Madras Agric. J. 90 (4-6) : 298-300 April-June 2003

Management of seedborne pathogens and wilt disease of coriande

S.K. MANORANJITHAM, R. RABINDRAN AND SABITHA DORAISWAMY
Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore-641 003, Tamil Nad

Abstract: Survey was undertaken in coriander growing areas of Tamil Nadu, South Arcot Vallalar V.O.Chidambaranar district. Samples showed *Fusarium oxysporum* fsp *Coriandrii* occurrence in blotter technique and later in pathogenicity test, the seeds showed wilt incidence. Seed treatment studies were carried out with biocontrol agents namely *Tricoderma viride, Pseudomonas flourescens* (PF1, PF2, PF23, PF11, PF7, PF20) and fungicide, bavistin in pot culture and field. *P.fluorescens* (PF1) was found to be highly effective in controlling wilt disease followed by PF2, *T. viride* and bavistin.

Key words : Coriander, Wilt, Fusarium oxysporum fsp Coriandrii.

Introduction

Coriander (*Coriandrum sativum* L.) commonly called as "dhania" is grown on a large scale in Andhra Pradesh, Tamil Nadu, Karnataka, Rajasthan and Madhya Pradesh. The crop is widely grown for tender green leaves and seeds. Coriander is affected mainly by wilt disease *Fusarium oxysporum* fsp. *coriandrii* which causes 60 per cent loss in yield. Including *Fusarium*, most of the pathogens are transmitted through seeds. Benlate and Bavistin are used to control the wilt disease. Due to the recent growing concept of environmental safety, the use of biocontol agents on wilt disease and also on seed borne pathogens, have been increased tremendously. Fusarium wilt diseases have been reported to be controlled by certain strains of fluorescent pseudomonas (Gamliel and Katen, 1993; Tari and Anderson, 1988; Weller and Cook, 1986).

Materials and Methods

A survey was undertaken during 1998 in six districts of Tamil Nadu (Cuddalore, Coimbatore, Salem, South Arcot, Aruppukottai and Thuthukudi districts). The seeds from the infected plants were collected. The collected samples were studied for the presence of seed borne pathogens using standard blotter technique (I.S.T.A. 1976) after incubating it at 24 ± 1°C for 12 hrs with alternating cycles of NUV rays for 7 days and observation was taken. Pathogen were subcultured and multiplied in individual mudpots to check the wilt incidence.

Pot culture studies were carried to find out the efficacy of biocontrol agents on management of coriander wilt. Talc based formulations (Jeyarajan *et al.* 1994; Vidyasekaran and Muthamilan, 199 of a fungal biocontrol agents *viz. T.viride* an two bacterial biocontrol agents *Bacillus subtil* and *P.fluorescens* (PF1, PF2, PF20, PF11, PF and PF23) were used. Seeds were treated wit fungal and bacterial biocontrol agents at th rate of 4g/kg and 10g/kg respectively. Treat seeds (CO 3) were sown in sick soil and (*Fusariu* sp.) inoculated in mud pots at complete randomized design. After flowering wilted plan count was taken. Field trial also carried ou in sick soil. A plot size of 3 x 4 m bed was used. Treated CO3 seeds were sown usin randomized block design with three replications Seed rate used was 8kg/ha with the spacin of 30 x 10 cm. Line sowing method wa adopted. After flowering stage the wilted plan count was taken along with total number o healthy plants twice and mean was calculated (Table 2). Individual plot yield was also recorded

Results and Discussion

Aspergillus niger was more predominant in the seed samples collected from Coimbator district. Among 36 samples collected from South Arcot Vallalar district, most of the samples were infected with *Alternaria* sp. *Fusarium* spp. *Penicillium* sp. *Aspergillus* sp. (60%), *Rhizopus* sp. (20%). Koothiparai a village from V.O.Chidambaranar district is completely free from seed-borne pathogens whereas the other samples from same districts recorded *Alternaria* sp., *Fusarium* sp., *Aspergillus* sp. and *Rhizopus* sp. In pathogenicity test *Fusarium* inoculated plot showed wilt incidence. The wilted plant count was taken after flowering. In pot culture studies the biocontrol agents *P.fluorescens* (PF1) treated seeds sown pots showed lower wilt incidence

ble 1. Seedborne microflora of coriander

No.	Districts surveyed	Villages covered	Total No. of samples collected	Disease incidence observed in the field	Pathogens isolated from seed samples
	Coimbatore	Thudiyalur, Puduppalayam, Gomangalam Pudur, Anthiyur, Pulankinar	32	Wilt <1% powdery mildew 60%	*Aspergillus niger*
	South Arcot	Ramanathapuram, Thottankuruchi, Paroor, Avatti, Posalambadi, Neeramani, Kaliyameedu, Kalur	36	Nil	*Alternaria* sp. *Fusarium* sp. *Aspergillus niger*
	Virudhunagar	Kovilankulam, Gopalapuram, Ramaniyapuram, Palayampatti, Kopisthapuram	10	Powdery mildew 45%	*Alternaria alternata* *Fusarium semitectum* *Aspergillus niger*
	Tuticorin	Udayanathanpuram, Ramachandrapuram, Krishnapuram, Mallarpatti, Mettukundu, Koothipari	28	Powdery mildew 40%	*Alternaria* *Fusarium*
	Salem	Minampalli	1	Powdery mildew	*Fusarium*

hereas it was maximum in control. Seed treatment ith *T.viride,* Bavistin and *P.fluorescens* (PF2) ere also equally effective followed by *P.fluorescens* PF1) treatment.

