Effect of Different Light Spectrum on Growth and Sporulation of *Pythium* sp. and *Saprolegnia* sp.

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Abstract

The research was carried out at Kirat Sagar Lake in Mahoba, Uttar Pradesh, India. This lake is located in the Malakpura district of Mahoba, Uttar Pradesh, India. Fine ghats with granite steps surround this lake. Its attractiveness is enhanced by a slope of red dirt in the background. The goal of this study was to see how different light spectrums affected Pythium sp. and Saprolegnia sp. growth and sporulation. Pythium sp. grew well in green light, but grew poorly in all other light spectra. Sporulation was also outstanding in both the control and green light conditions. In the case of Saprolegnia sp., good growth was detected in the control and green light spectra, but poor growth was reported in the other light spectra. Sporulation was outstanding in the control condition and fair in the Green light condition. In diffused light and darkness, it was moderate. In Red light spectrum, sporulation was very weak or non-existent.

Keywords

Kirat Sagar Lake, Growth, Sporulation, Light Spectrum

1. Introduction

Pythium sp. was isolated using the Baiting technique on human nails and worm skin as baits from the freshwater of Kirat Sagar Lake (Autumn 2018, Winter 2018-19), Mahoba (U.P.) India. The pH concentration ranged from 6.2 to 7.99 and the water temperature ranged from 14.60C to 330C. On YPSS and YPG culture mediums, the fungus grows effectively. Sporangia filamentous, without inflations, and indistinguishable from vegetative Hyphae. sporangia can be generated terminally with a warted wall measuring 56um x 84um in diameter and even bilobed. Hypha coenocytic, thin. The diameter of zoospores in the encysted state. Exogenously on chitinous baits, echinulated oogonia (56um – 70um in diameter) and antheridia in abundance, both echinulated oogonia with bubbling like protrusion 56um – 70um in diameter. Smooth-walled, round, occasionally papillate oospores, 3–5 in number. Even after being fused with oogonia, antheridia with diclinous or monoclinous walls remain linked to the oogonial wall.

Several mycologists from Pusa, Bihar, isolated the Pythium debaryanum fungus from this nation [1-2]. The morphological characteristics of this isolate suggested that it was Pythium

debaryanum; nevertheless, slight changes in morphological structure can be attributable to environmental variables. This is a new fungus from the Bundelkhand region. Culture had been stored in the culture area of the department. Pythium middletonii is a fungus that has been found in Delhi and Rampur [3]. This is the first time the Bundelkhand region has been documented. Culture had been stored in the culture area of the department. Pythium catenulatum had been identified in Jabalpur quite lately (M. P.). The departmental culture section had been submitted with the culture [4].

Baiting technique on rice grains, mustard seeds, and hemp seeds was used to extract Saprolegnia sp. from the freshwater of Kirat Sagar Lake (summer 2018, winter 2018), Mahoba (U. P.) India. The water temperature was between 30 and 32 degrees Celsius, while the pH was between 6.56 and 6.86 during summer. On YPSS and YPG culture mediums, the fungus grows effectively. Zoosporangia cylindrical, elongated, displaying internal proliferation 392 um in length and 84 um in width, however no zoospore discharge was observed. Stout, coenocytic, branching hyphae. Oogonia present at the base of discharged primary sporangia, cylindrical, elongated, or oval with oospores 2 - 15, oogonial wall pitted or unpitted or both, some were papillate at the apex, ranging in diameter from 115um to 126um, oospores 2 - 12 in number, centric and eccentric or both, oogonial wall pitted or unpitted or both There are no antheridia or gemmae.

Sampling sites selected for study purposes:

Site A: It is situated on the eastern side of the ghats, which are deep, bathing and washing ghats with numerous trees lining the embankment.

Site B: It is situated on the northern side of the river and is also deep on the bank with scant aquatic vegetation.

