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EFFECT OF NITROGEN ON PHYCOBILIPROTEIN CONTENT IN NITROGEN-FIXING CYANOBACTERIA ISOLATED FROM SERBIAN FOREST ECOSYSTEMS

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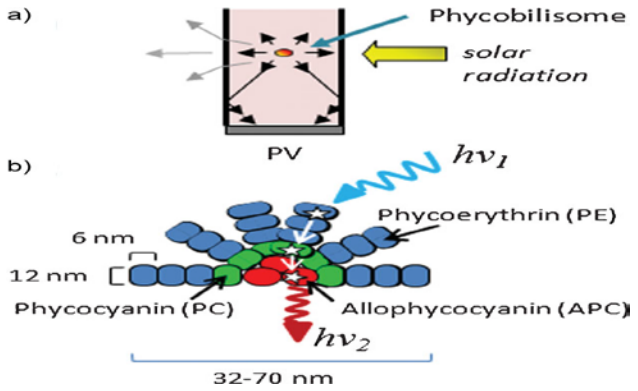
5th CASEE Conference "Healthy Food Production and Environmental Preservation – The Role of Agriculture, Forestry and Applied Biology“

Novi Sad, 26.05.2014.

- Cyanobacteria - highly diverse group of photosynthetic microorganisms
- Colonize highly diverse ecological niches

- Phycobiliproteins - the major light harvesting supramolecular complex structure:

1. Allophycocyanin (APC, λ_{max}~650 nm),
2. Phycocyanin (PC, λ_{max}~620 nm),
3. Phycoerythrin (PE, λ_{max}~545-565 nm)
4. Phycoerythrocyanin (PEC, λ_{max}~575 nm)



Baldo et al., 2009

- Phycobiliproteins are widely used in different branches of industry

THE AIMS

- To analyze the influence of nitrogen on phycobiliprotein production in six nitrogen-fixing filamentous cyanobacteria isolated from two mountains in Serbia

- To establish the differences in the content of phycobiliprotein between tested cyanobacteria as potential producers of phycobiliprotein pigments during different phases of their growth

Material and methods

- Culture conditions :
- - mineral, nutrient medium BG-11 with nitrogen (the concentration of 1.5 g/L) and without nitrogen (Rippka et al., 1979)
- - at 22-24ºC
- - cool white fluorescent light (50 µmol m-2s-1)
- - 12 hours of light/12 hours of darkness

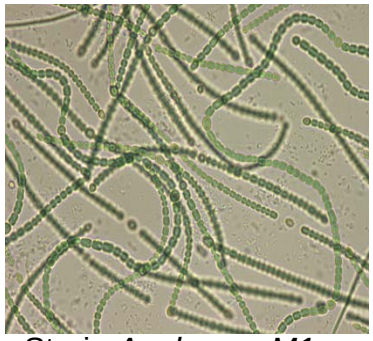
Spectrophotometric method (Bennett and Bogorod, 1973)

PE [mg/ml] = (A_{562}-2.41•PC-0.849•APC)/9.62

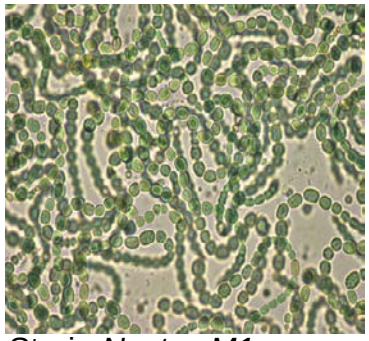
- PC [mg/ml] = (A_{615}-0.474•A_{652})/5.34
- APC [mg/ml] = (A_{652}-0.208•A_{615})/5.09

Tabele 1. Tested terrestrial cyanobacterial strains

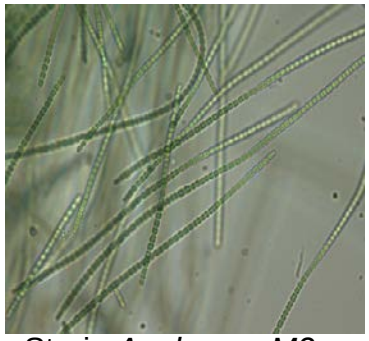
strain	Genus	Origin of the strain
SP2	Nostoc	Stara Planina
SP2	Anabaena	Stara Planina
M1	Nostoc	Fruška gora (area Morović)
M1	Anabaena	Fruška gora (area Morović)
M2	Nostoc	Fruška gora (area Morović)
M2	Anabaena	Fruška gora (area Morović)



