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Survey for the incidence of basal stem rot in major arecanut growing areas of Karnataka

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Abstract

In the current study, a two year random roving survey *viz.*, 2019-20 and 2020-21 was conducted in major arecanut growing areas of Karnataka *viz.*, Shivamogga, Chikmagalur, Davanagere, Udupi, Uttara Kannada, and Dakshina Kannada districts. In 2019-20, the mean maximum disease incidence (18.17%) was recorded in Shivamogga district, followed by Davanagere (12.64%), and the mean lowest disease incidence (2.42%) was noticed in Dakshina Kannada district. During 2020-21, the mean maximum disease incidence (18.53%) was recorded in Shivamogga district, followed by Davanagere (13.95%), and the least disease incidence (2.55%) was noticed in Dakshina Kannada district. Among several soil types surveyed, mean maximum disease incidence (11.14% in 2019-20 and 11.71% in 2020-21) was noticed in red sandy soils in both the years. During both the years, maximum mean disease incidence was noticed in palms of age group greater than 30 years old and in gardens where flooding method of irrigation was practiced.

Keywords: roving survey, disease incidence, soil type, irrigation

Introduction

Arecanut is one of the important plantation crop grown in most parts of Tropical Asia and East Africa. It is the source of chewing nut, which is the economic part of this arecanut. India is one of the major producer and consumer of arecanut in the world. In India, Karnataka accounts for major production and productivity. Among several biotic stresses attacking arecanut, basal stem rot caused by *Ganoderma* spp. is one of the severe problem causing huge economic losses especially in old, ill-drained and neglected gardens. *Ganoderma* wilt is also called 'Aneberoga' in the Kannada language, which means a disease caused by mushrooms. In some localities, the entire arecanut plantation has been wiped out because of this *Ganoderma* wilt. In neglected gardens, the mortality rate of palms is observed as high as 94 per cent (Butler, 1906)^[1]. Later, some researchers found a death rate of five per cent or eight per cent in neglected gardens (Naidu *et al.*, 1966)^[3]. According to a survey conducted by CPCRI, RC, Kahikuchi, disease incidence of this basal stem rot ranged from 1-65 per cent in Assam (Chakrabarty *et al.*, 2013)^[2]. Narayanaswamy *et al.* (2018)^[5] surveyed Karnataka during 2009-10 for basal stem rot of arecanut and reported the losses of palms from 5 to 12 per cent in maiden areas of Shimoga, Davanagere, Chitradurga, and Chickmangalore districts.

Materials and Methods

An extensive roving survey was conducted during 2019-20 and 2020-21 in six different arecanut growing districts of Karnataka, *i.e.*, Shivamogga, Davanagere, Chikmagalur, Udupi, Uttara Kannada, and Dakshina Kannada. In each district, three major arecanut growing taluks were selected, and in each taluk, three villages were selected, and in each village, three gardens were selected for the survey. In each garden, 50 plants were chosen randomly for observations such as the age of the palm, soil type, GPS coordinates, presence of fruiting bodies, per cent disease incidence, *etc.*

Per cent disease incidence was calculated by using the formula,

$$\text{Disease incidence (\%)} = \frac{\text{Total number of affected palms}}{\text{Total number of palms observed}} \times 100$$

Results and Discussion

The roving survey was conducted during 2019-20 and 2020-21 for assessing the incidence of *Ganoderma* wilt in major arecanut growing areas of Shivamogga, Chikmagalur, Davanagere, Udupi, Uttara Kannada, and Dakshina Kannada. Survey data revealed that, during 2019-20, maximum disease incidence (24.86%) was recorded in Bhadravathi taluk of Shivamogga followed by Shikaripura taluk (15.93%). Incidence was nil in Sullia and Puttur taluks of Dakshina Kannada. Among six districts surveyed, the mean maximum disease incidence (18.17%) was recorded in Shivamogga, followed by Davanagere (12.64%), and the mean lowest disease incidence (2.42%) was noticed in Dakshina Kannada district, respectively (Table 1). During 2019-20, mean disease incidence (%) in major arecanut growing districts of Karnataka was observed in the following order Shivamogga > Davanagere > Chikmagalur > Uttara Kannada > Udupi > Dakshina Kannada.

Survey results during 2020-21 revealed that maximum disease incidence (26.00%) was observed in Bhadravathi taluk of Shivamogga followed by Chennagiri (17.01%), and disease incidence was not noticed in Puttur taluk of Dakshina Kannada. Among the districts surveyed during 2020-21, the mean maximum disease incidence (18.53%) was recorded in Shivamogga, followed by Davanagere (13.95%), and the least disease incidence (2.55%) was noticed in Dakshina Kannada district (Table 2). Mean disease incidence (%) in major arecanut growing districts of Karnataka during 2020-21 was observed in the following order Shivamogga > Davanagere > Uttara Kannada > Chikmagalur > Udupi > Dakshina Kannada.

In the perusal of two years survey data, it is observed that maximum disease incidence (18.17% in 2019-20 and 18.53% in 2020-21) was recorded in Shivamogga and minimum disease incidence (2.42% in 2019-20 and 2.55% in 2020-21) was noticed in Dakshina Kannada districts of Karnataka.

The two-year random roving survey data took up during the year 2019-20 and 2020-21 indicated that incidence of basal stem rot disease varied from one district to another district, and Shivamogga district showed maximum disease incidence in both years. This may be due to favorable environmental conditions such as relative humidity, temperature prevailed in that region favored pathogen spread and multiplication or the soil type, cultivation practices, and lack of management practices undertaken by the farmers. Whereas Uttara Kannada district showed the lowest disease incidence in both the years, this might be due to unfavorable conditions prevailed in that

region for pathogen spread and multiplication, varieties used may be resistant to pathogen attack or clean maintenance of orchids and following proper management practices by the farmers.

