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Identification and Documentation of Endemic Grapevine Varieties in Samegrelo

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Abstract

Georgia is one of the earliest centers of grapevine origin, where the history of grapevine domestication spans several millennia. This is confirmed by the archaeological expedition's discovery at Shulaveris Gora in Kvemo Kartli - an ancient winemaking vessel, the "dergi," dated to 7000 BCE (Lortkipanidze 2002; Rusishvili 2010; Chilashvili 2004; McGovern et al. 2017), as well as by archaeobotanical remains discovered in the Dzanisi River valley (Adigeni Municipality), dating back 5 million years (Mirvelashvili, Maghradze 2017). The presence of more than 400 wild grapevine forms in nature, classified as Vitis vinifera L. silvestris (Tsertsvadze 1999), and the abundance of indigenous cultivated grapevine varieties - 525 documented forms of Vitis vinifera L. sativa (Ketskhoveli, Ramishvili, Tabidze 1961)- further support this view. These varieties exhibit characteristics highly adapted to the specific environmental conditions in which they originated.

Among the viticultural regions of Georgia, Samegrelo remains the least studied in terms of identifying and investigating endemic grapevine varieties, despite significant interest from viticulturists.

The present study was carried out within the framework of the internal research project of Caucasus International University, "Development of a Model for the Distribution of Grapevine and Its Associated Crops in Georgia's Mountainous Regions According to Vertical Zonation." The project encompasses ampelographic documentation of endemic grapevine varieties identified in the Samegrelo region - Kharistvala Megruli, Machqvaturi, Chergvali, Makhvateli, Chechiphesh, and Paneshi - including descriptive materials on mature leaves, clusters, and berries.

Keywords: region, Samegrelo, ampelography, endemic, variety.

Introduction

Georgia, distinguished by its diverse natural conditions and mountainous–hilly landscapes, is divided into viticultural regions and groups of endemic cultivated grapevine varieties. Each region is characterized by the following number of local varieties: Kakheti- 80, Imereti- 74, Samegrelo- 60, Racha–Lechkhumi- 50, Kartli- 72, Meskheti- 26, Guria- 59, Adjara- 53, and Abkhazia- 51 varieties. Over long historical periods, more than 400 forms of wild grapevine (Vitis vinifera L. silvestris) and up to 525 cultivated varieties of Vitis vinifera L. sativa have developed and spread across these regions, each adapted to the specific environmental conditions in which it originated.

Among Georgia's viticultural regions, Samegrelo remains the least studied in terms of identifying and characterizing endemic grapevine varieties, despite considerable interest among viticulturists. As early as the 19th century, the renowned French ampelographer V. Pulliat, with the assistance of Baron de Longuenil, a landowner residing in Kutaisi, began describing and studying endemic grapevine varieties of western Georgia. His work, "Mille variétés de vignes: description avec planches coloriées des vignes à raisins de table et à raisins de cuve" (Paris, 1874–1875), represents one of the earliest systematic efforts in this field. Furthermore, at the International Congress of 1876, grapevine varieties belonging to the Pontic group (Prol. pontica subprol. Georgica Negr. 1946) attracted such significant interest among European ampelographers that, by the mandate of the International Ampelographic Commission (Herman Göthes), descriptions of 23 Georgian grapevine varieties were included in the Ampelographisches Wörterbuch (Ampelographic Dictionary).

Agro-Climatic Characteristics of Samegrelo

Samegrelo is situated in the northwestern part of Georgia. It is bordered by the Imereti region to the east, the Black Sea to the west, Guria to the south, and Svaneti and Abkhazia to the north. According to the current administrative–territorial division, the Samegrelo region is incorporated into the Samegrelo–Upper Svaneti province and consists of the following municipalities: Abasha, Zugdidi, Martvili, Senaki, Chkhorotsku, Tsalenjikha, Khobi, and Poti.

Based on vertical altitudinal zoning, three main zones are distinguished within the territory of Samegrelo: (a) the coastal and lowland zone, (b) the foothill zone, and (c) the high-mountain zone. The largest portion of Samegrelo belongs to the coastal and lowland zone. Located south of the Enguri River and extending to the Supsa River, this area forms part of the Colchian Lowland. Due to its low elevation, the zone is characterized by extensive waterlogging, high atmospheric precipitation, and the close proximity of groundwater to the soil surface.

