



PRODUCTION OF PHENOLIC COMPOUNDS BY PERENNIAL RYEGRASS (*LOLIUM PERENNE* L.) / *NEOTYPHODIUM LOLII* ASSOCIATION AS A DEFENSE REACTION TOWARDS INFECTION BY *FUSARIUM POAE* AND *RHIZOCTONIA SOLANI*

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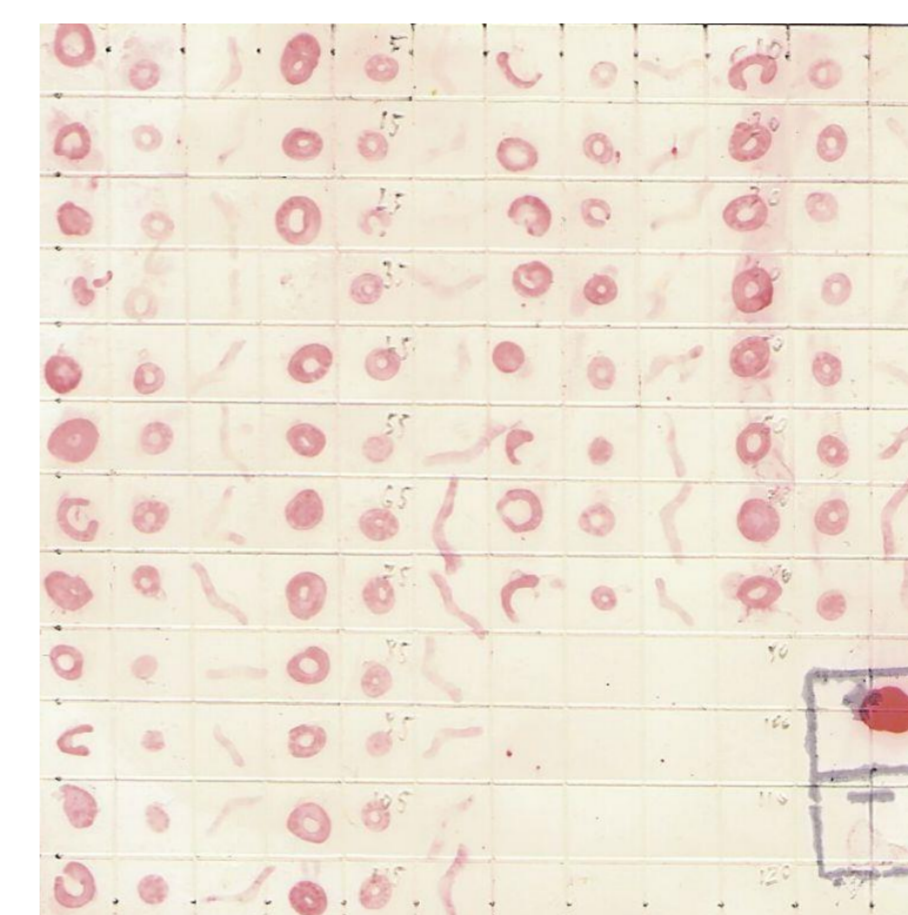


INTRODUCTION

Endophytic fungi belonging to the genus *Neotyphodium* very often form symbiotic associations with grasses. The host plants usually benefit from the association with an endophyte. Presence of the symbiont may increase host resistance to drought stress, feeding of many insects, infection by harmful nematodes, infection with some pathogens and enhance protection from herbivores. Such effects are mainly conditioned by the presence of a wide range of chemicals e.g. ergot alkaloids, lolitrem, peramine, and lolines. The biologically active metabolites are often produced by endophytes in vitro, although they may not be synthesized in sufficient quantities in vivo. Apart from antibiotic activity of the endophytes the indirect influence of the symbiont on the defense reaction of the host plant may play a role in the protection of grass/endophyte association from pathogens. Plant responses may involve e.g. synthesis of phenolic compounds. The aim of the study was to determine i) whether the presence of endophyte in perennial ryegrass increases the production of phenolic compounds in the plants, ii) what is the extent and direction of changes in phenolics production when perennial ryegrass is infected by *Fusarium poae* and *Rhizoctonia solani*, and iii) whether perennial ryegrass genotypes differ in their ability of phenolics induction.