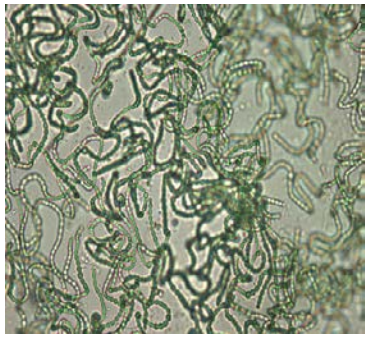
Strain *Anabaena M1*



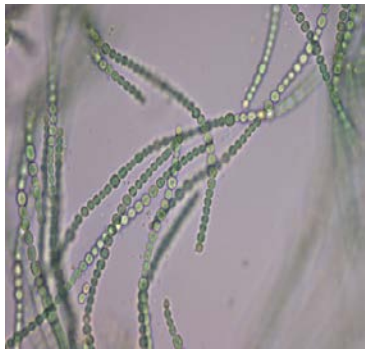
Strain *Nostoc M1*



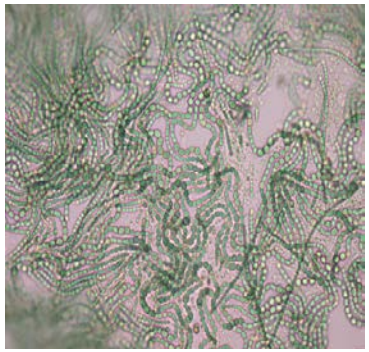
Strain *Anabaena M2*



Strain *Nostoc M2*



Strain *Anabaena SP2*



Strain *Nostoc SP2*

Results

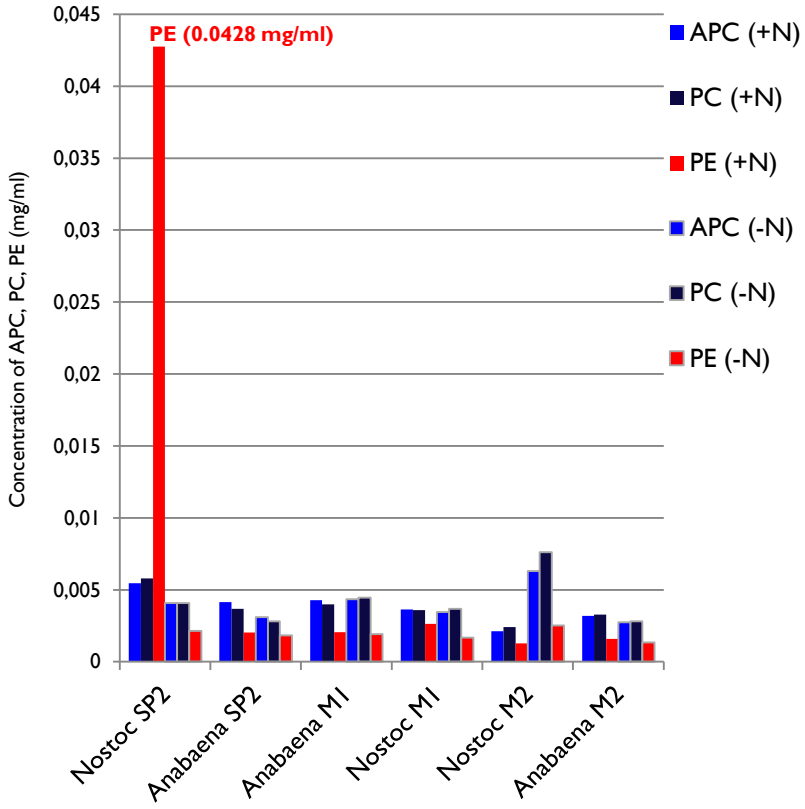


Fig. 1. Content of phycobiliproteins in tested cyanobacterial strains on the14th day of cultivation

