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Research Article

Survey for the Incidence of Groundnut Collar Rot Disease in Major Growing Areas of Rayalaseema Region, Andhra Pradesh, India

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ABSTRACT

To monitor collar rot disease of groundnut, roving survey was carried out in the groundnut growing areas of two major districts of Rayalaseema region viz. Anantapur and Chittoor during Kharif season in 2013. To assess incidence of collar rot disease, six representative mandals in each district were selected. Clear disease symptoms were noted in the fields during the season. In Anantapur district, the disease incidence was in the range of 13.33 % (Reddipalli) to 39.17 % (Thimmanacherla) whereas in chittoor district, it was in the range of 14.17 % (Ramapuram) to 38.33 % (Rangampeta).

Keywords: *Groundnut, Collar rot, Disease incidence, Rayalaseema*

INTRODUCTION

Groundnut crop (*Arachis hypogaea* L.) is an important food, fodder and cash crop for small farmers. Groundnut is cultivated around the world in tropical, sub-tropical, warm and temperate climates. It is grown in 12.29 M ha in Asia, 14.62 M ha in Africa and 0.51 M ha in Northern and Southern America and in other parts of the world. India and China are the largest producers of groundnut with China having a share of about 41.5 per cent of overall world production followed by India (18.2 per cent) and United States of America (6.8 per cent). The world average production of groundnut is 34.43 million tonnes (USDA-2010). In India, the total area under groundnut crop is 6.70 M ha with a total production of 7.16 million tonnes. Andhra Pradesh occupies an area of 1.76 M ha and annual production of 0.95 million tonnes. In southern districts of Andhra Pradesh, Anantapur is the largest producer of groundnut in an area of 0.89 M ha with a total production of 0.11 million tonnes (CMIE-2010). Approximately, eighty per cent of the world groundnut crop is grown in developing countries including India where the yields are usually low. Among several biotic and abiotic constrains of groundnut production, diseases are the major causes of poor yields in the state. Among the diseases, collar rot is one of the most important disease. Generally the collar rot affected seeds showed the blackish testa, rotted internal tissue. In case of emerging hypocotyledons, affected seedlings showed yellow colored and rotten cotyledons. The collar rot affected mature plants showed wilting and rotting of the tissue just below the ground level.

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The affected portion turned dark, shrunken and shredded, and later covered by black spores of the pathogen. Collar rot is a serious problem in sandy soil (Gibson 1953; Chohan 1965). Ghewande *et al.* (2002) reported the losses in terms of mortality of plants due to collar rot was in the range of 28 to 50 per cent. Collar rot caused by *Aspergillus niger* resulted in an average of 5 per cent yield loss but in some areas it cause as high as a 40 per cent loss. Based on these reports, the present survey was undertaken to understand the disease situation in majaor groundnut growing areas i.e., Anatapur and Chittoor districts in Rayalaseema region of Andhra Pradesh, India.

MATERIALS AND METHODS

Survey

Roving survey was conducted in groundnut growing mandals of Anantapur and Chittoor districts of Andhra Pradesh during *Kharif* 2013. In each district, six mandals were selected and in each mandal, three villages were selected for the study of disease incidence (Table 1). In each village, five fields were selected randomly and the disease incidence was calculated in a square metre area at five different places in a field. The Per cent disease incidence was calculated using the following formula.

Per cent disease incidence = (No of diseased plants / Total number of plants observed)×100

Isolation and Identification of Pathogen

The pathogen was isolated from the representative samples of each mandal from stems of infected groundnut plants by tissue segment method using Potato Dextrose Agar (PDA) medium. The infected collar portions was cut with sterilized blade into small bits of 1 cm and were surface sterilized by dipping in 0.1 per cent sodium hypochlorite for 30 seconds followed by 3 washings in sterile distilled water before placing on PDA. The plates were incubated at 28 ± 1°C and observed periodically for growth of the fungus. Axenic culture of the pathogen was obtained by single hyphal tip method and maintained on PDA slants throughout the present investigation. The pathogen associated with the disease in the pure form obtained on Potato Dextrose Agar medium was identified based on mycelial growth and spore production characters as per Barnett and Hunter, 1972.

RESULTS AND DISCUSSION

The disease incidence of 26.39 % was recorded in Anantapur district and Chittoor district was recorded with 24.89 %.

In Ananthapur district, the disease incidence was ranged in between 13.33 % (Reddipalli) to 39.17% (Thimmanacherla). The highest average disease incidence (31.39 %) was recorded in Gunthakal mandal followed by Tadipatri (28.33 %) and Gooty (28.06 %). The incidence 24.44 % was recorded in both Singanamala and Yadiki mandals, while the lowest average disease incidence (21.67 %) was recorded in Bukkaraya Samudram mandal (Table 1)

In Chittoor district, the disease incidence was ranged in between 14.17 % (Ramapuram) to 38.33 % (Rangampeta). The highest average disease incidence (33.89 %) was recorded in Chandragiri mandal followed by Pakala (29.17 %). The incidence of 24.16% , 23.61 % and 23.06 % was recorded in Bangarupalyam , Tirupati rural and Vadamalpeta, respectively. The lowest average disease incidence (15.56 %) was recorded in Ramachandrapuram mandal (Table 1)

The high incidence of disease was observed in sandy loam soils compared with black soils. In black soils, most cases were found with below 20 % disease incidence (Table 1). No significant difference in the disease incidence distribution was found among irrigation and rainfed conditions (Table 1).

The present results were in accordance with the findings of Nandeesha *et al.* (2013), who conducted a roving survey for the occurrence of collar rot disease in and around Tirupati in Andhra Pradesh and reported 11.21 % of disease incidence in Srikalahasti and least 6.47 % in Chandragiri. The present results suggesting high incidence

of disease in sandy loam soils compared with black soils and it also supported by the findings of Gibson 1953 and Chohan 1965.

