



Distribution and new records of Myxomycetes from Tropical Dry Evergreen Forests of South India

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Nivetha M, Babu B, Kumar M 2023 – Distribution and new records of Myxomycetes from Tropical Dry Evergreen Forests South India. Asian Journal of Mycology 6(2), 290–304, Doi 10.5943/ajom/6/2/10

Abstract

The present survey is a preliminary study of the diversity of Myxomycetes occurring in the tropical dry evergreen forest vegetation of the southeastern coastal belt of India. A total of 11 taxa belonging to the orders *Ceratiomyxales*, *Trichiales*, *Stemonitidales* and *Physarales* were collected, studied, and described from this region. The identification was supported using both morphological and microscopic characters. *Ceratiomyxa fruticulosa* var. *arbuscula*, *Arcyria insignis*, *Hemitrichia serpula*, *Stemonitis flavogenita*, *Physarum notabile*, *Fuligo septica* var. *candida*, *Fuligo septica* var. *septica*, and *Comatracha anomala* are reported for the first time from Tamil Nadu, South India.

Keywords – *Arcyria* – *Ceratiomyxa* – *Comatracha* – *Fuligo* – Fungal diversity – *Hemitrichia* – new report – *Physarum* – *Stemonitis* – Tamil Nadu

Introduction

Myxomycetes are highly neglected and less studied organisms in biodiversity studies because of their minute size and brief life cycle. They are fungus-like organisms (FLO), which are acellular, plasmodial or true slime moulds and can be characterized by an amorphous, multinucleate, protoplasmic mass called a plasmodium and a sporulating structure that consists of a mass of spores borne in a simple or complex membranous or tough, non-cellular sac (Clark & Haskins 2016).

Myxomycetes are now classified under the kingdom Protista (Ruggiero et al. 2015). The earliest branches of the eukaryote tree consist of amoeboid protists in the supergroup Amoebozoa (Fiore-Donno et al. 2010). The most diverse groups of the Amoebozoa are eumycetozoans, which are commonly called slime moulds (Stephenson & Stempen 1994, Stephenson et al. 2023). The recent classification of Myxomycetes based on phylogeny was provided by Leontyev et al. (2022). The true myxomycetes, which are exosporous and myxogastric, form a monophyletic clade within the phylum Eumycetozoa with two subclades, namely the Columellomycetidae (dark-spored) and the Lucisporomycetidae (light-spored), based on the spore colour. *Stemonitidales* and *Physarales* are included in the former clade, whereas *Trichiales* is included in the latter clade (Dmitry et al. 2022). Myxomycetes are common and cosmopolitan in distribution, occurring for a short period during rain but thereafter disappearing very soon. Myxomycetes comprise between 1050 and 2000 species (Keller et al. 2008, Lado et al. 2022), representing 60–68 genera with a worldwide distribution. Around 500 species representing 60 genera have been recorded in India

(Manoharacharya & Nagaraju 2016).

The Pioneer work on Myxomycetes in India was carried out by Drake in the early 20th century. Interest in the field of Myxomycetes was revived by Thind in North India and by Agnihothurudu, Indira Kalyanasundaram in South India during the 1950s simultaneously. This period is considered the golden era of Myxomycetes study in India. Thind et al. (1964) have described 175 species of Myxomycetes from North India, ranging from the Northwestern region, Eastern Himalayas and Punjab plains. Agnihothurudu et al. have described 78 species from South India (Ranade et al. 2012). A checklist of the myxomycetous fungi of India was published by Ranade et al. (2012).

Although Myxomycetes were studied from South India, Tropical dry evergreen forest (TDEF) was not explored for the documentation of FLO. The TDEFs are terrestrial forest types confined along the Coromandel Coast of Peninsular India, growing in lateritic and dune soils distributed along the coasts of Tamil Nadu, Andhra Pradesh and part of Orissa. They occur in patches, which are short-stature and three-layered with patchy ground flora (Udayakumar et al. 2016). TDEFs have been distinguished by various authors (Sebastine & Ellis 1967, Champion & Seth 1968, Rao & Meher-Homji 1993), and they represent a peculiar type that is confined to the southeastern coast of India, Northeast Sri Lanka (Blasco & Legris 1973), northwest Thailand (Bunyavejchewin 1999) and Jamaica (Kelly et al. 1988). There have been very few studies on the diversity of angiospermic plant species (Muthuperumal & Parthasarathy 2010). However, studies on the diversity of FLOs, mushrooms, and other fungi in TDEFs are lacking, except for very few (Kumar et al. 2021). In this connection, the present work is the outcome of Myxomycetes (FLO) exploration in Madras Christian College campus, Chennai, Tamil Nadu, a representative region of the Tropical dry evergreen forest in India.

Materials and methods

Extensive fieldwork was undertaken to collect as many specimens of Myxomycetes as possible. The specimens ranging from younger to older were collected along with the bark and twigs of the plants from the study area (Madras Christian College Campus [Fig. 1]), which is a part of the tropical dry evergreen forest vegetation in the coastal belt of the Tamil Nadu, South India. The specimens were collected without any damage and kept in boxes similar to matchboxes, labelled with information like field number, date and place of collection. The specimens were then dried at 50–60°C and preserved in cardboard boxes along with respective tags and naphthalene balls. The morphological and microscopical characters of the specimens were examined in the laboratory using a binocular stereo microscope (20x) and Magnus MLX microscope respectively. The dried specimens were revived using 5% KOH and were stained with phloxine. The morphological characters, such as shape, size, and proportion of stalk were measured, and the colour of the fruiting bodies was noted using the Methuen Handbook of the colour book (Kornerup & Wanchester 1978). The microscopic characters such as spore and capillitium pattern, were recorded using Carl Zeiss photomicroscope (AxioVision star plus). Measurements of sporocarps were represented with at least 10 nos. while the spores were represented with 50 nos. Specimens were deposited in the Madras Christian College herbarium (MCCH) under the mycology division with accession numbers. The specimen was identified with appropriate keys and literature (Mitchell 1979, Lizarraga et al. 1997, Ranade et al. 2012, Moreno et al. 2018, 2020, 2022).

