Natural Diversity of Slime Moulds in the Rural Area of the Mota Khuntavada, Mahuva, Bhavnagar

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Abstract: Slime moulds are group of organisms which are eukaryotes in nature. There is a vast diversity of slime moulds are found throughout the world. Its diversity is dependent on the environment and climate conditions where they grow. They are able to survive a single cell but mostly they form multicellular arrangement for better survival. Here in this study, diversity of slime mould in an unexplored location was done. The location was a small village named Mota Khuntavada of Bhavnagar district, Gujarat state, India. The study has shown that there are atleast nine different species of slime moulds are present in that location. Based on the structure and morphology, it was found that these species belongs to four genuses. Species were identified as *Stemonitis sp, Stemonitisoxifera, Ceratiomyxa fruticulose, Stemopnitopsis typhina, Arcyria denudate, Stemonitis splendens, Arcyria cinerea, Fuligo septic.* Reason for such great diversity is such small area is not known clearly but it may be because of higher animal and human activities in such a small area.

Keywords: slime moulds, diversity, Mota Khuntavada, rural area

I. INTODUCTION

Slime moulds can be defined as group of unrelated eukaryotic organisms which can live as single cell organisms. (Chung, Liu, & Tzean, 1998; Fiore-Donno et al., 2010; Nieves-rivera & Stephenson, 2004) Often these organism makes colonies by aggregating together to produce regenerative structure. Initially they were considered as a fungi but recent development has suggested that they have certain characteristics like paraphyletic which makes them more suitable as protista rather than fungi. Hence they are now classified as protests. Till date more than 1000 species were identified, most of which are macroscopic. They generally have size of few centimeters only. (Braun, 1971; VD, ST, AV, & KR, 2012) However, certain species may have higher tendency to aggregate more firmly resulted into bigger size and weight of slime mould. Wide varieties of adaptation were seen in the slime mould especially for nutrition. If sufficient amount of feeding material available then they prefer to stay as separate cell and grow individually. (Bo & Yu, 2016; Fiore-Donno et al., 2010) But in case of food scarcity, they form larger body by aggregating which may migrate from one place to another place. Not only this, they can also make such structure which helps them in nutrition like stalks. (Novozhilov, Schnittler, Vlasenko, & Fefelov, 2010; Robbrecht, 1974) Many species are also known to produce fruiting body or spores which can be spreaded out by carries including animal and winds. In the modern classification, these slime mould are classified into three groups. Myxogastria includes syncytical, plasmodial and acellular moulds. Dictyosteliida includes developed cellular slime moulds and protosteloids includes slime mould having amoeboid structure and fruiting bodies. (Bo & Yu, 2016; Keller, 1973; Lee, Kim, & Kwak, 2014; Samuels, 1973) Slime moulds are known to grow on any decaying material. They play vital role in maintain the ecosystem by decomposing the dead plant material, yeast cells and fungi. In addition to moist geological sites they are also found to grown on cellulosic material including paper, wood or natural fiber textiles. (Braun, 1971; Tran, Stephenson, Hyde, & Mongkolporn, 2007) Here in this study, a village of district Bhavnagar named mota khuntavada was selected to study the diversity. The high moisture content of the atmosphere and favourable temperature makes it suitable for the growth of verities of slime moulds making it more potential site for the study.

II MATERIALS AND METHODS

2.1 Geographical Location

Mota khuntavada village is located at 21.189744 N^{o}, 71.650743 E^{o}. This study was carried out for two months.

2.2 Method for the study

The entire location was divided in to 1m X 1m area and studies thoroughly. Observations include detailed visual observation of every objects, grasses, tress, leaf, wood pieces, decaying wooden part organic waste materials and other garbage. Each distinguish species was marked and studied for various parameters. (Samuels, 1973; VD et al., 2012)

2.3 Parameters of the study

Each slide mould observed in the field was analyzed for several parameters. These parameters are type of location, physical dimensions, size of colony, colour of colony and any special characteristic appearance. Based on these parameters, species were identified. (Chung et al., 1998; Dai, Okorley, Li, & Zhang, 2020; VD et al., 2012)

II. RESULTS AND DISCUSSION

The specimens' length×breath×height in mm was being measured in mm. Outer structure was being observed. Fold microscopic observation was done for the details study of the collected specimens. Data were recorded for each & every specimens collected during the field work. The data of every particular specimen were than compared with the searched data of the similar structure of the slime moulds in the internet and other references.

Based on the field of various parameters, the following observations are made (Table 1). Morphological characteristics were used to identify particular species. (Figure 1 to 8).

