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PROGRESS IN GERMPLASM IDENTIFICATION AND GENOTYPING METHODS IN THE STUDY OF THREE TABLE GRAPE VARIETIES[1]

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In the present article, we have described data of comparative ampelography of biometric evaluation of leaf parameters of the three table grapes: *Preobragenie*, *Victor* and *Jubiley Novocherkassk*, widespread in the amateur and farming areas of Russia and the Ukraine. Showed results of molecular genetic analysis of DNA from these table grapes

Keywords: GRAPES, GRADE, FEATURES, PROPERTIES, SHEETS, COMPARATIVE AMPELOGRAPHY, MORPHOLOGY, BIOMETRIC EVALUATION, PREOBRAGENIE, VICTOR, JUBILEY NOVOCHERKASSK, COMBINATIVE SELECTION, SIBLINGS

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ИДЕНТИФИКАЦИЯ И ГЕНОТИПИРОВАНИЕ ЗАРОДЫШЕВОЙ ПЛАЗМЫ ТРЕХ СТОЛОВЫХ СОРТОВ ВИНОГРАДА

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В представленной статье освещены данные сравнительной ампелографии о биометрической оценке листовых параметров трех столовых сортов винограда *Преображение, Виктор и Юбилей Новочеркасска*, широко распространенных на любительских и фермерских участках России и Украины. Приведены результаты молекулярно-генетического анализа ДНК этих столовых сортов

Ключевые слова: ВИНОГРАД, СОРТ, ПРИЗНАКИ, СВОЙСТВА, ЛИСТ, СРАВНИТЕЛЬНАЯ АМПЕЛОГРАФИЯ, МОРФОЛОГИЯ, БИОМЕТРИЧЕСКАЯ ОЦЕНКА, ПРЕОБРАЖЕНИЕ, ВИКТОР, ЮБИЛЕЙ НОВОЧЕРКАССКА, КОМБИНАТИВНАЯ СЕЛЕКЦИЯ, СИБСЫ

INTRODUCTION

Derived by combinative breeding three new high-yielding table grape varieties *Preobragenie, Victor* and *Jubilej Novocherkassk* with elevated resistance to Phylloxera and fungal diseases and suitable for own-rooted cultivation became a basis for solutions a two hundred year problem in grape growing [1-12, 16-17, 19-30].

It plays an important role a market demand for spreading of these and similar "optimal" hybrid forms of spectacular appearance as a consumer of breeding material, it is difficult to visually distinguishable by morphometry of

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leaves and therefore needed to recognize when attracting an interactive ampelography [4, 13-15, 18].

Material and Methods

Three table grape sibling varieties were taken for studies, bred by amateur wine-grower Victor Nikolaevich Kraynov from city Novocherkassk under supervising of a professional Ivan Aleksandrovich Kostrikin. The breeding scheme was the following: *Talisman* [*Frumoasa Alba* (*Guzal kara* x *Saves Villard* 20-473) x *Vostorg* (*Dawn North x Dolores*) x *Russian early*] x *Kishmish Luchistyi* (*Cardinal* x *Kishmish rozovyi, pink*) [2, 6-7, 9, 19, 22-23] (Fig. 1 and 2).

x

Fig. 1. Cluster of *Talisman* [25]   Fig. 2. Cluster of *Kishmish Luchistyi* [25]

While these three (*Preobragenie, Victor* and *Jubilej Novocherkassk)* varieties have quite similar phenotypes (Fig. 3-17) its become necessary to conduct comparative morphometric study of leaves [13-15].

Fig. 3-6. Open bud, shoot tip, matured leaf and cluster of *Preobragenie*

Preobragenie. The variety has very early ripening period - 110-115 days. The clusters are large, in range from 0,7 to 1,5 kg, conic, without berry shot. The berries are very large, 12-18 g, oval-oblong, pink, with harmonious taste. The flesh is fleshy-juicy, the skin is edible. The productivity is high. It can be cultivated as own-rooted plant having medium-power growth. The shoot ripening is good, rooting ability of cuttings is easily, the compatibility with rootstocks is good. The frost resistance is -21°C. Resistance to fungal diseases is of 3,0-3,5 points. The transportability is good with very high market ability. Damaging by wasps is medium. This variety has similar morphological characters as *Victor*, but vigor of growth is higher respect of it. The variety has ability to give an additional crop on stepson [19].

Fig. 7-10. Open bud, shoot tip, matured leaf and cluster of *Victor*

Victor. Variety is very early ripening period 110 days. Clusters are of medium loose, from 0,7 to 1 kg, tapered, are not exposed breakage, very interesting. Berries are large, 12-18 g, elongated, dark pink, harmonious taste. Sredneplotnaya pulp, peel eaten. 1-2 seeds per berry pieces. Can be cultivated in own-rooted culture and medium-power growth. Shoots ripen well, cuttings take root easily, compatibility with the stocks is good, freezeproof to -23 °C. To fungal diseases is relatively stable - 3 points. Portability is good, very high marketability. Wasps damaged in the medium. Morphologically similar to *Preobragenie*, but has a more moderate force growth. Able to give a second crop on stepson [19].

Fig. 11-14. Open bud, shoot tip, matured leaf and cluster of *Jubilee Novocherkassk*

Jubilee Novocherkassk. Variety is very early ripening period: 110-115 days. The clusters are large, 0,8 to 1,6 kg, tapered, are not exposed breakage. Berries are very large, 12-18 g, oblong-oval, white and pink, harmonious taste. Flesh fleshy-juicy, the skin is eaten. Can be cultivated in own-rooted culture and medium-power growth. Shoots ripen well, cuttings root easily, compatibility with the stocks is good. Average frost resistance, can withstand temperatures of -23 °C. Resistance to fungal diseases 3 points. Transportability and high marketability. Wasps damaged in the medium. Morphologically similar to the sort *Victor* and *Preobragenie*, but differs from them in a more subtle berry. Currently proliferate growers Russia and Ukraine [19, 25].

The task of research: a comparison of morphological features descriptor leaves of three grape varieties growing in the testing plots of OAO "Juzhnaja", Temryuk district of the Krasnodar Territory, and to find out their phenotypic identity and DNA- analysis of this siblings.

