Crop Breeding and Applied Biotechnology 14: 266-269, 2014
Brazilian Society of Plant Breeding. Printed in Brazil

CULTIVAR RELEASE

http://dx.doi.org/10.1590/1984-70332014v14n4c42

'BRS MAGNA' – a novel grape cultivar for juice making, with wide climatic adaptation

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Received 01 August 2013

Accepted 31 March 2014

Abstract – *'BRS Magna' is a-novel cultivar to make grape juice, which presents intermediate productive cycle and wide climatic adaptation, released as an alternative to improve the color, the sweetness and the flavor of grape juice in Brazil.*

Key words: *Genetic breeding, color, flavor, phenolic compounds.*

INTRODUCTION

Between 2008 and 2011, the production of integral and concentrate (turned into liters of integral juice) grape juices in Brazil increased 32%, reaching about 190 million liters. Meanwhile the grape juice commercialization in the country duplicated between 2004 and 2009, increasing in 117% (IBRAF 2009, Mello 2012). The state of Rio Grande do Sul is the main producer of grape juice in Brazil, especially the region of Serra Gaúcha. In the last years, it has been witnessed a strong trend of expansion of this activity in the country, especially towards tropical and subtropical areas, such as the states of Mato Grosso and Goiás, São Francisco River Valley and the North of Paraná State (Camargo 2008, Embrapa Uva e Vinho 2012).

The traditional cultivars used for juice making in Serra Gaúcha are 'Isabel' or 'Isabella', 'Concord' and 'Bordô' or 'Ives', which belong to the group of the American Grapes (hybrids of *Vitis labrusca*). The raspberry flavor of these labrusca grapes is the reference of the organoleptic quality of grape juices (Camargo 2005). This group of varieties used by the Brazilian juice industry has been complemented in the last years with the breeding of novel grape juice cultivars in order to increase the sustainability and the competitive edge of this segment (Camargo and Maia 2008). These new juice cultivars differ in the length of productive cycles, in the intensity of the juice color, in the sugar content, and also in the range of climatic adaptation. Six new grape juice cultivars were released in last years by the Grape Breeding Program maintained by Embrapa Grape and Wine. This group of cultivars has contributed to increase and diversify the options of grape juice cultivars in Brazil (Camargo 2008, Ritschel and Maia 2012).

'BRS Magna' is a new cultivar used for grape juice making, with intermediate cycle and wide climatic adaptation, released as an alternative to improve the color, the sweetness and the flavor of grape juice in Brazil.

BREEDING METHODS

'BRS Magna' resulted from the crossing of 'BRS Rúbea' X 'IAC 1398-21' ('Traviú'), made in 1999, at Embrapa Grape and Wine, in the City of Bento Gonçalves, state of Rio Grande do Sul (RS). It was used the classical breeding method, via crossing, with selection in F1 populations. Three hundred and thirty-six plants were obtained and grafted in the vineyards of the Experimental Station of Tropical Viticulture (EVT) in the city of Jales, state of São Paulo. The first evaluation occurred in September 2006. The original plant was selected as CNPUV 773-319, due to its good fertility, raspberry flavor (labrusca), high sugar content and proper color (Ritschel et al. 2012).

'BRS Magna' was also evaluated from 2008 to 2012 in Bento Gonçalves, RS, and from 2010 to 2012 in the city of

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Nova Mutum, state of Mato Grosso. Yield and grape quality were observed in all places where the tests were done.

Main traits and performance

'BRS Magna' presents medium productive cycle and its potential yield reaches 25 to 30 t ha^{-1}. The sprout of BRS Magna in Serra Gaúcha starts in the beginning of September, and it is harvested in the beginning of February, about one week after the harvest of 'Concord' cultivar (Figure 1). The phenological behavior of 'BRS Magna', in Serra Gaúcha and in the Northwest São Paulo State is shown in Table 1.

In temperate climate, the estimated thermal necessity of 'BRS Magna' was 1,442 degree-day from pruning to the end of maturation and 1,330 degree-day from sprouting to the end of maturation. The length of the cycle (from pruning to harvest) may change according to the thermic sum of specific periods in each growing area. In the Northwest São Paulo, the average length of the cycle varies from 115 to 120 days; in Serra Gaúcha, Bento Gonçalves region, from 165 to 175 days, and in Mato Grosso, Nova Mutum, from 100 to 110 days.

