E-ISSN: 0000-0000

International Journal of Latest Trends in BOTANICAL SCIENCES

Volume 1 No.1
August, 2011

Web: excelingtech.co.uk
ojs.excelingtech.co.uk/index.php/IJLTB

Efficacy of Fungicides Against *Alternaria Pluriseptata* and *Geotrichum Candidus* Incitant of IVY Gourd Fruit

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Abstract **- IVY gourd suffers from pre and post-harvest diseases. This paper describes the sensitivity (MIC) of *Alternaria pluriseptata* and *Geotrichum candidus* against chlorothalonil and mancozeb fungicides. Sensitivity of 15 isolates of *A.pluriseptata* was tested against chlorothalonil. There was large variation in the sensitivity of these isolates. Some isolates were sensitive (600 µg/ml) while others were resistant (2500 µg/ml) i.e. ranged from 600 µg/ml to 2500 µg/ml while in case of mancozeb sensitivity ranged from 60 µg/ml to 1100 µg/ml . In case of *G.candidus* the sensitivity of 10 isolates were tested against chlorothalonil and mancozeb. In chlorothalonil some isolates were sensitive & resistant i.e. ranged from650 µg/ml to 2000 µg/ml while in case of mancozeb sensitivity ranged from 20sµg/ml to 300 µg/ml. in *vivo* results also showed positive.**

Key words: *Coccinia indica*, *Alternaria pluriseptata* , *Geotrichum candidus*, *fungicides*

1. Introduction

IVY gourd (*Coccinia indicia* Wight & Arn.) of family Cucurbitaceae is distributed in tropical Asia, Africa, Pakistan, and India & Srilanka (Cook 1903, Sastri 1950). It is a climber & trailer (Nasir & Ali, 1973). The fruit is used as vegetable when green & eaten fresh when ripened. Every part of this plant is valuable in medicine. The IVY gourd, however suffers from pre & post harvest disease caused by *A.pluriseptat* (Karst &Har). Isolates & *Geotrichum candidus (*link: Leman*)* .The cultures were deposited at ASC College Naldurg and Agharkar Research Institute (ARI) Pune investigation was undertaken to evaluate the sensitivity of *A.pluriseptat and G.candidus* against Chlorothalonil & Mancozeb fungicides.

International Journal of Latest Trends in Botanical Sciences
IJLTBS, E-ISSN: 0000-0000

2. Material and Methods

Sensitivity of isolates were tested against chlorothalonil & mancozeb determined by food poisoning test (Dekker and Gielink, 1979). Czapek Dox agar plates were prepared containing different concentration of fungicides mancozeb & chlorothalonil.Seven days fresh cultur disc(9&4mm) of the isolates wereinoculated at the centre of plates in triplicate. The plates were incubated at 28±ºc in the dark and radial growth was measured at different intervals. Plates without fungicides treated as control. In *vitro* studies, *A.pluriseptata* for chlorothalonil (100to 2500 µg/ml) & for mancozeb (100 to 2000 µg/ml) concentrations were prepared. While in *G.candidus* for chlorothalonil (100 to750 µg/ml) & mancozeb (10 to 300µg/ml)were prepared.

In *vivo* experiment was conducted on IVY gourd fruits by using the different concentrations *A.pluriseptata* chlorothalonil ranged from 100 to 3000 µg/ml & macozeb ranged 10 to 1500 µg/ml. For *G.candidus* ranged from chlorothalonil 100 to 3000 µg/ml and mancozeb ranged 10 to 350 µg/ml were used.

Table: 1: Sensitivity of *Alteranaria pluriseptata* isolates from *Coccinia indica*

Against fungicide.

