New finds of wild grapes of the Kuban region and their environmental and geographic characteristics

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Abstract. This article presents the study results of new locations of wild forms of the Krasnodar Territory, Crimean region. Two populations in two locations were found in the slope and plain territories. In the course of the expeditions, the environmental and geographic characteristics of the habitats of wild grape forms were given, a complete description of the vegetation of the ecotopes under study was made, and the morphological and biological qualitative and quantitative indicators of grape wild forms have been studied in detail. When analyzing scientific literature data, it was found that there is not enough information about Kuban wild plants, feral forms and autochthons of grapes. The urgent need for this study arose. The research was carried out using route-reconnaissance, geobotanical, ampelographic, analytical methods. The variability of some indicators was detected to a greater or lesser extent, both at interpopulation and endogenous levels. Populations differ in the shape of the leaf blade, with leaves occurring pentagonal, deltoid, and rounded. The degree of leaf corrugation varies from weak to medium. The crown of the young shoot is slightly open or half open, with very rare pubescence, the depth of the upper lateral leaf clippings is from very small to medium.

1 Introduction

At present, according to the second theory on the origin of cultivated grapes, it is believed that the spread of Eurasian grapes started from several centers that contributed different genetic inputs from different populations *of Vitis sylvestris* Gmel. or by multiple selection and domestication of *Vitis vinifera ssp. silvestris* Gmel genotypes. This hypothesis is based on a study of the morphological characteristics between varieties from the eastern and western parts of the planet. Proof of this assertion was provided by the analysis of chlorotype variation of 1201 wild and cultivated plant specimens collected throughout the distribution area of the species in Europe and by studying their genetic relationships [1-6]. The results of this study showed the appearance of two centers of origin of cultivated germplasm, one in the Middle East and the other in the western part of the Mediterranean Sea. In this case, the

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second one gave rise to many existing Western European varieties [7-9]. The existence of various theoretically and practically substantiated centers of origin of plant forms suggests that the preservation of endemic relict plant forms in these centers is still possible., The territory of the Northern Caucasus and the Black Sea coast (northern regions of the Black Sea) is considered the most promising of all zones from the point of view of studying the biodiversity of grapevines [10]. It is widely studied by various laboratories of the world because of its great importance as a supposed center of origin of cultivated grapes [11, 12]. Its research and sustainable use are due to several reasons, including:

- The presence of a large variety of traditional local varieties (about 1 500 names), existing in the region and representing botanical and biological-economic values;
- The presumed need to use these varieties to improve modern European varieties;
- The existence of the ancestor of the cultivated grape *V. vinifera ssp. silvestris* Gmel. within the region [13-15].

Therefore, based on the interests of the world scientific community and the origin of the world variety composition of grapes, search expeditions were conducted in the Krasnodar Territory, in particular, on the territory of the Crimean region, 15 km from the Shkolny settlement. At the same time, two populations in two locations were found - in the slope and plain parts of the surveyed territory.

2 Methods

The study of wild grape forms in the Kuban has been started by us since 2019 [16-18]. In 2021-2022, we carried out expeditions in the territory of the Crimean region of Krasnodar Krai, 15 km from the settlement of Shkolny.

Research Methods:

- route reconnaissance (the study area was covered by a uniform network of routes, during which floristic descriptions were made);
- traditional geobotanical [19];
- morphometric [21];
- analytical.

3 Results and discussion

Research sites of wild forms of grapes are located 15 km from the settlement of Shkolny, the Crimean region, and the Krasnodar Territory. The climate of the area is moderately continental, which is explained by its location in the southwest in the zone of medium-high foothills of the western part of the Greater Caucasus Range [20]. July is the warmest month, with an average monthly temperature of +22.6ºC. The duration of the summer period is 135-140 days. The coldest month is January, with an average monthly temperature of 0.9ºC. The sum of active temperatures per year is 3400 ºC. The average annual air temperature is 11.8 ºC.

In terms of precipitation, the study area falls within the moderate moisture zone, but precipitation is very unstable, especially in summer. On average, 657 mm of precipitation fall per year. The greatest amount is in December - 71 mm, the minimum - in April and August - 40 mm.

