

## Brewers grains and the rational approaches to its utilization

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### Abstract

The current work represents the results of brewers' spent grain (BSG) recycling attributed to its use as the most abundant brewer by-product in national economy applications. The chemical composition of the BSG, rich in proteins and carbohydrates on the one hand, high humidity (70-80%) and the ability to rapidly decay with the formation of highly toxic substances (indole, scatol, furfural) on the other hand, solves the dual problem of resource conservation and environmental protection.

The objectives of this study were to investigate the hydrolysis of brewers' spent grain by Cellolux-A enzymes and evaluate malt bagasse content after the treatment to apply it as a soil structurant. Treatment of BSG (fraction  $\leq 5$  mm, fraction  $\leq 1$  mm) with Cellolux-A at different temperatures (40, 50 and 60 °C) was performed. The parameters of the hydrolysis process were optimized: the dose of the enzyme was 0.1g/1g of substrate, the temperature was 60 °C, the duration was 5 hours. They provide the maximum yield of reducing sugars, equal to  $9.96 \pm 0.30\%$ . The monosaccharide composition of brewers' spent grain hydrolysates was studied by HPLC. It is established that they contain glucose, xylose, mannose, arabinose – sugars, which are sources of carbon and used to accumulate yeast biomass, which causes the demand for hydrolysates in biotechnology. The brewers' spent grain bagasse can be recommended to maintain soil fertility due to the increased protein content and lack of acid after the treatment. It's important to emphasize that BSG bagasse utilization doesn't affect acidification of soil. All this provides an opportunity to create a low-waste complex processing of grain waste of brewers.

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