

## AROMA PROFILE OF STANUŠINA WINES DETERMINED BY GC-MS

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Stanušina is an autochthonous Macedonian grape variety, grown mainly at the oldest Tikveš wine district, at the region near to the Tikveš Lake (Begnište, Resava and Brusani) in Republic of N. Macedonia. The main characteristic of this variety is its high endurance, especially on droughts and its ability to grow at vineyards with not very fertile soils. Before the period when the phylloxera was spread in XIX century causing devastating damage by infecting roots of European *Vitis vinifera*, including the grapevines in Macedonia too, Stanušina was the main variety for producing red wine in the region. In this study, nine Stanušina wines from the Tikveš wine district have been produced in order to determine their aroma profile. The analysis of aromatic composition was performed with GC-MS system consisted of GC-17A Gas Chromatograph and GCMS-QP5050A Mass Spectrometer after liquid-liquid extraction. In total, 42 aroma compounds were detected revealing a complex aroma profile of Stanušina wines composed of high alcohols, esters, fatty acids, terpenes, volatile phenols and sulphur and other compounds. The dominant compounds were high alcohols, and among them, isoamyl alcohol (with fruity aroma of pear and banana) was the major compound, followed by 2-phenylethyl alcohol (with pleasant floral aroma of rose). Ethyl acetate, which influence floral and complex wine aroma, dominated in the group of esters, followed by ethyl lactate and ethyl succinate. Terpene alcohols such as nerol, geraniol, linalool and terpeniol, which determine the aroma of Muscat grape varieties, were detected in Stanušina, in which linalool and geraniol were the main terpenes. This study provides an important aroma characterization of Stanušina red wines useful for the viticulturists and winemakers confirming that this autochthonous variety possesses typicality and quality and should be considered for production of quality wines.

**Keywords:** aroma, alcohols, esters, terpenes, Stanušina wine

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## PROFIL AROME VINA SORTE STANUŠINA UTVRGEN SA GC-MS

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Stanušina je autohtona makedonska sorta vinove loze, koja se gaji uglavnom u najstarijem tikveškom vinskom okrugu, u regionu blizu Tikveškog Jezera (Begnište, Resava i Brušani) u Republici Severnoj Makedoniji. Glavna karakteristika ove sorte je visoka izdržljivost, posebno na suše i sposobnost da raste u vinogradima sa ne baš plodnim zemljištima. Pre perioda širenja filoksere u XIX veku, koja je nanela razornu štetu zarazom korena evropske *Vitis vinifera*, uključujući i vinovu lozu u Makedoniji, Stanušina je bila glavna sorta za proizvodnju crvenog vina u regionu. U ovoj studiji proizvedeno je devet vina sorte Stanušina iz tikveškom vinskom okrugu u cilju utvrđivanja aromatičnog profila vina. Analiza aromatičnog sastava je izvršena pomoću GC-MS sistema koji se sastoji od gasnog hromatografa GC-17A i masenog spektrometra GCMS-QP5050A nakon tečno-tečne ekstrakcije. Detektovana su ukupno 42 aromatična jedinjenja koja otkrivaju složen profil arome vina Stanušina sačinjen od viših alkohola, estara, masnih kiselina, terpena, isparljivih fenola i sumpora i drugih jedinjenja. Dominantna jedinjenja su bili viši alkoholi, a među njima je glavno jedinjenje bio izoamil alkohol (sa voćnom aromom kruške i banane), a zatim 2-feniletil alkohol (sa prijatnom cvetnom aromom ruže). U grupi estara dominirao je etil acetat, koji utiče na cvetnu i kompleksnu aromu vina, a zatim slede etil laktat i etil sukcinat. Terpenski alkoholi kao što su nerol, geraniol, linalol i terpeniol, koji određuju aromu muskatnih sorti vinove loze, otkriveni su u Stanušini, među kojima su linalol i geraniol bili glavni terpeni. Ova studija daje značajnu aromatičnu karakterizaciju crvenih vina sorte Stanušine korisna za vinogradare i vinare, potvrđujući da ova autohtona sorta poseduje tipičnost i kvalitet i da se treba uzeti u obzir za proizvodnju kvalitetnih vina.

**Ključne reči:** aroma, alkoholi, estri, terpeni, vino Stanušine.

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