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PLUM POX VIRUS STRAINS IN BULGARIA

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SUMMARY - A survey was carried out in Bulgaria to characterize PPV strains. The universal 5BMAb and two strain-specific monoclonal antibodies (MAb4DG5 for PPV-D and MAbAL for PPV-M) were used in DASI-ELISA test for virus detection and strain differentiation. PPV infection level in different fruit species was as follows: plum (62%), apricot (23%), peach (19%) and cherry (0%). Only PPV-M strain was identified in peaches and apricots. PPV-M and PPV-D incidence in plum was respectively 88% and 5%. Mixed infection (M+D) in plum was 6%. In the Kustendil region, infection rate of PPV-M strain was 75%, PPV-D of 12% and M+D of 13%. PPV-M confirms its dominant and endemic presence in Bulgaria.

Key words: Bulgaria, stone fruits, PPV, virus strain, ELISA, MAbs

RESUME *- Une enquête a été réalisée en Bulgarie dans le but de caractériser des souches du PPV. Le Mab universel 5B et deux anticorps monoclonaux spécifiques pour les souches (4DG5 pour le PPV-D et AL pour le PPV-M) ont été utilisés dans le test DASI-ELISA pour la détection du virus et la différenciation des souches. Le niveau d'infection du PPV chez les diverses espèces fruitières était le suivant : prunier (62%), abricotier (23%), pêcher (19%) et cerisier (0%). Seule la souche PPV-M a été identifiée chez les pêchers et les abricotiers. L'incidence du PPV-M et du PPV-D chez le prunier était de 88% et 5%, respectivement. La présence d'infections mixtes (M+D) sur prunier a été estimée à 6%. Dans la région de Kustendil, le taux d'infection était égal à 75% pour la souche PPV-M, à 12% pour la souche PPV-D et à 13% pour l'association M+D. On a confirmé la présence prédominante et endémique du PPV-M dans les populations bulgares du virus.*

Mots-clés: *Bulgarie, espèces fruitières à noyau , PPV, souche virale, ELISA, Mabs*

INTRODUCTION

Sharka disease caused by *Plum pox virus* (PPV) was described for the first time at the end of the 1910s in plums in Bulgaria. During the 1930s it was also described in apricot. Later, sharka moved to neighboring countries, then throughout the rest of Europe and the world.

Despite its early report in Bulgaria, studies on the virus characterization started only recently. Up to date some limited investigations on PPV distribution and its incidence in different areas of Bulgaria (Kamenova *et al*., 2001; Kamenova and Borisova, 2001) have been carried out. Therefore, in the framework of MNFTV activities, a large-scale survey was undertaken to type PPV isolates in Bulgaria.

MATERIAL AND METHODS

Surveys were carried out in experimental and commercial plum orchards in the main plum-growing regions of the country: Kyustendil, Drjanovo, Sofia and Plovdiv. Leaf samples were collected from symptomatic and randomly from asymptomatic trees.

Thirty-two plum cultivars were sampled in Kyustendil region, whereas in Drjanovo and Plovdiv all samples were from the orchards of the Fruit Growing Institute (Plovdiv). Peach and apricot samples were collected mainly from Plovdiv, Silistra and Sofia regions, whereas the cherry samples were from the experimental orchard of the Fruit-Growing Institute, Plovdiv.

RESULTS AND DISCUSSION

A total of 536 samples (370 plums, 82 peaches, 64 apricots and 20 cherries) were tested by ELISA for the presence of PPV. DASI-ELISA (Cambra *et al*., 1994) was carried out for 261 selected virus isolates for strain characterization using three monoclonal antibodies (MAbs): 5B, universal for all PPV isolates; 4DG5, specific for PPV-D and AL, specific for PPV-M. The samples collected from PPV-infected cherry and apricot trees were tested also against two additional MAbs: EA24 (specific for PPV-EA) and AC (specific for PPV-C) strains (Table 1).

Table 1. Results of PPV typing with serotype-specific Mabs

Host species	Typed isolates (nr)	MAbs reaction					Serotype
		5B Univ	AL (M)	4DG5 (D)	AC (C)	EA24 (EA)	
Plum	203	+	+	-	nt	nt	M
Plum	12	+	-	+	nt	nt	D
Plum	15	+	+	+	nt	nt	M+D
Apricot	15	+	+	-	-	-	M
Peach	16	+	+	-	nt	nt	M
Total	261						

+ positive; - negative; nt not tested

The highest PPV infection level (62%) was in plum, followed by apricot (23%) and peach (20%). No PPV infection was found in cherry samples, despite a report in sweet and sour cherry in Bulgaria at rates of 12% and 31%, respectively (Kölber *et al*., 2001). In our survey, however, the number of the tested cherry trees was limited and further PPV investigations are needed. The highest rate of PPV on plum was recorded for Sofia region (77%), followed by Drjanovo (73%), Kyustendil (63%), and Plovdiv (39%).

Only PPV-M strain was identified in peach and apricot cultivars. The most distributed strain on plum was PPV-M (88%), followed by PPV-D (5.2%). Mixed infections of both strains (M+D) (6%) were demonstrated also. All plum isolates coming from the regions of Drjanovo, Plovdiv and Sofia were identified as M strain, while PPV-D and mixed infection (M+D) were found only in Kyustendil region. These results confirmed our previous surveys for the presence of PPV strains in Bulgaria (Kamenova, 2001). PPV-M strain was the only strain identified in all infected peaches and apricots and in the majority of plum areas surveyed, whereas PPV-D and M+D occurred only in Kyustendil region (Fig. 1). So far, no Bulgarian PPV isolate has been identified as PPV-EA and PPV-C, but the number of tested samples was limited.

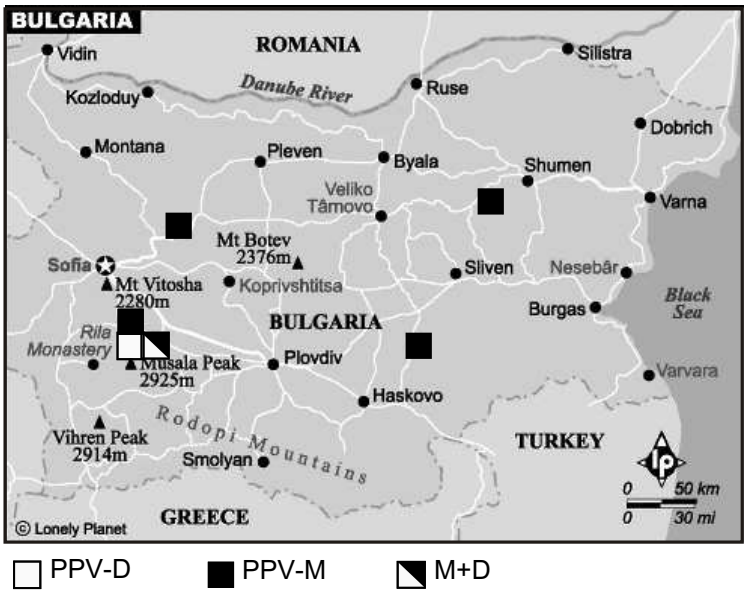

Fig.1. Distribution of PPV strains in the stone-fruit growing areas of Bulgaria

CONCLUSIONS

Our data on PPV-M dominance agreed with other studies in the neighbouring Balkan countries: i.e. Albania (Myrta *et al*., 1998), Yugoslavia (Dulic-Markovic, 2002) and Greece (Boutsika and Varveri, 1998). Evidently, the present data need to be completed by extending the study with further surveys in other regions and testing more trees.

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