Survey of some Soil Protozoa and Nematodes from Lasur (Tq: Gangapur)

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Abstract: *Protozoa and nematodes play significant roles in the fertility of soils In the present study morphological characters of soil protozoan and nematodes have been described on live observation as well as stained preparations. We have found seven species of protozoa - Amoeba radiosa, Pelomyxa palustris, Arcella discoides, Colpoda cucullus, Uronema sp. Laxophyllum rostratum and seven species of nematodes- Tylenchus ritai, Hoplolaimus indicus, Xiphinema basiri, Aorolaimus helices, Pratylenchus, Helicotylenchus dihystera , Mylonchulus sigmaturus from Lasur (Tq: Gangapur).*

Key Words: *Protozoa, Nematode, Soil, Lasur , Gangapur.*

1. INTRODUCTION:

Soil organisms (protist, insects worms) are not just residents of the soil; they are ingredient or components of the soil. The soil biota heavily influences soil characteristics such as hydrology, aeration, and gaseous composition all of which are essential for primary production and for decomposition of organic materials. These Protozoa are feed primarily on bacteria, but also eat other protozoa, soluble organic matter, and occasionally fungi. Protozoa are abundantly present near the surface of the soil, particularly in the upper 15 cm (six inches). The life cycle of many protozoa consists of an active or trophozoite stage where the organism feeds and multiplies and a resting or cystic phase where the cell produces a thick covering. In the cystic phase, many species can resist insensitive environmental conditions and persist for a long period until the environmental conditions improve or favorable . Sarcodina (Amoebae), Ciliophora and Mastigophora are the three major groups of protozoa found extremely abundant in Soil. Numerous heterotrophic flagellates and amoebae are also found in agricultural soils, grassland, and forest soil, underneath sediment of freshwater, coastal and marine waters. They are affected by, cyst, living roots by dead organic material as well as the characteristics of soil; occasionally they may reach to a greatest population as several millions per gram of soil.

2. LITERATURE REVIEW:

Testate amoebae (protist) are potentially important organisms in the cycling of nutrients and energy in soils (1). The early Rothamsted studies highlighted on the role of protozoa as predators of bacteria. As several of the papers in this special issue show, the feeding relationships, energy and nutrient flows between bacterial protozoa and small metazoan such as nematodes, are still controversial area of research (2,3,4). Many recent studies have emphasized the positive effect of protozoan predation of bacteria on plant growth through mechanisms such as increased nitrogen mineralization (4 and references therein). Despite the long history of soil protozoology or protistology and the fact that the diversity of protists in soil would be as high as that in aquatic environments (5,6) The International Society of Soil Protistologists has recently proposed common questions to be answered after the extensive survey (18,19), which clearly states how little we know about soil protist that means how many scientific treasures are buried under our feet. It is time to go hunting with the new map and compass.

3. MATERIALS AND METHOD:

Soil samples were collected in morning time as the temperature affects the abundance of protozoa and they und more abundant in low temperature. Sample were observed in saline solution and fixed in Schaudinn's fixative followed by haematoxylene. In case of Nematodes are isolated by Cobb's seiving method and modified Baermenn funnel technique mounted in glycerine and observed under a Compound Light Microscope and stereomicroscop, (Labomed CXL Mono, at 100X and 400X magnifications). Identification of protozoa was done John O Corliss (17) For nematodes identification was done by DeMan. The dimensions of the organism were based on organisms selected at random from different smears with an ocular micrometer.

4. DISCRIPTION AND ANALYSIS:

Morphological characters of fourteen species are as follows - .