Results and Discussion

Around 20 myxomycetous specimens were collected during our biodiversity study at TDEF regions. Among them, around 11 collections were identified and delimited to seven genera, seven species, and four varieties belonging to the orders *Ceratiomyxales*, *Trichiales*, *Stemonitidales* and *Physarales* were described in the present study. The other nine collections were either similar or degraded. Among the described collections, *Ceratiomyxa fruticulosa* var. *arbuscula*, *Arcyria insignis*, *Hemitrichia serpula*, *Stemonitis flavogenita*, *Physarum notabile*, *Fuligo septica* var.

candida, *Fuligo septica* var. *septica* and *Comatricha anomala* are reported for the first time from Tamil Nadu.



Fig. 1 – a–c Tropical dry evergreen forest of MCC campus

The taxonomic key to the following identified species is given below.

- | | |
|--|--|
| 1a. Sporangia branched..... | <i>Ceratiomyxa fruticulosa</i> var. <i>arbuscula</i> |
| 1b. Sporangia unbranched | 2 |
| 2a. Sporangia fused to form aethalium | 3 |
| 2b. Sporangia not fused | 4 |
| 3a. Cortex yellow with white calcareous deposits | <i>Fuligo septica</i> var. <i>septica</i> |
| 3b. Cortex white with white calcareous deposits..... | <i>Fuligo septica</i> var. <i>candida</i> |
| 4a. Sporangia sessile, network of veins | <i>Hemitrichia serpula</i> |
| 4b. Sporangia stalked, elongated or globose..... | 5 |
| 5a. Sporangia globose, columella absent | <i>Physarum notabile</i> |

5b. Sporangia cylindrical, columella extending till the tip of sporocarp	6
6a. Sporangium clustered arising in tuft	7
6b. Sporangium single, spread, isolated and troops	9
7a. Capillitium smooth, spore mass dark brown, Warty	<i>Stemonitis ferruginea</i>
7b. Capillitium smooth, spore mass dark brown, different but not warty	8
8a. Spores 8–10 µm in diam., Mesh of internal network irregular, loose, broadened and angled expansions	<i>Stemonitis fusca</i> var. <i>nigrescens</i>
8b. Spores 7–9 µm diam., Mesh of internal network large, irregular, dark brown, flexuous	<i>Stemonitis flavogenita</i>
9a. Capillitium smooth, spore mass brownish, distinctly warty	<i>Comatricha anomala</i>
9b. Capillitium with spines, spore mass pink, minutely warty	10
10a. Sporangia pastel red, calyculus plicate, smooth, funnel-shaped, spores hyaline	<i>Arcyria insignis</i>
10b. Sporangia greyish red, calyculus saucer-shaped, spinulose, spores slightly warty	<i>Arcyria incarnata</i>

Taxonomy

Ceratiomyxa fruticulosa* var. *arbuscula (Berk. & Broome) Nann.-Bremek., Nederlandse Myxomyceten (Amsterdam): 55 (1975) [1974] Fig. 2a–c

Sporophores in troops, forming large colonies, translucent, frost-like, quickly transforming to evanescent, milky white (1A1), sporophores with solitary branches to gregarious branches with spores developing solitary on finger-like stalks that are uniform in length throughout. Two or three branches evident, uppermost branching dichotomous. True capillitium, columella and peridium absent. Sporophores 0.1–0.3 mm wide and 1.5–4.5 mm height. Spores directly borne on the branches of the sporophore in clusters, ovoid, 6–10 × 7–15 µm, translucent, hyaline.

Habit and Habitat – in troops on unknown dead wood in Tambaram, Chennai.

Specimen examined – India, Tamil Nadu, Chennai - Madras Christian College Campus, near Department of Botany, on dead wood, 13 January 2021, M. Nivetha, Accession no: MCCH2101.

Notes – *Ceratiomyxa fruticulosa* var. *arbuscula* is represented with clear dichotomous branching evident at the tip. This species is distinguishable from the other species due to the branches that support the spores grouped at the end through a stipe-like structure. This collection agrees with the *Ceratiomyxa fruticulosa* var. *arbuscula* described by Cavalcanti *et al.* (2008). This species had been reported on decaying wood from Pune, Maharashtra (Ranade *et al.* 2012).

Fuligo septica* var. *septica (L.) F.H. Wigg., Prim. fl. holsat. (Kiliae): 112 (1780) Fig. 2d–f
 ≡ *Aethalium septicum* (L.) Fr., Systema Mycologicum 3: 93 (1829)

Plasmodium light orange (5A6). Aethalia often in small groups, slightly oblate, low pulvinate or irregular, 3–5 cm across and up to 1 cm thick, cortex brittle and crumbling irregularly, smooth or rough. Hypothallus membranous, often consisting of several perforated layers, encrusted with white lime, often protruding outside the aethalium. Peridium of the tubular plasmodiocarps that form the aethalium, fragmented. Capillitium tubules hyaline, connected at each end to peridium, branched or unbranched and sometimes forming a net, with a variable number of large or small fusiform or irregular, lime nodes containing white lime, the nodes sometimes merged into a pseudocolumella in the middle of the tubes. Spores dark brown, mostly oval, 7–9 µm in diam., verruculose, rarely spinulose.

Habit and Habitat – single aethalium on dead wood in Tambaram, Chennai.

Specimen examined – India, Tamil Nadu, Chennai – Madras Christian College Campus, near Department of Botany, on deadwood, 2 March 2021, M. Nivetha, Accession no: MCCH2114.

Notes – This specimen agrees with *Fuligo septica* var. *septica* described from Germany, Russia and Austria by Hoppe (2017), which clarifies that the variety *septica* does not lose its yellow

colour during maturity, and this specimen spotted retains its yellow pigment even after maturity.

