The effect of cyanobacterial compounds on the organogenesis of pea cultured in vitro

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ABSTRACT Many experimental results suggest the plant growth regulator (PGR) content and its physiological function in macro- and microscopic algae. Various compounds of cyanobacteria could be useful sources to enhance or substitute the influence of synthetic PGRs on tissue cultures of recalcitrant plants in vitro. In this study we have evaluated the beneficial effects of some extracellular compounds derived from axenic cultures of cyanobacteria. The cyanobacterial compounds in biomass alone have produced lower rates of shoot regeneration and gained smaller fresh weights compared to the PGRs control. They are not like real substitutes of synthetic PGRs but as a supplement in culture media resulting more vigorous cultures and regenerated shoots.

Results and Discussion Plant growth regulators derived from 2 g/l biomass of cyanobacteria showed positive effects on tissue cultures in our earlier experiments. Based on these findings cyanobacterial strains MACC-304 and -612 were found better than others. Highest fresh weight were scored at 0.2-0.6 g/l biomass earlier experiments. Based on these findings cyanobacterial strains MACC-304 and -612 were found better than others. Highest fresh weight were scored at 0.2-0.6 g/l biomass segments compared to shoot tips. Lower shoot regeneration rates and fresh weights were obtained in culture media supplemented with only the cyanobacterial biomass. Complex nutritive mixtures have been added to plant tissue culture media in the past decades. Nowadays media

Materials and Methods Plant material: biomass derived from four strains of our microalgal and cyanobacterial collection (MACC) (MACC-203 - Pseudochlorococcum typicum, MACC-304 - Anabaena spheeria, MACC-533 - Coenochloris sp., MACC-612 - Nostoc entophytum) have been tested as a source of growth regulators for in vitro cultures of Pisum sativum L. cv. "Akt", in three different harvest dates.

Explants: shoot tips and mesocotyl segment of in vitro grown 7-days-old seedlings of pea were cultured on B5 medium (Gamborg et al. 1968). The centrifuged and freeze-dried biomass of aseptically grown cyanobacteria were added to culture media first in 2 g/l concentration. Afterwards two chosen strains (MACC-304 and -612) were tested in different dilutions (0.2 - 0.6 - 1 - 2 g/l).

Culture media: a combination of benzylamino purine (BAP, 4.5 mg/l) and naphthalene acetic acid (NAA, 0.02 mg/l) (B5NB) plus a hormon-free medium (B50) was used as controls. The combined effect of microalgal supernatants and synthetic growth regulators was also studied.

Evaluation: fresh weight of tissues, the number of regenerated shoots and leaves were scored after eight weeks of culture. Data were analyzed with one way ANOVA.

KEY WORDS in vitro culture cyanobacteria Pisum sativum L. organogenesis

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containing only chemically-defined compounds are commonly used. The *in vitro* culture of recalcitrant plants (such as pea) needs other organic growth substances than plant hormones. In this study we have evaluated the beneficial effects of some extracellular compounds derived from axenic cultures of cyanobacteria.

After the results of our previous bioassays 2 g/l biomass of MACC-304 and MACC-612 were found beneficial for the *in vitro* growth of tissues from pea. The dilutions of biomass (0.2 – 0.6 – 1 – 2 g/l) have increased the fresh weight of cultures. The optimal concentration ranged from 0.2 to 0.6 g/l. Mesocotyl segments served better sources for the shoot regeneration. The cyanobacterial compounds in biomass alone have produced lower rates of shoot regeneration and gained smaller fresh weights compared to the PGRs control. They are not like real substitutes of synthetic PGRs but as a supplement in culture media resulting more vigorous cultures and regenerated shoots.

**References**


