Internat. J. agric. Sci. Vol.3 No.1 January 2007 : 35-38

Studies on seed borne nature of *Colletotrichum capsici* causing seedling blight and its control through chemicals

R.K. Mesta, V.R. Kulkarni and M.S.L. Rao*
Department of Plant Pathology, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA

ABSTRACT
The seed mycoflora associated with seeds and fruits of fruit rot infected chillies collected from northern Karnataka were detected. *Colletotrichum capsici* was detected in all the samples with or without surface sterilization by 0.1% $HgCl_2$. In some samples *Alternaria, Cercospora, Curvularia* and *Fusarium* were also detected. However, these fungi were eliminated by surface sterilization in majority of the seed and fruit samples. *In vitro* evaluation of fungicides revealed that captan (0.1%) and thiram (0.1%) were effective against *C. capsici.* All these fungicide were proved effective when tested in pots in glasshouse.

Key words : Chilli, Anthracnose, Fruit rot, *Colletotrichum capsici,* Seed borne.

INTRODUCTION

The chilli (*Capsicum annuum*), a member of solanaceae family is mainly cultivated as vegetable in many countries including India. Among the many diseases of chillies, seedling blight caused by *Colletotrichum capsici* is a major threat in the cultivation of chillies. The disease is seed transmitted and cause seedling blight or damping off in the nursery. The same pathogen is causing anthracnose and fruit rot in the next stages of plant growth.

Grover and Bousal (1968) during their study found that seeds of chilli obtained from diseased and healthy fruits carried the pathogen both internally and externally leading to damping off of seedlings that died after emergence. Ahmed (1982) studied many seed samples of chilli from different locations, which showed infection of *C. capsici,* resulted into poor germination and low vigour. Manandhar *et al.* (1995) reported *C. capsici* and *C. glocosporiodes* from the seeds of chilli and proved their pathogenicity. Cyclohexamide, agrimycin, zineb and tridemorph were found effective seed treatment chemicals against *C. capsici* (Azad, 1992). In the present study an effort has been made to identify mycoflora associated with fruits and seeds collected from different locations and to find out effective chemical control method to control the disease.

MATERIAL AND METHODS

The chilli fruit and seed samples were collected from different locations of north Karnataka from the infected fields. The mycoflora is detected by following standard blotter technique (Anon, 1999). Sterile petriplates (20 cm) were used in the study, which are lined with sterile moistened blotter paper. Twenty five chilli seeds in each plate and 3 replications of such plates were kept for incubation for five days. After incubation fungal growth was observed in sterio binocular microscope for identification.

In vitro evaluation of seed treatment chemicals was carried out following poison food technique. Per cent inhibition of growth was calculated by using the following formula (Vincent, 1947)

$$I = \frac{100\ (C-T)}{C}$$

Where: I = Inhibition
C = Rate of growth in control
T = Rate of growth in treatment

The efficiency of chemicals in pot culture was detected by sowing chilli seeds in pots in glasshouse after treating them with fungicides. Untreated seeds were sown as control. Each treatment replicated 4 times. Observations on per cent seedling emergence were taken after 1 month of sowing.

RESULTS AND DISCUSSION

Different fungi that are associated with fruit-surface and seeds of chilli from affected chilli fruits were noted by blotting paper technique (Table 1) *C. capsici* was detected in all the fruit and seed samples with or without surface sterilization, collected from different locations. In addition to this, *Alternaria, Curvularia, Cercospora* and *Fusarium* were noticed on unsterilized fruit surfaces of 18 varieties from 6 locations while only *Alternaria* and *Curuvlaria* detected in surface sterilized fruits of 5 varieties collected from 2 locations.

On both sterilized and unsterilized seed surface *Colletotrichum* was detected in all the 18 varieties of 6 locations. In addition to this *Alternaria* (10 varieties of 4 location), *Cercospora* (2 varieties of 1 location) and *Curvularia* (1 variety of 1 location) on unsterilized and only *Alternaria* (2 varieties of 2 location) and *Curvularia* (1 variety of 1 location) were detected.

