

Major Diseases of Coriander (*Coriandrum sativum* L.) in Different Growing areas of Ethiopia

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ABSTRACT

Coriander (*Coriandrum sativum* L.) an important annual herb used extensively all over the world. In Ethiopia it is intensively cultivated in the different districts of East Showa, Arsi, and Bale zone of Ethiopia. Survey was conducted in four major producing zone of Ethiopia, to record the incidence of major diseases in coriander. Accordingly root rot and wilt are important diseases prevalently occurring and causing yield loss in most of coriander growing areas of Ethiopia which ultimately causes rotting of roots and wilting of plants. Highest disease incidence (%) of root rot and wilt was observed in Arsi zone 49.5% and 14% respectively. *Fusarium solani* and *Fusarium oxysporum* were isolated from the diseased samples and identified based on their cultural and morphological characteristics. The diseases causing a direct loss in its productivity with an incidence of root rot ranged from 24-49% and wilt ranged from 3-11%.

Keywords: Coriander, *Fusarium* spp., Survey

INTRODUCTION

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 of different food. Coriander 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 tons per hectare in 2014/15 (Spice Board, 2015). In Ethiopia the production and exports of coriander have been increased significantly in the past few years due to strong demand and from the local and abroad markets. But, this crop is highly affected 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 broad range of diseases on various host plants, such as vascular wilts, pre and post emergence blights as well as root and stem rots (Pascale *et al.*, 2002; Schollenberger *et al.*, 2006). The disease symptoms were observed in scattered patches in the cultivated fields. Soil borne pathogens cause a major damage to crop and cause 10 per cent yield loss on coriander (Muthulakshmi *et al.*, 2002). Therefore the present investigation was undertaken to know the diseases incidence and

detection of pathogens associated with coriander in the major growing areas of Ethiopia.

MATERIALS AND METHODS

A survey was conducted during 2016 and 2018 main cropping season, to record the diseases incidence in coriander growing areas of Ethiopia (East Showa, Arsi and Bale zones). Fields were assessed for incidence of major diseases of coriander and identification of the pathogen. Within selected fields a quadrant of 0.5m x 0.5m was thrown and disease incidence were taken for every quadrant by crossing the fields diagonally and the number of plants showing typical root rot and wilt symptoms and the total number of plants were recorded. Percent disease incidence was calculated by using the following formula.

$$\text{Disease Incidence (\%)} = \frac{\text{No. of diseased plants}}{\text{Total no. of plants observed}} * 100$$

Isolation and Identification of the Pathogen

The infected portions of plants showing symptoms of root rot, vascular discoloured and premature dried plants were selected for tissue isolation and 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,

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blot dried and then transferred to sterilized Petri-dishes containing potato dextrose agar (PDA) media. 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 literature.

RESULTS AND DISCUSSION

Incidence of root rots and wilts diseases were recorded (Table 1) during survey in most of the coriander growing areas of Ethiopia. The percent disease incidence was noticed in all the locations surveyed with a range of 24 to 49%. These soil borne pathogens caused yellowing of leaves followed by vascular discoloration 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.

During survey, majorly two fungal pathogens viz. *Fusarium solani* and *Fusarium oxysporum*

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 white to creamish aerial mycelia with abundant chlamydospores in singles or in pairs on terminal either single or sometimes in chain. The pathogen was identified based on their morphological and cultural characters (Bhaliya and Jadeja, 2014).

Table 1. Incidence of root rot and wilt disease of coriander at major growing areas of Ethiopia.

S/no	Zone	Districts	Disease incidence (%)	
			Root rot	Wilt
1	East showa	Chafedonsa	25.16	5
		Akaki	32.28	7.2
		Debrezeit	28.2	5.8
	Mean	26.1	3.25	
2	Arsi	HelaZambaba	49.5	14
		HelaTareta	24.23	11.3
		ZambabaHela	43.5	5.2
	Mean	39.36	11.56	
3	Bale	Goro	34.56	6.8
		Ginnir	44.52	7.8
		Gololcha	28.72	8.9
	Mean	34.54	8.21	

Morphological view of the cultures

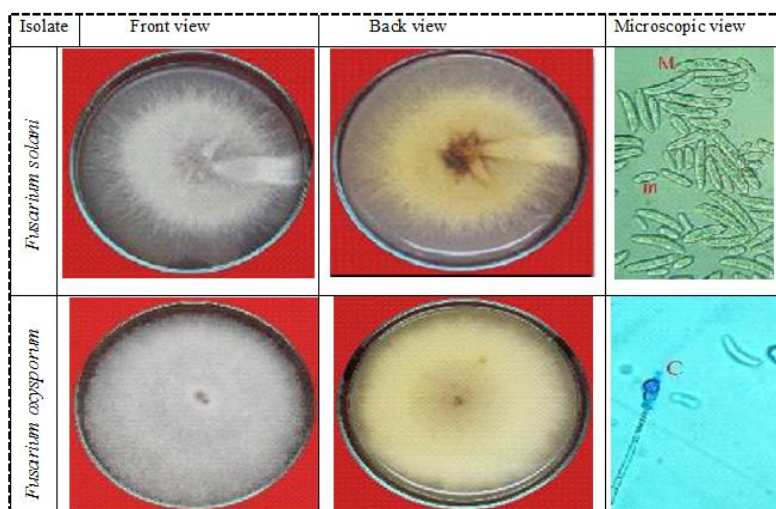


Fig1. Morphological and Microscopic characteristics of *Fusarium* isolates from coriander

M- Macroconidia m- Microconidia C- Chlamydospore

Highest disease incidence of root rot (49.5%) and wilt (14%) was observed in Hela Zambaba 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

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disease incidence of root rot (24.23%) and wilt (5%) was observed in HelaTareta and Chafedonsa districts, since farmers are used the pesticides and the area may be free of soil borne dormant chlamydos pores. Due to this root rot (*Fusarium solani*) and wilt (*Fusarium oxysporum*) diseases in coriander are more prevalent and attempt a greater yield loss. This is the first survey report on incidence of root rot and wilt diseases in the coriander growing areas of Ethiopia. Therefore integrated disease management potions should be developed for those major disease identified on the coriander.

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