

## Incidence of insect pests and diseases on nursery plants of Kinnow mandarin under different growing conditions

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### ABSTRACT

Experiment was conducted during 2002-2003 in the College Orchard, Department of Horticulture, Punjab Agricultural University, Ludhiana (Punjab). Incidence of leaf miner was not observed on the rough lemon seedlings grown under screen house conditions, whereas significantly higher incidence was recorded in open field conditions, both during March and September, growing seasons. Maximum incidence of leaf miner was recorded in medium M<sub>2</sub> (Farm soil + FYM) under open field conditions, irrespective of growing season, while minimum was observed in medium M<sub>1</sub> (Farm soil) and M<sub>5</sub> [Farm Soil + FYM + Sand + Burnt rice husk (1:1:1:1)] during March and September, respectively. No attack of citrus psylla was recorded on the rough lemon seedlings irrespective of growth conditions and growing season. Significantly higher incidence of citrus canker and citrus scab were recorded on the seedlings grown in open field conditions and no incidence was found on the seedlings grown under screen house conditions, irrespective of growing season.

**Key words :** Kinnow mandarin, Leaf miner, Citrus psylla, Citrus canker and Citrus scab.

### INTRODUCTION

Citrus industry is the third largest fruit industry of India after banana and mango covering approximately 0.56 million ha area with an annual production of 4.58 million tonnes (Anon 2003). India ranks sixth amongst the citrus producing countries contributing 4.80 per cent of the world's total citrus production. In Punjab, however, the citrus fruits rank first with respect to area 20411 ha and an annual production of 2.8 lakh tonnes. Among the citrus fruits being grown in Punjab, Kinnow has attained major commercial significance. It alone occupies 17189 ha area and produces 257835 tonnes of fruits annually (Anon 2004).

There are several insect pest and diseases which damage the foliage and reduces the yield and quality of fruits. Some of the insects attack the fruits and render them unfit for marketing. The control of insect pest and diseases, therefore, forms an important orchard operation. A few serious insect pests and diseases attacking citrus in Punjab are citrus leaf miner, citrus psylla, citrus canker and citrus scab. In view of this fact, the experiment was conducted to find out the incidence of insect pests and diseases on nursery plants of Kinnow under greenhouse conditions.

### MATERIALS AND METHODS

Experiment was conducted during 2002-2003 in the College Orchard, Department of Horticulture, Punjab Agricultural University, Ludhiana (Punjab). Rough lemon (*Citrus jambhiri* Lush.) seeds after extraction from fruits of single and healthy tree were sown in well prepared seed beds. When the seedlings attained the height of 15 cm, these were transplanted in black polythene bags (14"x8.5" size, 250 gauge) filled with five different growing media. Then one set of poly bags containing seedlings was placed inside screen house and the other set in open field conditions. The experimental plants after their establishment (15 days after transplanting), were supplied with half strength Hoagland's nutrient solution until the seedlings attain a diameter of 0.4-0.5 cm and thereafter with full strength Hoagland nutrient solution upto the stage when the seedlings attain buddable stage, at fortnightly interval.

On the basis of visual symptoms, Kinnow plants were screened for their reaction to insect pests and diseases following recommended spray schedule. About 100 leaves from each replication were observed during the months of March and September. The disease or insect incidence and index were calculated by using the formula by Mayee and Datar (1986):

$$\text{Disease or pest incidence} = \frac{\text{Number of diseased or damaged leaves}}{\text{Total number of leaves observed}} \times 100$$

### RESULTS AND DISCUSSION

#### Leaf miner

There was no incidence of leaf minor on the seedlings grown under screen house conditions, whereas significantly higher incidence was recorded under open field conditions during March (34.42%) and September (36.04%) months (Table 1).

Under open field conditions during March, high incidence of leaf miner was recorded in M<sub>2</sub> (37.25%) followed by M<sub>5</sub> (34.40%), M<sub>3</sub> (34.02%), M<sub>4</sub> (33.82%), while the minimum was recorded in M<sub>1</sub> (33.61%). Similarly during September, the incidence of leaf miner was significantly higher in M<sub>2</sub> (39.21%) and it was followed by M<sub>1</sub> (36.06%), M<sub>3</sub> (35.45%), M<sub>4</sub> (35.05%) and minimum incidence was recorded in M<sub>5</sub> (34.43%). The mean maximum incidence of leaf miner was recorded in M<sub>2</sub> (19.12%) followed by M<sub>1</sub> (17.42%), M<sub>3</sub> (17.37%), M<sub>4</sub> (17.22%) which was significantly higher than in all other growing media. The mean minimum incidence of leaf miner was observed in M<sub>5</sub> (16.96%) which was significantly less than in all other growing media except in M<sub>4</sub> (17.22%).

