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Budding and Fruitfulness of Seedless Grape in the São Francisco River Valley

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Abstract. Aiming to evaluate the bud burst percentage and frultifulness index of five varieties of seedless grape in five different pruning dates, an experiment was carried out in the Experimental Station of Bebedouro, of Semi-arid Embrapa, in Petrolina-PE. The varieties were Perlette, Thompson Seedless, Marroo Seedless, Catalunha and Superior Seedless, and the pruning times were from: 12/18 to 12/19/2000; 06/18 to 06/21/2001; 10/23 to 10/29/2001; 01/29 to 02/05/2002 and 04/08 to 04/12/2002. The best results for budding and fruitfulness were obtained in the Marroo Seedless and Perlette varieties, being favored by pruning in June 2001 and April 2002 in most of the varieties.

Resumen. Com el objetivo de evaluar la brotación y frutificación de cinco variedades de uvas sin semillas en cinco diferentes fechas de poda, fue conduzido uno ensayo en la Estácion Experimental de Bebedouro, Embrapa Semi-Árido, en Petrolina, PE, Brazil. Las cultivares fueron Perlette, Thompson Seedless, Marroo Seedless, Catalunha y Superior Seedless y las fechas de poda: 18-19/12/2000;18-21/06/2001; 23-29/10/2001; 29/01-05/02/2002 y 08-12/2002. Los mejores resultados para brotación y fertilidad de yemas fueron obtenidos en Marroo Seedless y Perlette. Las podas realizadas en junio de 2001 y abril de 2002 favorecceran a la fertilidad de yemas en la mayor parte de las variedades.

Seedless grapevine is a crop that has been expanding fast in São Francisco River Valley, Northeast of Brazil, being a part of that marketed in the external market, where it has been reaching prices up to three times more than that for seeded cultivars. Bud fertility can be defined as the capacity the bud presents to differ of vegetative in fruitfulness bud, or a quantitative measurement of the potential of the plant for producing fruits. The flower differentiation in the grapevine and another perennial plants happens during the growth vegetative phase of the previous cycle and it involves three very defined stages: formation of the 'anlagen', formation of the primary inflorescences and formation of the flowers (Srinivasan & Mullins, 1981). The bud differentiation begins in the basal bud and continues in direction to the apical portion of the shoots. This characteristic depends on each cultivar, but in the same cultivar it can show great variations from cycle to cycle. Therefore, the climate, has great influence on bud fertility. Knowing the position of the fertile bud for each cultivar is important in the definition of the pruning type to be used in the vineyard. There are references for results obtained for different grape cultivars, in different regions of the world, as the northeast of Brazil (Leão & Pereira, 2001), south of Brazil (Tonietto & Czermainski, 1993), Venezuela (Valor & Bautista, 1997), Mexico (Murrieda, 1986) and Italy (Sansavini & Fanigliulo, 1998). However, there is little information about the behavior of grape cultivars under tropical climate conditions, as in the São Francisco River Valley. This information is an important subsidy to obtain more rational techniques of pruning, resulting in the increase of yield in the vineyards. The objective of this work was to evaluate the shooting percentage and bud fertility index of five seedless grape cultivars in five different pruning times in the tropical semi-arid climate of the São Francisco River Valley.

Materials and Mehods

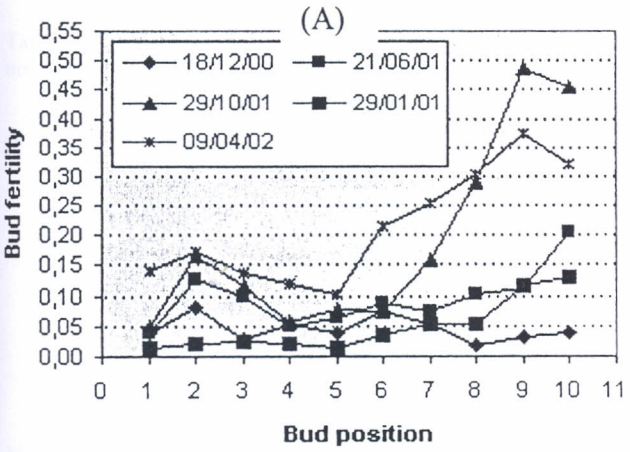
The experiment was carried out at Experimental Station of Bebedouro of Semi-Arid Embrapa, in Petrolina - PE, 9°09 ' S, 40°22 ' W, and altitude 365.5m. The experimental was stablished in randomized blocks in split splot design, where the main treatments were the cultivars (Perlette, Thompson Seedless, Marroo Seedless, Catalunha and Superior Seedless), and the secondary treatments were five periods of pruning (December, 2000 to April, 2002: 18 and 19/12/2000; 18 to 21/06/2001; 23 to 29/10/2001; 29/01 at 05/02/2002 and 08 to 12/04/2002). Plants of the experimental vineyard were about three years old and they were grafted in the IAC 572 rootstock; they were trained in overhead trellis with row and plants spacing of 4.0 x 2.0m, under drip irrigation. The pruning was with spurs and canes. The branches were sprayed with commercial dormex at 5% to induce and to make uniform the shooting of the buds. The shooting percentage was calculated by the ratio between the number of shoots and the total number of buds. Meanwhile, the index of real fertility was obtained by dividing the total number of bunches for the total number of buds per plant. The shooting percentage and the index of real fertility for each bud position on the cane was determined by evaluating between the 10^{th} to and the 30^{th} days after the pruning time before thinning shoots time. This evaluation was done for the canes and spurs, from the 1^{st} to 10^{th} bud of the branch, in ten plants for cultivar. Total number of buds, total number of shoots, total number of bunches and number of bunches for bud position were registered. Before the analysis, the shooting data, expressed in percentage were transformed into arch seno $\sqrt{x}$. The results were analyzed using the SAS program, being submitted to the Teste F for variance analysis, settling down the comparison of the averages for the test of Duncan at the level of 1% of probability.

