Effect of Hydrogen-Ion Concentration on the Growth and Reproduction of *Curvularia eragrostidis* (Henn.) J. A. Mey.

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Abstract

Fungi are very sensitive to their growth as well as sporulation are greatly influenced by pH of the substrate. Studies on eight different pH regimes revealed that the fungus *Curvularia eragrostidis* causing leaf tip blight of spider lilly produced maximum dry mycelial weight with good sporulation in pH ranging from 4.0 to 6.5.

Keywords: *Curvularia eragrostidis*, pH, spider lilly

1. Introduction

The isolate of *C. eragrostidis* was obtained by tissue isolation techniques from the infected leaf of Spider lilly. The fungus produced initially profuse brownish black mycelial growth, which gradually turned into dark black in colour on potato dextrose agar medium. Conidia were ellipsoidal, straight, mostly median portion thick with three transverse septa and very dark brown central cells. The cells of conidia adjoining to central cells were much paler while the end cells were smaller and lighter than mid cells. The conidiophores of the fungus were erect, grouped, unbranched, septate and brown to dark brown in colour. The majority of conidia readily germinated from both polar ends which is the main morphological characteristics of fungus infecting spider lilly crop. Fungi are very sensitive to their growth as well as sporulation are greatly influenced by pH of the substrate. Even slight variation in any factor may induce marked differences in growth and reproduction and therefore fungus have minimum, optimum and maximum pH for mycelial yield and sporulation. The initial pH of 5 to 6 is satisfactory for a majority of fungi. The pH of a medium may be favourable for growth and unsuitable for spore production or *vice versa*. Sporulation usually takes place over a narrower range of pH than that needed for hyphal development. The present work was, therefore, undertaken to study the effect of pH on the growth and sporulation of *Curvularia eragrostidis.*

2. Materials and Methods

2.1. Isolation and identification

Curvularia eragrostidis was isolated in the laboratory from infected foliage of the spider lilly, were collected from farmer's fields. The infected portions were cut into small pieces (about 2 mm) in such a way that each piece consist of infected as well as healthy portion. The pieces were surface sterilized with 0.1% (1 g l^{-1}) mercuric chloride ($HgCl_2$) solution for 60 seconds followed by three subsequent washing with distilled sterile water and then transferred aseptically under laminar air flow on sterile 90mm diameter Petri dishes containing 20 ml Potato Dextrose Agar (PDA) medium (peeled potatoes 200 g, dextrose 20 g, agar agar 20 g in 1000 ml distilled water). These Petri plates were incubated at room temperature (27±2 °C). The fungal hyphae developed from infected tissues were sub-cultured aseptically on PDA slants or Petri dishes containing PDA. The pure culture thus obtained was microscopically examined for identification and was further purified by using single spore isolation technique. The single spore culture was maintained for further future investigations.

2.2. pH studies

pH studies were carried out for the growth and sporulation of the fungus was obtained on PDA medium, which was used as standard medium prepared excluding agar agar from its composition to get it in liquid form, in sets of eight different pH levels ranging from 4.0, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5 and 8.0. The pH was adjusted by addition of 0.1 N NaOH or 0.1 N HCl with the help of a pH Tester.Fifty ml of liquid PDA medium was poured in to 150 ml conical flasks. Each treatment was replicated four times. After sterilizing at 1.2 kg cm^{-2} pressure for 20 minutes in the autoclave, these flasks were inoculated with 5 mm diameter disc of mycelial mat obtained from

margin of 8 days old actively growing cultures with the help of a sterile 5 mm cork borer under aseptic condition. Inoculated flasks were incubated at room temperature (27±2 °C) for 15 days. Mycelial mats were collected from three repetition in each case on previously weighed Whatman's filter paper no. 42 and dried in oven at 60 °C for 3 consecutive days up to the constant weight was obtained.

The sporulation of the fungus was recorded from fourth replication. At the end of incubation period, the whole mycelial mat with substrate was homogenized in 150ml sterile distilled water with the help of mixture and grinder. The homogenate was filtered through muslin cloth. A drop of suspension was examined under microscope. The numbers of conidia per microscopic field under low power magnification (10 X) were recorded from four randomly selected microscopic fields in each case. The data, thus obtained were graded as+=poor (below 5), ++=moderate (6- 15), +++=good (16-30) and ++++=excellent (above 30).The data were subjected to statistically analysis.

3. Results and Discussion

The PDA broth with and without agar was found superior and so it was used as basal medium for the physiological studies. The dry mycelial weight and spore count after incubation period were recorded in liquid medium. The data were statistically analyzed and presented in Table 1. The results clearly indicated that the fungus grew and sporulated in wide pH range from 4.0 to 8.0 in liquid medium. The dry mycelial weight was significantly higher at pH 6.0 (1158.67 mg). Next best in order of merit was pH 4.0 (714.67 mg) which was statistically at par with pH 6.5 (623.67mg) followed by pH 5 (609.27mg) and pH 5.5 (608.00 mg) which were statistically at par with pH 6.5. The significantly least growth of the fungus was recorded at pH 7 (261.67 mg) followed by pH 7.5 (181.67 mg) and pH 8 (85.33 mg).

Table 1: Effect of different pH regimes on growth and sporulation of *Curvularia eragrostidis*

Sr. No.	pH	Liquid medium (after 15 days)	
		Av. dry weight of mycelium (mg)	No. of conidia/low power micro field (10x)
1.	4.0	(2.85)* 714.67**	++++
2.	5.0	(2.78) 609.27	++++
3.	5.5	(2.78) 608.00	++++
4.	6.0	(3.06)1158.67	++++
5.	6.5	(2.79) 623.67	++++
6.	7.0	(2.42) 261.67	+++
7.	7.5	(2.26) 181.67	+++
8.	8.0	(1.93) 85.33	++
SEm±		0.017	
CD (*p*=0.05)		0.052	
C.V. %		1.15	

*: Figures indicate logarithmic transformed values; **: Figures indicate original values; Sporulation (no. of conidia); +: Poor (below 5); ++: Moderate (6-15); +++: Good (16-30); ++++: Excellent (above 30)

Regarding sporulation, the fungus produced excellent sporulation on pH 4, pH 5, pH 5.5, pH 6 and pH 6.5, while in pH 7 and pH 7.5 produced good sporulation while pH 8 showed moderate sporulation of *Curvularia eragrostidis.* Excellent growth and sporulation of *Curvularia* sp. was recorded at pH 5 to 6.5, which was in conformity with that of Kapoor, 1970; Aulakh (1970); Hasija (1971); Misra et al. (1973); Kore and Bhide (1981); Chalal and Rawla (1984); Zhu and Qiang (2003).

4. Conclusion

Testing of different pH regimes on the growth and sporulation, among them pH 4 to 6.5 proved very effective indicating that the fungus preferred acidic to near neutral medium for the growth and sporulation as compared to alkaline medium.

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