Even though the disease was observed in many soil types viz., red sandy, red laterite, red loamy, and black soils, mean maximum disease incidence (11.14% in 2019-20 and 11.71% in 2020-21) was noticed in red sandy soils in both the years. This is due to the influence of red sandy soil type on the growth, multiplication, and spread of *Ganoderma*. Palms of age group greater than 30 years showed maximum disease incidence in both the years (13.49% in 2019-20 and 11.80% in 2020-21). Basal stem rot of arecanut is generally observed in ill-drained and old orchards. Maximum disease incidence in old orchards is due to the susceptibility of older palms to *Ganoderma* infection. In both years, maximum disease incidence (13.95% in 2019-20 and 14.56% in 2020-21) was observed in gardens where farmers practice flooding irrigation methods. Flooding method of irrigation favored pathogen spread quickly by carrying basidiospores to its neighboring palms. In gardens where arecanut is intercropped with coconut, maximum disease incidence (14.31% in 2019-20 and 16.31% in 2020-21) was observed (Table 3). *Ganoderma* has a wide host range, and coconut is one of the important hosts for *Ganoderma* causing basal stem rot. Because of this reason, arecanut gardens intercropped with coconut recorded maximum disease incidence.

Naik and Venkatesh (2001)^[4] noticed the occurrence of basal stem rot of coconut mostly in red sandy soils in Arsikere taluk of Hassan district, and the disease incidence was ranged between 6.06 to 36.15 per cent. Palanna *et al.* (2020)^[8] observed maximum disease incidence in sandy soils followed by red soils. They also stated that the flooding method of irrigation with canal water favored the disease spread. According to Palanna *et al.* (2017)^[6], the *Ganoderma* wilt of arecanut occurred especially in dry tracts of Southern Karnataka. Basal stem rot disease was observed to be causing a loss of 5 to 12 per cent in maidan areas of Shivamogga, Chikmagalur, Davanagere, and Chitradurga districts (Narayanawamy *et al.*, 2018)^[5]. During 2014-15, *Ganoderma* incidence was ranged from 0 to 55 per cent in dry southern tracts of Karnataka, and Tumkur district recorded maximum disease incidence (19.3%). Disease incidence was less in gardens under drip/sprinkler type of irrigation compared to the gardens under flooding type of irrigation (Palanna *et al.*, 2018)^[7]

Table 1: Mean per cent disease incidence of basal stem rot of arecanut in Karnataka during 2019-20

Sl. No.	District	Taluk	No. of gardens visited	Taluk mean PDI	District mean PDI
1	Shivamogga	Bhadravathi	09	24.86	18.17
		Shikaripur	09	15.93	
		Shivamogga	09	13.73	
2	Chikmagalur	Koppa	09	6.60	8.34
		Kadur	09	7.50	
		Tarikere	09	10.94	
3	Davanagere	Chennagiri	09	13.21	12.64
		Harihar	09	11.36	
		Honnali	09	13.35	
4	Udupi	Karkala	09	1.73	4.75
		Brahmavar	09	7.93	
		Kundapura	09	4.60	
5	Uttara Kannada	Sirsi	09	10.26	8.09
		Siddapur	09	4.70	
		Haliyal	09	9.33	

6	Dakshina Kannada	Mangalore	09	7.26	2.42
		Sullia	09	0.00	
		Puttur	09	0.00	

Table 2: Mean per cent disease incidence of basal stem rot of arecanut in Karnataka during 2020-21

Sl. No	District	Taluk	No. of gardens visited	Taluk mean PDI	District mean PDI
1	Shivamogga	Bhadravathi	09	26.00	18.53
		Shikaripur	09	14.60	
		Shivamogga	09	15.00	
2	Chikmagalur	Koppa	09	9.06	7.94
		Kadur	09	7.50	
		Tarikere	09	7.27	
3	Davanagere	Chennagiri	09	17.01	13.95
		Harihar	09	13.50	
		Honnali	09	11.36	
4	Udupi	Karkala	09	4.16	3.95
		Brahmavar	09	3.53	
		Kundapura	09	4.16	
5	Uttara Kannada	Sirsi	09	10.63	9.22
		Siddapur	09	3.93	
		Haliyal	09	13.10	
6	Dakshina Kannada	Mangalore	09	6.50	2.55
		Sullia	09	1.16	
		Puttur	09	0.00	

Table 3: Average disease incidence of basal stem rot of arecanut at different conditions during 2019-20 and 2020-21

Sl. No	Particulars	Average disease incidence (%)			
		No. of gardens visited	2019-20	No. of gardens visited	2020-21
1	Soil type				
	a. Red sandy soil	60	11.14	60	11.71
	b. Red loamy soil	30	9.22	24	7.28
	c. Red laterite soil	60	6.54	60	7.20
	d. Black soils	12	8.41	18	10.20
2	Age of the palm				
	a. < 15 years	15	2.12	12	2.20
	b. 15-30 years	87	7.06	72	7.91
	c. >30 years	60	13.49	78	11.80
3	Irrigation methods				
	a. Flooding	51	13.95	54	14.56
	b. Drip	102	6.42	99	6.72
	c. Sprinkler	9	7.96	9	7.23
4	Cropping pattern				
	a. Arecanut alone	81	6.35	102	6.30
	b. Arecanut + Coconut	42	14.31	39	16.34
	c. Arecanut + Pepper	24	5.91	12	5.80
	d. Arecanut + Coconut + Pepper	12	11.95	12	15.35

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