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# Efficacy of different fungicides and botanicals against blossom blight of Mango caused by *Colletotrichun gloeosporioides*

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ABSTRACT

Use of fungicide is a common practice to control the disease. However, the detrimental effects require alternative measures to control the disease, which is the need of the time. The present investigation was carried out with isolation of the organism responsible for blossom blight to suggest suitable control measure in respect of fungicides, botanicals and bio-agent in controlling the blossom blight of mango. Under *in vitro* studies carbendenzim (0.1%) was beneficial for inhibiting the growth of *Colletotrichum gloeosporioides* and in botanicals, neem leaves extract at 5 per cent concentration was found to inhibit the growth of *Colletotrichum gloeosporioides*. Thus, it was observed that the use of botanicals and fungicides was useful in controlling the disease under *in vitro* condition.

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## INTRODUCTION

The mango (*Mangifera indica* L.) is native to India and South East Asia. It is the king of Indian fruits and is commercially important as a tropical fruit. Mango occupies an area of 23.12 lakh ha, production being 15026.8 tonns in the country. In Maharashtra state, mango occupies an area of 4.74 lakh ha and production 597.00 tonns (Anonymous, 2012).

India stands first in global mango production, however, the productivity of mango is affected by various diseases. Among these diseases, blossom blight of mango is the most serious disease caused by *Colletotriticum gloeosporioides* which causes losses upto 20 per cent (Waller, 1992). Blossom blight is the main cause of poor yields. The fungus attacks all parts of the inflorescence as well as the leaves and fruits. It causes blossom drop and destroys young fruitlets. Round to lens-shaped necrotic spots appear on the stalks and in many cases die-back of the inflorescence occurs, when the disease is serious, all the young fruits and flowering parts are destroyed and leave the tree fruitless.

However, now a day's concept of integrated disease management is getting more popular. Therefore, different bioagents and botanicals were tested for controlling the blossom blight of mango (*Collectotrichum gloeosporioides*). Due to heavy losses, there is need to work on blossom blight of mango. In view of the above facts, the present investigation was therefore, initiated to elucidate some of the aspects of the pathogen, host and relative damage caused by pathogen with the following objectives:

- To isolate and identify the pathogen related to blossom blight,
- To study the bioefficacy of different chemicals under *in vitro* condition,

– To study the botanicals and yeast for management of blossom blight of mango.

## MATERIAL AND METHODS

The present study was carried out at Department of Plant Pathology and Agricultural Microbiology, Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahmednagar (M.S.).

**Isolation of the pathogen :**

Mango inflorescences infected with blight were collected from mango orchard during the survey and isolation of the fungus was made by following the standard tissue isolation technique. The infected portions along with some healthy parts were cut and surface sterilized by using 1 per cent sodium hypochlorite solution for 60 seconds. These bits were thoroughly washed in sterile distilled water to remove the traces of sodium hypochlorite if any and then aseptically transferred to sterile Potato dextrose agar (PDA) plates and incubated at room temperature (27±1°C) and observed periodically for fungal growth and sporulation. Colonies, which developed from the bits, were identified by microscopic observation by taking mycelial and spore character as means for identifying the pathogen. After identification, they were transferred to new PDA slants and incubated at 27±1°C for further use.

***In-vitro* evaluation of fungicides :**

The efficacy of three non-systemic and two systemic fungicides (Table 1) were tested against *Colletotrichum gloeosporioides* for radial growth inhibition on the Potato dextrose agar medium using poisoned food technique under *in vitro* condition. The non-systemic fungicides were tried at 0.1, 0.25 and 0.3 per cent concentrations, whereas, systemic fungicides were tried at 0.1 per cent concentration.

The poisoned food technique (Shravelle, 1961) was followed to evaluate the efficacy of non-systemic and systemic fungicides in inhibiting the mycelial growth of *Colletotrichum gloeosporioides*. The pathogen was grown on PDA medium for 12 days prior to setting up the experiment. The PDA medium was prepared and molted. The fungicidal suspension was added to the melted medium to obtain the required concentrations on commercial formulation basis of the fungicide. 20 ml of poisoned medium was poured in each sterilize Petriplate. Suitable check was maintained without addition of fungicide. Mycelial disc of 5mm was taken from the periphery of 12 days old colony and was placed in the centre of Petriplates and incubated at 27±1°C for 12 days and three replications were maintained for each treatment. The diameter of the colony was measured in two directions and average was recorded. Per cent inhibition of mycelial growth of the fungus was calculated by using the formula of Vincent (1947).

$$I = \frac{(C - T)}{C} \times 100$$

where,

I = Per cent inhibition

C = Radial growth in control

T = Radial growth in treatment (fungicide/ botanicals/ bio agents).

***In vitro* evaluation of botanicals :**

The present investigation was carried out to evaluate the extracts of five plant species *viz.*, garlic, ginger, neem, onion and tulsi to know the presence of fungitoxicant properties against *Colletotrichum gloeosporioides*.

Fresh healthy plant parts of 100g (leaves/bulbs/rhizome) were collected from field and washed with distilled water, air dried and crushed in 100ml of sterilized water. The crushed product was tied in muslin cloth and collected the filtrate. The solution obtained was taken as 100 per cent, which was further diluted to required concentrations of 2 and 5 per cent. The extracts were tested against *Colletotrichum gloeosporioides* on the PDA using poisoned food technique under *in vitro* condition as described earlier. The per cent inhibition of growth of the test fungus was calculated by using the above formula.

## RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been presented under the following heads :

**Isolation :**

The field survey was conducted during 2012-13 in MPKV, Rahuri from horticulture field which showed diverse incidence of blossom blight on mango in different locations. Affected disease samples, showing typical blossom blight symptoms were collected from different locations during the survey. Upon tissue isolation, the pathogen from the locality brought into pure culture and identified as *Colletotrichum gloeosporioides* (Penz.) Penz. and Sacc. based on morphological and cultural characters in accordance with the description given by Ekbote (1994); Sudhakar (2000); Prasanna Kumar (2001); Venkataravanappa (2002) and Prashanth (2007).

***In vitro* evaluation of fungicides :**

Two systemic and three non-systemic fungicides were screened with different concentrations in the laboratory for their efficacy against *Colletotrichum gloeosporioides*. Poisoned food technique was followed. The data revealed that the effect of different fungicides on growth of *Colletotrichum gloeosporioides* was significant. Among systemic fungicides, carbendazim was found to be most

**Table 1 : *In vitro* evaluation of fungicides against *Colletotrichum gloeosporioides***

| Sr. no. | Fungicide | Per cent inhibition |
|---|---|---|
| 1. | Carbendanzim + mancozeb (0.1%) | 56.32 |
| 2. | Carbendazim (0.1%) | 89.66 |
| 3. | Thiophanate methyl (0.1%) | 57.35 |
| 4. | Mancozeb (0.25%) | 89.38 |
| 5. | Propineb (0.3%) | 58.57 |
| Mean | | 70.25 |
| S.E. ± | | 0.12 |
| C.D. (P=0.05) | | 0.38 |

**Table 2 : *In vitro* evaluation of different plant extracts against *Colletotrichum gloeosporiodes***

| Sr. no. | Botanicals | Per cent inhibition | |
|---|---|---|---|
| | | Concentration (2%) | Concentration (5%) |
| 1. | Neem leaf extract | 30.62 | 35.21 |
| 2. | Tulsi leaf extract | 11.52 | 15.44 |
| 3. | Onion bulb extract | 8.41 | 10.35 |
| 4. | Ginger rhizome extract | 14.74 | 18.32 |
| 5. | Garlic clove extract | 9.39 | 11.57 |
| Mean | | 14.93 | 18.18 |
| S.E. ± | | 0.20 | 0.94 |
| C.D. (P=0.05) | | 0.65 | 0.30 |

effective which inhibited 89.66 per cent growth of the fungus at 0.1 per cent concentration (Table 1). Similarly, 89.38 per cent inhibition was observed in case of non–systemic fungicide *i.e.* mancozeb at 0.25 per cent concentration, followed by propineb (58.57%) at 0.3 per cent concentration and thiophanate methyl (57.35%) at 0.1 per cent concentration. The per cent inhibition was least in carbendazim + mancozeb at 0.1 per cent is (56.32%). These results are in agreement with that of Sudhakar (2000) and Prashanth (2007).

***In vitro* evaluation of botanicals :**

The antifungal activity of five plant extracts *viz.*, neem leaf, tulsi leaf, garlic cloves, ginger rhizomes and onion bulb, were tested against *Colletotrichum gloeosporioides* by poison food technique. Inhibition of mycelial growth of the pathogen was assayed and are presented in Table 2. The results revealed that, effect of plant extracts on the fungal growth was significant. Neem leaves (30.62%) was found effective in inhibiting mycelial growth at 2 per cent concentration which was significantly superior over all other plant extracts evaluated and this was followed by ginger rhizome (14.74%), tulsi leaves (11.52%) and garlic clove (9.39%). Least growth inhibition of *Colletotrichum gloeosporioides* was observed from onion bulb (8.41%). The leaf extracts at 5 per cent were significantly superior over 2 per cent concentration. Neem leaves (35.21%) was found effective in inhibiting the mycelial growth at 5 per cent concentration which was significantly superior over all other plant extracts evaluated and this was followed by ginger rhizome (18.32%), tulsi leaves (15.44%), garlic clove (11.57%) and onion bulb extract (10.35%) which were least effective in inhibiting the mycelial growth of *Colletotrichum gloeosporioides.*

The effectiveness of onion and garlic as a pesticide due to an acrid volatile oil which contains diallyl disulphide, diallyl trisulphide and sulphoxides derived from allicin has been well established (Venkataravanappa, 2002).

Effectiveness of eucalyptus leaf, garlic bulb and ocimum leaf extract against *Colletotrichum gloeosporioides* is supported by the work of Prashanth (2007). The toxicity of *Allium cepa*, *A. sativum*, *Ocimum sanctum*, *Datura stromonium*, *Polyalthia longifolia*, *Tagetas errecta* and *Vinca rosea* has been reported by Shivpuri *et al.* (1997). Plants are resourceful biopesticides and need to be evaluated to find out the chemicals involved /synthesized in them. Fungicidal spectrum of neem (*Azadirachta indica*), *Tridax procumbense* and *Datura stramonium* has already been investigated by Ameresh *et al.* (1998) in oilseed disease management.

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