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Dharnendra Reang

Department of Plant Pathology,
Faculty of Agriculture,
Uttarbanga Krishi
Viswavidyalaya, Pundibari,
Coochbehar, West Bengal, India

S Khalko

Department of Plant Pathology,
Faculty of Agriculture,
Uttarbanga Krishi
Viswavidyalaya, Pundibari,
Coochbehar, West Bengal, India

A Roy

Department of Plant Pathology,
Faculty of Agriculture,
Uttarbanga Krishi
Viswavidyalaya, Pundibari,
Coochbehar, West Bengal, India

To find out the seasonal incidence of diseases in chilli at different locations of Terai zone of West Bengal

Dharnendra Reang, S Khalko and A Roy

Abstract

Survey of chilli diseases was carried out at seven locations in Terai zone of West Bengal. The diseases found during the period of survey are Anthracnose, *Cercospora* Leaf Spot, *Choanephora* blight, Leaf Curl and Wilt. The severity percentage of Anthracnose, *Choanephora* blight and *Cercospora* leaf spot affected was less during winter season and more during rainy season. The severity percentage of Anthracnose disease ranged from 3.09 % to 12.64 % during winter season and 17.07 % to 25.60 % in rainy season in fruits. The severity percentage of *Choanephora* blight disease ranged from 0.64 % to 3.68 % during winter season and 16.05 % to 21.49 % in rainy season in fruits. The severity percentage of *Cercospora* leaf spot disease during winter season and rainy season ranged from 1.16 % to 6.81 % and 8.98 % to 28.57 % respectively.

Keywords: Chilli, anthracnose, *Cercospora* leaf spot, *Choanephora* blight, leaf curl, wilt

Introduction

Chilli (*Capsicum annum* L.) or red pepper, a member of solanaceae is an important economic crop worldwide (Poulos, 1992) [6]. The primary centre of origin of chilli is said to be Mexico with secondary centers in Guatemala and Bulgaria (Salvador, 2002) [9]. It was introduced to Europe by Columbus in 15th century and spread to rest of the globe along the spice trading routes to Africa, India, China and Japan. Chilli was introduced to India by the Portuguese from Brazil in the middle of 17th century.

Broadly, the chillies can be categorized into hot and mild types based on pungency. In the world, it is cultivated on an area of 1.45 million hectares with an annual production of 19.50 million tonnes and having the productivity of 2,808 kg ha⁻¹ (Anon., 2007) [2]. The important chilli producing countries in the world are India, China, Indonesia, Korea, Pakistan, Turkey and Srilanka. The 'mild' Chilli is known as paprika and it is produced in Hungary, Spain, Romania, Bulgaria and Slovak Republic countries.

In India, chilli is grown all over the country under varying agro-climatic zones but area of ripe dry chilli is concentrated in southern states. In India, the area under this crop is 8.35 lakh hectares with an annual production of 9.50 lakh tonnes with a productivity of 1,016 kg ha⁻¹ (Anon., 2007) [2]. India alone contributes about 50 per cent of world production, out of which 90 per cent is used for domestic consumption and only six per cent is exported to other countries like USA, Bangladesh, Nepal and Mexico.

Chilli fruits are used as pickles, sauces, ketchup, essence, oleoresins and is an inevitable ingredient in Indian dishes. Chilli is a good source of capsaicin, Vitamin A, Vitamin C, Riboflavin and thiamine. It contains about 8.8 gram carbohydrates, 5.3 gram sugar, 1.9 gram protein and 534 micro gram beta carotene per 100 gram chilli (Panda *et. al.*, 2010) [5]. These properties increase the demand for chillies all over the world.

Chilli suffers from many diseases caused by fungi, bacteria, viruses, nematodes and also abiotic stresses. Among the fungal diseases, anthracnose or fruit rot, leaf spots, damping off and powdery mildew are the most prevalent ones. Different fungi viz. *Alternaria tenuis*, *Aspergillus* spp., *Cercospora capsici*, *Colletotrichum capsici*, *Curvularia lunata*, *Fusarium* spp., *Macrophomina phaseolina* and *Penicillium* spp. were found to be associated with the seeds obtained from diseased fruits of chilli and also some seed-borne fungi such as *Aspergillus* spp., *Colletotrichum capsici*, *Curvularia lunata*, *Fusarium* spp. and *Penicillium* spp. were found to be associated with the healthy fruits of chilli (Rahman *et. al.*, 2004) [7]. Considering the literature on Chilli diseases the objectives of the present investigation has been planned on the study of seasonal incidence of different chilli diseases in order to get an idea on occurrence of chilli diseases at different localities of Terai zone of West

