

## RESEARCH ARTICLE

# Nitrogen fixer nostocs found in rice field of Ranchi district

■ Ashmrita Mahto and Radha Sahu

### SUMMARY

Nostocs are motile, filamentous mucilaginous gelatinous colonial form of algal taxa belonging to order Nostocales and family of Nostecase. This is a common alga of both terrestrial and aquatic habitats. Terrestrial species grow on bare soil or intermingled with leafy plants many species are known to grow in the paddy fields and in alkaline user soil. Lazaroff (1973) summarized his own and other investigation of the life history of Nostoc are related to nutrition and light. Enormous information is available on occurrence and distribution of nostocales from various part of India. Nostoc species has been used most frequently in fundamental research to improve soil qualities and crop production. These algal specimens which are more frequently found in the soil of rice field were collected during 2008-2009. *Nostoc commune*, *N. linekia*, *N. piscinale*, *N. pongiaeforme*, *Anabaenapsis circularis*, *A. lyengarii*, *A. aphanizomenoid*, *A. azollae* were dominant in the soil of rice fields. *Nostoc commune*, *N. linekia* were recorded throughout the year. *A. azollae* is found symbiotically with *Azolla* plant during summer season. As there is no report of any kind of algal investigation in rice field at Ranchi district. Survey was made for the collection and identification of order Nostocales algal specimen during the period of Nov. 2008 to 2010. Present paper deals with the total 8 species of Nostoc belonging to order Nostocales.

**Key Words :** Nostoc, Algal taxa, Rice field

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**N**ostocs are motile, filamentous, mucilaginous, and gelatinous or curvaceous thallus form algal taxa belonging to order Nostocales and family of Nostecase. This is a common alga of both terrestrial and aquatic habitats. Terrestrial species grow on bare

soil or intermingled with leafy plants many species are known to grow in the paddy fields and in alkaline user soil. Lazaroff (1973) summarized his own and other investigation of the life history of Nostoc are related to nutrition and light. They play a vital role in nitrogen fixation, water holding capacity and soil enrichment due to the presence of heterocyst. Nostoc species have been used most frequently in fundamental research to improve soil quality and crop production (Kulasooriya, 2011). Enormous information is available on occurrence and distribution of Nostocace from various parts of India (Bornet and Flahault, 1986; Sankaran, 1996; Shakuntala, 1990; Kumar, 1999; Srivatava, 2000; Palaniselvam, and

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Kathiresan, 2002; Dubey, 2003 and Thakur, 2008).

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**MATERIAL AND METHODS**

Algal collection was made during 2008 to 2010 from the several site of the Ranchi district. The sample was collected periodically from different sites of paddy fields. The collected samples were preserving in 4% formalin the morphological studies were made in fresh materials using light microscope and making their camera lucida drawing and digital photographs has taken. Identification was done with the help of available literature and standard mono graphs (Desikachary, 1959).

**RESULTS AND DISCUSSION**

The results are summarized below according to the objective of the study.

**Enumeration and description of the algal taxa:**

*GENUS- NOSTOC :*

*Nostoc commune :*

Plate 1, Fig. 7

Trichome 3.9-6.6 μ broad, cells spherical 4.9 μ long,

heterocyst 7 μ broad, spores as big as the vegetative cell. Habitat -Paddy field, Jonha, March-April 2008

*N. linekia :*

Plate 1, Fig. 8

Trichome 6-8 μ broad, heterocyst 6- 7.5μ broad and 7-8 μ long.

Habitat -Floated rice field. Angara, and growing on a standing water of rice field, Silli, Oct.- Nov. 2008

*N. piscinale :*

Plate 1, Fig. 9

Trichome 3.3-6.6 μ broad, cells spherical slightly longer than broad, heterocyst 6.6μ broad, spores ablong 5.2-6.6 μ broad. Habitat- Floated rice field. Angara, Oct.- Nov. 2008

*N.spongiaefarme :*

Plate 1, Fig. 10

Cells 3-3.5 μ long spore 6-7 μ broad and 10-12 μ long, Habitat- planktonic found on a Moist soil of paddy field, Angara, July 2009

*Anabaenapsis circularis :*

Plate 1, Fig. 2

Trichome 3.3-5.8μ broad, cells spherical slightly longer than broad, heterocyst 6.6μ-7.2 μ broad, spores not seen. Habitat moist soil of paddy field, Angara, June