RESULTS

To determine the morphological features of leaves of compared three varieties of siblings: *Preobragenie, Victor* and *Jubilee Novocherkassk* first made

their scan and detailed measurement on every sheet of 22 quantitative traits (Fig. 15-30, Table 1).
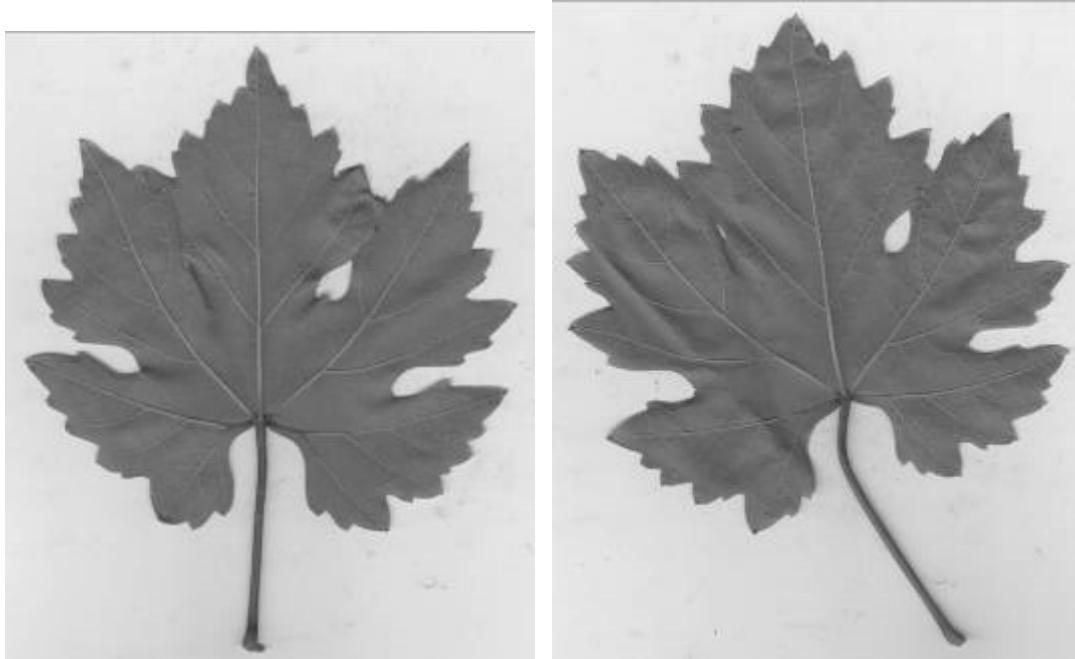
Fig. 15-16. The leaves of bushes number 4 and number 18 varieties *Preobragenie*
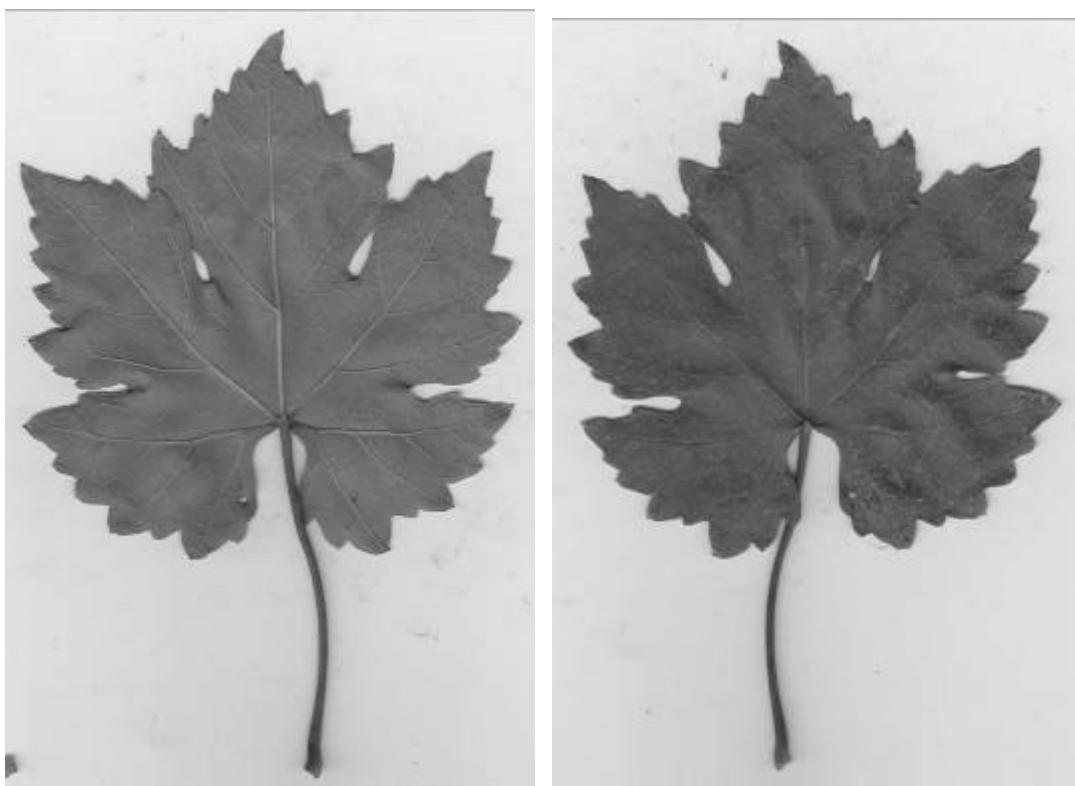