S N o.	**Isol ate**	**Place**	**Fungicides**			
			Chlorothalonil (MIC) µg/ml (9mm disc)		**Mancozeb (MIC) µg/ml (4mm disc)**	
			Invit ro	***Inv ivo***	***Invit ro***	***Inv ivo***
1	Ap_1	Naldurg	600 *	700*	120	130
2	Ap_2	Murum	1500	1700	80	90
3	Ap_3	Lohara	1600	1800	70	80
4	Ap_4	Osmana bad	900	1200	90	100
5	Ap_5	Omerga	1200	1400	400	400

6	Ap_6	Nilanga	2000	2200	700	800
7	Ap_7	Paranda	1400	1600	300	400
8	Ap_8	Solapur	2000	2300	800	900
9	Ap_9	Auranga bad	2000	2100	1100 +	1500 +
10	Ap_{10}	Pune	1800	1900	500	600
11	Ap_{11}	Beed	2500 +	3000 +	100	130
12	Ap_{12}	Latur	1300	1500	60*	70*
13	Ap_{13}	Mumbai	1700	1900	900	950
14	Ap_{14}	Thane	1900	2000	300	400
15	Ap_{15}	Jalna	1100 .	1400	1000	1200

** Sensitive + Resistant,* ***Ap*** *- Alteranaria pluriseptata* ***MIC*** *- Minimum Inhibitory Concentration*

Table: 2: Sensitivity of *Geotrichum candidus* isolates from *Coccinia indica*

Against fungicide.

S N o.	Isola te	Place	Fungicides			
			Chlorothalonil (MIC) µg/ml (9mm disc)		Mancozeb(MIC) µg/ml (4mm disc)	
			Invitro	*Invivo*	*Invitro*	*Invivo*
1	Gc_1	Mumbai	1300	1400	20*	50*
2	Gc_2	Anala	1500	1600	50	60
3	Gc3	Solapur	650 *	750*	90	100
4	Gc_4	Latur	1600	1700	220	230
5	Gc_5	Auranga bad	1500	1600	100	150
6	Gc_6	Andur	1300	1400	140	150
7	Gc_7	Omerga	1900	2000	270	280
8	$Gc\text{-}_8$	Naldurg	1800	1900	150	170
9	Gc_9	Murum	2000 +	3000+	180	200
10	Gc_{10}	Nilanga.	1800	1900	300+	350+

** Sensitive + Resistant,* ***Gc****- Geotrichum candidus,* ***MIC*** *- Minimum Inhibitory Concentration*

3. Results and Discussion

This paper describes the sensitivity (MIC) of *A. pluriseptata* & *G.candidus* against chlorothalonil & mancozeb fungicides Sensitivityof 15 isolates of *A. pluriseptata* was tested against chlorothalonil. There was large variation in the sensitivity of these isolates. Some isolates were sensitive (600µg/ml) i.e. Ap1 while others were resistant (2500µg/ml). i.e. Ap12, Ap6, Ap8, Ap9, Ap14. Its rainged from (600 to 2500 µg/ml).In case of mancozeb, sensitivity ranged from 60 µg/ml to 1100 µg/ml) & sensitive isolates are Ap1, Ap2, Ap3, Ap4, Ap11, and Ap12 & tolerant isolates were Ap9, Ap13 and Ap15 (Table 1, Fig1&2).

Table 2 showed that the sensitivity of *G.candidus* 10 isolates in chlorothalonil ,some isolates were sensitive isolates Gc3 (650 µg/ml) and highly tolerant isolates 2000 µg/ml i.e. Gc9 while in case of mancozeb , sensitivity ranged from 20 µg/ml to 300 µg/ml(Fig 3&4).

In *vivo* experiments, showed positive results. Sensitivity of *A. pluriseptata* against chlorothalonil ranged from 700 to 3000 µg/ml while in mancozeb its ranged from 50 to 400 µg/ml. In case of *G. candidus* against chlorothalonil ranged from 750 to 3000 µg/ml while in mancozeb it was 50 to 350 µg/ml.

Variation in the sensitivity of different pathogens in relation to many fungicides have been reported (Jones and Ehret, 1976, Dekker & Gielink, 1979, Gangawane & Saler , 1981; Gangawane and Shaikh, 1988; Hollomon, 1981, Kamble, 1991, Bhale, 2002). Annamalai and Lalithakumari (1996) suggested that it is essential to establish the base line sensitivity for the fungicide against sensitive strain, Brain (1980) considers that heterogeneous population of nuclei consisting of resistant and sensitive nuclei in the isolates might be responsible for variation in the MIC of fungicides. Recently Bhale and Gogle reported the development of carbendazim resistance in *Alternaria spinaciae* incitant of spinach (*spinacia oleracea L.*). There was variation in MIC of Ridomil Gold among the five isolates of *Phytophthora palmivora* var. *piperina* on the agar plates (Patil and Kamble, 2011).

