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Influence of 'c' and 'n' sources on growth and development of *Ceratocystis paradoxa*

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SUMMARY

Sett rot, a soil borne fungal disease has gained importance as it primarily affects bud germination, a vital step of crop growth resulting in poor crop stand. The disease has become endemic in all the sugarcane growing areas *esp* in the northern Karnataka. The huge losses, the disease has been causing, has necessitated to characterize the fungal growth attributes to effectively isolate the pathogen for *in-vitro* and *in-vivo* studies and also for designing control measures. Hence a study to know the preferred sources of carbon and nitrogen was takenup. Among the 11 carbon sources tested for their influence on the pathogen's growth and sporulation intensity, starch induced highest growth of *C. paradoxa* with maximum biomass of 1039.99 mg as well as sporulation (79.67 spores/ mL) followed by glucose (72.30 spores/mL). Among the nitrogen sources, *C.paradoxa* produced significantly highest biomass (1590.70 mg) in potassium nitrate, ammonium nitrate (1496.97 mg), ammonium oxalate (1405.00mg) and magnesium nitrate (1234.30 mg) were next best preferred sources. The sporulation pattern of the fungi also followed similar trend.

Key words : *C. paradoxa*, Sett rot, Sugarcane

Sett rot, a soil borne fungal disease has gained importance as it primarily affects bud germination, a vital step of crop growth resulting in poor crop stand (Wismer, 1951). The disease has been reported from almost all sugarcane-growing countries of the world like USA, Australia, Java and Brazil (Martin *et al*., 1961). In India the disease prevalence has been reported from all major sugarcane growing states like Uttar Pradesh, Punjab, Maharashtra, Kerala, Karnataka and Tamilnadu (Agnihotri, 1983). Disease affliction results in germination loss to the extent of 12-20 per cent while in Karnataka the loss ranges from 15 to 20 per cent. Disease affliction during later stages causes yield reduction of 10-15 t per ha (Anon., 2003).

The sett rot disease of sugarcane caused by an ascomycetous fungus *Ceratocystis paradoxa* (De Seynes) Moreau, was first studied exhaustively by De Seynes (1886) in France where it had been previously known to cause rotting of pineapple fruits. Basic knowledge about the pathogen, its survival, spread and other related aspects are very important for better management of the disease. Such studies would help in designing suitable " Integrated Disease Management Practices." It is imminent to characterize the optimal fungal growth attributes for its efficient management. Hence a study was taken upto assess the influence of carbon and nitrogen sources on the growth of the pathogen.

MATERIALS AND METHODS

The experiment was conducted in the laboratory using Czapek's Dox medium substituting the same quantity of enlisted carbon sources in lieu of sucrose with 15 g each of AR grade glucose, fructose, maltose, sucrose mannitol, lactose, xylose, starch, cellulose, pectin and inositol. They were added separately in each of sterile volumetric flasks (500ml) containing sterile distilled water and allowed to dissolve thoroughly. To each of the flasks 1.0g of sodium nitrate and 0.5g potassium dihydrogen phosphate was added. Before using pH was adjusted using either N/10 NaOH or N/10 HCl as the case deserved. The Czapek's Dox medium containing sucrose served as control.

Prepared media with different carbon sources were sterilized at 121.5°C under 1.1kg/cm^2 pressure for 15 min and 100 ml of each of the medium was transferred to sterile labeled 250 ml Erlenmeyer flasks in triplicates. The fungal discs of five mm diameter from the fresh subculture, were transferred to each of the flasks.

The flasks were inoculated at 28±1°C for a period of 10 days. After the incubation period the whole fungal colony in each of the flasks was dispersed in known volume. A drop was taken on haemocytometer to determine conidial intensity. The solution was filtered through the funnel, thoroughly washing with distilled water. The filter paper containing harvested fungus growth was dried in hot air oven at 40°C for a period of two days and its weight was recorded.

To determine the different nitrogen sources for the pathogen, an experiment was conducted using Czapek's Dox medium substituting sodium nitrate with equivalent quantities of either of AR grade ammonium sulphate, ammonium chloride, ammonium oxalate, ammonium nitrate, ammonium molybdate, potassium nitrate, magnesium nitrate and calcium nitrate, 10 g each for preparation of 500 ml of each of the medium. Concurrently medium with sodium nitrate served as control. All the procedures such as inoculation of fungus and incubaton were essentially the same as described above.

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