

Ingoldian Fungi in Kigga Falls, Chikmagalur District, Karnataka.

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Abstract: Fungi are the ubiquitous organism. They exist in diverse forms in a range of habitats, arboreal, freshwater, marine, subterranean and terrestrial. In fresh water we concentrated only Ingoldian fungi. The selected study sites of foam samples and decaying debris were collected in the same study area and kept for screening and incubation respectively. The conidia developing on decaying debris were screened using microscope. The collected foam samples were revealed Ingoldian fungi. In this contribution of occurrence and abundance of Ingoldian fungi were enumerated. A total of 24 species were isolated twelve genera were identified.

Key words: Ingoldian fungi, decaying debris, Water bodies.

I. Introduction

At a distance of 15 Kms from Sringeri & 5 Kms from Kigga, Kigga Falls (also known as Sirimane Falls) is a popular waterfall located in the deep forest of Western Ghats with a height of about 40 feet, this waterfall is located in scenic surroundings with dense forest all around. The falls are wide and can accommodate more forest litter at the bottom. Anamorphic fungi inhabiting forest litter are characterized by wide adaptation abilities in different environments, but their species composition and ecology are still insufficiently known. The best-known and most studied are terrestrial, aquatic and aero-aquatic groups of Hyphomycetes (Ellis 1971, 1976; Matsushima 1975; Ingold 1975; Bäerlocher 1992 et al.). During the studies of *Hyphomycetes* associated with forest litter in various terrestrial and freshwater ecosystems in mixed deciduous forests of central and southeast Lithuania in 1999–2004, five rare and interesting for their ecological adaptation patterns species were obtained both in terrestrial and aquatic habitats. Recorded species were mainly polytrophic and developed as saprobes on dead woody plant substrates. Till present time three reported here fungi species, *Cladorrhinum foecundissimum*, *Lateriramulosauini-inflata* and *Tetraploasetifera* were known exceptionally as terrestrial or soil-inhabiting (Matsushima 1971; Mouchacca, Gams 1993; Révay 1993), other two, *Dwayaangam cornuta* and *Pyramidospora herculiformis* aquatic (Descals, Webster 1982; Singh 1976). Our observation indicated that they can grow, sporulate and actively decompose plant debris of forest litter both in moist terrestrial and submerged conditions. This has focused attention on how and to what extent ecosystem functioning may be affected by changes in biological communities. Several hypotheses have been proposed concerning the relationship between biodiversity and ecosystem functioning (Johnson et al. 1996). MacArthur (1955) predicted a positive, linear relationship between species numbers and both productivity and the ability of ecosystems to recover from disturbances. The Ingoldian fungi most commonly occur on dead leaves (Webster and Descals 1981; Bäerlocher 1992) and wood (Willioughby and Archer 1973; Sanders and Anderson 1979; Shearer and Webster 1981) as well as in foam (Iqbal and Webster 1973; Iqbal 1995). A few species have also been reported from well aerated and they mediate energy flow and nutrient cycling in streams (Baldy et al., 1995) and act as intermediaries of energy flow between leaf litter and invertebrates (Bäerlocher and Kendrick 1976; Suberkropp 1992). Relationship where species loss has a slight negative effect on ecosystem functions until a critical diversity level, beyond which further losses will seriously compromise ecosystem integrity. Similarly, the hypothesis (Walker 1992) predicts a positive and asymptotic relationship, where the loss of species is of little consequence as long as all functional groups are well represented. Finally, the idiosyncratic hypothesis (Lawton 1994) assumes that the relationship between species richness and ecosystem functioning does not follow a consistent pattern, but depends crucially on the identity of species and on the order in which they are lost from ecosystems. There is no agreement as to which of these hypotheses best describes the relationship between biodiversity and ecosystem functions, but generally diversity has been positively associated with primary productivity or plant biomass (Naemet al.). Fungi are instrumental in leaf decomposition in streams (Gessner & Chauvet 1994), and their biomass accumulating on leaves improves substrate palatability and nutritional value to shredders (Bäerlocher 1985; Suberkropp 1992; Graca 2001). Positive interactions predominate (e.g., facilitation among freshwater invertebrates, Cardinale et al. 2002; There is no agreement as to which of these hypotheses best describes the relationship between biodiversity and ecosystem functions, but generally diversity has been positively associated with primary productivity or plant biomass 1999). In a community of species with complementary niches, positive interactions predominate (e.g., facilitation among freshwater invertebrates, Cardinale et al. 2002; and combination of facilitation and niche differentiation among grassland producers,