Sr. No.	Sample ID	Type of Location	Dimensions in mm (L*W*H)	Size of Colony (Average number of species)	Any special characteristic
1	*Stemonitis sp.*	Wood Decaying	6*1*2	70 ± 9	Tall brown sporangia
2	*Stemonitis oxifera*	Hard wood	13*2*6	Cluster	
3	*Ceratiomyxa fruticulosa*	Dead wood	6*2*10	Cluster	Series of erect, simple or branch column
4	*Stemopnitopsis typhina*	Hard wood	4*1*1	200 ± 12	--
5	*Arcyria denudata*	Dead wood	5*1 *1	190 ± 16	Ovate to cylindrical structure
6	*Stemonitis splendens*	Hard wood	10*1*2	Cluster	Long brown tube sporangia
7	*Arcyria cinerea*	Dead wood	11*1*2	35 ± 9	Sporotheca ovate to cylindrical with white in color
8	*Fuligo septica*	Rotted wood	1*1*5	Cluster	Peculiar yellowish, bile colored

Figure 1. *Stemonitis sp.*

Figure 2. *Stemonitis oxifera*

Figure 3. *Ceratiomyxa fruticulosa*

Figure 4. *Stemopnitopsis typhina*

Figure 5. *Arcyria denudata*

Figure 6. *Stemonitis splendens*

Figure 7. *Arcyria cinerea*

Figure 8. *Fuligo septica*

*B*ased on the observation it was found that species 1 which was identified morphological belong to *Stemonitis sp*. (Figure 1) It is the most common genus found throughout the world. They generally grown on decaying wood in the humid conditions. Life span of this species is very short. It will decay in 1-2 days followed by spore formation. (Nieves-rivera & Stephenson, 2004; Tran et al., 2007) The second specie which was identified was *Stemonitis oxifera*, which is most commonly found in the wood with upright position from top. It has brownish appearance with prevalence in the wood used for constructions. (Keller, 1973; Moreno, Castillo, & ThÜS, 2020) The third specie was identifies as *Ceratiomyxa fruticulose* which belong to genus *Ceratiomyxa* and generally found in the rotting wood. Its plasmodium shows white frost like net or thin growth. Plasmodium can produce pillar from where sporangia are developed, These sporangia are around of 1mm long. (Chung et al., 1998; Moreno et al., 2020; VD et al., 2012) The fourth specie which was identified was *Stemopnitopsis typhina*. Its sporangia are found in scattered form and may have height of about 4mm with stalk of 1mm. The sporangia have of brownish color with dark brown stalk. (Chung et al., 1998; Dai et al., 2020; Novozhilov et al., 2010) The fifth specie was *Arcyria denudate* which belongs to genus *Amoebozoa*. It is most commonly found in neem tree trunk. The sporocarps of the species are gnerally of 5mm long with in pinkish appearance.It has stalk of around 0.5mm long with sporocarps. Peridium consists of the fruiting bodies. Its capillitium has thin network like threads. (Fiore-Donno et al., 2010; Novozhilov et al., 2010; VD et al., 2012) The sixth specie which was identifies was *Stemonitis splendens*, which is commonly called as Chocolate tube slime, because of its brown color appearance. It was found in the woods of decaying building. Its sporangia are dark purplish brown in color with average 10mm tall and 2mm diameter. (Bo & Yu, 2016; Dai et al., 2020; Nieves-rivera & Stephenson, 2004) Seventh species which was identified was *Arcyria cinerea*. It is commonly found in dry tree branches. Its sporangia have average 11mm length with white color and the transparent stalk is also found attached with it having average 2mm length. (Novozhilov et al., 2010; Robbrecht, 1974; VD et al., 2012) The last specie was *Fuligo septic*, which belongs to genus *Fuligo*. It is also known as Dog Vomit Slime Moulds. It has yellowish appearance It was found most commolny after the rain in the wet area of rotten wood trees and plant debris. It generally makes clusters in the humid conditions and dries in dry condition, releasing the sporangia in the air. (Braun, 1971; Chung et al., 1998; Fiore-Donno et al., 2010; Novozhilov et al., 2010)

IV CONCLUSION

Based on the entire study, it was found that, Mota Khuntavada is a place which is not yet been explored for determination of biodiversity of slime moulds. In a small area 8 difference species with different characteristics were observed, which is an indication of good diversity of moulds in the particular region.

FUTURE SCOPE

A details study can be carried out to study the biodiversity in Mota Khuntavada for slime mould in various environmental conditions. There is high probability of getting better diversity in the particular region.

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