Performance of the new seedless grape 'BRS Isis' grown in subtropical area

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Abstract. 'BRS Isis' is a new colored seedless table grape tolerant to downy mildew, the main vine disease in subtropical humid areas. This new seedless cultivar is an interspecific hybrid from the crossing of CNPUV 681–29 [Arkansas 1976 X CNPUV 147–3 ('Niagara Branca' x 'Venus')] x 'BRS Linda', and was recently released by Embrapa Grape and Wine, Brazil. The performance of 'BRS Isis' seedless grape was evaluated in an experimental vineyard in 2016 located in a subtropical area at Marialva city, state of Parana, Brazil. The vines were grafted onto 'IAC 766 Campinas' rootstock and trained in an overhead trellising system spaced at 2× 5 m. Vines were cane-pruning in late winter of July 2016, and for assessments, 20 representative vines were selected in the area. As 'BRS Isis' is a very fruitful grape, presenting 4 bunches per shoot, a load adjustment was performed after fruitset removing 50% of bunches per shoot, leaving 2 bunches per shoot, equivalent to a density of 10 bunches.m^{-2}. The duration in days of the main phenological stages from pruning to harvest, and the physicochemical and yield characteristics of 'BRS Isis' seedless grape were subjected to evaluation. It was determined that the cycle is 144 days. The means of berry and bunch weight was 6.7 ± 1.0 g and 500.0 ± 0.04 g, respectively, and the color index of berries (CIRG) was 4.3 ± 1.3. The means of total soluble solids (TSS), titratable acidity (TA) and maturity index (TSS/TA) observed were $14.2 \pm 0.3°$ Brix, 0.6 ± 0.04% of tartaric acid and 24.1 ± 1.5, respectively, while the yield was 49.0 ± 5.7 tons.ha^{-1}. The yield observed is considered high to keep a sustainable crop over time, thus, in order to obtain grapes of 'BRS Isis' with regular yield, and possibly, with a higher content of soluble solids, it is desirable to keep only 1 bunch per shoot (5 bunches.m^{-2}) after fruitset.

1. Introduction

Viticulture is an important economic activity in Brazil. In the recent years, it has also become important in generating employment in large enterprises for production of table grapes, mainly the seedless types. The worldwide trend for the consumption of seedless grapes has increased the competition between producers, which direct efforts to meet a more demanding consumer market [1,2].

Seedless grapes have certain characteristics that make them a high quality fruit and have better acceptance by consumer. Thus, Embrapa Grape ans Wine has been conducting a breeding program since 1997 aimed at creating cultivars of seedless table grapes well adapted to the Brazilian tropical and subtropical conditions. In this context, 'BRS Isis' seedless grape was released by Embrapa in 2013. It is tolerant to downy mildew and adapts well to the different climates of Brazil. It also stands the high bud fertility and presents firm texture and neutral taste. It is the result of crossing CNPUV 681–29 [Arkansas 1976 X CNPUV 147–3 ('Niagara White' x 'Venus')] x 'BRS Linda', held in 2004 at Embrapa Grape and Wine, Brazil. It presents large and red berries, good adhesion and crunchy texture [3].

The northern region of Parana State is a consolidated area in table grape production, but it is based on seeded grapes such as 'Benitaka', 'Italia', 'Rubi' and 'Brasil'. In this area, due the mild winter and subtropical conditions, two crops of grapes per year are obtained. Thus, seedless grape cultivation, such as 'BRS Isis', could be an alternative to diversify the current production system, opening the possibility of international market. However, there is no information about the performance of 'BRS Isis' grape in the state of Parana, and the results cannot always be extrapolated from one region to another, because these characteristics vary depending on the genotype and climatic conditions of each region, influencing also on the fruit quality [4,5].

2. Materials and methods

This study was conducted in a commercial vineyard of 'BRS Isis' seedless grapes grafted on IAC 766, from 2-year-old vines, located in Marialva, state of Parana (PR), Brazil (23°29′52, 8″S, 51°47′58″0 W, elevation 570 m), in crop season 2016. According to the Köppen classification, the climate is type Cf*a*. The vines were trained on overhead trellis and spaced 2×5 m. Vines were cane-pruning in late winter of July 2016. Pruning was performed to leave two to 3–4 buds per cane. Subsequently, 5% hydrogen cyanamide was applied to the buds to induce and standardize sprouting. During the trials, the standard regional cultivation practices with regard to nutrition, weed control, and pest and disease management were used.

