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Ampelographic Characteristics of New Grape Varieties

Abstract

This article is devoted to the ampelographic evaluation of newly developed grape varieties, namely *Nakhchivan Muscat*, *Nargizi*, and *Alinja*. The study investigates their ecological, phenological, agrobiological, and biomorphological characteristics, examines their genetic structure, and provides a comprehensive description based on standard ampelographic descriptors.

The *Nakhchivan Muscat* variety was selected from plants obtained in 1985 through the treatment of germinating seeds of the Uzbek Muscat variety with a 0.3% colchicine solution for 24 hours. The plants selected from the resulting seedlings were chosen for further cultivation. The newly developed variety was granted a patent and copyright certificate in 2020 (No. 00288; author: Professor V.M. Guliyev). The average yield per vine is 11–13 kg.

The *Nargizi* variety was developed in 1980 via open pollination of seeds of the Uzbek Muscat variety. Seed germination was stimulated using a 0.3% colchicine solution for 48 hours, followed by the selection of promising genotypes from the resulting seedlings. The variety was granted a patent and copyright certificate in 2020 (No. 00291; author: Professor V.M. Guliyev). The average yield per vine is 15–17 kg.

The *Alinja* grape variety was developed through open pollination of the Meleyi variety. Prior to germination, the seeds were treated with a 0.5% colchicine solution for 48 hours. For cultivation subsequent selection was carried out among seedlings. The *Alinja* variety was granted a patent and copyright certificate (No. 00284; author: Professor V.M. Guliyev). The average yield per vine is 10–12 kg.

The article presents a concise ampelographic characterization of these newly developed varieties.

Keywords: *grape breeding, grapevine varieties, biomorphology, agrobiological traits, ampelography, chromosome structure*

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Yeni üzüm sortlarının ampeloqrafiq xüsusiyyətləri

Xülasə

Məqalə Naxçıvan Muskatı, Nərgizi və Alincə adlı yeni üzüm sortlarının ampeloloqrafik qiymətləndirilməsinə həsr olunmuşdur. Tədqiqat dövrü yeni üzüm sortlarının ekoloji, fenoloji, aqrobioloji, biomorfoloji xüsusiyyətləri araşdırılmış, onların genetik strukturu tədqiq edilmiş, ampelo-deskriptor xüsusiyyətləri təsvir olunmuşdur.

Naxçıvan muskatı sortu 1985-ci ildə Özbəkistan muskatı üzüm sortunun cücərən toxumlarına 0.3% kolxisin məhlulu ilə 24 saat ərzində təsir edilməsi nəticəsində əldə olunmuş bitkilər içərisindən seçilmişdir. Yeni sort 2020-ci ildə patent və müəlliflik şəhadətnamə almışdır (№ 00288, müəllif: prof. V.M. Quliyev). Hər bir kol 11-13 kq məhsul verir.

Nərgizi sortu 1980-ci ildə Özbəkistan muskatı sortunun sərbəst tozlanma yolu ilə əldə edilmiş toxumlarına cücərmə dövrü 48 saat ərzində 0.3% kolxisin məhlulu ilə təsir edilmişdir. Sonra cücərən bitkilər içərisindən seçilmişdir. Nərgizi 2020-ci ildə patent və müəlliflik şəhadətnaməsi almışdır (№ 00291, müəllif: prof. V.M. Quliyev). Hər bir kol 15-17 kq məhsul verir.

Alincə üzüm sortu Mələyi sortunun sərbəst tozlanma yolu ilə alınmış. toxumlarına cücərmədən əvvəl 48 saat ərzində 0.5% kolxisin məhlulu ilə təsir edilmişdir. Nəticədə alınan bitkilər işərisindən seçilmişdir. Alincə patent və müəlliflik şəhadətnaməsi almışdır (№ 00284, müəllif: prof. V.M. Quliyev). Hər bir kol 10-12 kq məhsul verir.

Məqalədə yeni sortların qısa ampeloqrafik təsviri verilmişdir.

Açar sözlər: *seleksiya, üzüm sortu, biomorfologiya, aqrobiologiya, ampeloqrafiya, xromosom*

Introduction

Relevance of the Research Topic: In the context of modern viticulture, the introduction of highly productive and economically valuable grapevine cultivars with diverse end-use applications into cropping systems represents a strategically important and actual issue both globally and within the Republic of Azerbaijan.