The percentage of seed mycoflora recorded is given in table 2. The seed infection was more than 50 per cent in 17 samples out of 22 samples collected. HMT-local collected from Hanumanmatti recorded highest seed infection (96%) and lowest germination (15%). In contrast Pant C-1 collected from Dharwad recorded lowest seed infection (8%) and highest germination (68%).

The results of seed transmission studies indicated that

* Author for corrospondence.

Table 1 : Mycoflora associated with rotted chilli fruits and seeds.

Location	Variety	Fruits		Seeds	
		Without surface sterilization	With 0.1% $HgCl_2$ surface sterilized	Without surface sterilization	With 0.1% $HgCl_2$ surface sterilized
A. Dharwad	Byadgi kaddi	*Colletotrichum Alternaria*	*Colletotrichum*	*Colletotrichum*	*Colletotrichum*
	Byadgi dabbi	*Colletotrichum Cercospora*	*Colletotrichum*	*Colletotrichum*	*Colletotrichum*
	Guntur	*Colletotrichum Alternaria Curvularia*	*Colletotrichum*	*Colletotrichum Alternaria*	*Colletotrichum*
	Pant C-1	*Colletotrichum Alternaria Cercospora*	*Colletotrichum*	*Colletotrichum*	*Colletotrichum*
	PKM-1	*Colletotrichum Cercospora Fusarium*	*Colletotrichum*	*Colletotrichum Alternaria*	*Colletotrichum*
	Pusa Jwale	*Colletotrichum Alternaria Fusarium*	*Colletotrichum*	*Colletotrichum Alternaria*	*Colletotrichum*
	CO-1	*Colletotrichum Cercospora Fusarium*	*Colletotrichum*	*Colletotrichum Cercospora*	*Colletotrichum*
	CO-2	*Colletotrichum Alternaria*	*Colletotrichum Alternaria*	*Colletotrichum Alternaria*	*Colletotrichum*
	K-1	*Colletotrichum Alternaria Fusarium*	*Colletotrichum*	*Colletotrichum Alternaria*	*Colletotrichum*
	Sankeshwar	*Colletotrichum Alternaria Curvularia Cercospora*	*Colletotrichum Alternaria*	*Colletotrichum Alternaria Cercospora*	*Colletotrichum Alternaria*
	Guntur	*Colletotricum Fusarium Cercospora*	*Colletotrichum Fusarium*	*Colletotrichum Fusarium*	*Colletotrichum*
	RCR-local	*Colletotricum Fusarium*	*Colletotrichum Fusarium*	*Colletotrichum Fusarium*	*Colletotrichum*
B.Hanumanamatti	Byadgi kaddi	*Colletotricum Alternaria Fusarium*	*Colletotricum*	*Colletotricum*	*Colletotricum*
	Byadgi dabbi	*Colletotricum Alternaria Fusarium*	*Colletotricum*	*Colletotricum Curvularia*	*Colletotricum*
	HMT-local	*Colletotricum Alternaria Curvularia Cercospora*	*Colletotricum Alternaria Cercospora*	*Colletotricum Alternaria Cercospora*	*Colletotricum Alternaria*
C. Belgaum	Byadgi kaddi	*Colletotricum Alternaria Fusarium*	*Colletotricum*	*Colletotricum*	*Colletotricum*
	BGM-Local	*Colletotricum Fusarium Cercospora*	*Colletotricum Cercospora*	*Colletotricum Cercospora*	*Colletotricum*
E. Belvatagl	Guntur	*Colletotricum Fusarium Cercospora*	*Colletotricum Cercospora*	*Colletotricum Cercospora*	*Colletotricum Cercospora*

infected seeds acted as primary source of infection causing radical discolouration with development of acervuli rolled in margins of the leaves and rotting at the crown regions. Later the discolouration on roots extended along its longitudinal axis with production of plenty of acervuli. Siddique *et al.* (1977) also indicated that primary source of infection comes from the seed and secondary spread of the disease takes place from diseased to healthy by production of fruiting bodies containing large number of conidia.

