

## Modeling Fertility and Production of Hazelnut Cultivars through the Artificial Neural Network under Climate Change of Karaj

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**Abstract :** In recent decades, climate change, global warming, and the growing population worldwide face some challenges, such as increasing food consumption and shortage of resources. Assessing how climate change could disturb crops, especially hazelnut production, seems crucial for sustainable agriculture production. For hazelnut cultivation in the mid-warm condition, such as in Iran, here we present an investigation of climate parameters and how much they are effective on fertility and nut production of hazelnut trees. Therefore, the climate change of the northern zones in Iran has investigated (1960-2017) and was reached an uptrend in temperature. Furthermore, the descriptive analysis performed on six cultivars during seven years shows how this small-scale survey could demonstrate the effects of climate change on hazelnut production and stability. Results showed that some climate parameters are more significant on nut production, such as solar radiation, soil temperature, relative humidity, and precipitation. Moreover, some cultivars have produced more stable production, for instance, Negret and Segorbe, while the Mervill de Boliver recorded the most variation during the study. Another aspect that needs to be met is training and predicting an actual model to simulate nut production through a neural network and linear regression simulation. The study developed and estimated the ANN model's generalization capability with different criteria such as RMSE, SSE, and accuracy factors for dependent and independent variables (environmental and yield traits). The models were trained and tested while the accuracy of the model is proper to predict hazelnut production under fluctuations in weather parameters.

**Keywords :** climate change, neural network, hazelnut, global warming

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