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RESEARCH NOTE

Hot spots of groundnut pod rot diseases in Northern Karnataka - A Survey

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The major hot spot areas of pod rot of groundnut caused by *Sclerotium rolfsii*, *Rhizoctonia bataticola* and *Fusarium oxysporum* were assessed during the survey *kharif* 2018 in the northern parts of Karnataka (Bagalkote, Belagavi, Dharwad and Gadag). Among these, maximum incidence of pod rot was recorded in Khanagav (54.52 %) village of Gokak taluka, followed by Kavalageri (54.08 %) village of Dharwad taluka and Somapur (50.53 %) village of Hubballi taluka. The minimum incidence of pod rot was recorded in Murgod (16.66 %) village of Savadatti taluka.

Key words: Groundnut, Pod rot, Survey

Groundnut (*Arachis hypogaea* L.) is an annual, amphidiploid, allotetraploid soil enriching leguminous crop plant, it is termed as peanut, monkey nut, king of oilseeds, wonder nut, poor man's cashewnut and goober. It is grown mainly for its edible seeds and one of principal oilseed crops which is widely cultivated in world's tropical and subtropical regions, being predominant crop of small and large farmers. It is categorized as both grain legume and an oil seed crop due to its high oil content. It is mainly rich in oil (40-48 %) followed by protein (22 -27 %). It also contains carbohydrate (26 %), fat (3 %) and high thiamine, niacin and calcium, which makes a substantial contribution of proteins for human beings and animal nutrition (Maiti and Sen, 1991).

Among the different cultivated annual oil seed crops in the world, Groundnut engrossed total area of 26.4 mha with 37.1 MT of total production and 1,550 kgha^{-1} is the average productivity (Anon., 2019). In world, China is the largest producer of groundnut followed by India and Nigeria. There were nine states which produced groundnut more than 100 thousand tonnes *viz.,* Tamil Nadu, Andhra Pradesh, Gujarat, Madhya Pradesh, Rajasthan, Karnataka, West Bengal, Maharashtra and Telangana during 2018-19. Among Indian states, Karnataka ranks fourth in acreage with 0.378 million hectare area with 0.502 million tonnes of total production and productivity of 627 kgha^{-1} (Anon., 2019). Low production of groundnut is attributed to major devasting disease like pod rot, it's a major constraint in groundnut producing areas in northern parts of Karnataka. Pod rot has a complex etiology caused by *Sclerotium rolfsii*, *Rhizoctonia bataticola* and *Fusarium oxysporum*. The research work on pod rot has been carried out one decade ago by Adiver (1996) and Dwarakanath (1994) where they reported that incidence of pod rot ranged from 25 to 46 per cent.

Roving survey was carried out in northern parts of Karnataka *viz.,* Bagalkote, Belagavi, Dharwad and Gadag during *kharif* 2018. Groundnut fields on the survey route were visited at pod development stage or harvesting stage and then ten plants were uprooted in each field randomly. Soil was removed from the pods and disease incidence was recorded based on number of pods showing clear cut visible rotting symptoms on them to the total number of pods present in plant and disease incidence expressed in percentage and associated causal agents of pod rot complex pathogens like *Sclerotium rolfsii*, *Rhizoctonia bataticola* and *Fusarium oxysporum*) were isolated and recorded. These infected pod rot samples were observed for per cent incidence of pod rot (Dwarakanath, 1994) for measuring severity of disease.

Per cent disease incidence was calculated by using formula given below

$$\text{Per cent incidence of pod rot (\%)} = \frac{\text{Number of pods affected}}{\text{Total number of pods observed}} \times 100$$

During *kharif* 2018 season, the roving survey was carried out on pod rot of peanut in northern parts of Karnataka *viz.,* Bagalkot, Belagavi, Dharwad and Gadag for estimation of per cent incidence of pod rot in farmers field (Table 1and Fig. 1). The results showed that per cent incidence of pod rot was ranged between 16.66 to 54.42 per cent.

In Bagalkot district, three taluks were selected for surveying. Among these taluks, in Bagalkot, pod rot incidence in villages like Bhagavathi, Rampur and Benakatti were 32.98, 23.30 and 19.62 per cent, respectively. In Badami taluka, pod rot incidence was recorded of 43.38, 38.23 and 36.12 per cent, respectively in Hoovinahalli, Kamatagi and Ilakal villages.

