Summary

Yield and the quality of corn (*Zea mays* L.) fertilized with urea-ammonium nitrate solution

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The aim of this study was to evaluate the agricultural efficiency of spring fertilization with nitrate-urea solution enriched with macronutrients (P, Mg and S) of common corn varieties NK Borago.

Field experiment was conducted between 2015 and 2017 in the Agricultural Experiment Station in Bałcyny (north-eastern Poland; 53°35′49″N 19°51′20″E). The experiment was conducted in the system of random blocks in four replications. The scheme of the experiment contained the following objects: 1-control, 2-ammonium nitrate/urea, 3-UAN/urea, 4-UAN/UAN, 5-UAN+S/UAN+Mg, 6-UAN+P (Medium)/UAN+P (Medium), 7-UAN+P (Starter)/UAN+S, 8-UAN+P (Starter)/UAN+Mg.

Nitrogen fertilization, compared to the control, significantly increased the corn grain yield, but no significant differences in the performance of individual nitrogen fertilizers were found. Weather conditions in individual years of research had a greater impact on yield of grain and corn straw than nitrogen fertilization. Among the examined elements of the crop structure, the number of kernels in the cob had the greatest impact on the corn grain yield.

The greatest net agricultural effectiveness of fertilization was found after pre-sowing and topdressing fertilization with RSM and RSM + P (Medium). In turn, the best effects expressed in net physiological efficiency were found on the object fertilized with RSM before sowing and urea as topdressing.

The weather conditions had a greater impact on the feed value of grain than fertilization of corn by different types of nitrogen fertilizers. The application of nitrogen resulted in the

increase of protein content and the decrease of crude fibre content in corn grain. Pre-sowing corn fertilization with UAN+P (Starter) and with UAN+Mg as topdressing and fertilization with UAN (pre-sowing and topdressing) led to the increase of crude fat content. Fertilization with UAN+P (Starter)/ UAN+Mg also increased energy net concentration in maize grain.. The content of deoxynivalenol (DON) in corn grain depended on meteorological conditions during ripening of the grain and corn harvest.

Nitrogen fertilization increased the N content in maize grain and straw, P and S in grain and K, Ca and Na in maize. Compared to the control, nitrogen fertilization increased, not always significantly, the macronutrient uptake. The highest uptake and the highest unit uptake of macroelements was stated in the second year of the research when the best conditions for corn growth were. The usage of nitrogen from mineral fertilizers was from 9 to 77 per cent and it depended on a greater way on the weather conditions in the given year and obtained yield than used nitrogen fertilization On average for the period of research the least utilization of nitrogen (35%) was obtained after pre-sowing fertilization with UAN and urea as topdressing fertilization. The greatest utilization of N was obtained (48%) when corn before sowing was fertilized with UAN+P (Starter) and UAN+ Mg as topdressing.

The content of microelements was varied depending on research years and fertilization. Nitrogen fertilization did not have an impact on Cu and Mn content in grains and decreased the content of B, Fe and Ni. The greatest amount of Se was in corn grain after fertilization with UAN+P (Starter) (pre-sowing) and UAN+Mg (topdressing).

Tested N fertilization did not have a significant influence on chosen soil chemical properties (soil pH, the content of N total, available forms of P, K, Mg and S-SO_4^{2-}) after corn harvest.