Journal of Food Technology 3 (4): 491-494, 2005

Variations in the Tenor of Total Soluble Solids in Grape Cultivated under Organic System and Stored in Different Temperatures

[1]A.M Detoni, [1]E. Clemente, [2]G.C.Braga and [2] N. Herzog,
Lab. Bioquímica de Alimentos /DQI , Universidade Estadual de Maringá
Av. Colombo 5790- Zona 7, CEP: 87020-900 - Maringá -PR - Brazil

Abstract: This study aimed was evaluating the effect of the time of storage (0, 7, 14, 21, 28 and 35 days) and of the temperature (1, 14 and 24°C) in the tenor of solids soluble totals of grapes *Niágara rosada* cultivated in the organic system.The grape *Niágara rosada (Vitis labrusca* L. *x Vitis vinifera* L.*)* its come as one of the main consumed grapes of Brazil. In the market of fresh fruits one of the important aspects is the quality. That involves, besides the characteristics of the fruits the processes used in the production and commercialization. The consumer is every more concerned with the origin of the products that will acquire, with the presence of toxicant residues, hormones, toxin and with the conservation state. The cultivation system, the cultivars and the crop conditions and post harvest, its cause direct reflexes in the conservation and quality of the grapes. The results demonstrated that in the storage at 1 and 14°C the content of solids soluble totals stayed without significant variations. However in the storage at 24°C the tenors decrease along the period, reducing the quality of the fruits and turning them with low quality for the consumption. The temperatures of storage at 1 and 14°C were the ones that its provided longer time of conservation of the fruits.

Key words: Grape, cultivation system, quality post harvest, *Niágara rosada*

INTRODUCTION

The grape is one of the fruits more consumed in the world, your cultivation exists there are centuries and it is distributed by all the continents[1]. The grape *Niágara rosada' (Vitis labrusca* L. *x Vitis vinifera* L.*)* its comes as one of the main grapes consumed in Brazil, for having high quality for consumption in natura , as well as to the lower production cost, what has been allowing great expansion in the cultivated area[2] .

In the market of fresh fruits one of the important aspects is the quality. The modern concept of quality involves, besides the characteristics of the fruits, as appearance and flavor, the processes used in the production and commercialization, also taking in consideration the nutritious aspects and quality of the product[3].

The consumer is more and more concerned with the origin of the products that will acquire and with the presence of toxicant residues, hormones and toxin, and also with the conservation state. They wants the warranty that the food is free from chemical residue (pesticide), biological (pathogenic microorganisms), physical (glasses and stones) or of any other substance that comes to be a harm to the health. In this context the sale of the products clean environmentally is growing quickly. The consumers mainly European, American, Japanese and even Brazilians, they are willing to pay more for the horticulture products that its show stamps green or ecological[3].

In Brazil the crop area now with organic horticulture it is of 100 thousand hectares, what it assures the 2nd place in Latin America after Argentina. The states of São Paulo and Paraná are the principal producing of organic products[1].

The world market of organic products is rate by the Department of Agriculture of the United States (USDA) in US$ 23,5 billion. To participate in that it is necessary to obtain an origin certificate sent by official entities. The certification is a process that attests that certain food is really organic and that the producer is accomplishing the effective norms for the organic production. In Brazil some exist certifiers, as the Biodynamic Institute of Rural Development (BID), only certifier recognized by the International Federation of Movements of Organic Agriculture (IFOAM).

Day by day every more consumer acquire organic products, free from agro toxin, this induces changes in the production, in the storage, distribution and commercialization. That ecological conscience turns into a viable opportunity for the agriculture, valuing the trade of organic products. Before that, some viticulture farmers are addressing the traditional production for the organic production or integrated.

The success of the agro business of grapes is the quality market that includes the appearance of the fruit, quality, and the safety of the food, the environmental

quality and of the human life. These attributes vary in agreement with to cultivate, cultivation conditions, cultivation system and the crop conditions and powder-crop, with direct reflexes in the conservation and quality of the grapes[1].

