Depth of application of a microgranule for precision sowing on the controlled release of nutrients, and the growth of maize plants in the initial stage of development

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Abstract– The manuscript presents the results of vase experiments on the determination of the depth impact of soil microgranulate application for precision sowing on the growth of maize plants in the initial stage of development. Multi-component granule used in the experiment characterized by the controlled release of ingredients was made on the basis of an alternative source of a phosphate in accordance with the patent application No. P.429318.

Keywords – alternative raw material, phosphorus, precision fertilization, soil-applied microgranula, maize

Introduction

The innovative simplified technology of maize cultivation consists of the utilization of a cultivating and seeding aggregate, thanks to which seed sowing is performed at the same time as a deep precise application of fertilizer to cultivated soil [Ochal i in., 2015].

Aim and scope

The purpose of the pot experiments was to determine the effect of the depth of application for precision sowing of microgranules developed on the basis of an alternative source of phosphorus originating from thermally processed bone waste (patent application No. P. 429318) for the growth and development of corn at the initial stage of development.

Methodology

Table 1. Composition of microgranules for precision sowing

Content of makro- and mikroelements								
P_2O_5	K_2O	CaO	MgO	Na_2O	Mn	Fe	Cu	Zn
314,0 $g \cdot kg^{-1}$	42,3 $g \cdot kg^{-1}$	663,1 $g \cdot kg^{-1}$	240,3 $g \cdot kg^{-1}$	5,4 $g \cdot kg^{-1}$	6,5 $mg \cdot kg^{-1}$	1 $mg \cdot kg^{-1}$	3,2 $mg \cdot kg^{-1}$	0,8 $mg \cdot kg^{-1}$

The pot experiments were carried out under strict conditions in the vegetation greenhouse. Standardized soil, a mixture of sand and acidified peat with a pH of 5.5-6.5 in the ratio of 7: 1, was used in the experiment and certified maize seeds of the variety Farm Gigant (MTZ = 264g) were utilized. The developed microgranule (table 1) for precision sowing at a dose of 30 kg · ha-1 was applied at the depth of: 2, 4, 6, 8 and 10 cm in relation to the kernel in the Fix system. The experiment was carried out at a constant soil moisture of 50% PPW.

Conclusions

Based on the pot experiments on the depth of application of microgranules for precision sowing with controlled release of components, it was found that the highest growth and development of maize plants occurred in a variant in which the fertilizer was applied at a depth of 2 cm to the kernel. The location of microgranules at a depth of 2 cm from the kernel resulted in obtaining the highest parameters of biometric traits of maize plants in the 6th week of sowing (Fig. 1).

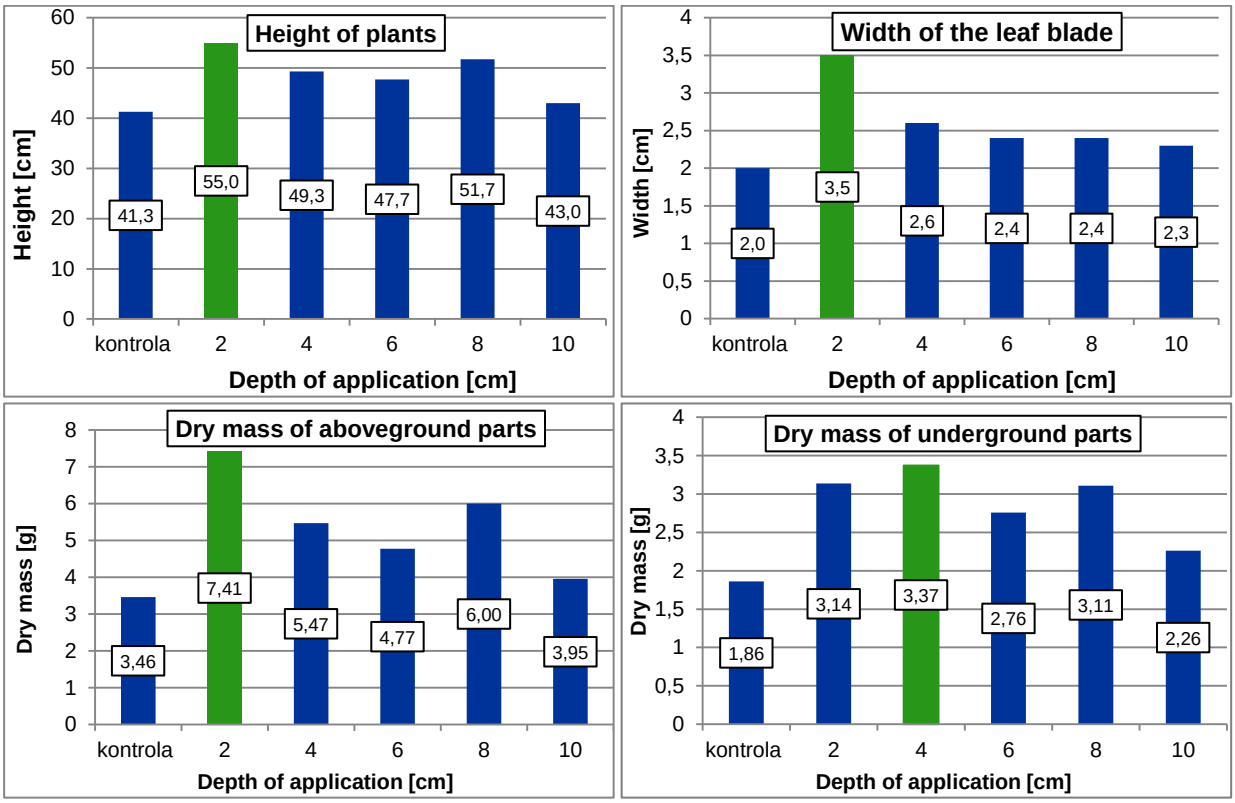

Fig.1. Biometric features of maize plants depending on the depth of application of the fertilizer

Summary

The application of a multi-component fertilizer with a controlled release of ingredients at a depth of 2 cm in relation to the kernel, developed on the basis of an alternative source of phosphate, results in the best growth and development of maize plants in the first 6 weeks of sowing.

Thanks

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Literature

[1] Ochal P., Jadczyszyn T., Jurga B., „Rozwój systemu korzeniowego kukurydzy w zależności od umieszczenia nawozu w glebie”, *Polish Journal of Agronomy*, 23, s.74–81, 2015.