

RESEARCH PAPER:

Protein profiling of nitrogen fixing cyanobacteria under pesticide stress by SDS-PAGE

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SUMMARY

Sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS PAGE) analyses of the total protein profile of *Anabaena fertilissima*, *Aulosira fertilissima* and *Westiellopsis prolifica* showed a linear decrease in the protein content with increasing pesticide stress when administered different concentrations of Endosulfan and Tebuconazole. SDS-PAGE protein profile after pesticide stress revealed a decline in the synthesis of several proteins but at the same time, synthesis of a new set of proteins was induced after 4 and 16 days of incubation. However, complete elimination of the many protein bands occurred after sixteen days of exposure. The results indicate that different stressors exert specific effects on cyanobacterial protein synthesis.

Key words :

Anabaena fertilissima,
Aulosira fertilissima,
protein, SDS-PAGE,
Westiellopsis prolifica

Cyanobacteria are among the most known widespread, morphologically distinct and abundant prokaryotes. They are oxygenic photosynthetic autotrophs, originally considered as a class of algae, the blue-green algae possessing a unique ability in fixing atmospheric nitrogen, (Holt *et al.*, 1994). With an extraordinary biosynthetic potential and a repertoire of diverse metabolic activities, they are one of the dominant genera in various ecological habitats, especially in rice fields. *Anabaena fertilissima*, *Aulosira fertilissima* and *Westiellopsis prolifica*, photoautotrophic cyanobacteria constitute an important fraction of the N-fixing microflora of the paddy. Increased production of rice for meeting the food demand of the ever-growing population requires enormous use of fertilizers and pesticides, resulting in heavy contamination of paddy fields and the cyanobacteria inhabiting therein.

Cyanobacteria are known to adapt to environmental stresses by suitably modifying their proteome (Apte and Bhagwat, 1989). Rajendran *et al.* (2007) detected the presence of newer polypeptides in *Tolythrix scytonemoides* in response to a fungicide, insecticide and a biopesticide by SDS-PAGE. Photosynthetic, biochemical and enzymatic investigation of *Anabaena fertilissima* in

response to an insecticide-hexachloro-hexahydro-methano-benzodioxathiepine-oxide was also studied by Kumar *et al.* (2009). The organochlorine insecticide showed to be deleteriously affecting the activities in the cyanobacterium, *Anabaena fertilissima*.

Moreover, Suroz and Palinska (2004) have studied the effect of different doses of copper on the SDS-PAGE protein profile of *Anabaena flos-aquae* and demonstrated down-regulation of the synthesis of a large number of proteins and up-regulation of only one protein of 55 kDa. In view of the above, there appears a complete lack of information on the pesticide-induced stress stimulation N-fixing cyanobacteria in particular. The current study was aimed at studying protein profile changes and differentially expressed proteins in three cyanobacterial strains, *Anabaena fertilissima*, *Aulosira fertilissima* and *Westiellopsis prolifica*, exposed to Endosulfan (insecticide) and Tebuconazole (fungicide) as most widely used pesticides in paddy fields in Gujarat, India.

MATERIALS AND METHODS

Cyanobacteria strains, growth conditions and pesticide treatment:

Axenic cultures of *Anabaena fertilissima*

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