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“BESSER NATURAL HISTORY STUDIES”

*To mark the 240th anniversary of the birth of the renowned botanist
Willibald Besser and the 215th anniversary of the beginning of his scientific
and pedagogical work in Kremenets*

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INFLUENCE OF THE COMPOSITE TREVITAN® RECVLANT ON THE YIELD INDICATORS OF LUPINUS ALBUS L. UNDER THE CONDITIONS OF THE WESTERN FOREST-STEPPE OF UKRAINE

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Legumes are valuable food crops that contain bioactive compounds in the grain, including proteins with essential amino acids, unsaturated lipids, complex carbohydrates, dietary fiber, vitamins, and minerals. Among legumes, white lupine (*Lupinus albus* L.) holds a special place in human nutrition, as its consumption improves health by lowering blood glucose levels, reducing cholesterol, and enhancing intestinal function. It is also cultivated as a honey plant, and its seeds are used as a protein supplement in animal feed [5]. The protein content in lupine seeds ranges from 30% to 55% [3, p. 13].

The varietal policy for *Lupinus albus* L. is currently based on domestic varieties. The 2024 catalog of plant varieties suitable for distribution in Ukraine includes 11 white lupine varieties: Barvinok, Veresnevy, Volodymyr, Diyeta, Lybid, Makarivsky, Rapsodiya, Serpnevy, Snigur, Chabansky, and Shchedry 50 [2]. The main research institution involved in crop selection is the National Scientific Center “Institute of Agriculture of the NAAS of Ukraine”. The varieties developed there are successfully introduced into production both in Ukraine and abroad.

Among the varieties developed by the National Scientific Center “Institute of Agriculture of the NAAS of Ukraine,” the high-protein, early-ripening variety Diyeta is particularly noteworthy. It has a universal application and is used in both human nutrition and animal feed. According to the UPOV database (International Union for the Protection of New Varieties of Plants), the *Lupinus albus* L. variety Diyeta is registered in the UK for inclusion in the national catalog [4].

The aim of the study was to determine the effect of pre-sowing treatment of white lupine seeds of the Dieta variety with the composite recultivator TRE-VITAN® (CRT) on seed productivity and crop yield structure indicators.

The research was conducted in 2023–2024 at the experimental sites of Taras Shevchenko Kremenets Regional Academy of Humanities and Pedagogy on gray forest soil. The study material was white lupine (*Lupinus albus* L.) of the Dieta variety, developed by the National Scientific Center “Institute of Agriculture of the National Academy of Sciences of Ukraine.” The

experiments followed this scheme: Option 1 — control: seeds not treated with the preparation, moistened with tap water at a rate of 2% by weight; Option 2 — experimental: seeds treated before sowing with a 0.5% CRT solution at a rate of 2% by weight.

White lupine seeds were sown using the wide-row method with 45 cm row spacing, at a depth of 4–5 cm, in the second decade of April, under optimal soil temperature and adequate moisture conditions. The sowing rate was 125 kg/ha (0.7 million seeds/ha).

The CRT was developed by the Limited Liability Company “TREVITAN UKRAINE” in accordance with TU 20.1-44141048-002:2021. It contains organic substances, with a mass fraction of 55.0–75.0%, fulvic and humic acids, potassium, nitrogen, phosphorus, and water-soluble salts (Mg, Ca, Mn, Fe, Cu, Zn, Co), with a mass fraction of 0.5–1.0% [1].

Upon ripening, white lupine seeds were harvested manually. Microsoft Excel was used for the statistical processing of the research results.

An important aspect of modern agricultural production involves research aimed at improving crop cultivation technologies through the introduction of new elements that enable the management of productivity processes — specifically, the creation of optimal conditions for plant growth and development under which yield indicators reach their maximum potential.

The research results showed that CRT, used for pre-sowing treatment of seeds and planting material, increased seed productivity and contributed to improved formation of white lupine yield structure indicators.

High productivity of white lupine is achievable in crops with an optimally dense stem stand. Therefore, one of the key indicators influencing crop yield is the number of plants per 1 m². It was found that in the experimental variant, this indicator was 17.2% higher compared to the control (control — 26.7 ± 0.9 pcs; experimental — 31.3 ± 0.9 pcs). The CRT improved the field germination of plants in the experimental variant and enhanced their survival during ontogenesis.

Important indicators characterizing crop structure include the number of beans per plant, bean length, and the number of seeds per bean. It was found that pre-sowing treatment of seeds with CRT increased bean length by 21.7% (control — 6.0 ± 0.6 cm; experiment — 7.3 ± 0.3 cm); the number of beans per plant by 43.2% (control — 3.7 ± 0.3 pcs; experiment — 5.3 ± 0.3 pcs); and the number of seeds per bean by 32.5% (control — 4.3 ± 0.3 pcs; experiment — 5.7 ± 0.3 pcs).

One of the main elements influencing crop yield is the mass of 1000 seeds. The study showed that in the experimental variant, the mass of 1000 seeds of *Lupinus albus* L. variety Dieta was 23.5 g higher compared to the control (experiment — 280.8 ± 5.1 g; control — 257.3 ± 3.6 g). The composite recultivant TREVITAN® had a positive effect on yield structure indicators, which in turn contributed to increased crop productivity. The mass of white lupine seeds per 1 m² in the experimental variant was 10.8% higher than in the control (experiment — 55.4 ± 0.9 g; control — 50.0 ± 0.4 g).

Thus, pre-sowing treatment of white lupine seeds of the Dieta variety with the composite recultivant TREVITAN® under the soil and climatic conditions of the Western Forest-Steppe of Ukraine contributed to the formation of taller plants, increased bean length, seed number per bean, and the mass of 1000 seeds, thereby statistically significantly increasing plant productivity. The use of this preparation as an element in the cultivation technology of *Lupinus albus* L. represents a promising direction for further field research under the conditions of the Western Forest-Steppe of Ukraine.

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