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The influence of rootstock on vigor and bud fertility of 'BRS Tainá' grape in the São Francisco Valley

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Abstract – 'BRS Tainá' is a new seedless table grape cultivar developed and recommended for the Submedium of São Francisco Valley, the main producing and exporting region of table grapes in Brazil. The objective of this study was to evaluate the influence of rootstock on vigor, bud fertility, sucrose and total soluble carbohydrates content in leaves of 'BRS Tainá' vine cultivated in semi-arid environmental conditions in the Brazilian Northeast. The treatments were represented by eight rootstocks: '101-14 MgT', 'IAC 313', 'IAC 572', 'IAC 766', 'Paulsen 1103', 'Ramsey', 'SO4' and 'Teleki 5C'. The experimental design was in randomized blocks with four replications, in split plots, the production cycles were considered as plots, and eight rootstocks as subplots. The following variables were evaluated: pruning weight, stem diameter, number of lateral bunches, bud fertility, sucrose and total soluble carbohydrates content in leaves. The 'BRS Tainá' vine had moderate canopy vigor and 54% of bud fertility. The carbohydrate content and sucrose in the leaves did not differ among treatments during pruning. Therefore, it is possible that there is no effect of the rootstock on the initial vegetative growth of 'BRS Tainá' vines, which vigor and bud fertility remained stable in the initial production cycles.

Index terms – *Vitis vinifera* L.; seedless grape; tropical viticulture; carbohydrate.

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Influência de porta-enxertos no vigor e fertilidade de gemas de videiras ‘BRS Tainá’ no Vale do São Francisco

Resumo – ‘BRS Tainá’ é uma nova cultivar de uvas de mesa sem sementes desenvolvida e recomendada para o Vale do Submédio São Francisco, principal região produtora e exportadora de uvas finas no Brasil. O objetivo deste trabalho foi avaliar a influência do porta-enxerto sobre o vigor, a fertilidade de gemas e o conteúdo de sacarose e carboidratos solúveis totais nas folhas de videiras ‘BRS Tainá’, cultivadas em condições semiáridas do Nordeste brasileiro. Os tratamentos foram constituídos por oito porta-enxertos: ‘101-14 MgT’, ‘IAC 313’, ‘IAC 572’, ‘IAC 766’, ‘Paulsen 1103’, ‘Ramsey’, ‘SO4’ e ‘Teleki 5C’. O delineamento experimental foi em blocos casualizados, em parcelas subdivididas, com quatro repetições, sendo os ciclos de produção considerados como parcelas, e os oito porta-enxertos, como subparcelas. As seguintes variáveis foram avaliadas: massa fresca de ramos e folhas, diâmetro de caule, número de saídas laterais, índice de fertilidade de gemas, conteúdo de sacarose e carboidrato nas folhas. A videira ‘BRS Tainá’ apresentou vigor da copa moderado e fertilidade de gemas em 54%. O conteúdo de carboidratos solúveis totais e de sacarose nas folhas não diferiu entre os porta-enxertos durante a poda de produção. Logo, é possível inferir que não houve influência do porta-enxerto no desenvolvimento vegetativo inicial de videiras ‘BRS Tainá’, visto que apresentam estabilidade no vigor e fertilidade de gemas nos primeiros ciclos de produção.

Termos para indexação – *Vitis vinifera* L.; uva sem semente; viticultura tropical; carboidrato.

Introduction

Viticulture is one of the most profitable fruit cultivation in the world, due to the high export value, grapes diversity and yield. In Brazil grapes export broke record in 2021, with volumes exported of 76.6 thousand t, resulting in a revenue of US$ 155.9 million (COMEXTAT, 2022). In the Brazilian Northeast, the Submedium of São Francisco Valley is the main producer and exporter of table fine grapes.

‘BRS Tainá’ is the first Embrapa grape cultivar fully developed in semi-arid tropical environmental conditions, recommended for the Submedium of São Francisco Valley. It is a white seedless grape with medium size berries, firm pulp texture and pleasant neutral taste (LEÃO et al., 2021). ‘BRS Tainá’ vine is a hybrid resulting from the crossing between the apyreneous cultivars Sugraone (♀) and Marroo Seedless (♂), obtained by the immature embryo rescue technique (LEÃO et al., 2020a). This new table grape cultivar was developed to meet the high market demand and the productive sector, since the white coloring grapes currently cultivated in the region present low profitability or belong to foreign companies, generating in the latter case, the royalties payment and restrictions on the expansion of the cultivated areas (LEÃO et al., 2020b).

