Impact of SDHI seed treatment on microbiological activity of root system and shoots

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INTRODUCTION

Soil is a living dynamic system containing many free enzymes, immobilized extracellular enzymes and enzymes within microbial cells. Soil enzymes are the soil quality indicators which play an important role in organic matter decomposition and nutrient cycling. What is more SDHI have an impact on morphological features of plants, mainly on their root system.

The aim of study concerned the influence of different seed treatment from succinate dehydrogenase inhibitor on development of spring barley seedling and selected microbiological soil properties.

MATERIAL AND METHODS

Research was conducted in 2013-2014 years at Brody Experimental Station (Poznan University of Life Sciences, Agronomy Department) on the basis of field experiments. Experiments was conducted on Nadek variety.

Fifteen plants form each experimental plots from BBCH 13-14, 23-25 i 36-39 growth stage was assessed by its height, root length and root fresh mass.

Interestingly, model experiments were done in order to determine the influence of sedaxan, fluksapyroksad and fluopyram inside Systiva 333 FS, Vibrance Gold 100 FS, Baytan Trio 180 FS on change in dehydrogenase activity and number of selected soil microorganisms.

Dehydrogenase activity was determined by spectrophotomeric Thalmann method. 1% TTC was used as a substrates for reaction. After 24 h of incubation in 30 ºC, the amount of product- TPF (µmol TPF*g^{-1} s.m.*24 h^{-1}) was measured with the usage of Novospec spectrophotometer and wavelength 485 nm.

Assessment of microbiological activity of soil was done four times: 3, 7, 14 and 30 days after beginning of the model experiment.

Effect of seed treatment on number of fungi (cfu· 10^{-4} g-1d.m.of soil)

Days after beginning of the experiment		3	7	14	30
CHECK	-	7	7,5	5,6	5,1
FLUDIOXONIL/ DIFENOCONAZOLE/ SEDAXANE	0,2 LPR/ 100KGSEED	5,2	0,6	0	0
FLUXAPYROXAD + PROCHLORAZ/ TRITICONAZOLE	0,5 LPR/ 100KGSEED + 0,2 LPR/ 100KGSEED	1,6	0,6	0	0
TRIADIMENOL+ FLUOKSASTROBINA+ FLUOPYRAM	0,2 LPR/ 100KGSEED	3	0,6	0	0

Effect of seed treatment on dehydrogenase activity (mmol TPF·kg^{-1} · h^{-1})

Days after beginning of the experiment		3	7	14	30
CHECK	-	0,045	0,085	0,15	0,097
FLUDIOXONIL/ DIFENOCONAZOLE/ SEDAXANE	0,2 LPR/ 100KGSEED	0,068	0,077	0,13	0,06
FLUXAPYROXAD + PROCHLORAZ/ TRITICONAZOLE	0,5 LPR/ 100KGSEED + 0,2 LPR/ 100KGSEED	0,057	0,056	0,97	0,06
TRIADIMENOL+ FLUOKSASTROBINA+ FLUOPYRAM	0,2 LPR/ 100KGSEED	0,061	0,073	0,10	0,08

Effect of seed treatment on root fresh mass (g) mean 2013-2014

Growth stage (BBCH)		13-14	23-25	36-39
CHECK	-	3,82	19,91	20,16
FLUDIOXONIL/ DIFENOCONAZOLE/ SEDAXANE	0,2 LPR/ 100KGSEED	5,94	28,69	30,57
FLUXAPYROXAD + PROCHLORAZ/ TRITICONAZOLE	0,5 LPR/ 100KGSEED + 0,2 LPR/ 100KGSEED	5,97	30,32	31,68
TRIADIMENOL+ FLUOKSASTROBINA+ FLUOPYRAM	0,2 LPR/ 100KGSEED	5,05	26,84	29,17

Effect of seed treatment on leaft lenght (mm) mean 2013-2014

Growth stage (BBCH)		13-14	23-25	36-39
CHECK	-	28,44	48,68	81,82
FLUDIOXONIL/ DIFENOCONAZOLE/ SEDAXANE	0,2 LPR/ 100KGSEED	27,85	49,93	79,91
FLUXAPYROXAD + PROCHLORAZ/ TRITICONAZOLE	0,5 LPR/ 100KGSEED + 0,2 LPR/ 100KGSEED	27,17	49,18	78,53
TRIADIMENOL+ FLUOKSASTROBINA+ FLUOPYRAM	0,2 LPR/ 100KGSEED	29,57	51,35	81,37

CONCLUSION

Succinate dehydrogenase inhibitor did not have an impact on leaft lenght of spring barley shoots. On the other hand they stimulated development of root system (both their length and mass).

Significant differences in length and mass of roots were observed after usage of fluksapyroksad + tritikonazol and prochloraz. Similar tendency was observed concerning Vibrance Gold 100 FS (fludioksonil + difenokonazol + sedaxan).

Seed treatments showed both stimulating and reducing influence on number of soil microorganisms. Their highest impact was observed on fungi, as they reduced fungi number.

Enzymes activity in soil was affected by seed treatments. Dehydrogenase activity can be boosted or weakened, concerning the term of assessment.