

## FUNCTIONING OF PHOTOSYNTHETIC APPARATUS OF BEAN PLANTS IN CONDITIONS OF TRANSCARPATHIA

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**Relevance of research.** Growing leguminous crops, in particular kidney beans (*Phaseolus vulgaris* L.), is an important source of high-quality food protein production. Its value is due to the high content of protein, balanced by amino acid composition, and property of the culture to fix nitrogen from the air in symbiosis with the root nodule bacteriabacteria, thereby improving soil fertility. Thanks to these benefits beans become a widespread on the globe and among leguminous crops with 26 million hectares of sown area, is second only to soybeans. Demand for its grain in the world is constantly increasing.

Beans – a traditional culture of Ukraine. Unfortunately, in recent years the area under this culture was insignificant, and was grown mainly on the farmland. During the last five years, production of beans was increased from 28.8 to 43.3 thousand tons. Expansion of industrial production of beans is conditioned by growing of demand on domestic and world markets. At the same time, beans grown in households do not always meet the needs of commercial companies and processing enterprises. On the market, demanded are commodity batches, multiple of machine standards, that is, 4 or more tons.

In this case, product must belong to the same variety in order to be homogeneous in size, color, structure, etc. This can be achieved with the commercial cultivation of beans or organization of its cultivation in private farms through the establishment of service agricultural cooperatives. Using of one variety will ensure the homogeneity of products, and compliance with technology of cultivation - its quality.

Transcarpathia is an unconventional, but favorable region for growing beans, which is grown mainly in the private sector in a small areas (mostly in private plots), which does not satisfy demand on it product. Therefore, the question is about expansion of sowing area in the region and beans production increasing. Among varieties of beans, the most suitable for cultivation in this region are varieties of grain direction - Mavka, Perlyna, Nadiya, which are characterized by resistance to shedding, lodging, defeating by the most common diseases and bean weevil, form a grain with high flavor and a good boil soft capability, the yield of which is 2.6-2.8 t / ha of grain.

The purpose of research is to determine peculiarities of photosynthetic apparatus formation and its functioning of beans varieties Mavka, Perlyna, Nadiya depending on level of fertilizing and seeds inoculation.

**Materials and methods of research.** Experiment was laid on the collection-demonstration field at "Mukachevo Agrarian College" NULES of Ukraine in Transcarpathian region. Soil of test plot - sod-podzolic heavy-grained on modern alluvium with humus content in arable (0-20 cm) soil layer - 1,9%, pH of saline 5,54-5,86, low supply of nitrogen, high - potassium and phosphorus. Mineral fertilizers were introduced in ammonium nitrate form (34.4% a.i.), granulated superphosphate (19.8% a.i.), kalimagnesia (28.0% a.i.). Beans seed inoculation was carried out at the day of sowing by Risobophyte (mark P), which contains the symbiotic nitrogen fixing bacteria of the genus *Rhizobium phaseoli* from the Institute of Agroecology and Nature Management of NAAS.

Sown area of the test plot - 10 m<sup>2</sup>, accounting area - 8 m<sup>2</sup>, repetition of experiment – is quadruple. Placement – is systematic. The predecessor is winter wheat. Leaf surface area was determined in the dynamics of the main phases of growth and development by method of "carving" (1990); the net productivity of photosynthesis is based on the methodology of A. O. Nichiporovich.

**Results of experiment.** It was established that all studied factors had a significant impact on beans photosynthetic apparatus formation and functioning. Plants responded positively to the seeds inoculation and mineral fertilizers introduction. As you know, in order to obtain maximum yield, the optimal leaf surface area should be 40-50 thousand m<sup>2</sup> / ha. In the experiment, such indicators of assimilation apparatus in varieties Mavka, Perlina and Nadiya provided an option where the seeds were inoculated with nitrogen-fixing bacteria and introduced mineral fertilizers in dose N<sub>60</sub>P<sub>45</sub>K<sub>45</sub> – 40,7–42,9 thousands m<sup>2</sup> / ha.

In experiment such indicators of the assimilation apparatus in varieties Mavka, Perlyna and Nadiya provided an option where seeds were inoculated with nitrogen-fixing bacteria and introduced mineral fertilizers in normal dose N<sub>60</sub>P<sub>45</sub>K<sub>45</sub> - 40.7-42.900 m<sup>2</sup> / ha. The biggest beans leaf surface area was noted at the period end of the flowering and in the studied varieties it varied within 31,8-40,7 thousands m<sup>2</sup> /ha in variety Mavka, 30,7-41,2 - Perlyna and 32,6-42 , 9 thousands m<sup>2</sup>/ha in variety Nadiya depending on fertilization and seeds inoculation. At the time of grain maturing the of the leaf surface area of beans plants was reduced due to leafs drying and shedding to an average 6.0-7.2 thousand m<sup>2</sup> / ha.

In the studying of production processes, an important indicator is net photosynthetic yield (NPY), which characterizes intensity of organic matter accumulation per unit of leaf surface over a certain period of time (day) and

directly affects the yield level. was found that the most intense this process took place during periods of the first trifacial leaf - budding (3.73-7.83 g / m<sup>2</sup> per day) and budding - flowering (3.68-8.29 g / m<sup>2</sup> per day), significantly decreasing in the period of flowering - filling of beans (1.61-2.18 g / m<sup>2</sup> per day) depending on beans variety, fertilizing doses and seed inoculation. Depending on variety, by higher intensity of organic matter accumulation by the unit of leaf surface during budding period - flowering was characterized by variety Nadiya (4.11-8.29 g / m<sup>2</sup> per day), which ultimately formed a higher yield.

**Conclusions.** Fertilizing system has a significant influence on bean plants photosynthetic apparatus formation and functioning. The biggest leaf surface area of kidney bean plant was formed at the end of flowering and with mineral fertilizers application in dose N<sub>60</sub>P<sub>45</sub>K<sub>45</sub> and seeds inoculation by Risobophite of brand P with bacteria of the genus *Rhizobium phaseoli* it reached 40.7-42.9 thousand m<sup>2</sup> / ha . The process of photosynthesis occurs most intensively in variety Nadiya with sowing by inoculated seeds and introducing N<sub>60</sub>P<sub>45</sub>K<sub>45</sub>, providing the maximum values of NFY - 8.29 g / m<sup>2</sup> per day.