The grapevine gene pool of the Republic of Azerbaijan comprises approximately 600 cultivars, of which around 400 are indigenous and 200 are introduced varieties. Within the Nakhchivan Autonomous Republic, the grapevine genetic resources include 92 indigenous cultivars, categorized as follows: 9 raisin varieties, 29 table varieties, 19 dual-purpose (universal) varieties, and 35 technical (wine) varieties. In addition, 23 introduced cultivars are cultivated in the region. Furthermore, the regional gene pool encompasses a wide range of newly developed clones, mutants, and experimentally derived hybrid and polyploid grape forms (2n = 76), characterized by diverse genetic, and economically valuable traits (Kuliyev, 2011).

Brief literature review. The species and cultivar diversity, as well as the global distribution of the genus *Vitis* L., have been extensively investigated in contemporary scientific research (Yang Dong et al., 2023). Considerable attention has also been devoted to the theoretical and practical foundations underlying the development of new grapevine cultivars (Kazakhmedov, 2024).

At present, breeders in leading viticulture-producing countries employ a range of genetic and breeding approaches, including clonal selection, classical hybridization, induced mutagenesis, and polyploidization, for the development of new cultivars (Musayev et al., 2015). Clonal selection has proven particularly effective, resulting in the identification and propagation of high-yielding and economically valuable genotypes.

A substantial body of literature addresses the evaluation of agrobiological and chemical-technological characteristics of newly developed cultivars and forms, as well as their introduction into viticultural production systems (Lnitskaya et al., 2022). The incorporation of improved cultivars into vineyard plantings contributes significantly to increased productivity and enhanced fruit quality.

It should also be emphasized that standardized criteria exist for grape cultivars intended for commercial cultivation. These traits are codified and described using internationally recognized ampelographic descriptors in accordance with the methodology of the International Organisation of Vine and Wine (OIV) (OIV Codes, 2020). The application of this descriptor system facilitates accurate cultivar identification, supports selection processes for vineyard establishment, and enhances the economic efficiency of viticultural production (Troshin et al., 2021).

In recent years, genome and DNA analyses in grapevine have played a significant role in elucidating evolutionary development, origin, and genetic relationships among grape cultivars (L'nitskaya et al., 2016; Il'nitskaya et al., 2016).

The main objective of the work. The primary objective of grapevine breeding is the development of new cultivars characterized by different ripening periods (reaching technological maturity at various times), high market appeal, stable productivity, resistance to major diseases and pests, elevated sugar content, and suitability for transportation and storage. The present study is aimed at addressing these breeding priorities.

The research was conducted using high-yielding grapevines of the varieties "Nakhchivan Muscat," "Nargizi," and "Alinja," developed through selective breeding. The study encompassed the evaluation of phenological, agrobiological, cytological, and biomorphological characteristics of the newly developed cultivars, as well as their productivity, yield quality parameters, and resistance to diseases and pests.

Ampelographic characterization was carried out in accordance with the standardized methodologies of the International Organisation of Vine and Wine (OIV). Phenological observations were systematically performed throughout the growing season, and resistance to diseases and pests was assessed under field conditions. Cytological analyses were conducted using MBI-6 and Palom microscopes (Agayev, 2001). In addition, the ampelographic descriptor profiles of the cultivars were established, and production costs were calculated based on the relevant methodological framework (Orudzhov, 2007).

Results and discussion

On the Ecology of the Studied Grape Varieties. Large-scale environmental assessments of agricultural crops, including grapevine, have been conducted in several countries worldwide (Sundyreva et al., 2023; Sudnikova et al., 2025). The present study was carried out in the Nakhchivan Autonomous Republic of the Republic of Azerbaijan, which represents one of the key agro-industrial regions of the country. Within the regional agricultural sector, viticulture constitutes one of the most economically profitable branches, and its importance has been steadily increasing in recent years. Areas suitable for grape cultivation are predominantly located in plains and foothill zones. Viticulture-suitable lands account for approximately 60–65% of the total territory, corresponding to about 3.0–3.5 thousand km². The soils of grape-growing areas are highly diverse, comprising more than 15 types and subtypes. The region is characterized by high thermal resources, with the sum of active temperatures exceeding 3500-4000°C. Under such conditions, the sugar content in the juice of

more than 75% of cultivated grape varieties reaches 19.0-25.0 g/100 cm³. Seasonal temperature dynamics significantly influence grapevine phenology. In spring, sap flow begins when soil temperature reaches +8–10°C, while active vegetative growth starts at temperatures above +10.8°C. Optimal vine development occurs at +25–30°C, whereas temperatures exceeding +30–35°C during summer lead to a slowdown in growth processes. In autumn, as air temperatures decrease below +30°C (late September-early October), a secondary phase of physiological activity is observed. Subsequently, when temperatures fall below +18°C, vegetative activity gradually ceases, and the vines enter a dormancy period. The onset of relative dormancy is associated with soil temperatures of +8–10°C. Climatic conditions are further characterized by an average relative air humidity of 66.0–70.0%. During the growing season, soil moisture in the arable layer ranges from 17.6% to 32.6%, which plays a crucial role in regulating vine growth and productivity.

