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SUMMARY

Leaf curl is one of the most widespread and destructive viral diseases of tomato. The use of neem leaf extracts 10% in combination with monocrotophos (0.25%) and endosulfon (0.2%) was found most effective in reducing the whitefly population and tomato leaf curl virus incidence and promoting the yield of tomato as compared to other treatments.

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Eco-friendly management, TLCV, Whitefly, Leaf extracts, Insecticides, Tomato leaf curl

Tomato (*Lycopersicon esculentum* Mill.), a member of family Solanaceae is grown extensively in adjacent to big cities, because of the readily available market for its fruit vegetable. At places in eastern Uttar Pradesh, tomato is cultivated throughout the year. This crop has been known to may be susceptible to many bacterial, fungal, and viral pathogens. Among them, tomato leaf curl disease caused by TLCV is the most important and serious threat to tomato cultivation in India (Varma,1993; Ansari and Tewari, 2004). In India, the disease was first reported by Vasudeva and Samraj in 1948. In nature, the disease is transmitted by vector whitefly (*Bemisia tabaci* Genn.). The disease affects all stages of the plants causing 38-100 per cent yield loss, depending on the stage of the crop at the time of infection (Butter and Rataul, 1981; Das Gupta *et al.*, 2003; Ansari, 2007).

Thus, its cultivation has been hampered by TLCV disease, resulting in enormous losses in the form of reduced yield; Hence, in order to find out suitable management practices for TLCV diseases the present investigation was carried out the using insecticide and plant extracts known to have antiviral properties.

MATERIALS AND METHODS

A field experiment was conducted during 2009-2010 and 2010-11 in M.L.K. (P.G.) College field to test the efficacy of plant extracts and insecticides in managing TLCV disease. The experiment was laid out in randomized block design with three replications with plot size 5x4 meter and spacing maintained 80x80 cm. Local susceptible variety, Pusa Ruby was used and all agronomic package of practices were followed for getting higher yield. Neem, Parthenium and Clerodendrum leaf extracts and insecticides, monocrotophos (0.25%) and endosulfon (0.2%) were evaluated against TLCV disease.

Leaves of plant species were collected, dried and powdered separately. One kg. powder of each species was suspended in 5 litres water, heated at 50°C for one hour, filtered and volume made up of 10 liters by adding water to get 10 per cent concentration. Each plant extract at 10 per cent concentration was mixed with monocrotophos (0.25%) and endosulfon (0.2%) and used for spraying. First spray was given at nursery stage and subsequent sprays were given at 15 days after transplanting, pre-flowering and fruiting stages. Observations

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were recorded at maturity stage by counting the number of infected plants and total number of plants in each treatment and then per cent disease was calculated. Whitefly population count was taken just before and 24 hour after each spray. The data were statistically analyzed.

RESULTS AND DISCUSSION

The results are presented in Tables 1 and 2. The results indicated that the least disease incidence (30.5%) was recorded in neem leaf extracts + monocrotophos (0.25%) + endosulfon (0.2%) followed by monocrotophos (0.25%) + endosulfon (0.2%) and Clerodendrum leaf

extracts and monocrotophos (0.25%) + endosulfon (0.2%), spray which was significantly superior over other treatments except mixed spray of monocrotophos (0.25%) and endosulfon (0.2%), the untreated plot recorded highest tomato leaf curl virus disease incidence (83.4%). The result revealed that the neem leaf extracts + monocrotophos (0.25%) + endosulfon (0.2%) was highly effective in reducing the whitefly population. (Table 2) followed by monocrotophos (0.25%) + endosulfon (0.2%). Higher yield (9.57q/ha) was obtained in case of neem leaf extracts + monocrotophos, (0.25%) + endosulfon (0.2%), treated plot when compared to other treatments. Many workers from time to time (Peshney and Moghem,

Table 1 : Effect of plant leaf extracts and insecticides on whitefly population in tomato

Treatments	Number of whitefly							
	2009-2010				2010-2011			
	Before spray	Ist spray	IInd spray	Pooled	Before spray	Ist spray	IInd spray	Pooled
Neem leaf extracts (10%) and monocrotophos (2.5m.l/1) + Endosulfon (2.0 m.l/1)	2.16	1.86	2.15	2.05	1.71	1.77	1.87	1.78
Parthenium leaf extracts (10%) and monocrotophos (2.5m.l/1)+Endosulfun (2.0m.l/1)	2.18	2.11	2.40	2.23	2.09	2.15	2.25	2.16
Clerodendrum leaf extracts (10%) and monocrotophos(2.5m.l/1)+Endosulfon	2.25	2.12	2.28	2.21	2.17	1.89	2.14	2.06
Monocrotophos(2.5m.l/1)+ Endosulfon(2.0m.l/1)	2.20	2.09	2.19	2.16	1.77	1.81	1.99	1.85
Monocrotophos alone (2.5m.l/1)	2.07	2.15	2.60	2.27	2.13	1.97	2.49	2.19
Endosulfon alone (2.0m.l/1)	2.15	2.17	2.87	2.39	1.89	2.02	2.79	2.23
Control/ untreated	2.60	2.65	3.69	2.98	2.25	2.45	3.40	2.70
C.D. (P=0.05)	0.39	0.40	0.67	1.02	0.47	0.56	1.07	0.62

Table 2 : Eco-friendly management of TLCV disease through plant extracts and insecticides

Treatments	Disease index%			Yield(q/ha)		
	2009-2010	2010-2011	Pooled	2009-2010	2010-2011	Pooled
	Neem leaf extracts (10%)and monocrotophos (2.5ml./1)+Endosulfon (2.0ml./1)	31.4	29.7	30.5	6.78	9.57
Parthenium leaf extract (10%)and monocrotophos (2.5ml./1)+Endosulfon (2.0ml./1)	48.2	48.4	48.3	6.00	5.24	5.62
Clerodendrum leaf extract (10%)+and onocrotophos (2.5 ml./1)+ Endosulfon (2.0ml./1)	45.6	43.2	44.4	6.20	6.42	6.31
Monocrotophos (2.5ml./1)+ Endosulfon (2.0ml./1)	48.9	34.2	41.5	5.00	6.88	5.94
Monocrotophos alone (2.5ml./.)	72.7	67.5	70.1	3.42	3.85	3.63
Endosulfon alone (2.0ml. /1)	64.7	63.5	64.1	3.95	4.70	4.32
Control/ untreated	74.6	92.2	83.4	2.92	1.65	2.28
C.D. (P=0.05)	7.69	8.87	8.4	0.47	0.37	0.48

1989; Cheema *et al.*, 1991; Baranwal and Ahmad, 1997; Ansari and Tewari, 2005, Ansari 2007) have investigated reduction of plant virus diseases by application of some plant extracts.

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