

195-4, BAUL 189-2, Shubhra and Sweta belong to cluster II, T 397 and BAUL 286-5 to cluster II and LCK 8657, RLC 33, BAUL 135, and BAUL 65-2 one each to clusters III, V, VI and VII, respectively (Table 2). Therefore, considering the  $D^2$  analysis and stability of yield and yield attributes making crosses among the selected genotypes of cluster IV (BAUL 9 and BAUL 159-4) with the genotype of VI (BAUL 135), cluster III (LCK 8657) with the genotypes (BAUL 9 and BAUL 159-4), Cluster VI (BAUL 135) with cluster VII (BAUL 65-2) and cluster II (T 397) and BAUL 286-5) with cluster VI (BAUL 135) is recommended and is expected to provide enough genetic variability to select for yielding and stable segregates in the segregating generations.

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## CULTURAL AND PHYSIOLOGICAL STUDIES OF *Fusarium oxysporum* f.sp. *sesami* CAUSING WILT DISEASE OF SESAMUM

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#### ABSTRACT

Cultural studies of *Fusarium oxysporum* f.sp. *sesami* were carried out on six different medium viz. Asthana and Hawker's medium, Czapek, Dox's Agar medium, Potato Dextrose Agar, Richards medium and Wakman's medium. Out of these, the fungus showed luxuriant growth and maximum sporulation on Potato Dextrose Agar medium. The profuse growth and sporulation of *Fusarium oxysporum* f.sp. *sesami* was recorded at 27°C temperature. Further it was observed that the fungus growth and sporulation was maximum at pH range between 6.5 and 7.5.

KEY WORDS : Cultural and Physiological Studies, Fusarium Wilt, Sesamum

Sesamum is one of the important oilseed crops grown in Maharashtra. Area under sesamum cultivation is less as compared to other oilseeds crops like groundnut, sunflower and safflower. The situation is also the same in respect of production (Anon., 1983). Sesamum is often threatened by several diseases such as wilt caused by *Fusarium oxysporum* f.sp. *sesami*.

During the *kharif* season there was a heavy mortality of sesamum at the Central Research Station, P.K.V., Akola. Taking into consideration of the severity of wilt disease various studies on pathogen viz. cultural characters on different solid media, effect of temperature on growth and sporulation, effect of pH on growth and sporulation were undertaken for further investigation.

## MATERIALS AND METHODS

In cultural study of *Fusarium oxysporum* f.sp. *sesami* six different media were used. As per the composition, the media were prepared and sterilized at 15 lbs psi for 15 min. The petriplates were sterilized in hot air oven at 180° for one h. Small fungal discs from mother culture were inoculated in the centre of solidified agar medium. Each medium was replicated four times and incubated at 27±2°C. Colony diam was recorded on 7th day of incubation by measuring it in two marked directions at right angle to each other. Sporulation was recorded on 7th day of incubation. The composition of different media is as follows.

(1) Asthana and Hawker's medium :- Glucose - 5.0 g, Potassium nitrate - 3.5 g, Potassium dihydrogen phosphate - 1.75 g, Magnesium sulphate - 0.75 g, Agar-agar - 20 g and Distilled water - 1000 ml. (2) Dox's medium :- Sucrose - 15.0 g, Sodium nitrate - 2.0 g, Potassium dihydrogen phosphate - 1.0 g, Potassium chloride - 0.05 g, Magnesium sulphate - 0.5 g, Ferrous sulphate - 0.01 g, Agar-agar - 20.0 g, Distilled water - 1000 ml. (3) Richard's medium :- Sucrose - 50.0 g, Potassium hydrogen phosphate - 5.0 g, Magnesium sulphate - 2.5 g, Ferric chloride - 0.02 g, Agar-agar - 20.0 g, Distilled water - 1000 ml. (4) Czapek's medium :- Sucrose - 30.0 g, Sodium nitrate - 2.0 g, Magnesium sulphate - 0.5 g, Potassium chloride - 0.5 g, Ferrous sulphate - 0.01 g, Agar-agar - 20.0 g, Distilled water - 1000 ml. (5) Potato Dextrose Agar (PDA) :- Peeled potatoes - 200.0 g, Dextrose - 20.0 g, Agar-agar - 20.0 g, Distilled water - 1000 ml (6) Wakman's medium: - Glucose - 10.0 g, Peptone - 5.0 g, Potassium dihydrogen phosphate - 1.0 g, Magnesium sulphate - 0.5 g, Agar-Agar - 20.0 g, Distilled water - 1000 ml.

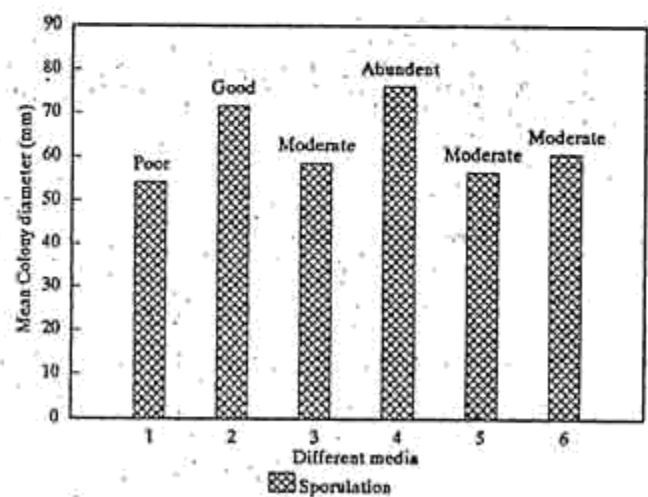
In order to study the effect of temperature on growth and sporulation of *F.oxysporum* f.sp. *sesami*, the PDA plates were incubated at 5°, 10°, 15°, 20°, 27°, 30° and 40°C with three replications and observations were recorded on 7th day.