METHODS

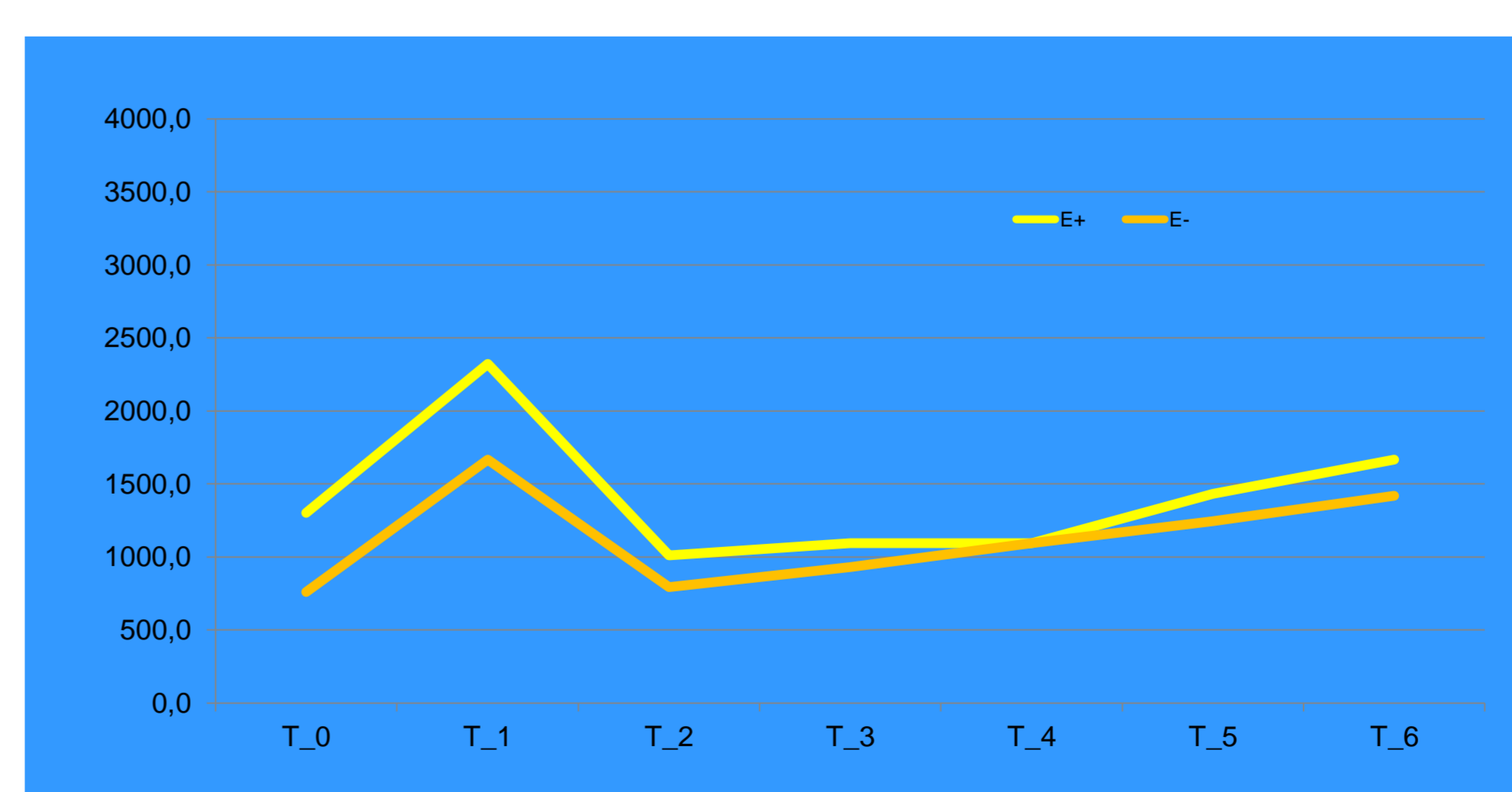
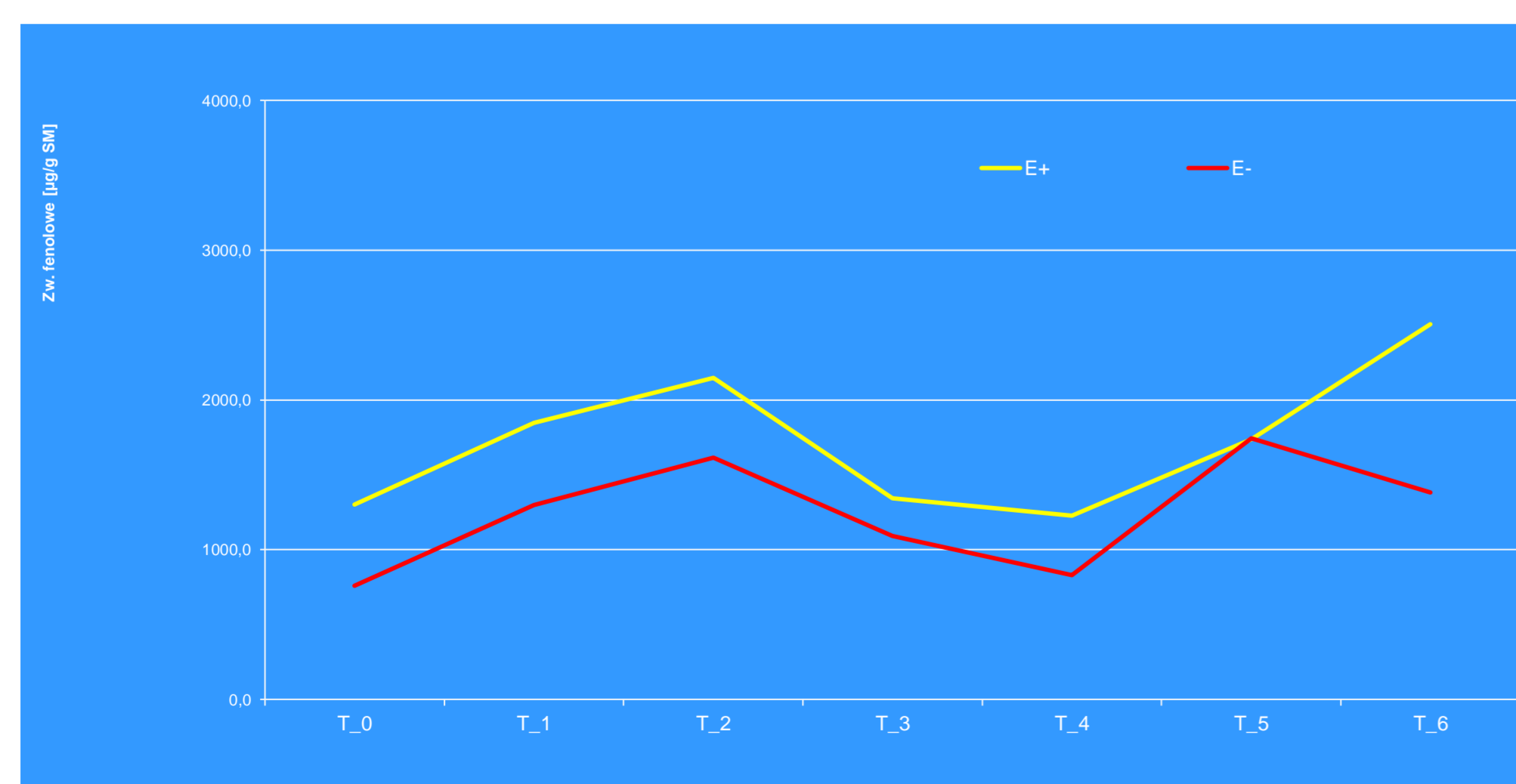
Three endophyte infected (E+) and non-infected (E-) perennial ryegrass genotypes were used for research. The plants were artificially inoculated with *F. poae* and *R. solani* infection material by foliar spray. Analyses of total phenolics content in above ground parts of each plant were performed in control (not inoculated) and inoculated plants after 1, 2, 3, 4, 5, and 6 days. Phenolics were extracted with ethanol and distilled water solution (50:50). Total content of phenolic compounds was determined according to Folin-Ciocalteu procedure.



Identification of *Neotyphodium* spp. with Phytoscreen Immunoblot Kit (AGRINOSTICS Ltd. Co, Watkinsville)

RESULTS

There was observed a highly significant effect of the perennial ryegrass genotype, endophyte status, time of the analysis (Intervals) and their interactions on the phenolic compounds content in plants. The presence of *N. lolii* increased significantly the production of total phenolics in all genotypes, in the control combinations. The highest content of phenolics was recorded 1 or 2 days after infection by *F. poae* and 1 day after infection by *R. solani*. Decrease of phenolics content was recorded in the next 2-4 days and then an increase depending on the grass genotype and species of the pathogen.



Mean content of total phenolic compounds analyzed 0 to 6 days after inoculation by *F. poae* (right) and *R. solani* (left) in E+ and E- perennial ryegrass genotypes

CONCLUSIONS

Results suggest that phenolic compounds can play an important role in defence mechanisms of E+ perennial ryegrass against pathogens.