CERCETĂRI PRIVIND INFECŢIA CU VIRUSURILE PPV, PDV ŞI ACLSV LA UNELE GENOTIPURI LOCALE DE PRUN

RESEARCHES REGARDING THE INFECTION WITH THE VIRUSES PPV, PDV AND ACLSV AT SOME LOCAL PLUM GENOTYPES

Silvia Preda, Mihai Botu, Silvia Poenaru
University of Craiova Fruit Growing Research&Extesion Station Vâlcea

Abstract

Regarding the infection with the viruses PPV, PDV and ACLSV during 2009 and 2010, 12 local plum genotypes were evaluated, respectively the genotypes Boambe de Leordeni, Goldane Negre, De Boteşti, Troianu 10, Troianu 9, Troianu 6, Gogoşele Otăsău 13, Gogoşele Otăsău 11, Gogoşele Otăsău 5, Gogoşele Otăsău 4, Călugăreşti T1 and Călugăreşti T2. The serological method DAS-ELISA was applied and the results showed that no infection with the viruses PDV and ACLSV was established in the sap of the sample analized. Only 2 genotypes, Troianu 10 and Călugăreşti T2, were determined to be positive to the infection with Plum pox virus (PPV). Also for the detection of the Plum pox virus was used the imunocromatografic test AgriStrip, the results showing that only Călugăreşti T2 was infected.

Keywords: Viruses, serological assay, plum, infection.
Cuvinte cheie: Virusuri, metodă serologică, prun, infecţie

1. Introduction

The Plum pox virus (PPV) causes reduction of the yield and undervalues the flavour and the commercial qualities even in cultivars tolerant to Sharka (Dzhuvinov et. al., 2007). In plum, Prune dwarf virus (PDV) can cause severe dwarfing, the disease being usually kept under control through the use of certified nursery stock and rhe removal of any trees that develop symptoms (Strand, 1999). Apple chlorotic leaf spot virus (ACLSV) symptoms are almost impossible to be distingueshed from plum pox symptoms under field conditions (Racskó et. al., 2004; Lebas et. al., 2004).

The present work looks to established wich of the local plum genotypes can be used as resistance or tolerance source for Plum pox virus in future breeding programs.

2. Material and methods

The biological material was represented by twelve local plum genotypes. Leaves were sampled from two different parts of the trees crown in may, june and august 2009 and 2010.

For the three viruses: PPV, PDV and ACLSV was applied the serological method DAS-ELISA (Double Antibody Sandwich Enzyme Linked Immunosorbent Assay) (Clark and Adams, 1977). The incubation period was 4 hours at 30ºC for the anticorp substrate and 5 hours at 30ºC for the conjugate substrate (Figure 1) using the incubator Stat Fax 2200. The readings were made at 405 nm using the microplate reader Stat Fax 3200.

For PPV was applied also the rapid imunocromatografic test AgriStrip (Figure 2). Once the strip is introduced with the sample side into the sample extract, the liquid migrates upwards and initiates the antigen-antibody reaction witch results in visible color lines: one red line for sample negative response and two red lines for sample positive response.

3. Results and discussions

Table 1 shows the results of the serological method DAS-ELISA performed for three viruses: PPV, PDV and ACLSV for two consecutives years: 2009 and 2010. The test was done in the months May, June and August to assure a better certainty of the results. Thus, from the twelve genotypes only two were found to be infected with PPV in natural fiels conditions: Troianu 10 and Calugaresti T2.

Visually, chlorotic spots, blotches and line patterns were recorded in four local plum genotypes: Troianu 10, Calugaresti T2 (Figure 3) Troianu 9 and Boambe de Leordeni. Although in field the conclusions was that the four were positive to the infection with PPV, tests showed that Troianu 9 and Boambe de Leordeni were not infected, the discoloration of the leaves tissues being induced by other stress factors.

The viruses PDV and ACLSV were not determined in the leaves of the local plum genotypes evaluated for viral infections, the values obtained at 405 nm being around the values of the negative controls for both viruses (Figure 4 and Figure 5).

Through AgriStrip test only Calugaresti T2 was determined to be infected with PPV, probably because it is well known that the viral concentration it is very variable in the plant tissues.

4. Conclusions

PDV and ACLSV were not determined in the tissues of any sample analyzed.

PPV was found only in two local plum genotypes: Troianu 10 and Calugaresti T2 through DAS-ELISA and in one through Agristrip test: Calugaresti T2.