Loreau and Hector 2001), leading to a greater overall efficiency of resource use. This raises community performance above the level expected from the sum of performances by individual species. On the other hand, the probability of encountering dominant species, which tend to be the most productive species, will increase with the number of species present in a community (sampling effect, Huston 1997; Tilman et al. 1997). The performance of a diverse community will therefore largely be determined by the inclusion of the species with the highest performance in monoculture (Huston 1997; Tilman et al. 1997). It is often difficult to distinguish between complementarity and sampling effects, and they may occur simultaneously, but if sampling effects predominate, the performance of multicultural asymptotically approaches an upper limit defined by the top performing monoculture. Their diversity has been correlated with temperature, water chemistry and quality of riparian vegetation (Baerlocher, 1987; Gonczol, 1987). Hypomyces are group of aquatic community which degrades leaves and twigs shed in to water (Kaushik & Hynes, 1971). In the present study, work was carried out on the colonization of aquatic fungi on the specific composition of foam, leaf debris and sporeulation.

Study area

Kigga falls comes under district of chikmagalur the south Western parts of Karnataka state in India, situated at 13°19'31.99"N latitude and 75°14'17.92"E longitude, the altitude of is 2517ft. The temperature varies from 15° to 25°C and the annual rain fall is 1904 mm. The heavy rain fall has resulted in many water tanks, streams and reservoirs. A lot of foam is developed in all the seasons. The heavy rain fall has resulted in many water tanks, streams and reservoirs. Foam developed in all the seasons. Four study sites (A, B, C and D) were identified at Kigga falls stream, each site was sub divided into 2 sub sites (A1, A2, B1, B2, C1, C2, D1 and D2).

II. Materials and Methods

Foam analysis

The foam was scooped with the help of spoon and transferred into a jam jar or similar receptacle. Equal parts of FAA (Formal-acetic-alcohol) was added and fixed. The germinated conidia were examined under microscope.

Incubation studies

During the investigation, water samples were collected from Kigga falls of Chikmagalur District. Water samples were collected in small plastic bottles and leaf debris were collected in sterile polythene bags. The substrate of plant leaves and wood pieces were also kept for incubation. Fungi were isolated by a plating technique to separate different forms. When monocultures were growing, they were further studied for their colony characteristics. These fungi were further mass multiplied by the help of a baiting technique and were stored in sterile polyethylene bags.

The spores were identified under a compound microscope with great accuracy such that relatively small spores down to 5 mm in span or less could be isolated. Most Ingoldian fungi were isolated by the England finder technique as it offers several important advantages over the spore suspension technique. The slide finder is a standard sized microscopic slide bearing a photographically reduced grid pattern. Each compartment on the grid is identified with letter or number coordinates arranged sequentially along the horizontal and vertical axes. A piece of agar medium from an incubation plate was placed on the finder, the coordinates directly underneath each spore were noted and any spores detected were relocated individually under the compound microscope.

Isolation of suspended spores

The hair technique was used to capture single spores in isolation under the dissecting microscope. The incubated plates were placed under the dissecting microscope then spore along with leaf bits. The conidial expression was observed, after confirming the conidia with the help of mounted hair, single conidia were transferred to malt extract plates. The plates were incubated at 18°C for one week. The micropipette technique was used to capture floating spores in incubated plates. The incubated plates were placed under the dissecting microscope and the conidia were observed. The selected spores were sucked into a micropipette and directly transferred to the malt extract plate. The plates were incubated at 18°C for one week.

Table.1. Occurrence and distribution of Ingoldian fungi in Kigga falls.

Sl. No.	Species Name	Site A		Site B		Site C		Site D	
		A1	A2	B1	B2	C1	C2	D1	D2
1	<i>Anguilosporacrassa</i>	+	-	+	-	+	-	-	+
2	<i>Centrospora aquatica</i>	+	-	-	+	-	+	-	-
3	<i>Centrospora accurina</i>	+	-	+	+	-	-	-	+
4	<i>Limnoria angulata</i>	+	-	-	+	+	-	+	-
5	<i>Dactylella acuminata</i>	+	-	-	-	-	-	-	-
6	<i>Tricelosporus manusporas</i>	+	+	+	+	+	+	+	+
7	<i>Tricelosporus accuminatus</i>	+	-	-	+	-	+	-	-
8	<i>Lunulosporacurvala</i>	+	-	+	-	+	-	+	-
09	<i>Tetrachaetumelegans</i>	+	+	+	+	+	+	+	-
10	<i>T. angulatum</i>	+	+	+	+	+	+	+	+
11	<i>T. furcatum</i>	+	+	+	+	+	+	+	-
12	<i>Clucidosporagravida</i>	+	+	+	-	+	-	+	-
13	<i>Alatosporapulchella</i>	-	-	+	-	+	-	+	-
14	<i>Lunulosporacurvala</i>	+	-	+	+	-	-	-	-
15	<i>Anoptedera mangrove</i>	-	+	-	-	-	-	-	-
16	<i>Lemoneria terrestris</i>	+	-	-	+	+	-	+	-
17	<i>Clucidospora aquatica</i>	-	-	-	-	-	+	+	-
18	<i>Tetracladium marchalianum</i>	-	-	+	-	+	+	+	-
19	<i>Anopdera indica</i>	-	-	-	+	+	-	-	-
20	<i>Anguilosporalongissima</i>	-	-	-	-	+	+	-	-
21	<i>Anguilosporagigntia</i>	-	-	+	+	+	-	-	-
22	<i>Limnoriapseudofloscula</i>	-	-	-	+	-	-	+	+
23	<i>Actinosporamegalospora</i>	-	-	-	+	-	-	-	-
24	<i>Flabellosporacrassa</i>	+	+	-	-	-	-	+	-

