INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN 2278 – 0211 (Online)

Leaf Spot of Brinjal: Epidemiological Aspects

A. Premila
Associate Professor and Head, Department of Botany, Standard College, Imphal, Manipur, India
Y. Sophiarani
Junior Research Fellow, Institutional Level Biotech Hub, Department of Botany, Standard College, Imphal, Manipur, India

Abstract:
Fungal airspora over brinjal field was monitored for two consecutive cropping seasons (February toJune, 2014 and February toJune, 2015) usingTilak's Rotorod Air Sampler. Altogether, 25 fungal types were identified and assigned to 5 different subdivisionsof fungi. Dominant fungal types were Aspergilli – Penicilli, Alternaria, Cercospora, Curvularia, Cladosporium, etc.In both the cropping seasons, monthly variation of Alternaria melongenawere observed. Occurrence of leaf spotdisease of brinjal depend on weather parameters.Disease incidence and percentage contribution of Alternaria melongena were correlated with meteorological parameters like relative humidity, temperature and rainfall.

Keywords: *Leaf spot, brinjal, epidemiology, relative humidity.*

1. Introduction

Among the most widely cultivated vegetable crops in Manipur valley, brinjal (*Solanummelongena*) is also one of the main crop. In all the growth stages of brinjal, many plant pathogens attack the crop resulting in less production. Most importantfungal diseases of brinjal are "damping off" caused by *Pythium aphanidermatum*, leaf spot (*Alternaria melongena* and *Cercospora melongena*), *Verticillium* wilt (*Verticilliumdahliae*), *Phomopsis* blight (*Phomopsis vexans*) and fruit rot (*Phytophthora nicotianae*).Leaf spot caused by *Alternaria melongena*is a major constraint for large cultivationof the crop.*Cercospora* spores were reported over brinjal field by Patel (2009) at Nashik. Various workers reported the airspora over brinjal field (Dingar and Singh, 1985; Pandey and Pandey, 2001; Pandey, 2010). No such detail reports on fungal airspora in relation to fungal diseases of brinjal were available in Manipur. As such, the present investigation was undertaken to detect the composition and components of airborne fungi over the brinjal field and percentage contribution by pathorganic fungi for the incidence of leaf spot caused by *Alternaria melongena.* to correlate with meteorological parameters. The percent disease incidence of leaf spot of brinjalwas correlated with meteorological parameters in order to understand the influence of meteorological parameters on theepidemiology of the disease.

2. Materials and Methods

Fungal airspora was monitored over brinjal field at Kangchup, Imphal WestDistrict, Manipur using Tilak's rotorod air sampler. Air sampling was carried out for two consecutive cropping seasons (CS_1–February to June, 2014 and CS_2–February to June, 2015) at weekly intervals. Transparent cello tape was applied to the rods of the sampler, trimmed back to the width of the rods with a sharp razor blade and then coated with Vaseline. The sampler was operated at 1 metre above ground level clinging at the rate of 100 litres per minute. Air sampling was started 15 days prior to plantation of the crop and continued for 15 days after harvesting of the crop. Scanning of the slides was done regularly throughout the investigation period. Fungal spores were identified by comparing with reference slides and published literatures (Ellis, 1971; Barnett and Hunter, 1972; Tilak, 1989). The number of spores were multiplied by the conversion factor (5) of the sampler and expressed as per cubic metre of air. Meteorological data during the investigation period was obtained from ICAR Research Complex, Lamphelpat, Imphal. Percent disease incidence (PDI) was calculated following standard formula:

PDI= Number of plants infected/total number of plants × 100

3. Results and Discussion

The components of the airspora were categorized as Fungal spores and Other types. Fungal spores were assigned to five subdivisions of fungi (Hawkswork et al, 1985). The percentage contribution of different subdivisions was Mastigomycotina (3.02% in CS_1 and 3.15% in CS_2), Zygomycotina (5.05% in CS_1 and 4.85% in CS_2), Ascomycotina (4.75% in CS_1 and 4.67% in CS_2), Basidiomycotina (15.29% in CS_1 and 16.21% in CS_2) and Deuteromycotina (60.54% in CS_1 and 61.04%in CS_2). Other types which consist of hyphal fragments, epidermal scales, pollen grains, etc. contributed 10.46%of the total population in CS_1 and 10.08% in CS_2.(Table

1).Dominant fungal types were *Alternaria* contributing 8.81% in $CS_{1\ and}$ 8.43% in $CS_{2,}$ Aspergilli- Penicilli (7.21% and 7.31%), *Cladosporium* (7.01% and 7.5%), *Cercospora* (6.22% and 6.34%), *Curvularia* (6.09% and 6.41%), etc. During the present investigation, qualitative and quantitative variations of different spore types were more or less similar in both the cropping seasons. Variations in meteorological parameters might have resulted in slight fluctuation in concentration of fungal spores. Similar results were reported by other workers (Patil, 1989; Pandey, 2010; Devi and Chanu, 2012; Premila and Sophiarani, 2015).