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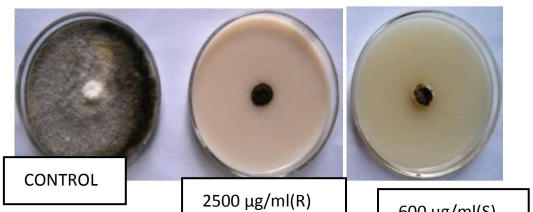
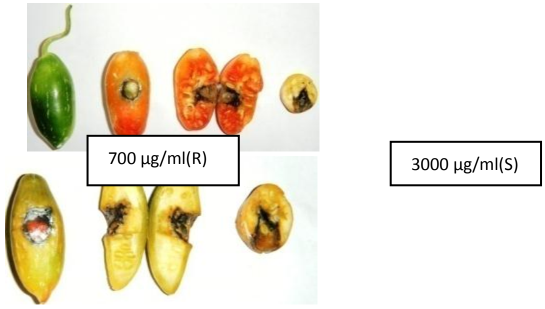
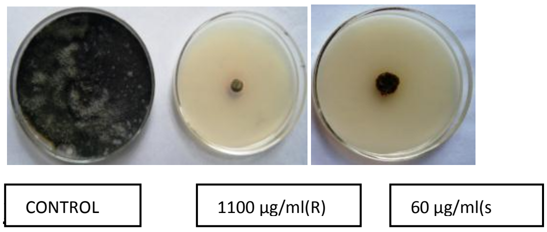


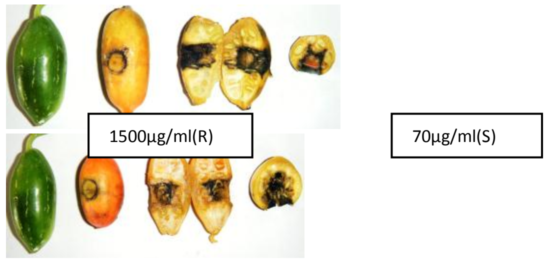
In invitro



Fruits

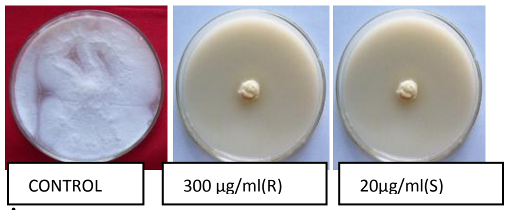
Figure 1 - Sensitivity of *Alteranaria pluriseptata* isolates from Coccinia indica against fungicides chlorothalonil.



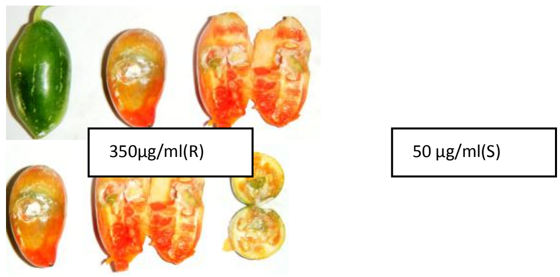


Fruits

Figure 2 - Sensitivity of *Alteranaria pluriseptata* isolates from Coccinia indica against fungicides mancozeb.



In invitro

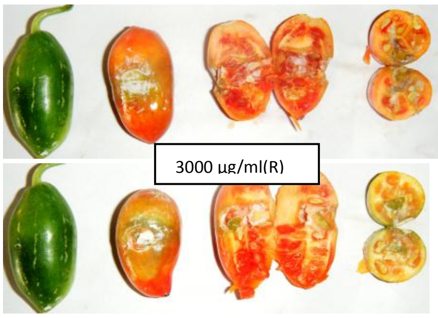


Fruits

Figure 3 - Sensitivity of Geotrichum *candidus* isolates from Coccinia indica against fungicides chlorothalonil.

