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Ashulata Kaushal

Department of Plant Pathology,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

CP Khare

Department of Plant Pathology,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Disease scenario of *Chilli leaf Curl* complex in Chhattisgarh plains

Ashulata Kaushal and CP Khare

Abstract

Chilli (*Capsicum annum* L.) is an economically important vegetable cum spice crop grown in almost all parts of tropical and subtropical regions of the world. *Chilli leaf curl virus* is one of the major limiting factors and is currently a serious problem in all the major chilli growing area of India. A survey was conducted during December- January months for two years (2018-19 and 2019-20), in five different districts of Chhattisgarh plains viz., Raipur, Durg, Rajnandgaon, Kabirdham and Dhamtari covering ten blocks viz., Tilda, Raipur, Kumhari, Kawardha, Pandariya, Lohara, Magarlod, Loharsi, Chhuikhadaan and Bodla, to record the percentage incidence of *chilli leaf curl* disease. Percentage incidence of chilli leaf curl in the year was 2018-19 ranged from 15 to 98% and was recorded highest at Raipur District (98%). In the second year, leaf curl incidence ranged from 14 to 100%, highest recorded at Rajnandgaon District. Commercial hybrids such as T-305, VNR 435, Pride, Sunidhi, Agnirekha, Namdhari 2722, Namdhari 2992, Armour, Karishma, VNR Vidya 725, Mahyco Sierra, Nupoor, Indu and *Pusa Jwala*, and other local cultivars were taken up by the farmers for chilli cultivation. A higher percentage of leaf curl incidence was recorded in the crop sown during October to November indicates the presence of viruliferous vector population might have favoured the higher incidence and spread of the disease.

Keywords: Survey, *Chilli leaf curl*, Chhattisgarh plains

Introduction

Chilli is an annual sub-herb plant, belongs to the family *Solanaceae*. It has an erect and branched shoot, strong tap root system. The leaves are simple ovate, tapering to a sharp point, measuring up to 15 cm, dark green on the upper surface and pale green on the lower surface. It's flowers are small, usually white and borne singly or in clusters of 2 or 3 in the axils of the leaves. The fruit is indehiscent many seeded berry, of diverse shapes, sizes, colour and degree of pungency depending upon the variety. Chilli is a rich source of vitamin C and A. The pungency in chilli is due to the alkaloid capsaicin contained in the pericarp and placenta of fruits. Chillies have long been used for pain relief as they are known to inhibit pain messengers, extracts of chilli peppers are used for alleviating the pain of arthritis, headaches, burns and neuralgia. More than 80 % share of the country's chilli production is contributed by three states Telangana, Karnataka and Madhya Pradesh. In Chhattisgarh, Chilli occupies 40.60% of the total cropped area of spices (0.34 lakh ha.). (*Anonymous*). Major districts of Chhattisgarh plains, where Chilli is grown, includes Raipur, Balodabazar, Gariyaband, Rajnandgaon, Raigarh, Korba, Kabirdham, Durg, Bemetara, Balod and Bilaspur. Chilli crop is grown mainly as Kharif (sowing time June to July) and Rabi crop (sowing time October to November). Among the biotic factors diseases are the major constraints to chilli production. Some of the important diseases of chilli are anthracnose, *Septoria* leaf spot, and *Choenophora* blight (during September), wilt and viral diseases such as leaf curl disease. Leaf curl disease of chilli is currently a serious problem in all the major chilli growing area of India. The characteristic field symptoms of leaf curl disease in chilli are upward curling, puckering and reduced size of leaves. Severely affected plants are stunted and produced no fruit. Whiteflies (*Bemisia tabaci* L) are mainly associated with persistent transmission of Begomoviruses, the causal agent of *chilli leaf curl*. (Brown *et al.*, 2015) [3].