In Guledagudda taluka, the maximum incidence of pod rot was recorded in Haradolli (29.23 %) followed by Hangarani (22.39 %) and less incidence was recorded in Kotikal (20.89 %). When taluka mean was considered, maximum incidence was recorded in Badami (39.24 %) followed by Bagalkot (25.30 %) and minimum incidence was noticed in Guledagudda (24.17 %) and 29.57 per cent pod rot incidence was observed in the total district mean (Bagalkot).

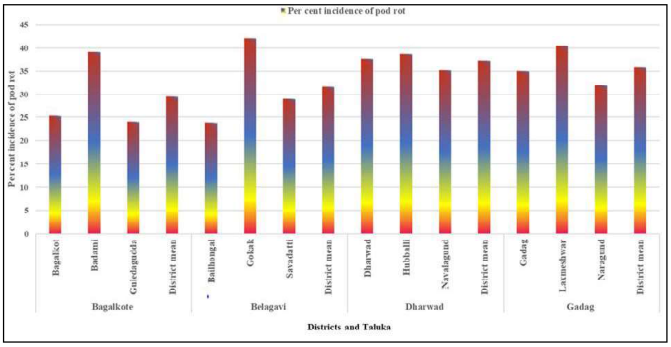

Fig.1. Survey on pod rot of groundnut in northern parts of Karnataka during *kharif* 2018

Table 1a. Survey on pod rot of groundnut in northern parts of Karnataka during *kharif* 2018

District	Taluka	Village	Soil type	Variety	S/I	Crop grown condition	Crop stage	Incidence of pod rot (%)	Previous crop grown	Other diseases noticed
Bagalkot	Bagalkot	Bhagavathi	Black	GPBD-4	S	I	PD	32.98	Maize	LLS, R, SR
		Benakatti	Black	GPBD-4	S	I	PD	19.62	Maize	LLS, R, SR
		Rampur	Black	TMV-2	S	I	PD	23.30	Maize	LLS, R, SR
				Taluka mean				25.30		
	Badami	Hoovinahalli	Black	TMV-2	S	I	PD	43.38	Maize	LLS, R, SR
		Ilakal	Black	TMV-2	S	I	PD	36.12	Maize	LLS, R, SR
		Kamatagi	Black	TMV-2	S	I	PD	38.23	Sorghum	LLS, R, SR
				Taluka mean				39.24		
	Guledagudda	Hangarani	Black	TMV-2	S	I	PD	22.39	Maize	LLS, R, SR
		Haradolli	Black	GPBD-4	S	R	PD	29.23	Sorghum	LLS, R, SR
		Kotikal	Black	TMV-2	S	R	PD	20.89	Sorghum	LLS, R, SR
				Taluka mean				24.17		
				District mean				29.57		
Belagavi	Bailhongal	Bailhongal	Black	GPBD-4	S	R	PD	17.24	Maize	LLS, R, SR
		Bailwad	Red	GPBD-4	S	R/I	PD	21.31	Maize	LLS, R, SR
		Belavadi	Black	GPBD-4	S	R/I	PD	33.33	Cotton	LLS, R, SR
				Taluka mean				23.96		
	Gokak	Khanagav	Black	GPBD-4	S	R/I	PD	54.42	Cotton	LLS, R, SR
		Midakanatti	Black	GPBD-4	S	R	PD	29.48	—	LLS, R, SR
		Vannur	Black	GPBD-4	S	R	PD	42.20	—	LLS, R, SR
				Taluka mean				42.03		
	Savadatti	Halaki	Red	DSG-1	S	R	PD	28.00	Sorghum	LLS, R, SR
		Murgod	Black	GPBD-4	S	R	PD	16.66	Sorghum	LLS, R, SR
		Yaragatti	Black	GPBD-4	S	R	PD	42.64	Maize	LLS, R, SR
				Taluka mean				29.10		
				District mean				31.69		
Dharwad	Dharwad	Govinakoppa	Black	GPBD-4	S	R	PD	31.87	Cotton	LLS, R, SR
		Kavalageri	Red	GPBD-4	S	R	PD	54.08	Cotton	LLS, R, SR
		Yattinagudda	Black	GPBD-4	S	R	PD	27.12	Cotton	LLS, R, SR
				Taluka mean				37.69		
	Hubballi	Byahatti	Black	GPBD-4	S	R	PD	36.93	Cotton	LLS, R, SR
		Kusagalla	Black	GPBD-4	S	R	PD	29.16	Cotton	LLS, R, SR
		Somapur	Black	GPBD-4	S	R	PD	50.53	Cotton	LLS, R, SR
				Taluka mean				38.87		
	Navalagund	Amaragol	Black	GPBD-4	S	R	PD	25.51	Cotton	LLS, R, SR
		Arekurahalli	Black	GPBD-4	S	R	PD	42.30	Cotton	LLS, R, SR
		Navalagund	Black	GPBD-4	S	R	PD	38.02	Cotton	LLS, R, SR
				Taluka mean				35.28		
				District mean				37.08		
Gadag	Gadag	Hombal	Black	GPBD-4	S	R	PD	30.35	Maize	LLS, R, SR
		Hulkoti	Black	GPBD-4	S	R	PD	32.43	Cotton	LLS, R, SR
		Venkatapur	Black	GPBD-4	S	R	PD	42.62	Maize	LLS, R, SR
				Taluka mean				35.13		
	Laxmeshwar	Ramagiri	Black	GPBD-4	S	R/I	PD	37.75	Sorghum	LLS, R, SR
		Laxmeshwar	Black	GPBD-4	S	R	PD	33.33	Cotton	LLS, R, SR
		Sigli	Black	GPBD-4	S	R	PD	50.70	Maize	LLS, R, SR
				Taluka mean				40.59		
	Naragund	Kurleri	Black	GPBD-4	S	R	PD	31.31	Cotton	LLS, R, SR
		Naragund	Black	GPBD-4	S	R	PD	34.01	Cotton	LLS, R, SR
		Naveli	Black	GPBD-4	S	R	PD	30.43	Cotton	LLS, R, SR
				Taluka mean				31.91		
				District mean				35.87		

