

Original Research Article

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Survey for the Incidence of Stem Rot of Groundnut in North Bengal Districts of West Bengal, India

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ABSTRACT

Groundnut (*Arachis hypogaea* L.) is an important edible leguminous oilseed crop. Diseases of groundnut act as the limiting factor to its economic production. Recently, the stem rot caused by *Sclerotium rolfsii* is becoming severe disease of groundnut in India. Crop Losses up to 59 per cent due to stem rot disease have been reported by many researchers. Hence, to get a preliminary an idea regarding the incidence level and pattern of prevalence of the disease in the agro-ecological condition of northern part of West Bengal, fixed plot and roving survey were conducted at different locations during the crop growing season of 2016-17 and 2017-18. The North Bengal part of West Bengal denotes Jalpaiguri Division (Alipurduar, Cooch Behar, Darjeeling, Jalpaiguri and Kalimpong) and Malda division (Uttar Dinajpur, Dakshin Dinajpur and Malda) together. It also includes parts of Darjeeling Hills. Traditionally, the Ganga River divides West Bengal into South Bengal and North Bengal, divided again into Terai and Dooars regions. The pooled analysis of two years data of survey revealed that disease incidence was ranged from 8.16 to 25.89 % and the Alipurduar district had maximum level of disease incidence ranging from 8.16 to 25.89 % followed by Jalpaiguri district 13.41 to 22.49 %, Coochbehar district 11.46 to 18.81%, Darjeeling district 8.25 to 16.26 %, Uttar Dinajpur district 9.36 to 14.71%, Dakshin Dinajpur district 8.91 to 13.67%,.However, Malda district was noticed with less incidence levels ranging from 8.16 to 12.37 %. This study provided an elementary idea about the percent disease incidence (PDI) as well as paved the path for developing location specific good agricultural practices (GAP).

Keywords

Groundnut, Disease incidence, Survey, Stem Rot, North Bengal districts, West Bengal

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Introduction

Groundnut (*Arachis hypogaea* L.) is an important edible leguminous oilseed crop. Diseases of groundnut act as the limiting factor to its economic production. Due to its extensive cultivation, different biotic and abiotic factors have emerged as a major constraint in the successful cultivation of groundnut. Among the biotic factors, different diseases i.e., Botrytis blight (*Botrytis cinerea*), Charcoal rot (*Macrophomina phaseolina*), *Cylindrocladium* black rot (*Cylindrocladium crotalariae*), Early leaf spot (*Cercospora arachidicola*), Late leaf spot (*Cercospora personatum*), Phyllostica leaf spot (*Phyllostica arachidis hypogaea*), Rust (*Puccinia arachidis*), Sclerotinia blight (*Sclerotinia minor*), Verticillium wilt (*Verticillium spp.*), Web blotch (Phoma leaf spot) (*Phoma arachidicola*), Stunt Peanut stunt virus (PSV), Tomato spotted wilt virus & Peanut bud necrosis Tomato spotted wilt virus (TSWV), Peanut bud necrosis virus (PBNV) (Meah, 2003). But recently, the stem rot caused by *Sclerotium rolfsii* is becoming severe disease of groundnut in India. It caused 80% per cent of crop loss in groundnut (Mehan *et al.*, 1990). Ray *et al.*, (1994) reported stem rot caused by *Sclerotium rolfsii* (*Corticium rolfsii*) is one of the major threats in India, with an incidence of 59%. Singh and Mathur (1953) reported stem rot caused by *Sclerotium rolfsii* (*Corticium rolfsii*) is one of the major threats in Kanpur, Uttar Pradesh, India, with an incidence of 27%. The disease is widely distributed in tropical and sub-tropical regions where high temperature prevails. *Sclerotium rolfsii*, the causal agent of stem rot of many crops (Aycock, 1966) having a wider host range attracted the attention of plant pathologist and professional researcher throughout the world. The pathogen is known to cause diseases of cereals, oil crops, pulses, vegetables, ornamentals, and in the nurseries of seedlings of fruits and forest trees (Bertus,