The use of rootstocks in viticulture began in the middle of the nineteenth century as a form of phyloxera resistance (*Daktulosphaira vitifoliae* Fitch), pest that attacks the grape root system, the effects of the rootstock in the literature are well documented in the vigor, grape production components and quality (BRIGHENTI et al., 2021). In view of this, taking into account the rootstock interaction with the canopy and the local edaphoclimatic characteristics, the choice of the rootstock is one of the first decisions that should be made before the implementation of new areas. Knowledge regarding the use of appropriate rootstock for each cultivar in a given region, allows understanding and adjusting the management system in the attempt to regulate the canopy vigor in order to achieve the expected productivity, because very vigorous plants tend to interfere in fruit potential (LEÃO and RODRIGUES, 2015).

Vigor is associated with intense metabolism and shoot rapid growth, and it is considered as the genotype capacity to assimilate, store and/or use non-structural carbohydrates for the production of large canopies (HUGALDE et al., 2019). However, several studies demonstrate the use influence of rootstocks in the canopy vegetative vigor; and it is common to observe a negative correlation between the buds high vigor and the fertility, consequently, reducing the production (LEÃO et al., 2020a; VERDUGO-VÁSQUEZ et al., 2021; EDWARDS et al., 2022). Therefore, although more vigorous rootstocks have a greater capacity for absorbing and translocating water and nutrients to the canopy, the use of less vigorous rootstock tends to present better balance between the vegetative material produced and the amount of fruit. When high vigor is observed during the resting period, it is recommended to increase the bud load per plant. However, when verified only a few weeks after the pruning, producers tend to reduce the amount of water and nitrogen used in the vineyard, aiming to disfavor the canopy vegetative growth. These last managements could be avoided by the estimate of the carbohydrate relative content in the leaves during the production pruning, since the carbohydrate concentration presents an inverse correlation with vigor (KELLER, 2015a). Thus, to evaluate the carbohydrate concentration in the leaves is of paramount importance for producers that target high productivities, since the low carbohydrate content in the leaves can reduce the grapes buds fertility, and consequently, productivity (BENNETT et al., 2005).

Buds potential fertility is a term to describe the presence of one or more primordial inflorescences in latent buds, it is used as an indicative of the plant production potential (DRY, 2000). Thus, the use of rootstock that guarantee buds high fertility in the canopy cultivar is a key factor for the productive sector, since it favors stable and high productivities, ensuring two crops in any time of the year in semi-arid tropical conditions. Additionally, because it presents a negative correlation with vigor, the production cost tends to be reduced with the use of less vigorous rootstock because these favor the formation of less dense canopies, reducing the labor during the green pruning practices.

There is no information in the literature regarding vigor – buds fertility balance in new table grape cultivars developed by Embrapa, so the objective of this study was to evaluate the rootstock influence on vigor, buds fertility, as well as total soluble carbohydrate content and sucrose in young grape leaves ‘BRS Tainá’ cultivated in the Submedium of São Francisco Valley.

Material and Methods

The experiment was conducted in a commercial vineyard located in the irrigation project Senador Nilo Coelho (N4), in Petrolina, PE, Brazil (9°19’S, 40°28’W and 386 m altitude) during the first two production cycles up to the flowering phase of the third cycle. Mixed pruning for production and harvest occurred, respectively, in 08/23/2021 and 12/07/2021, for the first cycle, and in 01/28/2022 and 05/12/2022, for the second cycle. In the third production cycle pruning occurred in 07/07/2022 and buds fertility evaluation in 08/03/2022. According to the Köppen’s classification, the local climate is BSh’, semi-arid type, with precipitation concentrated in three to four months of the year (SILVA et al., 2017). Information regarding climate conditions, temperature (T), global radiation (GR) and precipitation recorded during the study period are presented in Figure 1.