The soil type of the study area is chestnut leached thick black soils. Soil-forming rocks here are loess-like and alluvial clays.

New sites of wild grape growing on the territory of Kuban's Crimean region were discovered. Places of growing wild grapes are divided into two areas - on the slope and the plain.

On a sloping site, the soil is humus-carbonate, the type of vegetation is a broad-leaved forest consisting of ordinary ash, fluffy and petiolate oak, field maple, hornbeam and their combinations.

The flat area is located in the floodplain of the Psebeps River, has humus-gley soils, and is occupied by mesophilic broad-leaved forests.

The vegetation type is a downy-oak and ash forest. Tree vegetation is represented by downy oak (*Quercus pubescens* L.), English oak (*Quercus robur* L.), common ash (*Fraxinus excelsior* L.), common hornbeam (*Carpinus betulus* L.), field maple (*Acer campestre* L.), Caucasian pear (*Pyrus caucasica* Fed.), prunus spiny (*Prunus spinosa* L.), etc.

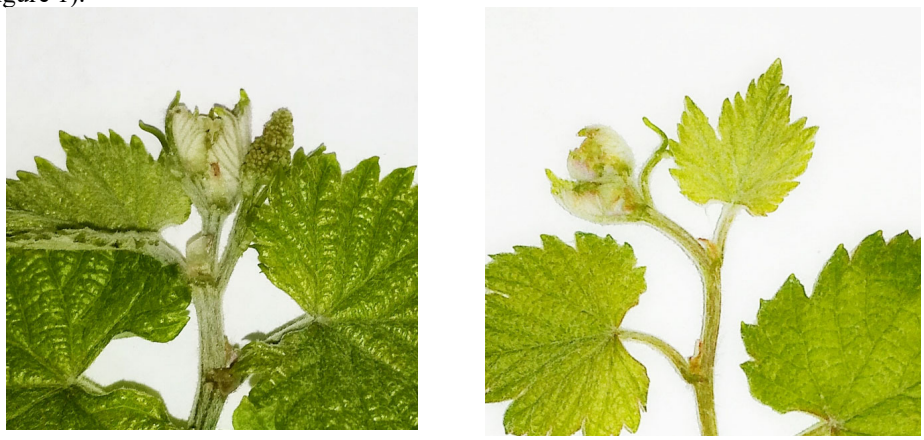
From shrub vegetation, we can note: male dogwood (*Cornus mas L.*), southern pigweed (Swida australis (C.A. Mey.) Pojark. ex Grossh.), black elderberry (*Sambucus nigra* L.), mountain ash (*Sorbus torminalis* L.), dog rose (*Rosa canina* L.), mossy rose (*Rosa villosa* L.), hawthorn (*Crataegus monogyna* Jacq.), etc.

The herbaceous layer is represented by the following plants: ground creeper (*Cflfmfgrostis epigeios* (L.) Roth.), hedgehog (*Dactylis glomerata* L.), sweet clover (*Melilotus officinalis* (L.) Pall.), noble yarrow (*Achillea nobilis* L.), crow's-feet (*Omithogalum woronowii* Krasch.), forest strawberry (*Fragaria vesca* L.), forget-me-not (*Myosotis nemorosa* Besser), plough clover (*Trifolium arvense* L.), plantain lanceolate (*Plantago lanceolata* L.), etc.

It is possible to note grapevine (*Clematis vitalba* L.), and common ivy (*Hedera helix* L.) from lianas.

One population of wild grapes was found in each of the study plots.

In the sloping plot (plot 1), the population is represented by 3 specimens growing separately from each other at a distance of 20 m. Vines of medium thickness - 3-5 cm, high up to the crowns of neighboring trees. The bark coloration of the bark of the wild grape bole is brownish-brown or reddish-brown, dying off (peeling). Leaves are 5-lobed, slightly dissected or entire, pentagonal or rounded, light green, pubescence of the underside of the leaf is cobwebby, weak, and the apex of the young shoot is slightly pubescent, open halfway (Figure 1).



a b

Fig. 1. The appearance of the crown of the shoots of grapes growing in the forest: a) population #1, b) population #2.

