Predisposing factors for Phytophthora blight of pigeonpea[1]

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Phytophthora blight caused by *Phytophthora drechsleri* Tucker f. sp. *cajani* (Pal *et al.*) Kannaiyan *et al.* is an important disease of pigeonpea in India (1, 2, 5). Water-logging predisposes the crop to this disease (5). The fungus survives in the soil but the form in which it survives is not known. At ICRISAT Centre, Patancheru, evaluation of pigeonpeas for blight resistance is carried out using the diseased-debris inoculation method in a sick plot (3). Pigeonpeas are sown in the sick plot between 10 and 15 June. During 1987 and 1988 rainy seasons, a one ha sick plot in an Alfisol field was observed daily for blight infection from sowing

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time onwards. During 1987 rainy season, the blight onset occurred on 10 July and during 1988 rainy season on 4 August. Disease onset usually occurs once in any growing season. After disease onset, the rate of disease progress may vary from year to year as influenced by various factors. The initial blight symptoms on the primary and trifoliate leaves were small and numerous water-soaked lesions. Within the next 72 hours, these lesions became necrotic resulting in blighting of leaves and stems. The weather data during the week before disease outbreak was analyzed in an effort to determine the effect of weather conditions on disease onset.

The daily weather data from a meteorological observatory located one km from the blight sick plot during the week previous to blight outbreak is presented in Table 1. Disease outbreaks during both seasons occurred

Table 1 : Daily weather data for the week previous to the pigeonpea Phytophthora blight out-break at ICRISAT Centre, Patancheru, in rainy seasons

Date	Rain (mm)	Temperature maximum (°C)	Temperature minimum (°C)	Relative humidity (%)	Sunshine (h day⁻¹)
1987					
4 July	15.4	30.8	22.1	76.5	4.7
5 July	6.0	39.0	22.0	86.5	0.1
6 July	12.0	25.5	21.5	92.0	0.0
7 July	15.0	26.4	21.5	87.0	0.0
8 July	2.0	28.5	23.0	83.5	0.3
9 July	61.0	28.0	20.6	93.5	0.0
10 July	5.4	25.9	23.2	89.5	0.0
Average	116.8*	27.7	21.9	86.9	0.7
1988					
29 July	20.9	25.0	21.7	97.5	0.2
30 July	50.0	23.5	22.0	96.0	0.0
31 July	1.0	25.5	22.5	92.0	0.3
1 August	0.0	28.0	22.5	81.5	0.3
2 August	3.4	27.0	22.5	82.5	0.0
3 August	5.6	28.0	22.5	85.5	0.1
4 August	0.0	28.5	23.4	83.5	0.8
Average	80.5	26.5	22.4	88.3	0.2

* Cumulative weekly rainfall.

Table 2 : Weather data for pigeonpea Phytophthora 'blight-week' and its previous and succeeding weeks at ICRISAT Centre, Patancheru, in rainy season

Period	No. of rainy days	Rainfall (mm)	Temperature maximum (°C)	Temperature minimum (°C)	Relative humidity (%)	Sunshine (h day-1)
1987						
Previous week (27 June-3 July)	5	67.1	33.6	23.4	68.3	3.9
Blight-week (4-10 July)	7	116.8	27.7	21.9	86.9	0.7
Succeeding week (11-17 July)	3	3.3	31.2	22.9	71.6	6.5
1988						
Previous week (22-28 July)	6	35.9	28.1	22.2	83.8	2.4
Blight-week (29 July-4 August)	5	80.5	26.5	22.4	88.3	0.2
Succeeding week (5-11 August)	5	23.7	29.5	22.9	80.7	3.0

when there was a decrease in day temperature of the previous week and difference between minimum and maximum temperature was the least (Table 2). It appears that infection and subsequent disease development occur when day temperatures· are less than 28°C. The reduction in day temperature was coincident with rainy and cloudy weather. During 1987 rainy season, there was rain on 7 consecutive days prior to onset of blight and during the 1988 rainy season, rain was recorded on 5 of 7 days before onset

of blight symptoms. The amount of rainfall was also higher during the 'blight-weeks'. The sunshine was negligible (0.2-0.7 h day^{-1}) during the 'blight weeks' in both seasons. The amount of rainfall, maximum temperature and sunshine hours seem to influence blight infection and disease development.

Observations on blight pathogen inoculum in soil and disease incidence were recorded at about 1-week intervals in the same sick plot during June-August in both the seasons (Table 3). The increase in inoculum level, estimated by dilution end point method (4) and blight incidence, was associated with a decrease in day temperature, higher rainfall and cloudy weather.

Table 3 : Pigeonpea Phytophthora blight inoculum level in soil and disease incidence in an Alfisol blight sick plot at ICRISAT Centre, Patancheru ·

	1987		1988	
Date	Inoculum level*	Blight incidence (%)	Inoculum level	Blight incidence (%)
18 June	0	0	0	0
25 June	43	0	0	0
7 July	58	1	2	0
14 July	164	90	3	0
21 July	76	2	43	2
28 July	0	0	58	5
4 August	0	0	164	95
11 August	1	0	76	2
18 August	0	1	0	0
25 August	0	0	0	0

Estimated by dilution end point method and the values are the reciprocals of the dilution.

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