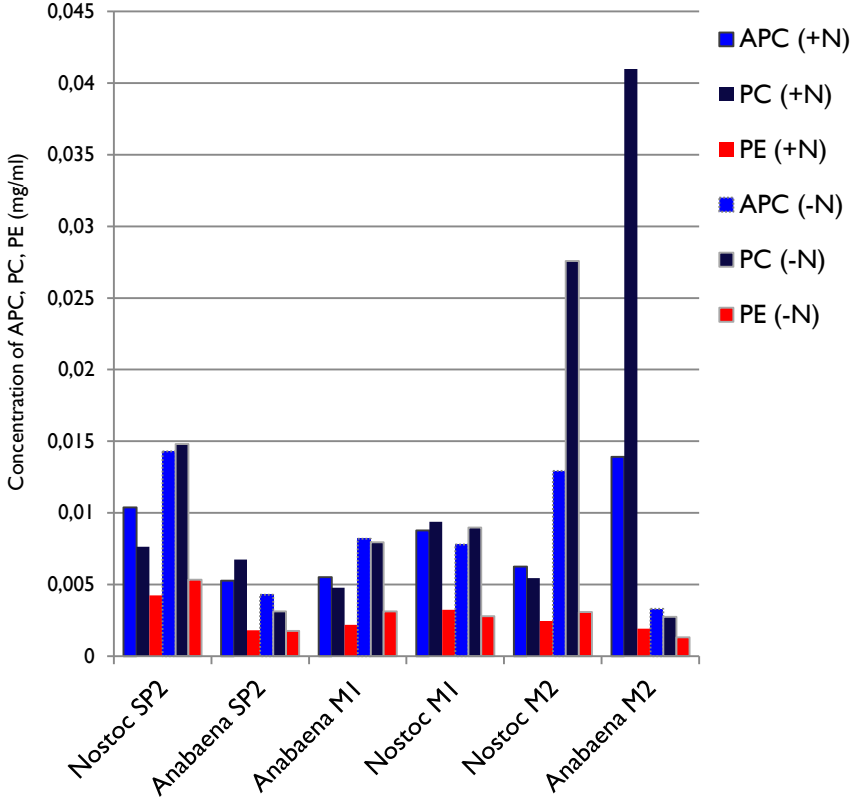


Fig. 2. Content of phycobiliproteins in tested cyanobacterial strains on the 21th day of cultivation

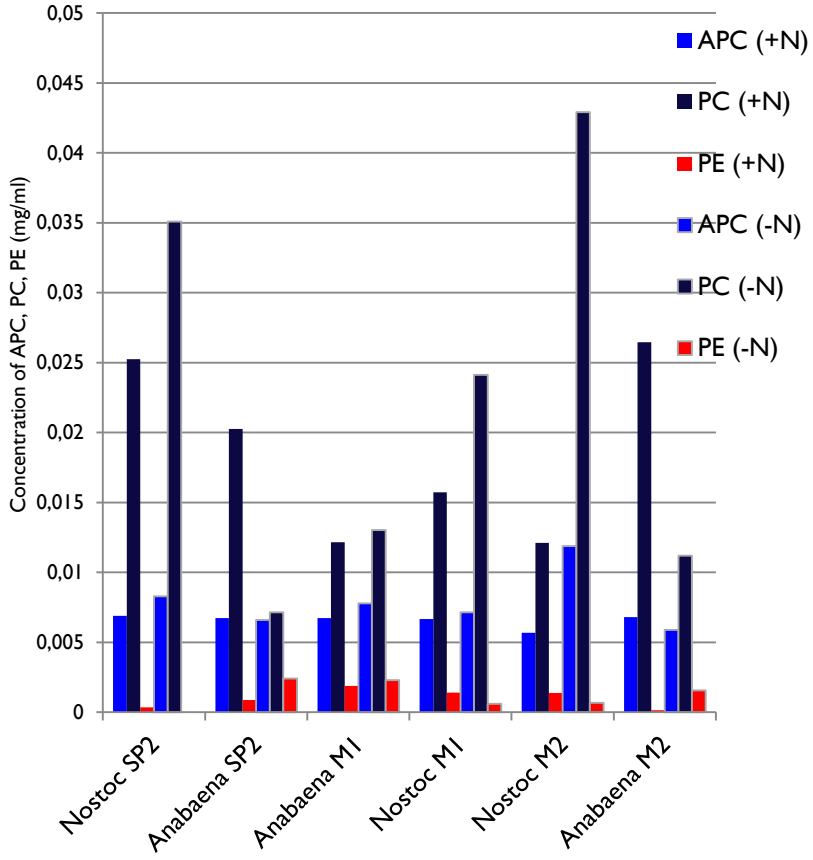


Fig. 3. Content of phycobiliproteins in tested cyanobacterial strains on the 28th day of cultivation

