

# Preliminary Results on Behavior of Transgenic and Conventional Plum to Natural PPV Infection in a New Field Trial

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## Abstract

To assess the durability of resistance to PPV of 'HoneySweet' transgenic plum harbouring plum pox virus (PPV) capsid gene, a new field trial was recently established in Romania at Fruit Research & Development Station Bistrița. 'Stanley' and 'Reine Claude d'Althan' cvs. were used as control. PPV inoculum source was secured within the experimental plot. PPV monitoring was made by visual observations of symptoms development on leaves and by serological (DAS-ELISA) and molecular (IC/-RT-PCR) testings. Three years after tree planting PPV was observed and detected only on 'Stanley'. 'HoneySweet' and 'Reine Claude d'Althan' cultivars remained PPV free.

**Keywords:** *natural infection, PPV., transgenic plum*

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## Introduction

*Plum pox virus* (PPV) is the causal agent of sharka, one of the most devastating diseases of *Prunus* species (Cambra *et al.*, 2006). In order to restrict the spread of PPV, European and Mediterranean Plant Protection Organization recommended measures such as quarantine isolation, nursery and orchard survey, propagation of virus-free *Prunus* and chemical treatment of trees against aphid vectors. These measures have appeared to be ineffective in halting the spread of PPV which is endemic in many countries. Due to the rapid spread of PPV by aphids and the presence of many potential hosts, sharka disease is difficult to eradicate once it has become established in an area. Therefore, the use of resistant cultivars represents an important strategy to control PPV.

In the context of the paucity of natural resistance, few transgenic clones of *Prunus domestica* L. carrying the CP gene of *Plum pox virus* (PPV) were developed to obtain PPV resistant plums (Scorza *et al.*, 1994). One transgenic line, C5, subsequently named 'HoneySweet' (Scorza *et al.*, 2007) was found to be highly resistant to

graft- and aphid-mediated inoculation by PPV in greenhouse and field tests (Ravelonandro *et al.*, 1997, 2001; Malinowski *et al.*, 2006, Polak *et al.*, 2008, Zagrai *et al.*, 2008 a, b).

## Aims and objectives

The goal of the study was to continue monitoring the durability and stability of resistance to *Plum pox virus* in 'HoneySweet' transgenic plum in a new field trial.

## Materials and methods

The study on resistance to PPV of 'HoneySweet' transgenic plum is continued in Romania at Fruit Research & Development Station Bistrița, with a new field trial established in 2013 under the required permitting. The plot is surrounded by a large apple orchard so that a buffer zone of minimum 500 m it was necessary to be secured. The experimental plot was arranged in 12 blocks of 4 trees (two trees of 'Honey Sweet', one tree of Stanley and one tree of Reine Claude d'Althan) each. *Prunus cerasifera* and *Prunus spinosa* were interspersed for coexistence studies (data not

show). Source of PPV inoculum was provided by infected plums grown in pots. Limited treatments with insecticides were made within the experimental plot in order to stimulate the virus spread by aphids. PPV monitoring was made by visual observation (three times per year) and by DAS-ELISA (Double Antibody Sandwich – Enzyme Linked Immunosorbent Assay) and IC/-RT-PCR (Immunocapture/-Reverse Transcription-Polymerase Chain Reaction) testings.

### Results and discussion

No PPV symptoms were observed both on 24 transgenic and 12 + 12 conventional plums from the experimental plot on 2014 and 2015. DAS-ELISA has confirmed the PPV free status in all those trees. PPV infected trees were found in *Prunus cerasifera* and *Prunus spinosa* since 2014, probable due to previous infection. Also, in the spring of 2016 no PPV symptoms were observed on ‘HoneySweet’ and ‘Reine Claude d’Althan’ cvs. Typical PPV symptoms were observed on one tree belonging to Stanley, and DAS-ELISA and IC-RT-PCR confirmed the virus infection.

### Conclusion

PPV infection was recorded within experimental plot on Stanley cv, three years after planting, ‘HoneySweet’ and ‘Reine Claude d’Althan’ cultivars remained PPV free.

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