DEVELOPMENT OF ENTEROSORBENT RECOVERY TECHNOLOGY BASED ON MECHANICALLY ACTIVATED HYDROLYTIC LIGNIN

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ANNOTATION

According to the test results, neither mineral-based sorbents, nor complex sorbents (using microorganisms, elements of their cells, products of their metabolism, etc.), nor "biotransformers" can show 100% efficiency against the main mycotoxins. According to the test results (mycotoxins at a concentration of 200 μg/kg were added to the feed and adsorbents at the level of 0.5% of the feed), the maximum absorption rate of zearalenone was 58%, ochratoxin A - 54%, deoxynivalenol - no more than 40%, T-2 toxin - not more than 30%. Currently, there is no single drug that has universal adsorption and inactivating activity against all major mycotoxins.

Keywords: Dioxynivalenol (DON), T-2 toxin, zearalenone, ochratoxin A, mycotoxin, optimization.

INTRODUCTION

Mycotoxicoses cause billions in losses to the agricultural industry worldwide every year. They can cause the development of tumors, damage the immune system, disrupt the functioning of the liver and kidneys [1,2]. The main method of removing mycotoxins from feed is neutralization using enterosorbents included in mixed feed. The effectiveness against different mycotoxins varies significantly due to the diversity of their chemical structure and properties [3,4]. Nowadays, the demand for adsorbents in the pharmaceutical, oil and gas, cosmetology, oil and gas processing industries, also, the demand for highly selective, efficient and environmentally safe adsorbents in various sectors of the national economy is increasing [5,6]

EXPERIMENTAL PART

In order to optimize the composition of the complex nanosorbent for use in agriculture, it is necessary to draw up "content-property" diagrams that reflect the dependence of the sorption capacity on typical exogenous toxins common in our country. It is constructed using experimental design methods. There is a "composition-property" diagram in the implementation of the simplex lattice plan of the experiment to study the dependences of the sorption capacity on the composition of the complex nanosorbent. First of all, it depends on the structural features of the sorbents themselves and the toxins they adsorb. After constructing mathematical models of sorption capacity for various toxic substances, it is necessary to solve the problem of multi-criteria optimization. Usually, to solve such problems, the method of selecting the main criterion is used, after which the problem of optimization with respect to the selected criterion is solved.

In the case under consideration, it is difficult to choose the main criterion, the mathematical solution of the problem causes great difficulties. Therefore, it is appropriate to use a graphical method to solve the given optimization problem. The obtained result is shown in Figure 1.

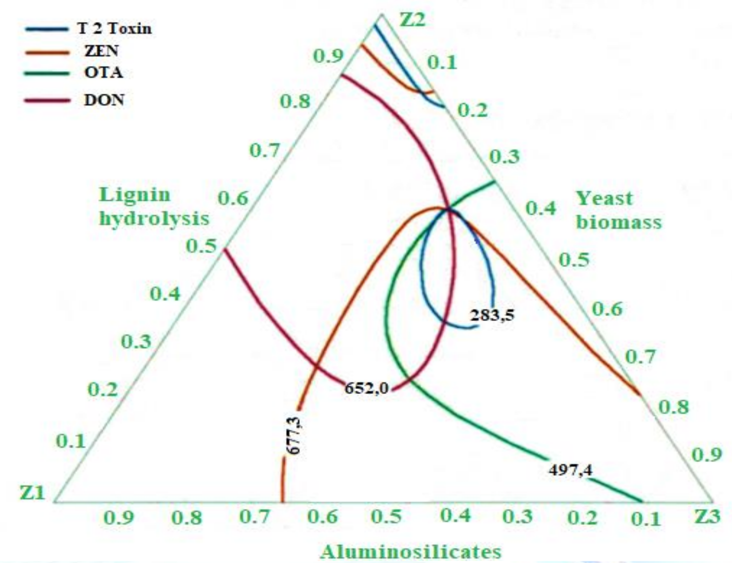

Figure 1. Composition-property diagram for 4 toxin sorptions

As can be seen from Figure 1, the composition of the composition with optimal sorption capacity for all studied toxins (in mass percentage): 60% mechanically activated hydrolytic lignin, 30% mechanically activated nutritional yeast biomass and 10% mechanically activated bentonite clay. Experimental determination of the sorption capacity of the above composition showed a good convergence of theoretical and experimental data.

CONCLUSION

1) As a result of the research, a complex nanosorbent production technology for agriculture was developed.

2) The optimal commercial form of complex nanosorbent for agricultural use is microgranules with a size of 0.2-0.8 mm, their composition (in mass percentage) is 60% hydrolytic lignin, 25% fodder yeast biomass, 10% aluminosilicates and 5% Na-CMC.

3) Information obtained during research tests can serve as a basis for creating technical conditions and technological regulations.

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