



BIOFERTILIZER BASED ON PHOTOSYNTHETIC CONSORTIUM IMPROVES THE GERMINATION OF WHEAT SEEDS

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Introduction. Cyanobacteria are photosynthetic microorganisms of biological and ecological importance, they play a fundamental role in the colonization and establishment of microbial flora in the soil, also they can provide benefits to the plants supplying essential elements as nitrogen and phosphorus (3). Studies in literature show that the nitrogen fixation capability of cyanobacteria is not the only factor contributing to the growth and improvement of phenological characteristics of the plant, also the presence of phytohormones as auxins, cytokinins, abscisic acid, gibberellins, and ethylene play important role in this process (4), that's why cyanobacteria biomass is widely used as biofertilizers in different types of crops such as rice, wheat, soybean, etc. The photosynthetic microbial consortium (PMC) of this investigation showed to have high nitrogen fixation capacity and its mainly microbial components are cyanobacteria of genera *Anabaena*, *Aphanizomenon* and *Leptolyngbya*; reports in literature mention that these microorganisms have the capacity to synthesize and liberate indole-3-acetic acid (IAA).

The aim of this work was to study the effect of PMC addition in the germination of wheat seeds variety Bárcenas S2002.

Methods. It was qualitatively determined the presence of total indolic compounds in isolated colonies from bacteria and cyanobacteria that conform the PMC using the technique described by Glickmann and Dessaux (1995). Four treatments were carried out with eighteen wheat seeds each, and different concentrations of PMC growing suspended culture (1.25, 2.5, 5 y 7.5 mL) were tested. Distilled water and culture medium BG11₀ were the controls. Assays were performed by duplicate under controlled conditions of light and temperature (80 $\mu\text{mol photons m}^{-2} \text{s}^{-1}$ and $21 \pm 2^\circ \text{C}$) with a photoperiod 12:12 light:dark. Germination and seedling growth was daily observed and evaluated the number of seeds germinated per treatment at day seven. The following parameters were determined: seedling

height, flag leaf length, number and length of roots.

Results and discussion. Isolated colonies from bacteria and cyanobacteria that comprise the PMC tested positive for total indolic compounds, so it is probable the synthesis and liberation of IAA into the culture, these compounds help to increase the length of root in plants (1). Figure 1 shows the number of seeds germinated per treatment and the percentage of germination at day seven. Table 1 shows the overall results of the treatments tested.

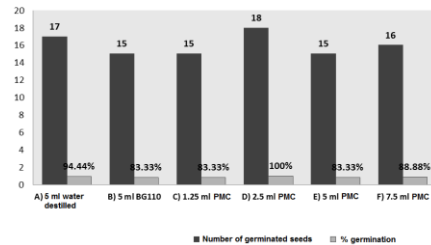


Figure 1. Wheat seeds germination in the different treatments with PMC

Table 1. Overall results of the wheat seed germination

Treatment	% germination	Seedling height (cm)	Flag leaf length (cm)	Root Number	Root length (cm)
A. Distilled water	94.44	5.43	3.23	4	3.68
B. BG11 ₀	83.33	5.89	3.70	5	4.37
C. 1.25 mL	83.33	7.12	4.75	5	5.41
D. 2.5 mL	100	5.79	3.49	6	4.75
E. 5 mL	83.33	6.85	4.50	5	5.36
F. 7.5 mL	88.88	5.48	3.65	5	4.93

The higher germination rate and bigger seedlings were obtained in the presence of low concentrations of PMC (1.25 and 2.25 mL). The root number kept a directly proportional relationship to the PMC concentration, obtaining the highest number of roots at the highest concentration of PMC (7.5 mL).

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