Рис. 17-18. Double-sided sheet of bush number 9 varieties *Preobragenie*
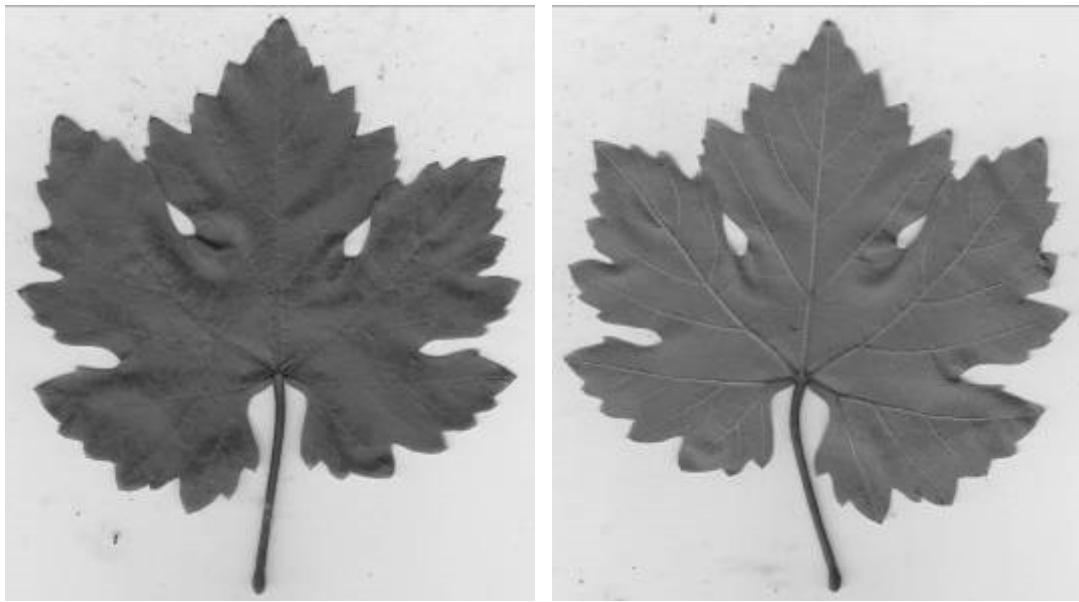
Fig. 19-20. Double-sided sheet number 14 of the bush varieties *Preobragenie*
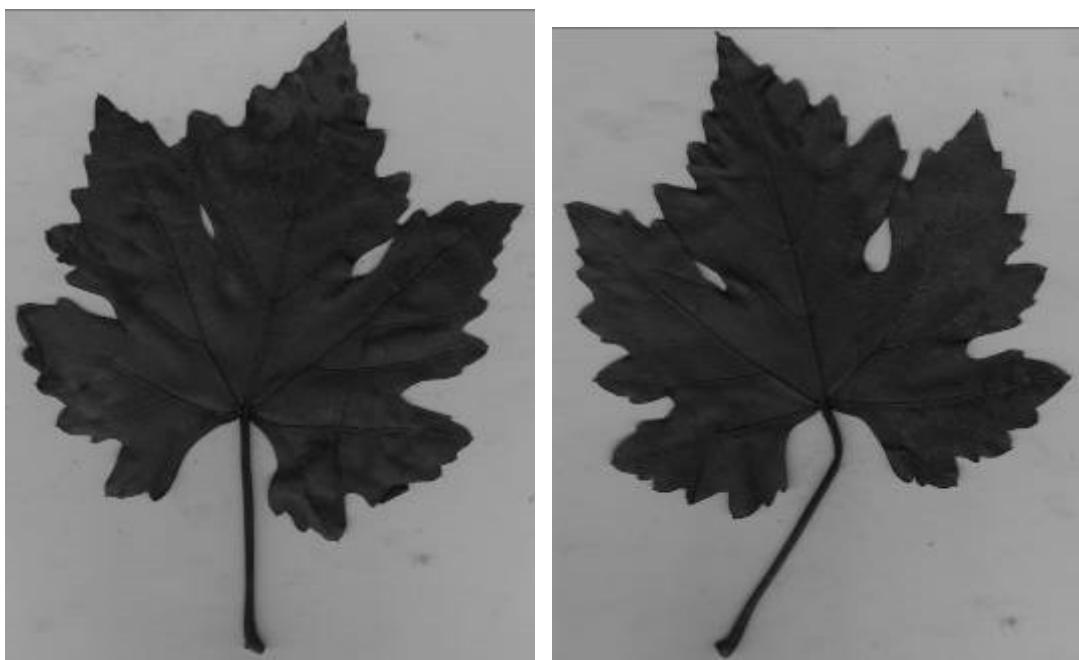
Fig. 21-22. The leaves of bushes number 2 and number 4 varieties *Victor*
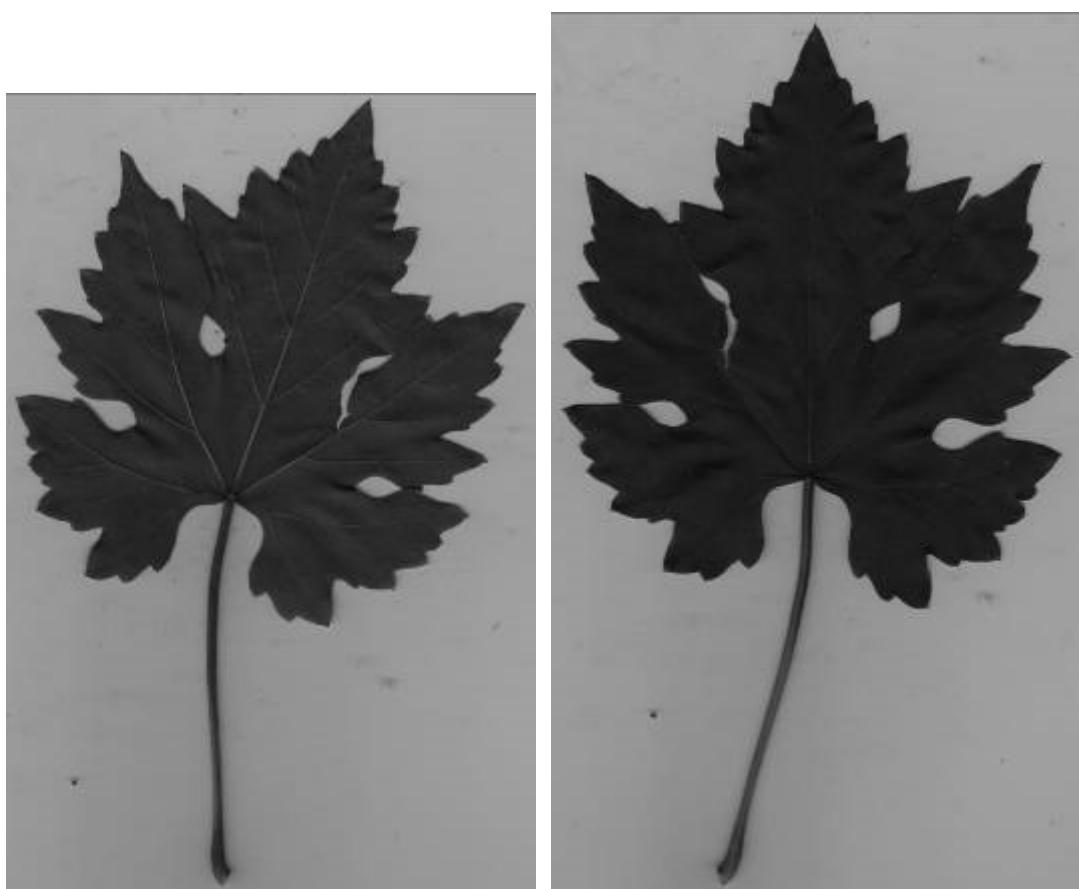
Fig. 23-24. Double-sided sheet number 5 of the bush varieties *Victor*
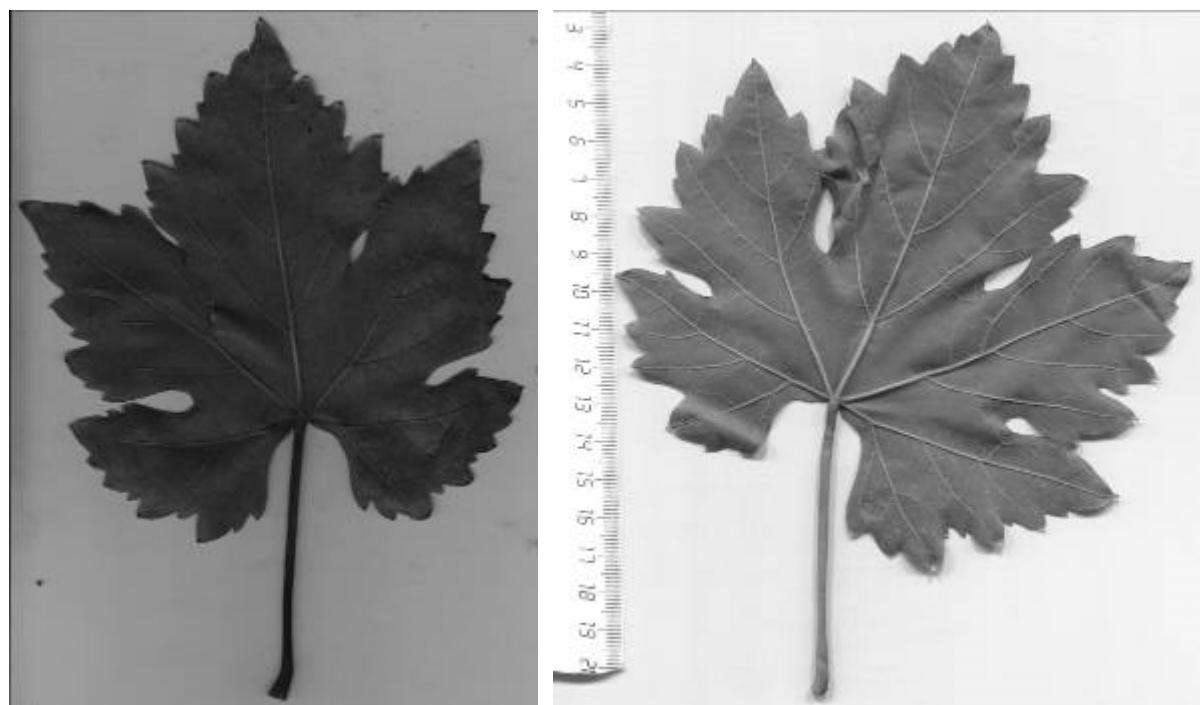

