

## Evaluating the fungicidal properties of copper oxychloride against *Fusarium oxysporum* the wilt pathogen of cotton

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### ABSTRACT

The wilt pathogen of *Gossypium hirsutum* namely *Fusarium oxysporum* pv *vasinfectum* was isolated using Czapek Dox agar from diseased plant and characterized using standard procedures. The optimal bioparameters for efficient growth of fungi were studied with Czapek Dox broth using mycelial dry weight estimation which showed 38°C the optimum temperature, pH 5.5, two days continuous aeration and seven days of incubation, that favored the better growth of fungi. An attempt was made to assay the systemic activity of copper oxychloride using 30 days old cotton seedlings. The root and shoot extract of seedlings that are exposed to different concentration of copper oxychloride at various time intervals, posed a scientific inhibition of *Fusarium oxysporum* at low concentration which is revealed through invitro assay. Bioassay revealed 50% and 62.5% inhibition of phytopathogenic fungi in 48 hours shoot and root extracts, respectively.

**Key words :** *F.oxysporum*, Copper oxychloride, Invitro assay, Bio assay, Seeded agar technique.

**A**griculture is the science, art and industry of managing the growth of plants and animal for make use of by humans. Growing crops to produce sufficient yield to nourish the human population across the globe can form an urgent and genuine scenario. In this regard proper care should be taken in cultivating disease free crops that provide qualitatively and quantitatively better yields. Several brands of fungicides were readily available in the markets, choosing the apt one requires skilful research, that provides feasible solution to arrive at a fungicide which is phyto and eco-friendly.

The major class of fungicides includes Contact and Systemic. Contact (protectant) fungicides remain on the leaf surface where they are deposited and they do not move inside the leaf tissue. Systemic fungicides are absorbed into the leaf tissue. Fungicides can be categorized according to their role in production. Preventative (protectant) fungicides protect the surface of the leaf by inhibiting spore germination and infection. They can be contact or systemic fungicides. Curative (eradicant) fungicides kill the fungus and fruiting body within the leaf, and therefore are always systemic fungicides.

Mode of action of fungicides varies with the nature of chemical compounds present in it. For instance some interfere with the production of fungal ATP and others prevent the production of sterols, the key components of fungal cell membrane. Nowadays phytopathogens tend to develop resistance towards the time honored fungicides (Sierotzki and Helge, 2000; Schnabel and Jones, 2001; Zwiers *et al.*, 2003). Since then copper oxychloride was found to be effective against a broad

spectrum of fungal phytopathogens with germicidal action. Cotton, the commercial cash crop is very famous for its yarn is affected by a number of phyto pathogens. In the present investigation an attempt was made to study the systemic effect of copper oxychloride using 30 days old cotton seedlings, to substantiate its fungicidal activity.

### MATERIALS AND METHODS

#### *Isolation and characterization of phytopathogen*

*Fusarium oxysporum* pv *vasinfectum* was isolated from diseased cotton plant using Czapek Dox agar. The organism was identified by performing macroscopic and microscopic studies [Lacto Phenol Cotton Blue staining]. The pathogen was sub cultured using Czapek Dox agar and stored it 4°C for further studies.

#### *Invitro studies:*

Invitro assay of fungicide namely copper oxychloride was performed using Poison Food Technique [PFT]. Fungicide at different concentrations [10, 20,30,40,50 ìg/ml] were added to sterile Czapek Dox agar and poured into the sterile petridishes. After solidification, a 5mm disc of *F.oxysporum* pv *vasinfectum* was placed at the center on the seeded agar and incubated at 30°C for 4 days. After suitable incubation the radial growth of colonies were measured. Each treatment was replicated five times and the average value was taken into consideration (Mukhopadhyay and Thakur, 1973).