ABSTRACT BOOK

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Investigation of a novel soil analysis method in agricultural areas of Çarşamba plain for fertilizer recommendation

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Abstract

In this study, a novel soil analysis method for fertilization recommendation is developed and validated with 164 soil samples taken from Çarşamba plain, Turkey for determination of potassium as a plant nutrient. In conventional soil analysis methods, available potassium nutrient is determined by ammonium acetate extraction with flame photometer. In this study an alternative to existing method is proposed by developing extraction solutions suitable for interference dynamics of ion selective electrodes in a flow injection setup. Flow injection analysis system was optimized and K ion concentration of 164 soil samples taken from Çarşamba plain was determined with potentiometrically. For the same soil samples, K ion concentration is determined with ammonium acetate extraction using flame photometer in parallel. Fertilization recommendations for potassium are calibrated on ammonium acetate extraction based measurements. In order to evaluate available K nutrient analysis results from new generation soil analysis method in fertilization recommendation process, a correlation model is required for relating new generation method results to conventional method results. An artificial neural network based soft sensor system is developed for this task. Potentiometric K ion measurement of soil sample in flow injection analysis system is presented as input to soft sensor system. Soft sensor predicts available K in soil sample based on artificial neural network model which can be used in fertilizer recommendation. Prediction performance of soft sensor is validated with experimental data and fitted with high correlation coefficient (R² = 0.902). Experimental studies have shown that K determined by potentiometric measurements can be used in fertilization recommendations in Çarşamba plain by using soft sensor approach.

Key words: Soil analysis, fertilization recommendation, soft sensor, artificial neural network.

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