

**RESEARCH ARTICLE :**

# Survey on incidence of soil borne diseases of coriander (*Coriandrum sativum* L.) in major districts of Andhra Pradesh

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**SUMMARY :** Coriander (*Coriandrum sativum* L.) an important annual herb used extensively all over the world. It is cultivated intensively in the districts of Kurnool, Guntur, Prakasam, Ananthapur, Chittoor and Kadapa of A.P in India. Four districts of A.P were surveyed to record the disease incidence of soil borne diseases in coriander. Root rot and wilt are important soil borne diseases prevalently causing yield loss in most of coriander growing fields which ultimately causes rotting of roots and wilting of plants. Highest disease incidence (%) of root rot and wilt was observed in Kurnool district (38.79%) (10.35%) respectively. *Fusarium solani* and *Fusarium oxysporum* f.sp. *corianderi* were isolated from the diseased samples and identified based on their cultural and morphological characters. These diseases causing a direct loss in its productivity with an incidence of root rot ranged from 26-38% and wilt ranged from 2-10%.

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## **BACKGROUND AND OBJECTIVES**

Coriander (*Coriandrum sativum* L.) is an annual herb prominently used as a leaf and seed spice. Since from the ancient period it can be used as an important ingredient. The fresh green herb called as Cilantro or Chinese parsley is popularly used in soups, salads, seasoning and chutney all over the world. It is cultivated in India with an area of 552.7 thousand hectares and productivity of 0.8 metric tonnes per hectare in 2014-15 (Spice

Board, 2015). The exports have increased significantly in the past few years due to strong demand from the overseas markets but this crop is affected majorly with soil borne diseases which causes heavy yield loss year by year. These soil borne pathogens are microscopic, hidden and unevenly distributed in the soil or in infected plant material enters through roots and become systemic causing a broad range of diseases on various host plants, such as vascular wilts, pre and post

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emergence blights as well as root and stem rots (Pascale *et al.*, 2002 and Schollenberger *et al.*, 2006). The disease symptoms will be observed in scattered patches of the cultivated field. Soil borne pathogens cause a major damage to crop and cause 10 per cent yield loss (Muthulakshmi *et al.*, 2002). Present investigation was undertaken to know the incidence of soil borne diseases and detection of pathogens in the growing hot spot areas of A.P.

## RESOURCES AND METHODS

### Survey:

A survey was conducted during 2016-17, to record the incidence of soil borne diseases in coriander growing districts like Kadapa, Kurnool, Guntur and Prakasam. In each field, five rows were selected randomly and the number of plants showing typical root rot and wilt symptoms and the total number of plants were recorded. Per cent disease incidence was calculated by using formula.

$$\text{Per cent disease incidence} = \frac{\text{Number of infected plants}}{\text{Total number of healthy plants}} \times 100$$

### Isolation, identification and pathogenicity:

The infected portions of plants showing typical symptoms of root rot and vascular discoloured plants, premature dried plants were selected for tissue isolation cut into 3mm small pieces, washed with sterile distilled water, surface sterilized with 0.1 per cent sodium hypochlorite solution for 60 seconds and subsequently washed three times in sterilized distilled water, blot dried and then transferred to sterilized Petridishes containing PDA. The plates were then incubated at room temperature ( $28 \pm 1^\circ\text{C}$ ) and observed periodically for fungal mycelial growth of pathogens. Hyphae from these bits were again purified and pure cultures were maintained on PDA slants. The identities of these cultures were confirmed by National Centre for Fungal Taxonomy (NCFT), New Delhi. Pathogenicity of these cultures was proved by soil inoculation technique. Pathogens were mass multiplied on sand-sorghum (1:1) medium at  $25 \pm 1^\circ\text{C}$  for 10 days and then sick soil was made by inoculating the multiplied pathogens @ 20g/kg soil with sterilized soil in poly bags. Poly bags were kept for observation for 30 days. Initial symptoms of root rot and wilt were carefully observed and re-isolation of pathogens was attempted with same procedure as mentioned above.

