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RESEARCH ARTICLE

SCREENING OF FUNGICIDES AGAINST DAMPING OFF DISEASE OF CHILLI IN FOOT HILLS OF HIMALAYAN REGION

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ABSTRACT

One of the most common problems encountered in vegetable seedling production this time of year is "damping-off". Damping off is a disease that results in the rotting, collapse and finally death of seedlings just before or soon after they emerge. It often starts out in a few plants but can spread quickly throughout the entire flat and into neighbouring flats. Chemica lcontrol is an important tool for managing diseasesincluding soil borne ones particularly when the disease is prevalent in the field. Efficacy of eight fungicides was tested against *R. solani* by poisoned food technique. Among fungicides mancozeb, copper hydroxide and a combined products of carbendazim 12 % + mancozeb 63 %, carbendazim, benomyl, carbendazim 25 % + mancozeb 50 % recorded maximum inhibition of (100 %) mycelial growth at all concentrations (0.10 %, 0.20 % and 0.30 %) and captan showed 90.20 % inhibition at 0.10 per cent concentration, 100 per cent inhibition at 0.2 and 0.3 per cent concentrations. Least inhibition of 84.00, 88.88 and 89.33 per cent was observed in case of ziram at 0.10, 0.20 and 0.30 per cent respectively. Bavistin was most effective fungicide in reducing the mycelial growth of *R. solani* and gave complete inhibition of mycelial growth and action of these chemicals inhibit the germination, growth and multiplication of the fungus.

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INTRODUCTION

Vegetables provide much needed nutritional security through balanced diet. India is the second largest producer of vegetables after China, but the per capita consumption (140/day) is much below the minimum level (280/day) recommended by Indian Council of Medical Research. Hence, there is a need for further increase in the production to overcome the present inadequate availability and to keep pace with the ever-rising domestic demands. As the vegetables are more succulent and rich in nutrients, their successful cultivation is often affected due to numerous biotic and abiotic constraints, thereby, incurring high yield losses during post-production periods. The biotic constraints include the attack of various diseases caused by fungi, bacteria and viruses whereas nutritional and physiological disorders comprise abiotic constraints. Some of the previously unknown problems have become serious and are causing enormous losses to these crops. In the absence of suitable control measures, plant disease control has become heavily dependent on the fungicides to combat the wide variety of fungal diseases (Ahamad *et al*., 1998; Ahamad, and Narain (1998; Ahamad, and Ahmad, 1999; Ahamad *et al*., 2000; Ahamad, 2005 and Ahamad, 2006). Vegetables such as tomato, chili, cauliflower, cucurbits, onion etc. are raised through nursery. Damping off, a commonly occurring disease of nursery of vegetables appears usually in poorly managed nursery beds sown with infected seed. Chili (*Capsicum annuum* L.) is an important commercial crop of India, being grown in an area of. 0.9 million hectares. One of the most common problems encountered in vegetable seedling production this time of year is "damping-off". Damping off is a disease that results in the rotting, collapse and finally death of seedlings just before or soon after they emerge. It often starts out in a few plants but can spread quickly throughout the entire flat and into neighboring flats. One or more soil-borne pathogens may be responsible for this disease, depending on the environmental conditions in the greenhouse. Chilli (*Capsicum annum* L.) is mainly cultivated for its vegetable green fruits and for the dry chilli as the spice of commerce. It is a rich source of Vitamin C, A and B. Seedling rot of chilli caused by *Rhizoctoniasolani* is one of the

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important disease. *Rhizoctoniasolani* is another common soil-borne pathogen that causes seed rot, damping-off and root rot during the production of vegetable seedlings in the greenhouse (Ahamad, 2005, Agarwal and Ahamad, 2007; Ahamad *et al*., 2009, Ahamad *et al*., 2012; Ahamad *et al*, 2012; Ahamad *et al.,* 2013; Ahamad *et al*., 2013). Most strains of *Rhizoctonia* infect in somewhat dryer soil than the water mold pathogens. Often, *Rhizoctonia* spp. will girdle the stems above and below the soil line of susceptible seedlings resulting in the seedling toppling over. The best control of damping-off is to avoid it altogether. Once damping-off has started in a seedling flat, it may be difficult to control. The following are a few tips that will help avoid or reduce the risk of damping off becoming established in the greenhouse production of vegetable seedlings. Damping off is the cause for poor germination and guppy stand of the seedlings in nursery beds. The disease may occur as pre- or post-emergence damping off. There is failure of seedling emergence from the soil in the first phase resulting in patchy appearance. In post-emergence damping off, there is toppling down of the infected seedlings and infection occurs at ground level with water soaked tissue being apparent. Commonly occurring fungi reported to be responsible for damping off in nursery are *Pyhtium, Fusarium, Rhizoctonia* and *Phytophthora* spp. (Gupta and Thind, 2006). Chilli (*Capsicum annum* L.) also called red pepper is an important cash crop in India and is grown for its pungent fruits, mainly cultivated for its vegetable purpose and dry chilli as a spice of commerce. It's a rich source of vitamin C, A, and B. In India, its important cash crop, which is grown for the domestic and export market. India is the largest producer of chilli in the world (8.5lakh tones) followed by China (4 lakh tones). Among the fungal diseases, damping off disease of seedling as well as root and stem rot in transplanting chilli caused by *Rhizoctoniasolani* is a major soil borne pathogen causing the economic losses in chilli. Chemical control is an important tool for managing diseases including soil borne ones particularly when the disease is prevalent in the field. In addition, identification of effective fungicides would enable integration of different components required for synthesis of integrated disease management. Hence, screening of fungicides was tried in Research laboratory of KVK, Rajouriin 2010 to know their relative efficacy in efficient management of seedling rot disease of chilli.