Correspondence**Dharnendra Reang**

Department of Plant Pathology,
Faculty of Agriculture,
Uttarbanga Krishi
Viswavidyalaya, Pundibari,
Coochbehar, West Bengal, India

Materials and methods

The intensive roving survey was conducted during 2014 and 2015 to know the severity of Anthracnose, *Cercospora* leaf spot, *Choanephora* blight and the incidence of Leaf curl and Wilt diseases and to record the time of appearance of diseases (Fungal, Bacterial or Viral) of chilli in field throughout the year in the farmer's fields in Coochbehar, Jalpaiguri and Darjeeling districts. In each district one to four villages were selected and in each village one to three fields were surveyed. In field, for viral and wilt disease total number of infected plants was counted in a plot and divided with total number of plants in that plot and multiplied by hundred (100). For fungal diseases 5 (five) plants was randomly selected in a plot, 5 leaves and 5 fruits was also randomly selected in zigzag manner and the severity of fungal disease of chilli on leaf and fruit were recorded as follows.

To estimate the diseases on chilli fruit 0-5 scale was followed as proposed by Ravinder Reddy (1982) [8]

Disease Severity Scale

Category	Description
0	No infection
1	1- 5%
2	6-10%
3	11-25%
4	26-50%
5	>51% of fruit area infected

Further, these scales were converted to per cent disease index (PDI) using the formula given by Mckinney (1923).

$$PDI = \frac{\text{Sum of all individual ratings}}{\text{Total number of fruits/ leaves observed}} \times \frac{100}{\text{Maximum disease scale}}$$

To estimate the diseases on chilli leaves 0-9 scale was followed as suggested by McKinney (1923).

Disease Severity Scale

Category	Description
0	No infection
1	<1% of area infected
3	1-10% of area infected
5	11-25% of area infected
7	26-50% of area infected
9	More than 50% of area infected

Further, these scales were converted to per cent disease index (PDI) using the formula given by Mckinney (1923).

$$PDI = \frac{\text{Sum of all individual ratings}}{\text{Total number of fruits/ leaves observed}} \times \frac{100}{\text{Maximum disease scale}}$$

Results and discussion

During the period of survey 2014-2015, anthracnose disease was found prevalent in Madhupur, Maynaguri, Kharibari, Falakata, Dinahata and Bowdia locations. The disease severity of anthracnose disease is presented in Table.1.

In the year 2014 in fruits, in all the locations disease severity during winter season ranged from 3.15 % to 12.64 % and during rainy season disease severity ranged from 17.07 % to 25.60 %.

In leaves during winter season disease severity in all the locations ranged from 0.74 % to 4.45 % and during rainy season disease severity ranged from 10.49 % to 26.19 %.

In the year 2015 in fruits, in all the locations disease severity during winter season ranged from 3.09 % to 12.59 % and during rainy season disease severity ranged from 17.81 % to 25.55 %.

In leaves during winter season disease severity in all the locations ranged from 0.74 % to 4.27 % and during rainy season disease severity ranged from 10.61 % to 26.52 %.

During the period of survey 2014-2015, *Choanephora* blight disease was found prevalent in Madhupur, Sajarpara and Bowdia locations. The disease severity of *Choanephora* blight disease is presented in Table.1.

In the year 2014 in fruits, in all the locations disease severity during winter season ranged from 0.91 % to 3.52 % and during rainy season disease severity ranged from 16.05 % to 21.49 %.

In leaves during winter season disease severity in all the locations ranged from 0.62 % to 2.04 % and during rainy season disease severity ranged from 11.70 % to 22.61 %.

In the year 2015 in fruits, in all the locations disease severity during winter season ranged from 0.64 % to 3.68 % and during rainy season disease severity ranged from 16.11 % to 20.59 %.

In leaves during winter season disease severity in all the locations ranged from 0.74 % to 2.49 % and during rainy season disease severity ranged from 11.11 % to 23.94 %.

During the period of survey 2014-2015, *Cercospora* leaf spot disease was found prevalent in Bowdia, Mynaguri and Sajarpara locations. The disease severity of *Cercospora* leaf spot disease is presented in Table.1.