The plum genotypes Boambe de Leordeni, Goldane Negre, De Boteşti, Troianu 9, Troianu 6, Gogoşele Otăsău 13, Gogoşele Otăsău 11, Gogoşele Otăsău 5, Gogoşele Otăsău 4 and Călugăreşti T1 can be considered sources of gene in future breeding programs for the amelioration of the resistance to viruses, mainly to PPV.

5. References

1. Clark, M. F. and A. N. Adams (1977) Characteristics of the microplate method of enzyme linked immunosorbent assay for the detection of plant viruses. J . Gen . Virol. 34: 51-57.

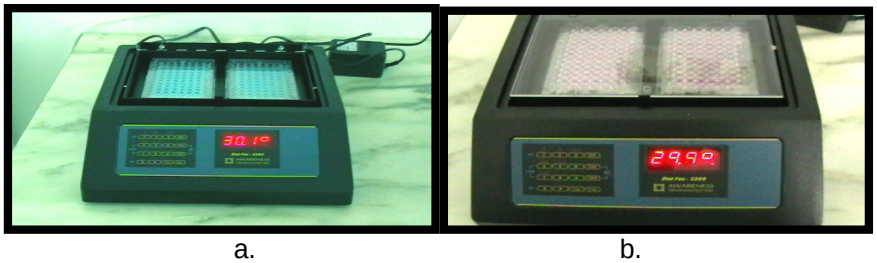
2. Dzhuvinov, V. T., Bozhkova, V. B., Milusheva, S. A. and P. S. Gercheva. 2007. Investigation of Plum Pox Virus in Bulgaria for the past 70 years. Bulg. J. Agric. Sci., 13: 265-272.

3. Lebas, B.S.M., Elliott, D.R., Brink, R., Ochoa-Corona, F.M., Tang J.Z. and B.J.R. Alexander. 2004. Apple chlorotic leaf spot virus infection induces plum pox virus-like symptoms on plum in New Zealand. XIX International Symposium on Virus and Virus-like Diseases of Temperate Fruit Crops - Fruit Tree Diseases, Valencia, Spain.

4. Racskó, J., Holb, I., Szabó, Z. and J. Nyéki, 2004. Leaf and fruit susceptibility of Europen plum cultivars to plum pox potyvirus in Hungary. International Symposium on Plum and Prune Genetics, Breeding and Pomolgy, Lofthus, Norway, 85.

5. Strand, L.L. 1999. Integrated pest management for stone fruits. University of California, Division of Agriculture and Natural Resources:158.

Tables and Figures



a. b.

Fig. 1 The incubation period for both anticorp and conjugate substrate: a. Anticorp substrate; b. Conjugate substrate

Fig. 2. Agristrip test

a. b.

Fig. 3 Syptoms of the Plum pox virus: a. Calugaresti T2; b.Troianu 10

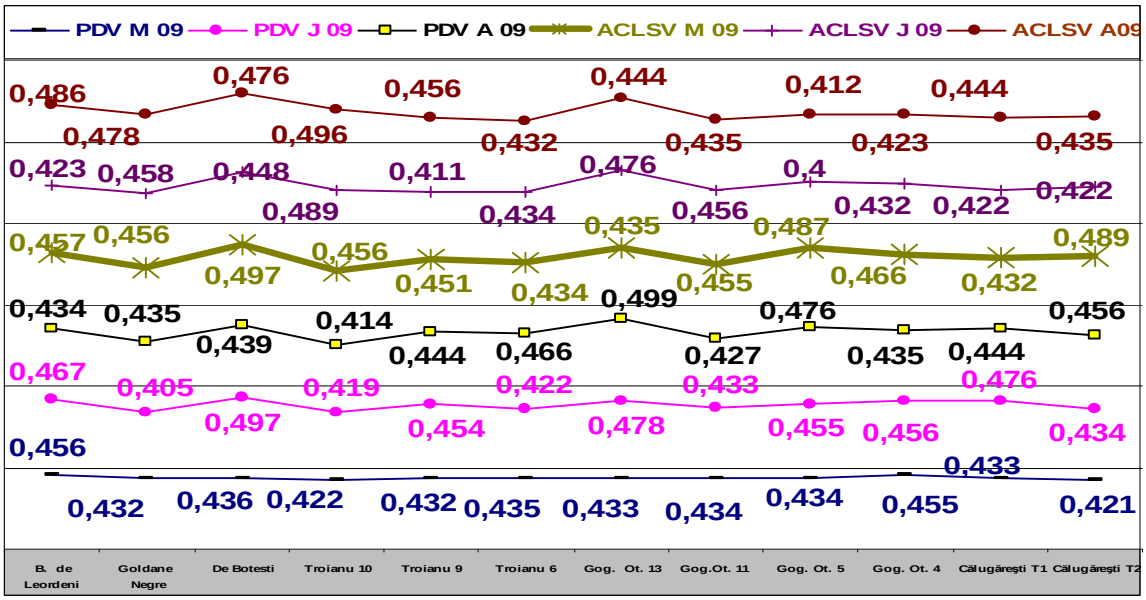


Fig. 4 Values at 405 nm for the samples tested through DAS-ELISA in 2009 in may (M 09), june (J 09)and august (A 09) for PDV and ACLSV