Towards the northeast, the lowland gradually transitions into a system of hills and mountains—namely, the foothill zone. This zone, in turn, forms part of the high-mountain system toward the northwest and northeast. The elevation of the foothill zone reaches up to 500 meters above sea level. It consists predominantly of poorly permeable marl and clay formations, which, combined with the action of surface water flows, have created deeply incised ravines.

The northern and northeastern areas of Samegrelo are distinguished by steep slopes, where the geomorphological influence of the river network is particularly pronounced.

General Characteristics of Soils

In the Zugdidi and Tsalenjikha districts, large areas are covered with red soils, which, in the foothill and mountainous zones, transition into humus–carbonate soils. In these same areas, shallow humus–carbonate soils formed on marl are also encountered. In the Kheta and Tsaishi zones, deluvial soils developed on limestone occur in extensive tracts. These soils have formed as a result of the erosion and displacement of humus–carbonate soils along slopes and are characterized by considerable depth and a dark coloration. In the lowland areas of the region (Zugdidi, Abasha), medium- and strongly gleysolic soils are widespread, while in the valleys of the Tekhuri, Khobi, Tsivi, and Enguri rivers, alluvial soils are present.

Of the various soil types distributed across Samegrelo, only those of the foothill zone are suitable for the industrial development of viticulture.

Climate

According to agro-climatic zoning, the territory of Samegrelo belongs to the humid subtropical zone. It should be noted that the microclimate across this extensive area varies significantly from zone to zone. For example, the lowland zone of Samegrelo is characterized by abundant atmospheric precipitation, a high hydrothermal coefficient, an elevated sum of active temperatures reaching 45,000–46,000, and the strong influence of foehn winds.

Compared with the lowland, the mid-foothill zone experiences lower precipitation, reduced humidity, and a weaker effect of foehn winds. In the high-mountain zone, the sum of active temperatures is considerably lower.

Based on the assessment of the region's environmental conditions, the foothill zone appears to be the most promising for the further development of industrial viticulture.

Materials and Methods

For the ampelographic characterization, descriptors established by the International Organisation of Vine and Wine (OIV, 2009) were employed, as recommended by the European COST FA1003 project "East–West Collaboration for Grapevine Diversity Exploration and Mobilization of Adaptive Traits for Breeding" (2010–2014).

The documented material includes ampelographic descriptions—based on 51 core descriptors—of mature leaves, clusters, and berries of the grapevine varieties collected from the expedition area: Kharistvala Megruli, Machqvaturi, Chergvali, Makhvateli, Chechiphesh, and Paneshi.

Kharistvala Megruli

Mature Leaf

OIV 067- The mature leaf is pentagonal in shape; OIV 068- 3–5 lobed;

OIV 070- Anthocyanin coloration of the main veins is visible up to the second bifurcation; OIV 072- The blistering of the upper leaf blade surface is absent or very weak;

OIV 074- In transverse section, the leaf blade profile shows downward-curved margins; OIV 075- The surface undulation is moderately expressed;

OIV 076- Leaf teeth are convex on both sides;

OIV 079- The petiole sinus is open;

OIV 080- The petiole sinus is predominantly V-shaped;

OIV 081-1- A tooth is present within the petiole sinus, which is characteristic of the variety; OIV 081-2- No vein delimitation is observed around the petiole sinus in the mature leaf; OIV 084- The lower leaf surface is densely covered with prostrate hairs;

OIV 094- The upper lateral sinus is of medium depth.

Cluster

OIV 202- Cluster length (excluding peduncle) is short; OIV 203- Cluster width is of medium size;

OIV 204- Cluster density is medium;

OIV 206- Length of the primary cluster peduncle is short; OIV 208- The cluster shape is conical;

OIV 209- According to this descriptor, the number of wings on the primary cluster is 1–2.
Berry

OIV 220- Berry length is short,

OIV 221- while berry width is small;

OIV 223- The berries are spherical in shape; OIV 225- The skin is bluish-black in color;

OIV 231- No anthocyanin pigmentation is observed in the berry pulp; OIV 235- The pulp has medium firmness;

OIV 236- According to the descriptor, the pulp has no particular or distinctive flavor; OIV 241- Seeds are fully developed within the berry.

