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AN EPIDEMIC OF CHILLI LEAF CURL DISEASE IN RAJASTHAN

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Field surveys were conducted in the summer (2004-2005) and winter (2005-2006) in the rain fed chilli growing belt of Rajasthan and leaf curl incidence was recorded in different villages. The disease induced curling of leaf lamina and stunting of infected plants, even yellowing in severe cases. The disease was found to be successfully transmitted through graft and white fly transmission. In irrigated areas the crop is transplanted in February to March and grow till June/July, where as, in rain fed areas the crop in the transplanted during July to September and sometimes even till December. Maximum incidence of disease was recorded in winter, with severe intensity in Shahpura of Jaipur district.

Key words :- Chilli leaf curl; Epidemiology; Transmission.

Among the viral diseases infecting chilli in India, chilli leaf curl is one of the most serious diseases which take a heavy toll of the crop. Sastry and Singh[1] reported the losses due to tomato leaf curl disease. In irrigated zones of sub-tropical areas the crop is transplanted in February to March (Summer) which gives yield till June to July. Whereas, in rain fed areas, the crop is transplanted during July to September (Winter) which gives fruit throughout winter season. It has been experienced that (September to December) winter season cultivation of chilli especially in rain fed areas of Rajasthan resulted in yield loss up to 25-50 percent. Experiments therefore, were undertaken to study disease incidence in winter and summer season.

Etiology and epidemiology of leaf curl disease

Collection - Surveys were undertaken in rain fed condition during 2004-2005 and 2005-2006 at farmer's fields in Karauli, Sawai Madhopur, Jaipur, Kota and Alwar districts of Rajasthan and chilli plants, showing characteristic symptoms of chilli leaf curl disease, were collected. The virus was transmitted to healthy chilli (selection 71) through white fly *Bemisia tabaci* Genn.

Transmission studies

Graft transmission- One and half month old plants infected through white fly transmission and healthy plants of same age group of chilli (selection 71) were used for grafting. Ten grafts were made in the month of January. The successful grafts were then maintained for another 5 weeks and observed for development of symptoms. Percentage frequency of disease incidence is calculated by the following formula :

$$\text{Percentage Average disease incidence} = \frac{\text{No. of quadrats in which diseased plant accured}}{\text{Total No. of quadrats}} \times 100$$

Effect of transplanting date on disease incidence and yield : Effect of five transplanting dates (20th, 26th July, 15th, 28th September and 30 October) on the disease incidence and crop loss was studied. Twenty day old seedling of selection 71 were transplanted in field as a test variety having two rows on two meters for each date in three replications. Disease incidence at each date was recorded starting from seedling to maturity of crop.

For assesing the extent of yield loss due to leaf curl disease, yields from 10 randomly selected infected chilli plants from each transplanting date were calculated and compared with the yield obtained in apparently healthy plants transplanted during last week of October. Percent reduction in yield was calculated on the basis of 10 plants and monetary loss was also calculated by multiplying yield with existing rate of chilli (Rs/q 1000) in local market.

Surveys conducted at farmers fields revealed that leaf curl incidence in chilli during 2004-2005 and 2005-2006 ranged from 25-50%.

Percentage (%) disease incidence was more in Anta and Shahpura as compared to Mahua, Bahrunda and Sapotra in winter season (Table 1). In summer season, the percentage disease was more in Shahpura as compared to Bahurunda Kuchaman city. Anta and Sapotra (Table 2). The average percentage disease incidence was found to be higher in winter as compared to summer season.

Field survey of perennial alternate hosts for white fly were conducted during Oct.-March (2005-2006) months. *Lantana camara, Malvastrum* spp. and *Hibiscus esculentus* were recorded to have high population of white fly though these plant species were free of virus symptoms. Moderate fly population were noted on *Lycopersicon esculentum, Euphorbia hirta* and *Carica papaya,* which showed curling, yellowing and mosaic type of symptoms (Table 3).

Low white fly population was recorded on symptomatic *Datura stramonium* and *Verbicinia,* and symptom less *Calotropis gigantea, Chenopodium album* and *Amaranthus* suggesting that these pereninial hosts might be playing an important role in virus perpetutation and transmission. This substantiates the earlier reports of

Table 1. Incidence of chilli leaf curl disease during winter season (Sept.-January, 2005 to 2006).

Panchayat	District	No. of villages surveyed	No. of fields surveyed	Average % disease incidence
Sapotra	Karauli	8	21	42.18
Bahurunda	S. Madhopur	5	8	45.15
Shahpura	Jaipur	6	12	50.00
Anta	Kota	4	17	56.00
Mahua	Alwar	5	12	48.00

Table 2. Incidence of chilli leaf curl disease during summer season (March-June).

Panchayat	District	No. of villages surveyed	No. of fields surveyed	Average % disease incidence
Sapotra	Karauli	8	3	18.8
Bahurunda	S. Madhopur	5	4	29.18
Shahpura	Jaipur	6	8	32.56
Anta	Kota	4	7	25.02
Kuchaman city	Hanumangarh	4	8	27.28

Table 3. White fly population on different plant species in chilli growing belt of Rajasthan.

Host plant	Family	Intensity of while fly population	Disease symptoms
1. *Lantana camara*	*Verbenaceae*	+++	NS
2. *Euphorbia hirta*	*Euphorbiaceae*	++	LC, LP
3. *Lycopersicon esculentum*	*Solanaceae*	++	LC, M
4. *Calotropis gigantea*	*Asclepiadaceae*	+	NS
5. *Hibiscus esculentus*	*Malvaceae*	+++	NS
6. *Carica papaya*	*Caricaceae*	++	LC, Ly, M
7. *Datura stramonium*	*Solanaceae*	+	MLY, LP
8. *Chenopodium album*	*Chenopodiaceae*	++	MLY
9. *Verbicinea*	*Verbehaceae*	+	LY
10. *Amaranthus*	*Amaranthaceae*	++	NS
11. *Ricinus communis*	*Euphorbiaceae*	+++	MLY, M.

+++ > 10 (Severe), ++ > up to 5 (moderate) and + < 5 white flies/10 leaves
Curl = LC, yellowing = Ly, Puckering = LP, Mild curl = MLC, Mild yellowing = MLY, Mosaic = M, No symptom = NS

Sastry *et al*[2]. and Ramappa *et al*[3]. Occurence of white fly on *L. camara, C. gigantea, Malvastrum* spp. and *D. stramonium* was recorded in Jammu for the first time. Some of the viruses which are transmitted by white flies are leaf curl of tobacco[4], yellow mosaic of *Acalypha indica*[5] and yellow mosaic of *Phaseolus aureus*[6].

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