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PRELIMINARY RESULTS OF THE STUDY ON THE SPREAD OF APPLE CHLOROTIC LEAF SPOT VIRUS (ACLSV) IN DIFFERENT FRUIT TREE SPECIES IN KYUSTENDIL REGION OF BULGARIA

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Abstract. The survey was carried out mostly in one of the main fruit tree growing regions of Bulgaria – Kyustendil during the period of 2004-2005. A total of 632 trees corresponding to 50 apple, 27 pear, 19 plum, 4 peach, 9 sweet cherry and 4 sour cherry cultivars and 21 apricot elites were tested for the presence of *Apple chlorotic leaf spot virus* (ACLSV) and six other viruses by ELISA. Samples for analyses were collected from different organs of plants: flowers, leaves or phloem tissues. In the present research ACLSV was not found in pear, plum, apricot and sour cherry. The highest infection rate of the virus among the infected fruit tree species was in apple (73%) followed by sweet cherry (13.3%) and peach (11.76%). The frequency of mixed infection was 43.2% in the infected apple, 33.4% in sweet cherry and 12.5% in peach trees. The highest concentrations of ACLSV, measured by ELISA, were observed in naturally grown flower petals of apple and sweet cherry trees in May.

Key words: *ACLSV*, infection rates, single and mixed infection, ELISA.

INTRODUCTION

The apple chlorotic leaf spot virus (ACLSV) is known to infect a wide range of fruit trees: apples, pears, plums, quinces, cherries, apricots and peaches (Németh, 1986; Lister 1970). It is the most frequently encountered virus of apple orchards causing mainly latent infections (Desvignes et al., 1992; Waterworth, 1993). Although most strains are latent in apple trees, others can be responsible for apple russet ring spot, topworking disease and lethal decline of apple on some rootstock varieties (Desvignes and Boye, 1989). The virus causes serious disease in stone fruits including plum bark split, plum pseudopox or false plum pox, peach dark green sunken mottle and graft incompatibility in some scion/rootstock apricot combinations (Desvignes and Boye, 1989; Sutic et al., 1999). In a recent study on plum cultivars, it was proved that ACLSV symptoms are almost impossible to be distinguished from plum pox under field conditions (Racskó et al., 2004).

In Bulgaria, the distribution of ACLSV in stone fruit in Plovdiv region was investigated by Topchiiska (1995) and Milusheva (2005).

The present work was aimed at studying the spread of ACLSV in pome and stone fruit tree species in Kyustendil region and in apricot in Silistra region, frequency of single and mixed infection and checking the possibility of detection of ACLCV in different tissues in its natural host.

MATERIAL AND METHODS

The survey was carried out mainly in one of the main fruit tree growing regions of Bulgaria – Kyustendil during the period 2004-2005. The samples were taken from experimental, collection and commercial orchards (Table1).

Table 1

Number of fruit tree samples collected from different orchards and provinces in Bulgaria in 2004 -2005

Number of cultivars/ species	Institute of Agriculture Kyustendil	IFG Plovdiv/ IMABA Troyan	Ex. station Silistra	Private orchards and nursery				Total
				village Sh-vci	town Petric	village Sh-vo	town D-ca	
50 cv. apple	93	-	-	17	20	-	-	130
27 cv. pear	54	-	-	26	-	-	-	80
19 cv. plum	68	3	-	-	-	-	-	71
21 elites apricot	2		69	1				72
4 cv. peach	-	3	-	65	-	-	-	68
6 elites, 9 cv. sweet cherry	112	-	-	-	-	10	11	133
4 cv. sour cherry	78	-	-	-	-	-	-	78
Total	407	6	69	109	20	10	11	632

All plant materials (fully-developed leaves, flower petals and phloem tissues) were subjected to DAS-ELISA using the ACLSV, ASGV and AMV detection kit of Loewe Biochemica GmbH, Germany for pome fruit trees and ACLSV, PNRSV, PDV, PPV, CLRV and RpRV detection kit of the same company for stone fruit trees following recommendations of the supplier. ACLSV detection kit of Bioreba (Switzerland) was used, too.

RESULTS AND DISCUSSIONS

In the present research ACLSV was detected in naturally infected apples, sweet cherries and peaches. ACLSV was not found in pears, plums, apricots and sour cherries, but it was tested in less than one hundred samples of each species. According to Topchiiska (1995) and Milusheva (2005), in Bulgaria the percentage of the virus infected trees in apricot is 29.94% and 11% and in plum is 20.72 % and 15%, respectively.

