

Research Note :

BIOLOGICAL INDEXING OF CITRUS GREENING

Sarbjeeet Kaur* and Anita Arora

Department of Fruit Science, Punjab Agricultural University, Ludhiana, Punjab

*E-mail: sarbjeeetkaur@pau.edu

ABSTRACT : Field identification of greening disease is often difficult because the symptoms on affected trees are sometimes confused with that of zinc and other nutritional deficiencies. The citrus greening disease was detected from source Kinnow plants collected from citrus growing area of the state showing yellowing with green veins or green islands and yellow mottling by biological indexing.

Keywords: Citrus greening, biological indexing, Kinnow mandarin.

Citrus is highly prized fruit crop having significant importance in fruit economy of the country. The diseases are one of the important factors in the low productivity of citrus fruits in India (Ahlawat *et al.*,1). Citrus greening or Huanglongbin (HLB) is a destructive disease of citrus, caused by *Liberibacter*, which is transmitted by citrus psyllid insect vectors, *Diaphorina citri*. For HLB, no control is known, except preventing the trees from becoming infected. The leaves of infected trees show a blochy mottle condition that results in the development of yellow shoots, the early and very characteristic symptom of disease. Infected trees become stunted, declining and bear a few, small-sized, deformed (lop-sided) fruits, that are green and with coloration starting at the peduncular end. But these symptoms do not always occur together on the same tree. The symptoms are also confusing with nutritional deficiencies and other stress related factors.

Biological indexing of infected Kinnow mandarin plants was done to confirm the presence of citrus greening disease. Bud-wood from greening suspected Kinnow mandarin trees from various locations of Hoshiarpur, Fazilka and Ludhiana districts were collected. Bud-woods were put in plastic bags and transferred immediately to a cool box to avoid bud-wood desiccation. Indexing was done on mosambi sweet orange, pineapple sweet orange and Kinnow mandarin indicator plants by side grafting. The inoculated plants were kept in an insect proof glass house for symptom development on indicator plants. Symptoms and disease intensity were recorded on indicator plants. The results of biological indexing from year 2009 to 2013 (Table 1) showed the presence of greening disease in Kinnow mandarin trees. The inoculated plants showed typical symptoms of disease in 4-6 months of indexing. The symptoms produced on indicator plants were variable *viz.* chlorotic leaves with green veins and midrib, chlorotic leaves with green islands and chlorotic leaves with mottling. However, the symptoms expressions depend upon the titer of pathogen which has not been uniform (Lopes *et al.*, 5). Thiara *et al.* (6) also reported 30.0-62.50 per cent citrus greening positive samples

Table1: Biological indexing of greening suspected source Kinnow mandarin plants.

Year	Location	Greening infected plants/tested plants (No.)			Disease intensity on indicator plant
		Mosambi sweet orange	Pineapple sweet orange	Kinnow mandarin	
2009-2010	Hoshiarpur	8/15	7/15	5/15	++
2010-2011	Hoshiarpur	12/21	9/21	8/21	+
2011-2012	Hoshiarpur	4/9	2/9	2/9	++
	Fazilka	2/5	1/5	0/5	+
	Ludhiana	2/5	1/5	0/5	+
2012-2013	Hoshiarpur	6/15	10/15	5/15	++
	Fazilka	2/7	4/7	3/7	+
	Ludhiana	5/9	5/9	2/9	+

+= moderate symptoms, += moderately severe symptoms, +++= severe symptoms, ++++= highly severe symptoms

collected from Hoshiarpur, Nawanshehar and Ferozpur districts of Punjab.

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