Machqvaturi (Machqvadina)

Mature Leaf

OIV 067- The mature leaf is lanceolate in shape, OIV 068- and the blade is 3-lobed;

OIV 070- Anthocyanin coloration of the main veins is present beyond the second branching; OIV 072- Blistering of the upper leaf surface is absent or very weak;

OIV 074- In transverse section, the leaf blade profile shows downward-curved margins; OIV 075- Surface undulation is moderate;

OIV 076- Leaf teeth are of medium type, ranging between straight-sided and convex on both sides;

OIV 079- The petiole sinus is open, OIV 080- and V-shaped;

OIV 081-1- A tooth is present within the petiole sinus; OIV 081-2- The petiole sinus is not vein-delimited;

OIV 083-2- No tooth is present in the upper lateral sinus;

OIV 084- The lower leaf surface shows strong prostrate hairiness; OIV 093- The depth of the upper lateral sinus is small.

Cluster

OIV 202- Cluster length is short; OIV 203- Cluster width is medium;

OIV 204- The cluster is dense;

OIV 206- The length of the primary peduncle is short; OIV 208- The cluster is conical in shape;

OIV 209- The cluster generally bears 1–2 wings.

Berry

OIV 220- Berry length is short; OIV 221- Berry width is small; OIV 223- The berries are spherical;

OIV 225- They exhibit a dark reddish-purple coloration;

OIV 231- No anthocyanin pigmentation is present in the pulp; OIV 235- The pulp has a soft consistency;

OIV 236- According to the descriptor, the pulp has no distinctive flavor; OIV 241- Seeds are fully developed within the berry.

Chergvali

Mature Leaf

According to descriptor OIV 067, the mature leaf is round in shape, OIV 068- with 3–5 lobes;

OIV 070- Anthocyanin coloration of the main veins is present above the second branching on the upper leaf surface;

OIV 072- Leaf blade blistering is weakly expressed; OIV 074- The leaf blade profile is undulated;

OIV 075- Surface undulation is weakly expressed; OIV 076- Leaf teeth are convex on both sides;

OIV 079- The petiole sinus is open, sometimes closed, with lobes touching each other; OIV 080- The petiole sinus is U-shaped;

OIV 081-1- No tooth is present within the petiole sinus; OIV 081-2- The petiole sinus is not vein-delimited;

OIV 083-2- No tooth is present in the upper lateral sinus;

OIV 085- The lower leaf surface shows medium-density cobweb-like hairiness between the major veins;

OIV 094- The upper lateral sinus is of medium depth.

Cluster

OIV 202- The cluster is short; OIV 203- Narrow in width; OIV 204- Dense;

OIV 206- The length of the primary peduncle is short; OIV 208- The cluster is cylindrical in shape;

OIV 209- The cluster bears 1–2 wings.

Berry

OIV 220- Berry length is short; OIV 221- Berry width is small;

OIV 223- The berries are spherical or slightly short-elliptical in shape; OIV 225- They display a greenish-yellow coloration;

OIV 235- The pulp is of medium firmness; OIV 236- With no distinctive flavor;

OIV 241- Seeds are fully developed within the berry.

Makhvateli

Mature Leaf

OIV 067- The mature leaf is lanceolate in shape; OIV 068- It is 3–5 lobed;

OIV 070- Anthocyanin coloration of the main veins is present only at the petiole junction;
OIV 072- Blistering of the upper leaf surface is weak;

OIV 074- In transverse section, the leaf blade profile shows downward-curved margins;
OIV 075- Surface undulation is strongly expressed;

OIV 076- Leaf teeth are convex on both sides;

OIV 079- The petiole sinus is closed, with the lobes touching each other; OIV 080- The base of the petiole sinus is V-shaped;

OIV 081-1- No tooth is present in the petiole sinus;

OIV 081-2- The petiole sinus is vein-delimited on both sides; OIV 083-2- No tooth is present in the upper lateral sinus;

OIV 084- The lower leaf surface is characterized by strong prostrate hairiness; OIV 094- The upper lateral sinus is shallow or very shallow.

Cluster

OIV 202- The cluster is short; OIV 203- Medium in width;

OIV 204- Dense;

OIV 206- The length of the primary peduncle is short; OIV 208- The cluster is cylindrical to conical in shape; OIV 209- Generally 1–2 winged.