After the crop they happen some changes in the fruits as the increase of the permeability of the cellular membranes, dehydration, softening and increase of the susceptibility to the invasion of microorganisms, as well as some chemical transformations.

For a better presentation of the processes that happen during the ripening and in the period post harvest, during the storage, some parameters are used as: organic acids, pH, total soluble solids, sugars, vitamins and enzymes.

The total solids soluble are composed soluble in water and important in the determination of the quality of the fruit. This parameter gives us an indicative of the amount of existent sugars in the fruit. The tenors of SST usually increase in elapsing of the process of maturation of the fruit, can be by the biosynthesis or for the polysaccharides degradation[5,6].

This study aimed at to evaluate the quality grapes *Niágara rosada*' cultivated in the organic system, through the tenor of total soluble solids in function of the time (0, 7, 14, 21, 28 and 35 days) and of the temperature (1, 14 and 24°C) of storage.

MATERIALS AND METHODS

Grape sample: Grapes were used ' *Niágara rosada*' *(Vitis labrusca L. x Vitis vinifera L.)*, cultivated at commercial orchard in the municipal district of Toledo-PR, located to 547 m of altitude, south latitude 24°45 ' and longitude west 53°42 '[7].

The orchard is led in the organic system, with certificate sent by IBD. The cultural practices are accomplished in agreement with allowed him/it by the norms of organic production. Being used natural mixtures for the control of curses and diseases and fertilizer through tanned animal manure.

The crop was accomplished when the grapes presented identified maturation point for the value of the Total Soluble Solids between 15 and 16 ° Brix. Reading made by refractometer Cosmos, Model K - 32.

The bunches were picked manually, with aid of pruning scissors, later submitted cleaning leaving leaves or branches, contained among the grapes, damaged berry, rotten or pricked by insects.

Packing: After having picked the bunches its were conditioned in boxes of cardboard microwave with capacity for 2,5kg, possessing 4 front holes and 6 in the lateral ones. Later the boxes were labeled properly and involved with plastic film of PVC (13 mm of thickness) and made openings with scissors of approximately 12 mm in the film, in the direction of the cardboard box's holes.

Storage: After the grapes been packed in boxes of cardboard microwave, the boxes were stored in chamber BOD previously washed and sterilized and regulated in 1 14 and 24°C (± 2°C). The relative humidity was around 85-90%, being controlled periodically by hygrometer, and maintained through sheet of water.

Determination of the total soluble solids: The evaluation of the tenor of soluble solids was made in function of the time (0, 7, 14, 21, 28 and 35 days) and of the temperature (1, 14 and 24°C and UR 85-90%) of storage. For this analysis it was used 4 composed repetitions by 2 bunches, being the readings made in triplicate.
The tenor of solids soluble totals was obtained by refractometry; through refractometer Cosmos, Model K - 32, according with AOAC[8] method.

Statistic analysis: The variation of the tenor of total soluble solids in function of the storage period was analyzed through the regression analysis; being used the statistical package SAEG.

RESULTS AND DISCUSSION

The sample of grapes stored at 1and 14°C (Fig.1) did not present an significant differences ($p>0.05$) in the tenor of Total Soluble Solids (SST) during the period that the grapes were stored. Both temperatures presented an average of SST 16,27°Brix.

The conservation of the tenor of SST can be related with the low weight loss observed in the grapes during the storage; some authors relate the increase of the tenor of soluble solids with the loss of water of the fruit. Cenci[1] it observed that the content of solids soluble totals increased with elapsing of the storage, due to larger losses of fresh weight of the berry.

In the storage at 24°C happened significant differences ($p <0.05$) in the tenors of soluble solids among the storage periods, happening decrease in the values of 16°Brix in the first evaluation for 13.96°Brix in the last (Fig. 2).

