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Viral diseases in the most widespread Balkan varieties of grapes in Kosovo

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Abstract

This study was conducted in several farms in Rahovec, Suhareka and Prizren municipalities where viniculture is developed. The following samples of varieties were selected in above mentioned regions: Afuzali, Demirkapi, Groqanka, Melnik, Pllovdin, Prokupe, Smedereve, Vranac and Zhillavk. In Rahovec region a total of 155 samples were selected, followed by the Suhareka region with 90 samples and Prizren region with a total of 5 samples. In August (2014) the labelling of samples and observation of symptoms were conducted and in January (2015) sample collection was carried out, whereas in April (2015) all samples were tested with ELISA method. All samples (300) were tested for seven viruses: Nepoviruses: (GFLV, ArMV), Closterovirus: (GLRaV-2), Ampeloviruses: (GLRaV-1, GLRaV-3), Vitivirus: (GVB) and Vitivirus: (GVA). According to the results of the ELISA test, GLRaV-3 is the most common virus with (13.3%). The second most common virus is GLRaV-1 with (8%), followed by GVA (7.3%). Regarding GFLV (2.3%) and ArMV (1%), these viruses were detected with very low incidence. None of the tested samples gave any positive reaction to GLRaV -2 and GVB. In respect of the virus distribution based on regionalization, out of 125 samples selected in Rahovec 44% came up with a positive result and out of 95 samples in Suhareka 38 were infected, whereas in Prizren only 1% samples out of 40 samples were infected.

Key words: Test ELISA, Nepoviruse, Closterovirus, Ampeloviruses, Vitivirus.

Introduction

According to the register of vineyards, Republic of Kosovo currently has 3166 hectares of vineyards. Grape varieties platform in Kosovo is predominantly oriented (ranges around 65%) towards red grape, privileging varieties such as Vranç, Smederefkë and Prokupë that belong to autochthone origin (Balkan), as well as a part of a varieties with mainly French origin like Game e Thjesht, Burgundezi i Zi, Kabernet Sovinjon.

Rahovec is, certainly, the most important region for grape cultivation in Kosovo which, out of overall Kosovo areas, consist about 72% of the vineyard area. Morphologically, the majority of the vineyards in the region are located at the sensitive slanting surfaces, which at the same time is the characteristic feature of the valleys between Gjakova and Rahovec. The vineyards are owned mostly by private persons; they have a small surface and are very well-maintained. Regarding the division of variety, red grape is cultivated in about 60% of the areas; the varieties with the larger areas are Vranc, Gama and Prokupe. In most of the cases, the white grape varieties are Smederevka and Italian Risling. With regard to Suhareka, current data from cadastral records shows a total of 553 ha. The highest indication rates of planted varieties are Muskat Hamburgu, Prokupe and Afuzali.

Prizren is located in the south part of Kosovo region where the grapes are cultivated. This region faces high temperatures and we can assume that it best suits the red varieties, which in turn require more heat than the white variety, and this factor should be taken into account. The most spread varieties include: Prokupe, Muskat and Afuzali.

Grapevine is affected by a set of viral diseases, or pathologies alike, which have a significant impact in the viability of the plants and their production. In vineyards, viral diseases emerge

with a variety of signs, depending on the cultivar, virus strain, specific environmental condition or combinations with rootstock [1].

A lot of effort and a considerable time have been spent in order to find the proper chemicals which would eliminate or limit the virus replication in the cultivated plants. Until today because of the infectivity, phyto-toxicity or economy such chemicals weren't able to be founded. In order to prevent or limit the infection, the virologist needs to rely on the control methods. Very often, in order to combat the specific diseases, it is needed the combination of the control measures, also known as integrated control [2].

The planting of seedlings should be avoided if there is not sufficient knowledge regarding their phytosanitary status, or even worse, if the existing plants are grafted with new scions, with the aim to improve production. In this case, the plant phytosanitary conditions deteriorate because of the increase of viral infections and there are synergic effects of them. The safest way which will provide long-term efficiency for farmers is planting of certified seedlings for planting new vineyards [3].

Material and Method

This study was conducted during the time period between 2014 and 2015 encompassing several vineyards in the Rahovec, Suhareka and Prizren municipalities in Kosovo. Several variety samples were selected in these areas, including: Afuzali, Demirkapi, Groqanka, Melnik, Pllovdin, Prokupe, Smedereve, Vranac and Zhillavk. In Rahovec a total of 155 samples were selected, followed by Suhareka area with 90 samples and Prizren area with a total of 55 samples. In August (2014) the labelling of samples and observation of symptoms were conducted, and in January (2015) sample collection was carried out, whereas in April (2015) all samples were tested with ELISA method. All samples (300) were tested for seven viruses: Nepoviruses: (GFLV, ArMV), Closterovirus: (GLRaV-2), Ampeloviruses: (GLRaV-1, GLRaV-3), Vitivirus: (GVB) dhe Vitivirus: (GVA).

Serological tests:

The following ELISA protocols were applied for the virus detection: (i) DAS-ELISA for *Grapevine fanleaf virus* (GFLV), *Arabis mosaic virus* (ArMV), *Grapevine leafroll associated virus -1, -2 and -3* (GLRaV-1, GLRaV-2 and GLRaV-3) [4]; (ii) TAS-ELISA for *Grapevine fleck virus* (GFkV) and *Grapevine virus B* (GVB) [5]; and (iii) Protein-A (A-DAS ELISA) for *Grapevine virus A* (GVA) [6].