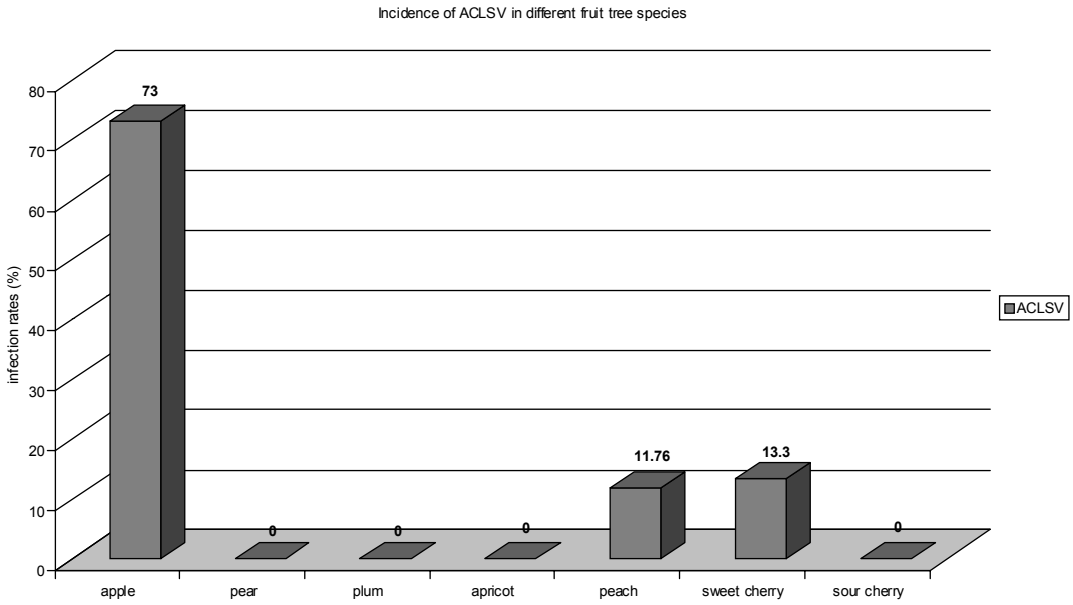
Among the infected fruit tree species, apple was found to have the highest infection rate (73 %) followed by sweet cherry (13.3 %) and peach 11.76 (Figure 1).

A high infection level of ACLSV in apple cultivars and rootstocks was reported by many authors in England – 93.5 % (Campbel, 1961), in Moldova – 86 % (Verderevskaja and Marinescu, 1985), in USA – 60 % (Waterworth, 1993), in Czech Republic 69 % (Karesová and Paprstein, 2001).

Most of the apple, sweet cherry and peach trees detected to be ACLSV infected were generally symptomless and collected randomly. These results were confirmed by reports on the natural infections of fruit trees by ACLSV as a latent virus (Németh, 1986; Sutic et al., 1999). On the other hand, dark green sunken mottle on leaves caused by ACLSV were observed on one of naturally infected peach trees.

The absence of any symptoms in most of the ACLSV infected plant samples exemplifies the need to test more samples to determine the infection rate of the virus in Bulgaria.

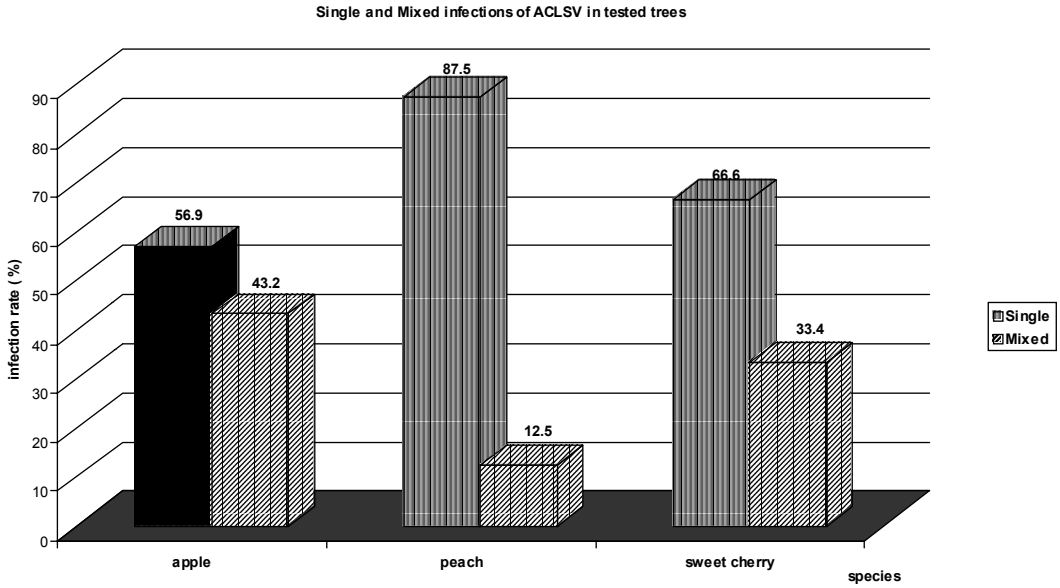
Figure 1



Double infections were observed in 43.2 % of the infected apple trees, with the combination ACLSV + ASGV. No ApMV was serologically found in tested trees of the investigated apple cultivars. In sweet cherry, mixed infection with ACLSV and PDV or PNRSV was detected in 33.4 % of the infected trees. Triple virus infection was found in one cherry tree.

