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Survey on dry-root rot incidence in acid lime in Nellore and Kadapa districts of Andhra Pradesh and identification of major dry-root rot causing pathogen in acid lime

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Abstract

A roving survey was conducted in total 16 locations belonging to four mandals of Nellore and Kadapa districts of Andhra Pradesh, for recording the prevalence and distribution of root rot incidence in acid lime caused by various pathogens *Fusarium*, *Rhizoctonia*, *Phytophthora*, *Diplodia* and *Ganoderma*. The per cent disease incidence in the surveyed locations was in the range of 2.70 per cent to 11.42 per cent. The root rot disease incidence was found to be high in Rapur mandal (8 per cent) followed by Podalakur mandal (5.8 per cent) of Nellore district. The incidence of root rot diseases was low in Kadapa district (3.59 per cent) comparatively. Among the surveyed locations, most of the plants were infected by dry-root rot disease caused by *Fusarium solani*.

Keywords: Dry-root rot incidence, survey, percent disease incidence, *Fusarium solani*

1. Introduction

Citrus is a good source of vitamin C. It contains many essential nutrients including carbohydrates, potassium, phosphorus, vitamin B6, riboflavin and pantothenic acid. The fruits are extensively used for pickles, syrups, cordials, squashes and manufacture for citric acid and for table purpose in the daily life of Indians. The fruit is valued not only for its nutritional qualities but also for medicinal purposes. In India, citrus ranks third in production after banana and mango. India is the largest producer of acid lime in the world and is cultivated in almost all the states. Andhra Pradesh, Odisha, Maharashtra, Telangana, Bihar, Chhattisgarh and Karnataka are the major growing states. In India, acid lime occupies an area of 259.3 thousand hectares with a production of 2789.0 thousand MT having productivity 10.8 MT/ha in 2016-17 (NHB, 2017) ^[1]. Andhra Pradesh has an area of 52.53 thousand hectares under citrus with a production of 840.55 thousand MT having productivity 16.00 MT/Ha and holds the first rank in acid lime production accounting for nearly 75% of the total lime production in the country. The common variety under cultivation is Kagzi lime and in Andhra Pradesh, majorly cultivated varieties are Balaji and Petlur Pulusu Nimma.

Acid lime is majorly grown in Nellore, Kadapa, Prakasham, Guntur, West Godavari, East Godavari and Anantapur districts of Andhra Pradesh. Acid lime holds the most remunerative position over other crops in Nellore district. Gudur town of Nellore district is the largest market for acid lime in the country. The main factors of citrus decline abetting the production are diseases, shallow soils and poor management. Acid lime is affected by number of fungal, bacterial and viral diseases (Gopal *et al.*, 2000) ^[2]. Among fungal diseases root-rots are economically important diseases caused by *Fusarium*, *Rhizoctonia*, *Phytophthora*, *Diplodia* and *Ganoderma*. Keeping in view the importance of acid lime and the severity of the diseases caused by soil borne pathogens the present investigation was aimed to record the incidence of soil borne diseases in different mandals of Nellore and Kadapa districts of Andhra Pradesh.

2. Materials and Methods

2.1. Survey on the incidence of soil borne diseases of acid lime in Nellore and Kadapa districts of Andhra Pradesh

A roving survey was conducted in acid lime orchards for collecting root samples from infected plants at farmer's field in Nellore and Kadapa districts of Andhra Pradesh during the year

2018-2019. A total of 16 locations were surveyed from Nellore and Kadapa districts of Andhra Pradesh. In each district, two mandals were selected and in each mandal two villages were selected and in each village two orchards were selected taking four plots per orchard. In each orchard randomly 25 plants per plot were observed for calculating percent disease incidence. Percent disease incidence was assessed by counting the number of affected plants out of the total plants observed.

$$PDI = \text{Total no. of infected plants} / \text{total no. of plants observed} \times 100$$

The root samples from infected plants were collected for the isolation of major pathogen responsible for soil borne diseases in acid lime. Among many root-rot causing fungal pathogens, dry-root rot causing pathogen was the major and the pathogen was identified following isolation for further studies.

