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## Chemical composition of *Hordeum vulgare* var. *rimpaii* grain under reduced tillage and *Methylobacterium symbioticum* application\*

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### Abstract

Agronomic practices, including soil tillage and fertilisation, exert a profound influence on the nutritional quality of cereal grains, particularly in organic farming. This study assessed the effect of soil tillage (reduced vs ploughing) and foliar application of the nitrogen-fixing bacterium *Methylobacterium symbioticum* (single and double application) on the chemical composition of black barley (*Hordeum vulgare* var. *rimpaii*) cultivated organically. A field study was conducted in two growing seasons (2023-2024) on an organic farm located in west-central Poland. Grain was analysed for macro- and micronutrients, protein content and amino acid profile, starch, dietary fibre,  $\beta$ -glucan, and total phenols. The crop responses were influenced by the weather conditions. The tillage system had an impact on most of the parameters, with ploughing increasing the content of P, K, Mg, total phenols, and, under less favourable hydrothermal conditions, protein content and amino acid composition. Conversely, reduced tillage led to improved grain density. Application of *M. symbioticum* had a limited effect, primarily enhancing starch content following double application. However, when combined with reduced tillage, the biostimulant enhanced dietary fibre and  $\beta$ -glucan accumulation. Grain yield and size parameters were positively correlated with Mg, Ca, and amino acid contents, whereas micronutrient concentrations were negatively associated with grain size. Overall, the results indicate that reduced tillage combined with microbial fertilisation can improve selected quality traits of black barley grain, supporting its sustainable cultivation in organic systems.

**Keywords:** reduced tillage, *Methylobacterium symbioticum*, nutritional value, organic farming, black barley

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