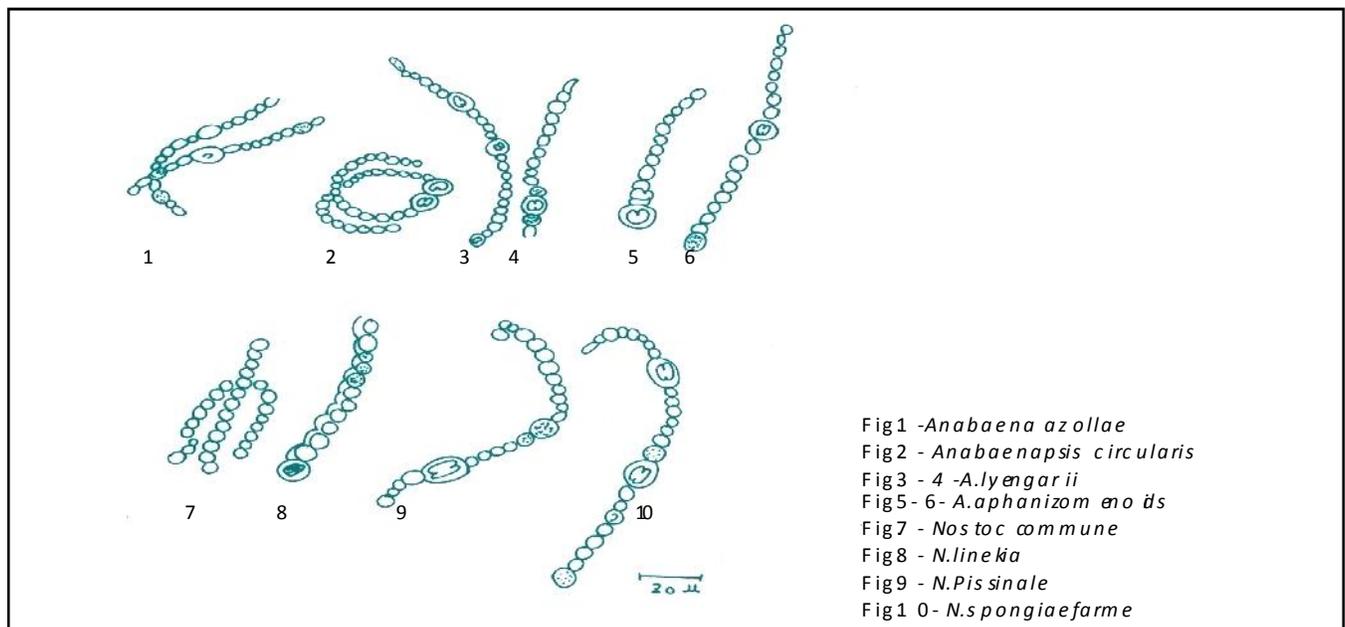


Fig1 -*Anabaena azollae*  
 Fig2 - *Anabaenapsis circularis*  
 Fig3 - 4 -*A.lyengar ii*  
 Fig5- 6- *A.aphanizom eno ds*  
 Fig7 - *Nostoc commune*  
 Fig8 - *N.linekia*  
 Fig9 - *N.Pis sinale*  
 Fig10 - *N.spongiaefarme*

Plate 1 : Camera lucida drawing of algal samples Genus - Nostoc



Fig. 1 : *N. spongiaefarmer*

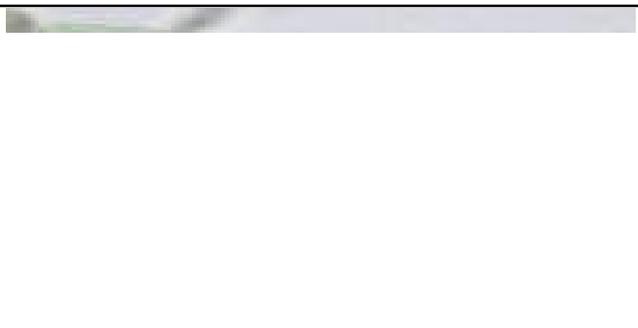


Fig. 3 : *Anabaena azollae*

Fig. 2 : *Nostoc commune*

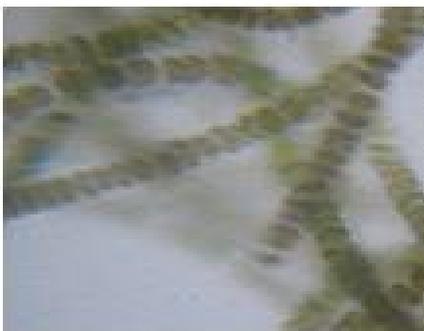


Fig. 4 : *N. linekia*

Plate 2 : Microphotographs of Nostoc species

2009

*A.lyengarii* :

Plate 1, Fig. 3-4

Trichome slightly curved 4.6-68  $\mu$  broad, cell 5.2-6.6 $\mu$  long, heterocysts barrel shaped 6.6 -7 $\mu$  broad and 6.9-7.5  $\mu$  long. Habitat – Moist soil of paddy field, Ormanjhi, Aug. 2009

*A.aphanizomenoids* :

Plate 1, Fig. 6

Trichome 3.3-5.6 $\mu$  broad, constricted cross wall, cells spherical slightly longer than broad, heterocyst 6.2-6.4  $\mu$  broad and 7.2- 7.8  $\mu$  long, spores 6-7  $\mu$  in diameter. Habitat-soil of rice field, Angara Aug. and Dec., 2008

*A. azollae* :

Plate 1, Fig.1

Trichome 3-5. At 8 $\mu$  broad, constricted cross wall, cells spherical slightly longer than broad, heterocyst 6 $\mu$ -6.4  $\mu$  broad and 7-8.1  $\mu$  long, spores 4.9-6  $\mu$  in Diameter.

Habitat- Founded on water logged soil of rice field Kanke. Attached with *Azolla*, Rice field, March-April

2008-2009.

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