

SURVEY OF BRYOPHYTE IN RICE FIELDS OF BHOR AND VELHE REGION

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ABSTRACT

The ecological distribution of many bryophytes is highly sensitive to factors that affect plant water status. Many bryophyte species have evolved morphological structures that enhance water uptake, water storage and/or limit water losses. This unique feature plays significant role in natural ecological balance. Rice field ecosystem is a monoculture agro-ecosystem. It is observed that Bryophytes play significant role in water conservation during progressive growth of rice crop. The association of bryophytes and the water retention is known but such studies are not reported from the areas under study. The Bhore and Velhe taluka of Pune district, Maharashtra are well known for the rice production. The observations from this region revealed the presence of 7 bryophytes which contributes towards water retention phenomenon.

Keywords: Rice fields, Bryophytes, Bhore and Velhe region

INTRODUCTION

Bryophytes are non-vascular, thalloid plants adapted uniquely in their organization and physiology. Water is primary requirement to keep these plants in correct and default physical and metabolic state. Histological and physiological adaptations in thallus allows plants to absorb water and food from remote sources such as rainwater, dews and leachates, soil surface, etc. (Olarinmoye, 1974).

Rice fields are apparent habitats for bryophytes which grow on variety of the substrates such as soil, rocks, trenches and walls around the fields, etc. Since bryophytes assist in maintaining moisture for a long time, their association with rice became an important aspect to study. Maharashtra state has rich diversity of rice due to variation in soil, climate and choice of local people. About 25 land races of rice like Kala rice (aromatic rice), Varangal, Rajguda, Kolambi, Tam, Raibhog, Halva, Garva, and White rice were reported from Western ghat of Maharashtra (Kulkarni *et al.*, 1998). Bhore and Velhe taluka are rice producing regions.

The rice field undergoes three major ecological phases- aquatic, semi-aquatic and terrestrial dry, during a single paddy cultivation cycle. The aquatic phase of the rice field represents

the vegetative and the initiation of reproductive phase of the rice plant. While the semi-aquatic and terrestrial dry phase correspond to the grain ripening stage of the rice crop (Fernando, 1995). Thus, rice fields are dynamic environment that undergo rapid temporal variation in relation to the growth of the rice plant and the hydrological status. Therefore, as a whole, the ecology of rice fields is dominated by rapid physical, chemical and biological changes.

In the present study, survey of bryophyte in the rice fields from Bhore and Velhe taluka including its identification, determination of micro-habitat in rice fields, associations was carried out.

MATERIALS AND METHODS

The surveys were undertaken during years (2009-2011) from Bhore and Velhe region during different stages of rice crop. The documentation of life cycle of Bryophyte and rice crop was made periodically. The mature plant samples were collected in clean plastic bags to establish their identity. The samples were brought in laboratory, dust was removed and clean samples were identified using literature (Biradar & Shirke, 1992). The specimens were prepared and mounted with standard technique (Azuelo, 2010).

The specimens were deposited in Agharkar Herbarium at Maharashtra Association for Cultivation of Sciences, Pune (AHMA). Photo documentation was carried out using 'Olympus C7070' digital camera. The observations were recorded systematically.

Descriptions of the specimens:

Family: Ricciaceae

***Riccia cruciata* Kash** - Thalli monoecious, spongy cruciform when young, in rosettes, 5 to 7 X 2 to 3 mm. dorsal surface light green at maturity, usually two times dichotomously branched, obovate to oblong, dorsal groove shallow. Epidermis thin, scales are small, delicate purple weak, semi lunar. Rhizoids mostly smooth, few, tuberculate. Antheridia globular with inconspicuous papillae. Archegonia in a row, papillae prominent.

Locality: Bhor-Bare; Velhe-Dapode

***Riccia melanospora* Kash** - Plants are monoecious, small, greyish, dichotomously brownish in overlapping patches. Thalli are 2.5 to 4.5 X 1 to 2 mm. Segments linear, ciliate, cilia along the margins near the apical portion, dorsal groove deep & narrow near the apex or slightly concave towards the posterior side; scales prominent, overlapping, deep purple. Rhizoids usually smooth, sometimes tuberculate. Antheridia were in mid dorsal row, with conspicuous papillae, sporophytes embedded in thallus prominent on dorsal surface.

