

Effect of Hydrogen ion Concentration (pH) on the Growth and Sporulation of *Alternaria alternata* Causing Leaf Spot of Cotton

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ABSTRACT

The hydrogen ion concentration of the medium causes significant and pronounced effect on the growth and sporulation of fungus grown in different pH values and after culturing the pathogen, it was observed that reaction of medium tended towards alkaline in cases where the initial pH was on acidic side and vice versa in the cases, where the media was adjusted at P14 (pH 9.0) to P1 (pH 10.0) initially.

Key words: *Hydrogen –ion concentration, Alternaria alternata, Sterilization.*

INTRODUCTION

Leaf spot of cotton caused by *Alternaria* is one of the major diseases of cotton affecting the crop both qualitatively and quantitatively as it is having a pivotal place due to its high oil contents, staple fibres, high multiplication ratio, high degree of adaptability and good quality of fibres, so the investigations were carried out to determine the effect of pH on the growth of *Alternaria alternata*

MATERIAL AND METHODS

To study the effect of hydrogen ion concentrations (pH), the pathogen was grown in 150.0 ml. flasks containing basal medium (potato dextrose agar medium) as suggested by Clark (1928), on 20 different pH values viz, 2.50 (P₁), 3.0 (P₂), 3.5 (P₃), 4.0 (P₄), 4.5 (P₅), 5.0 (P₆), 5.50 (P₇), 6.0 (P₈), 6.50 (P₉), 7.0 (P₁₀), 7.50 (P₁₁), 8.0 (P₁₂), 8.50 (P₁₃), 9.0 (P₁₄), 9.50

(P₁₅), 10.0 (P₁₆), 10.50 (P₁₇), 11.0 (P₁₈), 11.50 (P₁₉), and 12.0 (P₂₀). Before sterilization initial pH values were adjusted by using N/10 KOH or N/10 HCl and accurately measured by Backman's pH paper. The treatment was replicated three times. After measurement of pH, the medium was sterilized in autoclave at 15.0 lb. pressure psi for 20 minutes and again pH value of each treatment were measured. The pH, was adjusted to original values by adding measured quantities of N/10 KOH or N/10 HCl under aseptic conditions in the culture chamber. After adjusting the required pH values, the discs of 5.0 mm. of the pathogen, were inoculated in each flasks, which were incubated at 25 ± 1°C upto the time till the growth in any of the flasks was completed. The observations regarding the average fungal dry weight and extent of sporulation of pathogen, were noted as de.

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TABLE – A

Average Fungal growth and sporulation of pathogen *Alternaria alternata* (Fries.), Keissler causing leaf spot of Cotton (*Gossypium hirsutum* L.) in Potato dextrose liquid medium adjusted at pH values after 10 days of incubation

S.No.	Initial pH(mg)	Fungal Dry weight(mg)	pH after the growth of fungus	Sporulation
1.	2.50(P 1)	72.5	6.30	-
2.	3.00(P 2)	116.30	6.50	-
3.	3.50(P 3)	170.30	7.60	+
4.	4.00(P 4)	273.60	7.60	+
5.	4.50(P 5)	305.30	7.10	+
6.	5.00(P 6)	344.60	7.40	+
7.	5.50(P 7)	387.00	7.40	+
8.	6.00(P 8)	435.20	-	+
9.	6.50(P 9)	493.5	7.50	++++
10.	7.00(P 10)	461.70	7.50	++++
11.	7.50(P 11)	403.70	-	+++
12.	8.00(P 12)	327.20	8.20	+++
13.	8.50(P 13)	291.80	8.50	+
14.	9.00(P 14)	227.10	8.50	+
15.	9.50(P 15)	103.20	8.90	+
16.	10.00(P 16)	69.70	8.70	+
17.	10.50(P 17)	60.00	8.30	+
18.	11.00(P 18)	56.00	8.10	-
19.	11.50(P 19)	58.20	7.50	-
20.	12.50(P 20)	54.00	7.20	-

(-) = Denotes Absence of sporulation.
 (+) = Denotes Poor sporulation.
 (++) = Denotes Fair sporulation.
 (+++) = Denotes Good sporulation.
 (++++) = Denotes excellent sporulation.

