

Reprint

ISSN 1991-3036 (Web Version)

International Journal of Sustainable Crop Production (IJSCP)

(*Int. J. Sustain. Crop Prod.*)

Volume: 7

Issue: 2

May 2012

Int. J. Sustain. Crop Prod. 7(2): 9-11 (May 2012)

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IJSCP** issn 1991-3036, HQ:19-10 cantral place, saskatoon, saskatchewan, s7n 2s2, Canada

MANAGEMENT OF LEAF CURL VIRUS DISEASE OF CHILLI BY USING CHEMICALS AND BARRIER CROP

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Accepted for publication on 10 April 2012

ABSTRACT

Talukder MMR, Riazuddin M, Mahmud E, Uddin MS, Khan MSI (2012) Management of leaf curl virus disease of chilli by using chemicals and barrier crop. *Int. J. Sustain. Crop Prod.* 7(2), 9-11.

An experiment was carried out at the Regional Agricultural Research Station (RARS), Rahmatpur, Barisal, during three subsequent years of 2008-2009, 2009-2010 and 2010-2011 to evaluate the efficacy of different chemicals and cultural practices against leaf curl of chilli. Efficacy of different chemicals namely Admire (0.05%), Omite (0.1%), Milk (10%), Furadan 5G (30 kg/ha), and cultural practices i.e. foxtail millet - one row after one row (barrier crop), foxtail millet (surrounding the plot), with untreated control were evaluated against leaf curl of chilli. Foxtail millet - one row after one row (barrier crop) gave the highest yield (778 kg/ha, 810 kg/ha and 757 kg/ha) and produce lowest percent disease index (19.34%, 24.53% and 22%) with lowest disease severity score (2, 3, 2) followed by foxtail millet (surrounding the plot) in the year of 2008-2009, 2009-2010 and 2010-2011, respectively. Control plot gave the lowest yield (329 kg/ha, 320 kg/ha and 299 kg/ha) and highest disease index (71.83%, 79.80% and 74.67% respectively) with highest disease severity score 4 in the subsequent years.

Key words: barrier crop, chemical, leaf curl, chilli

INTRODUCTION

Chilli (*Capsicum annum*) is the most important spice crop in Bangladesh and is being widely cultivated throughout temperate, tropical and subtropical countries. Green fruits as well as dried ripen fruits are used as spice for preparing curries, salad etc. Chilli is famous for its pleasant aromatic flavour, pungency and high colouring substance. It is used very widely in culinary, pharmaceutical and beverage industries throughout the world. It is an important condiment used for imparting pungency and colour to the food being rich in vitamin C, A, B, oleresin and red pigment. In Bangladesh chilli is being grown on an area of 0.89 lakh hectares with the production of 1.09 lakh tons (Yearbook of Agricultural Statistics of Bangladesh, 2010). The major disease problem in cultivated Chilli varieties throughout the chilli growing areas in the world is viral infections. Several malformations of the foliage are described as "leaf curl" and they are caused by virus infection, mites and thrips. Among them "leaf curl" due to virus infection is more prevalent in Central America, South India, Sri Lanka, Bangladesh and other tropical countries (Abeygoonawardena 1969). In plants with mixed infections of mosaic and leaf curl virus, the leaf curls symptoms are more severe than the mosaic (Sugiura *et al.* 1975). Leaf curl virus is more prevalent in most chilli growing areas of Bangladesh. Chilli leaf curl virus (CLCV) causes vein clearing on young leaves at the early stages of infection upward or downward curling of young and old leaves and stunting in most cases. Curling of fruits could be seen in mature plants. Virus is transmitted by white fly, *Bemisia tabaci* (Fernando and Peiris, 1875). However, Sugiura *et al.* (1975) reported that CLCV does not persist throughout the life span of the vector. The plant species and varieties known to produce clear symptoms of CLCV infections are *Ageratum*, *Conyzoides*, *Physalis floridana*, *Lycopersicon esculentum*, *Petunia hybrida*, *Nicotiana tabacum* and *Datura Stramonium*. The CLCV belongs to the group of circulative viruses such as *Euphobia* mosaic virus, tobacco leaf curl virus, cucumber vein yellowing virus and others (Suguiura *et al.* 1975). Leaf curl caused by mites shows downward curling of leaves, partial suppression of lamina near the petiolar end and a shiny bronze colour on the lower surface of the leaves. Emerging young leaves in infected plants become brittle narrow and thicker (Peiris 1953) Leaf curl due to thrips results upward curling of leaves and interveinal buckling. Irregular scraping of epidermis could also be seen (Johnpulle 1939). Application of insecticides for vector control has been the only effective method of arresting the spread of vector transmitted viral diseases. In this context, field experiments were undertaken to find out the eco-friendly management strategies that is through the use of border crop coupled with insecticides for the management of chilli leaf curl disease.