Fuligo septica* var. *candida (Pers.) R.E. Fr., Svensk bot. Tidskr. 6: 744 (1912) Fig. 2g–i

≡ *Aethalium septicum* (L.) Fr., Systema Mycologicum 3: 93 (1829)

≡ *Reticularia septica* (L.) With., A botanical arrangement of British plants 3: 470 (1792)

Plasmodium white (5B1) in colour, thin, filmy. Aethalia often in small groups, slightly oblate, low pulvinate or irregular, 3–4 cm across and up to 0.5 cm thick, pale grey or white, cortex brittle and crumbling irregularly, smooth or rough. Hypothallus membranous, consists of several perforated layers, encrusted with white lime, protruding outside the aethalium. Peridium fragmented and impregnated with white lime. Capillitium tubules hyaline, connected at each end to peridium, branched or unbranched and sometimes forming a net, with a variable number of large or small fusiform or irregular lime nodes containing white lime, nodes sometimes merged into a pseudocolumella in the middle of the tubes. Spores dark brown, mostly oval, 9–11 µm in diam., verruculose rarely spinulose, wall layer slightly thickened.

Habit and Habitat – single aethalium on dead woods in Tambaram, Chennai.

Specimen examined – India, Tamil Nadu, Chennai - Madras Christian College Campus, near Department of Botany, on dead wood, 11 January 2021, M. Nivetha, Accession no: MCCH2113.

Notes – This specimen agrees with *Fuligo septica* var. *candida* described from Germany, Russia and Austria by Hoppe (2017), which clarifies that the variety *candida* loses the yellow colour very soon during maturity, and the material spotted has lost its yellow pigment.

Hemitrichia serpula (Scop.) Rostaf., Versuche eines Systems der Mycetozoen: 14 (1873). Fig. 2j–l

≡ *Arcyria serpula* (Scop.) Masee, Monogr. Myxogastr. (London): 164 (1892)

≡ *Hemiarcyria serpula* (Scop.) Rostaf., Śluzowce monogr. (Paryż): 266 (1875) [1874]

≡ *Hyporhamma serpula* (Scop.) Lado, Cuadernos de Trabajo de Flora Micológica Ibérica (Madrid) 16: 48 (2001)

≡ *Mucor serpula* Scop., Fl. carniol., Edn 2 (Wien) 2: 493 (1772)

≡ *Trichia serpula* (Scop.) Pers., Neues Mag. Bot. 1: 90 (1794)

Sporocarp melon yellow (5A6) to light orange (5A5) in colour, 0.2–0.6 mm diam., elongate, worm-like branched network. Stalk and columella absent. Peridium thin, membranous, persistent at the base. Capillitium highly elastic net, twisted and intertwined threads, 5–10 µm wide with 3–5 spiral bands connected by longitudinal ridges and a spine-like structure, 5–8 µm. Spore mass orange yellow to golden in colour. Spore 11–14 µm diam., globose, marked with conspicuous high ridges having large irregular meshes, forming opaque appearance on spore surface, spore wall thick.

Habit and Habitat – twigs of unknown tree in Tambaram, Chennai.

Specimen examined – India, Tamil Nadu, Chennai Madras - Christian College Campus, quarters behind the lake, on unknown dead wood, 8 December 2021, M Kumar, Accession no: MCCH2115.

Notes – The *Hemitrichia serpula* in this study agrees with the description provided by McManus (1962). It was also confirmed with the scanning electron micrograph images of capillitial threads provided by Ellis et al. (1973). This species has been reported on decaying leaves of palms like *Areca catechu*, *Cocos nucifera*, *Agave* sp., mosses and leaves of *Musa paradisiaca* in West Bengal, Maharashtra, Uttar Pradesh, Assam and Madhya Pradesh (Ranade et al. 2012).

Physarum notabile T. Macbr., N. Amer. Slime-Moulds, Edn 2 (New York): 80 (1922) Fig. 2m–o

≡ *Didymium connatum* Peck, Ann. Rep. N.Y. St. Mus. nat. Hist. 26: 74 (1874) [1873]

≡ *Physarum connatum* (Peck) G. Lister, Monogr. Mycetozoa, Edn 2 (London): 71 (1911)

Plasmodium pale grey (1B1). Sporocarpous 0.5 – 1 mm length, stalked or sessile, merging into short plasmodiocarps, gregarious and often crowded. Stalk, when present, irregular, usually tapered upward, deeply plicate-furrowed, opaque, dark or covered with white lime. Sporotheca globose to reniform on a constricted and often dark and cupulate base, 1 mm diam. Peridium

membranous, densely encrusted with ash-white lime above the surface. Capillitium abundant, the nodes variable in size and shape, connected by long hyaline threads, the junctions not always expanded. Spore olivaceous brown, verruculose, 5 – 7 μm diam.

Habit and Habitat – troops on the bark of a tree in Tambaram, Chennai.

Specimen examined – India, Tamil Nadu, Chennai - Madras Christian College Campus, near Botany Department, on *Tamarindus indicus* tree, 19 January 2021, M. Nivetha, Accession no: MCCH2105.

Notes – This species agrees well with *Physarum notabile* described from Mongolia (Novozhilov & Schnittler 2008) and also the one described from western Kazakhstan (Schnittler & Novozhilov 2000) and Caspian Lowland (Novozhilov et al. 2006) species with slight variation and compressed to weakly reniform sporothecae.



Fig. 2 – a–c *Ceratiomyxa fruticulosa* var. *arbuscula*. a Habit. b Enlarged portion of sporophore.

c Spores. d–f *Fuligo septica* var. *septica*. d–e Sporocarp. f Spores. g–i *Fuligo septica* var. *candida*. g–h Sporocarp. i Spores. j–l *Hemitrichia serpula*. j Sporocarp. k Capillitial thread. l Spores. m–o *Physarum notabile*. m–n sporocarp. o Spores.

Stemonitis ferruginea (Bull.) T. Macbr., N. Amer. Slime-Moulds (New York): 120 (1889)

Fig. 3a–d

≡ *S. axifera* auct. (non *Stemonitis axifera* (Bull.) T. Macbr. = *nomen ambiguum*).

≡ *S. smithii* T. Macbr., Bull. Iowa Univ. Lab. Nat. Hist. 2(4): 381 (1893).