CONTROL 2000 µg/ml(R) 650 µg/ml(R)

In invitro



3000 µg/ml(R) 750 µg/ml(R)

Fruits

Figure 4 - Sensitivity of *Geotrichum candidus* isolates from Coccinia indica against fungicides mancozeb

Tolerance of Polluted Water on Seedling Growth of Some Cereal Crops

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Abstract **- Attempts were made to study the influence of sugar mill industrial polluted water on seed germination and seeding growth of cereal crops from Tuljabhavani Sahakari Sakhar Karkhana Naldurg. The higher concentration of distillery effluent were found to inhibit the germination of cereal crops. Maize (*Zea mayes*) and Rice (*Oryza sativa*) were more susceptible and Jowar (*Sorghum vulgare*) was less susceptible to polluted water as compared to other crops. Polluted water showed low pH (2.02) and high temp., OD, TS, TDS & TSS than tap water. In the phytotoxicity was more in *Sorghum vulgare* than other crops.**

Key words: *Effluent, pollution, seed germination, cereal crop seeds*

1. Introduction

The various kinds of pollution caused by rapid industrialization. The problem of water pollution due to industrial effluents waste water. The most important effluent discharging industries are distilleries, sugar mills, Pulps, paper mills etc. Polluted water not only affects animal life but also the vegetations. An investigation was conducted to utilize and observe the influence of Tuljabhavain Sahakari Sakhar Karkhana Naldurg polluted water on seed germination and seeding growth of some important cereal crops.

2. Materials and Methods

Five different types of cereal craps seeds viz. *Penisetium typhoides* (Bajara), *Sorghum vulgare* (Jowar), *Zea mayes* (Maize), *Oryza sativa* (Rice) and *Triticum aestivum* (Wheat**)** were selected for the present experiment. Thirty seeds of each were soaked in polluted water and another set in tap water as control for 24 hr in separate Petri dishes. Using filter paper method **(*Agrawal*, 1995),** the seeds were folded in germinating paper. Each paper contains 10 seeds in triplicate. The folded paper along with seeds were tied with thread and kept in 500 ml beaker. 200 ml polluted water was poured in it , while another beaker was kept as control by using tapwater. After every two days interval, water was added as per requirements depending upon rate of absorption. After seven days the germinated seeds were removed. Shoot & Root length, fresh and dry weight of the seedlings were measured & analyzed statistically (Mungikar, 1997). The standard method of (APHA, 1992), (Saxena, 1990), and (Trivedy, 1998) were followed for the analysis of effluent.

The phytotoxicity (%) was calculated using the formula Chou et al. (1978).

$$\text{Percentage of phytotoxicity} = \frac{\text{Length of Control} - \text{Length of Test(Polluted)}}{\text{Length of Control}} \times 100$$

The Effluent tolerance index (ETI) was calculated using the formula determined by Turner & Marshal (1972).

$$\text{Effluent tolerance index} = \frac{\text{Mean length of the longest root \& shoot in the Effluent}}{\text{Mean length of the longest root \& shoot in the control}}$$

3. Result and Discussion

Table -1. Analysis of physico-chemical parameters of tap water and polluted water used for seedling growth.

Parameter	Tap water	Polluted water
Colour	Transparent	Faint yellow colour.
Odour	No specific smell.	Foul smell.
Temp.(°c)	29	32
pH	72	2.02
Optical Density (OD)	0.01	0.67
Total Solids (TS) mg/1.	320	550
Total dissolved Solids. (TDS) mg/l	300	500
Total Suspended Solids. (TSS) mg/1.	150	250

International Journal of Latest Trends in Botanical Sciences
IJLTBS, E-ISSN: 0000-0000

Table 2. Effect of polluted effluent on seed germination of some cereal crops.

