THE INFLUENCE OF SOME PHYTOTECHNICAL MEASURES ON THE TABLE GRAPE VARIETY GELU GROWN IN IAŞI VINEYARD

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Abstract

The north zone of Romania offers relatively weak conditions for the culture of table grapes varieties. That is why the creation of new genotypes adapted to these restrictive conditions has long been a main research aim. Such a creation is the table grape variety „Gelu" obtained at the Station of Research and Development for Viticulture and Wine-making, Iaşi. The promotion of new grape varieties obtained after long in situ research, is only possible after specific studies concerning the technological steps. In the present article, the results obtained regarding the behaviour of the new table grape variety Gelu are presented, at different trellising forms and pruning types, in order to use the variety at its maximum qualitative and quantitative potential.

Key words: Iaşi vineyard, table grapes, Gelu grape variety, fruiting pruning

The table grape variety Gelu is a creation of the Station of Research and Development for Viticulture and Wine-making Iaşi, homologated in 1998. It was obtained from free fecundation of Coarnă neagră seeds, irradiated with X rays, authors Gh. Calistru and Doina Damian (Damian Doina *et al.*, 2006). It is a grape variety that is known for its productivity, early ripening and good resistance to freezing, being thus adapted to the climatic conditions of Iaşi vineyard (Rotaru Liliana *et al.*, 2008) .

The large scale promotion of new created grape varieties cannot be realised without a perfect perspective on agroproductive characteristics and their reaction to different ecosystems, when applying different technological factors (planting densities, trellising forms, length of fruiting elements, fruiting load), in order to determine their economical value (Dobrei A. et al., 2008).

The pruning system, the fruiting load and its distribution on the fruiting elements represent the main elements that decide the vigour optimum, production and quality of a grape variety (Rotaru Liliana *et al.*, 2010).

The buds' fertility on the fruiting cane registers differences according to the length of the fruiting element and the training form, fact that has significant implications on the production levels.

MATERIAL AND METHOD

The research have been done at the Station of Research and Development for Viticulture and Wine-making,Iaşi, in an experimental plantation of Gelu grape variety, grafted on Berlandieri x Riparia Kober 5 BB. The plot was planted in 2001, with planting distances of 2,2/1,2 , on a slight slope of 3%, with southern exposition and a cambic chernozem soil formed on loess deposits, with clay-loam texture, environment supplied with nutritive elements.

The study had two factors:

Factor A – the type of the fruiting element, with the following variations a_0-spurs of 2-3 buds; a_1-fruiting elements with canes with 6 buds, in both cases the training of the vine trunks being semi-high bilateral cordon (CB) and a_2-fruiting elements with canes with 10 buds, Guyot training on the semi-trunk (GS).

Factor B – fruiting load, with the variants b_0-14 buds/m^2, b_1-18 buds/m^2, b_2-22 buds/m^2, and b_3-26 buds/m^2.

RESULTS AND DISCUSSIONS

Vine trunk vigour. Through extensive research it was proved that the vigour of the trunks, represented by the weight of the pruned wood was influenced by the study factors (*tab. 1*).

The highest vigour was realised when the bilateral cordon training was used with spur pruning, closely followed by pruning in fruiting elements with long cordons (Guyot on semi-trunk) and canes on the bilateral cordon that registered negative differences to spur pruning variants.

The values of the ratio production/ annual wood (P/L) are superior in the case when the training is done in bilateral cordon with fruiting elements pruning especially when the training form is Guyot on semi-trunk. This fact proves that Gelu grape variety has its own process of vigour auto-adjustment, expressed through yearly growths.