MATERIALS AND METHODS

Screening of fungicides was tried in Research laboratory of KVK, Rajouri to know their relative efficacy in efficient management of seedling rot disease of chilli during 2010.The fungus *R. solani* Isolation was obtained by following standard tissue isolation method under aseptic condition. The infected tissues of the root were cut into small bits of size1-2 mm and surface sterilized in mercuricchloride solution for one minute and was hedrepeatedly thrice in sterile distilled water to remove the traces of mercuric chloride before transferring them to sterile potato dextrose agar (PDA) slants under aseptic condition in laminar flow and incubated at 28 ± 1^0Cin Incubator for growth. The culture was purified by single spore isolation method. The experiment was carried out in CRD. The details of treatments for *in vitro* evaluation of fungicides are listed in Table 1. Twenty ml of PDA medium initially mixed with chemicals listed below were poured in to 90 mm diameter Petri dishes. Control was maintained without adding of any fungicides. After solidification, 5 mm discs of *R. solani* were placed at the center of the plate. Each set of experiment was replicated thrice and plates were incubated at 30 ±1°C. Observations were taken on parameters such as colony diameter and per centinhibition of growth which was calculated using the formula (Vincent, 1927).

$$I = \frac{C - T}{C} \times 100$$

Where,
I = Per cent inhibition,
C = Radial growth of fungus in control
T = Radial growth of fungus in treatment.

RESULTS AND DISCUSSION

Efficacy of eight fungicides was tested against *R. solani* by poisoned food technique. Among fungicides mancozeb, copperhydroxide and a combined products of carbendazim 12% + mancozeb 63 %, carbendazim, benomyl, carbendazim 25 % + mancozeb 50 % recorded maximum inhibitionof (100 %) mycelial growth at all concentrations(0.10 %, 0.20 % and 0.30 %) and captan showed90.20 % inhibition at 0.10 per cent concentration,100 per cent inhibition at 0.2 and 0.3 per cent concentrations. Least inhibition of 84.00, 88.88 and89.33 per cent was observed in case of ziram at0.10, 0.20 and 0.30 per cent respectively. Bavistin was most effective fungicide in reducing the mycelial growth of *R. solani* and gave complete inhibition of mycelia growth and action of these chemicals inhibit the germination, growth and multiplication of the fungus or are directly toxic (Kumari *et al*., 2012). Similar results were obtained by several workers (Prajapati *et al*., 2002; Khan *et al.,* 2012; Ahamad, 2005, Agarwal and; Ahamad *et al*. 2009, Ahamad *et al*, 2012; Ahamad *et al*, 2012; Ahamad *et al.,* 2013; Ahamad *et al*, 2013, Sharma *et al.,* 2009 and Sharma *et al*., 2013).

Table. In vitro evaluation of fungicide on mycelial growth of R. solani at KVK,Rajouri

S.No.	Fungicides	Per cent inhibition at different concentrations			
		0.05 %	0.10%	0.20%	Mean
1.	Benomyl	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)
3.	Carbendazim	100 (90.00) *	100 (90.00)	100 (90.00)	100 (90.00)
4.	Carbendazim 25 % +Mancozeb 50%100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)	
5.	Tricyclazole 18 % +Mancozeb 62%100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)	
6.	Mancozeb	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)
7.	Ziram	84.00 (66.02)	88.88 (70.52)	89.33 (70.93)	88.07 (69.82)
8.	Captan	90.20 (82.60)*	100 (90.00)	100 (90.00)	97.40 (80.72)
9.	Copper hydroxide	100 (90.00)	100 (90.00)	100 (90.00)	100 (90.00)
10.	Check	0.00 (00.00)	0.00 (00.00)	0.00 (00.00)	0.00 (00.00)

*Figures in parentheses are arc sine values

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