

Grapes Quality of Velika Variety after Harvest and Refrigeration Storage

Daniela Atanasova, Agricultural University, 4000, Plovdiv, Bulgaria, daniat88@abv.bg
Boyan Stalev, Agricultural University, 4000, Plovdiv, Bulgaria, stalev26@abv.bg
Lyudmil Angelov, Agricultural University, 4000, Plovdiv, Bulgaria, vitis.vin_29@abv.bg

Abstract- The study on quality of table grape variety „Velika” grown in organic and conventional farming in the region of Naiden Gerovo, Municipality of Plovdiv, Bulgaria was carried out in the period 2009-2011. The region of the village of Naiden Gerovo is suitable for biological production of grapes. The condition of the grapes in both cultivation technologies was good. The percentage of rotted, moth-eaten and raisin-shaped berries was insignificant. There was a low density of the grape moth *Lobesia botrana* because of the activity of the pheromone dispensers in the plantation. Grapes of variety "Velika" have a very attractive appearance, they do not crack and have good transportability. They preserve relatively well on the vine after ripening and at refrigeration storage. The table grape variety "Velika" produced by both technologies, organic and conventional, has good transportability and refrigeration storage up to one month with insignificant losses. During transportation of grapes cracked berries were below 1.5% and the fallen berries reached 10-20%. In refrigeration storage at 2-6°C and humidity 90% within thirty days were established 0.25 -1.6% raisin-shaped and 1.0 - 5.6% rotted berries. During refrigeration storage of the grapes up to one month at temperature 2-6°C losses reached from 6.2 to 7 kg per 100 kg of fresh grapes.

Keywords: organic farming, conventional, transportability, refrigeration storage, *Lobesia botrana*, pheromone traps, pheromone dispensers.

I. INTRODUCTION

The healthy advantages and benefits of the grape are known by people all over the world since ancient times. Dark grapes varieties are a powerful antioxidant having anti-cancer effect and prevent premature aging. As a result of its regular consumption increases the metabolism and increase the vitality of the body.

The fresh table grapes with its nutrient and biologically active substances, rich and various mineral and vitamin compounds, contains almost everything needed for a healthy human body, as it provides the necessary energy and mineral balance. This makes it one of the most useful and essential food for human body.

The table grape variety „Velika” is one of the largest-fruited and earliest ripening grape variety, established more than thirty years and comes from the French variety "Alphonse Lavallee". The grapes are very large and reach up to 55 mm. length, a significant part of them are seedless, their skin is fragile, dark red to deep violet. The flesh is crunchy, with very good harmonious taste. At full ripening of the grapes, sugar content reaches a very high percentage. Grapes of variety „Velika” have a very attractive appearance, they do not crack and have good transportability. They preserve relatively well on the vine after ripening and at refrigeration storage [1].

The problem with the production of organic table grapes is a complicated and its solution requires an integrated approach, especially because it is needed the grapes to be produced according to the standards of organic farming [2, 3, 4, 5, 6].

To obtain quality grapes is very important to protect it from pests and diseases. The most important pest in vineyards in Bulgaria is European grape berry moth *Lobesia botrana* Den. & Schiff. [7]. The caterpillars of first generation chew the blooms and cover them in a silk web. The caterpillars of second generation feed with the green pea-size berries and of third generation feed with ripening and mature berries. Damages of the last generation are especially significant because damaged berries develop gray rot - *Botrytis cinerea* Pers.

The main way to preserve the nutritional value of grapes is refrigeration storage in connection with longer period of supply on the market and consumers with fresh grapes [8].

The aim of this study was to establish the postharvest quality of grapes variety „Velika” after transportation and refrigeration storage.

II. MATERIALS AND METHODS

The study was conducted in 2009-2011, in the vineyard of table grape variety „Velika” (0.5 ha), planted in 2004 in the village of Nayden Gerovo.

There were variants with organic cultivation (V_1 - mulching the soil surface with straw - 1 kg per $1m^2$, V_2 - grassed soil surface such as grass clippings are left in place to rot, V_3 - fertilization with well putrid manure - 40 t/ha once in the autumn, then the soil was plowed) and a variant with conventional cultivation of plantation - fertilization with mineral fertilizers and maintaining the soil surface clean from weeds (control V_0).

Studies on the quality of the grapes during its refrigeration storage were conducted in the Department of Horticulture at AU- Plovdiv. Extra class grapes were stored in the refrigerator with the following regime: a temperature of 2-6°C; humidity 90-95% and duration of storage up to 12 weeks.