Note: LLS-Late leaf spot, R-Rust, SR-Stem rot, S/I- Sole /intercrop, R-Rainfed, I-Irrigated, PD-Pod development stage

In Belagavi district, maximum pod rot incidence was recorded in Belavadi (33.33 %) followed by Bailwad (21.31 %) and minimum incidence was recorded in Bailhongal (17.24 %).

In Gokak taluka, maximum incidence of disease was noticed in Khanagav (54.42 %) followed by Vannur (42.20 %) and the least incidence was recorded in Midakanatti (29.48 %). In Savadatti taluka, maximum (42.64 %) pod rot incidence was recorded in Yaragatti village followed by Halaki (28.00 %) and minimum was observed in Murgod (16.66 %). When taluk mean was considered, the highest incidence was noticed in Gokak (42.03 %) followed by Savadatti (29.10 %) and least disease was noticed in Bailhongal (23.96 %). In Dharwad district, Kavalageri village has shown the highest incidence (54.02 %) followed by Govinakoppa (31.87 %) and least disease incidence was recorded in Yattinagudda (27.12 %) in Dharwad taluka.

In Hubballi taluka, Somapur has shown the maximum incidence (50.53 %) followed by Byahatti (36.93 %) and the least incidence was recorded in Kusagalla (29.16 %). In Navalagund taluka, maximum incidence of pod rot was recorded in Arekurahalli (42.30 %) followed by Navalagund (38.02 %) and the least was recorded in Amaragol (25.51 %). When taluk mean was considered, maximum incidence (38.87 %) was noticed in Hubballi taluka followed by Dharwad (37.69 %) and minimum was recorded in Navalagund (35.28 %) and the Dharwad district mean was 37.08 per cent.In the district of Gadag, Venkatapur village of Gadag taluka has recorded maximum incidence pod rot (42.62 %) followed by Hulkoti (32.43 %) and minimum pod rot incidence was recorded in Hombal (30.35 %).

In Laxmeshwar taluka, Sigli (50.70 %) village has maximum incidence of pod rot followed by Ramagiri (37.75 %) and minimum was recorded in Laxmeshwar (33.33 %) village. In Naragund taluka, maximum pod rot incidence was recorded in Naragund (34.01 %) followed by Kurleri (31.31 %) and minimum incidence was noticed in Naveli (30.43 %). When taluka mean was considered, the highest incidence of pod rot was observed in Laxmeshwar (40.58 %) followed by Gadag (35.13 %). The Gadag district mean was 35.87 per cent.