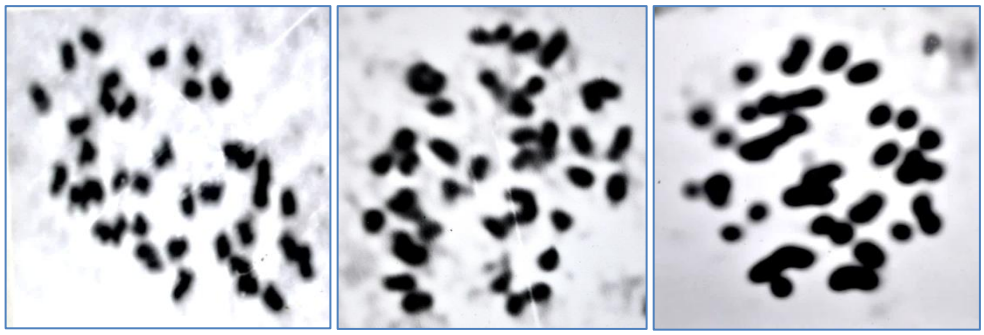
Progress of the main phenological phases. During the research period from 2022 to 2025, the progression of the main phenological stages of the newly studied grape varieties was investigated. The results obtained are presented below (Table 1).

Table 1.
The course of the main phenological phases.

Sorts r	Opening of buds		Blossoming		Fruit ripening		Vegetation period, days		Autumn (or Fall)
	mass	duration in days	mass	duration in days	mass	duration in days	until flowering	until fruit ripening	
Alinja	08-13.04	7	12.06	8	22.09	37	60	165	12.11
Nakhchivanmuscati	05-11.04	8	10.06	9	24.09	39	65	155	17.11
Nargizi	06-12.40	8	12.06	8	05.10	44	63	473	12.11

The yield of grapevines depends more on the fertility of pollen cells than on other factors. This is explained by the fact that during the flowering period, the higher the percentage of fertile pollen cells involved in the pollination process, the higher the berry set on the clusters, and therefore, the yield. During the study, the fertility of pollen grains in grapevine varieties was examined. The results of the study showed that the germination percentage of pollen cells in grapevine varieties is as follows: 93.8% for Alinja, 97.5% for Nakhchivan Muscati, and 94.0% for Nargizi.

Cytological analysis results. Grapevine yield is largely influenced by pollen viability, which plays a critical role in successful fertilization. During the flowering period, a higher proportion of viable pollen grains participating in pollination leads to improved fruit set within clusters and, consequently, increased yield. In the present study, the viability of pollen grains in the examined grapevine cultivars was assessed. The results indicated high germination rates across all studied varieties: *Alinja* - 93.8%, *Nakhchivan Muscat* - 97.5%, and *Nargizi* - 94.0%. It is well established that most cultivated grapevine varieties possess a diploid chromosome set (2n = 38). In this study, the chromosomal constitution of the somatic cells of the newly developed cultivars was investigated. Cytological analysis was performed using root meristem cells. The results confirmed that the somatic cells of the *Alinja*, *Nakhchivan Muscat*, and *Nargizi* cultivars are diploid, with a chromosome number of 2n = 38 (Figure 1).



a b c

Figure 1. a) Gahvayi kishmishi (2n=38) b) Sufra bayanshira (2n=38) c) Oguz (2n=38)

Agronomic Characteristics. The investigation of agrobiological, biomorphological, and principal productivity traits of grape cultivars provides farmers with broad opportunities for informed varietal selection in the production process (Antonenko et al., 2019, Beybulatov et al., 2018, Beybulatov et al., 2019).

During the period 2022–2025, the main agrobiological and productivity indicators of grape cultivars developed through breeding were studied. The research encompassed the evaluation of the vegetation period, the timing of onset and completion of phenological stages, shoot growth intensity, cluster and berry characteristics, yield level, and quality parameters.

The observations and measurements conducted revealed differences among the cultivars in terms of vegetation duration, yield potential, and resistance to environmental factors. The results obtained are presented in Table 2.

Table 2.

Main productivity indicators of new grapevine varieties.