Fig. 25-26. The leaves of bushes number 15 and number 17 varieties *Victor*

Fig. 27-28. The leaves of the bush number 4 varieties *Jubilee Novocherkassk*

Fig. 29-30. The leaves of bushes number 23 and 24 varieties *Jubilee Novocherkassk*

Description scanned 426 raised, that is, adult leaves was conducted using SIAMS Photolab. Information about OIV codes are automatically stored in Excel-table in the following order: 065-1 or 651 in our work, - the length of the leaf blade, 065-2, or 652, - width of the leaf blade, 092 - the length of the petiole, 601 - length of midrib; 602 - length of the upper lateral veins; 603 - length of the lower lateral veins; 604 - length from the intersection of the lower lateral veins to its lower edge 605 – distance to top bay, 606 – distance to lower bay, 607 - alpha angle, 608 - beta angle, 609 - angle zeta, 610 - angle gamma, 611 - the width of the intersection of the lower lateral veins of the lower edge, 612 - the length of the far right tooth, 613 - the width of the far right tooth, 614 - length of the right lower tooth; 615 - the width of the right lower tooth; 616 - the number of teeth the upper side of the blade, 617 - the width of the upper side of the blade, 618 - the distance between the lower lobes; 619 - length from the point of attachment of the petiole to the leaf blade to the end point of the lower teeth [13-15].

Technical work of measurement leafs was performed by A. Milovanov and B. Mahovitskii (Table 1). Provision of selected natural leaf samples carried out by agronomists of OAO "Juzhnaja", Temryuk district of the Krasnodar Territory O.B. Belizovskii and L.A. Lashenko, for which we express our sincere gratitude to them.

Table 1. –- Data of interactive measurement
adult leaves of three grape varieties and 22 original settings

