



EVALUATION OF SUGAR AND POLYPHENOLIC PROFILES OF FRUITS OF TWO APPLE CULTIVARS GROWN IN AN INTEGRATED AND ORGANIC PRODUCTION SYSTEM IN A NORDIC CLIMATE.

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Fjord areas in Western Norway (60 ° North) represents the most northerly tree fruit producing areas in the world. This area influenced by fjord and the Gulf Stream together with long daylight during summer days makes this location suitable for apple production. The aim of this study was to compare fruits, its size and chemical content of two main commercial apple cultivars ('Discovery' and 'Red Aroma') from both organic (OP) and integrated production (IP) grown in a high density planting system under the same agro-climatic conditions. Separations of sugars were performed using DIONEX ICS 3000 DP liquid chromatography system. Ultra high performance liquid chromatography (UHPLC) coupled with a diode array detector and connected to a triple-quadrupole mass spectrometer was used for determination and quantification of the polyphenols. OP fruits were smaller than IP for both cultivars. 'Red Aroma' fruits from IP were significantly larger than IP 'Discovery' (177 and 150 g, respectively). Over color of 'Discovery' fruits produced at an integrated way and 'Red Aroma' fruits produced at organic way were more intense. Among 17 sugars detected in the apple fruits, the most common were fructose, glucose, sucrose and galactose, which amounted around 43%, 33%, 11% and 4.5%, respectively. In total 13 other sugars (trehalose, arabinose, isomaltose, meslesitose, gentobiose, turanose, raffinose, ismaltotriase, maltose, panose, maltiose, ribose and zylose) and three sugar alcohols (sorbitol, galactitol and mannitol) were found too, but in low levels. According to the levels of glucose, fructose and sucrose, the sweetness index was calculated and IP 'Red Aroma' and OP 'Discovery' fruits were much sweeter than its counterparts. From a total of 19 polyphenolic compounds detected, quercetin 3-*O*-galactoside and chlorogenic acid were the most abundant. Organically produced apple fruits stored higher level of the majority of detected polyphenolic compounds. The skin had higher contents of phenolic compounds than the mesocarp and the most abundant in the skin was quercetin 3-*O*-galactoside and phlorizin. No differences in the phenolic contents were found between cultivars or OP and IP grown. Total anthocyanin content was higher in organic apples (0.293 – 0.540 g/kg frozen weight) than in integrated (0.184 – 0.253 g/kg frozen weight).

Keywords: *Malus domestica* Borkh., cultivars, fruit quality, sugar profile, phenolic profile