Sorts r	The average mass of a cluster, g	The number of berries in the cluster, number	The mass of 100 berries, g	In the press, %		Total juice yield %	In the juice		Yield coefficient		Yield per stem, kg
				Pee	seed		sugar content, g/100 cm³	acidity, g/dm³."	in the grapevine	in productive shoots	
Alinja	420,01±2,62	140,4	2600,0±8,1	10,5	4,5	88,0	20,2	5,4	0,67	1,1	10,0
Nakhchivan Muscati	354,0±10,36	59,4	360,0±12,0	14,3	4,0	77,0	20,1	6,7	0,76	1,4	13,0
Nargizi	750,6±10,12	20,4	340,0±16,0	12,2	3,6	82,0	18,0	6,1	0,75	1,60	15,0

Productivity variance analysis. The results of the variance analysis of the productivity of the grapevine varieties Alinja, Nargizi, and Nakhchivan Muscati for the years 2022-2025 have been calculated. The results obtained are presented below (table 3).

Table 3.
Results of variance analysis of productivity.

Varieties	Yield per vine, kg			ΣV	X
	I	II	III		
Alinja	10, 2	9,6	10,5	30,3	9,8
Nargizi	13,5	15,1	16,2	44,8	10,6
Nakhchivan Muscat	13,2	12,7	11,2	37,1	8,9
Σ P	36,9	37.4	37.9	Σx=112,2	X=9.8

Economic efficiency of the variety. During the course of the study, key economic indicators were analyzed, including production costs per hectare, yield per hectare (centners), selling price per centner, total sales revenue, net income (in manats), and profitability (%). The corresponding results are presented below. The analysis demonstrated that the highest profitability levels were observed in the following grapevine cultivars: *Alinja* — 319.28%, *Nakhchivan Muscat* — 230.00%, and *Nargizi* — 360.88% (Table 4).

Table 4.
Economic efficiency of grape varieties.

Grape varieties	**Production costs per hectare (manat)**	Yield per hectare (centners)	Selling price per centner (manat)	Total revenue from sales (manat)	Net income (manat)	Profitability (%)
Alinja	5364,31	321,60	70,0	22491,70	17127,39	319,28
Nakhchivan Muscat	5400,45	254,60	70,0	17822,00	12421,55	230,00
Nargizi	5490,45	321,60	80,0	25744,00	20253,55	360,88

Note: 1 US dollar = 1.70 manat (AZN)

Ampelo-descriptor characteristics. The ampelo-descriptive description of grape varieties was carried out according to the appropriate method of the International Organization of Vine and Wine (OIV) (table 5).

Table 5.
A brief ampelographic description of new grape varieties.

The morphologicalsigns		Appearance of the heritable signs					
		Nakhchivan Muscati		**Nargizi**		**Alinja**	
Chiper	Th enames	Code	Form	Code	Form	Code	Form
001	Form (openness) tops of young shoots	1	Closed	1	Closed	1	Closed
003	Intensity of anthocyanin coloring tops	1	missingr very weak	1	missing or very weak	1	missing or very weak
004	Young shoot: intensity of white prostrate hairs of the tip	1	none or very low	1	none or very low	1	none or very low
010	Color of ventral side of nodes of shoot	1	green	1	green	1	green
012	Density of erect hairs on internodes of shoot	1	none or very low	1	none or very low	3	low
017	Tendril length	1	very short	7	very short	7	long about