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Table 1

Trunk vigour and value of ratio P/L

Variant	Annual wood (g/vine trunk)	Ratio production/ annual wood
1 CB-spur pruning	776	4.38
2 Mt-spur pruning	840	3.92
3 CB-spur pruning	868	5.06
4 CB-spur pruning	853	5.39
5 CB-cane pruning	713	6.17
6 CB-cane pruning	745	4.38
7 CB-cane pruning	724	6.76
8 CB-cane pruning	677	7.68
9 GS- cordon pruning	666	6.45
10 GS-cordon pruning	728	6.56
11 GS-cordon pruning	777	7.85
12 GS-cordon pruning	696	8.47
Average	755.25	6.09

DL 5% - 62.95 g/trunk
DL 1% - 124.55 g/trunk
DL0,1% - 164,38 g/trunk

Bud break. The percent of bud breaking is highly dependant of the pruning system, the fruiting load and the position of the buds of the trajectory of the fruiting element (*tab. 2*). The highest values were obtained when the pruning was done in fruiting elements (81,9-84,8%), compared to 79,2% when the used system was spur pruning.

The fertility of the shoots, as one of the biological characteristics of the table grape variety was highly marked by the studied agrotechnical factors. The results was that the fertility of the shoots, represented by the number of fertile shoots on the trunk grew in a directly proportional manner with the length of the fruiting element, from 19 at the spur pruning variants to 23 and 27 at the variants that used spur and cane pruning.

Within the variant groups with different types of fruiting elements, the number of fertile shoots grew in a direct proportional manner with the grow of the fruiting load, such as: the percent of fertile shoots grew from 29% to 415% when the fruiting load was increased from 4 to 8 buds/m^2 for spur pruning, the percent of fertile shots changed from 31 to 47% for the cane pruning and from 25 to 37% for the cordon pruning.

The fertility of the shoots (%) registered high values of 53,1% and 62%, when the vine was pruned in long fruiting elements, the highest fertility values being obtained / bud.

Table 2

Bud break and fertility of the shoots

Variant	Viable buds (%)	No. of fertile shoots	Percentage of fertile shoots	Fertile shoots/buds
1 CB-spur pruning	81.9	15	50.0	0.41
2 Mt-spur pruning	79.9	17	47.1	0.35
3 CB-spur pruning	78.8	22	46.7	0.38
4 CB-spur pruning	76.4	24	46.2	0.34
Average	79.2	19	47.5	0.37
5 CB-cane pruning	85.4	19	61.2	0.53
6 CB-cane pruning	83.6	19	51.3	0.39
7 CB-cane pruning	79.8	25	51.0	0.43
8 CB-cane pruning	79.1	28	49.1	0.40
Average	81.9	23	53.1	0.44
9 GS-cordon pruning	90.3	22	68.7	0.61
10 GS-cordon pruning	83.6	24	61.5	0.50
11 GS-cordon pruning	83.2	30	61.7	0.52
12 GS-cordon pruning	82.2	33	56.8	0.47
Average	84.8	27	62.0	0.52

The variation of bud breaking, expressed in percentages, according to the position of the bud on the length of the fruiting element (*tab. 3*), has registered higher values for buds 2 and 3, in the case of spur pruning (80,9-83,8%), between buds 3 and 6, in the case of cane pruning (86,2-94,5%) and between buds 4 and 6 in the case of cordon pruning (92,8-95,2%).

The fruiting load registered high values at 22 buds/m^2 for buds 2-3 at spur pruning (83,8-84,6%); at 18 buds/m^2 for buds 3-6 at cane pruning with 6 buds (94,4-98,6%) and at all loads for the cordon between bud 4 and bud 6 for cordon pruning (90,0-97,2%). %).

Table 3

Percentage of viable buds according to the bud position on the length of the fruiting element

Variant	Bud position									
	1	2	3	4	5	6	7	8	9	10
1 CB-spur pruning	77.3	82.9								
2 Mt-spur pruning	75.0	75.7								
3 CB-spur pruning	68.4	83.6	84.6							
4 CB-spur pruning	70.3	81.5	83.0							
Average	72.7	80.9	83.8							
5 CB-cane pruning	56.2	85.4	89.6	93.7	97.9	89.6				
6 CB-cane pruning	76.4	83.3	94.4	97.2	98.6	94.4				
7 CB-cane pruning	77.4	85.7	89.7	80.9	91.7	78.6				
8 CB-cane pruning	68.5	79.6	86.1	87.0	89.8	82.4				
Average	69.6	83.5	89.9	89.7	94.5	86.2				
9 GS-cordon pruning	58.3	74.4	81.7	94.4	97.2	94.4	92.7	91.4	86.1	75.0
10 GS-cordon pruning	62.5	87.5	87.5	91.7	95.8	95.8	93.7	81.2	77.1	81.2
11 GS-cordon pruning	75.0	88.3	88.3	96.7	95.0	90.0	90.0	90.0	80.0	85.0
12 GS-cordon pruning	61.1	77.8	80.5	97.2	93.0	90.9	76.4	70.8	79.2	75.0
Average	64.2	82.0	84.5	95.0	95.2	92.8	88.2	83.3	80.6	79.0