(a) Map of kirat sagar lake

2. Materials and Methods

Pythium sp. and Saprolegnia sp., two Hyphomycetes used in this study, were collected from Kirat Sagar Lake in Mahoba (UP) during the summer of 2019. Stock cultures of Aquatic Hyphomycetes were maintained on slants of a YPSS medium solidified with agar to be utilised as inoculum. Because both fungi are monocentric, their growth on solid substrates is predetermined. It was discovered that using a low concentration of agar made it easier for them to spread throughout the entire surface of the slant. A little amount of liquid was able to pool at the slant's base as a result of this. After the third day of inoculation, rolling the liquid over the agar several times swamped the sporangia and distributed the zoospores. The effect of light was investigated by incubating a fungal water culture at the ideal temperature and pH under the

impact of various light conditions, including Red, Green, Diffused Fluorescent, Dark, and Control.

Composition of YPSS (Yeast Powder Soluble Starch Agar) Medium

K_2HPO_4 - 1.0gm
$MgSO_4.7H_2O$ - 0.5gm
Starch (soluble) - 15gm
Yeast Extract (Difco)- 4gm
Agar Agar - 15gm
Water - 1 litre

After a 7-day incubation period, the fluid evaporated and the dense creamy to crumbly fungus growth on the surface of the slant could be scraped off without affecting the underlying agar. The Thalli were carefully rinsed and allowed to settle to the tapered base of a 40-ml centrifuge tube containing 25 ml of YPSS medium devoid of organic components. Numerous sporangia released their contents after 1 hour, and the ensuing zoospore suspension was utilised to inoculate the experimental flasks. The observed differences between the means derived from duplicate experiments could have arisen from random sampling errors in more than 30% of the trials, according to preliminary experiments designed to test the extent to which the inoculation procedures had been standardised. When 2- ml samples of inoculum were used, the observed differences between the means derived from duplicate experiments could have arisen from random sampling errors in more than 30% of the trials. In addition, no coefficient of variation was determined to be greater than 10%. This approach was commonly followed because autoclaving glucose with the other components of the medium had neither a detrimental nor a stimulatory effect on these organisms. Autoclaving at 121oC (15 lb) for 15 minutes sterilised the nutrients. The organisms were exposed to various light conditions, including Red, Green, Diffused Fluorescent, Dark, and Control. On the 15th day after inoculation, the cultures were harvested. Prepare a camera lucida sketch and compare it to the original.

3. Result and Discussion

A perusal of the results presented in table 1 and 2 shows that good Growth of *Pythium* sp. was observed in Green light, while in all other light spectra, the mycelial Growth was comparatively poor. Sporulation was also excellent in controlled condition as well as in Green light. it was moderate in diffused light and darkness but poor in fluorescent and Red light.

In case of *Saprolegnia* sp. good Growth was observed in controlled and Green

light, while it was poor in rest of light spectra. Sporulation was excellent in controlled condition and good in Green light. It was moderate in diffused light and darkness. The Sporulation was very poor or negligible in Red light spectra.

Table.1. Effect of different light spectrum on Growth and Sporulation of *Pythium* sp.

Sr. No,	Different light Spectrum	5th day		10th day		15th day	
		Growth (in cm)	Sporulation	Growth (in cm)	Sporulation	Growth (in cm)	Sporulation
1.	Control	1.14	Moderate	1.5	Good	1.58	Excellent
2.	Complete Darkness	0.70	-	1.43	Poor	1.53	Moderate
3.	Fluorescent light	0.89	-	1.22	-	1.35	Poor
4.	Red light	0.85	-	1.19	-	1.36	Poor
5.	Green light	1.11	-	1.45	Moderate	1.57	Good
6.	Diffused light	0.7	-	1.43	Poor	1.52	Moderate

Analysis of the growth of *Pythium* sp. = (Growth = Colony Diameter)
1.58 (1) > 1.57 (5) > 1.53(2) > 1.52(6) > 1.35(3) > 1.36(4)

Figure.1. Effect of Different Light Spectrum on the Growth of *Pythium* Sp.