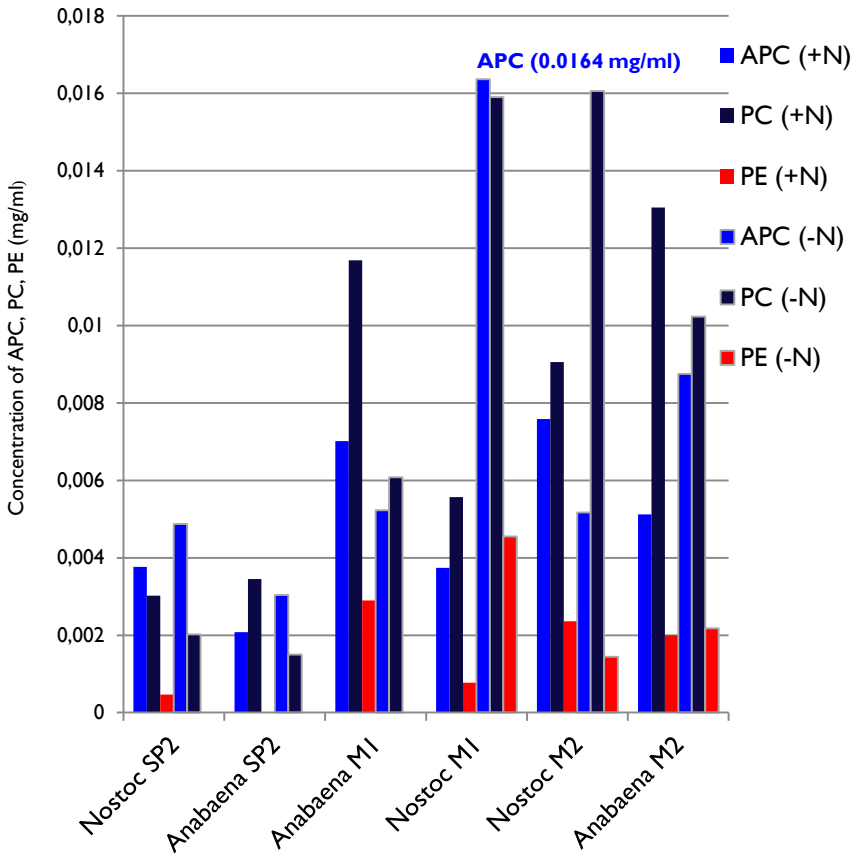


Fig. 4 .Content of phycobiliproteins in tested cyanobacterial strains on the 35th day of cultivation