- ***Amoeba radiosa:*** Body is spherical with nearly rigid pseudopodia, which are formed very slowly. It possesses pseudopodia or move by protoplasmic flow. The appearance resembles sometimes as starfish. *Amoeba radiosa* when contracts into a compacted form, sometimes into a spherical shape, with radiating pseudopodia tapering off in different directions. The nucleus is spherical.
- ***Pelomyxa palustris*:** Large forms moving slowly by means of blunt pseudopodia. *Pelomyxa* is a genus of giant flagellar amoeboids, measuring about 480-730 μm in length Endoplasm encloses sand particles and bacteria. Ectoplasm has a number of vacuoles. Nuclei are numerous (multinucleate). cylindrical in shape (when moving), with a single hemispherical pseudopodia at the front and a semipermanent projection called a uroid at the back, which is covered by tiny non-motile flagella.(14) They consume a wide variety of food, and have many vacuoles containing both food and debris such as sand. Reproduction by fission.
- ***Arcella discoides*:** Arcella is a genus of testate amoebae in the order Arcellinida. Test usually circular in apical view, plano-convex in lateral side , occasionally arched; diameter about three to four times the height; without a distinct rim or border. Two nuclei or more. Aperture circular, invaginated, bordered by a shallow lip, generally surrounded by a ring of numerous small pores. (20)Shell yellow or brown, smooth, regular, with a large circular aperture. Pseudopodia rarely visible. The diameter of the shell varies from 110 to 220 microns.
- ***Colpoda cucullus*:** One of the most commonly occurring soil protozoa. Colpoda are distinctly kidney-shaped and are strongly convex on one side, concave on the other. Length 70 to 100 microns. Macronucleus is spherical. Readily encysts under unfavorable conditions. The cytostome lies at the end of a groove in the middle of the body. (8)It is provided with long cilia which form a tuft or brush at the opening. The side of the body in front of the cytostomal region is notched or lobed, each lobe corresponding with one of the longitudinal rows of cilia which cover the body.(15) The single large contractile vacuole is at the posterior end. There are two nuclei.
- ***Uronema sp.*:** Urenema belongs to Family Uronematidae and order Philasterida. Ventral side almost straight from the mouth to the front and drawn out, the dorsal side being curved. Ciliation short and thick. Nucleus round and central. (16)The contractile vacuole is terminal posteriorly.
- ***Laxophyllum rostratum*:** *Loxophyllum rostratum* is about 100-130 μm long in vivo; body oblate leaf-shaped, contractile, convex ventral side and S-shaped dorsal side, beaklike anterior end; 2 Macronucleus and one Micronucleus, contractile vacuole single terminally located; (11) Cilia of the anterior region longer. Nuclei multiple. Trichocysts developed. Length is 150-210 microns.
- ***Euplotes patella:*** *Euplotes* is an interesting ciliate with a transparent body. A band-like macronucleus (the big backward "C" shaped shown inside the body). Flattened dorso-ventrally. There is a special development of cilia on the central surface of the body, It has large cilia that is tufted together to form cirri. (17)The marginal cilia are absent. Body is short in proportion to the breadth.

Nematodes: Morphological characters of Nematode species are as follows

- ***Tylenchus spp :*** Small to medium- sized (0.4-1.3mm) ventrally curved upon relaxation. Cuticle moderately thick, distinctly annulated. Lateral fields each with four incisures. Phasmids dorso-sub lateral, post-median, just behind vulva. Cephalic region is constant, annulated, framework with light or no sclerotization. (10) Amphidial apertures large, pit-like, confined to labial plate Stylet 8-21 um long, with conus about half of stylet length .
- ***Hoplolaimus spp:***First cephalic annule generally divided into six sectors which may be modified. Pharyngeal glands overlapping intestine. Subventral glands enlarged, equal to or usually larger than dorsal gland; nuclei of one or both subventral glands lying posterior to that of the dorsal gland. Cellular cardia absent. Male tail with a distinct hyaline terminal portion. Stylet well develops basal knobs prominent. (7)Females amphidelphic. Phasmids present in or near tail region. Prophasmids absent.

- ***Xiphinema spp*:** Body long (1.5-6 mm) and fairly stout, ventrally arcuate or J shaped upon fixation. Cuticle smooth. Lip region continuous or slightly too well set off from body. Amphidial apertures broad slits, extending for almost entire lipwidth. Odontostyle elongate, needle like, heavily sclerotized. (13) Dorsal gland nucleus elongate, smaller than those of the ventro sublateral glands and located at some distance posterior to its orifice. Dorsal gland round, larger than those of the ventrosublateral glands and located adjacent. Amphidial aperture a minute slit (pore-like), odontostyle with furcate base, guide ring located near to odontostyle/odontophore junction.
- ***Aorolaimus spp :*** Pharyngeal glands enlarged, usually extending to the dorsal gland. Juveniles and females with high arched cephalic framework. Male tail usually with enveloping bursa. Oesophageal glands lobed,

normally overlapping intestine. Phasmid distinct, large scutella in differing positions. Lateral field's are isolated at phasmid level. Lateral fields not areolated at phasmid. Stylet is length 24-29μ.

- ***Pratylenchus spp:*** Marked sexual dimorphism frequent .Lip region low, rounded or flattened anteriorly continuous or slightly setoff- from body, labial framework heavily sclerotized.Amphidial apertures small, slit-like. Spear strong, basal knobs well developed, rounded or flat anteriorly (9)**.**
- ***Helicotylenchus spp*** . Oesophageal glands extending over intestine mostly ventrally and ventrolaterall. Oesophageal glands extending over intestine mostly dorsally and dorso laterally. Posterior ovary non-functional or absent. Posterior ovary.
- ***Mylonchulus spp:*** Buccal cavity goblet-shaped, tapering at the base. Dorsal tooth large to massive situated in anterior half of buccal cavity .Subventral walls bearing three to numerous transverse rows of denticles, forming rasp like areas. A pair of ventral teeth opposite to base of dorsal tooth usually presents on Oesophago-intesitnal junction non tuberculate. (12)Female reproductive system amphidelphic. Spicules short, gubernaculums simple or bidentate, with or without lateral accessory pieces.Tail variable in shape.Caudal glands grouped or tandem. Spinneret terminal or subterminal.

5. SUMMARY :

No doubt parasitic protozoa and nematodes are very important as far as health is concern, but in view of biodiversity these soil protist and nematodes(freeliving) are also important. They play a vital role in almost all ecosystems, therefore, a study of protist and nematodes can be a proxy for a study of an ecosystem as a whole.

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