

Management of pea mosaic virus by leaf extracts of some medicinal plants

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SUMMARY

The present investigation deals with effect of seven medicinal plants extracts on the inhibition of three strains of pea mosaic virus viz., A (mild), B (severe), and C (moderate) on different intervals. It was recorded that medicinal plant extracts were inhibitory for all the three strains. Maximum reduction in disease incidence was noted by leaf extracts of *Rauwolfia serpentina* for all the three strains upto 75 days. Treatment of leaf extracts of *Rauwolfia serpentina* was also very effective for plant growth parameter.

Key words :

Management, Pea mosaic virus, Medicinal plants

Pea (*Pisum sativum* L.) is one of the most important pulse crops of the world. In our country, pea is grown commercially in U.P., M.P., Bihar and Maharashtra. The pea is affected by many diseases among which viral diseases play an important role in economy. The most common viral disease on pea is pea mosaic virus (Tu *et al.*, 1970; Singh and Mall, 1974; Dhingra and Chenulu, 1980; Agarwal *et al.*, 1995; Singh *et al.*, 2007 and Singh, 2009). Many workers have investigated reduction in plant virus diseases of different crops by application of several other methods and found increased yield (Griffing, 1956; Simons, 1960; Ali and Said, 1987; Singh *et al.*, 2004; Ansari and Tewari, 2005; Devaraju and Patil, 2005; Pun *et al.*, 2005; Awasthi and Verma, 2006; Shukla *et al.*, 2006; Srivastava *et al.*, 2009; Ansari, 2007; Ansari *et al.*, 2007 and Singh *et al.*, 2009).

The present investigation have been planned to see the effect of leaf extract of some medicinal plants on pea infected by pea mosaic virus.

MATERIALS AND METHODS

The seeds of pea var. contender were grown in an insect proof condition. Three strains of pea mosaic virus viz. A, B, C, already maintained in laboratory were used as inoculum (Singh, 2009). Fifteen days old seedlings were taken and divided into four groups each containing fifty seedling. Seedling of I, II and III groups were inoculated with three strains

of PMV while the IVth group was inoculated with natural phosphate buffer which served as control. Treatments were given at 15 days intervals upto 75 days. The disease incidence was recorded by visual observation of symptoms at two weeks interval and % incidence was determined/ plot using standard method. Changes of plant growth parameters in each treatment were also recorded and analysed statistically.

The leaf extracts of seven medicinal plants were used in this study. For preparation of leaf extract, the healthy leaves were air dried in shade for the duration of 15 days and then finely powdered. The powdered leaf materials were mixed in water in container and then heated on water bath at 80°C for one hour. The extract was filtered and volume of the filtrate was made upto 1:10 dilution (w/v), then were used for further studies. All experiments were conducted in R.B.D. and datas were statistically analyzed (Chandel, 2004).

RESULTS AND DISCUSSION

The results of Table 1 revealed that leaf extracts of all the seven tested medicinal plants were effective in reducing the incidence of the disease and promoting the growth of the plants (Table 1 and 2). Among the treatments, *Rauwolfia serpentina* leaf extracts were highly effective. It reduced the disease incidence of PMV-A (81.19%), PMV-B (79.06%) and PMV-C (83.65%). The general mean incidence of the disease indicates that

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Table 1: Effect of medicinal plants on disease incidence of Pea mosaic virus

