

Abstract

Biostimulants represent an environmentally friendly way of protecting plants and supporting their growth. Here, fermented nettle was characterized in terms of antioxidant properties, protein content, and activities of selected enzymes. Furthermore, this study focused on the effects of biostimulants (fermented nettle and vermicompost) on soil properties.

Fermented nettle showed high content of phenolic compounds and high antioxidant capacity. Activity of proteases, as well as acid and alkaline phosphatases was successfully determined in fermented nettle. Alkaline phosphatase activity was significantly higher than that of acid phosphatase.

Protease, endo- β -1,3-glucanase, and total peroxidase activities were determined in soils of plants treated with biostimulants – fermented nettle (N), vermicompost (V) – and compared with control (C). All groups of plants were also exposed to drought stress (D). Application of biostimulants did not affect protease activity in watered groups but D groups showed a significant increase in proteolysis. Endo- β -1,3-glucanase activity was higher in the groups treated with biostimulants and drought did not affect the activity. The group VD showed significantly higher total peroxidase activity than other groups. The protein content in groups treated with biostimulants was higher than in the control group; however, ND showed significant decrease in protein concentration. Based on the measured parameters, these biostimulants appear to alleviate drought stress.

Chemical plant protection products, while effective, have some severe disadvantages. Heavy utilization of pesticides leads to environmental pollution. Triazole fungicides are widely used to combat fungal pathogens and it is their impact on soil properties that was analysed. Triazole fungicides (penconazole (P) and tebuconazole (T)) were applied either as soil drench (s) or foliar spray (f). Application of triazoles did not affect soil protein content. Proteolytic activity was decreased in sPT, fP, and fPT groups compared with the control group. Groups sPT, fP, and sT showed decrease in endo- β -1,3-glucanase activity. Total peroxidase activity was significantly higher in every group (except fT) than in the control group. The soil drench of both triazoles (sPT) and foliar spray of penconazole (fP) decreased most of the determined enzyme activities, thus representing the most detrimental applications for soil parameters.

Key words: antioxidant properties, biostimulant, drought stress, phenolic compounds, soil enzymes, triazole fungicides