In the field trial, seed treatment with *seudomonas fluorescens* (PF1) was found to e highly effective in reducing the wilt incidence aused by *Fusarium oxysporum* fsp *coriandrii.* he wilt incidence was only 9.4% in the PF1 reated plot while it was (31.8%) in control. he yield was remarkably increased 1.36 kg/ lot in the PF-1 treatment, while in the control was only 0.8 kg/plot. Seed treatment with *viride*, Bavistin, PF-2 and *B.subtilis* were lso equally effective followed by PF-1 treatment. *fluorescens* strains PF-1, PF-2 have been reported o control pigeon pea wilt caused by *Fusarium dum* (Vidhyasekaran *et al.* 1997). For effective nanagement of soil borne diseases, the introduced ntagonist should colonize the roots (Weller, 988). *P.fluorescens* is known to colonize roots of several crops (Misagi, 1990; Parke *et al.* 1991). Possibly due to an improved capacity to compete for root exudates (Gamliel and Katen, 1992). Chickpea wilt caused by *Fusarium oxysporum* f.sp. *ciceri* was controlled by *Pseudomonas fluorescens* (Vidhyasekaran and Muthamilan, 1995). *P.fluorescens* is considered as a plant growth promoting rhizobacterium and yield increase due to this bacterium have been reported in several crops (Becker and Cook, 1988; Gamliel and Katan, 1991).

References

Becker, J.O. and Cook, R.J. (1988). Role of siderophores in suppression of Pythium species and production of increased growth response of wheat by fluorescent pseudomonas. *Phytopathology*, 78: 778-782.

Gamliel, A. and Katan, J. (1991). Involvement of fluorescent pseudomonas and other micro organisms in increased growth response of plants in solarized soils. *Phytopathology*, 81: 474-502.

Table 2. Effect of biocontrol agents on wilt incidence

Sl.No.	Treatments		Mean	Mean yield (kg/plot)	Mean yield (kg/ha)
1.	ST with *Trichoderma viride*	4 kg	11.66 (19.96)a	1.16 (1.16)abc	583.33d
2.	ST with PF 1	4 kg	11.62 (19.91)a	1.26 (1.26)bc	630.00c
3.	ST with Bavistin	2 g/kg	11.84 (20.09)a	1.13 (1.12)abc	565.00cd
4.	ST with PF 7	10 g/kg	19.83 (26.32)b	1.00 (1.00)abc	500.00b
5.	ST with PF 20	10 g/kg	26.01 (30.65)a	0.96 (1.29)bc	480.00b
6.	ST with PF 11	10 g/kg	30.78 (33.68)cd	0.86 (0.86)a	430.00a
7.	ST with PF 2	10 g/kg	9.44 (17.85)a	1.36 (1.36)c	680.00f
8.	ST with PF 23	10 g/kg	29.09 (32.63)cd	0.93 (0.93)ab	465.00b
9.	ST with *Bacillus subtilis*	10 g/kg	12.12 (20.28)a	1.06 (1.08)abc	541.00c
10.	Control (untreated seeds)		31.83 (34.34)d	0.80 (0.80)a	400.00

ST - Seed treatment; Pf - *Pseudomonas fluorescens*
Means followed by a common letter are not significantly different at 5% level by DMRT.

Gamliel, A. and Katan, J. (1992). Influence of seed and root exudates in fluorescent pseudo monads and fungi in solarised soil. *Phytopathology*, **82**: 320-327.

Gamliel, A. and Katan, J. (1993). Suppression of major and minor pathogens by fluorescent pseudomonads in solarized and non solarized soils. *Phytopathology*, **83**: 68-75.

I.S.T.A. (1976). *Proc. In. Seed Testing Ass.* **4**: 51-77.

Jeyarajan, R., Ramakrishnan, G., Dinakaran, D. and Sridar, R. (1994). Development of products of *Trichoderma viride* and *Bacillus subtilis* for biocontrol of root rot diseases. In: *Biotechnology in India*, pp.25-36.

Misagi, I.J. (1990). Screening bacteria for root colonizing ability by a rapid method. *Soil Biol. Biochem.* **22**: 1085-1088.

Parke, J.L., Rand, R.E., Joy, A.E. and Kind, E.B. (1991). Biological control of *Pythium* damping off and Aphanomyces root of pear by application of *Pseudomonas cepacia* or *P.fluorescens* to seed. *Plant dis.* **75**: 987-992.

Tari, P.H. and Anderson, A.J. (1988). Fusarium wilt suppression and agglutinability of *Pseudomonas putida*. *Appl. Environ. Microbiol.* **54**: 2037-2041.

Vidhyasekaran, P. and Muthamilan, M. (1995). Development of formulations of *Pseudomonas fluorescens* for control of chickpea wilt. *Plant dis.* **79**: 782-786.

Vidhyasekaran, P., Sethuraman, K., Rajappan, K. and Vasumathi, K. (1997). Powder formulations of *Pseudomonas fluorescens* to control pigeonpea wilt, **8**: 166-171.

Weller, D.M. (1988). Biocontrol of soil borne plant pathogens in the rhizosphere with bacteria. *Annu. Rev. Phytopathol.* **26**: 379-407.

Weller, D.M. and Cook, R.J. (1986). Increased growth of wheat by seed treatment and implications of pythium control. *Can. J. Plant Pathol.* **8**: 328-324.

(Received : June 2002; Revised : April 2003)