Material and Methods

Survey for chilli leaf curl complex disease was undertaken during December- January months for two years (2018-19 and 2019-20). Roving surveys method was adopted to know the *chilli leaf curl* disease incidence in five different districts of Chhattisgarh plains viz., Raipur, Durg, Rajnandgaon, Kabirdham and Dhamtari covering ten blocks viz., Tilda, Raipur, Kumhari,

Corresponding Author:

Ashulata Kaushal

Department of Plant Pathology,
Indira Gandhi Krishi
Vishwavidyalaya, Raipur,
Chhattisgarh, India

Kawardha, Pandariya, Lohara, Magarlod, Loharsi, Chhuikhadaan and Bodla, covering 62 fields to record the percentage incidence of *chilli leaf curl* and to study the symptoms of *chilli leaf curl* complex in the farmer's field. The crop stage during the survey was 5-6 months old (Kharif crop) and 2-3 months old (Rabi crop) in the fields. Thus, observations on leaf curl incidence in both Kharif and Rabi crop 2018-19 and 2019-20 was taken simultaneously at the same time. The disease diagnosis in the field was based on typical symptoms of *chilli leaf curl*. The per cent disease incidence was recorded in the field by counting total number plants and number of plants showing leaf curl disease symptoms using the formula given below.

$$\text{Percent disease incidence} = \frac{\text{No. of infected plants}}{\text{Total no. of plants}} \times 100$$

Results and Discussion

A survey was conducted during December- January months for two years (2018-19 and 2019-20), in the five different districts of Chhattisgarh plains viz., Raipur, Durg, Rajnandgaon, Kabirdham and Dhamtari covering ten blocks viz., Tilda, Raipur, Kumhari, Kawardha, Pandariya, Lohara, Magarlod, Loharsi, Chhuikhadaan and Bodla, to record the percentage incidence of chilli leaf curl and to study the symptoms of chilli leaf curl complex in the farmer's field. Table no. 1 shows the percentage incidence of chilli leaf curl in the year 2018-19 which ranged from 15-98%. At Raipur District 15-98% of chilli leaf curl incidence was recorded, at

Durg district it ranged from 23 to 95%, at Kabirdham, it was recorded 15 to 60% and at Dhamtari percentage chilli leaf curl incidence was recorded 97%.

In the second year, leaf curl incidence ranged from 14 to 100%. At Raipur district percentage leaf curl incidence was recorded 14 to 98%. At Durg it ranged from 23 to 98%, at Kabirdham it was 15 to 70%, at Dhamtari 28 to 35% and Rajnandgaon 100% of leaf curl incidence was recorded.

Different commercial hybrids of chilli were taken by the farmers for chilli cultivation, during 2018-19 and 2019-20 in the different locations mentioned in the Table no. 1 and 2 were T-305, VNR 435, Pride, Sunidhi, Agnirekha, Namdhari 2722, Namdhari 2992, Armour, Karishma, VNR Vidya 725, Mahyco Sierra, Nupoor, Indu and *Pusa Jwala*, including some local cultivars.

From the given data, it was revealed that chilli leaf curl incidence ranged from 14 to 100%. Chilli leaf curl up to 100% was recorded by Kumar *et al.*, (2016) at Jabalpur, which supports our findings. Also, a higher percentage of leaf curl incidence was recorded in the crop sown during October to November indicates persistence of viruliferous vector population, and increase in the susceptible host population, might have favoured the higher incidence and spread of the disease, our results corroborates with the findings of Roy *et al.*, (2021) [2] showed that the leaf curl epidemic is vector mediated and the spatio-temporal distribution pattern for whitefly abundance indicated that it was at maximum intensity during July–November period almost throughout the country.

Table 1: Percentage incidence of *chilli leaf curl* disease in different locations of Chhattisgarh during, 2018-19

