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# In vivo Effect of Sprint against Rot Pathogens associated with Cucurbitaceae members.

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**ABSTRACT**

This study evaluated the effectiveness of applying the Carbendazim+ Mancozeb (Sprint) to control different vegetable rot fungal pathogens in vivo. As in-vitro results clearly indicate that, Carbendazim+Mancozeb (Mix fungicide) was most effective as it completely inhibited the radial growth averagely 71.59% in the previous studies. The selected pathogens for the present study were *Fusarium moniliforme*, *Fusarium oxysporum*, *Fusarium solani*, *Rhizoctonia solani*, which were isolated from infected vegetables viz., *Cucumis sativus* L, *Lagenaria siceraria* L, *Cucurbita pepo* L, *Momordica charantia* L. Pathogenicity test was done according to Koch's postulates. For effective and economically viable control of the vegetable rot, 2 sprays of Carbendazim+Mancozeb (Sprint) at an interval of 15 days from disease initiation were found effective and recommended. Phytotoxic symptoms were observed after the application of fungicide when used at recommended doses. The percent of disease reduction with carbendazim+Mancozeb treatment was maximum, averagely 70% in all treated vegetables. MIC of fungicide against pathogenic fungi was found to be in between 50-60 µg/ml.

**Key words:** Sprint, Vegetable rot, MIC, Fungal Pathogens

## INTRODUCTION

Pathogenic fungi alone cause nearly 20% reduction in the yield of major food and cash crops (Agriose, 2000). Anthracnose rot attains serious status during transit, storage and market causing considerable economic losses (Rana. 2001). Use of modern fungicides greatly contributed to reducing damage caused by a variety of diseases and to increasing not only yields but also quality of crops. Concerns about toxicological and environmental problems which some but not all classical pesticides possessed undoubtedly prompted the development of selective fungicides, single-site (site-specific) inhibitors in particular. Chemical control measures have been tested and found effective in the control of diseases (Ogundana and Denis, 1981; Plumbley, 1985). Certain protective fungicides although hazardous to environment are still used for the control of fungal diseases (Nwankiti *et al.*,1990; Vaish and Sinha, 2003). Likewise, use of pesticides of plant origin have been suggested by some workers as alternative to synthetic chemicals in order to counter the potential hazardous effect on the environment associated with the use of synthetic chemicals (Singh, *et al*., 1997; Amadioha, 2000). Fungicides have been used widely to control these pathogens in vitro (Reuveni, 2006) and in vivo (Errampalli, 2004). Various fungicides including captafol, mancozeb, benomyl, carbendazim, metiram, copperoxychloride + dichlofluanid and copper oxychloride + folpet have been used for the control (Ramakrishnan and Kandaswami, 1978).

**MATERIAL METHODS**

For the assessment of fungicidal assay at field condition, sowing of each vegetable was carried out in 12×12 m plot in the field. After 7 days of interval, 200ml spore suspension of each targeted plant pathogenic fungi was mixed in the soil of the field respectively. After 30-40 days (depending on vegetables) of duration, the diseases symptoms were developed on the vegetables. Afterwards required minimum inhibitory concentrations (MIC) in μg/ml of respective fungicides from *in vitro* results were selected for *in vivo* study. The define concentration of each fungicide were sprayed directly onto the vegetables. The fungicide treatment was applied at an interval of days depending on the vegetables. In all cases, vegetable without fungicide treatment served as control and tagged. Simultaneously all treated vegetables were also tagged with respect to tested concentrations. After certain days of treatment, among each treated vegetable plants, the total number of fruits on each plant and total number of infected fruits on each plant were counted and average in triplicates was recorded. The effectiveness of each fungicide was evaluated by calculating the Percent Diseases Incidence (PDI) and Percent Diseases Reduction (PDR) over control by using following formula,

$$PDI = \frac{\text{Number of diseased fruits on each plant}}{\text{Total number of fruits on each plant}} \times 100$$

and

$$PDR = \frac{\text{PDI in control- PDI in treatment}}{\text{PDI in control}} \times 100$$

