
THE INCIDENCE OF PRUNUS NECROTIC RINGSPOT AND PRUNE DWARF VIRUSES IN PRUNUS SPECIES IN SOUTH BULGARIA

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ABSTRACT

Prunus necrotic ringspotvirus (PNRSV) and Prune dwarf virus (PDV) are among the most widespread and economical important viruses in Prunus spp. Enzyme-linked immunosorbent assay (ELISA) was used to determine the incidence of PNRSV and PDV in lots of stone fruit species- plum, apricot, peach, sweet cherry, sour cherry, almond and many of their rootstocks between 2000 and 2004. These viruses were found in all areas tested in South Bulgaria. Presence of range of Ilarviruses was as follows: PNRSV from 0.58% in P. mahaleb to 27.7% in sour cherry, and PDV from 1.4% in sour cherry to 15.8% in sweet cherry. Use of ELISA to monitor virus incidence in Prunus spp. is a valuable tool for reducing the incidence of viruses, which are transmitted by pollen and seeds.

Introduction

Prunus necrotic ringspot virus (PNRSV) and Prune dwarf virus PDV are common and widespread in different stone fruits, causing crop losses (1; 10). Studies on the harmful effects on the growth and yield of the both viruses on various Prunus hosts have been published by a number of authors (4, 6, 7, 15). The visual symptoms caused by these viruses in the stone fruit species are very similar and it is difficult to identify either visually. PNRSV and PDV are members of the genus Ilarvirus, family Bromoviridae. Both viruses are transmitted mechanically, through grafting, pollen and seeds and this could explain their widespread (2; 11).

Some of the biological, serological and epidemiological properties of PNRSV and PDV were investigated in Bulgaria (3, 8, 13, 14, 16, 17).

It was found that Bulgarian isolates of PNRSV are related to strain "G" (latent ring spot.) of Fulton and belonging to PNRSV serotype (16). The studies on the

serological diversities of stone fruits isolates showed that Bulgarian isolates of PDV reacted positively with antiserum against "B" strain of Fulton (16).

Recently, in our country it has been established certification scheme for the production of virus free and virus tested fruit propagating material, which was accepted by European plant protection organization (EPPO). According to the mentioned scheme stone fruits propagating material has to be free from PNRSV and PDV /and other harmful organisms/.

The aim of the present study was to find the incidence of PNRSV and PDV in plum, apricot, peach, sweet and sour cherries, almond and some of their rootstocks in South Bulgaria. The results obtained will be used for selection of nuclear stock and choice of the most suitable means to prevent and control both viruses.

Materials and Methods

Plant materials

The surveys were carried out in stone fruit

plantations in some of the main fruit tree growing regions in South Bulgaria, such as Kyustendil, Plovdiv, Pazardzhik, and Pommorie during the period 2000-2004.

The samples from plum, apricot, peach, sweet and sour cherries and almond were collected from experimental, collection, mother and commercial orchards. The samples from *P. cerasifera* and *P. mahaleb* were collected from mother gardens. The surveys included 120 *Prunus* varieties. The samples were collected from symptomatic and symptomless trees.

Serological assays

Samples from young leaves and blossoms were taken from the end of March to the end of June. A total of 2592 samples were tested by DAS ELISA, as it is used conjugate with alkaline-phosphatase (5). Diagnostic kits of Loewe Phytodiagnostica GmbH were used.

Results and Discussion

In the course of the surveys 2592 trees were ELISA tested for PNRSV and PDV. The results obtained for the total incidence of PNRSV and PDV are shown in **Fig. 1**. The surveyed viruses were diagnosed in all monitored stone fruit species.

The highest PNRSV infection level was observed in sour cherry – 27.7 %, followed by plum and peach-20%, almond 15% apricot-11.68%, sweet cherry-8.62%, *P. cerasifera*-7.8% and the lowest in *P. mahaleb* – 0.58%.

The highest rate of PDV was recorded in sweet cherry-15.8% followed by apricot 15.46%, plum 14.47%, peach-11.25%, almond-8.6%, *P.cerasifera*-6.25% and the least affected were *P. mahaleb*-1.45% and sour cherry-1.4%.

These results confirm data (12) concerning the higher susceptibility of sour cherry to PNRSV in comparison with sweet cherry.