To study the effect of pH on growth and sporulation, potato dextrose broth was prepared. This broth was distributed into ten flasks of 250 ml each. The pH level was adjusted by adding N/10 NaOH or N/10 Hcl in each flask and the pH level from 4.4 to 9.5 was adjusted. The content of each

flask was again divided into two different flasks and autoclaved at 15 lbs, psi for 15 minutes. The changes in the pH of the medium in one set of flask due to autoclaving was noted with the help of pH meter. In the remaining ten flasks small fungal discs were inoculated and the flasks were incubated at room temperature for 15 days. The medium was filtered through Whatman filter paper No.1. The fungus biomass was dried at 60°C till constant weight was achieved. The weight of mycelium was calculated by subtracting weight of filter paper from the weight of oven dried filter paper with mycelium.

## RESULTS AND DISCUSSION

Data pertaining to the cultural studies are presented in Fig. 1. It was observed that out of the six media, Potato dextrose agar (PDA) favoured the best growth and sporulation for *F.oxysporum* f.sp. *sesami* followed by Czapek's Dox's medium. The poor sporulation was observed on Asthana and Hawker's medium. Singh and Nene (1965) studied the cultural characters of *F.oxysporum* and found that the modified Czapek's medium was the best for hyphal growth of *Fusarium spp.* Soloveva and Madumarov (1969) studied the cultural characters of *F.oxysporum* and reported that PDA and acid potato agar media were best for the hyphal growth of *F.oxysporum*. Buldeo and Rane (1987) found that PDA and Czapek's media were the best solid



1 = Asthana & Hawker's      4 = Potato Dextrose Agar  
 2 = Czapek                      5 = Richard's  
 3 = Dox's                        6 = Wakman's

Fig.1. Studies on the growth and sporulation of *F.oxysporum* f.sp. *sesami* on various solid media

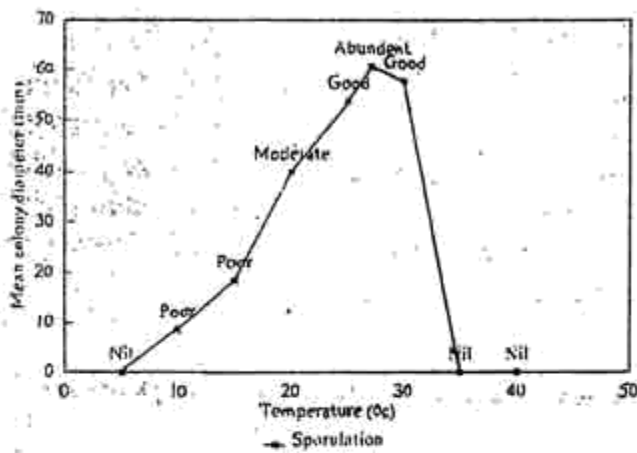


Fig.2. Growth and sporulation of *F.oxysporum* f.sp. *sesami* on PDA under different temperature

media for the luxuriant growth of *F.oxysporum* f.sp. *sesami*. Thus the results obtained in the present investigations are in conformity with the findings of above researchers. From the temperature studies presented in Fig. 2 it was observed that the fungus grew well between the temperature range of 20<sup>o</sup> and 30<sup>o</sup>C. Best growth and sporulation was observed at 27<sup>o</sup>C whereas 5, 10,15,35 and 40<sup>o</sup>C temperatures were observed to be unsuitable for growth and sporulation of this fungus. Similar results were obtained earlier by Neal (1927). Khare (1980) found maximum growth of *F.oxysporum* f.sp. *lentil* at 28<sup>o</sup>C while Virk and Gemawat (1982) temperature i.e. 10 to 35<sup>o</sup>C and optimum range being 20 to 30<sup>o</sup>C. Data pertaining to the pH studies are presented in Fig.3. It revealed that the fungus grew well between the pH range of 6.5 and 7.5. Best growth and sporulation was observed on pH 7.2. These findings are on the similar lines of Buldeo and Rane (1978) wherein they observed that *F.oxysporum* f.sp. *sesami* tolerated to pH 5.5 to 8.5. Virk and Gemawat (1982) found that the fungus *F.oxysporum* grew well and sporulated nicely between 6.5 to 7.3 pH.

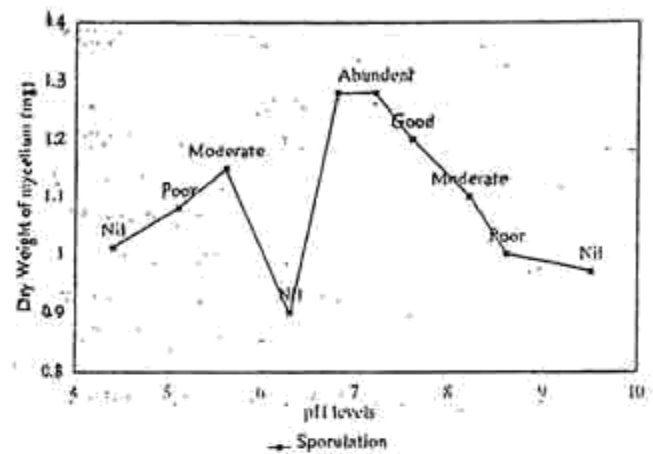


Fig.3. Dry weight of *F.oxysporum* f.sp. *sesami* in mg as influenced by different pH levels

Thus, it can be inferred that the fungus *Fusarium oxysporum* f.sp.*sesami*, wilt pathogen of sesamum had shown luxuriant growth and maximum sporulation on potato dextrose agar medium with temperature 27<sup>o</sup>C and pH range between 6.5 and 7.5.

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