

# GIBBERELLIN - AS A DETERMINANT FACTOR OF GRAPE'S QUALITY OF MUSCAT DE HAMBURG VARIETY

## GIBERELINA – CA FACTOR DETERMINANT AL CALITĂȚII RECOLTEI SOIULUI DE STRUGURI PENTRU MASA MUSCAT DE HAMBURG

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**Abstract.** *The vine area and volumes of production of table grapes in the country are not stable. In the last 15 years the vineyards decreased by 8 ha (from 28 thousand to 20 thousand ha). The harvest and total production of grapes decreased too. The quality of grapes and the structure of assortment are unsatisfactory. The technological methods, which have a substantial contribution to improving the quality of table grapes, represents: foliar fertilizer use; removal cauliflowers; growth regulators use, which are used little or not use in the vineyards. Growth regulator use in the vineyards, is used to improve the appearance of the grapes, increasing the productivity of plants and improve their taste. The purposes of investigations include the identification of the influence of the treatment period, the optimal dose of gibberellin on the quantity and quality of grapes and efficiency of table grapes of Muscat de Hamburg variety.*

**Key words:** Muscat de Hamburg, Grapes, Gibberelic acid.

**Rezumat.** *Suprafața viilor și capacitățile de producere a strugurilor de masă în țară nu sunt stabile. În ultimii 15 ani suprafața viilor s-a micșorat cu 8 mii ha (de la 28 mii până la 20 mii ha), s-a micșorat producția la ha și-n consecință - producția totală de struguri. Calitatea strugurilor și structura sortimentului la fel este nesatisfăcătoare. Secvențele tehnologice, care au o contribuție substanțială la îmbunătățirea calității strugurilor de masă, reprezintă: utilizarea îngrășămintelor foliare; rădirea înflorescențelor; utilizarea biostimulatorilor de creștere, care din păcate au o aplicare sporadică sau chiar lipsesc în plantațiile de vii actuale. Utilizarea biostimulatorilor de creștere la viile roditoare, se execută cu scopul îmbunătățirii aspectului comercial al strugurilor, majorării productivității plantei și ameliorării calităților gustative. În această lucrare se prezintă influența momentului aplicării, a dozei optime de aplicare a giberelinei, asupra cantității și calității producției, ceea ce are ca rezultat sporirea eficienței economice a soiului de struguri pentru masa Muscat de Hamburg.*

**Cuvinte cheie:** Muscat de Hamburg, Struguri de masă, giberelină.

## INTRODUCTION

The production of grapes on vines is conducted over two growing seasons, separated by a rest period. Only in exceptional conditions of temperature, light,

nutrition, (Burzo I., Thomas S. and others, 1999), the flowering formed from the buds in the same year.

The phases of development of vine generative organs are: floral induction, floral differentiation, flowering, pollination and fertilization, maturation of berries etc. (Burzo I., Toma S., 1999, Tarhon P., Raianu O., 1993, Stoev C., 1981, Boss P., Buckeridge, and others, 2003).

In the first growing season held the first two stages (floral induction, evocation and floral bud differentiation), and other two - stages of finalization of forming and development berries (flowering, pollination and fertilization, growth, ripening fruit). The first period has an indirect link with our research, so its essence will be briefly exposed.

First, it must pointed out that the phenomenon of alternation of vines' fructification does not exist, compared to fruit crops, (only if weather conditions caused by accidental - late spring frosts, high or very low humidity during flowering), therefore the floral induction and differentiation of buds that are studied more externally phenomena, certainly and from the inside, but internal factors of vine are stable unlike fruit trees (especially in species such as apple).

Therefore, external factors (Burzo I., Toma S., 1999, Tarhon P. and others, 1993) triggering floral induction and subsequent differentiation of buds are: temperature, acting on vegetal tissue, light intensity, humidity (water stress reduces number and size of floral primordial inflorescences), nutrients.

Internal factors are: genetical (number of flowering genes has not been determined definitively), hormonal (direct action - gibberellic acid, indirect action - given the important role in providing transport of assimilation).

