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APPLICATION OF DEEP NEURAL NETWORKS IN MODELING THE CAPTURE OF *Ips sexdentatus* IN PHEROMONE TRAP

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Abstract

In this study, the results were obtained for the first time during the flight period of the target species *Ips sexdentatus*, which has the potential to pose a threat to the forests of the region and to be caught in the natural environment by a pheromone trap with electronic control unit (ECU). This study carried out an open area covered by Crimean pine forests in the Daday region of the Kastamonu Forest Regional Directorate in Turkey. The caught status of *Ips sexdentatus* has been classified and the number of caught has been predicted by the deep neural networks (DNN) modeling methods. DNN models were developed using the Python language Keras Library to classify the status of the target species adults and to predict how many adults will be captured. It is aimed to develop an innovative approach by creating DNN models depending on the capture times of the target species and the temperature, humidity, wind speed and precipitation variables at these times. The DNN-1 model classifies the caught status of the species with high precision. The DNN-2 models verify the classification result of the DNN-1 model. The DNN-3 model estimates the number of captures of the target species. This study is the first modeling research for target species using DNN at local and country levels. DNNs are known to have high predictive potential in applied ecological research such as bark beetle outbreaks. Estimating and monitoring the population of the pest depending on variables will provide an ecological-based forecast for the development of control strategies.

Key words: bark beetle, pheromone trap, prediction in ecology, temporal and meteorological data

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