№ of leaves	Ampelographic features (OIV codes)										
	651	652	092	601	602	603	604	605	606	607	608
Preobragenie											
4-5	12,7	12,1	5,9	9,6	8,8	6,1	5,2	3,2	3,4	31,8	43,2
9-1	13,6	12,0	9,0	9,9	8,3	5,5	4,9	4,1	3,7	45,6	45,8
14-1	11,2	11,8	5,4	8,8	8,5	5,8	4,8	3,4	3,5	46,3	44,8
18-1	12,8	13,2	7,1	10,4	8,5	5,9	4,8	5,3	3,8	39,7	54,1
Victor											
2-6	13,9	12,6	6,4	10,8	9,1	6,0	5,2	4,8	4,3	38,6	40,4
4	13,1	14,5	7,7	10,9	10,1	7,5	4,2	4,8	4,2	47,1	39,2
5	14,4	13,7	6,4	11,4	10,1	6,7	3,6	4,8	4,1	38,3	40,7
15	13,7	13,6	8,2	10,8	9,5	7,2	3,1	3,7	4,2	45,1	56,9
17	15,6	13,7	11,1	12,3	10,1	7,0	3,8	4,0	3,3	37,8	36,7
Jubilee Novocherkassk											
4-18	12,4	11,7	6,4	9,8	8,9	6,2	2,8	3,2	3,6	40,8	49,6
4-19	13,8	11,7	7,4	10,8	9,5	5,5	2,8	4,4	4,6	46,9	56,5
23в	12,4	11,3	6,6	9,4	8,6	5,6	2,9	4,0	3,4	40,6	46,3
23с	12,0	11,3	7,1	10,1	8,2	6,4	3,4	4,2	3,1	42,2	51,4
23н	11,1	9,8	3,8	8,4	7,9	5,0	2,8	3,0	2,9	43,1	43,3
24в	12,7	10,1	6,2	9,4	7,8	4,9	3,1	3,0	3,2	48,1	44,5
24н	9,5	9,8	6,5	7,5	6,5	4,7	3,6	4,1	2,8	49,5	43,6
Continuation of Table 1											
	609	610	611	612	613	614	615	616	617	618	619
Preobragenie											
4-5	71,5	81,7	3,2	1,4	1,2	1,1	1,0	4	5,0	2,5	4,3
9-1	68,7	65,5	3,4	1,9	1,7	1,1	1,5	4	5,0	1,1	4,4
14-1	52,5	61,7	2,9	1,4	1,1	0,9	1,4	4	5,3	1,5	4,2
18-1	63,4	58,1	2,8	1,6	1,6	1,1	1,6	5	4,7	2,8	3,8
Victor											
2-6	70,4	66,5	3,4	1,8	1,8	1,6	1,2	3	3,7	3,3	4,3
4	70,1	52,2	2,8	1,0	1,2	0,7	0,9	5	4,2	3,4	5,1
5	72,8	66,1	2,9	0,5	0,7	1,0	1,3	6	4,3	3,1	4,2
15	55,1	52,3	2,4	0,7	1,0	0,3	0,8	6	4,6	3,3	4,6
17	75,4	64,5	2,4	1,1	0,9	0,6	1,0	5	4,7	2,7	4,7
Jubilee Novocherkassk											
4-18	74,2	66,6	2,0	1,1	1,0	0,4	0,9	5	5,0	1,7	3,4
4-19	66,2	73,9	1,5	0,8	0,9	0,9	1,1	6	4,4	1,7	3,5
23в	84,6	66,5	2,0	0,9	0,8	0,6	0,9	5	3,9	1,1	3,5
23с	76,9	57,5	1,7	0,7	0,7	0,4	0,7	5	3,7	0,8	3,3
23н	64,0	65,4	1,7	0,6	0,8	0,8	0,8	5	3,9	1,7	3,7
24в	79,7	65,7	1,6	0,7	0,6	0,6	0,8	6	3,4	1,6	3,6
24н	65,6	61,4	3,0	1,7	1,5	1,2	0,9	3	3,4	0,8	3,1

For comparative studies, leaves of varieties were also evaluated 18 additional index features [15].

Results of biometric data analysis of interactive three measurements of 426 leaves of grapes are shown in Table 2 and 3.

Table 2. - Variation analysis of the data leaves of the three grape varieties on 22 ampelographic featured

	Ampelographic features (OIV codes)										
	651	652	092	601	602	603	604	605	606	607	608
	Preobragenie, n = 148										
‾x	13,58	13,28	7,51	10,28	9,37	6,66	5,66	4,51	4,12	41,99	49,44
s$_x$	0,15	0,17	0,15	0,13	0,11	0,10	0,09	0,08	0,07	0,71	0,81
lim	9,5	11,1	9,6	10,9	6,8	5,9	5,5	6,5	5,6	58,9	53,9
min	9,9	8,6	2,6	5,8	6,9	4,2	2,9	2,0	1,5	13,7	25,0
max	19,4	19,7	12,2	16,8	13,7	10,1	8,4	8,5	7,1	72,6	78,9
CV	13,4	15,4	24,4	15,3	14,3	17,8	18,4	20,3	21,6	20,5	19,9
	Victor, n = 140										
‾x	13,61	13,37	7,71	10,35	9,39	6,72	5,72	4,52	4,13	41,94	49,36
s$_x$	0,16	0,17	0,16	0,13	0,12	0,10	0,09	0,08	0,08	0,74	0,84
lim	9,5	11,1	11,0	9,6	8,8	5,3	5,5	6,5	5,6	58,9	53,9
min	9,9	8,6	2,0	7,1	4,9	4,8	2,9	2,0	1,5	13,7	25,0
max	19,4	19,7	13,0	16,7	13,7	10,1	8,4	8,5	7,1	72,6	78,9
CV	13,5	15,2	24,8	14,9	14,7	17,5	17,9	20,5	22,0	20,9	20,1
	Jubilee Novocherkassk, n = 138										
‾x	12,85	12,22	6,92	9,51	8,72	5,97	5,03	4,42	3,97	40,30	48,05
s$_x$	0,16	0,16	0,14	0,12	0,11	0,09	0,08	0,08	0,06	0,65	0,73
lim	11,3	9,7	8,7	8,9	8,2	5,4	4,4	6,9	3,9	42,1	64,2
min	7,5	7,2	2,9	4,9	4,7	3,4	2,9	2,2	1,6	18,4	22,8
max	18,8	16,9	11,6	13,8	12,9	8,9	7,3	9,1	5,5	60,5	87,0
CV	14,6	15,2	24,0	14,8	15,4	17,8	18,7	22,4	18,1	18,9	17,8
											Continuation of Table 2
	609	610	611	612	613	614	615	616	617	618	619
	Preobragenie										
‾x	60,02	64,45	3,50	1,82	1,72	1,24	1,37	4,05	5,41	2,24	4,55
s$_x$	0,85	0,85	0,07	0,04	0,04	0,02	0,03	0,03	0,07	0,08	0,07
lim	66,5	62,3	7,3	2,6	3,7	1,8	2,7	2	5,3	6,8	5,2
min	29,8	25,8	2,0	1,1	1,0	0,6	0,5	3	3,5	0,7	2,5
max	96,3	88,1	9,3	3,7	4,7	2,4	3,2	5	8,8	7,5	7,7
CV	17,3	16,1	23,0	25,6	28,1	24,0	23,9	10,1	15,7	43,5	19,6
	Victor										
‾x	60,10	64,65	3,52	1,83	1,75	1,25	1,39	4,06	5,40	2,20	4,59
s$_x$	0,89	0,89	0,07	0,04	0,05	0,03	0,03	0,04	0,07	0,08	0,07
lim	66,5	62,3	7,3	2,6	3,7	1,8	2,7	2	5,3	4,1	5,2
min	29,8	25,8	2,0	1,1	1,0	0,6	0,5	3	3,5	0,7	2,5
max	96,3	88,1	9,3	3,7	4,7	2,4	3,2	5	8,8	4,8	7,7
CV	17,6	16,3	23,2	25,6	30,6	24,2	24,2	10,8	15,9	40,6	19,2
	Jubilee Novocherkassk										
‾x	60,05	61,11	3,43	1,68	1,54	1,19	1,24	2,51	3,65	2,28	4,01
s$_x$	0,77	0,84	0,06	0,04	0,03	0,02	0,02	0,05	0,06	0,07	0,06