It is a cultivar with medium vigor, which makes the management of the vegetative canopy easy, without affecting the formation of the vineyard in the first year. It presents high bud fertility, and it frequently produces two clusters per branch; however, the fertility is lower in the basal buds. 'BRS Magna' presents medium tolerance to leaf blight, whose etiological agent has not been identified yet. During the evaluations, it was also observed symptoms of downy mildew [*Plasmopara viticola* (Berk e Curt) Berl], powdery mildew [*Uncinula necator* (Schw.) Burr.], bunch rot (*Botrytis cinerea* Pers.), anthracnosis [*Elsinoe ampelina* (De Bary) Shear], grape ripe rot [*Glomerella cingulata* (Ston.) Sapuld & Schrenk], and leaf rust (*Phakopsora euvitis* Ono). All these diseases were managed with the traditional treatments used to grow 'Niagara Rosada'.

The full ripe grape presents pleasant raspberry flavor, typical of *V. labrusca.* The chemical traits of the must are sugar content of 17 - 19 ºBrix, average total acidity of 90 meq L^{-1}, and pH of 3.60. The juice made with 'BRS Magna' is intense violet, and can be taken pure or in blends with other juices in order to improve the color, the sweetness, and the flavor.

In the vintages 2010/11 e 2011/12, 'BRS Magna' juice was made in Embrapa Grape and Wine, in semi commercial scale, using the heat extraction method, tube to tube exchange. In the average, the juice of the two vintages presented high sugar content (19 ºBrix), equilibrate pH (3.7) and moderate total acidity (80.7 meq L^{-1}).

In the vintage 2011/12, 'BRS Magna' juice was described as having intense and profound purple color. The flavor was intermediate to high intense, fruity, resembling "tutti-frutti". The taste was distinguished by a *labrusca* attack, with mod-

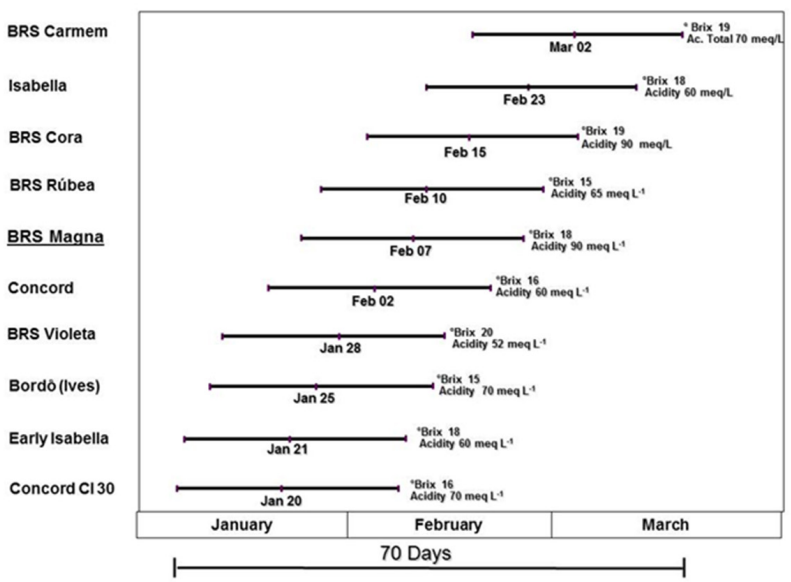

Figure 1. Harvest time and chemical traits of the must of 'BRS Magna' cultivar in comparison with other juice grapes in the Serra Gaúcha (modified from Camargo et al. 2008).

Table 1. Mean of phenological observations of 'BRS Magna' at Bento Gonçalves, in Serra Gaúcha, RS (2009-2012), and in Jales, in the Northwest São Paulo State (2008-2012)

Region	Pruning	Sprouting	Flowering	Maturation	Harvesting
Bento Gonçalves, RS	Aug 19	Sep 10	Oct 22	Dec 06	Feb 07
Jales, SP	Mar 25	Apr 05	Apr 26	May 31	Jun 30

erate to low acidity and soft tannins. The consistence was considered viscous, with high body and tannin structure. The aftertaste was sweet and lasting.

The juice was bottled and offered to the public in expositions and other events, where it was evaluated by the consumers. In Fenavinho 2011 (Wine Fair), the juice was appreciated as excellent, very good or good by 297 non-trained tasters.

Evidence about the positive effect of grape phenolic compounds in the prevention of cardiovascular disease has been found in specialized literature (Manach et al. 2004, Dohadwala and Vita 2009).