1929). The pathogen is a soil inhabitant, very aggressive nature, attacks at soil-line, which ultimately leads to wilting and ultimate to its death. The infection leads to the drying of lower leaves and eventually the whole plant dries giving a typical symptom of wilting. The stem rot of groundnut may occur at any growth stage of the plant (Begum *et al.*, 1985). The disease has been reported by many researchers in different agro climatic zone of West Bengal. But accurate information of disease incidence and severity of the disease particularly in the northern part of West Bengal is scanty. Inadequate knowledge of, the intensity of the disease, epidemiology and their distribution pattern etc. in respect to groundnut cultivation, which leads to the use of pesticide indiscriminately and cause environmental degradation. The North Bengal part of West Bengal denotes Jalpaiguri Division (Alipurduar, Cooch Behar, Darjeeling, Jalpaiguri and Kalimpong) and Malda division (Uttar Dinajpur, Dakshin Dinajpur and Malda) together. It also includes parts of Darjeeling Hills. Traditionally, the Ganga River divides West Bengal into South Bengal and North Bengal, divided again into Terai and Dooars regions. The Hill areas of Darjeeling District are located within the lesser and Sub - Himalayan belts of the Eastern Himalayas. The area is bounded by the Sikkim Himalaya in the north, the Bhutan Himalaya in the east and Nepal Himalaya in the west. The elevation varies from 100 m. above sea level to the mighty Kanchanjungha. There are different climatic zones with distinctive attributes along with endangered Medicinal and Aromatic Plants are available in this region. The average rainfall of the study area is about 2500-3,500 mm. Monsoon generally starts from the middle of May, temperature ranges 18°C - 30°C and it continues till the end of September. Winters are cold with foggy mornings and nights; temperature ranges 10°C - 21°C. Summer is mild and constitutes a very short period of the

year; temperature ranges 15°C - 25°C. The altitude of study area ranges from 90 to 1,950 m. No baseline data on stem rot disease of groundnut of North Bengal is available till now. Therefore, the present study was carried to find out the incidence, severity and distribution pattern of stem rot disease of groundnut in different agro-ecological condition of northern part of West Bengal, India.

Materials and Methods

Fixed plot surveys were carried out during the crop growing season of 2016-17 and 2017-18 to estimate the disease incidence of stem rot disease of groundnut under the different agro-ecological condition of northern part of West Bengal. North Bengal covers the area of the district, like Malda, Uttar Dinajpur, Dakkhin Dinajpur, Darjeeling, Alipurduar, Cooch Behar and Jalpaiguri, where groundnut crop was cultivated by the farmers. At a Random, uniform fields were selected in each location, and observation on the disease incidence of stem rot was recorded by using disease rating formula. The recorded data of disease incidences of stem rot have been presented in the table 1.

Percent Disease Incidence (PDI)

$$\frac{\text{Number of plants showing wilting symptom}}{\text{Total number of plants}} \times 100$$

Results and Discussion

The pooled analysis of two years data of survey revealed that disease incidence was ranged from 8.16 to 25.89 % in north Bengal districts and the Alipuduar district had maximum level of disease incidence ranging

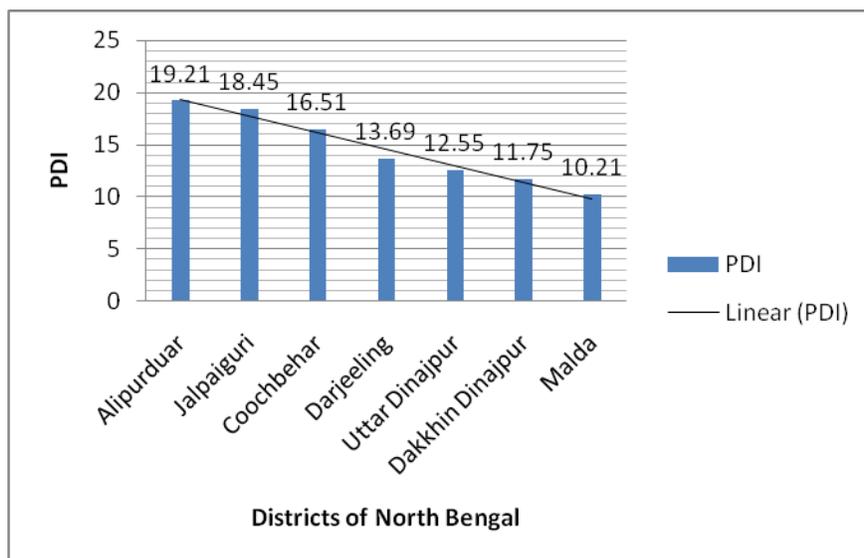
from 8.16 to 25.89 % followed by Jalpaiguri district 13.41 to 22.49 %, Coochbehar district 11.46 to 18.81%, Darjeeling district 8.25 to 16.26 %, Uttar Dinajpur district 9.36 to 14.71%, Dakhin Dinajpur district 8.91 to 13.67%,.However, Malda district was noticed with less incidence levels ranging from 8.16 to 12.37 %. It was also observed that While comparison of the district-wise incidence level of stem rot disease in six districts, the pooled analysis (Table 1 and Fig. 1) indicated that the Alipurduar district had maximum level of disease incidence 19.25 % followed by Jalpaiguri district 18.45%, Coochbehar district 16.51%, Darjeeling district 13.69 %, Uttar Dinajpur district 12.55 %, Dakkhin Dinajpur district 11.75 %, Malda district was noticed with less incidence levels 10.21% during seasons under surveyed, However, Among the locations surveyed, percent disease incidence was highest at Paschim Degaon village of Falakata block under Alipurduar district during both the years of survey (25.89%) while, it was lowest with 8.16%at Detola village of Gazole block, under Malda district.

