

**AMINO ACID COMPOSITION OF PROTEINS
HEDYSARUM ALPINUM L. UNDER CONDITIONS OF CULTURE
OF THE MID-TAIGA SUBZONE OF THE REPUBLIC OF KOMI**

N. V. Portnyagina, M.G. Fomina, E. E. Echishvili

*Institute of Biology of Komi Scientific Center of the Ural Branch
of the Russian Academy of Sciences
28 Kommunisticheskaya Str., Syktyvkar 167920, Russia
E-mail: elmira@ib.komisc.ru*

Received September 17, 2019

Revised September 30, 2019; Accepted October 29, 2019

The article presents the results of a long-term study of the amino acid composition of the proteins of the medicinal plant *Hedysarum alpinum* L. from the Fabaceae family. It was revealed that the above-ground raw phytomass of perennial alpine penny plants cultivated in the mid-taiga subzone of the Komi Republic in different years was characterized by high and stable crude protein (18.1 – 23.8%) and total amino acid content (13.6 – 17.8%) in them, regardless of reproduction seeds, plant age and meteorological conditions of the growing season. For the first time, the distribution of total nitrogen and amino acids in the aerial organs of Alpine penny worm was studied. High levels of crude protein (16.9 – 26.9%) and the amount of amino acids (12.4 – 16.8%) were found in unripe fruits, flowers, and leaves, medium in stems with a diameter of less than 3 mm, 10.6 – 15.0% of crude protein, and 7.2 – 9.5% of the amount of amino acids low – in stems with a diameter of more than 3 mm, 4.1 – 4.8% and 1.9 – 2.2%, respectively. In the raw aboveground phytomass, as well as in various organs of alpine cepa plants, 17 amino acids were found and quantified, including seven essential amino acids (threonine, valine, methionine, isoleucine, leucine, phenylalanine, lysine). The proportion of essential amino acids ranged from 36 to 40%. The highest content in the raw phytomass was noted for amino acids: aspartic, glutamine, lysine, leucine, proline, alanine, valine and tyrosine – 15.1, 11.6, 8.6, 8.1, 6.6, 6.3, 6.0 and 5.5%, respectively.

Key words: *Hedysarum alpinum*, introduction, total nitrogen, amino acids, amino acid analyzer.

DOI: 10.18500/1682-1637-2019-4-199-211

ACKNOWLEDGMENTS

The work was carried out on the basis of the unique scientific setting “Scientific Collection of Living Plants” of the Botanical Garden Institute of Biology

of Komi Science Centre of the Ural Branch of the Russian Academy of Sciences № 507428 and as part of a state assignment № AAAA-A17-117122090004-9.

REFERENCES

Atlas of Medicinal Plants of Russia. Moscow: All-Russian Scientific Research Institute of Medicinal and Aromatic Plants, 2006. pp. 122 – 123. (in Russian).

Kukushkina T. A., Zinner N. S., Vysochina G. I., Sviridova T. P. The content of xanthenes in the aerial part of plants *Hedysarum theinum* Krasnov and *Hedysarum alpinum* L. (Fabaceae) when grown in the Siberian Botanical Garden (Tomsk). *Khimija rastitel'nogo syr'ja (Chemistry of plant raw material)*, 2011, vol. 3, pp. 113 – 116. (in Russian).

Maysuradze N. I., Ugnivenko V. V. The tasks of introducing medicinal plants and ways to solve them. In: *Results and prospects of scientific research in the field of creating medicines from plant materials: abstracts of the All-Union Scientific Conference*. Moscow: All-Russian Scientific Research Institute of Medicinal and Aromatic Plants, 1985. pp. 294 – 251. (in Russian).

Mishurov V. P., Volkova G. A., Portnyagina N. V. *Introduction of useful plants in the subzone of the middle taiga of the Komi Republic: Results of the Botanical Garden over 50 years*. Vol. 1. St. Petersburg: Nauka Publ., 1999. 216 p. (in Russian).

Mishurov V. P., Portnyagina N. V., Zaynullina K. S., Shalaeva O. V., Shelaeva N. Yu. *Experience in introducing medicinal plants in the mid-taiga subzone of the Komi Republic*. Ekaterinburg: Ural Branch of the Russian Academy of Sciences, 2003. 243 p. (in Russian).

Miura T., Ichiki H., Hashimoto I., Kao M., Kubo M., Ishihara E., Komatsu Y., Okada M., Ishida T., Tanigawa K. Antidiabetic activity of a xanthone compound, mangiferin. *Phytomedicine*, 2001, vol. 8, iss. 2, pp. 85 – 87.

Portnyagina N. V., Fomina M. G., Punegov V. V., Zaynullina K. S., Echishvili E. E. The results of the introduction of *Hedysarum alpinum* L. under the conditions of the middle taiga subzone in the Komi Republic. *Izvestia of Samara Scientific Center of the Russian Academy of Sciences*, 2014, vol. 16, iss. 1 (3), pp. 796 – 799. (in Russian).

Portnyagina N. V., Fomina M. G., Echishvili E. E. Alpine penny (*Hedysarum alpinum* L.) in the culture of the middle subzone of the taiga of the Komi Republic. *Bulletin of the Institute of Biology of the Komi Scientific Center of the Ural Branch of the Russian Academy of Sciences*, 2015, vol. 6 (194), pp. 6 – 9. (in Russian).

Plants for us: reference publication. St. Petersburg: Educational Book, 1996. 654 p. (in Russian).

Punegov V. V., Fomina M. G., Chucha K. V. The content of mangiferin in the raw phytomass and organs of the plant *Hedysarum alpinum* L. in a culture in the middle subzone of the taiga of the Komi Republic. *Bulletin of the Institute of*

Biology of the Komi Scientific Center of the Ural Branch of the Russian Academy of Sciences, 2015, vol. 6 (194), pp. 13 – 16. (in Russian).

Red Book of the Komi Republic. Rare and endangered species of plants and animals. Moscow: KMK Scientific Press Ltd., 2009. 472 p. (in Russian).

Cite this article as:

Portnyagina N. V., Fomina M. G., Echishvili E. E. Amino acid composition of proteins *Hedysarum alpinum* L. under conditions of culture of the mid-taiga subzone of the Republic of Komi. *Bulletin of Botanic Garden of Saratov State University*, 2019, vol. 17, iss. 4, pp. 199 – 211. (in Russian). DOI: 10.18500/1682-1637-2019-4-199-211.