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RESPONSE OF AGROCHEMICAL CHARACTERISTICS OF MALTING BARLEY TO NITROGEN RATES

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Abstract: *Nitrogen was applied as ammonium nitrate in early spring in the tillering phase. The experiment was set up according to the block method with a plot size of 18 m^2 in four replications. It was established that that N_{120} rate reduced grain harvest index in both experimental years.*

• Introduction

Nitrogen is the main nutrient for barley yield and quality in combination with optimal agrotechnical factors such as soil cultivation, fertilization, plant protection, etc. (BAZITOV ET AL., 2011;). The nutrients absorption by barley is directly related to the amount of dry mass formed and the concentration of nutrients in plant organs (KANT ET AL. 2011).

• Material and method

The field fertilizing trail was carried out on the experimental field of Agricultural University of Plovdiv, Bulgaria during the period 2023-2025. Nitrogen fertilization rates 0, 40, 80, and 120 kg N.ha^{-1} were studied in Bulgarian winter two-row barley variety Emon. The experimental design consisted of a randomized, complete block design with four replications. The size of individual trial plots was 18 m^2. Nitrogen as ammonium nitrate (34% N) was applied as top dressing early in the spring in the tillering phase on the background P_{50} pre-sowing fertilization as triple superphosphate. The precursor of the barley was a sunflower and standard farming practices for the region of Southern Bulgaria were applied during the vegetation period.

• Results and discussions

The average grain and straw yields of the studied nitrogen rates were higher in the more favorable hydro-thermal year 2025 (Table 2). The increase was by 803 kg.ha^{-1} for grain yield and by 946 kg.ha^{-1} for straw yield, compared to their yields obtained in 2024. The N_{80} rate was highly effective for barley productivity in 2024, exceeding the control variant N_0 by 32.0% for grain yield and by 27.0% for straw yield.

• Conclusions

The average grain and straw yields were higher in 2025. The increase was by 803 kg.ha^{-1} for grain yield and by 946 kg.ha^{-1} for straw yield, compared to their yields in 2024. The high rate N_{120} was proven to reduce the GHI values in both experimental years. The accumulated amounts of nitrogen, phosphorus and potassium in the barley grain and straw at maturity were higher in 2025 under the more favorable hydrothermal conditions during the vegetation and the higher productivity of barley. The average nutrient content of grain yield was as follows: 85.7 - 99.8 kg N.ha^{-1}; 39.3 - 44.0 kg P_2O_5.ha^{-1} and 21.8 - 26.5 kg K_2O.ha^{-1} with higher values in 2025. The highest uptake of nitrogen 162.0 kg N.ha^{-1} and potassium 142.5 kg K_2O.ha^{-1} in grain+straw was established at application of N_{120} in 2025. Barley fertilization by 120 kg N.ha^{-1} reduced the total phosphorus uptake at maturity by 5.9 kg P_2O_5.ha^{-1}, compared to that at the rate N_{80} under less favorable hydrothermal conditions (2024).

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