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Sensitivity of Carbendazim against *Curvularia Pallescence* Causing Root Rot Disease to Coriander

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Abstract: ***Coriander (Coriandrum sativum) belongs to family Apiaceae, is a green herb with strong smell which gives aroma so used in cooking. Coriander is mainly used as a condiment for its medicinal properties as well as for culinary purpose as spice. Such economically and medicinally important plant is attacked by many fungal pathogens and deteriorates quality and yield. The diseased coriander infected by pathogens was selected for evaluation against fungicide, carbendazim. The MIC of carbendazim among 15 isolate of Curvularia pallescence on agar plate (in vitro) and inoculated on plants (in vivo)of coriander showed variation in resistance in both and among the samples.***

Keywords: *Coriandrum* sativum, *Curvularia pallescence*, MIC, Carbendazim

1. Introduction

Coriander (*Coriandrum sativum*) belongs to family Apiaceae, is cultivated in Indian states like Maharashtra, Rajasthan, Gujarat, Madhya Pradesh, Tamil Nadu, U.P., etc. It is a green herb with strong smell which gives aroma so used in cooking. It is mainly used as a condiment for its medicinal properties as well as for culinary purposes as spice. It provides high values of dietary fibers and is a rich source of magnesium, iron, non-organic phosphorus, essential oils, oleic acid, palmitic acid, stearic acid, and ascorbic acid etc.

Coriander is infected by pathogens like *Helminthosporium* spp., *Fusarium* spp., *Curvularia pallescence*, *Alternaria spp,* and *Erisyphe polygoni* which cause disease like grain mould disease, wilt, root rot, leaf spot and powdery mildew respectively. They affect quality and quantity of host plant. Root rot of coriander caused by *Curvularia pallescence*is serious among these diseases so there is urgent need to investigate management of these diseases. The aim of present investigation was to access the sensitive and resistant isolates among the select pathogens against carbendazim.

2. Material and Method

2.1. Materials

Infected material of coriander (*Coriandrum sativum*) causing root rot disease infected by *Curvularia pallescence*, collected from districts of Maharashtra and carbendazim(trade name Bavistin) a systemic fungicide.

2.2. Methods

Samples of coriander showing symptoms of root rot disease due to *Curvularia pallescence* were collected from Maharashtra state, during a survey. The samples collected from field in clean bags and pathogens were isolated by direct plating analysis (Pitt and Hocking, 1997).The isolated pathogens were identified(Subramanian1971 and Barnett and Hunter,1972),and the pathogenicity test was determined by following Koch's postulates (Koch,1893).Minimum inhibitory concentration(MIC) was carried by food poisoning test(Dekker and Gielink, 1979).

In vitro Czapek dox agar plates were prepared containing different concentration (300-3000µg/ml) of fungicide bavistin (source of carbendazim). Mycelial mat (8mm disc) of the isolates was inoculated at the center of the plate in triplicate. The plates were then incubated at 28±20°C in dark or BOD incubator and radial growth was measured at different intervals. Plates without fungicide were served as control. Calculation was done as percentage method by Vincent.

In vivo (on root rot disease) sensitivity tested on healthy plant of host. For this purpose, healthy plant (replicates of three) was treated with concentration of carbendazim solution. After 24 hours, these carbendazim treated plant roots were inoculated with 50ml, spore suspension (10^6spores/ml) of *Curvularia pallescence*, prepared from8 days old culture in sterile deionized water. After inoculating 25 to 35°C for 10 days and thereafter percentage of infection was recorded by 0-4 scale (Kareem, 2007).

3. Results and Discussion

The root rot of coriander was firstly reported by Dwivedi *et al*, (1982). The pathogen was responsible to causes severe infection to host and loss in quality and quantity. Carbendazim is systematic fungicide used to manage fungal disease. There was variation in MIC of carbendazim among 15 isolate, under *in vitro* and *in vivo* conditions. The MIC of carbendazim among 15 isolates of *Curvularia pallescence*on Agar plate (*in vitro*) and on incubated on plant(*in vivo*) of Coriandrum sativum ranged from 300 to 3000µg/ml *in vitro* and *in vivo* respectively (table.1). The resistance was observed more in the isolate Cp- 8 i.e 3000 µg/ml (*in vitro*) while there was 200 µg/ml or (0.2%) MIC was observed in Cp-9 (*in vivo*). There are many workers who determined sensitivity of a pathogen against fungicides. Arora *et al*(1992), noted resistance to metalaxyl in *Phytophthorainfestans* in Nilgiri hills of South India. Chander and Thind (1995), observed development of carbendazim resistance in *Gloeosporiumampelophagum*. Latha *et al* (2000), reported root rot disease management

through antagonist and chemicals. Apte and Kamble (2008), studied efficacy of carbendazim in combating caster blight in western Maharashtra. Khandare and Kamble(2013), observed carbendazim sensitivity in *Trigonella foenum graecum*. The above study was very useful for further investigation of resistance. The results are in aggregation with earlier workers like Avenot & Michailides (2007), Blix*etal*. 2011, Kuang J*etal*. (2011), Miller & Gubler (2004), Reis *etal*, (2005), Stehmann & De Waard (1996), Tremblay *et al* (2003).Viljanen-Rollinson*etal*(2007).

4. Conclusion

Carbendazim is very effective in management of *Curvularia pallescence*. Under laboratory (*in vitro*) conditions, resistance of pathogen is more than field (*in vivo*) condition.

Table 1: MIC of carbendazim against Curvularia pallescenceisolates of Coriander

Sr. no.	*Locality*	*Isolate of root rot of Curvularia pallescence*	*MIC of Curvularia pallescence (in vitro) µg/ml*	*MIC of Curvularia pallescence (in vivo) %*
1	Shirol (Kolhapur)	Cp-1	2500	2.1
2	Kagal(Kolhapur)	Cp-2	1000	1.1
3	Kodoli (Kolhapur)	Cp-3	900	0.7
4	Junnar (Pune)	Cp-4	800	1.7
5	Indapur(Pune)	Cp-5	2000	1.8
6	Tasgaon (Sangli)	Cp- 6	400	0.3
7	Shirala (Sangli)	Cp-7	2700	2.4
8	Walwa (Sangli)	Cp-8#	3000	2.7
9	Jat (Sangli)	Cp-9*	300	0.2
10	Akluj (Solapur)	Cp-10	700	0.6
11	Madha (Solapur)	Cp-11	2100	1.9
12	Sangola(Solapur)	Cp-12	1100	1.0
13	Karad (Satara)	Cp-13	2400	2.1
14	Faltan(Satara)	Cp-14	1300	1.2
15	Koregaon(Satara)	Cp-15	1800	1.8

*Cp-8- *Curvularia pallescence* isolate is more resistant than others.
#Cp-9- *Curvularia pallescence* isolate is more sensitive than others.

5. Abbreviations

MIC –Minimum inhibitory concentration
Cp- *Curvularia pallescence*
* - Sensitive
# - Resistant

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