



Antifungal activity of some bio-control agents on germinating seeds of Maize (*Zea mays L.*)

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Abstract

Maize is cultivated in India at different agronomical conditions. Globally, maize is known as queen of cereals because it has the highest genetic yield potential among the cereals. Maize seeds are contaminated with different fungal pathogens. Among these seedling blight caused by *Aspergillus* species is very fatal. So cultivars of maize have been selected from various parts of Maharashtra. Seed mycoflora was tested for fungal pathogens by using agar plate method. The dominant fungi were observed by stereo binocular microscope following the key of Mathur and Kongsdal (1994). Garlic & Neem extract were used to test antifungal activity similarly *Trichoderma* species were used as bio-fungicide against dominant fungus *Aspergillus* species. Among them, the Bio-fungicide has the strong potentiality for treating seeds of maize in controlling seed and seedling diseases. So, the seed treatment by Bio-fungicide should be widely explored to the country.

INTRODUCTION

Maize (*Zea mays L.*) is one of the most important cereal crops in the world and ranks third next to wheat and rice (Aldrich et al., 1975). It is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions. According to advance estimate it is cultivated in 8.7 m ha (2010-11) mainly during Kharif season which covers 80% area. So in present context six kharif cultivars of Maharashtra has been selected. The cultivars used were Ganga-II, DHM-103, H: Vivek 9 and Bio9681.

There are many factors involved in yield loss in which diseases play a significant role. Maize suffers from 28 diseases in seedling stage (Bari and Alam, 2004) in which 11 are seed borne in nature (Fakir, 2001). Among the diseases, seed rot (*F. moniliforme*, *F. oxysporum*, *Penicillium spp.*),

seedling blight (*Aspergillus spp.*, *Penicillium spp.*), Curvularia leaf spot (*C. lunata*) etc. are important ones. Chemical control of seed borne diseases is rather difficult to achieve a reasonably good control. Due to its hazardous environmental effect, the researchers have given attention on bio-control. Therefore the present piece of work has undertaken with the filling the objectives.

Material & methods:

Four maize cultivars collected from by different agronomical conditions of Maharashtra from local market. Seed health test was done by standard blotter method (ISTA, 2001) & Agar plate method Musket and Malone (1941). The seed borne fungal pathogen associated with seeds was observed

by stereo binocular microscope following the key of Mathur and Kongsdal (1994).

The statistical analysis of the obtained data was carried out by using the methods given by Panse, Sukhatme (1967) and Mungikar (1997).

Collection of bio-control agents

Bio-fungicide *Trichoderma* was collected from the Diseases Resistance Laboratory; Garlic and neem extracts were prepared in the Plant Disease Clinic, PG Department of Botany, S M, Udgir.

Seed treatment

The leaves were air dried, after that leaves were grinded with the help of pestle and mortar by taking (1:1 W/v). Ten grams of leaves was added in 10 ml distilled water separately for each plant extract and filtered through muslin cloth and centrifuged for 15 minutes at 3000 rpm. After that clean supernatant solution was removed in vial tube for further treatment of pathogens. Antifungal activity of leaf extract was tested by poisoned food technique method adopted, Thapliyal (1993).

Result & discussion:

Only the dominant fungus *A. flavus* was selected for screening purpose & result shown below for the same.

A) Effect of Garlic extracts On *A. Flavus*:

Results in Table 1 indicate that linear growth of *Aspergillus flavus* in millimeter takes place. The growth of *Aspergillus flavus* on control plate on 8th day of incubation was 70 mm. At the different concentrations ranging from 2.0% to 8.0%, the linear growths of fungus on the 8th day were 52 mm, 37 mm, 26 mm and 11 mm respectively. This means that at 8.0% concentration the maximum inhibition occurred and growth was just 11 mm. At 10.0% concentration there was complete inhibition of the fungus.

B) Effect of Neem extract on *A. Flavus* Link:

Results in Table 2 indicate that linear growth of *Aspergillus flavus* was 20 mm on 8th day of incubation, when treatment of *Neem extract* was given at 8.0% concentration showing the maximum inhibition. On the other hand, the growth of *Aspergillus flavus* on control plate on 8th day of incubation was 70 mm. At the different concentrations ranging from 2.0% to 8.0%, the linear growths of fungus on the 8th day were 55 mm, 50 mm, 40 mm and 20 mm respectively. At 10.0% concentration there was complete inhibition of the fungus.

Table 1. Effect of *Garlic extract* on linear growth of *Aspergillus flavus* Link.

Leaf extract Conc. (%)	Linear growth (mm)							
	Incubation period (Days)							
	1	2	3	4	5	6	7	8
0.0 (Control)	20	25	30	35	40	45	55	70
2.0	16	17	19	20	30	42	50	52
4.0	15	16	18	19	21	24	27	37
6.0	14	15	16	17	18	22	24	26
8.0	00	00	00	00	7	8	9	11
10.0	00	00	00	00	00	00	00	00
S.E ±	3.32	3.76	4.40	5.00	5.47	6.63	7.70	9.70
C.D. at p=0.01	12.97	15.15	17.73	20.15	22.04	26.92	31.03	39.09
C.D. at p=0.05	8.27	9.66	11.30	12.85	12.85	17.16	19.55	24.92

Table 2. Effect of *Neem extract* on linear growth of *A. flavus* Link.

Leaf extract Conc. (%)	Linear growth (mm)							
	Incubation period (Days)							
	1	2	3	4	5	6	7	8
0.0	20	25	30	35	40	45	55	70
2.0	18	19	21	29	34	35	44	55
4.0	17	18	20	22	27	29	35	50
6.0	15	16	18	20	22	25	28	40
8.0	00	00	00	00	00	10	15	20
10.0	00	00	00	00	00	00	00	00
S.E ±	3.43	3.93	4.56	5.48	6.36	6.16	6.97	9.49
C.D. at p=0.05	13.82	15.83	18.37	22.08	25.63	24.82	28.08	38.24
C.D. at p=0.01	8.81	10.10	11.71	14.04	16.34	15.83	17.91	24.38

C) Effect of *Trichoderma* species on the growth of *Aspergillus flavus* Link.

The growth of *Aspergillus flavus* in presence of *Trichoderma harzianum* was 2.9 cm and percentage of growth inhibition was 61.33. In presence of *Trichoderma viride*, it was 3.2 cm and percentage of growth inhibition was 57.33. From the Table 3, It is clear that *Trichoderma harzianum* inhibits the maximum growth of *Aspergillus flavus* as compared to *Trichoderma viride*. The growth of *Aspergillus flavus* on control plate was 7.5 cm.

Table 3. Effect of *Trichoderma* species on the growth of *Aspergillus flavus* Link. in Dual culture

Sr. No.	Fungal antagonists	Growth of <i>Aspergillus flavus</i> against <i>Trichoderma</i> species in cm	% of growth inhibition
1	<i>Trichoderma harzianum</i>	2.9	61.33
2	<i>Trichoderma viride</i>	3.2	57.33
3	Control	7.5	-
	S.E. ±	1.21	1.41
	C.D. at p=0.01	12.01	89.76
	C.D. at p=0.05	5.20	17.92

Conclusion

The garlic extract, neem extract and the Bio-fungicide showed the significant result in controlling seed borne fungal pathogen in maize. Among them, the Bio-fungicide has the strong potentiality for treating seeds of maize in controlling seed and seedling diseases. So, the seed treatment by Bio-fungicide should be widely explored to the country.

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