It is clearly indicated that the attack of leaf miner was significantly less on the seedlings grown in screen house conditions than those grown in open field conditions. It might be due to net of screen house which restricts the entry of pests. The results of present investigations are in accordance with those of Singh (2003) who found significantly less incidence of leaf miner on the rough lemon seedlings grown under screen house conditions than in open field conditions. Wang et al (2000) also reported similar results in citrus.

#### Citrus psylla

There was no attack of citrus psylla both under screen house and open field conditions irrespective of the growing season (Table 1).

#### Citrus canker

It is clearly indicated that there was no incidence of citrus canker under screen house conditions whereas significantly higher incidence was recorded under open field conditions (Table 2), during March (17.92%) and September (18.89%).

Under open field conditions during March, the incidence of citrus canker was higher in M<sub>2</sub> (19.35%), followed by M<sub>4</sub> (18.73%), M<sub>3</sub> (18.41%), M<sub>5</sub> (17.78%) while the minimum incidence was recorded

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Table 1 : Incidence of leaf miner and citrus psylla on nursery plants of Kinnow mandarin under different growing conditions

Growing / Rooting Media	Leaf miner				Mean	Citrus Psylla				Mean
	T <sub>1</sub>		T <sub>2</sub>			T <sub>1</sub>		T <sub>2</sub>		
	Screen house (%)	Open field (%)	Screen house (%)	Open field (%)		Screen house (%)	Open field (%)	Screen house (%)	Open field (%)	
	Mar. 2003	Sept. 2003	Mar. 2003	Sept. 2003		Mar. 2003	Sept. 2003	Mar. 2003	Sept. 2003	
Farm soil (M <sub>1</sub> )	0.00	0.00	33.61	36.06	17.42	0.00	0.00	0.00	0.00	0.00
Farm soil + FYM (1:1) (M <sub>2</sub> )	0.00	0.00	37.25	39.21	19.12	0.00	0.00	0.00	0.00	0.00
Farm soil + FYM + Sand (1:1:1) (M <sub>3</sub> )	0.00	0.00	34.02	35.45	17.37	0.00	0.00	0.00	0.00	0.00
Farm soil + FYM + Burnt rice husk (1:1:1) (M <sub>4</sub> )	0.00	0.00	33.82	35.05	17.22	0.00	0.00	0.00	0.00	0.00
Farm soil + FYM + Sand + Burnt rice husk (1:1:1:1) (M <sub>5</sub> )	0.00	0.00	34.40	34.43	16.96	0.00	0.00	0.00	0.00	0.00
Mean	0.00	0.00	34.42	36.04		0.00	0.00	0.00	0.00	0.00
CD (0.05)										
Treatment (A)			0.643					0.00		
Growing Media (B)			0.424					0.00		
Interaction (AxB)			0.848					0.00		

in M<sub>1</sub> (15.31%). Similarly, during September, significantly higher incidence of citrus canker was recorded in M<sub>2</sub> (20.84%), followed by M<sub>4</sub> (19.35%), M<sub>5</sub> (18.71%), M<sub>3</sub> (18.10%), while the minimum was recorded in M<sub>1</sub> (17.43%). The mean maximum incidence of citrus canker was recorded in M<sub>2</sub> (10.04%), followed by M<sub>4</sub> (9.52%), M<sub>3</sub> (9.13%), M<sub>5</sub> (9.12%), which is significantly higher than in all other growing media. The mean minimum incidence of leaf miner was observed in M<sub>1</sub> (8.19%) which is significantly less than in all other

growing media.