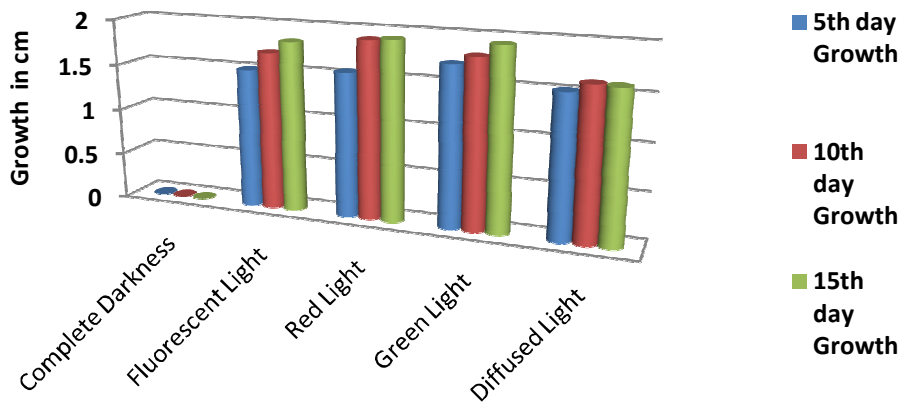
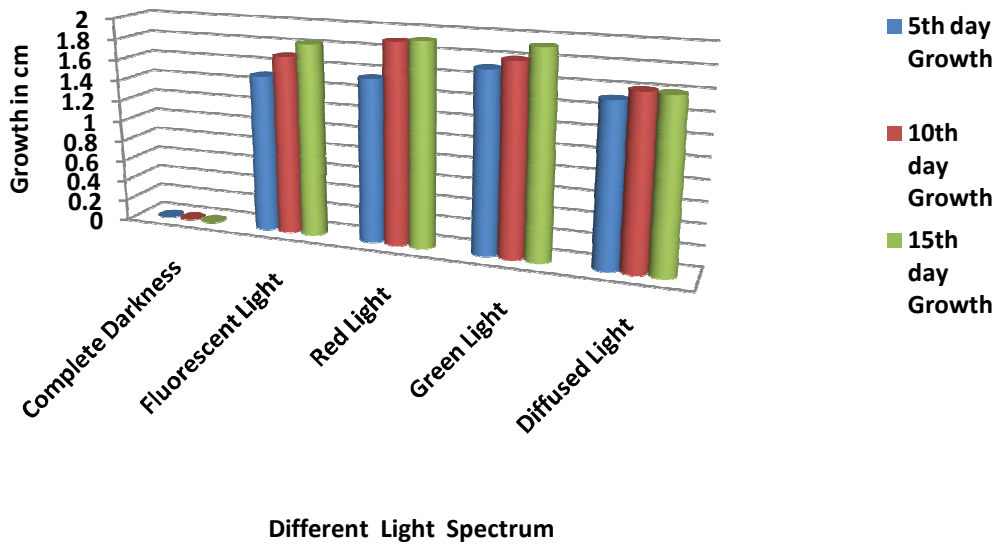


Table.2. Effect of different light spectrum on Growth and Sporulation of *Saprolegnia* sp.

Sr. no.	Different light Spectrum	5th day		10th day		15th day	
		Growth (in cm)	Sporulation	Growth (in cm)	Sporulation	Growth (in cm)	Sporulation
1.	Control	1.73	Moderate	1.89	Good	2.5	Excellent
2.	Complete Darkness	1.7	-	1.83	Poor	1.85	Moderate
3.	Fluorescent light	1.5	-	1.7	-	1.83	Moderate
4.	Red light	1.55	-	1.90	Poor	1.92	Good
5.	Green light	1.71	-	1.80	Moderate	1.93	Good
6.	Diffused light	1.52	-	1.61	Poor	1.60	Poor

Analysis of the growth of *Saprolegnia* sp. = (Growth = colony Diameter)
2.5 (1) > 1.93 (5) > 1.92 (4) > 1.85 (2) > 1.83 (3) > 1.60 (6)

Figure .2. Effect of Different Light Spectrum on the Growth of *Saprolegnia* sp.



4. Conclusion

Light favors various growth activities of fungi. Most favorable was the green light for vegetative growth and sporangial formation. Diffused light, fluorescent light, complete darkness and red light did not stop the growth but they are not very stimulating for fungal growth and reproduction.

5. Acknowledgments

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6. References

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