The pathogen *Aspergillus niger* was isolated using potato dextrose agar medium. Based on mycological keys, the pathogen was identified as *A. niger*. Microscopic examination of fungal culture revealed that, morphologically the fungus having upright and small conidiophores, terminate with globose swelling, bearing phialides radiating from the entire surface (Plate 1). The conidia were found to be one celled, globose, light to dark brown produced basipetally. Mycelium was hyaline, branched and septate. The colony characters include initially white color colony and later turned to grayish white with numerous dark black colored spore mass on PDA medium after three to four days of inoculation. The present results were in support with the findins of Radhaiah and Devamma (2013), who isolated same pathogen i.e *Aspergillus niger* from collar rot affected groundnut plants.

Table 1: Groundnut collar rot disease incidence in Anantapur and Chittoor distrcts of Rayalaseema region, Andhra Pradesh

District	Mandal	Village	Soil type	Irrigated /Rainfed	Collar rot disease incidence (%)		
					Mean disease incidence in Village	Mean disease incidence in mandal	Mean disease incidence in district
Chittoor	Bangarupalyam	Nalagampalli	Sandy loam	Rainfed	31.67		
		Gollapalli	Black	Rainfed	15.83	**23.61**	
		Cheekurupalli	Sandy loam	Rainfed	23.33		
	Pakala	Pachipalapalli	Sandy loam	Rainfed	28.33		
		Damalacheruvu	Black	Rainfed	22.50	**29.17**	
		Nendragunta	Sandy loam	Irrigated	36.67		
	Vadamalpeta	Devaraju Kandriga	Black	Rainfed	25.83		
		Pudi	Black	Irrigated	15.00	**23.06**	
		Kalluru	Sandy loam	Rainfed	28.33		**24.89**
	Chandragiri	Dorna Kambala	Sandy loam	Rainfed	30.83		
		Ithepalle	Sandy loam	Rainfed	32.50	**33.89**	
		Rangam peta	Sandy loam	Rainfed	38.33		
	Tirupati rural	Peruru	Sandy loam	Rainfed	21.67		
		Sanambatla	Sandy loam	Irrigated	22.50	**23.61**	
		Durga samudram	Sandy loam	Rainfed	26.67		
	Ramachandrapuram	Ramapuram	Sandy loam	Rainfed	14.17		
		Anupalle	Black	Rainfed	16.67	**15.56**	
		NAdavaluru	Sandy loam	Rainfed	15.83		
Anantapur	Bukkaraya Samudram	Reddipalli	Sandy loam	Irrigated	13.33		
		Govindapalli	Sandy loam	Rainfed	20.00	**21.67**	
		Chedulla	Sandy loam	Rainfed	31.67		
	Singanamala	Narayanavari palli	Sandy loam	Rainfed	18.33		
		Tarimela	Sandy loam	Rainfed	25.83	**24.44**	
		Korivipalle	Sandy loam	Rainfed	29.17		
	Tadipatri	Uliproddutur	Black	Irrigated	28.33		
		Ayyavaripalle	Sandy loam	Rainfed	30.83	**28.33**	
		Putlur	Sandy loam	Rainfed	25.83		**26.39**
	Gooty	Kojjepalli	Sandy loam	Rainfed	16.67		
		Dharmapuram	Sandy loam	Rainfed	30.00	**28.06**	
		Ubicherla	Sandy loam	Rainfed	37.50		
	Guntakal	Thimmanacherla	Black	Rainfed	39.17		
		Sangala	Sandy loam	Rainfed	26.67	**31.39**	
		Gonderla	Sandy loam	Rainfed	28.33		
	Yadiki	Rayala cheruvu	Black	Rainfed	24.17		
		Kamalapadu	Sandy loam	Rainfed	26.67	**24.44**	
		Nitturu	Sandy loam	Rainfed	22.50		

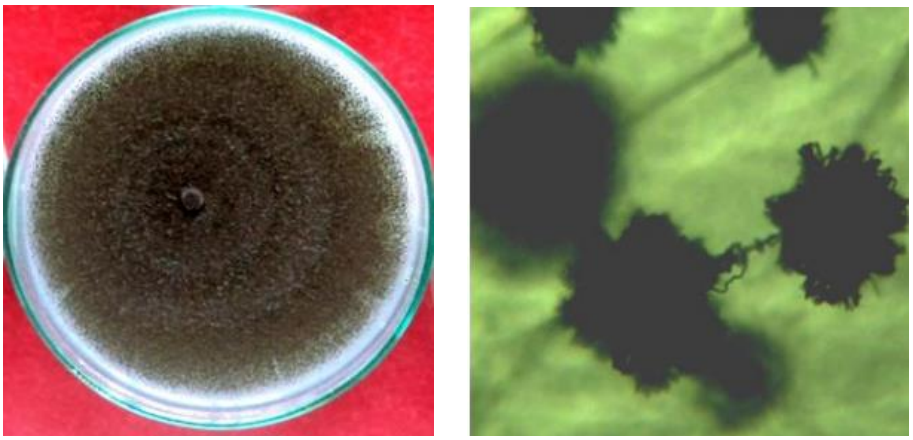

Plate 1. *Aspergillus niger* culture on PDA medium (left) and Conidial head at 100X (right) of Pakala mandal.

CONCLUSION

The results of the study indicated that collar rot disease is distributed in all the major groundnut producing districts of Rayalaseema region and the pathogen associated with the diseases if *Aspergillus niger*. Therefore, timely and possible management strategies are of at most important to control this potential threat.

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