



The content of indole-3-acetic acid in the apple-trees orchard soil after replantation

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Keywords: apple-tree orchard, soil fatigue, replantation, indole-3-acetic acid, fertilization, irrigation

Indole-3-acetic acid affects plants at very low concentrations and promotes cell wall loosening during cell elongation. Production of IAA is widespread among bacteria that inhabit the rhizosphere of crop (Halda-Alija 2003).

Studies were carried out from 2003 to 2005 in apple-tree orchard after replantation. The orchard is localized on the area of an Agricultural-Orchard Experimental Station in Przybroda belonging to the Agricultural University in Poznań, Poland. The experiment was established on proper grey-brown podzolic soil in the upper layer (0-50 cm) built of light loamy sand to heavy loamy sand. In the experiment, three irrigation levels were used:

W_0 – maintenance of soil moisture at the level of atmospheric precipitations,

W_1 – maintenance of soil moisture at the level of -0.03MPa of water potential,

W_2 – maintenance of soil moisture at the level of -0.01MPa of water potential.

Within each irrigation level, three fertilization combinations were used:

65kg N/ha (N),

65kg N/ha and 95 kg/ha K_2O (NK),

130kg N/ha, and 190kg/ha K₂O (2N2K).

Two control samples were introduced: „Nowina” (apple orchard with Šampion cv. Earlier, agricultural plants were grown on this soil) and „Virgin Soil” (where no plants were grown before, the so called fallow). Soil samples for analyses were sampled from belts of herbicide fallow from the depth of 0-20 cm, in three terms depending on the developmental phase of apple-trees in the orchard: intensive growth of trees (June), fruiting/ripening (August) and fruit harvest connected with leaf fall (October). In the studied soil samples, were determined spectrofluorimetrically the contents of indole-3-acetic acid (Szajdak 2004).

The objective of the present work was to investigate of soil biochemical activity by the determination of the contents of indole-3-acetic acid in the soil of an apple-tree orchard after replantation, depending on the term of sampling and the applied irrigation and fertilization levels.

The presented work indicated a insignificant effect of the term of sampling on the content of indole-3-acetic acid in the soil in 2003 and 2004 years. The term of sampling had a significant effect on the of indole-3-acetic acid of soil only in 2005 year. The highest the contents of indole-3-acetic acid was recorded in autumn, while in summer, the number was low in this year.

Fertilization revealed a significant effect on the of indole-3-acetic acid of soil only in 2005 year. In control objects (Nowina, virgin soil), rather similar IAA amounts were found in comparison with fertilized combinations identified in replanted orchard.

Irrigation significantly differentiated the content of indole-3-acetic acid in soil. The highest content of indole-3-acetic acid was found in the soil of the combination without irrigation (W₀). The lowest concentration of indole-3-acetic acid was observed in W₂ combination.

Between fertilized objects originating from apple-tree orchard after replantation and control combinations (Nowina, Virgin Soil) has not been confirmed different in the content of indole-3-acetic acid. Plant cultivation for many years on the same site has not been had a negative effect on the content of indole-3-acetic acid from apple-tree orchard after replantation. Between fertilization combinations, no significant differences in the concentrations of indole-3-acetic acid were confirmed. The applied irrigation levels (-0.03MPa, -0.01MPa) exert an effect on the decrease of indole-3-acetic acid in the soil.

References

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