The mean per cent incidence of pod rot in different taluks and districts during *kharif* 2018-19 listed in the Table 2. In Bagalkot, 70 to 80 per cent of crop under irrigated condition. The mean per cent incidence of disease in Bagalkot, Badami and Guledagudda was 25.30, 39.24 and 24.17 per cent, respectively.

In Belagavi district, the mean per cent incidence of pod rot in Bailhongal, Gokak and Savadatti was 23.96, 42.03 and 29.10 per cent, respectively.

In Dharwad region, maximum pod rot incidence was recorded in Hubballi (38.87 %) followed by Dharwad (37.69 %) and minimum was recorded in Navalagund (35.27 %). In Gadag district, 40.59 per cent was recorded in Laxmeshwar followed by Gadag (35.13 %) and minimum disease incidence was recorded in Naragund (31.91%).

Among the four districts of northern parts of Karnataka, maximum incidence of pod rot was observed in Dharwad (37.27 %) followed by Gadag (35.88 %) and minimum incidence was observed in Bagalkot (29.57 %). The remaining two districts like Belagavi and Gadag, the incidence was recorded 31.69 and 35.88 per cent, respectively. The mean disease incidence of four districts of about 33.60 per cent was recorded.

Groundnut pod rot was observed at AICRP on groundnut, Oil Scheme, Main Agricultural Research Station, University of Agricultural Sciences, Dharwad during *kharif* 2018. Pod rot incidence was also high in the trails of All India Coordinated Research Projects on oil seeds during *Rabi*/*summer* 1990 and 1991 (Gopal *et al.*, 1994). The pod rot of groundnut at Dharwad, incidence of pod rot ranged between 0 to 100 per cent (Anon., 1994). Thus, roving survey work has been taken up in four districts of northern parts of Karnataka (Bagalkote, Belagavi, Dharwad and Gadag) to know the incidence of disease during *kharif* season 2018. The report of the survey on pod rot of peanut during *kharif* 2018 revealed that the incidence ranged from 16.66 to 54.42 per cent in four districts of northern Karnataka (Fig. 1). The highest incidence was reported in Khanagav (54.42 %) of Gokak taluka followed by Kavalageri (54.08 %) and Somapur (50.53 %) of Dharwad taluka. The less incidence was reported in Murgod (16.66 %) of Savadatti taluka and this survey work found to be in agreement with the work on survey was conducted by Ramakrishna and Kolte (1988), Hollowell *et al.* (1998), Hanumanthegowda (1999), Adiver and Anahosur (2002) and Rakholiya (2015) who reported that pod rot incidence was 15 to 35 per cent. The same type of survey experiment was also conducted on groundnut with respect to pod rot in different parts of world, observed the incidence of disease ranged from 5 to 50 per cent (Garren and Wilson, 1951 and Filonow and Russel, 1991).

The major hot spot areas of pod rot were assessed during the survey in Khanagav (54.52 %) of Gokak taluka, Silgi (50.70 %) of Gadag taluka, Kavalageri (54.08 %) of Dharwad taluka, Somapur (50.53 %) of Hubballi taluka and Hoovinahalli (43.38 %) of Badami taluka.

Table 2. Mean per cent incidence of pod rot of groundnut in different talukas and districts of northern parts of Karnataka during *kharif* 2018

District	Taluka	Rainfed	Irrigated	Incidence of pod rot (%)	
				Taluka	District
Bagalkote	Bagalkote	—	25.30	25.30	29.57
	Badami	—	39.24	39.24	
	Guledagudda	24.17	—	24.17	
Belagavi	Bailhongal	23.96	—	23.96	31.69
	Gokak	42.03	—	42.03	
	Savadatti	29.10	—	29.10	
Dharwad	Dharwad	37.69	—	37.69	37.27
	Hubballi	38.87	—	38.87	
	Navalagund	35.27	—	35.27	
Gadag	Gadag	35.13	—	35.13	35.88
	Laxmeshwar	40.58	—	40.59	
	Naragund	31.91	—	31.91	
District mean disease incidence (%)					33.60

The incidence of pod rot was high under rainfed conditions and low in irrigated conditions. Such variations are mainly due to soil moisture stress and soil temperature conditions that prevailing in particular area and these pod rot pathogens are aerobic in nature (Adiver and Anahosur, 2002). They need less moisture level for their growth and infection (Ramakrishna and Kolte, 1988). Host plant become predisposed to infection under these conditions. The severity of disease is mainly due to favourable environmental conditions.

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