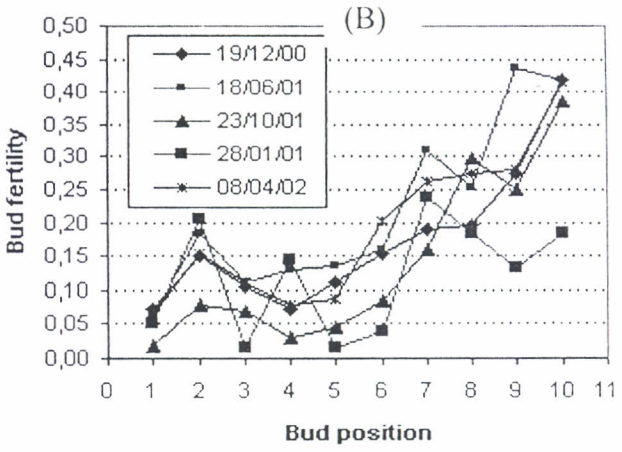
Results and Discussion

The variance analysis demonstrated that effects of cultivars and pruning times were significant for shooting and bud fertility of the plants. The interaction between the effects of cultivars and pruning times was also significant at the level of 1% of probability, that means the behavior of the cultivars in relation to shooting and bud fertility can vary according to the pruning time (Tables 1 and 2), and in a same pruning time, the five cultivars present significant differences for shooting and bud fertility. The average shooting varied from 62.42%, in cv. Catalunha, up to 75.56% in cv. Perlette. In 18 to December 19, 2000

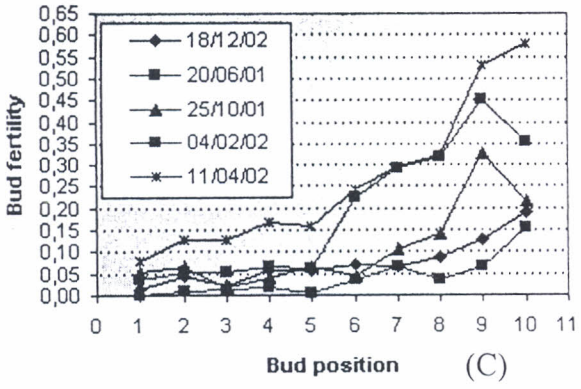
prunning date, the smallest values for shooting were obtained, differing significantly from the other treatments in all varieties. The average value for shooting percentage in this pruning date was just 44.75%. On the other hand, the bud shooting was higher in 18 to 21 of June of 2001 and 8 to April 12, 2002 pruning times, not differing significantly to each other in these two pruning times, except for cv. Catalunha, where it was obtained, for the pruning of February 2002, the best result among all the cycles, 84.78%, differing significantly from the other times. The highest indexes of real bud fertility were observed (Table 2), in the cv. Marroo Seedless, differing significantly from the other cultivars in all the pruning times, with an overall average of 0.37, followed by the cv. Perlette with 0.17. The other cvs. Thompson Seedless, Superior Seedless and Catalunha presented very low bud fertility, not differing from each other in the five studied pruning time, presenting an average of respectively 0.14; 0.12 and 0.10.

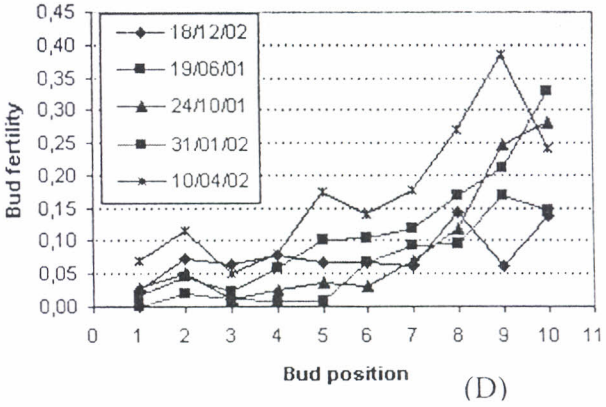
Fig. 1. Index of real bud fertility according its position on the cane during five prunnig times for grape seedless cultivars Superior Seedless (A), Perlette (B), Thompson Seedless (C), Catalunha (D), e Marroo Seedless (E).





