Original Research Paper

Volume - 7 | Issue - 6 | June - 2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

Botany

EFFICACY OF CARBENDAZIM AGAINST CHARCOAL ROT OF MAIZE

S.G. Jagtap — Mycology and Plant Pathology Research Laboratory, Department Of Botany, Shivaji University, Kolhapur. 416004

S.S. Kamble — Mycology and Plant Pathology Research Laboratory, Department Of Botany, Shivaji University, Kolhapur. 416004

KEYWORDS :

Introduction:-

Maize (*Zea mays* L.) is a large grain plant domesticated by indigenous people in Mesoamerica in prehistoric time. It is best grown in warm, tropical regions as it requires warm soil to develop optimally. It is an annual grass belonging to Poaceae and is a staple food crop grown all over the world. It is also commonly grown as a feed for livestock.

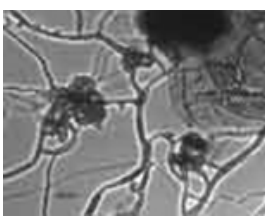
Such an important crop suffers from many fungal diseases, such as common smut caused by *Ustilago maydis* (de Candole) Corda, head smut caused by *Sphacelotheca reliana* (Kunhn) Clinton, brown rot caused by *Physoderma zeae maydis* F. J. Shaw, rust caused by *Puccinia sorghi* Schw., leaf blight caused by *Exserohilum turcicum* (Pass.) Leonard *et* Suggs. Seedling blight and wilt caused *Fusarium moniliforme* var. *subglutinans* Wollenw and Reinking, seedling blight and top rot caused by *Giberella zeae* (Schwein) Petch, Charcoal rot caused by *Macrophomina phaseolina* (Tassi.) Goid. Among these charcoal rot caused by *Macrophomina phaseolina* (Tassi.) Goid. is serious.

HEALTHY PLANTS OF MAIZE

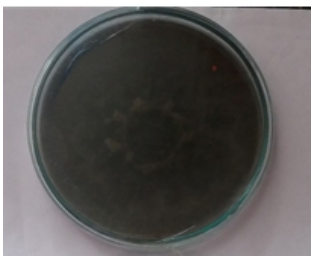
INFECTED PLANTS

INFECTED STEM

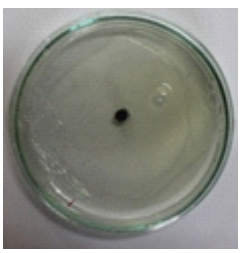
SCLEROTIA



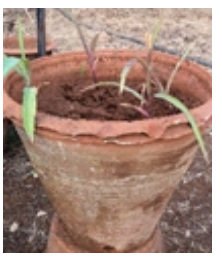
PURE CULTURE



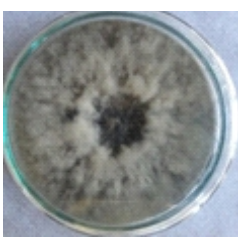
IN VITRO MIC SENSITIVE MP_3



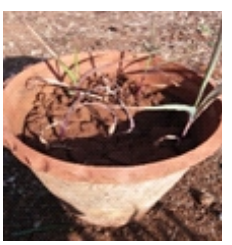
IN VIVO MIC SENSITIVE Mp_3



CONTROL

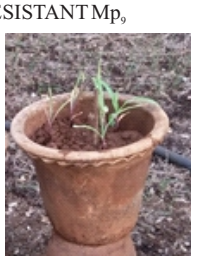


CONTROL



RESISTANT Mp_9

RESISTANT Mp_9



Material and Method:-

16 samples exhibiting charcoal rot of maize were collected from different districts of Maharashtra viz. Kolhapur (Minche savarde), Sangli, Satara (Nagthane, Songaon, Sangavi) Pune (Baramati), Ahamadnagar (Ane), Solapur (Madha), Nasik (Dindori), Belgaon (Padalihal), Nanded (Bomnali) Latur (Chakur), Parbhani (Bramhanpur), Usmanabad (Umarga) Jalana (Dawalwadi) and Bid (Nirgudi). To isolate the causal agent, the collected samples were brought to the laboratory in sterilized bags. The infected portion of

stem is cut in to the size 2 mm and sterilized by using 0.1% $HgCl_2$ and washed with sterilized distilled water (Jadhav et al., 2010), these sterilized stem portion were kept on a czapek dox agar plates amended with streptomycin sulphate (Patil et al., 2012; Mali et al., 2015). Inoculated plates were incubated at 30 ± 2^0 C for growth of the fungus and further studies (Mali et al., 2016). After 5-6 days of culture, black fungal mass was observed. On the basis of morphological, microscopic characters and following relevant mycological literature the fungal isolate was identified as *Macrophomina phaseolina* (Tassi.) Goid. In this manner, 16 isolates were obtained.