Skene K. (cited by Mănescu C., Georgescu M. and others, 1989) reveal the physiological role of GA<sub>3</sub> action on the vine, saying it directly promotes cell division, have a protective action on auxin activity (favouring their accumulation in tissues) and a role of elongation phenomena in cell have direct action on the formation and development of phloem and xylem, and perhaps most important property for our research contributes mobilization of assimilation, especially in the early stages of berry development.

Gibberellins presence in the vine (Mănescu C., Georgescu M. and others, 1989) was highlighted in the leaves, berries, sprouts, buds, the primary inflorescences, roots.

The purposes of these investigations include - determining the optimal dose of influence of gibberellic acid on the quantity and quality of grapes, and also on the economic efficiency of grapes.

To achieve the objectives were outlined:

- the study of influence of gibberellic acid dose, on the main direct and indirect indicators of quantity and quality of grapes;
- the economic evaluation of vineyards in depending on the treatment term, applied doses and grape varieties.

## MATERIAL AND METHOD

The studies object in our experience was the Muscat de Hamburg grape grafted on rootstock - Berlandieri x Riparia SO4. The vines are formed by fan unilaterally (evantai unilateral). Planting distance 3,0 m x 1,5 m.

The research was effectuated in 2008 year, with financial support of ASM in according to the financing contract nr.59/ind/2008. The vineyards founded in the spring of 2006 year in the "Sauron" Ltd. To study the dose of gibberellic acid was composed the scheme of experience with variants: 1) Control - H<sub>2</sub>O, 2) GA<sub>3</sub> - 25 mg/l, 3) GA<sub>3</sub> - 50 mg/l, 4) GA<sub>3</sub> - 100 mg/l.

Experience was held in three repetitions with five vines in each plot.

The air temperature, the sum precipitation and the relative air humidity were obtained from the meteorological station of Chisinau.

The soil conditions of the sector was obtained on the basis from experimental research materials by the project of organizing and establishing vineyards in "Sauron" Ltd..

The Application of gibberellic acid was effectuated by dipping inflorescences in solution with different concentration in according to the scheme experience. This method of application ensures full coverage of the inflorescences with the solution and provides a maximum effect.

In the experiences were carried botanical and ampelographical observations, analysis and evidence, in according to the specialised methods and standards.

Statistical processing of the major indicators was effectuated by the method of dispersion analysis after Dosphehov A. (1985).

## RESULTS AND DISCUSSIONS

**Muscat de Hamburg** (*Schiava Grossa (Trollinger) x Muscat of Alexandria*)

Synonyms: *Black Hamburg, Black Muscat, Black Muscat of Alexandria, Black of Alexandria, Chasselas Muscat Golden Hamburg etc.*

Muscat de Hamburg – the table grape variety, became widespread in France, Hungary, Romania, Greece, Tunisia, U.S., Argentina and other countries.

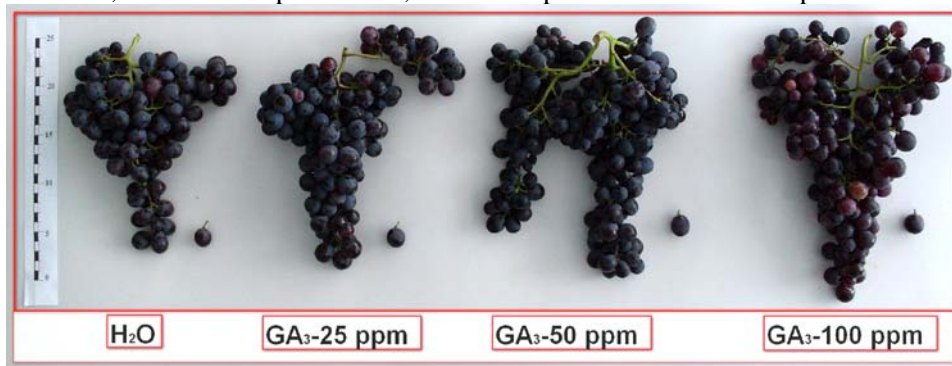
The leaves are medium and large size, heart-shaped, five-lobed, and wavy, with crimped edges. Pubescence of the lower leaf surface are rare arachnoid, the ribs are bristly. The flowers are hermaphrodites.

