NAME: - SAMAN MUSHIR

NAME OF SUPERVISOR: - PROF. TASNEEM FATMA

DEPARTMENT: - BIOSCIENCES

TITLE: - "**SCREENING AND OPTIMIZATION OF MYCOSPORINE-LIKE AMINO ACIDS AND SCYTONEMIN (SUNSCREEN PIGMENTS) IN CYANOBACTERIA"**

ABSTRACT

This study was conducted to screen cyanobacteria for presence of photoprotective pigments (MAAs & scytonemin) and to see the effect of various changes in physicochemical culture conditions on their yield. Its salient features are as follows_

1. In present study 51 cyanobacterial strains were screened for the presence/absence of MAAs and scytonemin. MAAs could be detected in 47 strains, while scytonemin was found only in 23 strains. Maximum amount of MAAs (0.1625 mg/g dry weight) was obtained in *Westiellopsis prolific* while maximum scytonemin (0.0530 mg/g dry weight) was detected in *Aulosira fertilissima.* In the present study *Aulosira fertilissima* showed second highest amount of MAAs and highest amount of scytonemin hence selected as a best candidate for further studies.

2. (i) During the HPLC characterization of MAAs from *A.fertilissima* two prominent peaks were observed at 334 nm with retention time of 2.3 min and 3.5 min and correspond to shinorine and porphyra-334 respectively. HPLC peaks elute was collected for further spectrophotometric analysis and these showed absorption maxima at 334 nm. Singh et.al., (2008) also reported the same retention time for shinorine (2.3 min) and porphyra-334 (3.5 min) and absorption spectrum (334 nm) in cyanobacterium *Anabaena Doliolum.*

2. (ii) During the HPLC analysis of scytonemin from *A.fertilissima* a peak was obtained at 384 nm with retention time 4.5 min. Scytonemin peak elute (as separated from HPLC)

showed spectrophotometric absorption maxima at 384 nm. Present scytonemin observations are similar to the retention time and absorption spectrum given in the literature (Garcia-Pichel & Castenholz 1991, Vincent et al. 1993, Llewellyn and Mantoura 1997).

2. (iii) During the TLC analysis of scytonemin extracted for scytonemin from *A.fertilissima* a khaki green coloured band with R_f value 0.45 was observed that corresponds to Garcia-Pichel & Castenholz (1991).

6. An effort was also done to find out optimal culture conditions for the higher MAAs and scytonemin yield. Outcome of these experiments are given below_

(i) UV-light proved to be highly effective for the synthesis of highest MAAs (387.90%) and scytonemin (320.60%) at 20 min/day UV-light exposure. (ii) Duration of light and dark cycle appeared to play role in MAAs and scytonemin synthesis. 16 hrs continuous light exposures showed maximum MAAs increase (124.317%) while 24 hrs continuous light exposures showed maximum scytonemin increase (96.881%). (iii) Not only light duration but light intensity also showed relationship with MAAs and scytonemin content. High light intensity (50 μ mol photons/m^2/s) proved to be the best for the synthesis of MAAs and scytonemin. (iv) pH of the medium showed differential effect on MAAs and scytonemin. MAAs was highest (13.225%) at pH 9. This suggests that pH 8-pH 9 (alkaline) favoured MAAs synthesis. MAAs was always less than control (pH 8). Contrary to MAAs, scytonemin synthesis was more in acidic conditions, its highest value were obtained at pH 2 (177.413%). (v) All spectral colours were not favoured equally for MAAs and scytonemin. Yellow light showed remarkable increase (315.16%) in scytonemin synthesis while white light showed greatest yield in for MAAs.