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Production and Quality Parameters of Oat Grown in Conventional/Organic Farming

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[Abstract]
Hulled and naked oat is a perspective crop for the low input production systems due to its low requirements for soil quality and nutrition. Oats have good competitive ability against weeds and can provide appropriate yield in organic farming in comparison with other cereal species such as wheat or barley. It is a perspective crop from the point of view of use in the food industry too. The aim of our study was to compare the production and quality parameters of naked and hulled oat grown in both organic (OF) and conventional fields (CF). Small plot trials were conducted in two locations in the Czech Republic (České Budějovice, Prague) for four years (2018-2021) in two production systems (OF, and CF). We used four varieties of hulled oat (Korok, Kertag, Raven, Seldon) and one variety of naked oat (Patrik). During the vegetation, agronomically important data were recorded. After harvest samples were processed in the laboratory and analyzed selected quality parameters of grain dry matter (the protein content was determined by the Kjeldahl method, starch content in grain according to Ewers, fat content in grain dry matter by the modified method according to Soxhlet, and ash content in grain dry matter). The data were evaluated using the program STATISTICA version 13.2, StatSoft, Inc., California, USA. It is clear from the results that the number of panicles before the harvest was influenced by the location, cultivation system, year, and, to a lesser extent, the influence of the variety. The number of panicles in OF averaged 340 per square meter, which was 90% of the value of CF. For thousand grain weight (TGW), a significantly predominant effect of year was found. The independent effect of location on TGW was statistically not significant. Grain yield was predominantly influenced by cultivation system and location. In OF, it reached an average of 3.97 $t.ha^{-1}$, which was 75% of the yield of CF. As part of the evaluation of the basic grain quality indicators, the content of protein, starch, fat, and ash in the dry matter of the grain was evaluated. The content of protein in the dry matter of the grain was predominantly influenced by year, followed by the influence of the variety and a fairly comparable influence of the cultivation system and locality. On average, it achieved 16.05% in OF and 17.01% in CF. The starch content was then related to the protein content, where as a result of the lower protein content in the grain of OF oats, the content of starch and fat was on the contrary increased. The year turned out to be the most significant factor, affecting both the starch content in the dry matter of the grain and the fat content. This was followed again by a fairly comparable influence on the cultivation system and locality. The influence of the cultivation system and location was not statistically significantly applied in the case of ash content in dry matter. Based on our results we can propose both types of oat (hulled and naked) as perspective crops for OF. An organic farmer can expect to achieve stable yields which, in less favorable conditions for the production of cereals in the OF, may be close to the level of conventional yields. In the future, it will be important to change agrotechnology in OF and increase oat yield because this crop has a good potential to grow in areas with low nitrogen input or less fertile soil.

Keywords: hulled oat, naked oat, organic farming, conventional farming, yield