

RESPONSE OF SOME COTTON VARIETIES TO COTTON LEAF CURL VIRUS

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Incidence of cotton leaf curl and yield of seed cotton in six varieties/strains of upland cotton viz; CIM-109, CIM-240, CIM-243, CIM-262, MS-84 and S-12 were recorded at nine locations. Leaf curl infestation was minimum in CIM-240 followed by CIM-109. Based on average at 9 locations, CIM-240 gave the highest yield closely followed by CIM-109.

Key words: *Gossypium hirsutum*, Leaf curl virus, yield.

Introduction

Cotton leaf curl (CLC) is a whitefly transmitted virus disease of cotton, (*Gossypium* spp.), caused by the cotton leaf curl virus (CLCV). Symptoms include upward or downward curling of the leaf margins, pronounced thickening of veins on the lower surface and minute outgrowth called "enations". These enations give rise to minute foliar structure. From the underside affected veins appear abnormally dark green. New leaves developed after symptoms appearance are usually small and distorted by curling.

CLC was recorded from Multan area in 1967 on a few individual plants [1]. This disease has not been considered economically important in the past due to its low incidence and or late infestation [2]. CLC, however has the potential of becoming a serious disease due to its transmission through white flies and has gained economic importance.

In the year 1991-92, a survey conducted by Extension Wing of Agriculture Department estimated the cotton area affected by the disease to be about 35000 acres out of which about 7000 acres were severely affected [3]. In the year 1992-93, the incidence of leaf curl virus increased dramatically. According to the field survey conducted during 1992, the area damaged by virus was estimated to be about 243950 acres, with a production loss of 543295 bales [4].

The above situation compelled the Government and research workers to pay their urgent attention to this new problem. These studies were conducted to record the incidence and severity of the disease, as well as to examine difference in varietal susceptibility of infection by CLC, based on symptomatology.

Materials and Methods

This study was conducted at nine locations in Multan, Khanewal, Vehari and Lodhran districts during the crop season 1992-93 on six varieties/strains viz; CIM-109, CIM-240, CIM-243, CIM-262, MS-84 and S-12. The crop was sown in

the first week of June, with four replications in complete randomized block design under normal cultural practices (fertilizer, irrigation and plant protection measures). One hundred plants were taken at random in each replicate/variety/strain for recording the incidence and severity of CLCV during the first week of September, 1992. The plants were graded by leaf symptoms with a little modification of the system described by Siddig, [5]. The grades were defined as follows:-

A = Absent (asymptomatic), M1 = Minor (small scattered vein thickening), ME = Medium (large groups of vein thickening), S = Severe (severe curling and or foliar outgrowths i.e. enations).

At the end of the season the yield of seed cotton was recorded in Kilograms per hectare. The yield data obtained was analysed through the factorial method of analysis of variance [6].

Results and Discussion

The incidence of CLCV on cotton cultivars/strains and their yield of seed cotton are given in Tables 1(a,b) and 2 respectively. The results are discussed below:

Incidence of CLCV. The data presented in Table 1 indicated that the average incidence of the disease on cultivars CIM-240 was low (26.0%) as compared to other cultivars i.e. MS-84 (53.1%) and S-12 (47.2%). However at Jahangeer Tareen Farm, Lodhran and Jumman Farm, Makhdum Rasheed the incidence was very high in all the cultivars (hot spot) but its S grade (leaf symptoms) of the disease was 0.0% in the cultivars CIM-240 and CIM-109 as compared to S-12 (64% and 55% in S grade respectively at both the farms).

The cultivars CIM-240 and CIM-109 showed tolerance to CLCV disease, as most of the plants of these varieties come under minor (MI) or medium (ME) leaf symptoms. These observations resemble those of Hussain *et al.* [7] and Ali *et al.* [3] who reported that the consensus among majority of the workers that S-12 and CIM-70 are the most susceptible varie-

ties and CIM-109 and CIM-240, MNH-93, FH-87, Gohar-87 and SLH-41 are somewhat tolerant to this disease.

Yield of seed cotton. Average yield data based on all the nine locations clearly indicate that CIM-240 outyield all the

varieties with a produce of 3300 Kgs/ha followed by CIM-109 (2938 Kgs/ha) Table 2. It also indicates that in the hot spot (Jahangeer Tareen Farm, Lodhran and Jumman Farm, Makhdum Rasheed) where CLCV incidence was high (83-

TABLE 1 (a). INCIDENCE OF CLCV (IN % AGE) OF ZONAL VARIETAL TRIAL DURING AUGUST, 1992.

