



Česká zemědělská univerzita v Praze

Fakulta agrobiologie,  
potravinových a přírodních zdrojů

DOKTORSKÝ STUDIJNÍ PROGRAM/ DOCTORAL STUDY PROGRAM

## NÁVRH TÉMATU/PROPOSAL OF THEME

Studijní program/*Study Program*: **Crop Science**

Studijní obor/*Branch of Study*: **General Crop Science**

Katedra/*Department of*: **Agroenvironmental Chemistry and Plant Nutrition**

Školitel (včetně titulů), email/*Supervisor, email*: **Prof. Ing. Jiří Balík, CSc., dr. h. c.**

Konzultant (včetně titulů)/*Co-supervisor*: **Ing. Martin Kulhánek, Ph.D.**

Forma studia/*Form of Study*: **Full\_time**

**Téma/Theme**: Phosphorus in soil: Development of models based on the long-term field experiments results

**Hypotéza/ Hypothesis**: Bright scale of results from precise long-term field experiments with different fertilizing systems allows to describe the history of phosphorus changes in soil and create the model of future development in given conditions.

**Anotace/Annotation**: Phosphorus became a strategic element in plant nutrition. The sources of quality phosphates are limited not only by quantity, but also regionally. The plant nutrition with P is often underestimated because of high costs of fertilizers in comparison to only low economical benefits. Phosphorus is also more and more depleted from soil reserves and became limiting for yields and production quality.

To get a better insight in future development of different P-forms in soils, it is important to know the history. The best option is the monitoring of results from precise long-term field experiments established in different soil-climatic conditions, where are archived the soil and plant samples from the beginning of experiment as well as the data about all inputs and outputs.

The objective of this work is to evaluate the changes of different P forms in soils during the long-term field experiments with the main aim to develop model to predict of the situation under the given conditions.

In the experiments, soil samples from five locations (Humpolec, Lukavec, Hněvčevy, Praha-Suchdol, Červený Újezd) will be evaluated. There are grown potatoes (maize), wheat and barley in crop rotation continually from the year 1996. Nine fertilizing treatments are including e.g. sewage sludge, farmyard manure or mineral fertilizers. The analyses of input samples (taken up in the year 1996) will be following: P-sorption isotherms, allowing to determine the possibility of P sorption or release; the contents of bioavailable P using anion exchange membranes, CaCl<sub>2</sub>/DTPA (CAT) and Mehlich 3 methods. Included will be methods to determine hardly available P fractions as well as residual P. These analyses will be realize also in the soil samples taken up after the end of last crop rotation (year 2020). Mentioned extraction procedures will be make on the archive soil samples taken up during whole experiment at selected fertilizing treatments. To the completeness, the data about P uptake with harvested plants will be monitoring during the whole experiment as well as the leaching of P at Suchdol site.

Based on the results and the supporting data (soil pH, weather conditions, soil type and texture) will be developed the models aimed to describe the history of P changes in soil and mainly to predict the future changes in given soil-climate conditions.

**Zdroj financování/Source of**: NAZV QK21010124 – Soil organic matter – evaluating of quality parameters European Regional Development Fund-Project NutRisk Centre (No.CZ.02.1.01/0.0./0.0/16\_019/0000845) S grant CULS

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