2.2. Isolation of pathogen from infected plants

The infected root portions were washed thoroughly under tap water followed by rinsing in distilled water. A small portion of diseased tissues along with a portion of adjacent healthy tissue were cut into small bits (3 to 5 mm in length) and surface sterilized with 2% sodium hypochlorite solution for three minutes. The sterilized bits were later rinsed thrice with sterilized distilled water. The completely surface sterilized root bits were inoculated aseptically on sterilized petri plates containing Potato Dextrose Agar (PDA) medium supplemented with streptomycin sulphate to prevent bacterial contamination. The inoculated petri plates were incubated at 25 ± 2 °C for five to six days. When the fungal colony was developed, a small bit of single hyphal tip was transferred on to another petri plate containing PDA medium to maintain pure culture.

2.3. Pathogenicity

Pathogenicity test was carried out using a root dip inoculation method. Healthy seedlings of acid lime (2 months old) were uprooted gently from the nursery. The roots of seedlings were dipped in a spore suspension of pathogen containing 10^6 spores per ml for 5 min, dried briefly on a tissue paper and then seedlings were transplanted into the pots filled with sterile soil. Three replications were maintained and the plants were irrigated regularly. The seedlings were assayed regularly for the development of symptoms. After symptom development, the associated fungus was re-isolated from inoculated seedlings to confirm recovery of the pathogen and the re-isolated cultures were examined with original culture, thus proving pathogenicity.

3. Results and Discussion

3.1. The incidence of root rot diseases of acid lime in Nellore and Kadapa districts of Andhra Pradesh

The results (Table 1) indicated that, the per cent disease incidence in the surveyed locations was in the range of 2.70 per cent to 11.42 per cent. In Nellore district, the disease incidence ranged from, 3.30 per cent to 11.42 per cent.

However, in Rapur mandal, two villages were surveyed and the disease incidence ranged from 11.42 per cent (Tumaya village) to 4 per cent (Nayanapalli village). The maximum disease incidence was noticed at one of the fields of Tumaya village (11.42 per cent) than the other locations that were surveyed in Rapur mandal.

In Podalakur mamdal, two villages were surveyed and the disease incidence ranged from 6.73 per cent (Marripalli village) to 3.3 per cent (Sri hari colony). The maximum disease incidence was noticed at one of the fields of Marripalli village (6.73 per cent) than the other locations that were surveyed in Podalakur mandal.

In Kadapa district, the disease incidence ranged from 2.70 per cent to 4.40 per cent. However, in Obularipalli mandal, two villages were surveyed and the disease incidence ranged from 3.5 per cent (Chennarajupodu village) to 2.7 per cent (Y. Kota). A maximum disease incidence of 3.5 per cent was recorded in one of the fields of Chennarajupodu village than the other locations that were surveyed in Obularipalli mandal. In Chitvel mandal, two villages were surveyed and the disease incidence ranged from 3.18 per cent to 4.40 per cent (C. Kandulavaripalli).

The data from the table revealed that during this year, in Nellore district, the village mean disease incidence observed in the two villages of Rapur mandal ranged from 4.65 per cent to 11.35 per cent. The village mean disease incidence observed in the two villages of Podalkur mandal ranged from 5.15 per cent to 6.46 per cent.

It is revealed from the table that the village mean disease incidence in the two villages of Obularipalli ranged from 2.87 per cent to 3.45 per cent. The village mean disease incidence observed in the two villages of Chitvel mandal ranged from 3.79 per cent to 4.25 per cent.

The maximum mean per cent disease incidence was recorded from Rapur mandal (8 per cent) followed by Podalakur mandal (5.8 per cent). The overall mean of Nellore district was 6.9 per cent. Whereas, the minimum percent disease incidence was reported from the mandals of Kadapa district ranging from 3.16 per cent (Obularipalli mandal) to 4.02 per cent (Chitvel mandal). The overall mean of Kadapa district was 3.59 per cent.

Gopal *et al.* (2005) ^[3], conducted a survey in four districts viz., Chittoor, Kadapa, Nellore, Guntur and the disease incidence varied and ranged from 9.4 per cent (Chundur) to 32.1 per cent (Petlur). The mean disease incidence was high in Nellore district followed by Kadapa (17.7 per cent) and Chittoor (14.8 per cent). A low mean disease of 12.3 per cent was recorded in Guntur district.