Sl. No.	Spore types	Percentage contribution (CS_1)	Percentage contribution (CS_2)
	MASTIGOMYCOTINA		
1	*Albugo*	3.02	3.15
	ZYGOMYCOTINA		
2	Round spores (*Rhizopus Mucor* type)	5.05	4.85
	ASCOMYCOTINA		
3	Fusiform ascospores	2.55	2.37
4	Chaetomium	2.20	1.30
		4.75	4.67
	BASIDIOMYCOTINA		
5	Basidiospores	5.03	5.53
6	Rust spores	4.63	4.68
7	Smut spores	5.63	6.00
		15.29	16.21
	DEUTEROMYCOTINA		
8	*Alternaria*	8.81	8.43
9	Aspergilli Penicilli	7.21	7.31
10	*Beltrania*	1.83	1.10
11	*Cercospora*	6.22	6.34
12	*Cladosporium*	7.01	7.50
13	*Curvularia*	6.09	6.41
14	*Drechslera*	1.04	1.70
15	*Diplodia*	1.72	1.02
16	*Memnoniella*	2.97	2.45
17	*Nigrospora*	3.20	3.52
18	*Periconia*	3.21	3.91
19	*Pithomyces*	2.83	2.81
20	*Pestalotia*	1.33	1.81
21	*Spegazzinia*	1.25	1.57
22	*Tetraploa*	0.96	1.20
23	*Torula*	2.04	1.82
24	*Trichoconis*	1.18	1.30
25	*Trichothecium*	1.33	1.55
		60.54	61.04
	OTHER TYPES	10.46	10.08

Table 1: Percentage contribution of fungal spores over brinjal field in Imphal

Table 2 revealed the correlation of meteorological parameters with monthly variations of the concentration of *Alternaria melongena* and its impact on leaf spot of brinjal. The lowest concentration of *Alternaria (*10% in $CS_1$and 20% in CS_2) was observed in the month of February whereas the highest concentration (21% in $CS_1$and 20% in CS_2) was observed in the month of May.

CS_1 – Feb to Jun 2014							CS_2 – Feb to Jun 2015					
MONTH	% of *Alternaria*	PDI (%)	Meteorological parameters				% of *Alternaria*	PDI (%)	Meteorological Parameters			
			T max (^oC)	T min (^oC)	RH(%)	RF (mm)			T max (^oC)	T min (^oC)	RH(%)	RF (mm)
Feb.	10	-	21	6.6	61	Nil	8	-	20	6.1	64	Nil
Mar.	15	-	23	7.1	65	Nil	15	-	23	7.5	66	Nil
Apr .	17	6.3	25	10	63	Nil	19	6.7	25	9	70	0.1
May.	21	15.2	25	12	81	0.9	20	9.2	25	11	83	0.9
Jun.	18	17.9	26	13	83	1.0	19	17.1	28	14	81	0.7

Table 2: Correlation between monthly percentage contribution of Alternaria melongena with meteorological parameters

In $CS_{1,}$ percent disease incidence (PDI) caused by the pathogen ranged from 6.3% to 17.9%. The lowest disease incidence (6.3%) was recorded on 14thApr., 2014 whereas the highest disease incidence (17.9%) was recorded on 21stJun., 2014. In $CS_{2,}$ percent disease incidence (PDI) caused by the pathogen ranged from 6.7% to 17.1%. The lowest disease incidence (6.7%) was recorded on 7thApr., 2015 whereas the highest disease incidence (17.1%) was recorded on 14thJun., 2015.The present finding confirmed that high relative humidity (>80%), moderate temperature and rainfall have influential effect on the epidemiology of leaf spot of brinjal as the correlation co-efficient (r = 0.85) between the disease incidence and weather parameters was found significant (P < 5%).Similar findings were reported by earlier workers (Dingar and Singh, 1985; Devi and Chanu, 2012; Premila and Sophiarani, 2015).

4. Acknowledgements

The authorsare thankful to Department of Biotechnology, Govt. of India, New Delhi for financial assistance through Institutional Level Biotech Hub and to ICAR Lamphelpat forproviding meteorological data. The authors are also thankful to Principal, Standard College, Imphal for encouragement.

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