Table 2 : Per cent infection of *Colletotrichum capsici* and germination of chilli seed samples collected from different areas.

S. No.	Variety	Place of collection	Seed infection (%)	Germination (%)
1	Byadgi dabbi	Dharwad	73	33
2	Byadgi kaddi	Dharwad	85	30
3	CO-1	Dharwad	72	32
4	CO-2	Dharwad	32	54
5	DS-1	Dharwad	80	43
6	Guntur	Dharwad	90	27
7	K-1	Dharwad	18	63
8	KDSC-6-3	Dharwad	36	41
9	Palur-1	Dharwad	52	46
10	Pant C-1	Dharwad	08	68
11	Phulice-5	Dharwad	64	38
12	PKM-1	Dharwad	59	30
13	Pusa Jwala	Dharwad	16	57
14	Sankeshwar	Dharwad	76	38
15	Byadgi dabbi	Hanumanmatti	78	23
16	Byadgi kaddi	Hanumanmatti	81	20
17	HMT-local	Hanumanmatti	96	15
18	Byadgi kaddi	Belgaum	65	40
19	BGM-local	Belgaum	73	33
20	Guntur	Raichur	78	45
21	RCR-local	Raichur	85	32
22	Guntur	Belvatagi	83	21

Table 3 : Per cent inhibition of mycelial growth of *C. capsici* by different fungicides.

Sl. No.	Fungicides	Inhibition of growth
1	Thiram (0.2%)	79.24 (96.50)
2	Captan (0.2%)	69.80 (88.10)
3	Mancozeb (0.2%)	61.64 (79.80)
4	Iprodione (0.1%)	51.51 (61.30)
5	Carbendazim (0.1%)	90.00 (100.00)
6	Triademefon (0.1%)	90.00 (100.00)
7	Neem leaf extract (2%)	44.89 (49.80)
8	Onion bulb extract (2%)	44.97 (49.95)
	SEm ±	0.94
	C but	3.12

Figures in parenthesis are original values.

Studies on the association of mycoflora on rotted chilli fruits and seeds revealed that several fungi other than *C. capsici* are involved in fruit rot. However, in all the samples tested *C. capsici* was present. Even after surface sterilization with mercuric chloride, *Alternaria* and *Cercospora* were found on some fruit and seed samples. Mathur and Agnihotri (1961) and Basak *et al.* (1994) reported involvement of *Alternaria* and *Cercospora* in fruit rot of chilli. The seed germination studies revealed that seed samples showing moderate (11 to 50 per cent) and severe (51 to 100 per cent) infection gave poor germination and failed to reach the minimum required standard. The vigour of seedling arising from such highly infected seed samples was comparatively low, whereas seed samples showing infection up to 10 per cent gave very good germination and the vigour of seedling was also very high. So the results indicated that the seed samples with more than 10 per cent seed infection are poor in germination as well as in vigour.

Table 4 : Per cent mortality of seedlings treated with different seed treatment chemicals.

S. No.	Fungicide	Concentration	Per cent mortality
1	Captan	0.1	12.92 (5.0)*
		0.2	9.66 (2.5)
		0.3	0 (0.0)
2	Thiram	0.1	15.89 (7.5)
		0.2	12.92 (5.0)
		0.3	0 (0.0)
3	Mancozeb	0.1	20.70 (12.5)
		0.2	15.89 (7.5)
		0.3	9.10 (2.5)
4	Carbendazim	0.05	22.82 (15.0)
		0.10	15.89 (7.5)
		0.15	9.10 (2.5)
5	Control	-	67.38 (85.26)
	SEm ±		0.78
	CD at 1%		3.23

Figures in parenthesis indicate original percentage.