lim	69,9	58,5	5,0	2,3	2,7	1,6	1,3	2	3,9	4,2	4,3
min	20,7	31,5	1,4	0,6	0,9	0,6	0,6	1	1,9	0,4	1,7
max	90,6	90,0	6,4	2,9	3,6	2,2	1,9	3	5,8	4,6	6,0
CV	15,2	16,2	21,5	25,4	26,2	21,8	20,5	22,2	19,4	35,9	17,6

where: $\bar{x}$ - arithmetic mean, s_x - error of the mean, lim - the interval of variation, min - minimum value, max - the maximum value, CV - coefficient of variation, %.

According to the data presented in Table 3 and below the Table 4, you can make the following conclusion. The coefficients of variation CV directly measured 22 ampelographic characteristics of leaves, without their biometric transformation from *Preobragenie* vary within wide ranges: 10,1 – 43,5 under his average of 19,7% in CV *Victor* almost in the same range: 10,7 – 40,6 at 19,9%, and the cultivar *Jubilee Novocherkassk* in a smaller amplitude: 14,6 – 35,9 at 19,4%.

Table 4. - Variation analysis of these calculations 18 index traits of leaves in three grape varieties

Amelographic indexes									
	651x652	651/652	601/92	603/601	604/601	611/601	613/612	615/614	602/605
Preobragenie									
$\bar{x}$	183,27	1,03	1,43	0,65	0,55	0,35	0,97	1,13	2,14
s_x	4,32	0,01	0,03	0,01	0,01	0,01	0,02	0,02	0,04
lim	278,75	0,67	2,59	0,58	0,49	0,70	1,64	1,69	2,61
min	98,79	0,71	0,74	0,43	0,36	0,18	0,51	0,54	1,20
max	377,54	1,38	3,33	1,01	0,85	0,88	2,15	2,24	3,81
CV	28,7	9,3	23,0	13,2	14,1	24,4	26,1	23,1	20,7
Victor									
$\bar{x}$	185,08	1,02	1,41	0,65	0,56	0,34	0,98	1,14	2,14
s_x	4,47	0,01	0,03	0,01	0,01	0,01	0,02	0,02	0,04
lim	278,75	0,67	3,20	0,58	0,42	0,70	1,72	1,69	2,61
min	98,79	0,71	0,91	0,43	0,33	0,18	0,51	0,54	1,20
max	377,54	1,38	4,12	1,01	0,75	0,88	2,23	2,24	3,81
CV	28,6	9,3	27,7	12,7	13,6	23,8	28,0	23,7	20,0
Jubilee Novocherkassk									
$\bar{x}$	159,86	1,06	1,43	0,63	0,53	0,36	0,96	1,06	2,03
s_x	3,85	0,01	0,02	0,01	0,01	0,01	0,03	0,02	0,03
lim	262,87	0,53	1,97	0,43	0,41	0,43	2,37	1,16	2,38
min	53,83	0,83	0,88	0,44	0,37	0,15	0,50	0,57	1,16
max	316,70	1,36	2,85	0,87	0,78	0,58	2,87	1,73	3,54
CV	28,3	8,7	20,5	12,4	13,8	18,3	31,7	19,1	18,8
								Continue of table 4	

	602/601	603/606	614/615	612/613	607+608	607+610	607+608+609	607+608+610	616*617
					Preobragenie				
$\bar{x}$	0,92	1,69	0,93	1,08	91,42	106,44	151,44	155,87	21,90
S_x	0,01	0,04	0,02	0,02	0,99	1,07	1,37	1,24	0,34
lim	0,78	3,13	1,39	1,50	79,01	69,66	86,68	89,06	23,94
min	0,67	0,88	0,45	0,47	58,03	74,55	109,67	106,22	11,29
max	1,45	4,01	1,84	1,97	137,04	144,20	196,35	195,28	35,23
CV	11,3	29,2	23,6	21,3	13,2	12,2	11,0	9,7	18,8
					Victor				
$\bar{x}$	0,91	1,71	0,93	1,08	91,30	106,59	151,41	155,95	21,96
S_x	0,01	0,04	0,02	0,02	1,04	1,11	1,43	1,30	0,36
lim	0,65	3,13	1,39	1,52	79,01	69,66	86,68	89,06	23,94
min	0,59	0,88	0,45	0,45	58,03	74,55	109,67	106,22	11,29
max	1,24	4,01	1,84	1,97	137,04	144,20	196,35	195,28	35,23
CV	10,2	30,3	24,9	21,9	13,5	12,4	11,2	9,9	19,5
					Jubilee Novocherkassk				
$\bar{x}$	0,92	1,53	0,98	1,11	88,35	101,41	148,40	149,46	9,17
S_x	0,01	0,02	0,02	0,02	0,96	1,06	1,22	1,13	0,24
lim	0,53	2,38	1,18	1,63	71,76	68,42	94,17	71,52	15,05
min	0,64	0,95	0,58	0,35	61,26	57,48	102,46	113,22	2,47
max	1,17	3,33	1,76	1,98	133,02	125,91	196,63	184,74	17,52
CV	9,1	18,2	19,9	23,1	12,7	12,2	9,7	8,9	30,2

If we analyze the coefficients of variation of 18 index traits of leaves in the same three grape varieties (Table 4), they are reflected in the following figures: 9,3 – 29,2 at 18,5%, 9,3 – 30,3 at 18,9% and 8,7 – 31,7 at 17,5%. The overall mean CV of all index attributes accounted for more than 18% - almost 2% less than the original, that is, direct measurement of the 22 signs.

When combined with 40 CV source and index the basis of their average values in the cultivars were at the same level: 19,5, 19,8 and 18,9.

Carried out by the Student's evaluation of differences expressivity 40 ampelographic characteristics in the studied grape varieties has resulted in: between varieties *Preobragenie* and *Victor* significant arithmetic differences were found (t < 0,92 for P > 0.05) - the leaves they were twins phenotypic and grade *Jubilee of Novocherkassk* in comparison with his two above-named siblings metrically different in 21 and 22 cases out of 40 (t > 2,57 at P < 0.01).