Sr. No.	District	Block	Location	Commercial hybrid/ variety	Sowing	Percentage incidence of <i>chilli leaf curl</i>
1.	Raipur	Tilda	Janggira	T-305	June	30%
2.	Raipur	Tilda	Janggira	VNR 435	June	33%
3.	Raipur	Tilda	Janggira	Pride	June	15%
4.	Raipur	Tilda	Janggira	VNR 435	June	35%
5.	Raipur	Tilda	Janggira	T- 305	June	29%
6.	Raipur	Tilda	Janggira	VNR 435	June	30%
7.	Raipur	Tilda	Janggira	VNR 435	June	24%
8.	Raipur	Raipur	Jora, Research Field	VNR	October	98%
9.	Durg	Kumhari	Rampur chorha	Local cultivar	October	95%
10.	Durg	Kumhari	Murmunda	Agnirekha	June	25%
11.	Durg	Kumhari	Murmunda	VNR 435	June	23%
12.	Durg	Kumhari	Murmunda	Sunidhi	June	30%
13.	Durg	Kumhari	Murmunda	Namdhari 2722	June	25%
14.	Durg	Kumhari	Murmunda	Namdhari 2992	June	30%
15.	Kabirdham	Kawardha	Newari	Pride	July	15%
16.	Kabirdham	Kawardha	Newari	Armour	July	25%
17.	Kabirdham	Kawardha	Chandaini	Armour	July	30%
18.	Kabirdham	Pandariya	Palansari	Pride	July	20%
19.	Kabirdham	Lohara	Karesara	Karishma	July	60%
20.	Kabirdham	Kawardha	Dabrabat	Pride	June	15%
21.	Kabirdham	Kawardha	Laghan Pandariya	Karishma	July	40%
22.	Kabirdham	Kawardha	Jhalmala	Pride	July	15%
23.	Kabirdham	Pandariya	Mohgaon	VNR 435	June	30%
24.	Dhamtari	Loharsi	Rawa	Local cultivar	November	97%

Table 2: Percentage incidence of chilli leaf curl disease in different locations of Chhattisgarh plains during, 2019-20

Sr. No.	District	Block	Village	Commercial hybrid/ variety	Sowing	Percentage incidence of chilli leaf curl
1.	Raipur	Tilda	Janggira	VNR 435	June	15%
2.	Raipur	Tilda	Janggira	T- 305	June	49%
3.	Raipur	Tilda	Janggira	VNR 435	June	29%
4.	Raipur	Tilda	Janggira	T-305	June	25%
5.	Raipur	Tilda	Janggira	VNR 435	June	30%
6.	Raipur	Tilda	Janggira	Pride	June	14%
7.	Raipur	Tilda	Janggira	VNR 435	June	40%
8.	Raipur	Raipur	Jora	Sunidhi	November	95%
9.	Durg	Kumhari	Murmunda	Sunidhi	October	98%
10.	Durg	Kumhari	Murmunda	Namdhari 2722	June	27%
11.	Durg	Kumhari	Murmunda	Namdhari 2992	June	32%
12.	Durg	Kumhari	Murmunda	VNR 435	June	35%
13.	Durg	Kumhari	Murmunda	Agnirekha	June	30%
14.	Durg	Kumhari	Murmunda	VNR 435	June	23%
15.	Kabirdham	Kawardha	Dabrabat	Pride	June	15%
16.	Kabirdham	Kawardha	Laghan Pandariya	VNR 305	October	70%
17.	Kabirdham	Kawardha	Jhalmala	Pride	July	18%
18.	Kabirdham	Kawardha	Newari	Pride	July	15%
19.	Kabirdham	Kawardha	Newari	Armour	July	30%
20.	Kabirdham	Kawardha	Chandaini	Armour	July	25%
21.	Kabirdham	Pandariya	Palansari	Pride	July	14%
22.	Kabirdham	Pandariya	Mohgaon	VNR Vidya 725	June	30%
23.	Kabirdham	Bodla	Bhareli	Mahyco Sierra	July	30%
24.	Dhamtari	Magarlod	Kundel	Nupoor	June	30%
25.	Dhamtari	Magarlod	Kundel	Armour	June	28%
26.	Dhamtari	Magarlod	Kundel	Sunidhi	June	30%
27.	Dhamtari	Magarlod	Kundel	Indu	June	35%
28.	Rajnandgaon	Chuikhadaan	Kuraya	Pusa Jwala	June	100%

Conclusion

An overall survey revealed that *chilli leaf curl* complex was prevalent more or less in all the surveyed fields. Persistence of viruliferous vector population, and increase in the susceptible host population, might have favoured the higher incidence and spread of the disease.

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