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## Elisa based re-indexing of peach cv. July Elberta: An alternative strategy for producing virus indexed peach plants

**Shelly Kapoor and Anil Handa**

**Abstract**

The most commonly preferred strategy for management of viruses in temperate fruit plants is the use of certified virus-tested planting material. Though biotechnological approaches like meristem culture and heat therapy can be used to eliminate the viruses from propagative material of for the production of virus free plants, these techniques have limited use as they are expensive and need a lot of expertise. These critical issues have led to the use of ELISA based re-indexing of temperate fruit plants emerging as a key alternate strategy for the production of virus indexed plants. Studies conducted over a period of four years between 2015-2018 have successfully demonstrated the usefulness of DAS- ELISA in the production of prunus necrotic ring spot virus (PNRSV) indexed plants of peach cv. July Elberta by periodical re-indexing conducted by drawing samples round the year.

**Keywords:** PNRSV, peach, DAS-ELISA, re-indexing

**Introduction**

A good number of plant viruses exist in temperate fruit plants without showing any readily visible effects on host plants. This is more pronounced in case of viruses infecting stone fruits in many hosts. Some susceptible species or variety of *Prunus* must be used to determine the presence of such viruses which will exhibit definite symptoms when inoculated with these latent viruses. Such plants are called index hosts and the process of testing for latent viruses is referred to as indexing. In stone fruit indexing programme, the primary virus concerned has been prunus necrotic ringspot virus (PNRSV) as it is a common contaminant in stone fruit plants especially in peach as PNRSV does not always exhibit visible symptoms (Kapoor 2018b<sup>[1]</sup>; Kapoor 2018c<sup>[2]</sup>). It is, therefore, essential not only to index but also to re-index peach plants regularly to monitor the sanitary status of mother plants that are used to obtain budwood for raising healthy plants. This paper presents periodical re-indexing of peach cv. July Elberta over a period of four years by using DAS-ELISA technique.

**Materials and Methods**

In addition to the commonly used *in vitro* approach used for producing virus free plants of peach cv. July Elberta, an alternative approach was followed wherein virus free true to type healthy peach cv. July Elberta trees were tested by DAS-ELISA based serological indexing and periodical re-indexing for already marked trees during 2015 in the experimental farm of Department of Fruit Science, Dr Y S Parmar University of Horticulture and Forestry, Nauni, Solan. These re-indexed mother trees can be used to obtain budwood for raising virus indexed plants. Additionally, this strategy can be of immense use in case the *in vitro* established cultures fail to multiply during one or the other stage of micropropagation. Marked trees were re-indexed round the year for a period of three years (2015-2018) using DAS-ELISA for recording the sanitary status of these plants.

**Results**

An alternative approach based on serological indexing and periodical re-indexing was followed to select virus free true to type peach cv. July Elberta plants already marked in the Experimental Farm of the department of Fruit Science, Dr Y S Parmar University of Horticulture and Forestry, Nauni during 2015 since *in vitro* established cultures failed to multiply. The plants were re-indexed between 2015-2018 using DAS-ELISA (Table 1).

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It is evident from the data that all marked trees tested negative in re-indexing for the presence of PNRSV during the period of study as none of the samples had OD values more than

double than that of the negative control. These mother trees can act as a source for taking budwood to raise PNRSV free peach cv. July Elberta plants.

Trees Marked	OD Values ( $A_{405nm}$ ) Year/Month							Status of PNRSV 2018
	2015		2016		2017			
	June	December	June	December	June	December	June	
1	0.102	0.118	0.132	0.121	0.076	0.115	0.103	Negative
2	0.089	0.053	0.034	0.067	0.105	0.087	0.056	Negative
3	0.134	0.107	0.106	0.119	0.112	0.064	0.127	Negative
4	0.112	0.064	0.076	0.098	0.089	0.043	0.092	Negative
5	0.100	0.134	0.143	0.121	0.138	0.112	0.132	Negative
6	0.098	0.085	0.074	0.043	0.084	0.062	0.100	Negative
7	0.138	0.105	0.101	0.078	0.106	0.119	0.099	Negative
8	0.107	0.083	0.099	0.075	0.098	0.085	0.118	Negative
9	0.088	0.096	0.113	0.090	0.102	0.068	0.073	Negative
10	0.054	0.076	0.067	0.043	0.073	0.105	0.107	Negative



White spots on flowers



Shot holes



Diffused chlorotic spots



Deformed leaves

### Discussion

It is evident from the data in Table 1 that all trees of peach cv. July Elberta marked in the field remained free from PNRSV infection during the entire course of study and recorded very low OD values as the virus was not found in detectable limits in any of the marked trees.

Selection of pome and stone fruit trees for obtaining budwood on the basis of DAS-ELISA indexing and re-indexing is a routine practice and is successfully used in certification programmes and development of clean stock programme (EPPO 1992 [3]; EPPO 1993 [4]; EPPO 2012 [5]; Midgley and

Vermeulen 2015 [6]; Midgley *et al.* 2016 [7]; Handa and Kapoor 2018 [8]; Kapoor 2018a [9]). Peach has been used extensively throughout the world as an index plant for PNRSV. Many of the standard peach cultivars such as July Elberta, Lovell, Hale etc. have been used for indexing studies. An alternate strategy using DAS-ELISA for periodical re-indexing of apparently healthy marked trees of peach cv. July Elberta was successfully used to ascertain the sanitary status of these trees in the present studies. These re-indexed trees of peach cv. July Elberta could serve as nuclear stock for the production of PNRSV indexed planting material.

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