Protocols used here to evaluate anthocyanin and polyphenol content are described in Rizzon (2010). Anthocyanins are the main compounds, which determine the color of grape juices, and can be red in color in acidic extract, or blue and violet in basic extract. The determination of anthocyanins content in grape juices can be based on the difference of anthocyanins color in relation to pH, considering that the color intensity variation in acidic and basic extracts is proportional to the anthocyanin content. Total Polyphenol Index (TPI) corresponds to the entire group of phenolic compounds of the juice grapes, and is estimated by direct reading absorbance at 280 nm. At this wavelength, the great part of the absorbance corresponds to benzenic cores, which are characteristic of the phenolic compounds. As TPI is an index, it is not expressed in concentration; as a rule, each 20 units of TPI correspond to approximately 1g of tannins per liter of sample.

The contents of phenolic compounds and anthocyanin were evaluated in the grape juice made with 'BRS Magna'. In comparison with the juice made with other cultivars released by the Grape Breeding Program, 'BRS Magna' anthocyanin and phenolic compounds contents were distinguished, with smaller values only in comparison to 'BRS Violeta' juice (Figure 2). 'BRS Magna' is recommended to make varietal grape juice or blended with other grapes, aiming to improve the flavor, the sweetness and the color. It presents wide climatic adaptation, and can be grown in temperate and tropical humid climate. It presented good agronomic performance when grafted on the rootstocks 'Paulsen 1103', in Bento Gonçalves, RS, and 'IAC 572', in Jales, SP and in Nova Mutum, MT.

'BRS Magna' presents medium vigor and good bud fertility, and yields in São Paulo, Rio Grande do Sul and Mato Grosso reach about 25-30 t ha^{-1}, with sugar contents of 17 to 19 °Brix. It also distinguishes itself for the pleasant raspberry flavor and intense purple color. The productive cycle, from early to medium, makes it possible to have two cycles per year in tropical conditions, one starting from the short pruning without production, in order to form the vineyard, alternated with a productive cycle, starting from the medium pruning.

Healthy of propagative material

'BRS Magna' was tested for the presence of viral infections. In this indexing process it was considered some of the

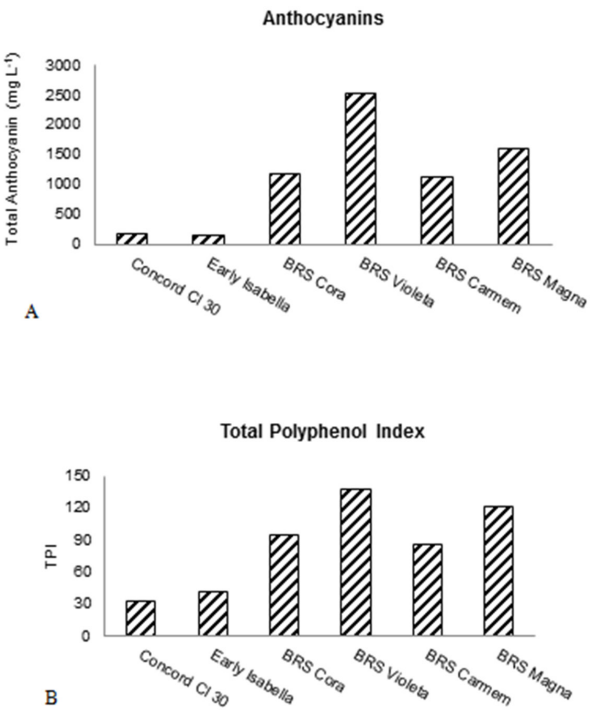

Figure 2. Mean of total anthocyanin content (mg L^{-1}) (A) and polyphenol index (B) determined in the juices made with cultivars released by the Grape Breeding Program. 'BRS Violeta' and 'BRS Magna', the new cultivar, presented the higher values. (Embrapa Uva e Vinho, vintages 2010-11 and 2011-12).

main viruses, which cause the grapevine diseases, such as Leaf roll complex and Rugose Wood Complex. Diagnosis tests were based on RT-PCR (conventional or real-time) or molecular hybridization techniques. This methodology is very sensitive and allows detecting the viral nucleic acid in infected plants, which are discharged from the development process of producing propagative material. Thus, only plants identified as healthy were used as foundation stock for obtaining propagative material to multiply 'BRS Magna'. Information about propagative material of the new cultivar 'BRS Magna' can be obtained in Embrapa Products and Market, Business Office of Campinas (www.campinas.spm.embrapa.br).

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