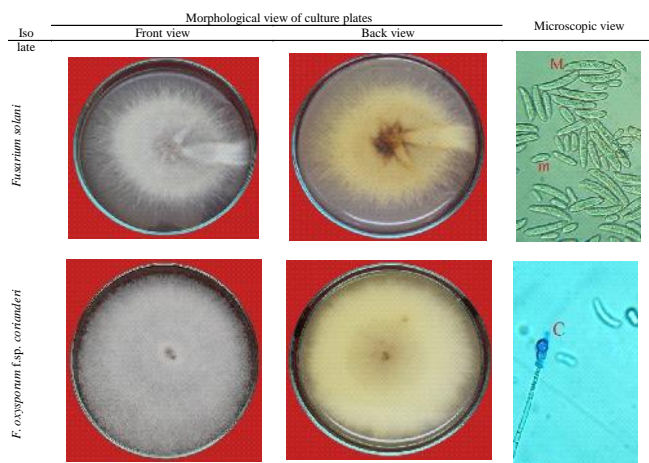
## OBSERVATIONS AND ANALYSIS

Major incidence of root rot and wilt diseases were recorded (Table 1) during survey in most of the growing areas. The per cent disease incidence was noticed in all the locations surveyed with a range of 26 to 38 per cent. These soil borne pathogens caused yellowing of leaves followed by vascular discolouration and drying of tap root. Initially, the tap root of infected plants showed a reddish brown discoloration which later extended larger and became darker. In severe stage of infection, the death of plants was observed.

Out of survey, mostly two fungal pathogens *viz.*, *Fusarium solani* and *Fusarium oxysporum* f.sp. *corianderi* (Plate 1.) were isolated from the diseased samples. Pure cultures were obtained with hyphal tip isolation technique. Pure culture of *Fusarium* spp. in Petri plate looked off white in colour and in compound microscope, hyphae looked hyaline, white to creamish aerial mycelia with abundant chlamydospores in singles or in pairs on terminal or intercalary hyphae either single or sometimes in chain. Microconidia were formed on long monophialides with  $2.2-5 \times 8.7-15.6 \mu\text{m}$  in size. Macroconidia borne on short conidiophores were curved, thick walled, 3-5 septate,  $3.4-5.8 \times 28-52 \mu\text{m}$  long. The pathogen was identified based on their morphological and cultural characters as of *Fusarium oxysporum* f.sp. *corianderi* (Muthulakshmi *et al.*, 2002), *Fusarium*

**Table 1 : Survey for incidence of soil borne diseases of coriander in Andhra Pradesh**

Sr. No.	District	Mandal	Disease incidence (%)	
			Root rot	Wilt
1.	Kadapa	Railway kodur	24.93	0.00
		Kadapa	31.86	1.00
		S. Mydukur	26.68	3.50
		District Mean	27.10	2.38
2.	Kurnool	Kurnool	48.14	12.00
		Kallur	23.85	9.33
		Orvakallu	44.40	3.00
		District Mean	38.71	10.35
3.	Guntur	Duggirala	35.82	5.50
		Guntur	43.53	8.50
		Mangalagiri	29.72	8.50
		District Mean	36.42	7.11
4.	Prakasam	Darsi	28.86	4.50
		Inkollu	27.27	5.25
		Kosirapadu	24.09	5.25
		District Mean	26.73	3.03



**Plate 1 : Morphological and microscopic characters of *Fusarium* isolates**  
**M- Macroconidia m- Microconidia C- Chlamydospore**

*solani* (Nelson *et al.*, 1983). Further *F. solani* identification was confirmed from NCFT, New Delhi (9002.17). Bhaliya and Jadeja, 2013 and 2014 reported *F. solani* as a causal agent of root rot.

Highest disease incidence of root rot (38.71%) and wilt (10.35%) was observed in Kurnool district because the disease is soil and seed borne, occurred in severe may be by the use of infected seed and the environmental conditions favoring the pathogen multiplication. Least disease incidence of root rot (26.73%) and wilt (3.03%) was observed in Prakasam district, since Carbendazim was used for seed treatment and the area may be free of soil borne dormant chlamydospores. Thus it is concluded that root rot (*Fusarium solani*) and wilt (*Fusarium oxysporum* f. sp. *corianderi*) diseases in coriander are more prevalent and attempt a greater yield loss. This is the first survey report on severity and incidence of root rot and wilt diseases in the coriander

growing areas of A.P.

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