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Biological Activities of the Golden Chantarelle Mushroom *Cantharellus cibarius* (Agaricomycetes) Extracts Obtained as a Result of Single and Multi-Objective Optimization Studies

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ABSTRACT: In our study, the biological activities of the wild edible mushroom *Cantharellus cibarius* were determined. First of all, 64 different experiments were performed in the Soxhlet device at 40–70°C extraction temperatures, 4, 6, 8, and 10 h of extraction time and 0.25, 0.50, 1, and 2 mg/mL extract concentrations, and total antioxidant (TAS) and total oxidant values (TOS) were determined, and both single-purpose and multi-objective optimization studies were performed. The extraction conditions were optimized so that the objective function of the single-purpose optimization would be the maximum TAS value, and the objective function of the multi-objective optimization would be the maximum TAS and minimum TOS values. The data obtained from the experimental study were modeled with artificial neural networks from artificial intelligence methods, and optimization was performed with a genetic algorithm. After the single-objective optimization process, the optimum extraction conditions were found as 46.622°C, 5.110 h and 1.973 mg/mL and the multi-objective optimum extraction conditions were found as 50.927°C, 6.094 h and 1.439 mg/mL. The TAS values of the extracts obtained as a result of single-objective and multi-objective optimization were measured as 5.511 and 5.359, respectively, and the TOS values were measured as 7.289 and 6.061. The anti-AChE value of the extracts was calculated as 16.12, 20.31 and anti-BChE value as 36.92, 40.28. In addition, it was determined that the single-objective optimization extract had stronger antiproliferative activity than the multi-objective extract. As a result, it was determined that the biological activities of the extracts of *C. cibarius* obtained under suitable conditions were high.

KEY WORDS: antialzeihmer, anticancer, antioxidant, chanterelle, *Cantharellus cibarius*, medicinal mushroom, optimization