

MASS CULTURING OF *FUSARIUM OXYSPORUM* SCHLECT, AN ENTOMO- GEOUS FUNGUS OF BROWN PLANT HOPPER *NILAPARVATA LUGENS* STAL

SUMA KURUVILLA AND ABRAHAM JACOB

College of Agriculture, Veltayani 695 522, Kerala, India

A good candidate for use in microbial control of insect pests should be amenable to easy mass production at competitive cost. Cheap materials of plant origin such as cereals, tubers etc. have thus been successfully tested by various workers in the mass production of several entomogenous fungi (Hall and Dunn 1958; Martignoni, 1964; Villacorta, 1976). The present paper reports results of studies made on the mass production of *Fusarium oxysporum* Schlect an effective pathogen on brown plant hopper *Nilaparvata lugens* (Kuruvilla and Jacob, 1978).

Materials and Methods

A preliminary trial was conducted with paddy, wheat, ragi, maize, sorghum, redgram, blackgram, greengram, horsegram, wheat bran, green leaf of paddy and paddystraw to screen the promising materials. Thirty g of each material was taken in separate 250 ml conical flasks containing 30 ml of distilled water and these were autoclaved at 15 lb pressure for 20 minutes. Circular discs of 5 mm diameter were cut out from the outer edge of four day old culture by means of a sterile cork borer. One disc was transferred to each flask containing the materials and incubated at room temperature. Growth of the fungus was observed daily. Greengram, sorghum, wheat, ragi and red gram which gave satisfactory growth of the fungus were selected for further studies. Growth and sporulation of the fungus in these media were assessed at three levels of water viz., 30 g of material + 25 ml of water, 30 g of material + 30 ml of water and 30 g of material + 35 ml of water. Four flasks were prepared for each medium and inoculations were carried out as described earlier. Spores in each flask were harvested on the fifth day by adding 50 ml of distilled water and the number of spores in each was estimated with the aid of a haemocytometer. Based on sporulation, the best combination for each material was selected and the virulence of the pathogen was assayed against third instar nymphs of brown plant hopper at a spore concentration of 3.1×10^6 conidia/ml.

Results and Discussion

Table 1 shows the data on sporulation of the fungus on different media.

It is seen that sporulation was significantly higher in green gram followed by wheat, sorghum, ragi and red gram, there being no difference between wheat and sorghum. The best combination for all materials was 30 g of material + 25 ml of water in all treatments. The lowest number of spores was produced with the highest quantity of water.

Data on the cumulative per cent mortality of *N. lugens* inoculated with spores of *F. oxysporum* harvested from different media are presented in Table 2. It is evident that the fungus cultured on all the media caused cent per cent

Table 1
Sporulation of *F. oxysporum* on different materials each, with three levels of water content

| Media | Average number of spores/ml | | | Mean |
|------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | 25 ml water | 30 ml water | 35 ml water | |
| Green gram | 6.197 x 10 ⁶ (6.7922) | 4.246 x 10 ⁶ (6.6280) | 2.823 x 10 ⁶ (6.4507) | 4.204 x 10 ⁶ (6.6236) |
| Wheat | 5.297 x 10 ⁶ (6.7240) | 3.150 x 10 ⁶ (6.4983) | 2,075 x 10 ⁶ (6.3170) | 3.258 x 10 ⁶ (6.5130) |
| Sorghum | 5.224 x 10 ⁶ (6.7180) | 3.013 x 10 ⁶ (6.4790) | 2 000 x 10 ⁶ (6.3010) | 3.157 x 10 ⁶ (6.4993) |
| Ragi | 4.677 x 10 ⁶ (6.6700) | 2.736 x 10 ⁶ (6.4372) | 1.663 x 10 ⁶ (6.2207) | 2.771 x 10 ⁶ (6.4426) |
| Red gram | 4.448 x 10 ⁶ (6.6482) | 2.174 x 10 ⁶ (6.3372) | 1.173 x 10 ⁶ (6.0695) | 2.247 x 10 ⁶ (6.3516) |
| Mean | 5.134 x 10 ⁶ (6.7104) | 2.991 x 10 ⁶ (6.4759) | 1.869 x 10 ⁶ (6.2717) | |

CD for comparison between different media = 0.0347

CD for comparison between different levels of water content — 0.0282

CD for comparison between different combinations - 0.0506

Figures in parenthesis indicate values after logarithmic transformation

Table 2

Cumulative per cent mortality of *N. lugens* inoculated with spores of *F. oxysporum* harvested from different mass culture media

| Media | Cumulative per cent mortality at intervals (days)* | | | |
|---------------|--|-------------------|------------------|----------------|
| | 1 | 2 | 3 | 4 |
| Green gram | 65.10 (53.81) | 100.00 (90.00) | 100 (90.00) | 100 (90.00) |
| Wheat | 63.40 (52.77) | 97.50 (80.93) | 100 (90.00) | 100 (90.00) |
| Sorghum | 56.70 (48.86) | 86.20 (68.15) | 100 (90.00) | 100 (90.00) |
| Ragi | 55.10 (47.91) | 83.50 (66.03) | 99.58 (86.28) | 100 (90.00) |
| Red gram | 50.10 (45.03) | 76.80 (61.20) | 96.20 (78.83) | 100 (90.00) |
| CD (P = 0.05) | 3.94 | 9.55 | 7.10 | |

* Mean of 4 replications of 15 insects each

Note:- In control no mortality was observed.

Figures in parenthesis are values after angular transformation.

mortality though the lethal period varied. Those from green gram and wheat were highly virulent causing mortality of 100 and 97.50 per cent respectively of third instar nymphs in two days, the difference between them being not significant. Fungus grown on sorghum caused complete mortality by third day which was on par with that from ragi. However, as revealed in the previous experiment sporulation was comparatively less virulent causing 100 per cent mortality within 4 days. The present studies revealed that *f. oxysporum* can be produced in large quantities on green gram, wheat or sorghum of which the latter two are cheaper.

Summary

Studies were conducted to evolve suitable techniques of mass culture of *Fusarium oxysporum* Schlect infecting the rice brown plant hopper. The results showed that green gram, wheat or sorghum could be used as substrates for easy mass production of the fungus as they produced maximum spores with high virulence. Further, for better growth and sporulation, a combination of 30 g of material + 25 ml of water was found to be the optimum.

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സംഗ്രഹം

[ബ്രൗൺഹോപ്പർ കീടത്തെ ബാധിക്കുന്ന ഫ്യൂസേറിയം ഓക്സിസ്പോറം എന്ന കുമിളിനെ ചെറുപയർ, ഗോതമ്പ് ചോളം എന്നീ ധാന്യങ്ങൾ ഉപയോഗിച്ച് വൻതോതിൽ ഉൽപാദിപ്പിക്കാമെന്നു കണ്ടു. മറ്റു മാധ്യമങ്ങളെ അപേക്ഷിച്ച് ഇവയിൽ രോഗോൽപാദന ശക്തിയുള്ള കൂടുതൽ മെച്ചപ്പെട്ട സ്പോറുകൾ ലഭിക്കുമെന്നും കാണുകയുണ്ടായി.

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