According to Coombe[9] the decrease of SST the can be associated a solids loss due to the breathing activity and perspiration. The breathing consists of the degradation oxidative of complex substances as polysaccharides (starch), simple sugars (glucose and

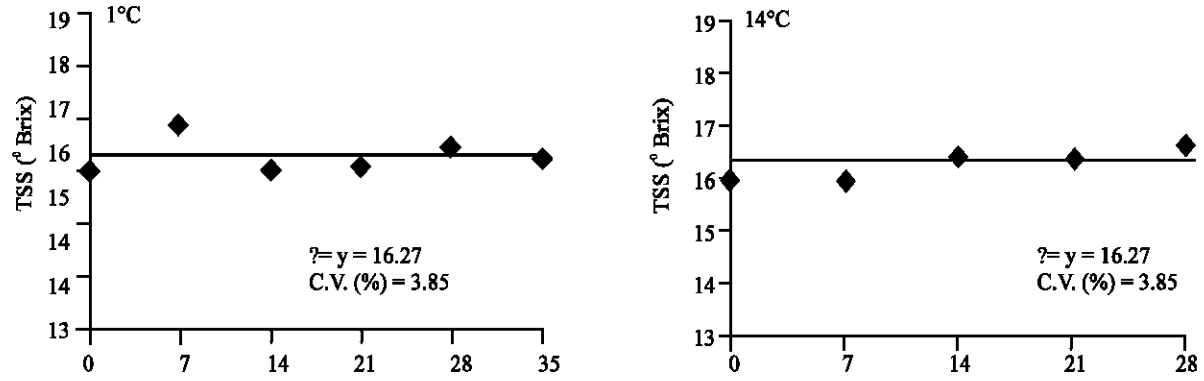

Fig.1: Medium tenor of total soluble solids (°Brix) of grapes *Niágara rosada (Vitis labrusca* L. *x Vitis vinifera* L.*)*, in function of the time and temperature (1 and 14°C) of storage

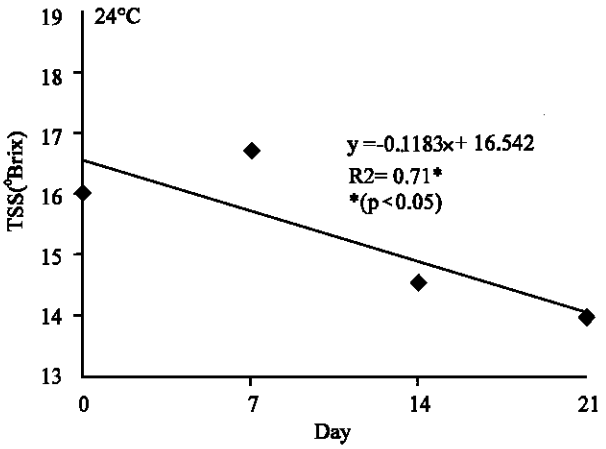

Fig.2: Medium tenor of total soluble solids (°Brix) of grapes *Niágara rosada (Vitis labrusca* L. *x Vitis vinifera L.)*, in function of time and temperature of storage at 24°C.

fructose), organic acids, proteins and lipids in simple molecules[6].

The breathing rate depends on some factors among them the storage temperature. In a general way, the speed of the biological reactions of a product increases from two to three times for each 10°C of increase of the temperature. The breathing rate of the submitted grape the 0°C temperature is of 1-2 mL $CO_2.kg^{-1}h^{-1}$, when stored to 20°C this value it increases for 12-15 mL $CO_2kg^{-1}h^{-1}$ [6].

CONCLUSIONS

The cultivar *Niágara rosada*, cultivated under organic system, when submitted to the storage at 1 and 14°C, it maintained the content of total soluble solids without significant variations during the period. However in the storage at 24°C the tenors decreased along the time, reducing the quality of the fruits and turning them of low quality for the consumption. Then its possible concludes which storage at 1 and 14°C provided larger time for conservation to of these grape cultivars.

ACKNOWLEDGEMENTS

We would like to say thanks to the producer Carlinhos Fornari for the supply of the grapes used in this experiment.

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