Occurrence of Parasitic Watermolds in Selected Forest Soils of Nainital, Indian Central Himalaya

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Abstract: Information regarding parasitic watermolds of forest soils and decomposing leaf litter is rare. Therefore, the present study was undertaken in hitherto unexplored forest ecosystems of Indian Central Himalaya. The present paper deals with isolation and taxonomic description of *Olpidiopsis* species from Indian Central Himalayan forest ecosystems of Kumaon region. Five species of *Olpidiopsis* were isolated from forest soils and decomposing leaf litter of cypress, mixed oak and chir pine forest ecosystems. *O.achylae* and *O.fusiformis* were isolated for the first time from Central Himalayan forest soils. Similarly *O. saprolegniae* var.*saprolegniae* and *O.varians* were isolated from decomposing leaf litters, while *O.pythii* was isolated from different soils and decomposing leaf litters. [Nature and Science. 2009;7(9):45-48]. (ISSN: 1545-0740).

Key Words: decomposing leaf litter; forest soils; Indian Central Himalaya; parasitic watermolds

1. Introduction

Some species of *Olpidiopsis* have been reported from India from tropical waters and soils by Butler (1907), Thirumalachar (1947), Das Gupta and John (1953) , Srivastava and Bhargava (1963), Srivastava (1964,1975), Dayal and Thakurji (1968) and Khulbe (1985, 2001).But the information regarding forest soils and decomposing leaf litter is little. Therefore, the present study was undertaken in hitherto unexplored Indian Central Himalayan forest soils and decomposing leaf litter.

During the course of the present study on parasitic watermolds, three temperate forest ecosystems viz., cypress (*Cupressus torulosa*, 2610m asl), mixed oak (*Quercus leucotrichophora* and *Q. floribunda*, 2150m asl) and chir pine (*Pinus roxburghii*, 1600m asl) were investigated. The characteristics of study sites are as follows:

Table 1. Characteristics of Study Site

Study Site	Latitude	Longitude	Elevation (m.)	Dominant Herbs	Dominant Shrubs	Dominant Trees
China Peak	29°23'9"	79°26'4"	2610	Erigeron karvinskianus, Anaphalis busua, Swertia pulchella, Oxalis dehradunensis, Achyranthes bidentata, Viola canescens, Nepeta leucophylla, Thalictrum foliolosum	Boenninghausenia albiflora, Myrsine africana, Rumex hastatus, Plectranthus japonicus, Colquehounia coccinea	Cupressus torulosa, Quercus floribunda, Cornus macrophylla
Pines	29°27'	79°23"	1600	Gerbera gossypina, Micromeria biflora,	Elsholtzia fruticose,	Pinus roxburghii,

				Setaria glauca, Commelina bengalensis, Polygonum chinense	Pyracantha crenulata, Berberis asiatica, Spiroea canescens, Aechyranthera goyypina, Euphorbia roylei,	Rhododendron arboreum
Tiffin Top	29°23'04"	79°28'36"	2150	Valeriana jatamansi, Impatiens amphorata, Flemingia involucrata, Polygonum nepalense, Salvia lanata, Anemone vitifolia Picea scripta	Rosa moschata, Rhamnus virgatus, Berchemia lineata, Caryopteris grata, Sarcoccoca hookeriana, Synotis rufinervis	Q. leucotrichophora , Q. floribunda

2. Materials and Methods

2.1 Method of collection:

To facilitate the isolation of aquatic fungi from soil samples, about 5 g soil of each sample was diluted in 100 cc of sterilized distilled water. The soil suspension was poured into five sterile Petri dishes and then baited with sterile hemp seed halves. The gross cultures were incubated at room temperature (18-22^{0}C). The colonized baits were taken out from the gross culture and washed thoroughly with sterile distilled water for several times and placed into freshly sterilized small Petri dishes containing sterile distilled water. Potassium tellurite (0.01% w/v), a bacterial suppressant was added in each culture to check the bacterial contamination. The colonized baits were examined under microscope. Pure cultures of host and parasites were identified with the help of keys provide by Coker (1923), Coker and Matthews (1937), Johnson (1956), Sparrow (1960), Scott (1961) and Khulbe (2001).

2.2 Fungi Collected

Olpidiopsis Cornu

Ann. Sci. Nat. Bot., V, 15: 114 (1872).

Thallus at first naked, later surrounded by a membrane, endobiotic, holocarpic; sporangium spherical or ellipsoidal, smooth walled or spiny, non-tubular and unlobed, with one to several discharge tubes; zoospores formed within the sporangium, biflagellate without well defined diplanetism, resting spores thick-walled, smooth or spiny, formed asexually.

Olpidiopsis achlyae McLarty

Bull. Torrey Bot. Club, 68: 62 (1941).

Specimen examined: INDIA, UTTARANCHAL, Nainital, Pines, 29^{0}27'N and 79^{0}26'E, 1600m a.s.l., hempseed halves, 22nd February, 2001, Manisha Upadhyay, Olp/a.

Zoosporangia solitary to numerous usually in terminal hyphal swelling of host, spherical, oval, variable in size, ranging from 16.0-120.0 x 105.0-560.0 *µm*; exit tubes 1-3; zoospores numerous, hyaline, small, spherical, oval, 3.5-6.0 *µm* in diameter, resting spores spherical, 30.0-120.0 *µm*, brown; companion cells may or may not present.

The fungus was parasitic on *Achlya* species. It was isolated for the first time form forest soils of Kumaun region of Indian Central Himalaya.

In India, it was isolated by Das-Gupta & John (1953), Dayal & Thakurji (1968), Manoharachary & Rao (1999) and Khare (1992). In an artificial inoculation experiment, this species could also infect *Thraustotheca clavata* (Khulbe 1985).