MATERIALS AND METHODS

The experiment was conducted at Regional Agricultural Research Station, Rahmatpur, Barisal during 2008-2011. The experimental land was well ploughed and properly leveled before bed preparation. Zia Moris (local) was used in the experiment. The unit plot size was 4m x 3m and plant spacing was 50cm x 40cm. The design was RCB with 3 replications. There were 7 treatments namely Admire (0.05%), Omite (0.1%), Milk (10%), Foxtail millet-one row after one row (barrier crop), Furadan 5G (30 kg/ha), foxtail millet-surrounding the plot and control. Five sprays were given at an interval of 10 days while the first one was applied just at the appearance of first disease symptom. Data

were recorded on disease incidence (%) by counting total number of plants as well as diseased plants. Percent disease incidence was calculated by following formula as suggested by Nene (1972).

$$\% \text{ Disease Incidence} = \frac{\text{No. of diseased units}}{\text{Total number of assessed units}} \times 100$$

Disease severity were recorded using 0-4 rating scale which developed by Suhag *et al.* (1983) as follows:

- 0 = No infection (Field resistant/tolerant)
- 1 = 1-10% infection (Moderately resistant)
- 2 = 11-20% infection (Moderately susceptible)
- 3 = 21-50% infection (Susceptible)
- 4 = above 50 % infection (Highly susceptible)

Data were analyzed by MSTAT-C for proper interpretation of results. Mean separation was done by DMRT (Zaman *et al.* 1982).

RESULTS AND DISCUSSION

All the treatments caused significant reduction in disease incidence. Results are presented in Table 1. The lowest disease incidence was observed in foxtail millet (as barrier crop), followed by foxtail millet (surrounding the plot), Admire, Furadan, Oomite and milk. The highest disease incidence was observed in control plots. Disease incidence varied from 21 to 64% depending on treatments.

Table 1. Effect of chemicals and barrier crop on the incidence of leaf curl of Chilli during 2008-2011

Treatments	Disease Incidence (%) in different years			Average
	2008-09	2009-10	2010-11	
Admire (0.05%)	41.23d	45.12d	47.33d	44.56
Omite (0.1%)	60.00c	52.33c	50.00c	54.11
Milk (10%)	68.28b	65.54b	60.00b	64.60
Foxtail millet (Barrier crop)	19.34f	24.53f	22.00f	21.96
Furadan 5G (30kg/ha)	53.44c	44.63d	49.67c	49.25
Foxtail millet (Surrounding the plot)	33.69e	31.79e	34.33e	33.27
Control	71.83a	79.80a	74.67a	75.43
CV (%)	6.26	3.87	2.91	

Mean(s) in the column followed by common letter(s) do not differ significantly at 5% level

The treatments reduced the disease severity also. Effecting different treatments on disease severity is compiled in Table 2. Disease severity was the lowest (2) in foxtail millet treated plot when used as barrier crop (one row after one row) and surrounding the plot followed by Admire and Furadan 5G, while control plot produced highest disease severity score 4.

Table 2. Effect of different chemicals and barrier crop on the severity of leaf curl of chilli during 2008-2011

Treatments	Disease severity (scale: 0-4)			Average	Disease reaction
	2008-09	2009-10	2010-11		
Admire (0.05%)	3	3	3	3	S
Omite (0.1%)	4	4	4	4	HS
Milk (10%)	4	4	4	4	HS
Foxtail millet (Barrier crop)	2	3	2	2	MS
Furadan 5G (30kg/ha)	3	4	3	3	S
Foxtail millet (Surrounding the plot)	2	3	2	2	MS
Control	4	4	4	4	HS

Mean(s) in the column followed by common letter(s) do not differ significantly at 5% level.

*N.B. S=Susceptible, HS=Highly Susceptible, MS=Moderately Susceptible

Yield was also increased due to application of different treatments (Table 3). Number of fruits per plant was the highest (25.33) in foxtail millet treated plot when used as barrier crop (one row after one row) followed by Foxtail millet –surrounding the plot, Furadan 5G, Admire, Milk and Omite respectively. Control plot produced lowest (15.78) number of fruits per plant. The highest yield (781.67 Kg/ha) was obtained from foxtail millet treated plot when used as barrier crop (one row after one row) followed by Foxtail millet –surrounding the plot, Admire,

Furadan 5G, Omite and milk respectively. The lowest yield was found in control plot (316 Kg/ha). The findings of the present study are in agreement with Tatagar *et al.* (2011).

Table 3. Effect of chemicals and barrier crops on the yield of chilli during 2008-2011

Treatments	No. of fruits/plant			Average	Yield (Kg/ha)			Average
	2008-09	2009-10	2010-11		2008-09	2009-10	2010-11	
Admire (0.05%)	24.83b	20cd	21b	21.94	678b	730b	632b	680
Omite (0.1%)	19.33c	20cd	18.33c	19.23	619c	583c	515d	572.33
Milk (10%)	19.00c	22.67b	18.00c	19.89	609c	595c	562c	618.67
Foxtail millet (Barrier crop)	27.00a	25.67a	23.33a	25.33	778a	810a	757a	781.67
Furadan 5G	24.00b	20.67c	21.33b	22.00	630c	675bc	620b	641.67
Foxtail millet (Surrounding the plot)	25.33b	24.00a	23.00a	24.11	690b	720b	634b	681.33
Control	16.67d	14.33e	16.33d	15.78	329d	320d	299e	316
CV (%)	3.31	3.87	2.89		2.89	3.39	2.00	

Mean(s) in the column followed by common letter(s) do not differ significantly at 5% level

CONCLUSION

From the findings of the present study, it can be concluded that use of foxtail millet as a barrier crop is an effective method for the management of leaf curl disease of chilli.

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