Berry

OIV 220- Berry length is short; OIV 221- Berry width is small; OIV 223- The berries are spherical;

OIV 225- Bluish-black in coloration;

OIV 235- The pulp is of medium firmness; OIV 236- No distinctive flavor is observed;

OIV 241- Seeds are fully developed within the berry.

Chechiphesh

Mature Leaf

OIV 067- The mature leaf is round; OIV 068- It is 3-lobed, rarely 5-lobed;

OIV 070- Anthocyanin coloration of the main veins on the upper surface is present up to the first branching;

OIV 072- No blistering is observed on the leaf blade;

OIV 074- In transverse section, the leaf margins are curved downward; OIV 075- The surface is smooth;

OIV 076- Leaf teeth are medium, ranging between straight-sided and convex on both sides; OIV 079- The petiole sinus is open;

OIV 080- The petiole sinus is V-shaped;

OIV 081-1- No tooth is present within the petiole sinus; OIV 081-2- The petiole sinus is not vein-delimited; OIV 083-2- A tooth is present in the upper lateral sinus;

OIV 084- The lower leaf surface is characterized by strong prostrate hairiness; OIV 094- The upper lateral sinus is shallow.

Cluster

OIV 202- The cluster is of medium length; OIV 203- Of medium width;

OIV 204- Loose;

OIV 206- The peduncle is of medium length; OIV 208- The cluster is cylindrical in shape;

OIV 209- The primary cluster bears 1–2 wings.

Berry

OIV 220- Berry length is short; OIV 221- Berry width is small;

OIV 223- The berry shape is short-elliptical; OIV 225- The coloration is greenish-yellow;

OIV 231- The pulp has a soft consistency; OIV 236- With no distinctive flavor;

OIV 241- Seeds are fully developed inside the berry.

Paneshi

Mature Leaf

OIV 067- The mature leaf blade is lanceolate in shape, sometimes pentagonal; OIV 068- The leaf is 5-lobed;

OIV 070- Anthocyanin coloration of the main veins is absent or very weak; OIV 072- Blistering of the upper leaf surface is moderately expressed;

OIV 074- In transverse section, the leaf blade profile shows downward-curved margins; OIV 075- The upper leaf surface is characterized by strong undulation;

OIV 076- Leaf teeth have convex sides on both margins;

OIV 078- The petiole sinus is closed (lobes slightly overlapping), although open sinuses also occur;

OIV 080- The petiole sinus is U-shaped or brace-shaped ({); OIV 081-1- No tooth is present within the petiole sinus; OIV 081-2- The petiole sinus is not vein-delimited;

OIV 083-2- No tooth is present in the upper lateral sinus;

OIV 084- The lower leaf surface exhibits strong prostrate hairiness between the main veins; OIV 094- The upper lateral sinus is of medium depth.

Cluster

OIV 202- Cluster length (excluding peduncle) is short; OIV 203- Cluster width is small;

OIV 204- The cluster is dense;

OIV 206- The peduncle is of medium length;

OIV 208- The cluster is cylindrical, rarely conical; OIV 209- Typically 1–2 winged.

Berry

OIV 220- Berry length is medium; OIV 221- Berry width is small;

OIV 223- The berry has a short-elliptical shape; OIV 225- Bluish-black in color;

OIV 231- No anthocyanin pigmentation is observed in the pulp; OIV 235- The pulp has a soft consistency;

OIV 236- The berry has no distinctive flavor;

OIV 241- Seeds are fully developed within the berry.

Based on the ampelographic study of these varieties, several homogeneous descriptors with similar characteristics were identified.

Homogeneous descriptors showing similarity across varieties include:

OIV 074- shared by Paneshi, Chechiphesh, Makhvateli, Machqvaturi, and Kharistvala Megruli;

OIV 076- common to Kharistvala Megruli, Chergvali, Makhvateli, and Paneshi;

OIV 236- absence of distinctive berry flavor, homogeneous across all studied varieties;

OIV 241- full development of seeds, identical across all examined varieties.

Conclusion

The identification, study, and preservation of endemic grapevine varieties in the Samegrelo region, along with ensuring their continuity within their area of origin, will contribute significantly to the conservation of biodiversity, the enhancement of recognition and appreciation of Samegrelo's indigenous grape varieties, their future use as valuable breeding material, and the advancement of micro-winemaking in the region.

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