The bunches are medium or large size (length 18-20, width 11-17 cm), tapered, branched, sometimes there are winged, frail. The bunch peduncle is medium length (4-6 cm), grass-green. The weight of clusters is 168-267 g. There are different berries size, predominantly large (length 12-26, width 11-17 mm), often obtained parthenocarpic berries; the berries are round and oval, violet-blue, with a thick waxy coating. The skin is relatively thick. The berries are fleshy-juicy. The taste is very pleasant, with fine original muscat aroma. In berries there are 2-3 large seeds.

The vegetation period from bud burst to removable maturity is 148 days, with the sum of active temperatures of 2870 ° C. The medium period of maturation variety. The bushes are medium vigorous. Yield potential is high, but unstable for different years. The relative fertility coefficient is 1,06, the absolute fertility coefficient is 1,58. In years with unfavourable weather conditions observed shedding of flowers and the formation of a large number of seedless berries. The sugar content in the juice of berries is 16-22%, and the acidity - 6-8 g/dm<sup>3</sup>.

The variety is unstable to downy mildew, powdery mildew, *Botrytis cinerea* and phylloxera. The damaged by berries leaf roller weaker than other varieties of grapes. Unstable to frost. At a temperature of -18-19 ° C, there is damage of buds (over 50%). The bunches have a good transportability capacity, can be stored for 2-3 months, bear the separation of berries is 290 gr., but the crushing - 1265 gr. Berries different high taste (tasting score - 9), they are used fresh or for cooking juices, marinade, jam

In our experience the bunches are very large, but rarely medium size. There are a different forms of bunches, that as cone, but rarely cylinder-cone, disperse, winged, or compact. The average weight of bunches in control was 377.4 grams, but the berries in bunches - 372.5 grams (fig. 1, table 1). The bunch structure index (berry weight / weight of the bunch) was 76. Bunches have the following dimensions: length - 23.0 cm, wide at the top - 21.5 cm, the middle part - 10.6 and bottom part - 4.6 cm.



**Fig. 1.** Effect of gibberellin (GA3) on the appearance of bunches and berries of Muscat de Hamburg variety (cl. - FPS 04), "Sauron", Ltd. 2008. Variants: Control - H<sub>2</sub>O; GA<sub>3</sub>-25 mg/l; GA<sub>3</sub>-50 mg/l; GA<sub>3</sub>-100 mg/l.

The number of normally developed berries per bunches 244.3 pieces, and undeveloped 21.3 pieces. The berries are of different sizes, spherical or oval, violet-blue, covered with a layer of grey-blue wax. Weight of 100 berries is 155.8 gr. The composition index of berries is - 5.88 (relatively small - as a result of weight reduction of skin). The strength of the berries on the crushing is 1236 gr. force.

Until flowering was remained 14-16 inflorescences per vine.

Average production in the control variant was 5,66 kg per vine. The sugar content - 174 g/dm<sup>3</sup>, the acidity - 7,5 g/dm<sup>3</sup>.

The treatment with gibberellic acid was effectuated in after fecundation phase (berries size 3-5 mm), the concentration of solution 25, 50 and 100 ppm. The method of treatment which we used was the dipping inflorescences.

It was established that under the influence of gibberellic acid weight increases with 10,0 (GA<sub>3</sub>-25 mg/l), 36,8 (GA<sub>3</sub>-50 mg/l) and 20,1% (GA<sub>3</sub>-100 mg/l), also the weight of berries per bunches increases, compared to controls. As a result there is a slowly reduction of structure indexes of bunches

Table 1

The reaction of Muscat de Hamburg variety for treatment of cauliflowers with gibberellic acid (GA<sub>3</sub>) on the stage after fecundation period, 2008

