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Summary of the dissertation entitled:

# „Influence of Nod factors and molybdenum on the improvement of symbiotic nitrogen fixation and yield of pea under various soil moisture conditions”

**Keywords:** legumes, pea, nitrogen, biological nitrogen fixation, drought stress, Nod factors, molybdenum, yield

The cultivation area of pea (*Pisum sativum* L.) in Poland is still insufficient. This is due to its high sensitivity to changing weather conditions and a low and unstable seed yield of this plant over the years. Therefore, some methods are being sought to improve the productivity of pea. One solution is the use of isolated signature particles of LCOs, which help to improve the process of symbiotic nitrogen fixation and thus improve seed yield of pea.

The aim of this study was to improve the biological reduction of molecular nitrogen by applying preparations of Nod factors, molybdenum and a solution containing of these both preparations. In the experiment was evaluated the effect of the mentioned preparations on minimizing the negative impact of drought stress on growth, development and seed yield. The research was conducted in 2020-2021 in the greenhouse of the Institute of Soil Science and Plant Cultivation - State Research Institute in Puławy. The two-factor experiment was set up in Mitscherlich pots containing a mixture of garden soil and sand in a ratio of 5:2. One pea variety, narrow-leafed Batuta, was use in the experiment. In the experiment was analyzed the effect of 4 preparations: $H_2O$ (control object) , LCOs, Mo, LCOs+Mo on the growth, development and yield of pea plants at two levels of soil moisture (30% - drought stress and 60% - optimal conditions). The experiment was established in 3 replicates in a completely randomized arrangement.

Plant samples were taken at 4 developmental stages of pea (BBCH 18, BBCH 65, BBCH 79, BBCH 89). During the vegetation period the dynamics of plant emergence was determined and growth and weight gain dynamics were measured. At the flowering stage (BBCH 65), leaf area, parameters of gas exchange, chlorophyll fluorescence and SPAD index were measured. At the green pod stage (BBCH 79) and full maturity (BBCH 89) indicators of biological

nitrogen fixation were analyzed. At the last developmental stage, pea seed yield and elements of its structure were evaluated.

The results proved that the LCOs, Mo and LCOs+Mo formulations had a favorable effect on the biometric and physiological characteristics of pea plants. The best results were obtained after use a solution containing a mixture of rhizobial Nod particles and molybdenum, regardless of the level of soil moisture. The analyzed preparations favorably influenced the height of plants and the weight gain of their aboveground parts and roots. The application of the tested solutions as a seed dressing before sowing improved the process of biological reduction of molecular nitrogen contributing to an increase in seed yield and improvement of elements of its structure. The study showed that the analyzed preparations significantly reduced the impact of adverse environmental conditions (drought stress) on the growth, development and yield of pea.

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