The Effectiveness of Using Ultradisperse humic Sapropel Suspension in the Food industry: a review

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Sapropel is organic-rich sediments deposited under highly anoxic conditions where deep water ventilation is absent. These dark, fine-grained, and unconsolidated sediments are from freshwater, including the lakes and oceans. It finds wide use in agricultural production as fertilizer and remediation of soils. Besides, it plays a role in animal feed production, medicine, balneology, etc. [1, 2]. Recently, research has revealed that sapropel can be used as raw material for obtaining sapropel extract. The latter is used to prepare pharmaceuticals and promote new exportable products and services [3].

The ultrasound treatment can be used to disintegrate sapropel, followed by chemical extraction to derive humic substances. Using the technology developed at the Institute of Lake Science of the Russian Academy of Sciences (RAS) in Saint Petersburg, the ultradisperse humic sapropel suspension (UDHSS) is extracted using alkaline extraction from sapropel under ultrasonic cavitation. This sapropel suspension is composed of sugars, lipids, humic substances, trace metals, and nanoparticles of size 86–89 nm [4]. This suspension's composition and properties have attracted much attention from researchers, and they have started researching this suspension and applying it in the food industry.

This review discusses the effectiveness of using ultradisperse humic sapropel suspension in the food industry. The article covers the application of UDHSS in cereal grains and feedstuff, ethanol production, mycotoxins fighting.

Sapropel suspension is used to fight microorganisms present in cereal grains and animal feed. According to previous studies, UDHSS has shown antimicrobial properties. Experiments conducted using this suspension on barley grains and distillers' grain proved a decrease in fungi and bacteria concentration. In these experiments, barley grains were treated using UDHSS with different dry matter concentrations and humic substance content [4, 5].

Ultradisperse humic Sapropel suspension can be applied in ethanol production. For evaluating the prospects of using UDHSS in ethanol preparation, pilot batches of ethanol were produced by fermenting wort obtained from barley treated with UDHSS. The latter influenced the fermentation process parameters: the ethanol concentration, the soluble unfermented sugars, the total soluble sugars, and the undissolved starch in the mash. In the research carried out, the results indicated that a distillate as a by­product of ethanol obtained from udhss treated barley contains less methanol, one of the most toxic congeners, and less 2-propanol. the future application of sapropel extract as an alternative to antibiotics was suggested [5, 6].

The study on humic substances carried out by [7] has shown that the soil humic substances affect soil enzymes' activity and stability (lysozyme and urease). The main components of UDHSS are humic substances (HSs), compounds that arise from the decomposition and transformation of plant, animal, and microbial residues. However, the research on the activity of humic substances (HSs) presented in UDHSS enzymes' activity is lacking. The research on the application of UDHSS on enzymes applied in the production of fermented alcoholic drinks is crucial.

Due to the high concentration of humic substances and the antimicrobial properties of UDHSS, the suspension can be used as a mycotoxins' adsorbent agent. A promising extract to fight against mycotoxins is an ultradisperse humic-sapropel suspension containing humic substances. The targeted mycotoxins may be Aflatoxins, Ochratoxin A (OTA), Fumonisin, Zearalenone (ZEA), and Deoxynivalenol (DON). These are the most common ones that pose a threat to human and animal health. Researchers will establish the adsorbing role of ultradisperse humic-sapropel suspensions. The researchers should also identify its ability to detoxify various mycotoxins without useful binding mineral and vitamin complexes [8].

References

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