**RESULTS & DISCUSSION**

The MIC values of Carbendazim+Mancozeb fungicide against eight pathogenic fungi of different vegetables were varied and recorded in the range of 50 μg/ml to 60 μg/ml. While the percent inhibition of mycelial growth of *F. moniliforme, F. oxysporum, F. solani* and *R. solani* were found to be significant as 66.03%, 60.68%, 51.73% and 58.16% respectively in vitro by Shaikh, FT and Sahera N (2018). For the assessment of fungicidal efficacy in vivo MIC values in μg/ml of Carbendazim + Mancozeb from the in-vitro test were used. These concentration were directly sprayed onto the vegetables plants after 15 days of interval and after different time duration depending upon the growth rate of vegetables the effectiveness of fungicide were recorded by tabulating the percent disease incidence (PDI) and percent disease reduction (PDR). The percent of disease reduction with carbendazim + Mancozeb treatment was maximum, averagely as 70% as given in the table 2.

Similar findings were recorded by Harlapur *et al*, (2007) revealed that mancozeb @ 0.25 per cent found most effective in inhibiting the growth of *E. turcicum.* The use of Benomyl, Carbendazim and Mancozeb significantly inhibited *Physoderma maydis* on maize (Brown spot) reported by Osunlaja, (1999) and there was complete inhibition of sporangia germination at 10,000 ppm i.e. of the fungicides. Carbendazim and Carbendazim + Mancozeb gave 100 % inhibition of mycelial growth of *F. solani* at 0.2 and 0.3% concentrations Chavan *et al*, (2009). Carbendazim fungicide has been shown to completely inhibit the *mycelial*l growth of *F. oxysporum* in Richard’s medium reported by Sharma, (2006).

**Table 1: MIC of various fungicides against plant pathogenic fungi in μg/ml.**

| Pathogens | Sprint |
|---|---|
| *Fusarium moniliforme* | 50 |
| *Fusarium oxysporum* | 60 |
| *Fusarium solani* | 60 |
| *Rhizoctonia solani* | 60 |

**Table 2: *In-vivo* effect of fungicide on vegetable disease reduction.**

| Vegetables | Control | | Treated | | PDI in control | PDI in treated | PDR(%) |
|---|---|---|---|---|---|---|---|
| | No. of Infected Fruits | Total no. of Fruits | No. of Infected Fruits | Total no. of Fruits | | | |
| *C. sativus.* | 10 | 20 | 06<br>08<br>04 | 25<br>24<br>24 | 50 | 24<br>33.3<br>16.66 | 52<br>50<br>71 |
| *C. pepo.* | 02 | 08 | 01<br>02<br>01 | 08<br>09<br>10 | 25 | 12.5<br>22.22<br>10 | 56<br>44<br>63 |
| *L. siceraria.* | 04 | 10 | 01<br>02<br>02 | 08<br>10<br>11 | 40 | 12.5<br>20<br>18.18 | 68.75<br>52<br>70 |
| *M. charantia.* | 08 | 25 | 06<br>07<br>04 | 26<br>25<br>28 | 32 | 23.07<br>28<br>14.28 | 56<br>52<br>71 |

*All values are mean of triplicate; where PDI = Percent Diseases incidence and PDR = Percent Diseases reduction.*

Patel *et al*, (2005) evaluated five different fungicides such as mancozeb, carbendazim, copper-oxychloride and potassium per-manganate *in vitro* for their efficacy mycelial growth of *Alternaria* sp. and observed that all tested fungicides at different concentration resulted in significant reduction in the colony diameter as compared to control.

## CONCLUSION

In in vivo studies the fungicide tested against vegetables revealed that Carbendazim+Mancozeb was highly effective in controlling the disease incidence. The percent of disease reduction with carbendazim+Mancozeb treatment was maximum, averagely 70% in all treated vegetables.

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