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Variation in Chemical Composition of the Hypocotyle of Maca (*Lepidium meyenii* Walp.) cultivated in Czech Republic and in Peru

INGRID MELNIKOVA¹, JAROSLAV HAVLIK², KATERINA HALAMOVA¹, PAVEL KLOUCEK², ELOY
FERNÁNDEZ CUSIMAMANI¹, IVA VIEHMANNOVÁ¹

¹Czech University of Life Sciences Prague, Department of Crop Sciences and Agroforestry in Tropics and Subtropics, Czech Republic

²Czech University of Life Sciences Prague, Department of Microbiology, Nutrition and Dietetics, Czech Republic

Abstract

Maca (*Lepidium meyenii* Walp., Brassicaceae) is a Peruvian crop cultivated in the Andes mountains for its hypocotyl that is used exclusively for medicinal purposes. According to folk beliefs, Maca is an aphrodisiac which enhances sexual drive and female fertility in humans and domestic animals. These beliefs have been sustained by various experiments in rats and in men. Maca has been reported to be rich in amino acids, glucosinolates and alkaloids macamides, which are probably responsible for the aphrodisiac effects and therefore the main quality markers in Maca.

The nutritional value (relative contain of macamides, fatty acid composition and energetical value) of three samples of Maca of Peruvian origin was compared to one sample of Maca cultivated in Czech Republic. The plant material was obtained from commercial sources except the sample that was grown on an experimental field of the Czech University of Life Sciences Prague. Although the growth period of Maca in Czech Republic was approximately the same as in Peru, the yield of bulbs was much lower than in samples of Peruvian origin. All the samples were prepared by extraction and repeated percolation in petrolether and analysed by RP-HPLC with DAD detection. The macamides and fatty acids were tentatively identified by retention time comparison on Agilent Eclipse XDB-C18 column and UV spectra matching. Bound fatty acids were determined as methylesters after alkaline hydrolysis using gas chromatography. Gross energy was determined using calorimetry.

There was a significantly lower concentration of macamides in the sample grown in Czech Republic compared to the Peruvian samples (4-9 times lower). The same was found for free fatty acids, linoleic acid and linolenic acid. The gross energy of Maca averaged 1740 kJ pro 100 g and was similar in all samples as well as the composition of bound fatty acids. The analysis showed that Maca cultivated under the climat condition of Czech Republic is similarly rich in energy as Maca cultivated in Peru, but it contains significantly lower concentrations of bioactive macamides and free fatty acids.

Keywords: Fatty acids, *Lepidium meyenii*, macamides, nutritional value