							25 sm
053	Density of prostrate hairs between main veins on lower side of blade (4th leaf) of young leaf	1	none or very low	1	none or very low	3	low
065	Size of blade of mature leaf	5	medium	5	medium	7	large
067	Shape of blade of mature leaf	7	circular	7	circular	7	circular
068	Number of lobes of mature leaf	3	seven	5	five	5	circular
069	Color of the upper side of the blade of a mature leaf	5	medium green	5	medium green	7	dark green
074	Profile of blade in cross section of nature leaf	3	Furrowed	3	only at the petiolar point	3	furrowed
075	Blistering of the upper side of the blade of a mature leaf	3	weak	3	Weak	3	weak
076	Shape of teeth of mature leaf	3	both sides straight	3	both sides straight	3	both sides straight
079	Degree of opening overlapping of petiole sinus of mature lea	3	open	3	open	3	open
082	Degree of opening overlapping of upper lateral sinus of mature leaf	3	closed	3	closed	3	closed
084	Density of prostrate hairs between the main veins on the lower side of the blade of the mature leaf	1	none or very low	1	none or very low	1	none or very low
085	Density of erect hairs on the main veins on the lower side of the blade of a mature leaf	1	none or very low	1	none or very low	1	none or very low
087	The density of bristly omission between the main veins on the lower surface of the leaf	1	missing or very weak (very rare)	1	missing or very weak (very rare)	1	missing or very weak (very rare)
093	Length of petiole compared to length of middle vein of mature leaf	5	equal	5	equal	5	equal
094	Depth of upper lateral sinuses of mature leaf	5	medium	5	medium	1	absent or very shallow
103	Depth of upper lateral sinuses of mature leaf	2	brownish	2	brownish	3	reddish-violet
151	Sexual organs of Flower	3	fully developed stamens and fully developed gynoecium	3	fully developed stamens and fully developed gynoecium	3	fully developed stamens and fully developed gynoecium
153	Number of İnflorescences per shoot	2	1.1 to 2 inflorescence	2	1.1 to 2 inflorescence	2	1.1 to 2 inflorescence
202	Length of bunch (peduncle excluded)	7	long	9	very long	9	very long
204	Density of Bunch	5	Medium	9	very dense	9	very dense
206	Bunch leg length (length of primary bunch stem)	5	medium, about 7 sm	7	long, about 9 sm	5	medium, about 7 sm
207	Wooding of the cluster petiole	5	medium (up to half of the cluster	7	strong (most of the cluster petiole)	7	strong (most of the cluster petiole)

			petiole)				
220	Length of berry	7	long (about 19-23 mm)	7	long (about 19-23 mm)	5	medium (about 14-18 mm)
223	Shape of berry	8	obovoid	2	globose	2	globose
225	Color of berry skin	1	green yellow	1	green yellow	5	dark red violet
228	Thickness of berry skin	5	medium	5	medium	7	thick
231	İntensity of the anthocyanin coloration of berry flesh	1	none or very low	1	none or very low	7	high
232	Juiciness of berry flesh	2	medium juicy	1	slightly juicy	2	medium juicy
235	Firmness of berry flesh	3	small, up to 65%	2	slightly	2	slightly firm
236	Particularity of flavor of berry	2	muckat	1	none	1	none
238	Length of pedicel of berry	9	very long (about 16 mm and more)	5	medium (about 8-12 mm)	3	short (about 4-8 mm)
240	Ease of detachment of berry from pedicel	3	Difficult	3	very easy	3	difficult
241	Formation of seeds of berry	3	Complete	3	Complete	3	Complete
243	Weight of seeds of berry	3	low (about 10-25 mg)	3	low (about 10-25 mg)	3	low (about 10-25 mg)
301	Time of blooming of kidneys	3	early chardonnay	3	early chardonnay	3	early chardonnay
303	The beginning of the maturing of berries	5	Average	7	late	7	late
304	Physiological maturity of berries	5	Average	9	very late	7	late
351	Vigor of shoot growth	5	medium (about 1,3-2,0 m)	5	medium (about 1.3-2.0 m)	7	strong (about 2.1-3.0 m)
452	Degree of leaf's resistance to **(***Plasmopara viticola Berl.***)** plasmop	7	High	5	average	7	high
453	Degree of cluster's resistance to **(***Plasmopara viticola Berl***)** plasmopara	7	High	5	average	7	high
455	Steadiness degree to an *(Ucinula necator Burill*.) oidium of leaves	7	High	5	average	7	high
456	Steadiness degree to an *(Ucinula necator Burill*.) oidium of bunch	7	High	5	average	7	high
458	Steadiness degree to grey rot **(***Botrytis cinerea Pers.*) of leaves	5	Average	3	low	7	high
459	Degree of cluster's resistance to Botrytis *cinerea Pers.)* botrytis	5	Average	3	low	7	High
504	Productivity, t/ha	9	very high (about 17 s/ha and more)	9	very high (about 17 s/ha and more)	7	high (about 13-16 t/ha)
505	Sugar content of must, g/100 sm^3	5	Medium (about 18-20 g/100 sm^3)	5	Medium (about 18-20 g/100 sm^3)	5	Medium (about 18-20 g/100 sm^3)
506	Acid content of must, g/dm^3	3	low (about 4-6 g/dm^3)	3	low (about 4-6 g/dm^3)	3	low (about 4-6 g/dm^3)

604	Degree of maturity of shoots, %	9	very high (more than 96.0%)	9	very high (more than 96.0%).	9	very high (more than 96.0%)
629	Vegetation period	6	late ripening (161-170 days)	7	Very late ripening (v.p. 171 days and more)	7	very late ripening (v.p. 171 days and more)
630	Oculus germination level (%)	9	very high	7	high	9	very high
631	Frost steadiness of a grade	5	Average	5	average	7	high
632	Steadiness of a grade at high temperature	5	Average	5	average	7	high

Below is a brief ampelographic description of the new grape varieties.