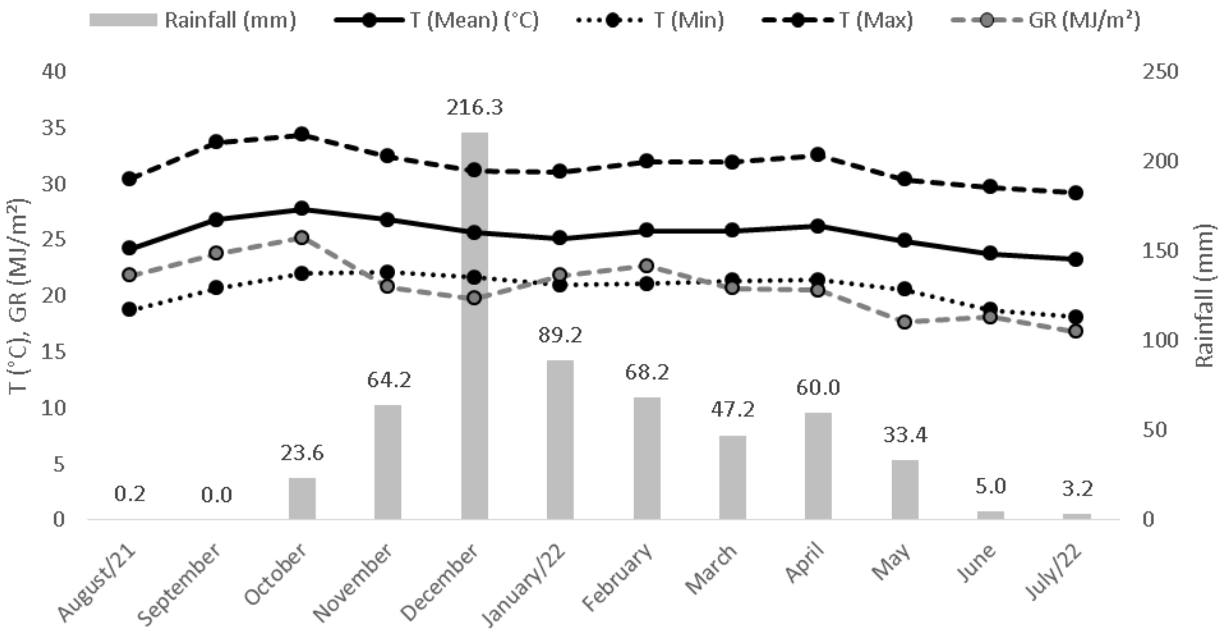

Figure 1: Monthly precipitation averages (mm); average, minimum and maximum air temperature (°C); and global radiation (MJ/m^2) during August/2021 and July/2022 in Petrolina, Pernambuco, Brazil.

‘BRS Tainá’ vines were implanted with two plants per hole, in the trellis-type horizontal conduction system, in spacing 3.5 x 2.5 m and irrigation located by drip. The treatments were composed of eight rootstock used for table grapes production in the Submedium of São Francisco Valley region, which are: ‘101-14 MgT’, ‘IAC 313’, ‘IAC 572’, ‘IAC 766’, ‘Paulsen 1103’, ‘Ramsey’, ‘SO4’ and ‘Teleki 5C’ (Table 1). The experimental design was in randomized blocks, with four replications, the plot composed of four plants, and two central plants per plot were evaluated, that is, one plant per hole.

During production pruning, the following variables related to vigor were evaluated: a) fresh branches and leaves mass (FM) – determined using a digital scale, expressed in kg per plant; b) stem diameter (D) - evaluated at a height of approximately 130 cm of the soil, with the aid of a digital caliper, in mm; c) number of secondary branches (NS). During the sprouts growth phase, when the inflorescences were visible, buds fertility index (FI) was estimated, in bunch per bud, using the equation FI = (bunches number / sprout number).

For the total soluble carbohydrate biochemical analyses (TSC) and sucrose (SAC), three

Table 1: Description, genealogy, country of origin and rootstock vigor studied.