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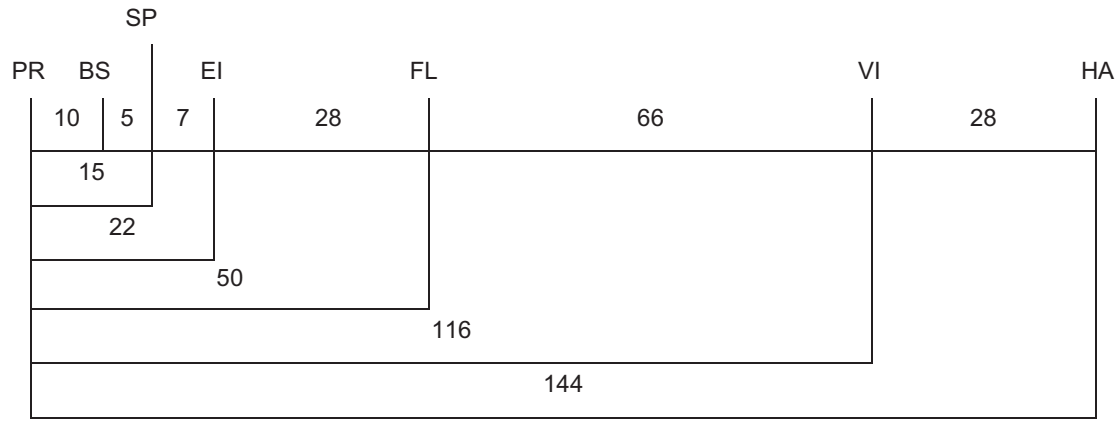

Figure 1. Duration in days of the phenological stages of 'BRS Isis' seedless grape in Marialva, PR. Crop season 2016. Pruning (PR); Bud-swelling (BS); Sprouting (SP); Emergence of inflorescence (EI); Flowering (FL); Veraison (VI); Harvesting (HA).

For assessments, 20 representative vines were selected in the area. As 'BRS Isis' is a very fruitful grape, presenting 4 bunches per shoot, a load adjustment was performed after fruitset removing 50% of bunches per shoot, leaving 2 bunches per shoot, equivalent to a density of 10 bunches.m^{-2}. The duration in days of the following phenological stages were evaluated by means of visual observation, from pruning (PR): a) bud swelling (BS) b) sprouting (SP); c) emergence of inflorescence (EI); d) flowering (FL); e) veraison (VI) and f) harvest (HA) [6].

Then, a diagram was constructed representing the duration in days of each phenological stage of crop season [7].

The grapes were harvested at full maturity and following physical characteristics were analyzed during the study: weight (g) and diameter (mm) of berries; weight (g) and width (cm) of bunches using digital calipers and scales. The number of bunches per plant were also analyzed, and according to the planting density, the production per plant (kg per plant) and per area (tons per ha) were also estimated.

The evolution of the ripening of the grapes was determined by analysis of the chemical characteristics of its berries as total soluble solids (TSS), titratable acidity (TA) and maturity index (TSS/TA).

For anthocyanin analysis 30 berries were collected with two berries taken from the upper, middle, and bottom regions of each marked cluster. The concentrations of total anthocyanins were carried out according to Peppi et al. [8].

3. Results and discussion

The duration in days of the 'BRS Isis' production cycle (PR-HA) was of 144 days, while the duration of the PR-BS, PR-SP, PR-EI, PR-FL and PR-VI was 10; 15; 22; 50 and 116 days, respectively (Fig. 1). Rodrigues [9], working with 'Itália' grapes in Porto Feliz, SP, where the climate is similar to that found in Marialva, PR (Cf*a*), detected a variation of 22 days between the regular and off season cycles, 161 and 139 days, respectively, a value close to the 25 days observed for the 'Black Star' grape in Marialva. The knowledge of the duration of the phenological phases is a requirement of modern viticulture, since it makes possible the rationalization and optimization of the cultural practices, which are indispensable for the cultivation of the vine [10].

Table 1. Physicochemical characteristics of 'BRS Isis' seedless grape. Crop season of 2016.

Physicochemical characteristics	Crop season 2016
Berry weight (g)	6.7 ± 1.0
Berry diameter (mm)	19.0 ± 1.7
Bunch weight (g)	500.0 ± 0.04
Color index of red grapes (CIRG)	4.3 ± 1.3
Soluble solids - SS (○ Brix)	14.2 ± 0.3
Titratable acidity – TA (% of tartaric acid)	0.6 ± 0.04
Maturation index (SS/TA)	24.1 ± 1.5
pH	4.3 ± 0.02
Total anthocyanins (mg.100g^{-1})	0.3 ± 0.1
Number of bunches per plant	94.9 ± 11.2
Production per plant (kg/planta)	49.0 ± 5.8
Yield (tons.ha^{-1})	49.0 ± 5.7

The means of production characteristics of the 'BRS Isis' grape such as the diameter and weight of the berry, the number of bunches per plant, the weight of the bunch, and the estimates of production per plant and yield were 19.00 mm, 6.7 g, 94.9, 500.00 g, 49 kg.plant^{-1} and 49 tons.ha^{-1}, respectively, while the color index of berries (CIRG) was 4.3. The means of total soluble solids (TSS), titratable acidity (TA) and maturity index (TSS/TA) observed were 14.2° Brix, 0.6% of tartaric acid and 24.1, respectively (Table 1).

4. Conclusion

The yield of 'BRS Isis' grown in subtropical area is considered high to keep a sustainable crop over time, thus, in order to obtain grapes with regular yield, and possibly, with a higher content of soluble solids, it is desirable to keep only 1 bunch per shoot (5 bunches.m-2) after fruitset.

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