Olipidiopsis fusiformis Cornu

Ann. Sci. Nat. Bot. V, 15: 147 (1872).

Specimen examined: INDIA, UTTARANCHAL, Nainital, Pines, 29^{0}27'N and 79^{0}26'E, 1600m a.s.l., hempseed halves, 25th June, 2001, *Manisha Upadhyay*, Olp/b.

Thallus endobiotic, holocarpic; zoosporangia one to many in terminal or intercalary swelling of the host hyphae; spherical, oval, fusiform, ellipsoidal, cylindrical, 35.0-350.0 *µm* long and 12.5-95.0 *µm* in diameter, wall smooth; exit tubes 1-3; zoospore numerous, ovoid; resting spores spherical, 40.0-80.0 *µm* in diameter; outer surface covered with spines, up to 7.0 *µm* long; companion cell 1-2 per resting spore, spherical, smooth walled, 20.0-30.0 *µm* in diameter.

It has been reported to be parasitic on *Achlya americana*. In India it was isolated by Srivastava (1966), Khulbe (1985), Rai and Misra (1981), Gupta and Mehrotra (1988, 1992). It was isolated for the first time form forest soils of Kumaun region of Indian Central Himalaya.

Olpidiopsis pythii (Butler) Karling

Simple Holocarpic Biflagellate Phycomycetes, p. 47 (1942).

Specimen examined: INDIA, UTTARANCHAL, Nainital, China Peak, Pines, Tiffin Top, $29^0$23'N and $79^0$26'E, $29^0$27'N and $79^0$23'E,$29^0$23N and $79^0$28'E respectively, 2610 m,1600 m and 2150m a.s.l., respectively, hemp seed halves, and decomposing leaf litter of cypress on 26th February 2000, pine (soil sample) on 24th February 2000 and 25thJuly 2001, and oak 22th June and 28th August 2000, and 22nd February and 22nd June 2001, Manisha Upadhyay, Olp/c.

Thallus endobiotic, holocarpic; zoosporangia one to many in terminal or intercalary swellings of the host hyphae, spherical, 12.0-38.0 *µm* in diameter, wall smooth, exit tubes 1-3; zoospore numerous, oval; resting spores spherical, sometimes oval; 9.5-35.0 *µm* in diameter, outer surface brown covered with spines; companion cells absent.

This fungus was parasitic on hyphae of *Pythium monospermum.*

It was interesting to isolate it for the first time from different soils and decomposing leaf litters of the Indian Central Himalayan forests. In India, it was earlier isolated by Khulbe (1985), Joshi (1993), Kaur (1996) and Nayal (1999) from different habitats in India.

Olpidiopsis saprolegniae var .***saprolegniae*** (Braun) Cornu

Indian Phytopathology, 16:271-274 (1963).

Specimen examined: INDIA, UTTARANCHAL, Nainital, China Peak and Tiffin Top, $29^0$23'N and $79^0$26'E and $29^0$27'N and $79^0$23'E, respectively, 2610 m and 2150m a.s.l., respectively, hemp seed halves, and decomposing leaf litter of cypress on 23rd July 2000 and 23rd August 2001, and Oak on 25th June 2000 and 28th August 2001, Manisha Upadhyay, Olp/d.

Thallus endobiotic, holocarpic; zoosporangia one to many, usually formed in terminal swellings of the host hyphae, sometimes intercalary, spherical, ovoid or ellipsoidal, 50.0-195.0 *µm* in diameter; wall smooth, discharge tubes 1-3, narrowly cylindrical; zoospore oval to elongate, 3-4 *µm* in length; resting spores spherical, thick, spiny, slender, 6-12 *µm* long; companion cells 1-2 per resting spore, usually spherical, 25.0-30.0 *µm* in diameter.

The fungus was parasitic on the hyphae of *Saprolegnia diclina*. This species was also isolated for the first time from different decomposing leaf litters (cypress and mixed oak) of Indian Central Himalayan forests.

Olpidiopsis varians Shanor

Indian Phytopathology, 17(3):249-253(1964).

Specimen examined: INDIA, UTTARANCHAL, Nainital, Pines, $29^0$27'N and $79^0$26'E,1600 m a.s.l., hemp seed halves and decomposing leaf litter of pine, 26th June and 24th July 2000, and 26th July 2001, Manisha Upadhyay, Olp/e.

Thallus endobiotic, holocarpic; zoosporangia one to many, usually formed in terminal or occasionally intercalary swellings of the host hyphae, spherical to oval, 35.0-75.0 *µm* in diameter; wall smooth, discharge tubes 1-3; zoospore oval, up to 5 *µm* in length; resting spores spherical, spiny, 20.0-52.5 *µm* in diameter (with spines); companion cells 1-2 per resting spore, spherical, 12.0-26.0 *µm* in diameter.

It was found parasitic on *Achlya flagellata*. This species was isolated for the first time from decomposing leaf litter of chir-pine forest in Indian Central Himalaya.

3. Results

Five parasitic watermolds viz., *O. lpidiopsis achylae*, *O. fusiformis*, *O. pythii*, *O.saprolegniae* var .*saprolegniae* and *O. varians* have been reported from temperate forest ecosystems of Nainital, Indian central Himalaya. Of these *O. achylae*, *O. fusiformis*, *O. pythii*, were isolated for the first time from chir-pine forest soils. *O. varians* was isolated from decomposing leaf

litter of chir-pine forest for the first time. *O. pythii* and *O. saprolegniae* var. *saprolegniae* were isolated from soils (mixed oak) and decomposing leaf litters of both cypress and mixed oak forest ecosystems. All the cultures were deposited in Aquatic Fungal Culture Collection Centre, Aquatic-Mycopathology laboratory, D.S.B Campus, Kumaon University, Nainital, Uttarakhand, India.

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