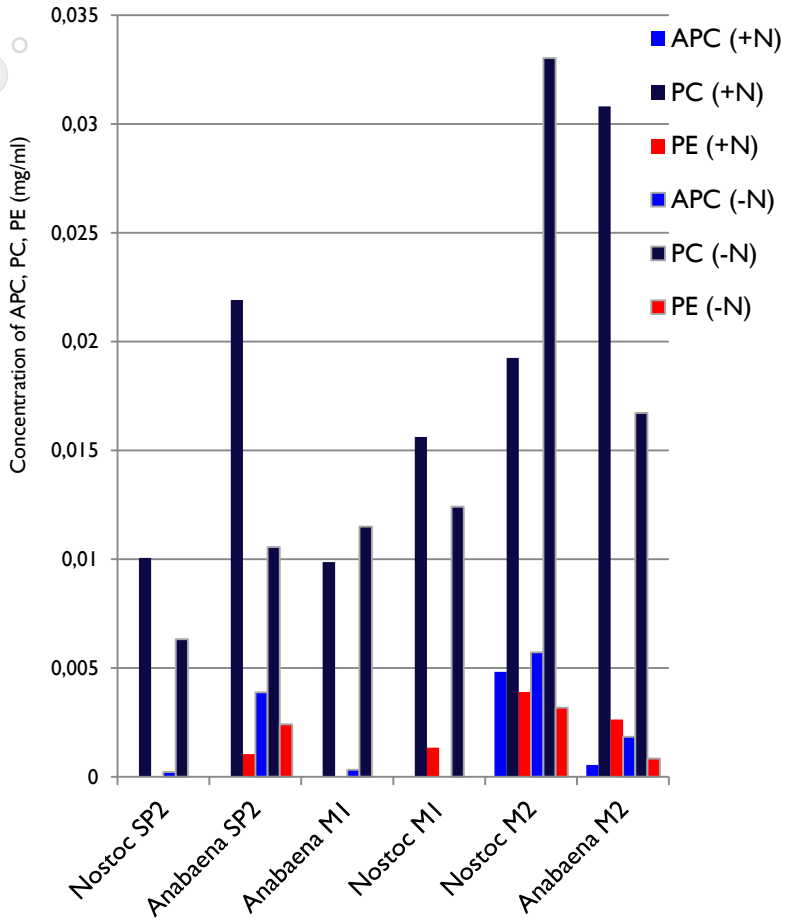


Fig. 5. Content of phycobiliproteins in tested cyanobacterial strains on the 42th day of cultivation

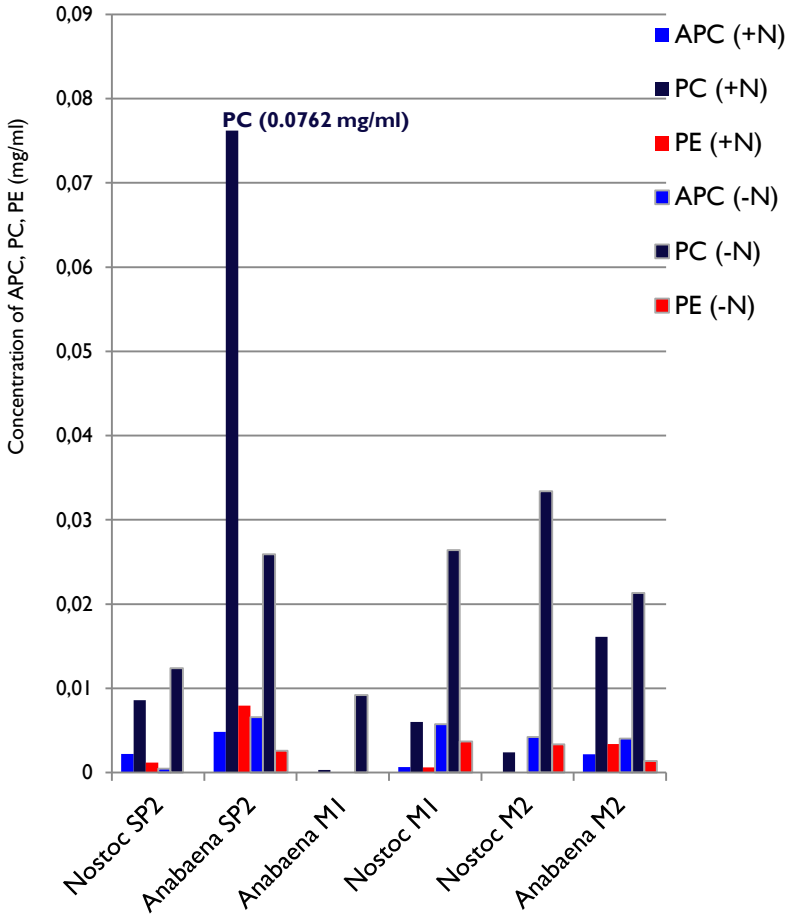


Fig. 6. Content of phycobiliproteins in tested cyanobacterial strains on the 50th day of cultivation

Conclusions

- Autochtone terrestrial, filamentous N_2-fixing cyanobacterial strains isolated from the forest ecosystems had good potential for phycobiliprotein production;
- Phycobiliprotein production is a strain-specific property;
- Phycobiliprotein content depends on the nitrogen source and growth phase;
- The highest amount of all three phycobiliproteins was detected in strains *Nostoc* M1, *Anabaena* SP2 and *Nostoc* SP2. The concentration of **phycoerythrin** was the highest in the strain Nostoc SP2. The concentration of **allophycocyanin** was the highest in the strain *Nostoc* M1. The concentration of **phycocyanin** was the highest in the strain *Anabaena* SP2.
- Tested strains, especially of the *Nostoc* genus, can be a concern as a potential natural source of phycobiliproteins;
- Adjusting the cultivation conditions can affect the pigments production in order to achieve maximum values for the biotechnological use.

- This study has been supported by the funding of the Ministry of Education and Science of the Serbian Government (project number: III 43002, 2011-2014) which is greatly acknowledged

THANK YOU FOR YOUR ATENTION