

Summary

Effect of pre-sowing seed magnetic stimulation on the growth, development and yielding of pea

Studies on the effect of pre-sowing pea seed stimulation with variable magnetic field was conducted in years 2012-2014 based on two laboratory experiments and a field experiment located in Subcarpathian Agricultural Advisory Centre in Boguchwala near Rzeszow (N 49°59' E 21°57'). The experiment factors included: I) pre-sowing seed stimulation - non-stimulated seeds (control), stimulation of seeds with variable magnetic field (35 mT, 50 Hz, 30 s), II) pea cultivar - Batuta, Bohun, Cysterski, Lasso, Medal, Tarchalska.

The laboratory research showed that pre-sowing seed magnetic stimulation of pea (*Pisum sativum* L.) causes a significantly higher germination percentage, germination rate and shortening time needed for germination of 1 seed as compared to non-stimulated seeds. Among the tested cultivars, the Cysterski, Bohun and Lasso varieties are the most vulnerable to the impact of magnetic field. Magnetic seed treatment causes a notable increase of the seedling length, including the root and shoot, as well as the seedling fresh weight as compared to seedlings grown from non-stimulated seeds.

In field conditions, the effect of pre-sowing seed stimulation with variable magnetic field on the course of growing season of pea plants is revealed only in germination phase and plant emergence, the effects of this treatment depend on the course of weather conditions. Acceleration of the plant emergence (by 1-2 days) resulting from pre-sowing seed stimulation is particularly visible in periods of precipitation shortage. After the seed biostimulation, higher plant density after emergence was obtained per area unit, which maintained until the end of vegetation, moreover, was found significant increase in: plant height and their fresh and dry weight in BBCH 14-15 phase, Leaf Area Index values, relative chlorophyll content and chlorophyll *a* fluorescence in bract of plants in BBCH 79 phase, plant height and the lowest located lower pod, number of total and full pods per plant, number and weight of seeds from plant, post-harvest residue weight and 1000 seed weight in BBCH 97 phase and increase (on average by 4,7%) total seed and protein yield as compared to non-stimulated objects. The Batuta variety stands out as the plant of the highest seed and protein yield. The seed yield is very high positively correlated with the number and weight of seeds from plant as well as high positively correlated with number of full pods per plant and number of seeds in pod.

The Lasso variety has the highest total protein and Ca content, Tarchalska - crude fat, P, Na and Zn, Batuta - crude fibre and Mg, Bohun - n-free extract, Cysterski - K and Cu, Medal - Fe and Mn. The pre-sowing seed stimulation with variable magnetic field causes a significant reduction of crude fibre content and higher P and Fe accumulation in seeds yielded from the plants. The seeds of tested pea cultivars stand out in terms of a favourable K:(Ca+Mg) ratio, too low Ca:P ratio and too high K:Na and Fe:Mn ratio. As a result of pre-sowing seed stimulation with variable magnetic field, the Ca:P ratio deteriorates in seeds obtained from the yield.