Indicators	Variants								DEM <sub>0,95</sub>
	Control - H <sub>2</sub> O		GA <sub>3</sub> -25 ppm		GA <sub>3</sub> -50 ppm		GA <sub>3</sub> -100 ppm		
	$\bar{x}$	%	$\bar{x}$	%	$\bar{x}$	%	$\bar{x}$	%	
Weight of bunches, g	377,4	100,0	415,0	110,0	516,5	136,8	453,1	120,1	-
berries, g	372,5	-	409,2	-	506,6	-	446,1	-	-
	4,9	-	5,8	-	9,8	-	7,0	-	-
Bunches size, cm									
- length	23,0	-	24,9	-	25,8	-	23,8	-	-
- width / top	21,5	-	19,7	-	24,6	-	20,9	-	-
mid	10,6	-	8,8	-	11,1	-	11,4	-	-
bottom	4,6	-	4,3	-	4,9	-	4,2	-	-
Peduncle size, mm	5,9		8,6		8,9		6,8		
	± 0,3	100,0	± 0,3	145,3	± 0,3	150,0	± 0,6	115,7	-
The number of berries in the bunch, (normal / abnormal), pieces	244,3	100,0	150,0	61,4	177,8	72,8	197,3	80,8	-
	21,3	-	3,8	-	1,5	-	5,0	-	-
Berry size, mm									
- length	19,8	100,0	19,0	96,0	20,0	101,0	20,3	102,5	0,45
- width	18,4	100,0	18,4	100,0	18,9	102,7	19,3	105,2	0,66
Weight of 100 berries, g	155,8	100,0	274,9	176,4	294,2	188,8	252,4	162,0	-
	± 7,6	-	± 7,3	-	± 20,6	-	± 23,3	-	-
The index composition of berries (pulp weight / skin weight)	5,88	-	5,02	-	4,65	-	6,26	-	-
The number of seeds per 100 berries	145,0	100,0	45,0	31,0	30,0	20,7	10,0	6,9	-
The seeds indexes	37,50	-	140,50	-	146,5	-	-	338,00	-
The strength of the berries on the crushing, g	1236	100,0	951	76,9	1199	97,0	1278	103,4	-
Yield, kg per vine	5,66	100,0	6,23	110,1	7,75	136,9	6,80	120,1	0,12
content of sugars, g/dm <sup>3</sup>	174	-	189	-	194	-	206	-	-
content of acids, g/dm <sup>3</sup>	7,5	-	6,5	-	6,4	-	6,7	-	-

The number of normally developed berries per bunch in according with treatment doses is reduced by 38.6 (GA<sub>3</sub>-25 mg / l), 27.2 (GA<sub>3</sub>-50 mg / l) and 19.2% (GA<sub>3</sub>-100 mg / l) and sharply reduce the number of undeveloped berries. There are reducing the number of undeveloped berries to 14 times in the GA<sub>3</sub>-50 mg / l variant. While treating in the earliest stages, during the mass flowering, leads to increasing the number of berries related (Kabbani Samer, 2001).

In experience, reducing the number of berries per cluster leads to greater weight of 100 berries, compared to control, with 62,0-88,8%, depending on the concentration of gibberellic acid. The berry composition index is similar with control variant. There are 1-2 seeds per berry. Under the influence of GB<sub>3</sub> There is a sudden reduction in the number of seed per berry on 3,2-14,5 times, especially at concentration of 100 mg / l. As a result the seeds index increased on

3,7-9,0 times. The variety is characterized by a high capacity to obtain a seedless berry when treating inflorescences with GB<sub>3</sub>. The strength of the berries on the crushing is the similar to control variant, or slightly reduced. The treatment of inflorescences with GB<sub>3</sub> leads to increased production of grapes. So, in control variant, production was 5.66 kilograms per bunch. Under the influence of GB<sub>3</sub> in concentration of 25 mg / l are found to increase the harvest of grapes by 10.1%, 50 mg / l - by 36.9% and 100 mg / l - 20.1%, also the content the sugars on 1,5-3,2% (increase by 15-32 g/dm<sup>3</sup>) and reduce the acidity content in according with control.

In finally the treating of inflorescences of Muscat Hamburg variety with GB<sub>3</sub> can lead to increased weight and size of bunches and berries, increasing the weight of 100 berries and increasing the seedless berries. The yield of treated vines, increase by 1,1-1,4 times and also increases the sugar content in berries. Following observations and calculations we can say that the optimal concentration of treatment of GB<sub>3</sub> in the 50 mg/l variant.

## CONCLUSIONS

1. Using GB<sub>3</sub> treatment on the Muscat Hamburg seed variety leads to increase the weight of bunches and berries and reduced the structure index of bunch.

2. The GA<sub>3</sub> - optimal concentration being 50 mg / l. The grape production increased by 31,4-85,6%., It is reduce the number of undeveloped berries and increases seed index.

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