Sporocarp crowded, forming large colonies, stipitate. Sporangium cylindrical, brownish orange (7C7), becomes paler after the dispersion of spores, acute or subacute apex, slender or slightly curving, fasciculate, 7 – 10 mm height. Stalk light brown (7D6) erect, slender, cylindrical, arising from the hypothallus, black, 2 – 3 mm in height. Hypothallus silvery, shining, membranous, confluent. Columella cylindrical, black, almost reaching the sporotheca apex, tapering and flexuous, towards the tip. Peridium fugacious. Capillitium consists of the internal network of branches arising around columella and peridial branches, 0.6 – 1.7 µm diam., dark brown; the mesh of the internal network is polygonal, angular, smooth, delicate, variable in size. Spore mass dark brown to pale brown in colour. Spore globose, smooth, dark brown, warty in some parts, 6 – 10 µm in diameter.

Habit and Habitat – crowded on a dead branch of a tree in Tambaram, Chennai.

Specimen examined – India, Tamil Nadu, Chennai - Madras Christian College Campus, near Thomas Hall, on dead wood, 19 January 2021, M. Nivetha, Accession no: MCCH2110.

Notes – The *Stemonitis ferruginea* in this study agrees with the previous reports [from Japan (Hatano 2007) from India (Vasava et al. 2015, Keekan & Ranadive 2017) and London (Moreno et al. 2020)]. The sporangium dimension, spore shape and dimension, and other characters are similar to these reports, with slight variations. This species has been reported on wood, living green mosses, decaying tea frames and decaying coniferous wood from Maharashtra, Assam, Delhi, Tamil Nadu, Uttar Pradesh, Himachal Pradesh, Punjab and West Bengal (Ranade et al. 2012).

Stemonitis fusca* var. *nigrescens (Rex) Torrend, Brotéria, sér. bot. 7: 81 (1908)

Fig 3e–h

≡ *Stemonitis nigrescens* Rex, Proc. Acad. nat. Sci. Philad. 43(2): 392 (1891)

Fructification sporangiate, densely clustered in small colonies, stipitate. Sporangium cylindrical, obtuse, erect, slightly bent, dark brown (7F8), becomes light after dispersion of spores, 4–7 mm in height, stalked. Stalk dark brown (7F7), slender, 1–4 mm long, tapering upwards rising from hypothallus. Peridium inconspicuous, fugacious. Hypothallus prominent, membranous, black. Columella cylindrical, slender, thick, tapering upwards reaching the apex of sporangium, black. Capillitium 1.5–3 µm diam., consists of the internal network and peridial network of branches. Branches arise at the tip and around the surface of the columella, tapering upwards, anastomosing to form an internal network. Mesh of internal network large, irregular, dark brown, flexuous. Spore globose, small reticulations, dark brown, 8–10 µm in diameter.

Habit and Habitat – clustered on dead wood in Tambaram, Chennai.

Specimen examined – India, Tamil Nadu, Chennai - Madras Christian College Campus, near Thomas Hall, on dead wood, 19 January 2021, M. Nivetha, Accession no: MCCH2106.

Notes – The *Stemonitis nigrescens* in this study aligns with the Japanese species (Hatano 2007) in the sporangium and spore dimensions. This species is also very similar to *Stemonitis fusca* but differs by having smaller size of the fruiting bodies. Castillo et al. (1997) stated that these two species cannot be separated on the basis of morphological characters and many authors have also described *Stemonitis nigrescens* as either a variety or synonym of *Stemonitis fusca*. Therefore, the present collection is *Stemonitis fusca* var. *nigrescens*.

Stemonitis flavogenita E. Jahn, Verh. bot. Ver. Prov. Brandenb. 45: 165 (1904) [1905]

Fig. 3i–l

Fructification sporangiate, densely clustered. Sporangium cylindrical, erect, obtuse at apex, short-stalked, slightly bent, dark brown (7D6), becomes lighter after the dispersion of spores, 4–8

mm in height. Stalk erect, slender, cylindrical, short, tapering upwards, arising from membranous hypothallus, dark brown (7D8), 1–3 mm in height. Peridium often inconspicuous, fugacious. Hypothallus membranous, light brown (7D6), thin. Columella cylindrical, slender, erect, gradually tapering upwards, black. Capillitium consists of the internal network and peridial network of branches. Branch arises around the surface of the columella, broadened, branching and anastomosing to form an internal network. Mesh of internal network irregular, loose, with broadened and angled expansions. Spore globose, light brown, faintly reticulate, 7–9 µm diam.

Habit and Habitat – densely clustered on fallen wood in Tambaram, Chennai.

Specimen examined – India, Tamil Nadu, Chennai - Madras Christian College Campus, near Thomas Hall, on dead wood, 16 January 2021, M. Nivetha, Accession no: MCCH2109.

Notes – The *Stemonitis flavogenita* in this study aligns with the Japanese species and the one from the National History Museum London (Hatano 2007, Moreno et al. 2020) in sporangium and spore dimension. This species is similar to *Stemonitis splendens* in morphological characteristics, but it has large fruiting bodies with large meshed surface nets, and the spores are reticulate. The reticulate spores are the distinctive characteristic feature of this species, while *S. splendens* does not show the reticulate spore ornamentation. This species has been reported on dead rotting wood and dead archegoniosphore of *Marchantia* sp. (Ranade et al. 2012).

Comatricha anomala Rammeloo, Bull. Jard. Bot. Natl. Belg. 46: 237. 1976

Fig. 4a–d

Sporocarps small, in clusters of 10–50, stalked, 2–3 mm long, scattered to gregarious, sometimes growing in large colonies. Sporangium ovoid to cylindric, 1–1.5 mm tall and 0.4–0.6 mm diam, bright rusty brown. Hypothallus thin, folded, membranous. Stalk short, 25–50% of the sporotheca, dark brown to black, angular or flattened, opaque, thickened at the base. Peridium rusty brown, predominantly evanescent, but persists near the apex in small patches. Columella opaque, coloured as the stalk, continuation of the stalk, tapering at the apex and continuing to the sporangial summit where it merges with the capillitium, sinuose at apex ending in several main branches. Capillitium dense, brown, arising evenly along the entire length of the columella, spreading from the columella with more or less perpendicular main branches, forming a well-developed external net at the basal half of the sporotheca. Capillitium threads distinct, slender, irregularly flattened, branching 2–4 times, rarely anastomosing to form a wide meshed network with numerous free ends, threads bearing scattered tubercles, 1–2.5 µm diam. and broadly dichotomous at the ends. Collar present. Spores rusty brown in mass, pale brown by transmitted light, 8 – 10 µm in diam., globose to subglobose, minutely warted and attached to form a partial and incomplete reticulum. Plasmodium unknown.