In the year 2014, in all the locations disease severity during winter season ranged from 1.24 % to 6.81 % and during rainy season disease severity ranged from 9.84 % to 24.35 %.

In the year 2015, in all the locations disease severity during winter season ranged from 1.42 % to 4.95 % and during rainy season disease severity ranged from 8.98 % to 28.57 %.

During the period of survey 2014-2015, Leaf curl disease was found prevalent in Sajarpara, Falakata, Dinahata, Maynaguri, Bowdia, Madhupur and Kharibari locations. The disease severity of Leaf curl disease is presented in Table.2.

In the year 2014, in all the locations disease percentage during winter season ranged from 2.93 % to 7.73 % and during rainy season disease percentage ranged from 5.07 % to 15.47 %.

In the year 2015, in all the locations disease percentage during winter season ranged from 3.20 % to 8.00 % and during rainy season disease percentage ranged from 5.33 % to 15.73 %.

During the period of survey 2014-2015, Wilt disease was found prevalent in Sajarpara, Falakata, Dinahata, Maynaguri, Bowdia, Madhupur and Kharibari locations. The disease severity of Wilt disease is presented in Table.2.

In the year 2014, in all the locations disease percentage during winter season ranged from 2.93 % to 7.47 % and during rainy season disease percentage ranged from 6.67 % to 14.67 %.

In the year 2015, in all the locations disease percentage during winter season ranged from 3.20 % to 5.87 % and during rainy season disease percentage ranged from 8.27 % to 14.40 %.

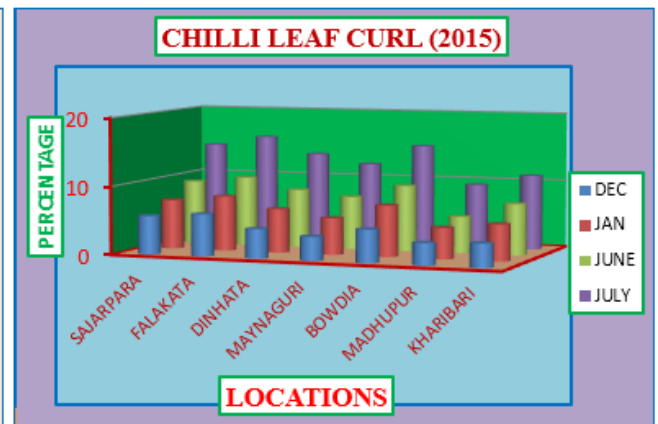
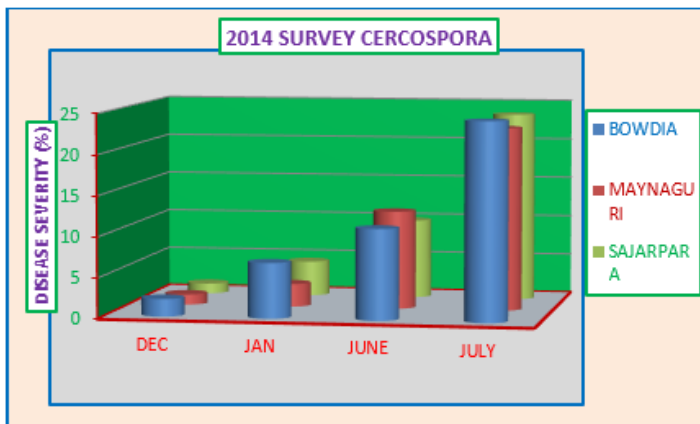
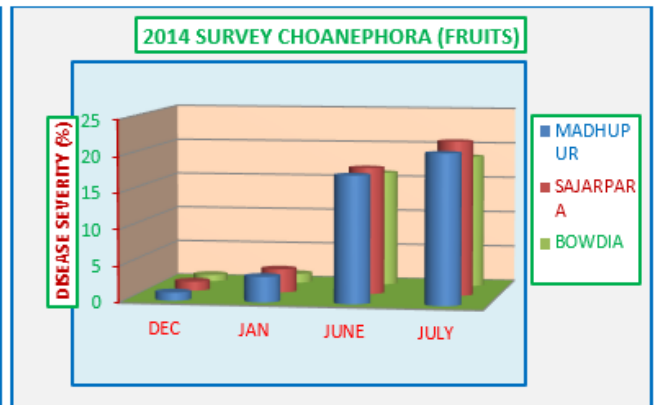
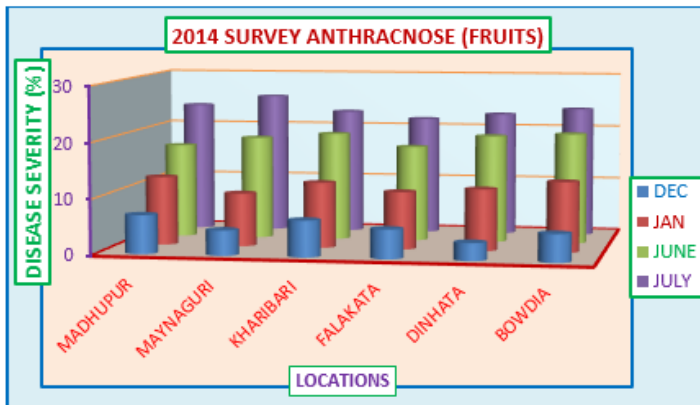
Survey on Chilli anthracnose was conducted at different parts of India at different times. Angadi (1999) [1] carried out survey for the incidence of anthracnose of chilli caused by *C. capsici* in Raichur, Dharwad and Gadag districts. The disease was more prevalent in Raichur district than in Dharwad and Gadag districts. Sanath kumar (1999) [10] during his survey in and around Bangalore district observed that, the chilli varieties Chikkaballapur, Gauribidanur, Byadagi Kaddi and Pant C-2 showed anthracnose infection of 25, 35, 30 and 25 per cent, respectively. Similarly survey on *Cercospora* leaf spot of Chilli and twig blight caused by *Choanephora cucurbitarum* were conducted at different times, with different level of disease severity. *Choanephora cucurbitarum* was recorded in the month of July to Dec. Its frequency was almost equal in all the months of its occurrence (Mishra and Vinit, 2012) [4].

