information from a fruit quality standpoint in that grapes were high in pH and acid. This would explain why young vines would have some inferior quality fruit and should alert growers that basal buds should not be left for fruiting. There should be a balance between fruit produced and shoot growth.

The ‘Sauvignon Blanc’ trials showed that cane pruning is the preferred method to maximize production. This is to be expected due to the small cluster characteristics of the cultivar.

Table 1. Yield and pruning characteristics of ‘Merlot’ grapevines grown in the Terra Rosa Vineyard-Elgin, AZ. 1994.

| Pruning Method | Yield |          | Clusters per vine | Cluster Weight (grams) | Pruning Weight (grams) |   |    |   |     |
|----------------|-------|----------|-------------------|------------------------|------------------------|---|----|---|-----|
|                | lbs/A | lbs/vine |                   |                        |                        |   |    |   |     |
| 2 Bud Spur     | 2735  | b*       | 5.28              | b                      | 70                     | b | 33 | b | 246 |
| 4 Bud Spur     | 3895  | a        | 7.52              | A                      | 85                     | a | 40 | a | 190 |
| Cane           | 2636  | b        | 5.09              | b                      | 47                     | c | 50 | a | 218 |
| Basal Buds     | 2926  | b        | 5.65              | b                      | 53                     | c | 49 | a | 216 |

\* numbers followed by the same letter vertically are not significantly different at the .05 level of probability.

Table 2. Influence of pruning method on pH, Brix and Acid of Merlot grapes grown in The Terra Rosa Vineyard near Elgin, AZ. 1994.

| Pruning Method | pH   |    | Must Analysis |   |          |   |
|----------------|------|----|---------------|---|----------|---|
|                |      |    | Brix          |   | Acid (%) |   |
| 2 Bud Spur     | 3.43 | a* | 21.8          | a | .82      | a |
| 4 Bud Spur     | 3.38 | a  | 20.4          | a | .97      | a |
| Cane           | 2028 | a  | 22.4          | a | .80      | a |
| Basal Buds     | 3.61 | b  | 22.8          | a | 1.21     | b |

\* numbers followed by the same letter vertically are not significantly different at the .05 level of probability.

Table 3. Yield and pruning characteristics of ‘Sauvignon Blanc’ grapevines grown in the Dos Cabezas Vineyard near Willcox, 1995.

| Pruning Method | lbs/vine |   | lbs/A |   | Clusters per vine |   | Cluster Weight (grams) |   | Pruning Weight (grams) |
|----------------|----------|---|-------|---|-------------------|---|------------------------|---|------------------------|
| 2 Bud          | 2.87     | a | 1302  | a | 20.2              | a | 63                     | b | 2724                   |
| 4 Bud          | 4.80     | b | 2179  | b | 31.7              | b | 65                     | b | 1909                   |
| Cane           | 6.66     | c | 3023  | c | 38.5              | b | 79                     | a | 4419                   |

Table 4. Brix content of ‘Sauvignon Blanc’ grapes pruned by different methods in the Dos Cabezas Vineyard near Willcox, AZ. 1995.

| Pruning Method | Brix   |
|----------------|--------|
| 2 Bud          | 20.3 a |
| 4 Bud          | 19.5 a |
| Cane           | 19.8 a |