In the plain plot (plot #2), the wild grape population consists of five specimens located 5-10 m from each other. The thickness of the vines at the base is up to 10 cm, also high up to the crowns of the tree tier. The bark of the boles has a bright brownish coloration. Leaves are also 5-lobed, with a weak or medium dissection of the leaf blade. The coloring of the formed

leaf blade is green or light green with weak pubescence on the lower side of the formed leaf. The crown of a young shoot is light green without anthocyanin coloring, almost glabrous, slightly open, or half-open. At the time of examination, grape plants had 10-15% of vine oidium infestation and there were traces of whitefly activity on young shoots, stems, and internodes.

More than 40 quantitative and qualitative morpho-signs of wild grape plants were studied, some of which had the highest indicators of variability, even at the endogenous level (Table 1).

As a result, the variability of some indicators at the interpopulation and endogenous levels was revealed. For example, populations differ in the shape of the leaf blade, with leaves found pentagonal, deltoid, and rounded (2 to 4 points). The degree of leaf corrugation varies from weak to medium (1 to 2 points). The crown of the young shoot is slightly open or half open (2 - 4 points), degree of pubescence of crown of young shoots - from almost bare to medium (1 - 3 points), depth of upper lateral leaf notches - from very shallow to medium (0 - 2 points), etc.

Table 1. The most variable qualitative morpho-characteristics of the studied wild grapes (fragment of the table).

Trait*	Population 1	Population 2
The shape of the sheet	2	3-4
Leaf coloring	1-2	1
Openness of the crown	2-3	3
Depth of upper leaf notches	2	1
Young leaf swelling	1	2
Cobwebby pubescence of the underside of the formed leaf	1	2
* Qualitative morpho-signs were evaluated in points [21].		

Variability in several qualitative and quantitative morpho-parameters of grapevine dicots, such as leaf blade rugosity and pubescence; leaf shape, color, size; length of internodes, etc., can also be traced between populations. For example, spider-like pubescence of young shoot crowns was observed in all populations studied, but the degree of pubescence varied (from almost naked to medium), the same is true for the degree of pubescence of the lower side of the formed leaf and young leaves.

Phytopathological examination of grape plants in both populations was carried out (Table 2).

Table 2. Presence of phytopathogens and pests in the studied wild grape populations.

Location		**Grape powdery mildew (*Uncinula necator* (Schw.) Burrill) is a marsupial stage of development; (*Oidium tuckeri* Berk). - anamorphic stage of development**	**Black spot (*Phomopsis viticola)* Sacc.**	**Grape felt mite (*Colomerus vitis* Pgst.)**	**White cicada (*Metcalfa pruinosa* Say.)**	**Leaf-eating insects**
Crimean district	slope	+	+			+
	Plain	+	+	+	+	+

Phytopathogens *Uncinula necator* (Schw.) Burrill and *Phomopsis viticola* Sacc. Sucking pests such as *Colomerus vitis Pgst.* and *Metcalfa pruinosa* Say were present on leaves. We also found results of leaf-eating insects with a small percentage of leaf surface damage.

4 Conclusion

As a result of research search work, 2 populations of wild forms of grapes on the territory of the Crimean region of Krasnodar Territory were discovered. A detailed description of ecologo-geographical conditions of wild grape growth grapes in two locations - on a slope and a plain site was carried out. More than 40 morphological features of wild grape plants were studied. Endogenous and interpopulation variability of some phenotypic traits was found: leaf blade rugosity and pubescence; leaf shape, color, and size; length of internodes; shape and degree of pubescence of young shoots apex, etc. Samples were taken for genetic analysis to determine genotypes. Phytopathological examination of wild grape forms was carried out, as a result of which phytopathogens (*Uncinula necator* (Schw.) Burrill, *Phomopsis viticola* Sacc.) and pests (*Colomerus vitis Pgst.* and *Metcalfa pruinosa* Say.) were found.

This research work on the search for new sources and donors of economically valuable characters is important for the improvement of the breeding process of grape culture. The isolation of new resistant wild forms of the genus *Vitis* L. allows expanding the possibilities of obtaining new zoned complex-resistant grape varieties.

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