For a contemporary analysis of the differences of genotypes was used molecular genetic method. When DNA isolation and PCR reactions were involved in the standard of our research methods and parameters previously highlighted in the literature [30].

DNA extraction was performed upgraded CTAB-method [30]. The paper studied the following protoclones grapes: *Victor* 29-5 (1), *Victor* 29-4 (2), *Preobragenie* 24-6 (3), *Preobragenie* 24-1 (4), *Jubilee Novocherkassk* 7-3 (5), *Jubilee Novocherkassk* 7-1 (6). For a description was used one microsatellite primer: VrZag79.

As a result, imaging and separation of products of the amplification on the acrylamide gel were obtained the following results.
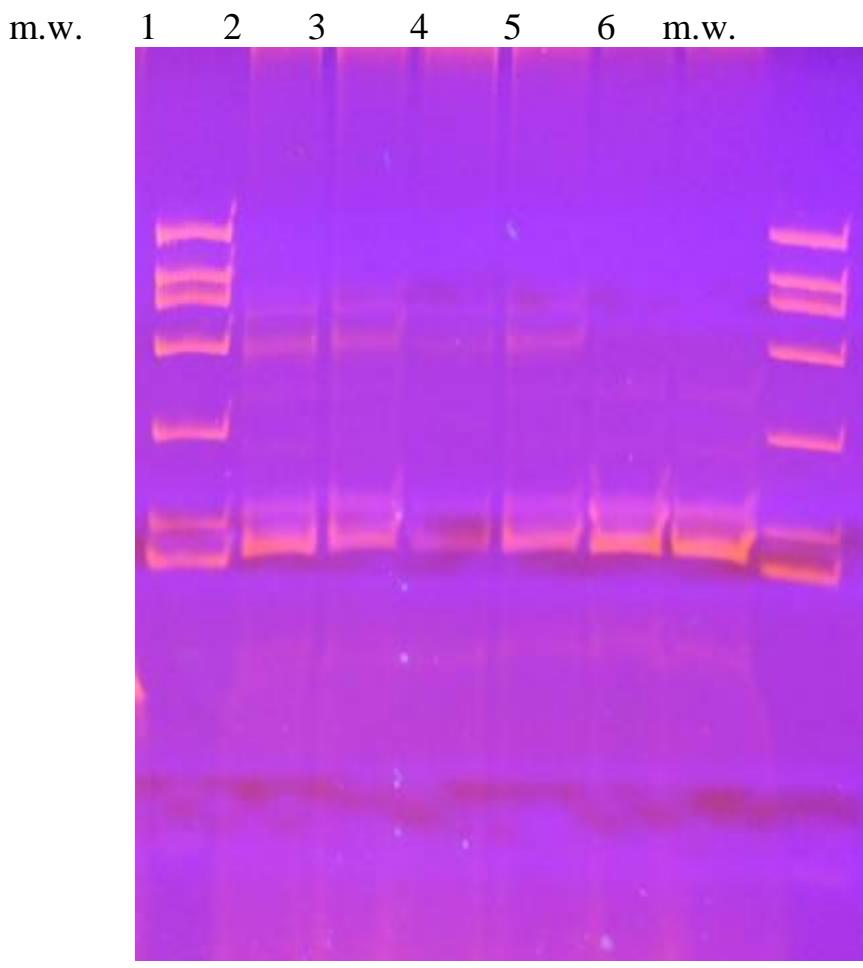
* m.w. - molecular weight marker

Table 5. - The molecular weight of the identified alleles

	Vict. 29-5	*Vict.* 29-4	*Pr.* 24-6	*Pr.* 24-1	*J.N.* 7-3	*J.N.* 7-1
VrZag79	260	262	262	262	262	262
	237	242	246	245	247	249

When comparing it can be concluded that, despite the close relationship, the individuals have different alleles on the number of nucleotides.

Conclusions

Recent evidence table grapes *Preobragenie*, *Victor* and *Jubilee Novocherkassk* an indisputable scientific and production value, and so they create a real basis for profitable production. Ampelometric information of leaf varieties of *Preobragenie* and *Victor* is very similar, which is phenotypically geminate and varieties *Jubilee Novocherkassk* - markedly different from the previous two siblings.

Molecular-genetic specifically PCR-method revealed that varieties *Victor*, the *Preobragenie* and the *Jubilee Novocherkassk* are different genotypes.

Along with these three table grape siblings-"heroes" in OAO "Juzhnaja " and OOO "Fanagoria-Agro" on the Anapa-Taman zone of Krasnodar region notable are varieties *Anthonii Velikii, Anjuta, Bogotyanovskii, Gelios (Arcadia rozovaya), Gurman rannii, Dolgozhdannyi, Kishmish Vengerskii, Kubattik, Livia-k, Nizina, Roschfor-k, Super-Extra*:
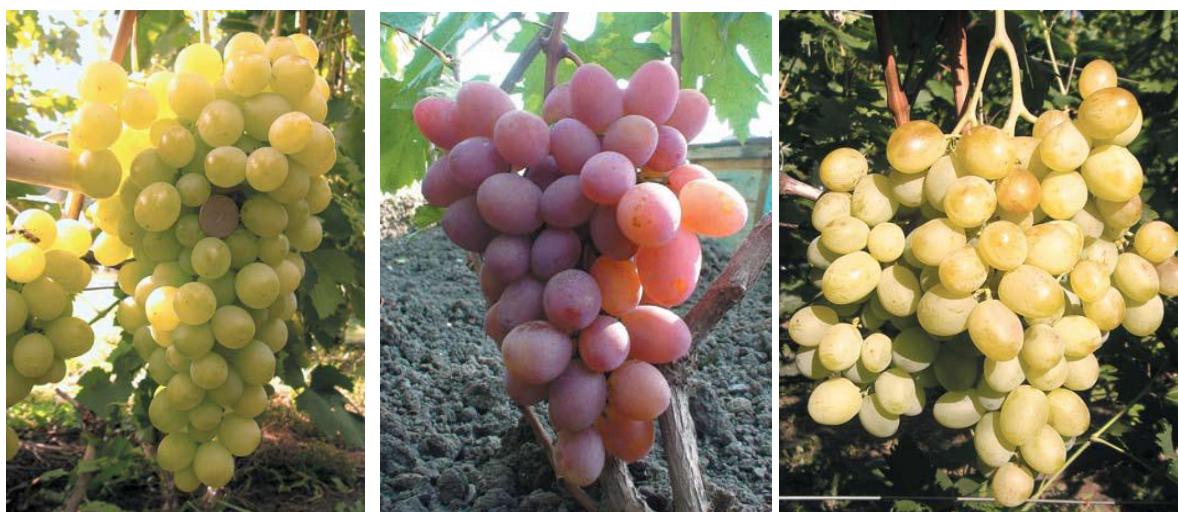
References:
1. Anapskaya amelographic collection. - Krasnodar: GNU North-Caucasian Zonal Research Institute of Horticulture and Viticulture, 2009. — 215 p.
2. Grape: Vostorg, Talisman and new rare resistant hybrid forms / I.A. Kostrikin [et al.]. — Rostov, 2004. — 48 p.