Hence such seeds should not be used. The results reported by Siddique *et al.* (1977) indicated that seeds from chillies showing more than 10 per cent fruit spotting reduce the yield considerably. Also, Adiver *et al.* (1987), Ahmed (1982) and Perane and Joi (1988) reported seed borne nature of *Colletotrichum capsici* in chilli and its adverse effect on seed germination. *In vitro* evaluation of fungicide revealed that there is significant difference between the treatments Carbendizim (100%) recorded highest inhibition followed by thiram (96.5 %), captan (88.1 %) and mancozeb (74.8 %). Plant extracts like Onion bulb extract (49.95) and neem leaf extract (49.80) were found ineffective. There fore these 4 fungicides were tested in pots in glasshouse.

Since the *C. capsici* is a seed borne fungus, seed treatment of chilli seeds before sowing has got importance in controlling the disease. In the present investigations all the four seed treatment chemicals used *viz.* Captan (0.2%) and Thiram(0.2 %) were effective in reducing the disease. Captan and Thiram were found to be effective in complete controlling of seed borne infection. Thiram was earlier reported to be very effective seed treatment chemical, by Dhawale (1975), Siddique *et al.* (1977) and Perane and Joi (1988).

REFERENCES

Adiver, S.S., Hiremath, P.C., Patil, N.K., Hegde, R.K. AND Dharmatti, P.R. (1987). Seed microflora of chilli and their role in seed germination. *Current Research,* **16**: 70-72.

Ahmed, S.S. (1982). Studies on seed-borne aspects of anthracnose of chillies caused by *Colletotrichum capsici* (Sydow.) Butler and Bisby. *M.Sc. (Agri.) Thesis,* University of Agricultural Sciences, Bangalore.

Anonymous (1999). International rules for seed testing. Seed Science and Technology, **27**: 1-335.

Azad, P. (1992). Effiency of certain fungi toxicants against *Colletotrichum capsici* (Syd.) Butler & Bisby, the incitant of ripe rot of chilli. *Journal of the Assam Science Society,* **34**: 34-39.

Basak, A.B., Fakir, G.A. and Mridha, M.A.U. (1994). Studies on the prevalence of six major fruit rot disease of chilli at different stages of fruit development in Chittagong district. Chittagong University Studies, *Science*, **18**: 125-128.

Dhawale, S. (1975). Mycoflora of chilli seed, its effects on germination and viability of seed and chemical control. Thesis abstract, Haryana Agricultural University.

Grover, R.K. and Bansal, R.D. (1968). Occurrence and over wintering of *Colletotrichum piperatum* on *Capsicum frutescens* in India. *Indian Phytopathology,* **21**: 116-118.

Manandhar, J., Hartman, G.I. and Wang, T.C. (1995). Semiselective medium for *Colletotrichum gloesporiodes* and occurrence of the *Colletotrichum* spp. on pepper plants. *Plant Disease,* **79**: 372-375.

Mathur, R.L. and Agnihotri, J.P. (1961). Internal mould of chillies caused by *Alternaria tenuis* Arct. *Indian Phytopathology,* **14**: 104-105.

Perane, R.R. and Joi, M.B. (1988). Studies on seed borne infection of fruit rot and die back of chilies. *Journal of Maharashtra Agricultural Universities,* **13**: 231-232.

Siddique, M.R., Singh, D. and Gaur, A. (1977). Provenance of chilli anthracnose fungus on seeds and its effective control. *Seed Research,* **5**: 67-72.

Siddique, M.R., Singh, D. and Gaur, A. (1977). Control of antracnose and die back of red chilli crop by seed treatment and sprays. *Seed Tech. New,* **7**: 5-9.

Vincent, J.M. (1947). Distortion of fungal hyphae in the presence of certain inhibitors. *Nature,* **159**: 850.

Received : February, 2006; Accepted : August, 2006