

Dissertation abstract

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Title: Prediction of yield and protein content of pea (*Pisum sativum* L.) seeds using artificial neural networks and multiple regression based on the results of varietal experiments

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The aim of this dissertation was to build linear and non-linear models for the prediction of seed yield and protein content in general-purpose pea varieties. The research was carried out using data from 2016-2020 from COBORU varietal experiments. The experimental plots were located in the following localities: Bezek, Głębokie, Kawęczyn, Krzyżewo, Pawłowice, Radostowo and Sulejów. Linear models were built using multiple linear regression analysis, and non-linear models were created using artificial neural networks. Using the obtained models, a forecast was made of the yield and protein content of peas as at 14 July. Nineteen independent variables were used to build the artificial neural networks and regression models. The variables were divided into two categories: phytophenological and agronomic data formed the first group. Meteorological information formed the second set. The neural models built were characterised by very good predictive properties. The N1 model (predicting protein percentage) had a MAPE error of 2.72%. While this error for the regression model (RS) averaged 8.85%. The neural networks also performed significantly better than the regression model in the prediction of pea yield. The N1 model (neural network) had a MAPE error of 7.98%, while the regression model (RS2) achieved a MAPE of 148.59%.

Keywords: artificial neural networks, multiple regression, prediction, peas, yield, protein