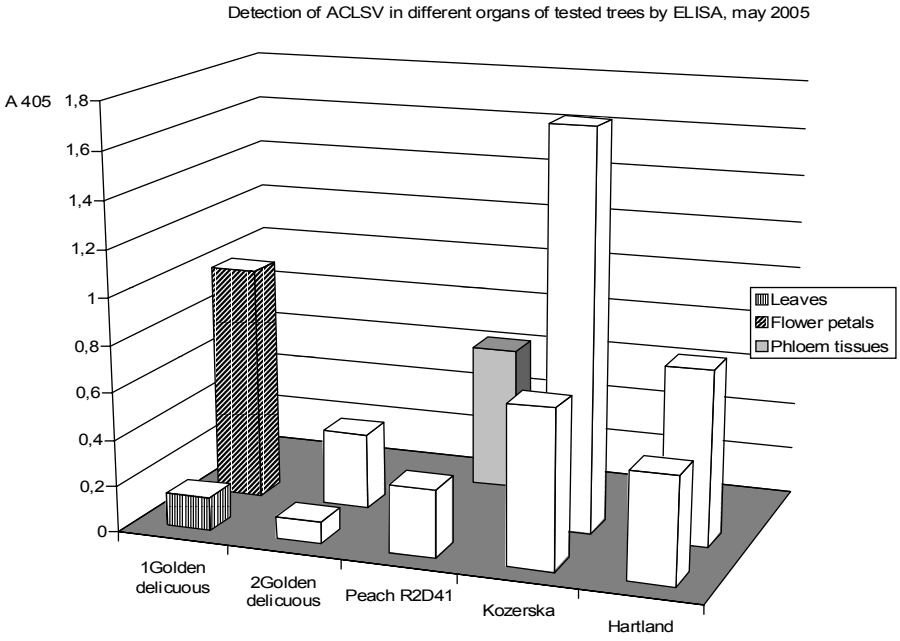
In 12.5% of infected peach trees double infection – ACLSV + PPV - was identified (Figure 2).

Figure 2



The highest concentrations of ACLSV, measured by ELISA, were observed in naturally grown flower petals of apple and sweet cherry trees in May (Figure 3).

Figure 3



Phloem tissues were suitable as test material, but they are more difficult to grind than leaves and petals. Different studies using DAS – ELISA have shown that, to be reliable, ACLSV detection should be done during a limited period in the growing season. The bark of one – and two – year – old branches (phloem tissue) of trees is a good donor for ACLCV determining in winter months of the year (Topchiiska, 1995).

CONCLUSIONS

1. In the present research ACLSV was not found in pear, plum, apricot and sour cherry trees. The highest infection rate of the virus among the infected fruit tree species was in apple (73 %) followed by sweet cherry (13.3 %) and peach 11.76. The frequency of mixed infection was 43.2% in the infected apple, 33.4% in sweet cherry and 12.5 % in peach trees.

3. The highest concentrations of ACLSV, measured by ELISA, were observed in naturally grown flower petals of apple and sweet cherry trees in May.

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REZUMAT

REZULTATE PRELIMINARE ASUPRA RĂSPÂNDIRII VIRUSUL PĂTĂRII CLOROTICE A FRUNZELOR (*CHLOROTIC LEAF SPOT VIRUS - ACLSV*) LA DIFERITE SPECII DE POMI FRUCTIFERI ÎN REGIUNEA KYUSTENDIL, BULGARIA

Studiul s-a realizat în cea mai mare parte în una din cele mai importante regiuni fructifere din Bulgaria – Kyustendil, în perioada 2004-2005. Un total de 632 pomi fructiferi, aparţinând la 50 cultivuri de măr, 27 de păr, 19 de prun, 4 de piersic, 9 de cireş, 4 de vişin şi 21 selecţii de cais, au fost testaţi pentru prezenţa virusului ACLSV (*Apple chlorotic leaf spot virus*) şi a altor şase viruşi prin testul ELISA. Mostrele pentru analize au fost colectate de la diferite organe ale plantelor: flori, frunze sau floem. În urma studiilor efectuate, ACLSV nu a fost găsit la păr, prun, cais sau vişin. Cea mai ridicată rată de infecţie cu virusul respectiv, apreciată prin prisma proporţiei de pomi infectaţi a fost identificată la măr (73%), urmat de cireş (13,3%) şi piersic (11,76%). Frecvenţa infecţiei mixte a fost de 43,2% la mărul infectat, 33,4% la cireş şi 12,5% la piersic. Cele mai ridicate concentraţii de ACLSV, măsurate prin testul ELISA, au fost observate la petalele florilor crescute natural la măr şi cireş în luna mai.