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VARIETY-BASED RESEARCH ON THE PHENOLIC CONTENT IN THE AERIAL PARTS OF ORGANICALLY AND CONVENTIONALLY GROWN BUCKWHEAT

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Chemical compounds: Neochlorogenic acid (PubChem CID: 5280633); Chlorogenic acid (PubChem CID: 1794427); Rutin (PubChem CID: 5280805); Quercitrin (PubChem CID: 5280459); Quercetin (PubChem CID: 5280343).

Abstract

The aim of this study was to evaluate the impact of different farming types—organic and conventional—on phenolic content in buckwheat varieties grown in Lithuania. Rutin was identified as the dominant phenolic compound in contrast to both phenolic acids (chlorogenic and neochlorogenic acids) and other flavonoids (quercetin and quercitrin). It was determined that variety had the highest impact ($p<0.05$) on the phenolic content of various aerial parts of buckwheat. In most cases, farming practice significantly ($p<0.05$) affected the accumulation of phenolics in buckwheat. Organically grown plants usually contained higher amounts of phenolics than those grown under conventional farming conditions. According to a cluster analysis, varieties *Panda*, *Zaleika*, and *VB Nojai* were found to accumulate the highest amounts of phenolics.

1. Introduction

Common buckwheat (*Fagopyrum esculentum* Moench) is recognized worldwide as an alternative crop that is regaining significance due to its nutritive, health-promoting, gluten-free, and biofunctional properties (Christa & Soral-Śmietana, 2008; Zhang et al., 2012). Although in the 20th century buckwheat grain lost its popularity to wheat (Cawoy, Ledent, Kinet, & Jacquemart, 2009), interest in it has recovered in recent years. According to data collected by the Food and Agriculture Organization of the United Nations, the global harvested area of buckwheat increased by 30 % between 2010 and 2013, leading to a 35 % yield increase and raising the production value of buckwheat by 61 % (http://faostat.fao.org, 2013). However, not all aerial parts of buckwheat, which are rich in nutritional and functional values, are fully utilized. Although the grain is the most exploited part of the plant, other aerial parts of buckwheat also possess medicinal properties (Lim, 2013). Buckwheat herb is included in the European Pharmacopoeia as a raw pharmaceutical material for treating venous disorders (Ihme et al., 1996; Schulz, V., Hänsel, R., Blumenthal, M., Tyler, 2004). Thus, buckwheat is a versatile crop with various agricultural purposes. Buckwheat has modest environmental requirements; it may be grown in poor soils and does not require protection (Ahmed et al., 2013; Popović et al., 2014). Hence, it is a perfect candidate crop for organic farming, which does not involve fertilization or any other plant protection measures.

Organic farming regained favor at the end of the 20th century (Lawrence, Lyons, & Wallington, 2011) due to a newly developed positive public perception. Generally, it is believed that vegetables, crops, fruit, and other plants grown on organic farms are healthier and safer and have a higher nutritional value than those grown conventionally. This opinion has had a major worldwide economic effect; e.g., between 1997 and 2011, in the USA