The incidence of citrus canker was nil on the seedlings grown in screen house conditions and was significantly higher in those grown in open field conditions. It might be due to the net of screen house which restricts the transmission of the disease in screen house as it might restrict the entry of causal

organisms of the disease to move in screen house. The results of present investigation are in accordance with those of Singh (2003)

Table 2 : Incidence of citrus canker and citrus scab complex on nursery plants of Kinnow mandarin under different growing conditions

Growing / Rooting Media	Citrus canker				Mean	Citrus scab complex				Mean
	T <sub>1</sub>		T <sub>2</sub>			T <sub>1</sub>		T <sub>2</sub>		
	Screen house (%)	Open field (%)	Screen house (%)	Open field (%)		Screen house (%)	Open field (%)	Screen house (%)	Open field (%)	
	Mar. 2003	Sept. 2003	Mar. 2003	Sept. 2003		Mar. 2003	Sept. 2003	Mar. 2003	Sept. 2003	
Farm soil (M <sub>1</sub> )	0.00	0.00	15.31	17.43	8.19	0.00	0.00	23.56	24.58	12.03
Farm soil + FYM (1:1) (M <sub>2</sub> )	0.00	0.00	19.35	20.84	10.04	0.00	0.00	25.31	26.77	13.02
Farm soil + FYM + Sand (1:1:1) (M <sub>3</sub> )	0.00	0.00	18.41	18.10	9.13	0.00	0.00	23.82	25.08	12.23
Farm soil + FYM + Burnt rice husk (1:1:1) (M <sub>4</sub> )	0.00	0.00	18.73	19.35	9.52	0.00	0.00	25.08	26.07	12.79
Farm soil + FYM + Sand + Burnt rice husk (1:1:1:1) (M <sub>5</sub> )	0.00	0.00	17.78	18.71	9.12	0.00	0.00	23.30	24.59	11.97
Mean	0.00	0.00	17.92	18.89		0.00	0.00	24.22	25.42	
CD (0.05)										
Treatment (A)			0.57					0.75		
Growing Media (B)			0.50					0.42		
Interaction (AxB)			1.01					0.82		

who found significantly less incidence of citrus canker in the rough lemon seedlings grown under screen house conditions than those grown in open field conditions. Wang *et al* (2000) also reported similar results in citrus.

#### Citrus scab complex

It is revealed that there was no incidence of citrus scab complex on seedlings under screen house conditions, whereas significantly higher incidence of citrus scab complex was recorded under open field conditions (Table 2), during March (24.22%) and September (25.42%).

Under open field conditions during March, significantly higher incidence of citrus scab complex was recorded in  $M_2$  (25.31%), followed by  $M_4$  (25.08%),  $M_3$  (23.82%),  $M_1$  (23.56%) while the minimum was recorded in  $M_5$  (23.30%). Similarly during September, the incidence of citrus scab complex was significantly higher in  $M_2$  (26.77%), followed by  $M_4$  (26.07%),  $M_3$  (25.08%), while minimum incidence was recorded in  $M_1$  (24.58%).

The mean maximum incidence of citrus scab complex was recorded in  $M_2$  (13.02%), followed by  $M_4$  (12.79%),  $M_3$  (12.23%) and  $M_1$  (12.03%) which was significantly higher than in all other growing media. The mean minimum incidence of citrus scab complex was observed in  $M_5$  (11.79%) which was significantly less than in all other growing media except  $M_1$  (12.03%) and  $M_3$  (12.23%) medium.

It is clearly indicated that the attack of citrus scab complex was nil on the seedlings grown in screen house conditions and was significantly higher in those grown in open field conditions. It might be due to the net of screen house which restricts the entry of the causal organisms of the citrus scab inside the screen house. Singh

(2003) also found significantly less incidence of citrus scab complex on the rough lemon seedlings grown under screen house conditions than those grown in open field conditions. In another study, Thind *et al* (1993) reported significantly less incidence of citrus scab in citrus under screen house conditions than open-field conditions.

#### REFERENCES

- Anonymous (2003).** Area and production of fruits in Punjab. Directorate of Horticulture, Punjab.
- Anonymous (2004).** Area and production of fruits in Punjab. Directorate of Horticulture, Punjab.
- Mayee, C.D. and Datar, V.V. (1986).** *Phytopathometry*. Technical Bulletin 1. Marathwada Agricultural University, Parbhani.
- Singh R (2003).** *Propagation studies on Kinnow mandarin under screen house conditions*. M.Sc. Thesis, Punjab Agricultural University, Ludhiana, India.
- Thind, S.K., Monga, P.K., Sharma, J.N. and Chohan, G.S. (1993).** Screening of citrus rootstocks for scab and its control. *Indian J. Hort.* **50** : 49-52;
- Wang, M.J., Hsu, H.T. and Linc, J. (2000).** The situation of virus free citrus germplasm preservation and utilization. *J. Chinese Soc. Hort. Sci.* **46** : 191-96. (Original not seen. Abstr in CAB Abstracts 2000-2002, CD-ROM, AN : 20001617504).

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