Rootstock	Genealogy	Origin	Vigor
101-14 MgT	*Vitis riparia x V. rupestris*[3]	France[5]	Average[5]
Paulsen 1103	*V. berlandieri x V. rupestris*[3]	Italy[5]	High[5]
IAC 313	*Golia x Vitis cinerea*[1]	Brasil[1]	Average[1]
IAC 572	*Vitis caribaea x 101-14 Mgt*[1]	Brasil[1]	High[1]
IAC 766	*Riparia do Traviu x V. caribaea*[1]	Brasil[1]	Average[1]
Ramsey	*V. champinii*[3]	USA[5]	High[3]
Teleki 5C	*V. berlandieri x V. riparia*[2]	Hungary[2]	High[2]
SO4	*V. berlandieri x V. riparia*[4]	Germany[4]	Average[5]

Source: CAMARGO (1998)[1]; RUEHL et al., (2015)[2]; IBACACHE et al., (2020)[3]; MIGICOVSKY et al., (2021)[4]; SHAFFER et al., (2004)[5].

fully expanded leaves per plot located in the opposite region of the bunches were used. The collections were performed during the second and third production cycles, and the leaves were refrigerated and taken to the Embrapa Semiarid Biotechnology Laboratory and immediately stored in ultrafreezer -80 °C until the transport moment to the Plant Anatomy and Biochemistry Laboratory (LAB-Plant) of the Federal Rural University of Pernambuco (UFRPE). TCS and SAC were estimated macerating 0.1g of fresh leaves in ethanol 80%, making up a volume of 12.5cm^3. Then, the extract was filtered through a fine mesh nylon screen. The quantification of the TSC and sucrose levels $mg.g^{-1}$ in fresh mass (FM) were performed by spectrophotometry in the wavelength of 620 nm, determined according to the Yemm and Willis (1954) and Van Handel (1968) methodology, respectively.

The data were submitted to variance analysis using the F test, in subdivided plot scheme, and the production cycles considered as plots and the eight rootstocks as subplot. To verify possible differences among the rootstock the variables averages were compared using the Tukey test ($p < 0.05$). Statistical analyses were performed using the SISVAR statistical program (FERREIRA, 2011).

Results

There was no significant interaction among the rootstocks and production cycles for the variables fresh branches mass (FM), stem diameter (D) and buds fertility index (FI) (Table 2). There was significant effect for production cycles for stem diameter and fresh branch mass. Stem diameter increased according to the plant age, presenting lower value in the first production cycle (26.65 mm) compared to the third cycle (47.65 mm). Opposite situation was verified for fresh branches mass (FM), where there was a 46.6% decrease between the first and last production cycles evaluated. Regarding the buds fertility index (FI), although it did not present significant difference among production cycles or rootstock cycles, this always maintained values higher than 50% throughout the three evaluated production cycles. For the treatment effect (P), which takes into account the general average of all productive cycles, no rootstock influence was observed for FM, D and FI (Table 2).

Table 2: Mean values and coefficients of variation for fresh branches and leaves mass (FM), in kg per plant; stem diameter (D), in mm; and fertility index (FI) of ‘BRS Tainá’ vines in three production cycles, Petrolina, PE

Roottocks (P)	**FM**	**D**	**FI**
101-14 MgT	7.05^{ns*}	39.83^{ns}	0.54^{ns}
IAC 313	5.69	37.62	0.53
IAC 572	5.66	38.78	0.56
IAC 766	6.73	38.58	0.57
P 1103	7.19	39.78	0.62
Ramsey	7.03	39.34	0.52
SO4	6.73	39.42	0.48
Teleki 5C	6.48	40.42	0.52
Average	**6.57**	**39.22**	**0.54**
CV (%)	**29.31**	**14.61**	**25.33**
Production cycle (C)			
1º	7.97 a^1	26.65 c	0.51^{ns}
2º	7.23 a	43.37 b	0.53
3º	4.52 b	47.65 a	0.58
CV (%)	**34.74**	**14.65**	**24.90**
Significance			
R	0.371	0.955	0.400
C	0.000	0.000	0.134
R x C	0.893	0.153	0.719

[1] Mean followed by the same letter in the column do not differ among themselves by the Tukey test at 5% of probability. R = rootstock; C = production cycle; R x C = rootstock and production cycle interaction; *ns: non-significant.