The grape production. The action of the studied factors underlined the reaction of the grape variety productivity of the vine trunk, considered a biological production unit (*tab. 4*). The production of grapes / trunk registered average values of 3,9 kg at spur pruning, 4,5 kg at cane pruning and 5,3 kg at cordon pruning.

The load of 22 and 26 buds/m^2 determined the obtaining of superior productions per trunk, of 4,4 and respectively of 6,1 kg/vine trunk.

The calculated production per hectare registered between 10,9 tons at the control variety and 20 tons at the Guyot on semi-trunk training. The combined action of the two factors is to be underlined, assuring distinctly significant and very significant growths (4,9 and 9,1 tone/ha) in the production when the fruiting spur and cane pruning is used.

The accumulated sugars registered at full maturity but not consumption maturity were between 178 and 194 g/l must, showing a increasing trend inverse proportional to the quantity of the production, thus confirming the quantity/quality principle in the Gelu table grape variety case.

Table 4

Quantity and quality of grape production

Variant	Production		Differences and their significance compared to:		Quality	
	kg/vine trunk	t/ha	average	kg/vine trunk	t/ha	aciditate (g/l H_2SO_4)
1 CB-spur pruning	3.4	11.9	-4.0^0	+0.2	194	4.3
2 Mt-spur pruning	3.3	10.9	-4.2^0	0	190	4.3
3 CB-spur pruning	4.4	14.5	-0.6	+3.6*	184	4.1
4 CB-spur pruning	4.6	15.2	+0.1	+4.3*	182	4.2
5 CB-cane pruning	4.4	14.2	-0.9	+3.3	184	4.8
6 CB-cane pruning	3.6	12.1	-3.0	+1.2	185	4.2
7 CB-cane pruning	4.9	16.3	+1.2	+5.4**	185	4.4
8 CB-cane pruning	5.2	17.3	+2.2	+6.5***	182	4.4
9 GS-cane pruning	4.3	14.2	-0.9	+3.3	185	4.9
10 GS-cordon pruning	4.8	15.8	+0.7	+4.9**	187	4.8
11 GS-cordon pruning	6.1	20.0	+4.9**	+9.1***	178	4.8
12 GS-cordon pruning	5.9	19.7	+4.6**	+8.8***	178	5.1
Average	-	15.1	-	-	-	-

DL 5% - 3.37 t
DL 1% - 4.5 t
DL 0,1% - 5.95 t

CONCLUSIONS

The research that studied the length of the fruiting element in vines and the fruiting load has an important role in analysing the vigour, fertility and productivity of the Gelu table grape variety.

The highest vigour was registered when the vine training was bilateral cordon with spur pruning. The highest values of the P/L were noted in the case of spur and cane pruning, 6,17 and 8,47, compared to 3,92 and 5,39 in the spur pruning variant.

The percentage of fertile shoots per fruiting bud grew from 0,37 at the bilateral cordon training with spur pruning to 0,44 at cane pruning and 0,52 at Guyot on semi-trunk.

The maximum fertility was registered between buds 4 and 7, at Guyot training on semi-trunk, while, in the case of cane pruning, this index was highest at the superior part of the shoot. In the case of spur pruning, the highest values were obtained between buds 2 and 3.

In the conditions of Iaşi vineyard, Gelu grape variety reached superior levels of production when Guyot on semi-trunk training system was used as well as bilateral cordon with spur and cane pruning, with a fruiting load of 18-26 buds/m^2, assuring thus a calculated production of over 16 t/ha grapes.

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