NEW GRAPE VARIETY NAKHCHIVAN MUSCATI. The Nakhchivan Muscat grape variety was selected in 1985 from the germinating seeds of the Uzbek Muscat variety, which were kept in a 0.3% colchicine solution for 24 hours. The new grape variety received a patent and author certificate in 2020 (No. 00288, author: Prof. V.M. Kuliyev).

Ampelographic Characteristics: The grapevines exhibit vigorous growth, with approximately 75% of new shoots being productive. The leaf blade is large, measuring 17.0 cm in length and 17.0 cm in width, and is broadly oval in shape. The leaf area is 180.82 cm², with a leaf index of 0.98. The leaf surface is smooth and light green, with margins oriented upwards. The flowers are hermaphroditic. Grape clusters vary in weight from 240 to 560 g, with lengths of 18.0–22.0 cm and widths of 11.0–14.5 cm. The berries are light yellowish-white or blue-white, large in size (23.0–25.0 mm in length and 2.0–2.5 mm in width), and contain 3–4 seeds per berry. The weight of 100 seeds is 5.2 g.

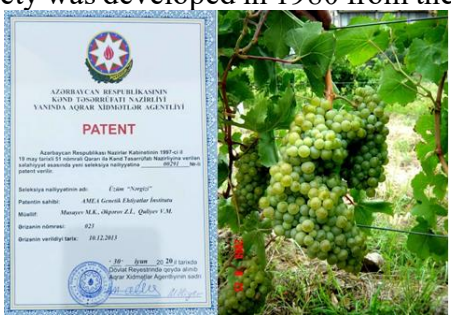
Agrobiological and Technological Characteristics: The annual growing period of the cultivar is 150–160 days, with a cumulative active temperature requirement of 3350–3400°C to reach full physiological maturity. This variety is highly productive, yielding 12–15 kg per vine. The average cluster weight is 354.0 g.

The berries are juicy and sweet, with a juice content of 75.0–78.0%. Sugar concentration ranges from 18.0 to 21.0 g/100 cm³, while acidity ranges between 5.0 and 7.5 g/dm³. The yield coefficient per vine is 0.76, whereas the coefficient for productive shoots is 1.4.

The cultivar demonstrates strong resistance to fungal pathogens, including downy mildew (*Plasmopara viticola*), rated 1–2 points, and powdery mildew (*Uncinula necator*), rated 0–1 point. Fully developed shoots are capable of withstanding temperatures as low as −20°C. In autumn, the wax coating on one-year-old shoots reaches 90–93%, providing additional protection against environmental stress.

This grape variety is intended to be consumed fresh.

NEW GRAPE VARIETY—NARGIZI. The new grape variety was developed in 1980 from the Uzbek Muscat (*Nimranq* × *Alexander Muscat*) cultivar, with plants selected from seeds treated for 48 hours in a 0.3% colchicine solution. The grape clusters are notably large, with weights ranging from 800 to 1200 g. The vines exhibit vigorous growth. Based on botanical features and morphological characteristics, the variety is classified within the ecological-geographical subgroup of Eastern grape cultivars (*Convar. orientalis* subconvar. *caspica* Negr.). In 2020, this cultivar was



officially granted a patent and copyright certificate (No. 00291; author: Prof. V.M. Kuliyev, 2020).

Ampelographic Characteristics. The grapevine develops vigorously. 42-60% of the growing shoots are productive. The length of one-year-old shoots is 1.5 to 2.0 meters. The leaves are medium-sized (diameter 14.5–16.5 cm) and are oval. The surface is light green, with edges directed upward, and they are five-lobed. The flowers are hermaphroditic. The fertility of the anthers is 96.0–98.0%.

Agrobiological characteristics. The grape clusters measure 16.0–21.0 cm in length and 10.0–12.0 cm in width, with berries densely arranged within the clusters. The berries are large, spherical, and light blue in color, with diameters ranging from 22.0 to 24.0 mm and medium-thick skins. Each berry contains 3–4 seeds, which are oval, light brown, and measure 5.4 mm in length and 3.2 mm in width. The mass of 100 seeds is 7.65–7.72 g.