The number of secondary branches (NS) also showed no significant difference among the rootstocks (Figure 2), during the first cycle that corresponded to the shoot formation phase, presenting an average of 21.98 secondary branches per plant.

There was significant interaction between rootstock and production cycles for total soluble carbohydrate content (TSC) in the leaves. In the second production cycle, the

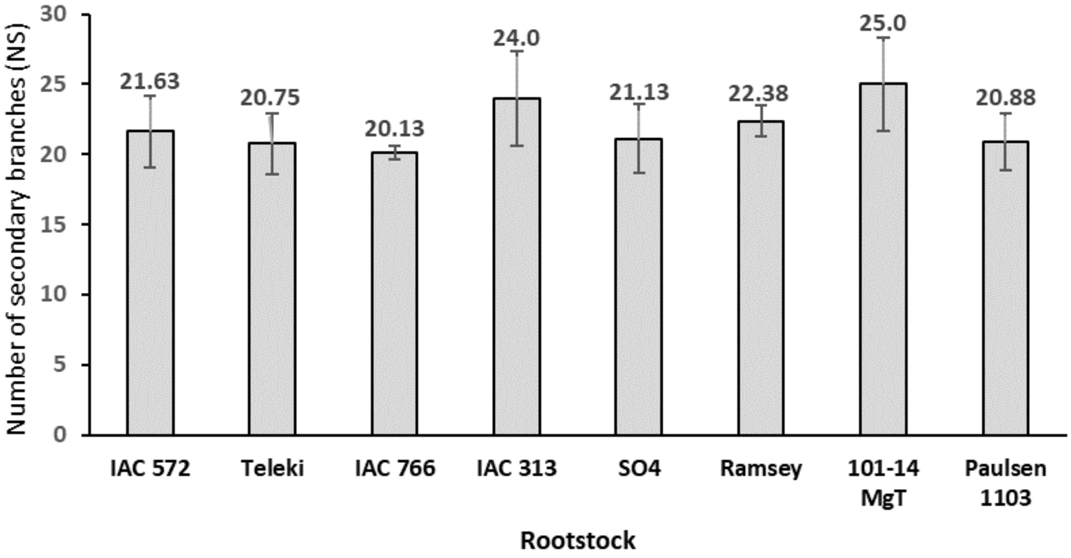

Figure 2: General average and standard deviation of 'BRS Tainá' vine number of secondary branches grafted on different rootstocks.

'Ramsey', 'Paulsen 1103' and 'Teleki 5C' rootstocks were superior to the 'SO4' (Table 3). However, in the following cycle 'SO4' favored higher TSC levels in the leaves compared to most of the rootstock but did not differ from '101-14 MgT' and 'Ramsey'. Comparing the production cycles, the estimated value for TSC in the third cycle was higher than the second, resulting in an increase of 3.08 $mg.g^{-1}$. The only rootstock that presented significant differences among the production cycles was 'SO4', increasing in almost twice the amount of carbohydrates present in 'BRS Tainá' leaves. Therefore, despite the differences evidenced in the treatments within and between the cycles for this variable, no significant differences among rootstock was observed, taking into account the general average of the two evaluated cycles (Table 3).

There was no significant interaction among the production cycles and rootstocks for the sucrose content in the leaves (SAC). In Figure 3, the means and the treatment standard errors can be observed for the two evaluated production cycles, with the general average of 5.16 $mg.g^{-1}$.

Table 3: Rootstock influence on the total soluble carbohydrate content (TSC), quantified in the second (01/28/22) and third (07/07/22) production prunes in 'BRS Tainá vine production cycles.