Habit and Habitat – densely clustered on fallen wood in Tambaram, Chennai.

Specimen examined – The specimen was collected from a dead wood on 19 January 2021 at Tambaram, Chennai, Tamil Nadu by Dr. B. Babu; Specimen code: MCCH2120

Notes – Nearly 42 species of *Comatricha* have been reported throughout the world (Paul et al. 2008, Lado 2001, 2005 - 2018), of which reticulate spores have been observed in nine species and spiny or verruculose spores have been observed in thirty-three species (Zhang et al. 2018). Macroscopically, *Comatricha anomala* resembles *Comatricha typhoides* (Bull.) Rost. and *Comatricha aequalis* Peck. *Comatricha anomala* differs from *Comatricha typhoides* by its darker colour and lacks silver sheath on the stipe; from *C. aequalis* by its shorter stipe and darker colour (Rammeloo 1976). According to Rammeloo (1976), *Comatricha anomala* closely resembles *Comatricha longipila* (Nannenga-Bremekamp 1962). In both species, the sporangia are clustered, cylindrical and less than 3 mm in total height. Capillitial threads rarely anastomose, and free-ends are abundant. Spores are rusty brown and less than 10 µm in diameter. Both species can be distinguished by several characters. In *Comatricha longipila*, the peridium is evanescent, hypothallus small, and spores minutely spinulose. In *Comatricha anomala*, the peridium is persistent in small patches, hypothallus irregular, and spores warted with partial and incomplete reticulum.

Comatricha anomala is also closely related to *Comatricha pulchelloides* (Nannenga-

Bremekamp 1985). Both species occur in groups, with ovoid to cylindric sporangia less than 3 mm of total height. The columella reaches the apex of the capillitium. The capillitium consists of flattened threads with sharply pointed free ends. The spores are less than 10 µm in diameter. Both the species can be distinguished by several characters.

In *Comatricha pulchelloides*, the substrate is leaf litter, hypothallus discoid, peridium completely evanescent, and spores are minutely spinulose or warted. *Comatricha anomala* is corticolous in nature, hypothallus irregular, peridium persistent in small patches and spores warted with partial and incomplete reticulum. Spores were of various sizes, ranging to small, medium and large sizes. *Comatricha anomala* differs from other species by its spore ornamentation and partial and incomplete reticulum. The possession of an incomplete reticulum in the spore is the unique and key character for the identification of this species. The spore ornamentation of this specimen agrees with the report of Rammeloo (1983).

***Arcyria insignis* Kalchbr. & Cooke**, in Kalchbrenner, Grevillea 10 (no. 56): 143 (1882) Fig. 4e–i
≡ *Clathroides insigne* (Kalchbr. & Cooke) E. Sheld., Minn. Bot. Stud. 1: 466 (1895)

Sporocarps erect, often in large colonies, crowded or gregarious, pastel red (7B1), 1–2 mm in height. Sporotheca cylindric to sub cylindric, erect, 1–2 mm in height. Stalk dark brown (7F8), 0.3–0.5 mm long. Capillitium net dense, tubules slender, 1.6–2 µm diam., usually with coarse half rings arranged spiral, elsewhere smooth or minutely warted or with fine sub reticulate ridges. Calyculus plicate, smooth, medium and slightly profound, funnel-shaped. Spores 6–8 µm diam., hyaline, slightly angular, smooth.

Habit and Habitat – crowded on decorticated hard woods in Tambaram, Chennai.

Specimen examined – India, Tamil Nadu, Chennai - Madras Christian College Campus, Mac Phail's road, on decorticated hardwoods of *Delonix regia*, 13 January 2021, M. Nivetha, Accession no: MCCH2112.

Notes – The present collection shows some similarity with *Arcyria rufosa* in the morphological aspect but varies in the colour of the fructifications and the spore dimension. Further, the present collection also shows some similarity to *Arcyria denudata* except for warty spores, which are otherwise similar in having scattered, small fructifications, a small and shallow calyculus, paler colour and slender threads marked with half rings (Robbrecht 1974 & Lui 1980). However, the present collection is similar in all aspects to the *Arcyria insignis* reported from Belgium by Robbrecht (1974). This species has been reported on the dead stems of *Saccharum officinarum*, Kolhapur, Maharastra (Ranade et al. 2012).

***Arcyria incarnata* (Pers. ex J.F. Gmel.) Pers.**, Observationes mycologicae 1: 58 (1796) Fig. 4j–n
≡ *Arcyrella incarnata* (Pers. ex J.F. Gmel.) Racib., Hedwigia 24: 170 (1885)
≡ *Stemonitis incarnata* Pers. ex J.F. Gmel., Syst. Nat., Edn 13 2(2): 1467 (1792)

Sporocarp in troops, gregarious, 2–3 mm height and 1 mm broad, greyish red (7B4), short cylindrical to ovoid. Hypothallus continuous. Stalk short, furrowed, dark. Calyculus saucer-shaped, spinulose or papillose. Peridium fugacious. Capillitium loosely attached at the centre of the calyculus, tubules slender, 4 – 7 µm diam., densely marked with sharp spines and half rings in a loose spiral. Spore mass pale pink, spore 8–10 µm diam., ovoid, minute warty.

Habit and Habitat – troops on decorticated hard woods in Tambaram, Chennai.

Specimen examined – India, Tamil Nadu, Chennai - Madras Christian College Campus, Mac Phail's road, on decorticated hardwoods of *Glyricidia sepium*, 20 November 2021, M. Kumar, Accession no: MCCH2113.