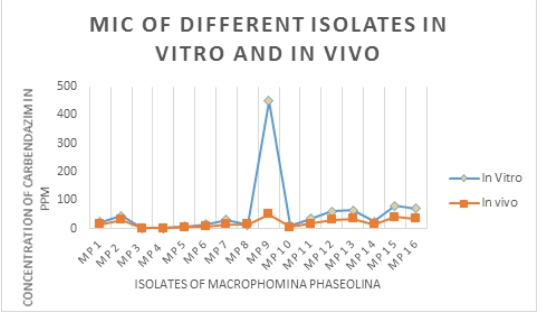
The *in vitro* sensitivity of *Macrophomina phaseolina* (Tassi.) Goid.was carried out by using Food Poisoning Technique (Dekker and Gielink, 1979). Czapek Dox agar medium plates were prepared containing different concentrations of carbendazim..

After solidification of media, a disc (6 mm) with fungal culture was obtained from the margin of an actively growing colony and placed upside down on the agar surface. These plates were then incubated at 30 ± 2^0 in 12 hour cycle of dark and light and then continuous growth was measured after various time intervals. Plates without carbendazim were served as control.

For *in vivo* experiments Mycelial suspensions of all fungal isolate were prepared in sterile distilled water, and then inoculated on the healthy plants of maize. treated with 10 ml solution of different concentrations of carbendazim 24 hours before the inoculation. The experiment was carried out in triplicates. The plants without fungicide treatment served as control. The plants without any treatment served as absolute control.

Table 1:- MIC (Minimum Inhibitory Concentration) of carbendazim against *Macrophomina phaseolina* (Tassi.) Goid. isolates causing charcoal rot of maize.

Locality	**Isolate**	***in vitro*** (ppm)	***in vivo*** (ppm)
Minche Savarde	MP_1	22	15
Nagathane	MP_2	44	30
Songaon	MP_3	1	1
Sangavi	MP_4	2	1.5
Ane	MP_5	8	6
Madha	MP_6	15	8
Dindori	MP_7	30	14
Baramati	MP_8	12	15
Padalihal	MP_9	450	50
Sangali	MP_{10}	10	6
Chakur	MP_{11}	35	16
Bomnali	MP_{12}	60	30
Bramhanpurpur	MP_{13}	65	35
Umarga	MP_{14}	25	15
Dawalwadi	MP_{15}	80	40
Nirgudi	MP_{16}	70	35



Result and Discussion:-

There was variation in the minimum inhibitory concentration of carbendazim. MIC on agar plates ranged from 1 to 450 ppm and it was 1 to 50 ppm on maize plants. Isolate MP_3 was sensitive to carbendazim and it showed 1 ppm MIC both *in vitro* and *in vivo* While isolate MP_9 was resistant to carbendazim and showed 450 ppm MIC on agar plates and 50 ppm on maize plants. The results are in agreement with other workers also. Wadikar, et al (2008) There was large variation in the MIC of carbendazim among the Macrophomina phaseolina isolates both on agar plate and pigeon pea plant, MIC on agar plate ranged from 80 to 140 mg/ml, while it was 65-127 mg/ml on pigeon pea plant. Similarly, Bhale (2009) reported the MIC of carbendazim against *Alternaria alternata* causing leaf spot of spinach was ranging from 350 to 700 µg/ml. According to Khandare (2013) the MIC of carbendazim among 12 isolates of *Alternaria alternata* causing root rot of fenugreek was ranging from 2500 to 5000 µg/ml *in vitro* and 500 to 1000 µg/ml *in vivo*.

References:-

1. Bhale, U. N., Rajkonda, J. N. and Sarwade, P. P. (2009): Evaluation of botanicals against Alternaria spinaceae causing leaf spot of spinach (Spinacea oleracea L.), Geobios, 36:125-128.
2. Dekker, J. and Gielink, A. J. (1979): Acquired resistance to pimaricin in Cladosprium f. sp. Narcissi associated with decreased virulence. Neth. J. Pl. Pathol. 85: 67-73.
3. Khandare, N. K. and Kamble, S. S. (2013): Sensitivity of carbendazim against Alternaria alternata causing root rot of Fenugreek, Bioinfolet 10 (1 B): 307 - 308, 2013.
4. Mali, A. M., Patil, V. B., Ade, A. B., Chavan, N. S. And Kamble, S. S. (2015): First Report Of Fusarium Sp. FIESC_17 On Cucumis trigonus In India. Plant Disease. 10.1094/PDIS -09 -14 -0881 -PDN. http://dx.doi.org/10.1094/PDIS -09 -14 -0881 -PDN 5. Mali, A. M., Patil, V. B., Pise, N. M. and Ade, A. B. (2016): First Report of Leaf Spot Caused by Fusarium sp. NFCCI 2882 on Angiopteris evecta: A King Fern from Western Ghats, India. Plant Disease.
6. Patil, V. B., Mali, A. M., Mahamuni, R. J., Chavan, N. S. And Kamble, S. S. (2012): First Report Of Leaf Spot Caused By Phoma Costarricensis on Delphinium Malabaricum In Western Ghats Of India. Plant Disease.
7. Wadikar, M. S.; Kadam,V.B.; Kamble,S.S. (2008) :Use of agrochemicals the managem ent of charcoal rot of pigeonpea caused by Macrophomina phaseolina resistant to carbendazim, Plant Archives 2008 Vol.8 No.1 pp.159-162 ref.13