During storage were reported following parameters: rotted (%) and raisin-shaped berries (%). Analyses were carried out every 2 weeks. About the study of transportability of the grapes were investigated following parameters: rotted (%), cracked (%) and fallen berries (%).

In the variants with organic production were placed 500 pheromone dispensers per ha. Dispensers type “spaghetti” of the Italian company “Serbios” were used for disorientation of the males of *L. botrana* and also to establish the efficacy of dispensers one pheromone trap “Pherocon” type 1C on “Trace” company was used.

In the control was placed one pheromone trap “Pherocon” type 1C to monitor the dynamics of flight of *L. botrana*. Between the control and the area with pheromone dispensers was left spatial isolation of 200 m. Dispensers have activity period of 150 days. Pheromone traps have the period of activity of the capsule 4 to 6 weeks.

III. RESULTS

For the successful storage of the grapes is very important the timely control against diseases and pests. The grape that was harvested for storage should not have damaged berries of the grape moth *L. botrana*.

Our results showed that in biological grown vineyards because of the activity of the dispensers in the plantation there was not caught moths in the pheromone trap and that showed the efficacy of dispensers. Damaged berries of the grape berry moth were not observed.

In the control (conventional cultivation) in the pheromone trap was caught insignificant number of moths (Fig. 1). In the period of study damaged berries of the grape moth were under 1%.

Data shows that in the area of village Nayden Gerovo density of *L. botrana* is low and the use of pheromone dispensers can protect the grape harvest from the pest.

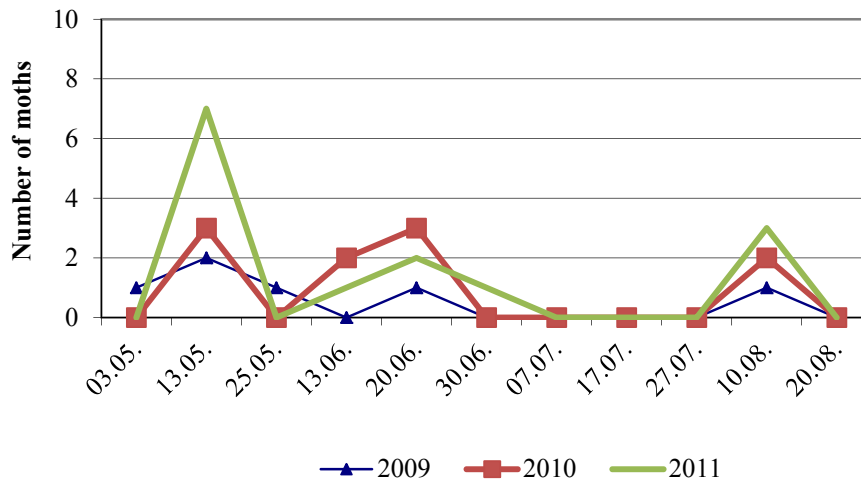


Figure 1. Population dynamics of *Lobesia botrana* and number of caught moths in pheromone trap in conventional vineyard of variety „Velika” in 2009-2011.

The transportability is very important characteristic of the table grapes, due to the necessity of their frequently transportation to different distances.

Transportation of grapes variety „Velika” was done by a lorry at distances of 180 to 360 km, without downtime. It was not found rotted and only 1.5% of the berries were cracked (Table I). This indicates that the variety has a good transportability.

TABLE I. Transportability of the table grape variety „Velika”

Variant	Date	Distances, km.	Weight of the sample, kg.	Cracked berries, %	Rotted berries, %	Fallen berries, %
V ₀	27.08.09	180	12	1,0	0	0
	21.08.10	360	50	1,4	0	15
	19.08.11	310	40	1,2	0	18
V ₁	27.08.09	180	12	1,1	0	0
	21.08.10	360	50	1,3	0	12
	19.08.11	310	40	1,0	0	16
V ₂	27.08.09	180	12	1,0	0	0
	21.08.10	360	50	1,2	0	10
	19.08.11	310	40	1,0	0	14
V ₃	27.08.09	180	12	1,0	0	0
	21.08.10	360	50	0,9	0	16
	19.08.11	310	40	1,2	0	20

The main way to preserve the nutritional and taste value of the grapes is refrigeration storage [9]. During the storage affect a lot of factors. The varieties, forming large loose clusters with large berries covered with a thick waxy coating are very suitable for it. The vines whose grapes will be stored the pruning should not be allowed overload.