Notes – The present collection shows similarity to *Arcyria insignis* reported from Belgium by Robbrecht (1974) but is distinct in the loosened capillitium, the colour of the sporophore and the dimension of the spores. They are easily distinguishable from *Arcyria denudata* by their brighter colour, short stipe and larger cup. This species has been reported on wood, decaying bark and twigs in West Bengal, Tamil Nadu, Delhi and Himachal Pradesh (Ranade et al. 2012).

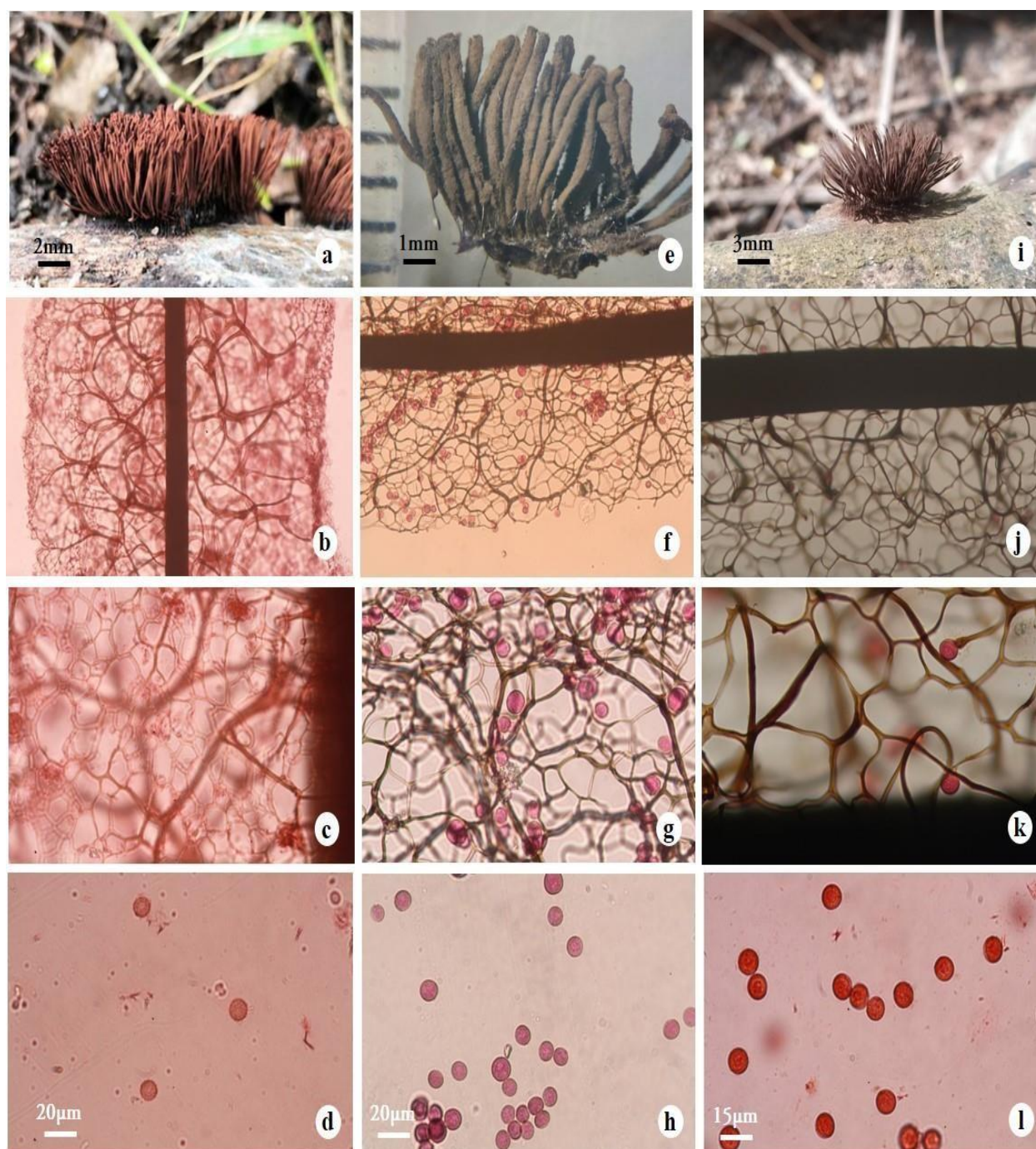


Fig 3 – a–d *Stemonitis ferruginea*. a Habit. b–c Capillitial net. d Spores. e–h *Stemonitis fusca* var. *nigrescens*. e Habit. f–g Capillitial net. h Spores. i–l *Stemonitis flavogenita*. i Habit. j, k Capillitial net. l Spore.

Among the 11 identified species, *Arcyria insignis* was the dominant species based on the number of sporocarps, while the least were both *Fuligo septica* and *Hemitrichia serpula*. The second dominant species was *Arcyria incarnata*, followed by *Stemonitis flavogenita* (Fig. 5). These species mentioned in this study were based on the total number of species collected and identified during all the seasons. Moreover, there will be a difference in the dominance of species in different seasons. However, there is a lack of ecological studies exclusively on myxomycetes; hence, we cannot say much about their importance, but a sustained study can help understand their ecological behavior and importance in any given ecological area.