Locality – Velhe – Ambavane, Margasani

***Riccia gangetica* Ahmad** - Plants are monoecious, dorsal surface bluish green, margin purple when young, whitish at maturity. Thalli 1.5 to 2.5 X 1 to 1.5 mm, one to two times dichotomously branched. Thalli linear-obovate, dorsal groove conspicuous. Ventral scales prominent purple. Rhizoids many, smooth & tuberculated, Antheridia and archegonia are in 1-3 rows along with mid dorsal groove. Antheridial papillae prominent hyaline projecting above the surface of the thallus. Archegonial neck prominent, hyaline protruding above thallus surface. Locality – Velhe- Margasani

***Riccia billardieri* Mont. & Nees ex Gottsche, Lindenb. & Nees** - Thalli monoecious, once or twice forked overlapping or in incomplete rosette. Thalli usually 4 to 12 X 2 to 3 mm. dorsal groove narrow

anteriorly, which gradually becomes flat on posterior side, epidermal cells hyaline and oval. Ventral scales prominent, purple, semilunar rhizoids many, ascending from mid ventral side, 8 to 12 mm long, both the types simple & tuberculate. Cross section of thallus 4 to 6 times as broad as high, Antheridia in 1 to 3 rows ostioles conspicuous, projecting above the surface of thallus, mostly on midrib, archegonia in rows, projecting above thallus.

Locality – Bhor- Hirdoshi, Venwadi, Nandgaon

***Riccia crystallina* L.** - Plants monoecious forming rosettes 12 to 20 mm in diameter, May be overlapping, Generally yellowish green or reddish, Thalli spongy 6 to 12 mm long, dichotomously branched dorsal surface of matured thalli pitted due to this organization of the epidermis, pits visible, dorsal groove inconspicuous except at the apex, rhizoids mostly smooth few tuberculate.

Locality – Velhe- Dhanep

Family: Targioniaceae

***Cyathodium tuberosum* Kash** - Individual plant is dioecious, 8 to 10 mm long & the rosette is about same diameter; thallus membranous, fan shaped with entire margin, dichotomous branching resulting into lobes. On the ventral side, smooth rhizoids are evenly spread all along the surface of the thallus except margin, 8 mm long; hyaline lines are more distinctly seen on ventral side except margin & tip. Antheridial chambers are marginal in position to the distal end of the thallus on dorsal side while the archegonia develop on ventral side individually capsules develop in the fold of thallus appear black in colour at maturity.

Locality – Bhor- Ambeghar; Velhe- Dapode.

Family: Anthocerotaceae

***Anthoceros erectus* Kash** - Plants dioeciously erect grouped into tufts thick fleshy spongy with a basal stalk expanding at the top into an open palm like structure, female thalli are large 10 X 7 mm, stalk is shorter as compared to that of the male thallus, male plants intermixed with the females, the inflated portion is cup like in male thalli while it is funnel shaped in female thalli, margin of both male and female thalli are highly dissected to form finger like projecting lobes.

Locality – Velhe- Ambavane

RESULTS AND DISCUSSION

Bryophytes found to be grown on wet rocks, soil, vertical walls retaining the moisture even after drying of the soil. *R. gangetica* mostly found to be associated with *R. billardieri*. *C. tuberosum* grows forming dense mats. These mats on vertical walls as well as ground field inhabits only in shade portions. All the species showed their sporophytic phases at the time of harvest of the crop.

These species commonly shows strong association with Algal communities. The association of *Nostoc* spp. with *Anthoceros* spp. enhances the formation of hormogonia in *Nostoc* spp. (Campbell and Meeks, 1989). It also been reported that the symbiotic association of Cyanobacteria helps in nitrogen fixation (Saxena, 1981). This helps to improve the quality and quantity of Rice.

During present studies, seven species belonging to three genera and three families were recorded. Out of these, family Ricciaceae includes

one genus and five species, Targioniaceae and Anthocerotaceae includes one genus and one species each. Floristic analysis has been compiled in Table 1.

The association of Bryophytes retains the water and enriches soil of the rice fields. This is a first report of Bryophytes from the region of Maharashtra in rice fields.

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Table 1: Floristic analysis

No.	Family	Species
1.	Ricciaceae	<i>Riccia cruciata</i> Kash
2.		<i>Riccia melanospora</i> Kash
3.		<i>Riccia gangetica</i> Ahmad
4.		<i>Riccia billardieri</i> Mont. & Nees ex Gottsche, Lindenb. & Nees
5.		<i>Riccia crystallina</i> L.
6.	Targioniaceae	<i>Cyathodium tuberosum</i> Kash
7.	Anthocerotaceae	<i>Anthoceros erectus</i> Kash

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