Table 1: Disease severity of fungal diseases of chilli at different locations under Terai zone of West Bengal (2014-15).

		Anthracnose (%)					Choanephora Blight (%)				Cercospora leaf spot (%)						
2014		Locations					2014		Locations			Locations					
		Madhupur	maynaguri	Kharibari	Falakata	Dinhata	Bowdia			Madhupur	Sajarpara	Bowdia	Bowdia	Mynaguri	Sajarpara		
FRUITS	Dec	6.93	4.48	6.51	5.23	3.15	5.01	FRUITS	Dec	1.12	1.28	0.91	LEAVES	Dec	2.16	1.27	1.24
	Jan	12.37	9.60	11.79	10.35	11.09	12.64		Jan	3.52	3.25	1.28		Jan	6.81	2.82	4.33
	Jun	17.07	18.67	19.57	17.33	19.52	20.05		Jun	17.55	17.65	16.05		Jun	11.17	12.12	9.84
	Jul	23.79	25.60	22.83	21.60	22.61	23.73		Jul	20.69	21.49	18.51		Jul	24.35	22.67	23.58
LEAVES	Dec	1.39	1.15	0.98	0.83	2.19	0.74	LEAVES	Dec	0.80	0.92	0.62	LEAVES	Dec	0.80	0.92	0.62
	Jan	3.11	2.22	2.61	2.04	4.45	1.72		Jan	1.93	1.87	2.04		Jan	1.93	1.87	2.04
	Jun	13.07	12.47	11.53	10.52	12.62	10.49		Jun	14.70	14.49	11.70		Jun	14.70	14.49	11.70
	Jul	26.19	21.21	23.47	23.20	23.23	22.67		JUL	22.61	22.11	20.98		JUL	22.61	22.11	20.98
2015		madhupur	maynaguri	kharibari	falakata	dinhata	bowdia	2015		madhupur	sajarpara	bowdia	2015		bowdia	Mynaguri	sajarpara
FRUITS	Dec	7.52	5.39	6.99	4.43	3.09	5.55	FRUITS	Dec	1.49	1.60	0.64	LEAVES	Dec	1.84	1.42	1.16
	Jan	11.95	9.01	11.47	10.56	10.67	12.59		JAN	3.68	3.47	1.33		Jan	4.95	3.29	4.12
	Jun	19.41	18.77	18.72	17.81	18.03	20.37		Jun	16.53	18.29	16.11		June	8.98	12.15	10.87
	Jul	25.44	25.55	23.89	22.93	22.45	24.05		Jul	20.27	20.59	19.57		July	28.57	25.01	26.19
LEAVES	Dec	1.48	0.80	0.83	0.74	2.02	0.74	LEAVES	Dec	0.77	0.74	0.80	LEAVES	Dec	0.77	0.74	0.80
	Jan	3.52	2.93	2.93	2.28	4.27	1.84		Jan	2.49	2.34	2.31		Jan	2.49	2.34	2.31
	Jun	13.10	12.06	10.67	10.61	13.04	11.38		Jun	14.64	14.41	11.11		Jun	14.64	14.41	11.11
	Jul	26.52	23.38	24.06	23.79	23.91	23.34		Jul	23.94	23.33	23.67		Jul	23.94	23.33	23.67