Higher rate of PNRSV and PDV in sour cherry was recorded in Kyustendil region in comparison with Plovdiv region. However,

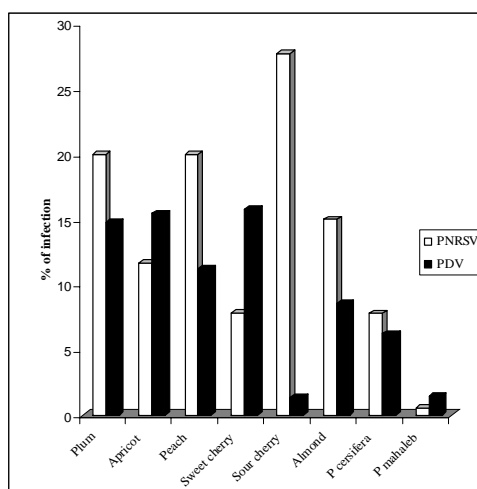


Fig. 1. Incidence of PNRSV and PDV in different stone fruits.

the frequency of both viruses is lower in sweet cherry and *P. mahaleb* in Kyustendil region than Plovdiv region (**Table 1** and **Table 2**). In the course of this study it was proved that infection levels of PNRSV and PDV in plum growing in Plovdiv region is 20% and 14.4% respectively. The results of previous investigation showed that those levels were lower in plum in Kyustendil region-11.04% of PNRSV and 1.8% of PDV (9). According to the obtained data the lowest infection levels of PNRSV and PDV were recorded in *P. mahaleb*. Probably, this is due to the fact that the samples were collected from mother gardens, established with virus-tested material.

The results presented here document the current situation about presence of PNRSV and PDV in stone fruit species in South Bulgaria. The level of the PNRSV infection out of the total 2592 tested trees was - 11.76% and of PDV - 12.57%. Higher rate of PNRSV as total and single infection was recorded in plum, peach, sour cherry, almond and *P. cerasifera* than PDV. The frequency of PDV was higher in apricot, sweet cherry and *P. mahaleb* in comparison with PNRSV.

TABLE 1

Infection level of PNRSV in two monitored regions

Species	Plovdiv			Kyustendil		
	Total number of samples	Positive reaction to PNRSV	%	Total number of samples	Positive reaction to PNRSV	%
Sweet cherry	563	68	12.07	481	14	2.91
Sour cherry	30	5	16.66	114	35	30.70
<i>P.mahaleb</i>	36	2	3.13	312	0	0

TABLE 2

Infection level of PDV in two monitored regions

Species	Plovdiv			Kyustendil		
	Total number of samples	Positive reaction to PDV	%	Total number of samples	Positive reaction to PDV	%
Sweet cherry	563	95	16.87	481	70	14.55
Sour cherry	30	0	0	114	2	1.40
<i>P.mahaleb</i>	36	1	2.80	308	4	1.30

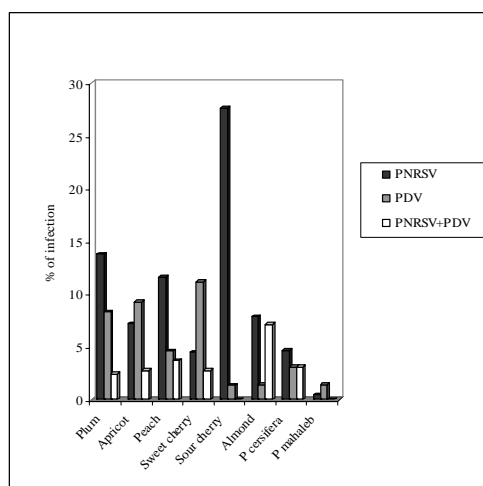


Fig. 2. Single and mixed infection of PNRSV and PDV.

Mixed infections with both viruses in some stone fruits were also observed. The highest level of mixed infection was observed in almond-7.14%. Double infection with PNRSV and PDV was not detected in sour cherry and *P. mahaleb*. The data of single and mixed infection with PNRSV and PDV are presented in Fig. 2. It was found that the combined effect of the in-

fection with both viruses is likely to be a serious reduction in the average salable yield and gross return per year (18).

In some cases a mixed infection with the studied viruses and PPV or ACLSV in plum, apricot, peach and CLRV or ACLSV in sweet cherry was diagnosed

The results from the study show that PNRSV and PDV are spread in a relatively high degree in economically important stone fruits, therefore it is necessary to apply all means to prevent and control both viruses.

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