Results and Discussion

Out of 300 samples, individually tested by ELISA for seven viruses, 72 (42%) appeared to be infected by one virus, whereas 11 (4%) by multiply viruses.

GLRaV-3 was the most widespread virus (13,3%). GLRaV-1 is ranked as the second most common virus with an average incidence of 8%,. The infection rate by GVA was also significant, about 7.3%. Regarding GFLV (2.3%) and ArMV (1%), both of these viruses have low incidence, which are both nematode-borne nepovirus agents of infectious degeneration of grapevine. None of the samples have given positive reaction to GLRaV -2 and GVB.

Regarding the distribution of viruses based on the region, out of 125 samples which were selected in Rahovec 44% came up with positive results; out of 95 samples selected in Suharekë 38% appeared infected, while only 1% out of 40 samples in the municipality of Prizren were infected.

In Kosovo the locally grown grapevines, had an overall sanitary condition less compromised than that reported in other Mediterranean countries [7].

Taking into account our insufficiency to apply direct measures for controlling viral diseases, we should label the effected plants in the field by excluding them from further replication.

Furthermore, the certification of planting material has a high importance.

New vineyards must be controlled if there is a presence of nematode X-index, the vector which serves for spreading of grapevine viruses, etc.

Achieving these objectives will enable the limitation of viral diseases in the vineyards in order to have healthier vineyards, thus the farmers will have a safer way to plant new vineyards.

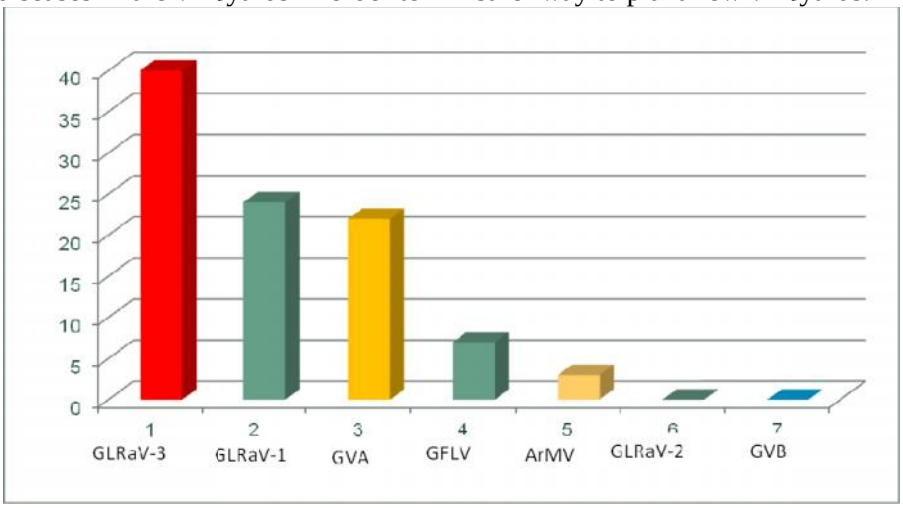

Figure 1 Incidence of viral infections in the main Balkan grapevine varieties cultivated in Kosovo, as determined by ELISA tests after analysing 300 samples.

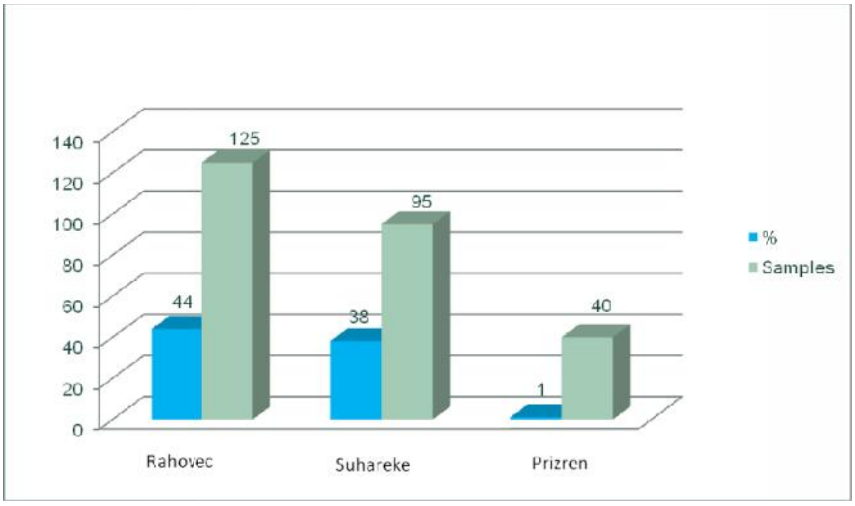

Figure 2 Distribution of viruses by region

Conclusions

Applied studies showed that grapevine plants are infected by several viral diseases, for which the final identification was carried out by serologic test ELISA.

In general, the sanitary status of grapevine in Kosovo is almost acceptable if compared with that of other Mediterranean countries.

The nepoviruses responsible of infectious degeneration, the most important grapevine disease, are very rare (GFLV, 2.3%) or completely absent (ArMV, 1%).

Except of GLRaV-2 and GVB, the ELISA results revealed that the most economically important grapevine-infecting viruses (GFLV, GLRaV-1, GLRaV-3, GVA and ArMV) are all present, even if with low incidence.

Acknowledgements

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