Locations	CIM-240					CIM-243					CIM-262				
	A	MI	ME	S	T	A	MI	ME	S	T	A	MI	ME	S	T
Jahangir Tareen Farm, Lodhran	17	73	10	0	83	2	52	37	9	98	6	23	57	14	94
Aziz Jhandir Farm, Lodhran	96	4	0	0	4	80	18	2	0	20	92	6	2	0	8
Majid Jhandir Farm, Lodhran	100	0	0	0	0	99	1	0	0	1	99	1	0	0	1
Hayatullah Tareen Farm, Duniyapur	64	33	3	0	36	40	55	5	0	60	48	41	7	4	52
Jumman Shah Makhdum Rasheed	16	72	12	0	84	3	40	47	10	97	2	19	47	32	98
PSC, 86-87/10-R, Khanewal	92	7	1	0	8	75	13	75	5	25	63	13	9	5	27
PSC, 83-85/10-R, Khanewal	96	3	1	0	4	80	14	4	2	20	96	12	9	3	24
Govt. Farm Vehari	90	8	2	0	10	69	24	7	0	31	69	22	9	0	31
Zaheer Farm, Burewala	95	4	1	0	5	81	14	5	0	19	85	7	6	2	15
Average:-		22.7	3.3	0	26		25.6	12.6	2.8	41.2		16	16.2	6.6	38.8

A = Absent (asymptomatic) MI = Minor (small scattered vein thickening) ME = Medium (Large groups of vein thickening) S = Severe (severe curling and or enations) T = Total disease incidence (including MI, ME, and S).

TABLE 1 (b). INCIDENCE OF CLCV (IN % AGE) OF ZONAL VARIETAL TRIAL DURING AUGUST, 1992.

Locations	CIM-109					S-12					MS-84				
	A	MI	ME	S	T	A	MI	ME	S	T	A	MI	ME	S	T
Jahangir Tareen Farm, Lodhran	12	82	6	0	88	0	14	22	64	100	15	14	43	28	85
Aziz Jhandir Farm, Lodhran	90	9	1	0	10	75	18	6	1	25	50	22	21	7	50
Majid Jhandir Farm, Lodhran	98	2	0	0	2	96	2	1	1	4	98	2	0	0	2
Hayatullah Tareen Farm, Duniyapur	48	48	4	0	52	31	6	36	27	69	25	39	29	7	75
Jumman Shah Makhdum Rasheed	11	55	32	2	89	7	4	34	55	93	1	44	40	15	99
PSC, 86-87/10-R, Khanewal	73	21	6	0	27	69	3	8	20	31	72	15	10	3	28
PSC, 83-85/10-R, Khanewal	79	14	5	2	21	63	7	8	22	37	49	25	22	4	51
Govt. Farm Vehari	82	15	3	0	18	68	10	12	10	32	64	19	10	7	36
Zaheer Farm, Burewala	92	8	0	0	8	66	14	10	10	34	48	24	18	10	52
Average:-		28.3	6.3	0.4	35		8.7	15.2	23.3	47.2		22.7	21.4	9	53.1

A = Absent (asymptomatic) MI = Minor (small scattered vein thickening) ME = Medium (Large groups of vein thickening) S = Severe (severe curling and or enations) T = Total disease incidence (including MI, ME, and S).

TABLE 2. INCIDENCE OF CLCV AND YIELD OF SEED COTTON IN SIX VARIETIES OF UPLAND COTTON AT NINE LOCATIONS DURING 1992-93.

Locations	CIM-240		CIM-243		CIM-262		CIM-190		S-12		MS-84	
	INC	YIE	INC	YIE	INC	YIE	INC	YIE	INC	YIE	INC	YIE
Jahangir Tareen Farm, Lodhran	83	2653	98	2180	94	1932	88	2539	100	1159	85	1354
Aziz Jhangir Farm, Lodhran	4	4318	20	4420	8	4400	10	4210	25	4330	50	4023
Majid Jhangir Farm, Lodhran	0	4010	1	4314	1	3491	2	3661	4	2414	2	3491
Hayatullah Tareen Farm, Dunyapur	36	3646	60	3407	52	2658	52	3663	69	3095	75	2818
Jumman Shah Makhdum Rasheed	84	3968	97	3091	98	2616	89	3121	93	2509	99	2096
PSC, 86-87/10-R Khanewal	8	2525	25	2376	27	2271	27	2510	31	1942	28	1464
PSC, 83-85/10-R Khanewal	4	3774	20	2559	24	2241	21	2643	37	2144	51	2013
Govt. Farm, Vehari	10	2828	31	2409	31	2438	18	2701	32	2132	36	1913
Zaheer Farm, Burewala	5	1979	19	1579	15	1639	8	1393	34	1848	52	1192
Average	26.0	3300	41.2	2926	38.38	2742	35.0	2937	47.22	2397	53.10	2262

INC = Incidence of leaf curl virus in %age YIE = Yield in Kgs/ha

100%), the reduction in yield was more than 50% in cultivar S-12 as compared to CIM-240. Similar results have been reported by Massy [8] and Andrew [9]. The severity (leaf symptoms) of the disease played an important role in the yield reduction: 50 to 64% of S-12 plants were graded as showing severe (S) symptoms, but none of the CIM-240 plants were similarly graded.

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