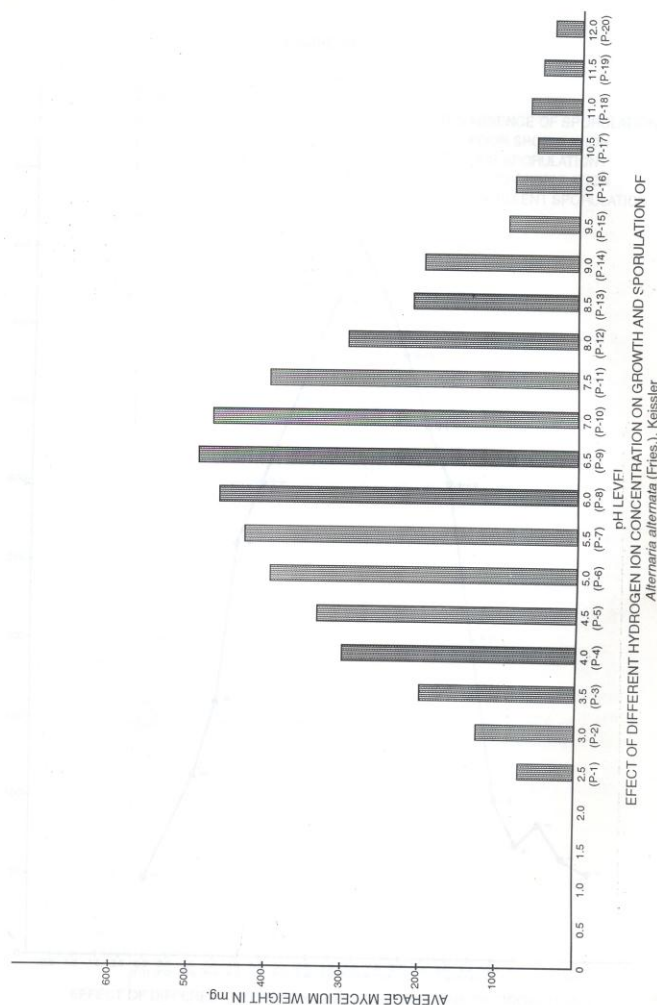
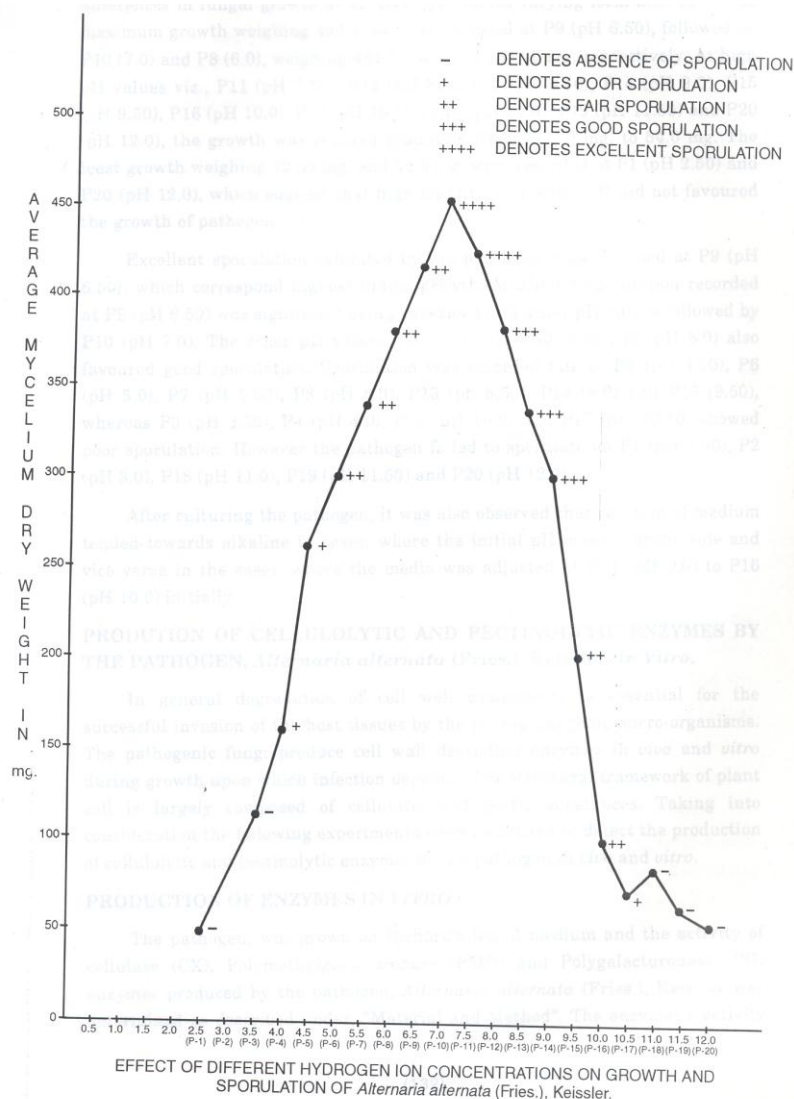


Fig : 1



tail in Table A and figures 1 and 2

RESULT AND DISCUSSION

It is evident from table A and corresponding figures (1) and (2) that the pathogen, alternaria alternata (frics), keissler, grew exhibiting significant differences in fungal growth at different pH values varying from 2.50-12.0. The maximum growth weighing 493.0 mg. was obtained at P9 (pH 6.50), followed by P10(7.0) and P8 (6.0), weighing 461.50 mg. and 435.20 mg. respectively. At high pH values viz., P11 (pH 7.50), P12 (pH 8.0), P13 (pH 8.50), P14 (pH 9.0), P15 (pH 9.5), P16 (pH 10.0), P17 (pH 10.5), P18 (pH 11.0), P19 (pH 11.5) and P20 (pH 12.0), the growth was reduced gradually from 403.70 mg. to 54.0 mg. The least growth weighing 72.80 mg. and 54.0 mg. were recorded at P1 (pH 2.50) and P20 (pH 12.0), which suggest that high

alkaline and acidic pH did not favour the growth of pathogen.

Excellent sporulation exhibited by the pathogen, was obtained at P9 (pH 6.50), which correspond highest fungal growth. Maximum sporulation recorded at P9 (pH 6.50) was significant being superior to all other pH values followed by P10 (pH 7.0). The other pH values viz., P11 (pH 7.50) and P12 (pH 8.0) also favoured good sporulation. Sporulation was recorded fair at P5 (pH 4.50), P6 (pH 5.00), P7 (pH 5.50), P8 (pH 6.00), P13 (pH 8.50), P14 (pH 9.00) and , P15 (pH 9.50) whereas P3 (pH 3.50) , P4 (pH 4.00), P16 (pH 10.00) and P17 (pH 10.50) showed poor sporulation. However the pathogen failed to sporulate on P1 (pH 2.50), P2 (pH 3.0), P18 (pH 11.0), P19 (pH 11.50) and P20 (pH 12.0).

After culturing the pathogen, it was also observed that reaction of medium tended towards alkaline in cases, where the initial pH was on acidic side and vice versa in the cases, where the media was adjusted at P14 (pH 9.0), to P16 (pH 10.0) initially

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