Sr. No.	Characterstics		Bajra	Jowar	Maize	Rice	Wheat
1.	Seed Germination (%)	Control	96.00	86.00	23.00	96.00	91.00
		Polluted	04.00	10.00	92.00	73.00	04.33
2.	Root length (cm)	Control	01.2±0.4	01.0 ± 0.2	02.99±0.3	82.23±0.1	04.99 ± 0.3
		Polluted	00.00	0.30 ± 0.2	04.11 ±0.3	03.32±0.4	00.10 ± 0.1
3.	Shoot length (cm)	Control	04.11 ±0.2	02.22 ± 0.2	03.33±0.2	07. 22±0.1	05.11±02
f>		Polluted	00.00	00.00	3.22±0.4	4.11±0.2	1.00±0.1
4.	Fresh weight of root (mg)	Control	00.70	00.70	01.32	00.21	00.10
		Polluted	00.00	00.10	00.30	00.09	00.10
5.	Fresh weight of Shoot (mg)	Control	00.20	00.60	01.11	00.20	00.770
		Polluted	00.00	00. 300	00. 255	00.210	00.20
6.	Dry weight of root (mg)	Control	00.17	00.34	00.00	00.10	00.200
		Polluted	00.00	00.10	00.40	00.22	00.002
7.	Dry weight of Shoot (gm)	Control	00.10	00.10	00.00	00.50	00.23
		Polluted	00.00	00.20	00.50	00.10	00.20
8	Phytotoxicity (%)	Root	16.80	71.90	00.00	13.00	17.33
		Shoot	00.00	33.30	00.00	31.50	12.33
9.	Effluent tolerance index (%)	Root	00.00	00.20	00.60	28.60	12.33
		Shoot	00.00	00.45	00.60	04.80	09.14

The physical properties of industrial water used for seedling are given in table 1. The presence of total suspended solids to the extent of 250 mg/l was responsible for faint yellow coloration of waste water. The pH of Polluted water 2.02, total dissolved solids (500 mg /l) total Solids (550 mg / l) & optical density (0.67) was stunted seedling growth. Morever root also adversely affected the fresh and dry weight of all seedlings except *Z. mayes* and *O. sativa* in polluted water.

The shoot length, root length, fresh and dry weight of different seedling treated with polluted water and tap water are give in Table 2. The observations showed that *Z. mayes* and *O. sativa* were most susceptible to polluted water as compared to others. Its root length and shoot length were decreased that form 4.11 to 2.99, 3.32 to 2.23 & 3.22 to 3.33, 4.11 to 7.22 cm respectively due to polluted water, while its fresh weight increased to 0.300 gm and 0.255 gm which were 1.32 gm & 1.11 gm respectively in control. Seed in polluted has maximum germination i.e. 92.00%, 73.00% in *Z.mayes* and *O.sativa*. Seed in polluted has minimum 04.00% in *S.vulgare* and *P.typhoides.* Phytotoxicity was increased in shoot of *O.sativa* (31.50 %) and effluent tolerance index was also adversely affected in root and shoot.

The results showed that the industrial polluted water adversely affected seedling growth of cereal crops due to suspended solid and low pH of polluted water. Therefore, it is concluded that the industrial polluted water from "Tuljabhabani Sahakari Sakhar karkhana Naldurg" is suitable for seedling growth of *Z.mayes* and *O.sativa*.

Several workers like Arokia Sami et. al. (1981) , Sahai et. al. (1983), Gupta et al. (2003), Swaminathan & Vidheeswaran (1997), Nanda et al,(1991) & Shreshtha & Niroula (2003) have observed the influence of different kinds of industrial effluents on seed germination and seedling growth.The higher concentration of distillery effluent were found to inhibit the germination and growth of paddy (*Oryza sativa L.*) (Suresha et.al,2006). Population studies of sugar mill effluent showed that most of the physico - chemical parameters like colour, odour total solids, COD, BOD, alkalinity and fluoride were found to be exceed the ISI prescribed permissible values while pH , phosphate and sulphate were found within permissible limit (Senthil Kumar et.al; 2001). Recently, Bhale and Gogle (2008) were reported the *Hibiscus esculentus* was more susceptible and *vigna radiata* was more resistant to polluted water as compared to other vegetable seeds.

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