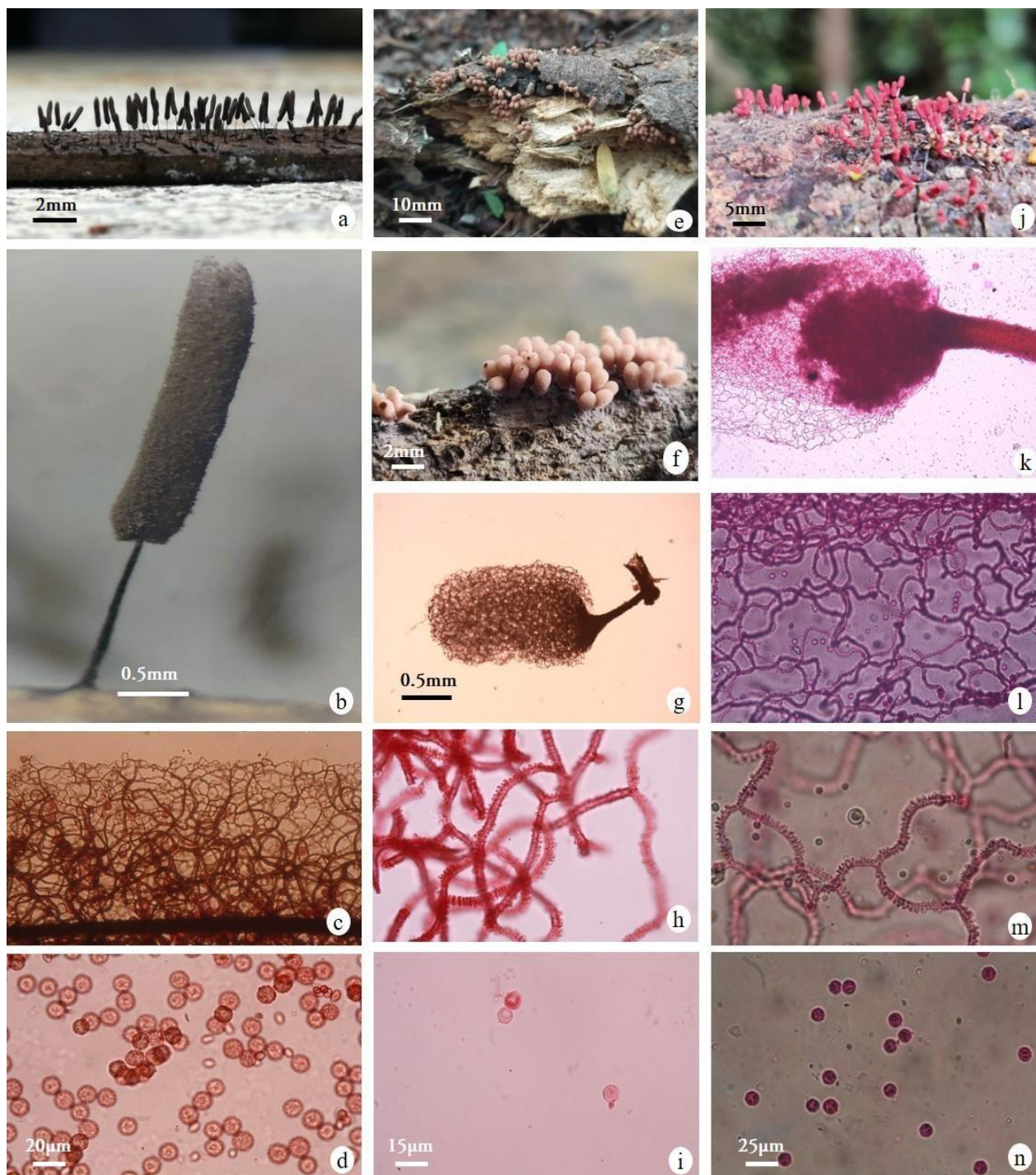


Fig. 4 – a–d *Comatrixia anomala*. a–b Sporocarp. c Capillitium. d Spores. e–i *Arcyria insignis*. e–g Sporocarp. h Capillitium. i Spores. j–k *Arcyria incarnata*. j, k Sporocarp. l–m Capillitium. n Spores.

Among the various collecting seasons, January 2021 was the best season for Myxomycetes collection, during which the maximum Myxomycetes species were collected, followed by October 2021. The least was observed during January 2022, while no collections were obtained during October 2020 due to the Covid-19 pandemic. From the graph, it is inferred that there is an alternate dominance and fewer dominance years (Fig. 6). In order to understand the seasonal dominance, there has to be a continuous collection of the species, and only then the pattern of Myxomycetes dominance can be clearly understood. Seasonal rainfall and its failure probably contribute to the fluctuations in the occurrence of species, and the collection at the right time is also another

parameter for finding out their occurrence because they are very short-lived. Further, their size also makes them unnoticeable in the forest during collection.

Myxomycetes were collected during high rainfall, which was also the same according to Venkataramani & Indira (1986). Some of the other observations which are similar to the previous work are as follows: Calcareous species also occur during low rainfall season. Calcareous and non-calcareous species were collected from dead wood in this collection, while the other reports reveal that they are common on dead leaves, which was not observed in the present study. Although there are reports that Myxomycetes are abundant in higher altitudes and temperate climates, our study found this statement slightly contradictory. This may be due to calcareous species being tolerant to tropical climates and also adaptable to a wide range of altitudes, temperatures and rainfall. If so many Myxomycetes can be collected in a small area like the collection site of the current study, there is a scope for much more exploration in a larger area. Here, ecological support could not be discussed because of the sample density. The sample density of Myxomycetes was found to be less due to difficulties in locating the species in a short span of time as they are very short lived. In addition to that the size and the fragile nature of the specimen pose difficulty in spotting them in this scrub jungle.