Rootstock	TSC ($mg.g^{-1}$ FM)		
	Cycle II	Cycle III	Average
101-14 MgT	24.15 ± 1.82 abcA[1]	27.59 ± 4.39 abA	25.87 ± 2.30[ns*]
IAC 313	23.70 ± 1.13 abcA	26.53 ± 0.87 bA	25.12 ± 0.85
IAC 572	24.85 ± 1.56 abcA	25.68 ± 0.52 bA	25.27 ± 0.78
IAC 766	21.07 ± 1.99 bcA	25.48 ± 1.53 bA	23.28 ± 1.32
Paulsen 1103	25.14 ± 2.66 abA	24.85 ± 1.00 bA	24.99 ± 1.43
Ramsey	30.19 ± 3.66 aA	28.42 ± 3.19 abA	29.30 ± 2.28
SO4	17.61 ± 1.34 cB	34.47 ± 4.04 aA	26.04 ± 3.75
Teleki 5C	26.74 ± 1.05 abA	23.74 ± 1.20 bA	25.24 ± 0.93
Average	**24.18 B**	**27.10 A**	**25.64**

[1] Average ± standard error followed by equal lower case letters in the column comparing rootstock, and upper case in the line, comparing production cycles, do not differ by the Tukey test (p <0.05); *ns: not significant.

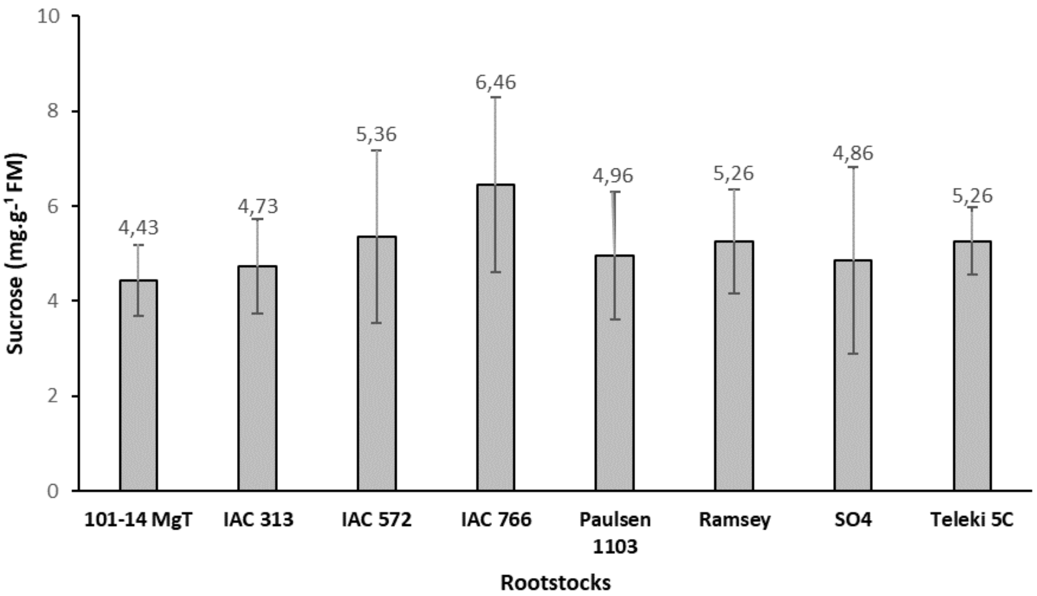

Figure 3: Sucrose content ($mg.g^{-1}$ FM) in 'BRS Tainá' leaves grafted in different rootstocks. The values represent the average of two production cycles (second and third) and the bars indicate the mean standard deviation.

Discussion

Considering the results found during the first 'BRS Tainá' vine production cycles, it was not possible to establish a specific rootstock that provides significant increments in the agronomic variables FM, D and FI. The rootstock can stimulate the development of the plant shoot however, other factors such as the environment, variety intrinsic genetic characteristics, plant age and the production system, can also interfere in the vegetative development and fertility of the grapevine buds. Thus, the ideal temperature and high luminous intensity conditions observed in the Submedium of São Francisco Valley during the experiment (Figure 1), associated with the soil humidity control and correct nutrient availability via localized irrigation, favored the 'BRS Tainá' canopy uniform development and buds fertility in different rootstocks.