This is a late-ripening cultivar, with a vegetative period of 170–175 days and a cumulative positive temperature requirement of 4380–4400°C for full physiological maturity. The variety is highly productive, with a yield coefficient of 0.65 per vine and 1.4 per bearing shoot. The grape juice contains 17.0–18.5 g/100 cm³ of sugar and 6.0–7.0 g/dm³ of acidity. Each vine produces 13.0–15.0 kg of fruit, corresponding to an average yield of 400.0–450.0 centners per hectare.

The cultivar exhibits strong resistance to fungal pathogens, with downy mildew (*Plasmopara viticola*) rated 1–2 points and powdery mildew (*Uncinula necator*) rated 0–1 point. Fully developed shoots tolerate temperatures as low as −20°C. In autumn, the wax coating on one-year-old shoots reaches 89.1–90%, providing additional protection against environmental stress.

The product is consumed both fresh and used for wine production.

NEW GRAPE VARIETY – ALİNJA. This is a technical grape variety obtained through selection. The seeds of the parent grape variety were germinated and kept in a 0.5% aqueous solution of colchicine for 48 hours. Afterward, the new plants obtained were selected from them.

In terms of morphological features and biological characteristics, it belongs to the ecological-geographical group of Eastern wine grape varieties (Convar orientalis subconvar caspica Negr.). A patent and an author's certificate were granted to the new variety in 2020 (No. 00284, author Prof. V.M. Guliyev, 2020). It is widespread in the territory of the Republic of Azerbaijan.

Ampelographic Description. The grapevine shoots are strong and bushy, with 60.8% of shoots being productive. One-year-old shoots exhibit vigorous growth, with branch lengths exceeding 160.5 cm. The leaves are predominantly round, occasionally slightly oval, measuring 17.0–19.0 cm in diameter, with an area of 174.51 cm². The leaf surface is smooth, relatively dark green, and five-lobed, with margins oriented upward. The flowers are hermaphroditic, and pollen viability is high at 96.0%. Grape clusters are long and cylindrical, with tightly packed berries. Cluster length reaches 28.0 cm, and width is 14.0 cm, with cluster weights ranging from 400–520 g, and in some cases reaching 650–800 g. The berries have diameters of 1.8–2.0 cm, with dark red to black coloration and a light powdery wax coating. The berries are juicy, with thick skins and colorless flesh. Each berry contains 2–3 seeds.

Agrobiological Characteristics. This cultivar is a medium-late ripening grape variety, with clusters reaching full maturity at the end of September to early October. The vegetative period lasts 155–165 days, requiring a cumulative active temperature of 3650–3660°C for complete physiological maturity. The productivity coefficient is 0.67 per vine and 1.1 per fruitful shoot. Each vine yields 10.0–12.0 kg of grapes, indicating high productivity. At technical maturity, the grape juice contains 18.0–20.0 g/100 cm³ of sugar and 5.0–6.0 g/dm³ of acidity.

The variety exhibits strong winter hardiness, with shoot survival reaching 89.0% (rated 4 points), and demonstrates high resistance to fungal diseases. Downy mildew (*Plasmopara viticola*) is rated 1–2 points, powdery mildew (*Uncinula necator*) is rated 0–1 point, and gray rot incidence is 2.5%

with an infection intensity of 5.7%. Fully developed shoots can tolerate frost down to −20°C. In autumn, the wax coating on one-year-old shoots reaches 89.1–90%, providing additional protection against environmental stress.

This grape variety is primarily used in winemaking and is well-suited for long-distance transportation due to its structural integrity and durability.

Conclusion

The following results were obtained from the study:

- The ecological characteristics of the regions where the new grape varieties are cultivated were investigated;
- Key phenological stages, biomorphological traits, and agrobiological characteristics of the newly developed grape cultivars were assessed;
- The genomic structure of the new cultivars was analyzed, confirming that the somatic cells possess a diploid chromosome number (2n = 38);
- Comprehensive ampelographic descriptions of the new grape cultivars were conducted in accordance with OIV standards;
- The economic efficiency of the newly developed grape varieties was evaluated;
- The new grape cultivars, *Nakhchivan Muscat*, *Nargizi*, and *Alinja*, developed through selective breeding, have been patented, registered in the State Register of the Republic of Azerbaijan, and are being introduced into cultivation in the grape-growing regions of the Republic of Azerbaijan.