This variation in disease incidence may be due to the edaphic factors. These results are in conformity with the findings of Mehan and McDonald (1990) where it was observed that the Stem rot is one of the major constraints in groundnut production as it severely affects the yield and quality of the produce. Kumar *et al.*, 2013 also recorded that In India, it occurs in all groundnut growing states and most severe in Andhra Pradesh, Maharashtra, Gujarat, Madhya Pradesh, Karnataka, Orissa and Tamil Nadu and Yield losses range from 10 to 25% annually. The disease incidence will be more severe reach upto 80% during stem rot epidemics coincides with wet climatic conditions prevailed at pod filling (Akgul *et al.*, 2011).

Table.1 Stem rot incidence in northern districts of West Bengal during 2016-17 & 2017-2018 (Pooled analysis)

Sl. No	Name of District	Name of Block	Name of Village	No of Field Surveyed	Village wise disease Incidence	District wise disease incidence
1	Alipurduar	Alipurduar II	TirlaTola (Shamuktola)	4	23.71	19.25
		Alipurduar II	Boropukhuria	3	19.32	
		Alipurduar II	Baniagaon	3	21.35	
		Alipurduar-I	Shimlabari	5	24.45	
		Falakata	Pashim Degaon	3	25.89	
			Satpukhuria	3	17.98	
		Kalchini	Biswanathpara (Hemiltanganj)	3	8.16	
		Kalchini	Satali Bosti	3	19.35	
		Kalchini	Machpara	3	17.39	
		Kumargaram	Paglarhat	3	17.31	
		Kumargaram	Marakhata	3	16.25	
		Kumargaram	Khowardanga	3	13.24	
		Madarihat	Hantapara Bagan bosti	4	15.24	
			Shishu-Bosti (Shishu-jhumra)	4	18.98	
2	Jalpaiguri	MalBazar	Gazole Doba	4	22.49	18.45
		MalBazar	Borodighi	4	21.89	
		MalBazar	Mathachulka	3	13.41	
		Nagrakata	Sukani Bosti	3	18.92	
		Nagrakata	khayerBari	3	17.65	
		Nagrakata	Shalgapara	3	15.91	
3	Coochbehar	Pundibari	UBKV Farm	3	18.81	16.51
		Pundibari	KhagriBari (Patlakhawa)	3	17.56	
		Dinhata	Santalpara	3	11.46	
4	Darjeeling	Kharibari	GodhiraJote	4	16.26	13.69
		Kharibari	Kopalashi	4	15.69	
		Kharibari	Urlajote	4	8.25	
5	Uttar Dinajpur	Itahar	Noliyabad	4	9.36	12.55
		Itahar	Modonia	3	13.27	
		Itahar	Boidra	3	14.71	
6	Dakshin Dinajpur	Buniadpur	Nilgombhir	4	13.67	11.75
		Buniadpur	Bodolpur	3	12.89	
		Buniadpur	Sisha	3	8.91	
7	Malda	Gazole	Bhaluk Danga	3	12.37	10.21
		Gazole	Jamalpur	4	11.85	
		Gazole	Deotola	3	8.16	

Fig.1 Stem rot disease incidence in northern districts of West Bengal



The results obtained in this experimental study revealed that the stem rot of groundnut caused by *Sclerotium rolfsii* was prevalent in all the north Bengal districts of West Bengal. The district Alipurduar showed maximum disease incidence of stem rot whereas minimum disease incidence was recorded in Malda district. The conducive weather parameters, soil type, and continuous cultivation of susceptible cultivars over the years, were responsible for higher percent disease incidence (PDI) in these locations. The finding emphasizes on area specific good agricultural practices (GAP) needs to be developed to cope up the loss due to stem rot disease of groundnut.

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