[1] Values proceeded by the same small letter in the column and capital letter in the line do not differ to each other for the test of Duncan at the level of 1% of probability





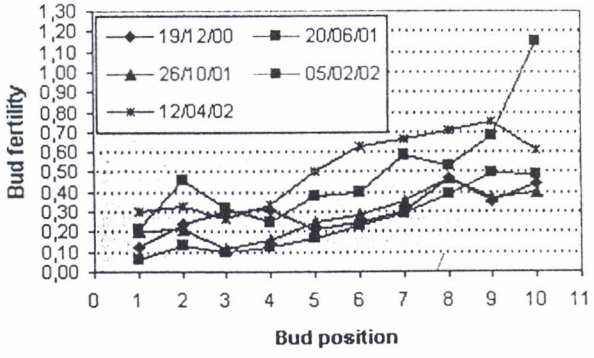


Table 1. Average values for shooting percentage and variation coefficient (V.C.) of five varieties of seedless grapes in different pruning times.[1]

Pruning times (month/year)	Varieties					
	Perlette	Thompson Seedless	Marroo Seedless	Catalunha	Superior Seedless	Average
12/2000	61.56 bA	30.93 cC	50.20 dB	31.87 dC	49.21 cB	44.75
06/2001	75.63 Abc	82.09 aAB	94.11 aA	66.98 bC	75.63 abBC	78.89
10/2001	75.34 aA	59.77 bB	63.08 cdAB	56.13 cB	77.19 abA	66.30
02/2002	79.16 aAB	77.33 aAB	69.98 bcB	84.78 aA	68.77 bB	76.00
04/2002	86.13 aA	77.78 aAB	82.45 abAB	72.32 bB	79.58 aAB	79.65
Average	75.56	65.58	71.96	62.42	70.08	
V.C. (%)	14.00	10.76	20.22	13.82	8.22	

[1] *Values proceeded by the same small letter in the column and capital letter in the line do not differ to each other for the test of Duncan at the level of 1% of probability*

Table 2. Average values for real index of bud fertility and variation coefficient (V.C..) of five varieties of seedlessgrapes in different pruning times.[1]

Pruning times (month/year)	Varieties					
	Perlette	Thompson Seedless	Marroo Seedless	Catalunha	Superior Seedless	Average
12/2000	0.17 aB	0.07 cC	0.30 bA	0.08 bcC	0.04 cC	0.13
06/2001	0.22 aB	0.19 bBC	0.50 aA	0.12 bDC	0.09 bD	0.22
10/2001	0.14 aB	0.11 cB	0.29 bA	0.09 bcB	0.19 aAB	0.16
02/2002	0.12 aB	0.05 cB	0.25 bA	0.06 cB	0.05 cB	0.10
04/2002	0.19 aB	0.26 aB	0.53 aA	0.17 aB	0.21 aB	0.27
Average	0.17	0.14	0.37	0.10	0.12	
V.C. (%)	6.08	44.88	44.21	50.63	38,71	

In previous work carried out in this area, indexes of bud fertility were more elevated for the cvs. Marroo Seedless, 0.89, and Thompson Seedless, 0.68 (Leão & Pereira, 2001), possibly because their longer prunings, being analyzed 15 buds on the cane. However, the results obtained are close to those observed by Camargo et al. (1996) in cv. Catalunha (0.18) and Perlette (0.21). The bud fertility in the five cultivars, except for 'Perlette', differed significantly among the different pruning times. From April 8 to 12, 2002 pruning time promoted the highest bud fertility in all the varieties, except for 'Perlette'. Another time of favorable pruning for bud fertility was in June 2001, except for cv. Superior Seedless (Table 2). The bud fertility did not present significant differences between these two pruning times (06/2001 and 04/2002) in the cvs. Perlette and Marroo Seedless. However, lower indexes of bud fertility were obtained when the pruning was in February of 2002 in all the cultivars. The general average for the indexes of bud fertility varied from 0.10 in the February 2002 to at 0.27 in April 2002 pruning times.

The bud presented a tendency to increase its fertility starting from the medium portion of the branch to the distal portion (Figure 1), in spite of that, it can happen a certain variation among the bud of adjacent positions. The fertility bud among the basal and at 10th bud on the cane during the five pruning times varied respectively from 0.02-0.07 to 0.18-0.42 in 'Perlette'; 0.0-0.08 to 0.16-0.58 in 'Thompson seedless'; 0.0-0.07 to 0.14-0.33 in 'Catalunha'; 0.06-0.30 to 0.40-1.15 in 'Marroo Seedless' and 0.01-0.14 to 0.04 to 0.46 in 'Superior Seedless'. The average values of bud fertility obtained for this last variety are in agreement with those observed by Sansavini and Faniglulo (1998), in Italy, varying from 0.03 to 0.6. The great variation for this variable is confirmed by the high values for coefficient variation obtained (Table 2). The pruning times in the 1st semester of the year (April 2002 and June 2001) seemed to favor the shooting as the bud fertility of most of the cultivars of seedless grapes.

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