

Bioactive compounds of fruits from the selected old apple-tree cultivars

mgr inż. Kamil Szymczak

Supervisor: dr hab. inż. Radosław Bonikowski, prof. uczelni

Auxiliary supervisor: dr inż. Małgorzata Zakłos-Szyda

Apples are the most important fruits in our climate zone. Their high consumption and pro-health values make them an extremely important component of our diet. The compounds contained in them are attributed to a very wide range of properties - from bactericidal and virucidal to antioxidant and anti-cancer.

In recent years, consumers' attention has been focused on old varieties of vegetables and fruit - including apples. Traditional varieties of trees and shrubs are known for their resistance to diseases (and thus the lack or minimal need to use chemical plant protection products) and high content of valuable bioactive compounds, such as polyphenols or triterpenic acids.

The research described in the dissertation was carried out over three harvest seasons, during which 30 old varieties and 7 new varieties of apples were tested. The analyzes included sensory evaluation, volatile organic compounds (GC) composition, acidity (titratable), allergenicity (ELISA), antioxidant potential (DPPH), total polyphenols (FC), phenolic compounds (GC), individual polyphenols (HPLC), content of triterpenic acids (GC) and content of sugars and sorbitol (GC). The obtained results suggest that selected old apple varieties can successfully rival with new varieties, commonly available in terms of consumption values, but above all they are characterized by significantly higher contents of biologically active compounds, such as polyphenols or triterpene acids.

For two old varieties with the highest content of bioactive compounds, *in vitro* tests were carried out to determine their influence on the metabolic activity of cells, proliferation, intracellular oxidative stress and cytoprotective activity. They clearly show that apple peel extracts have high metabolic activity and, above all, strong antiproliferative properties against various tumor cell lines (Caco-2, HepG2, HL60). Moreover, the extracts showed a high potential for reducing the intracellular level of free radicals and thus reducing oxidative stress.