However, that variety „Velika” is an early variety, may need to be stored for some time. Most often this is the time required to harvest sufficient quantity of grapes for making a batch of export and also in case of worsening weather conditions - often rainfall and impossible vintage.

The results obtained (Table II) indicate that in the regime of storage at 2-6°C and humidity 90% for thirty days have been established 0.25% and 1.6% raisin-shaped and 1.0-5.6% rotted berries. After this period a significant number of berries were rotted.

TABLE II. Refrigeration storage of the table grape variety „Velika”

Start date	Final date	Variant	Weight of the sample, kg.	Storage temperature, °C	Raisin-shaped berries, %	Rotted berries, %
27.08.09	27.09.09	V ₀	12	2-6	0	0
21.08.10	02.11.10		12	2-6	1,6	3,37
16.08.11	30.09.11		12	2-6	0,82	2,40
27.08.09	27.09.09	V ₁	12	2-6	0	0
21.08.10	02.11.10		12	2-6	0,25	0
16.08.11	30.09.11		12	2-6	0,39	1,40
27.08.09	27.09.09	V ₂	12	2-6	0	0
21.08.10	02.11.10		12	2-6	0,88	0
16.08.11	30.09.11		12	2-6	0,95	1,0
27.08.09	27.09.09	V ₃	12	2-6	0	0
21.08.10	02.11.10		12	2-6	1,30	5,60
16.08.11	30.09.11		12	2-6	1,0	3,90

During refrigeration storage the weight of the berries was changed, due to different water content and dry matter content. In the period of 30 days the weight of the grapes changes as follows: V₀ - 7 kg, V₁ - 6.2 kg, V₂ - 6.6 kg, V₃ - 6.2 kg. This is quantity that was lost per 100 kg of fresh grapes stored for a period of 30 days. Therefore should not to retain the grapes in refrigerated storage for more than a month due to large losses.

IV. CONCLUSIONS

The results showed that in biological grown vineyards because of the activity of the pheromone dispensers in the plantation there was not caught moths in the pheromone trap and damaged berries of the grape berry moth were not observed.

In conventional grown vineyards in the pheromone trap was caught insignificant number of moths and damaged berries of the moth were under 1%.

During transportation of grapes cracked berries were below 1.5% and the fallen berries reached 10-20%. In refrigeration storage at 2-6°C and humidity 90% within thirty days were established 0.25 -1.6% raisin-shaped and 1.0 - 5.6% rotted berries.

The grapes of variety „Velika” produced by both technologies, organic and conventional, has good transportability and refrigeration storage up to one month with insignificant losses. In storage of grapes up to one month at temperature 2-6°C losses reach from 6.2 to 7 kg per 100 kg of fresh grapes. Variety „Velika” keeps a good appearance during refrigeration storage and can be a commercially available without worrying about quality deterioration for one month.

REFERENCES

- [1] Biofreshfruits, 2016. [Online]. Available: <http://www.biofreshfruits.com/index.php/en/bio-products-eng/grapes>
- [2] H. Boulay, “Efficacite des fumures de fond”, *Revue horticole*, 1985, pp. 260.
- [3] P. Huglin, “Biologie et Eifflgie de la vigne”, Payot, Lausanne, 1986, pp. 366.
- [4] J. Lacouture, R. Cantagrel, “Etude des caracteristiques physicochimiques des sols viticoles charentais et de leur potential agronomique”, *Revue le Paysan francais*, 1987, pp. 26-34.
- [5] C. Capisano, “Que faire des mauvaises herbes”, *VITIS*, 2002, pp. 31-35.
- [6] MZG, “Naredba № 22 ot 4 yuli 2001 g. za biologichnoto proizvodstvo na rasteniya, rastitelni produkti i hrani ot rastitelen proizvod i negovoto oznachavane varhu tyah”, *Darzhaven vestnik*, br.68, Sofiya, 2001.
- [7] P. Galet, “Les Maladies et les Parasites de la Vigne”, *Paysan du Midi, Montpellier*, Vol. 2, 1982, pp. 1876.
- [8] D. Braykov, S. Pandeliev, L. Masheva, T. Mievska, A. Ivanov, V. Roychev, P. Botyanski, “Lozarstvo”, *Akademichno izdatelstvo na Agraren universitet, Plovdiv*, 2005.
- [9] A. Fikinin, Y. Gegov, V. Kalinov, R. Kandeveva, “Tehnologiya za hladilno sahranyavane na desertno grozde”, *Zemizdat, Sofiya*, 1972.