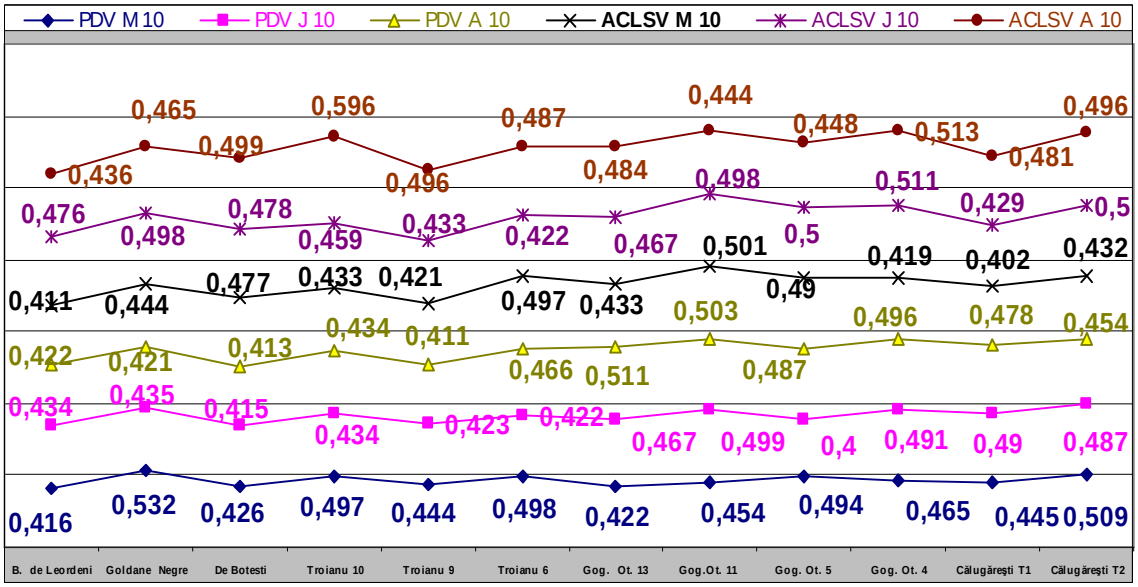


Fig. 5 Values at 405 nm for the samples tested through DAS-ELISA in 2010 in may (M 10), june (J 10)and august (A 10) for PDV and ACLSV

Tables

Table 1

Results of the serological method DAS-ELISA for PPV, PDV and ACLSV

Viruses	Year	Month	Local plum genotypes											
			Boambe de Leordeni	Goldane Negre	De Boteşti	Troianu 10	Troianu 9	Troianu 6	Gogoşele Otăsău 13	Gogoşele Otăsău 11	Gogoşele Otăsău 5	Gogoşele Otăsău 4	Călugăreşti T1	Călugăreşti T2
PPV	2009	May	-	-	-	+	-	-	-	-	-	-	-	+
		June	-	-	-	+	-	-	-	-	-	-	-	+
		August	-	-	-	+	-	-	-	-	-	-	-	+
PDV	2009	May	-	-	-	-	-	-	-	-	-	-	-	-
		June	-	-	-	-	-	-	-	-	-	-	-	-
		August	-	-	-	-	-	-	-	-	-	-	-	-
ACLSV	2009	May	-	-	-	-	-	-	-	-	-	-	-	-
		June	-	-	-	-	-	-	-	-	-	-	-	-
		August	-	-	-	-	-	-	-	-	-	-	-	-
PPV	2010	May	-	-	-	+	-	-	-	-	-	-	-	+
		June	-	-	-	+	-	-	-	-	-	-	-	+
		August	-	-	-	+	-	-	-	-	-	-	-	+
PDV	2010	May	-	-	-	-	-	-	-	-	-	-	-	-
		June	-	-	-	-	-	-	-	-	-	-	-	-
		August	-	-	-	-	-	-	-	-	-	-	-	-
ACLSV	2010	May	-	-	-	-	-	-	-	-	-	-	-	-
		June	-	-	-	-	-	-	-	-	-	-	-	-
		August	-	-	-	-	-	-	-	-	-	-	-	-

Note: + = sample infected; - = sample not infected