For FM and FI variables, these results are in accordance with those obtained by Leão et al. (2020a) evaluating seven rootstock effect for the 'BRS Vitória' vine in the same region, not observing significant differences for the FI and FM variables throughout successive production cycles. Regarding the stem diameter (D), few vine studies relate this simple and non-destructive variable with vegetative vigor. Li et al. (2019) evaluating seven-year-old 'Marselan' wine vine managed to identify that 'Teleki 5C' favored larger vine stem diameter compared with seven other rootstocks studied. Verdugo-Vásquez et al. (2021) also obtained similar results to those obtained in this study for interaction among production cycles and rootstock cycles, these being non-significant, during the first five cycles in the 'Syrah' cultivar for D and FM variable. However, they managed to identify differences among rootstock for these variables in the cycle average value. Although many studies show different results related to vigor and buds fertility, in several canopy x rootstock combinations in the first vine production cycles, it was possible to verify in this study that the canopy vegetative vigor and buds fertility of young 'BRS Tainá' vine were not influenced by the rootstock and remained stable throughout the first three production cycles.

It is important to highlight that the definition of the number of secondary branches (NS) occurs during the canopy formation during the first pruning, varying according to the diameter and the rod density recommended for each cultivar. 'BRS Tainá' vines conducted in unilateral cordon, independent of the rootstock used, managed to achieve the recommended pattern, presenting on average 22 lateral branches per plant, 11 for each side (Table 2).

The production cycle factor (C) significantly affected the branches and leaves fresh mass (FM) eliminated during pruning, occurring FM superiority in the first two production cycles compared to the third cycle. Despite this difference, FM reduction was not a negative factor for buds fertility (FI), because regardless of the amount of fresh matter removed, FI did not differ among cycles. This result associated with the soluble sugar content (Table 3) demonstrates that 'BRS Tainá' vines tend to establish a balance among the sugar production that can be immediately used in the development of the shoot despite the changes imposed by the environment, with reserves accumulation that will be used in the future in organs of the drain type. This characteristic is indispensable for the São Francisco Valley producing region, because the maintenance of buds fertility throughout the cultivation cycles, can reduce the alternances in productivity, allowing the stable production of two annual crops. When compared to the fertility indices of white table grapes produced in the region presented by Leão (2018), 'BRS Tainá' presented the average value (0.54) higher than that of Thompson Seedless cultivar (0.33), however lower than that of 'BRS Clara' vine (0.84).

With the advance of plant age, the stem diameter presented increasing values among production cycles (Table 2), which was already expected due to the greater vegetative development and vigor with the plant age. There was an increase of 63% between the first and second cycle, reducing the growth average to 10% between the second and third production cycle. Although the stem is also an energy reserve organ for the plant, the reduction of the growth rate observed between the last two evaluated cycles can be considered normal, because with the age advancement and the consecutive production cycles, the plants in general try to restore their reserves preferably in the roots. Most of the authors consider the vine vigor as being only the vegetative biomass removed during the pruning, not measuring other important characteristics such as the stems and branches secondary growth (ANGELOTTI-MENDONÇA et al., 2018; LEÃO et al., 2020b). It is important to highlight that the fresh mass obtained during the production pruning should not be the only measure to estimate the vine vigor, since the amount of material produced depends on other factors, such as the branch diameter, number of buds, energy reserves left after the previous productive cycle, rest period among crops and edaphoclimatic conditions (KELLER, 2015b).

Hanson and Semmekes (2009) and Meyer et al. (2007) go beyond the morphological and agronomic characteristics, which are easily measurable, and establish that vegetative growth promotes the primary metabolism while using the accumulated resources; consequently, there is a correlation between vigor and concentration of leaf sugars. Thus, the sugar metabolism is an important process in the growth and development of vines. Sucrose is the main leaf photosynthetic product used in the transport for long distances through the phloem, for tissues that are acting as drain, where it serves as carbohydrate storage for the maintenance of metabolic pathways and carbon storage (ZHU et al., 2017; ZHONG et al., 2020; WALKER et al., 2021). Wu et al. (2011) studying six grape cultivars with the objective of understanding the relationship between the accumulation of sucrose in the leaves and its concentration in the berries, concluded that the sucrose concentration in the leaves during the harvest was higher than that found in the beginning of fruiting (20 days after anthesis), with no significant differences among the treatments during fruiting. Lo'ay et al. (2021) evaluating the performance of 'Flame seedless' in different rootstocks, identified that even under salt conditions, the carbohydrate content in the shoot increases from the flowering until the moment of the harvest, independent of the rootstock. In the present study, the use of different rootstock did not exert significant influence in the sucrose production in the 'BRS Tainá' leaves after the fruiting, at the moment of production pruning, and at the end of the rest period (Figure 3). Taking into account that the destination of sucrose depends on factors such as the leaves position and the phenological stage of the vine, after the removal of one of the main drains (berries), the majority of the sucrose is exported and accumulated in permanent organs (roots and trunks) in starch form. Subsequently, after production pruning, the accumulated starch is converted into sucrose to support the development and initial growth of shoots in order to reestablish the canopy (KELLER, 2015c).