References

1. Agayev, Y. M. (2000). *Sposob okrashivaniya khromosom rasteniy* (Avt. svid. No. 812240). Byulleten' izobreteniy, 10, 1.
2. Antonenko, M. V., Guguchkina, T. I., Prah, A. V., Kolesnov, A. Y., & Zenina, M. A. (2019). Research of physical and chemical characteristics of grapes from different regions of Krasnodar territory for their use as standards of authenticity of wine production. *Fruit Growing and Viticulture of South Russia, 55*(1), 95–106. https://doi.org/10.30679/2219-5335-2019-1-55-95-106
3. Beybulatov, M. R., Buyval, R. A., Tikhomirova, N. A., & Urdenko, N. A. (2018). Otsenka agrobiologicheskikh i khozyaystvennykh priznakov klona sorta vinograda Muskat belyy VCR-3 v usloviyakh Yuzhnogo berega Kryma. *Plodovodstvo i vinogradarstvo Yuga Rossii, 51*(3), 88–97. https://doi.org/10.30679/2219-5335-2018-3-51-88-97
4. Beybulatov, M. R., Urdenko, N. A., Tikhomirova, N. A., & Buyval, R. A. (2019). Otsenka potentsiala aborigennykh i mestnykh sortov vinograda dlya upravleniya protsessom formirovaniya urozhaya. *Plodovodstvo i vinogradarstvo Yuga Rossii, 57*(3), 60–71. https://doi.org/10.30679/2219-5335-2019-3-57-60-71
5. International Organisation of Vine and Wine (OIV). (2001). *Codes of character descriptors for varieties and species of Vitis*. http://www.oiv.int
6. Ilnitskaya, E. T., Sheludko, O. N., & Makarkina, M. V. (2022). Molecular genetics and chemical-technological characteristics of the Dmitry grape variety. *Magarach. Viticulture and Winemaking, 24*(3), 235–241. https://doi.org/10.34919/IM.2022.24.3.006
7. Il'nitskaya, E. T., Tokmakov, S. V., Suprun, I. I., Naumova, L. G., & Ganich, V. A. (2016). Izucheniye geneticheskogo skhodstva donskikh aborigennykh sortov vinograda s primeneniyem SSR-analiza i po osnovnym ampelograficheskim priznakam lista. *Sel'skokhozyaystvennaya biologiya, 51*(1), 60–67. https://doi.org/10.15389/agrobiology.2016.1.60
8. Kazakhmedov, R. E. (2024). Osnovnyye itogi nauchno-issledovatel'skoy raboty Dagestanskoy selektsionnoy opytnoy stantsii vinogradarstva i ovoshchevodstva za 2023 god. *Plodovodstvo i*

vinogradarstvo Yuga Rossii, 85(1), 74–91. https://doi.org/10.30679/2219-5335-2024-1-85-74-91

9. Kuliyev, V. M. (2011). Indutsirovannyye autotetraploidnyye mutanty vinograda. *Tsitologiya i genetika, 45*(3), 35–42. https://doi.org/10.3103/S0095452711030054
10. Musayev, M. K., Akparov, Z. I., & Kuliyev, V. M. (2015). Results of the study of genetic resources of grapes in Azerbaijan. *Acta Horticulturae, 1074*, 15–22. https://doi.org/10.17660/ActaHortic.1074.1
11. Orudzhov, T. A., Mustafayev, R. I., Veliyev, S. Y., & Alekperov, A. O. (2007). *Rekomendatsii po uchotu i kal'kulyatsii proizvodstvennykh zatrat na sel'skokhozyaystvennuyu produktsiyu*. Baku.
12. Sudnikova, V. P., Zeleneva, Y. V., Gusev, I. V., Kon'kova, E. A., & Kovalenko, N. M. (2025). Novyye istochniki i donory pshenitsy s vysokim potentsialom kompleksnoy ustoychivosti k osobo opasnym boleznyam. *Sel'skokhozyaystvennaya biologiya, 60*(1), 3–20. https://doi.org/10.15389/agrobiology.1.3
13. Sundyreva, M. A., Mishko, A. E., & Seget, O. L. (2023). Scion-rootstock combinations of grapes for increasing adaptation potential in the summer period in the North-Western Ciscaucasia. *Fruit Growing and Viticulture of South Russia, 80*(2), 170–179. https://doi.org/10.30679/2219-5335-2023-2-80-170-179
14. Troshin, L. P., Kravchenko, R. V., Matuzok, N. V., & Kufanova, R. N. (2021). Sovershenstvovaniye sortimenta dlya optimizatsii tekhnologii proizvodstva vinograda v Anapo-Tamanskoy zone. *Magarach. Vinogradarstvo i vinodeliye, 23*(2), 120–124. https://doi.org/10.35547/IM.2021.23.2.003
15. Yang, D., Duan, S., Xia, Q., & Kuliyev, V. (2023). Dual domestications and origin of traits in grapevine evolution. *Science, 379*(6635), 892–947.

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