

## ABSTRACT

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Topic: “Role of Phytohormone (IAA) in Pesticide Stress Resistance in Cyanobacterial Biofertilizer”

**Keywords:** Cyanobacteria, Indole-3-acetic acid, Atrazine, Molecular Docking

The pesticide toxicity affects humans due to their unrestricted use in agriculture. Atrazine is one such pesticide that affects the growth of organisms by reactive oxygen species (ROS) generation (Ramel et al. 2009). Indole-3-acetic acid (IAA) is the most common, naturally occurring plant hormone of auxin class that has many functions including cell elongation, division, signaling etc. There have been reports that IAA helps in stress amelioration in certain photosynthetic organisms. Cyanobacteria are a group of prokaryotic organisms that are **prokaryotic** organisms that also act as **natural biofertilizer** (Lau et al. 2015).

During the present work, 34 cyanobacterial strains were screened for IAA production out of which *Cylindrospermum stagnale* showed highest IAA and was selected for further experiments. The best of optimized physico-chemical culture conditions optimization were as follows: pH 7.5; Temperature 30°C; 16:8 h illumination

period; Inducer 1,500 µg/ml tryptophan; EDTA 0.5 µg/ml; citric acid 9 µg/ml; carbon source sucrose and nitrogen source ammonium chloride.

Preliminary characterization was done via UV-vis spectroscopy which was confirmed by TLC, HPLC, GC-MS and FTIR.

During determination of role of IAA supplementations following observations were made: Maximum growth occurred at 24<sup>th</sup> day which reduced in a concentration dependent manner under atrazine stress. The chlorophyll content decreased and MDA content increased in the presence of atrazine in a concentration dependent manner. The total protein content and the activities of all studied antioxidant enzymes increased till 80µg/L of atrazine but decreased after that. IAA negated the harmful effects of atrazine as indicated by enhanced chlorophyll and protein content as well as by the SOD, CAT and APX activities and reduced MDA content in the presence of IAA.

To study the exact mode of action on photosynthesis in *C. stagnale* molecular docking was performed on D1 protein and atrazine molecule. Software AutoDock Vina was adopted that showed 4 types of following bonds i.e. Hydrogen bonds, Van der Waals interaction, Pi-Pi T-shaped interactions and Pi-Alkyl interactions respectively.

It can be concluded that the cyanobacterium *Cylindrospermum stagnale* can be used as a biofertilizer as it has the potential to tolerate pesticide (atrazine) toxicity due to release of Indole-3-acetic acid.