

Apol-Humus, Stymjod and microalgae as a source of biologically active compounds for enhancing physiological activities, germination and growth of plants

Apol-Humus, Stymjod i mikroalgi jako źródło składników biologicznie aktywnych do poprawy aktywności fizjologicznej, kiełkowania i wzrostu roślin

Mieczysław Grzesik¹, Zdzisława Romanowska-Duda², Regina Janas¹

¹Research Institute of Horticulture, Skierniewice, Poland, ²Department of Ecophysiology and Plant Development, University of Łódź, Poland
e-mail: Mieczyslaw.Grzesik@inhort.pl

The effects of natural biologically active compounds from microalgae or Apol-Humus (Poli-Farm Sp. z o.o.) and Stymjod (Jeznach Sp.J.), applied to the conditioned propagating material or to leaves on germination, growth and physiological activity in corn (*Zea mays* L.) or topinambour (*Helianthus tuberosus* L.) plants, were studied. Application of *Microcystis aeruginosa* MKR 0105 and *Anabaena* sp. PCC 7120 (*Cyanobacteria*), *Chlorella* sp. (green algae) or Apol-Humus and Stymjod to the conditioned propagating material or to leaves as triple foliar spray, increased germination, growth and several physiological events having the crucial impact on plant development. The used treatments increased the activity of selected enzymes having the essential impact on germination or plant growth: dehydrogenases, RNase, acid or alkaline phosphatase and nitrate reductase. Microalgae applied to leaves slightly increased content of macroelements (NPK) in corn plants and did not influence the calorific value in the operating state, heat of combustion in the analytical state and ash content in the working state. The improved growth of plants and yield of biomass was associated with the increased physiological activities in leaves, such as: stability of cytomembranes, index of chlorophyll content in leaves, net photosynthesis, transpiration and stomatal conductance, coupled with a decreased intercellular CO₂ concentration. These advancements were depended on applied microalgae strains and biological compound. The plant biofertilization with e.g. *Microcystis aeruginosa* MKR 0105 was slightly more profitable than the foliar application with *Anabaena* sp. PCC 7120, *Chlorella* sp. and environmental sample. Hence, triple foliar spray of plants with the mentioned strains of microalgae and biological compounds was more beneficial than their application to the conditioned propagating material. The positive effects of these treatments on plant development could be caused by macronutrients (N, P, K, Ca, Mg), microelements (S, Zn, Fe, Mn, Cu, Mo, Co) and growth-promoting substances, including hormones (auxin, gibberellins, cytokinins), vitamins (B12), amino acids, polyamines and several other secondary metabolites which are contained in microalgae and then they are transferred from their cells to the cultivated plants. Stimulating effect on the plant growth could also be caused by humic acids and chitosan polymers contained in Apol-Humus, and by iodine, macro- and micronutrients included in Stymjod.

Acknowledgements: Research were supported by National Science Center in Poland under Grant No. N N304 102940 and National Centre for Research and Development Grant No. DZP/BIOSTRATEG-II/393/2015.