Regarding the effect among productive cycles, evaluating the average content of total soluble carbohydrates (TSC), the third cycle was higher than the second production cycle, which was due to higher values presented in this cycle by the SO4 rootstock (Table 3). Probably, the largest exposure of the leaves to sunlight provided by the lower amount of FM, in the third cycle in 'BRS Tainá' grafted on SO4, stimulated the increase of photosynthesis in this rootstock. Despite the FM reduction in the last productive cycle for all rootstocks, most maintained the TSC content found in the previous cycle (with the exception of 'SO4'). Dantas and Ribeiro (2005) studying TSC in 'Petit Syrah' in the Submedium of São Francisco Valley for two consecutive cycles, evidenced that TSC increased following climatic variations during the cycle. This may have been the factor for the compensatory increase of photosynthesis in the third production cycle, due to lower rainfall concentration and, consequently, higher temperature in the vineyard, resulting in the maintenance or superiority of TSC production in all rootstocks. Regarding the general average of TSC taking into account the two cycles, Souza et al. (2011) studying TSC in 'Italy' vine leaves grafted on 'IAC 313' in the Submedium of São Francisco Valley, with evaluation performed 60 days after harvest (DAH), obtained an average of 23.97 $mg.g^{-1}$ FM value similar to that of this study (25.64 $mg.g^{-1}$ FM). Dantas et al. (2007) studying Syrah cultivar grafted on the 'IAC 572', observed that the TSC content increases from the fifth leaf of the secondary branch, remaining constant (10.0 $mg.g^{-1}$ FM) until the leaf prior to the bunch, where it presented the value for TSC of 20.0 $mg.g^{-1}$ FM. Thus, it is possible to perceive that several factors such as environmental conditions, leaf position, canopy variety and rootstock can influence the production of TSC.

According to Bennett et al. (2005), the drastic reduction in carbohydrate accumulation tends to reduce the fertility of vine buds. After the implementation of pruning, the initial growth of the new leaf shoots depend entirely on the reserve nutrients stored during the rest period. At this moment, the buds that are still dormant become drains, because they are structures that are not fully differentiated, unable to compete with the previously formed structures, that is, requiring receiving carbohydrates from nearby leaves, which are the main sources of photoassimilated for the inflorescence development (LEBON et al. 2005). However, no investment in new reproductive growth is made until the new shoots close to the buds, reach the independence of the mother vine (VASCONCELOS et al., 2009). Thus, when the plant exhausts its reserves in the previous harvest because of the high vigor or excess production and cannot reestablish during the rest period, the trend is that there is a reduction in buds fertility, since the vine does not present conditions of supplying all organs, while developing the inflorescence (LEBON et al. 2008). In this study, it was observed a 37.5% reduction in fresh mass (FM) among the second and third production cycle, probably the high vigor in the first two cycles with average of 7.97 and 7.23 kg of branches and leaves removed, may have compromised the reserves accumulation. Despite the reduction of FM in the last cycle, there was no reduction in TSC and sucrose;

consequently, there was no reduction in FI independent of the rootstock used.

Conclusion

The vigor, buds fertility, sucrose content and total soluble carbohydrates present in 'BRS Tainá' vine leaves were not influenced by the rootstock in the first three production cycles. The production cycle affected the vine vigor and the total soluble carbohydrate content in the leaves, but did not have influence on buds fertility and sucrose content in the BRS Tainá young vine leaves cultivated in the Submedium of São Francisco Valley.

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