Reddy and Rao (1960) ^[4], also reported that shallow soils seem to favour early decline of acid lime due to root rot. Dry-root incidence may also occur due to various diverse causes such as excessive moisture, excess or irregular manuring and burrowing nematodes. The disease incidence may be due to raising the acid lime seedlings continuously in the same beds where the inoculum of the pathogen is present Vijay kumar, 2001 ^[5]; Gopal *et al.*, 2000 ^[2].

Table 1: Details regarding survey on the incidence of root rot diseases of acid lime in Nellore and Kadapa districts of Andhra Pradesh during 2018-19

District & Time of collection	Location			PDI*	Longitude & Latitude	
	Mandal	Village	No. of fields			
Nellore Jan, 2019	Rapur	Tumaya	Field 1	11.29 (19.63)	14.1998° N 79.5336° E	
			Field 2	11.42 (19.75)		
		Village mean				11.35 (19.69)
		Nayanapalli	Field 1	5.30 (13.31)		
			Field 2	4.00 (11.54)		
		Village mean				4.65 (12.45)
	Mandal mean			8.00 (16.43)		
	Podalakur	Marripalli	Field 1	6.20 (14.42)	14.3841° N 79.7324° E	
			Field 2	6.73 (15.04)		
		Village mean				6.46 (14.72)
		Sri hari colony	Field 1	7.00 (15.34)		
			Field 2	3.30 (10.47)		
		Village mean				5.15 (13.12)
	Mandal mean			5.80 (13.94)		
District mean				6.90 (15.23)		
District & Time of collection	Location			PDI*	Longitude & Latitude	
	Mandal	Village	No. of fields			
Kadapa Jan, 2019	Obulavaripalli	Chennarajupodu	Field 1	3.40 (10.63)	14.0375° N 79.2648° E	
			Field 2	3.50 (10.78)		
		Village mean				3.45 (10.70)
		Y. kota	Field 1	3.05 (10.06)		
			Field 2	2.70 (9.46)		
		Village mean				2.87 (9.75)
	Mandal mean			3.16 (10.24)		
	Chitvel	Kasturivaripalli	Field 1	4.31 (11.98)	14.1728° N 79.3290° E	
			Field 2	4.19 (11.81)		
		Village mean				4.25 (11.90)
		C. Kandulavaripalli	Field 1	3.18 (10.27)		
			Field 2	4.40 (12.11)		
		Village mean				3.79 (11.23)
	Mandal mean			4.02 (11.57)		
District mean				3.59 (10.92)		

3.2. Identification of pathogen

The isolated pathogen was identified as *Fusarium solani* and the further identification of the pathogen up to species level was confirmed at National Centre for Fungal Taxonomy (NCFT), New Delhi as *Fusarium solani* (NCFT, 9624.19). The dry-root rot disease caused by *Fusarium solani* was the major among soil borne diseases of acid lime in Andhra Pradesh.

4. Conclusion

Among all the root rots, dry root caused by *Fusarium solani* was the major cause for the decline of citrus in the surveyed areas. A percentage disease incidence of 6.9 per cent and 3.59 per cent was observed in Nellore and Kadapa districts, respectively. Based on cultural and morphological characters, the pathogen was identified as *Fusarium solani* (NCFT - 9624.19) which was confirmed at National Centre for Fungal Taxonomy (NCFT), New Delhi. As this pathogen constrains the production of the crop, there is a need for the farmers to implement integrated approach for the qualitative control of the disease.

5. References

1. NHB. Indian Horticulture Data base, National Horticulture Board. Government of India, 2017.
2. Gopal K, Subbi Reddy G, Reddy MRS, Chenchu Reddy B, Ramakrishna Rao A, Madhavi M, *et al.* Citrus decline in Andhra Pradesh causes and their management. Paper presented in International Symposium on Citriculture

held at Nagpur, November 23-27, 1999 at NRCC, Nagpur, India, 2000, 107.

3. Gopal K, Ahammed SK, Babu P. Survey and screening of citrus root stocks against dry root-rot disease. *Geobios.* 2005;32(4):229-32.
4. Reddy GS, Paparao A. Problems of sweet orange decline in Andhra Pradesh. *Andhra Agricultural Journal.* 1960;7:175-88.
5. Vijay KB. Studies on dry root-rot disease of acid lime (*Citrus aurantifolia* Swingle) nursery. M. Sc. Thesis, Acharya N.G. Ranga Agriculture University, Hyderabad, 2001.