3. Golodriga P.J., Malchikov J.A., Troshin L.P. Model of ideal cultivar and forecasting of ecological stability characteristics of grapes // Ecolog. genetics of plant and animals. - Kishinev, 1984. - P. 247.

4. Interactive ampelography and selection of grapes (Collection of materials of the International Symposium). – Krasnodar: KubGAU, 2012. - 264 p.

5. Catalog of grape varieties bred in VNIIViV of Y.I. Potapenko and introduced as a result of international cooperation / I.A. Kostrikin [et al.]. - Rostov n/D: SKNTS Publishing House, 2003. – 100 p.

6. Kostrikin I.A. New and Rare resistant varieties and hybrids of grapes (Part 20). - Rostov: Everest, 2008. – 20 p.

7. Kostrikin I.A. New resistant and less common varieties and hybrids of grapes (Part 15) / I.A. Kostrikin, S.I. Krasohina, E.A. Klyuchikov. - Rostov: Everest, 2008. – 20 p.

8. Kraynov V.N. Grapes and selection initiative // House, garden, kitchen garden. - Kiev, 2007. - 64 p.

9. Krasohina S.I., Khisamutdinov A.F. Table grapes (handbook / GNU VNIIViV of Y.I. Potapenko. - Rostov: Everest, 2008. – 36 p.

10. Pawlowski E.G. New hybrid forms of grapes. - Rostov: Everest, 2008. – 20 p.

11. The implementation of the model of ideal variety in breeding and genetic programs / L.P. Troshin, Y.A. Malchikov, M.A. Kostik and others // Proc. Reports. Proc. Scientific-tech. soveshch. "Prospects of Genetics and Selection of grapes on phytoimmunity" / Agricultural Sciences. VNIIVIV "Magarach". - M., 1986. - S. 21-22.

12. Simonova N.L., Troshin L.P. Innovations of Russian viticulture. 2. Improving the assortment of vineyards // Journal KubGAU [electronic resource]. – Krasnodar: KubGAU, 2009. - № 09 (53). - Cipher INFORMREGISTER: 0420900012 \ 0101. - Mode of access: http://ej.kubagro.ru/2009/09/pdf/10.pdf.

13. Troshin L.P. The morphometric analysis of the ampelographical sheet information // Winemaking and Viticulture. - 2011. - № 3. - P. 48-49; - № 4. - S. 47-49.

14. Troshin L.P. The morphometric analysis of the ampelographical sheet information / L.P. Troshin // Polythematic network electronic scientific journal of the Kuban State Agrarian University (Journal KubGAU) [electronic resource]. – Krasnodar: KubGAU, 2011. - № 06 (70). - S. 460 - 490. - Mode of access: http://ej.kubagro.ru/2011/06/pdf/32.pdf, 1,938 u.p.l.

15. Troshin L.P. Morphometry of Kuban leaves of wild grape vines / L.P. Troshin // Polythematic network electronic scientific journal of the Kuban State Agrarian University (Journal KubGAU) [electronic resource]. – Krasnodar: KubGAU, 2011. - № 07 (71). - S. 51-70. - Mode of access: http://ej.kubagro.ru/2011/07/pdf/05.pdf, 1,25 u.p.l.

16. Troshin L.P. Innovations of Russian viticulture. 5. Recommendations for the use of grape varieties in the south of Russia // Journal KubGAU [electronic resource]. – Krasnodar: KubGAU, 2009. - № 10 (54). - Cipher INFORMREGISTER: 0420900012 \ 0119. - Mode of access: http://ej.kubagro.ru/2009/10/pdf/10.pdf.

17. Troshin L.P. Improving of the assortment of Russian vineyards // Scientific support agricultural Kuban. - Krasnodar, 2002. - S. 109-116.

18. Troshin L.P., Magradze D.N. Amelographic screening of the gene pool of grapes. – Krasnodar: KubGAU, 2013. – 120 p.

19. Troshin L.P., Radchevsky P.P. Grapes: an illustrated catalog. Regionalized, perspective, limited edition varieties. - Rostov: Phoenix, 2010. - 271 s.: Ill. - (Gardener's World).

20. Troshin L.P., Radchevsky P.P. Innovations of Russian viticulture. 9. Temporarily permitted grape varieties // Journal KubGAU [electronic resource]. – Krasnodar: KubGAU, 2009. - № 10 (54). - Cipher INFORMREGISTER: 0420900012 \ 0115. - Mode of access: http://ej.kubagro.ru/2009/10/pdf/14.pdf.

21. Troshin L.P., Simonova N.L. Innovations of Russian viticulture. 8. Promising varieties of grapes // Journal KubGAU [electronic resource]. – Krasnodar: KubGAU, 2009. - № 10 (54). - Cipher INFORMREGISTER: 0420900012 \ 0116. - Mode of access: http://ej.kubagro.ru/2009/10/pdf/13.pdf.

22. New stable and rare varieties and hybrids of grapes (Part 17) / I.A. Kostrikin [et al.]. - Rostov: Everest, 2008. – 12 p.

23. New stable and rare varieties and hybrids of grapes (Part 18) / I.A. Kostrikin [et al.]. - Rostov: Everest, 2008. – 20 p.

24. Golodriga P.Ya., Trochine L.P. Modele du cepage ideal dans la Selection et la genetique de la Vigne // IV Symposium International de Genetique de la Vigne. – Verone / Italia, 1985. - P. 40.

25. Web-sait http://vinograd.info/sorta/.

26. Web-sait http://www.cnshb.ru.

27. Web-sait http://www.gossort.com/.

28. Web-sait http://www.vitis.ru/.

29. Web-sait http://www.vitis-vea.de/.

30. Web-sait http://ej.kubagro.ru/.