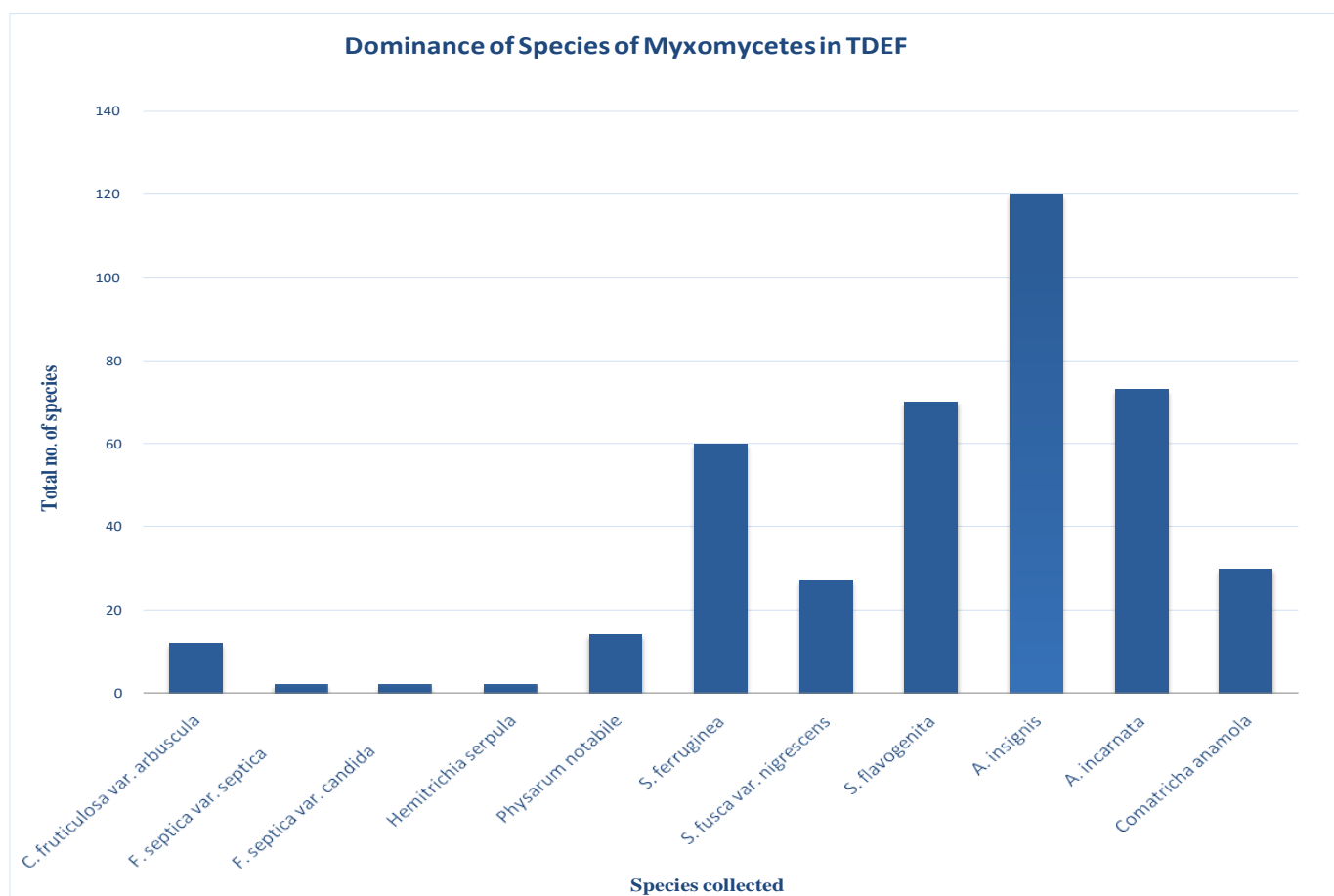


Fig. 5 – Dominance of Myxomycetes

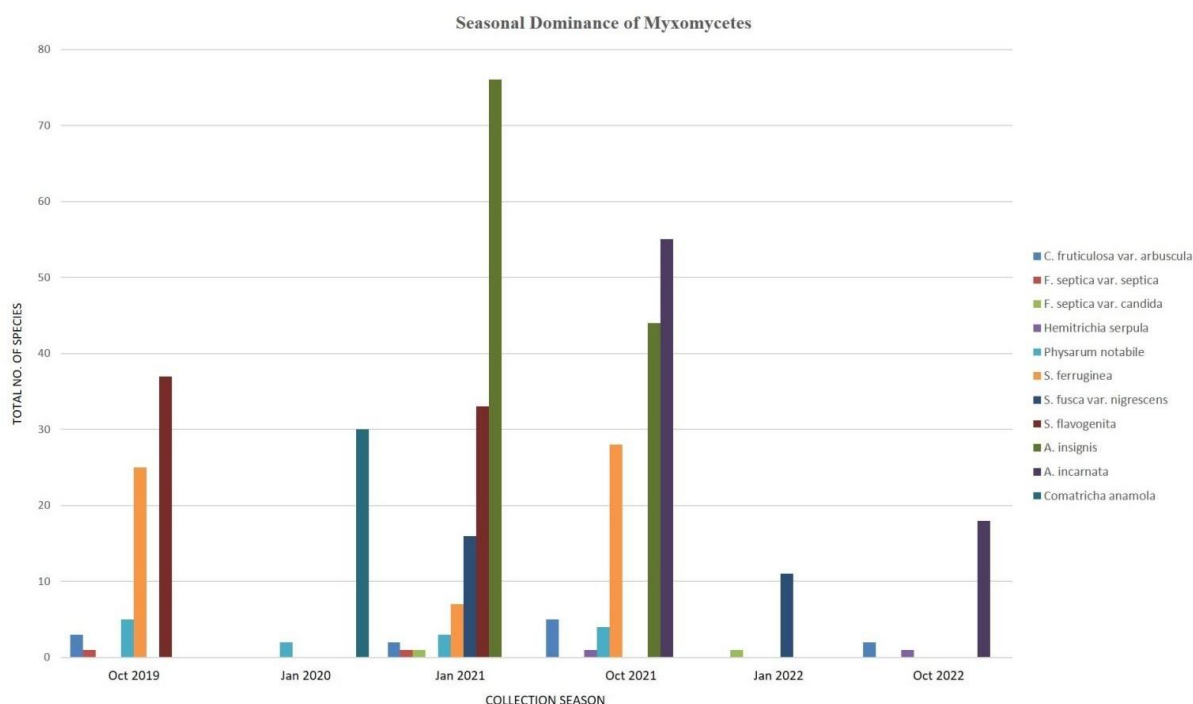


Fig. 6 – Seasonal Dominance of Myxomycetes

Acknowledgements

The authors express their gratitude to the Head of the Department of Botany for extending permission and laboratory facilities for the present work. Further, they would like to thank the Principal of Madras Christian College for encouragement and support. This study was financially supported by the Seed Money Grant (SMG - 2022) Madras Christian College, Tami Nadu, India.

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