Treatment	Disease incidence												Average incidence of Disease	Percent reduction over control								
	15 days			30 days			45 days			60 days					75 days							
	PMV A*	PMV B*	PMV C*	PMV A	PMV B	PMV C	PMV A	PMV B	PMV C	PMV A	PMV B	PMV C			PMV A	PMV B	PMV C					
<i>Catharanthus roseus</i>	12.00	18.00	6.00	13.00	18.50	10.00	13.50	18.50	10.50	14.00	18.90	9.00	14.00	20.00	9.00	13.30	18.78	8.90	47.22	36.38	46.12	
<i>Withania somenifera</i>	19.00	20.00	5.50	14.50	21.50	8.50	15.00	22.00	7.50	15.00	22.50	7.00	14.50	22.40	6.90	14.60	21.68	7.68	42.06	26.55	57.14	
<i>Bacopa monerri</i>	11.00	17.00	5.00	12.50	17.40	9.50	13.00	19.50	10.00	12.00	20.40	11.00	11.50	20.50	11.00	12.00	18.96	9.30	52.30	35.77	43.70	
<i>Boerhaavia diffusa</i>	8.00	15.50	4.00	9.50	16.40	6.00	9.90	17.00	6.50	9.50	17.50	6.50	9.20	17.50	7.00	9.22	16.78	6.00	63.41	43.15	63.68	
<i>Calotropis procera</i>	8.20	12.00	4.50	9.30	13.00	6.00	9.00	14.50	7.00	9.00	14.50	7.00	8.50	14.00	6.50	8.80	13.60	6.20	65.07	53.92	62.46	
<i>Ocimum sanctum</i>	5.50	8.00	3.50	6.90	9.00	4.00	7.20	9.50	5.50	7.20	9.40	5.00	7.20	9.40	4.90	6.80	9.06	4.58	73.00	69.30	72.27	
<i>Rauwolfia serpentina</i>	4.00	5.00	2.00	5.20	5.90	3.50	5.50	6.90	3.00	4.50	6.50	2.50	4.54	6.60	2.50	4.74	6.18	2.70	81.19	79.06	83.65	
Control	18.50	29.20	15.40	25.30	30.00	16.20	26.00	32.80	17.50	25.20	31.10	17.00	31.00	24.50	16.50	25.20	29.52	16.52				
SD	3.29	5.11	1.24	3.13	5.11	2.40	3.24	5.07	2.41	3.46	5.44	2.51	3.34	5.54	2.52	3.29	5.25	2.14				
S.E. ±	1.24	1.93	0.47	1.18	1.93	0.90	1.23	1.92	0.913	1.31	2.06	0.95	1.26	2.09	0.956	1.24	1.99	0.81				

* A = mile
* B = Severe
* C = Moderate

all the treatments significantly reduced incidence of the disease when compared to control. The results also indicate that statistically maximum inhibition occurred after 75 days, afterwards it became static.

All the growth characteristics viz., plant length, number of flower, number of pod, and fruit length were superior with *Rauwolfia serpentina* leaf extracts treatment in comparison to other treatments (Table 2).

Table 2 : Effect of medicinal plants on plant growth parameters of pea

Treatments	Plant growth parameter			
	Plant length (cm.)	No. of flower	No. of pod/plant	Fruit length
<i>Catharanthus roseus</i>	125 (44.0)*	7 (42.8)	9 (55.5)	8(37.5)
<i>Withania somenifera</i>	132 (46.9)	8 (50.0)	10 (60.0)	9 (44.4)
<i>Bacopa monerri</i>	100 (30.0)	5 (20.0)	8 (50.0)	7 (28.5)
<i>Boerhaavia diffusa</i>	145 (51.7)	9 (55.5)	12 (66.6)	12 (58.3)
<i>Calotropis procera</i>	135 (48.1)	8 (50.0)	11 (63.6)	10 (50.0)
<i>Ocimum sanctum</i>	149 (53.0)	10 (60.0)	15 (73.3)	13 (61.5)
<i>Rauwolfia serpentina</i>	165 (57.5)	12 (66.6)	20 (80.0)	15 (66.6)
Control	70	4	4	5
S.D.	18.99	2.05	3.83	2.66
S.E. ±	7.19	0.77	1.45	1.00

* Increase over control.

It is clear from the results presented in Table 1 and 2 that leaf extracts of different medicinal plant applied before virus infection reduced the disease incidence, symptom severity and delayed symptoms appearance. The protective effect was more pronounced if the number of sprays were increased upto 5, which showed highest reduction in the disease incidence and promoting the growth parameters of the plants.

Similar results were obtained and similar trend has been recorded by Verma and Prasad, 1983; Verma *et al.*, 1984, Awasthi *et al.*, 1989; Patel *et al.*, 1997 and Ansari *et al.*, 2007.

Thus, the leaf extracts of medicinal plants offer a novel, economic and eco-friendly tool for the management of pea mosaic virus disease. Therefore, the extract of medicinal plants may be recommended against pea mosaic virus disease.

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