

## Biological and technological characteristics of Georgian wine and table grapes

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**Abstract.** Georgian grapevine germplasm, which has formed for thousands of years, includes white, black, red, pink and grey 525 *Vitis vinifera* cultivars. In 2009–2014 up to 440 local grapevine varieties *Vitis vinifera sativa* has been restored. These varieties are cultivated in the LEPL Agriculture Scientific-Research Center grapevine collection GEO 038, Mtskheta Munisipal, village Jighaura, at an altitude 550 m. There are retrieved and recorded in the collection up to 60 forms of *Vitis vinifera silvestris*.

In order to study biological and technological characteristics of Georgian grapevine, in 2012–2014 were investigated 50 Georgian widely cultivated white and colored wine and table grapes varieties, in the seven viticulture regions of Georgia.

Description of grapevine varieties implemented through the descriptors for grapevine (IPGRI OIV). Botanical, biological-technological, qualitative and quantitative marks are characterized and evaluated. Investigation conducted during the biologic development phases were studied for chemical and eno-carpological characteristics.

History of grapevine culture is strongly connected with the history of Georgian nation. Creation and formation of local rich assortment was due to the longest cultivation period that made Georgia one of the leading country.

Mobilization and conservation of genetic resources are becoming global issues. Georgian grapevine genetic resources are well studied enough, though needs to be investigated again in accordance with the modern requirements.

In the east part of Georgia, Shida Kartli region, Jighaura micro-zone at the grapevine collection plantation GEO038 of LEPL Scientific-Research Center of Agriculture are preserved up to 450 Georgian domestic grapevine cultivars and 60 wild and ran wild cultivars. Currently, undergo searching, studying and conserving processes of domestic and wild grapevine cultivars.

Georgian grapevine cultivars preserved at the collection are being studied step by step. During 2012–2014 vegetation period according to the ethnographic regions of Georgia – Kakheti, Imereti, Guria, Samegrelo, Atchara, Racha-Lechkhumi, Meskheta – were selected and studied 50 samples of well distributed and rare, including white and red, table, wine and table-wine grapes varieties.

According to the vine plant description and evaluation descriptors worked out by the International Plant Genetic Resources Institute IPGRI's International Vine and Wine Office – OIV, were studied ampelographic descriptors: young shoot morphology, buds fertility, inflorescence and strength of shoot growth, mature leaf, bunch, berry, seeds and woody shoot.

In the micro-zone the average daily temperature stable transition above 10°C – is on April 10 and bud opening begins approximately on April 17. The end of the leaf falling was fixed approximately on November 25. In 2012–2014, the sum of average active temperature was 3605°C.

Phonological development of phases studied and their technological properties were studied based on grapes juice chemical indicators and eno-carpological characteristics.

The studied varieties were distinguished for middle and high fertility of basal buds. The varieties: Saphena, Kakheti tetri, “Kharistvala” (Kakhuri), “Jvari”, “Atcharuli tetri”, Tavkveri, Mkhargrdzeli have functionally female flowers. The varieties: Kharistvala, Akhmetis shavi, Danakharuli, Tsiteli budeshuri, Nakutvneuli, Tavkveri, Kartlis tita, Goruli mtsvane, Gorula, Chinuri, Aladasturi, Chitistvala bodburi were characterized by the shoot in the flowering period. The longest bunch had Chitistvala bodburi and the smallest – Tchvitiluri. According to the density of bunches, varieties having a thin, medium-dense, dense and very dense bunches were discovered. Grape morphology was investigated by eight descriptors, and between them one of the determining sign was color. As a result varieties with greenish-yellow, rose, red, gray, dark red-purple and dark blue color are selected. A typical for all the varieties was well-developed seeds.

Sugar content, total acidity and pH level of juice for the table grapes varieties (Tsiteli budeshuri, Tetri budeshuri, Kharistvala kakhuri, Tita Kartluri, Gorula) and wine varieties comply with the requirements.

The result of investigation (2012) for the following red grapes varieties (Dzelshavi, Usakhelouri, Chkhaveri, Shavkapito, Sapheravi, Tsiteli budeshuri, Satsuravi, Mujuretuli, Ojaleshi, Rkatsiteli vardispheri, Mgaloblishvili, Tavkveri, Otskhanuri Saphere, Aleksandrouli, Sapheravi atenis, Axmetis shavi, Nakutvneuli, Ghrubela kakhuri, Danakharuli, Gabasha, Aladasturi) showed the lowest content of total anthocyanin in Tsiteli budeshuri –133.63 mg/kg, highest was in Otskhanuri saphere – 2271.61 mg/kg. The total polyphenols studied in grape skin and seed. In grape skin, highest level found in Ojaleshi –3129.65 mg/kg

and lowest in Rkatsiteli vardispheri 1192.61 mg/kg. In grape seed, highest level found in Saperavi – 386.31 mg/kg and lowest in Chkhaveri – 148.14 mg/kg.

In 2013 vegetation period, total anthocyanin lowest content detected in Rkatsiteli vardispheri – 158.42 mg/kg, and the highest in Otskhanuri saphere – 1872.07 mg/kg. Total polyphenols lowest content in the grapes skin found in Aleksandrouli – 710.68 mg/kg, and the highest in Ojaleshi – 2262.43. In the grapes seeds lowest content found in Mujuretuli – 192.3 mg/kg, while lowest in Tavkveri – 421.72 mg/kg.

As a result of 2014 investigation total anthocyanin lowest content was found in Rkatsiteli vardispheri – 147.48 mg/kg and the highest in Ojaleshi – 1495.47 mg/kg. Total polyphenols content in grapes skin showed lowest content in Rkatsiteli vardispheri – 408.44 and the highest in Sapheravi – 1543.02 mg/kg. The lowest total polyphenols content in grapes seeds detected in Mgaloblishvili – 109.66 mg/kg, while the highest was in Akhmetis shavi – 848.95 mg/kg.

During 2012 vegetation period in white grapes varieties lowest polyphenols content was found in Mtsvivani kakhuri – 474.68 mg/kg, and the highest in Kundza – 1272.61. In the grapes seeds the lowest was in Meskhuri mtsvane – 136.0 mg/kg and the highest in Goruli mtsvane – 425.97 mg/kg.

According to the 2013 data with the lowest content of polyphenols in the skins of grapes was found in Tita kartluri – 283.11 mg/kg and the highest Kundza – 1272.0 mg/kg. In the grapes seeds the lowest polyphenols content detected in Kapistoni – 210.45 mg/kg and the highest in Mtsvane kakhuri – 862.88 mg/kg.

Because of 2014 investigation in the skin of grapes the lowest polyphenols content found in Atcharuli tetri – 712.56 mg/kg, and the highest in Saphena – 1942.8 mg/kg. In the seeds, the lowest content was found in Jvari – 136.23 mg/kg and the highest in Kakhis tetri – 1218.0 mg/kg.

The data of scientific research will be included in Georgian and European Plant Genetic Resources databases and catalogs; the data will be used for quick identification, preliminary determination of possible results, propagation, selection of parent in target breeding and other important matters to solve.

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