Table 2: Percentage of chilli leaf curl and wilt disease at different locations under Terai zone of West Bengal (2014-15).

2014	Leaf Curl (%)							2014	Wilt (%)		
	Locations								Locations		
	Sajarpara	Falakata	Dinhata	Maynaguri	Bowdia	Madhupur	Kharibari		Sajarpara	Madhupur	Bowdia
Dec	5.07	5.87	4.27	3.20	4.53	2.93	3.20	DEC	4.27	2.93	4.00
Jan	6.93	7.73	6.40	4.80	6.67	4	5.07	JAN	7.47	4.80	5.07
June	8.53	9.07	7.73	6.40	8.27	5.07	6.93	JUNE	10.93	8.27	6.67
July	13.07	15.47	12.56	10.40	14.40	9.07	10.67	JULY	14.67	11.73	9.87
2015	Sajarpara	Falakata	Dinhata	Maynaguri	Bowdia	Madhupur	Kharibari	2015	Sajarpara	Madhupur	Bowdia
Dec	5.60	6.13	4.27	3.47	4.80	3.20	3.47	DEC	4.27	3.20	3.47
Jan	7.20	8.00	6.40	5.33	7.47	4.53	5.33	JAN	5.87	4.80	4.00
June	9.33	10.13	8.53	7.73	9.60	5.33	7.47	JUNE	9.60	9.33	8.27
July	14.40	15.73	13.33	12.00	14.93	9.33	10.93	JULY	14.40	13.33	11.47



References

1. Angadi HD. Studies on anthracnose of chilli (*Capsicum annum*) and its management. M.Sc. (Agri.) Thesis, Univ. Agric. Sci., Bangalore, Karnataka, India, 1999.
2. Anon. Year Book of Agricultural Statistics of Bangladesh. Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning. Government of Bangladesh, 2007, 143.
3. Mckinney HH. A new system of grading plant diseases. J Agric. Res. 1923; 26:195-218.
4. Mishra AK, Vinit MK. Field survey for some fungal diseases on eggplant. International Multidisciplinary Research Journal. 2012; 2(9):23.
5. Panda R, Panda H, Prakash K, Panda A. Prospects of Indian Chillies. Science tech entrepreneur, 2010, 8.
6. Poulos. Problems and Progress of Chilli Pepper Production in the Tropics. In: Hock, C. B., Hong, L. W., Rejab, M., Syed, A. R. (Eds.), Proceedings of the conference on Chilli Pepper Production in the Tropics. Kaula lumpur, Malaysia, 1992, 98-129.
7. Rahman MK, Islam MR, Hossain I. Effect of Bion, Amistar and Vitavax on anthracnose of chilli. J, Food, Agriculture and Environment. 2004; 2(2):210-217.
8. Ravinder Reddy M. Evaluation of fungicides against major diseases of chilli. M.Sc. Thesis, Tamil Nadu Agric. Univ., Coimbatore, India, 1982, 64.
9. Salvador MH. Genetic resources of chilli (*Capsicum annum* L.) in Mexico, Proceedings of the 16th International Pepper Conference, Tampico, Tamaulipas, Mexico, November, 2002, 10-12.
10. Sanath Kumar VB. Studies on anthracnose of chilli caused by *Colletotrichum capsici* (Sydow) Butler and Bisby with special reference to epidemiology and management. M. Sc. (Agri.) Thesis, Univ. Agric. Sci., Bangalore, Karnataka, 1999.