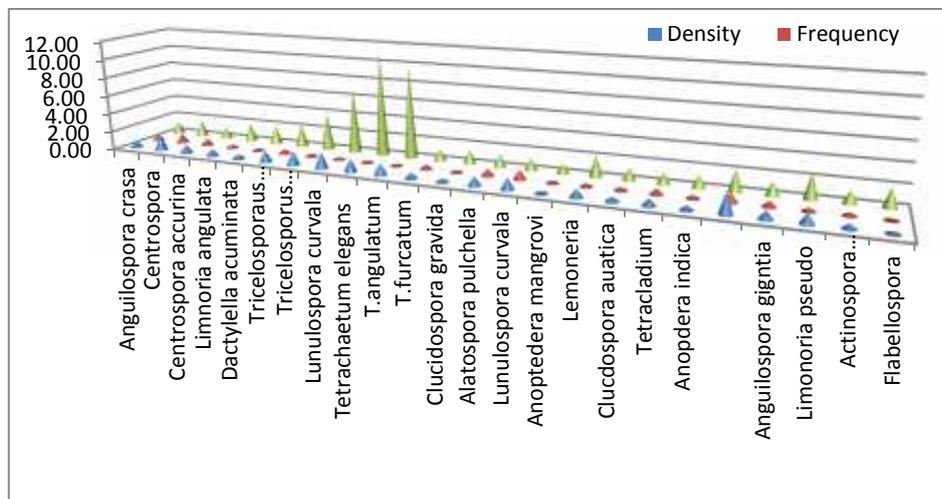


Fig. 1. Occurrence of Ingoldian fungi among different genera in a selected study site

III. Results

In the present study accounts 24 species (Table-1) of Ingoldian fungi belonging to twelve genera were isolated from the foam samples & debris of study sites. Environmental factors which influence the diversity of aquatic hyphomycetes, *T. angulatum*, *T. furcatum* and *Tetrachaetumelegans* are the common in all the study sites (Fig-1) shows clearly graphical representation. *Dactylella acuminata*, *Actinosporamegalospora* & *Anoptedera mangrove* are very rare species in this study area.

IV. Discussion and conclusion

The Ingoldian fungi play important role in degradation of organic complex to simpler form. The species of hyphomycetes occurs abundantly in submerged leaves. The study proved that different Ingoldian species vary in their susceptible to soluble substance present in plant materials. In this study area contains rich

vegetation hence varies tree species is commonly found in this study area. The tree species produces variety of dead leaves and are collected in aquatic ecosystem. The rain fall is very high in compare to other taluks rain fall create aquatic ecosystems. The diversity of aquatic fungi rich in this study area compares the other study sites.

Producers, such as plants and algae, acquire nutrients from inorganic sources that are supplied primarily by decomposers whereas decomposers, mostly fungi and bacteria acquire carbon from organic sources that are supplied primarily by producers. In the present study accounts twenty four species (Table-1) of aquatic fungi belonging to twelve genera were isolated from the foam samples of study sites. In kigga falls maximum numbers of Ingoldian fungi *Dactylella acuminata*, *Actinospora megalospora* & *Anoptedera mangrove* were recorded out of eight study sites and are very rare species recorded only in one study site whereas, *T. anguilatum*, *T. farcatum* sp and *Tetrachaetum elegans* were recorded in eight study sites (Fig-1) shows clearly in graphical representation. The freshwater ecosystem where fungi have been studied in particularly plant litter decomposition subsystem, they have been found to play key role both in the cycling of carbon and nitrogen and in mediating energy flow to higher levels. Fungi undoubtedly have a number of other roles in these ecosystems.

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