RESEARCH ARTICLE **(Open Access)**

Spreading of Grapevine Nepoviruses in the Municipality of Rahovec, Kosovo

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Abstract

Research on the spread of nepoviruses - Grapevine fanleaf virus GFLV and Arabis mosaic virus (ArMV) have been performed at several grape growing farms in the Rahovec municipality. In this area are sampled varieties: Afuzali, Demirkapi, Groqanka, Melnik, Pllovdin, Prokupe, Smederev, Vranac, Game, Italian Rizling and Zhillavk. According to ELISA test results, from 165 grape samples in Rahovec municipality tested by the ELISA method for nepoviruses – Grapevine fanleaf virus GFLV and Arabis mosaic virus ArMV, (1%) are infected with Arabis mosaic virus ArMV and (2.7%) are infected with Grapevine fanleaf virus GFLV.

Keywords: ELISA method, grapevine, viruses, nepoviruses, varieties.

1. Introduction

The subsector of vine in Kosovo includes 8 vineyard areas with 278 vineyard locations (villages), although the bulk of production is concentrated in three municipalities in the Prizren region. According to data from the Wine and Viticulture Institute in Rahovec, there are 11,000 vineyards and 9,000 vine growers throughout Kosovo, including table grapes and wine.

In 2014, the Agriculture Registration in Kosovo has registered 6,242 agricultural farms engaged in vine cultivation. In general, grapes were cultivated in 3,215 ha of which 58.6% were vine grape and 41.4% table grapes.

Table 1. Surface and grape production in 2009-2014.

	2009	2010	2011	2012	2013	2014
Grapes						
Surface	3,057	3,140	3,158	3,219	3,159	3,215
Production	26,303	28,578	16,584	29,682	27,610	n.a.
Table grapes						
Surface	637	636	648	702	751	1,331
Production	5,733	6,042	4,536	7,026	7,137	n.a.
Yield	9.00	9.50	7.00	9.99	9.50	n.a.
Vine grapes						
Surface	2,420	2,504	2,510	2,517	2,408	1,884
Production	20,570	22,536	12,048	22,656	20,473	n.a.
Yield	8,5	9	4,8	9	8,5	n.a.

Source: MAFRD Green Report 2014; ASK, Agricultural Household Survey in 2013

With reaching the peak of its production at the time of the former Yugoslavia, the wine industry has benefited from 9,000 hectares of vineyard areas, divided into private and public ownership, and has spread mainly to the south and west of Kosovo [5]

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(Accepted for publication March 20, 2018)
***ISSN**: 2218-2020,*

Vineyards are mainly spread in hilly areas (350-600 meters in height) which are also exposed to the sun. The soil conditions in hilly areas are suitable for the development of vineyards, which means that in some cases it is difficult to use land for other purposes.

The region with the largest area of vineyards is Gjakova, with 73.4% of the total amount of vineyards in the plantations, where 2,855 agricultural farms are engaged in vineyard production. Most of them are in the municipality of Rahovec. The second and most important municipality in vine cultivation is Suhareka. According to the Kosovo Institute for Wine and Viticulture, Viticulture Cadaster (2008/2009), over 43% of vineyards are estimated to be older than 30 years.

The average vineyard size is 0.5 hectares, with an average yield between 8-10 tons/hectare. More than three-quarters of the vineyards are owned by individual farmers with outdated and inadequate machinery for efficient grape production. About a quarter (980 hectares) of vineyards is owned by two large wineries, such as Vineyard and Winery StoneCastle L.I.C (500 hectares of wine grapes and 100 hectares of table grapes) and Agrokosova Holding (260 hectares of wine grapes and 120 hectares of table grapes) [5].

In Kosovo the phytosanitary situation of vineyards looks similar to that in Albania. A recent study has shown the presence of the following viruses: GLRaV-1, GLRaV-3, GFkV, GFLV and GVB, while there are no studies on the presence of phytoplasma [6].

2. Material and Methods

The diagnostic process is done in 4 main phases: (i) observation of the symptoms in the field; (ii) obtaining the information required for the diseased herb and disease progression; (iii) comparison of similarities with similar examples in scientific literature and finally (iv) completion of laboratory analysis and pathogen identification.

Field observations for nepoviruses: grapevine fanleaf virus GFLV and Arabis mosaic virus ArMV were made in the spring - early summer. During January, in the Rahovec region, fig. 1. 165 samples are collected, each of which is composed of 3-4 branches; 30-40 cm long, and shielded with moisture in plastic bags at 4 ° C until laboratory testing time.

Figure 1. Map of Kosovo.

Serological tests:

ELISA (Enzyme-linked Immunosorbent Assay) is the technique used in the lab. For nepovirus, DAS-ELISA (Duble Antibody Sandwich) protocols were used with polyclonal antibodies [3].The main stages involved are: 1. Placing antibodies in the wells of polystyrene particles; 2. blocking viruses from antibodies present in plate wells; 3. The binding of

antibacterial viruses linked to an enzyme (p-nitrophenylphosphate) and finally the reading of the colorimetric reaction values[7].

3. Results and Discussion

With 165 grape samples in municipality of Rahovec tested with the ELISA method for nepoviruses – Grapevine fanleaf virus GFLV and Arabis mosaic virus ArMV, it appears that (1%) are infected with Arabis mosaic virus ArMV, while (2.7%) are infected with the Grapevine fanleaf virus GFLV.

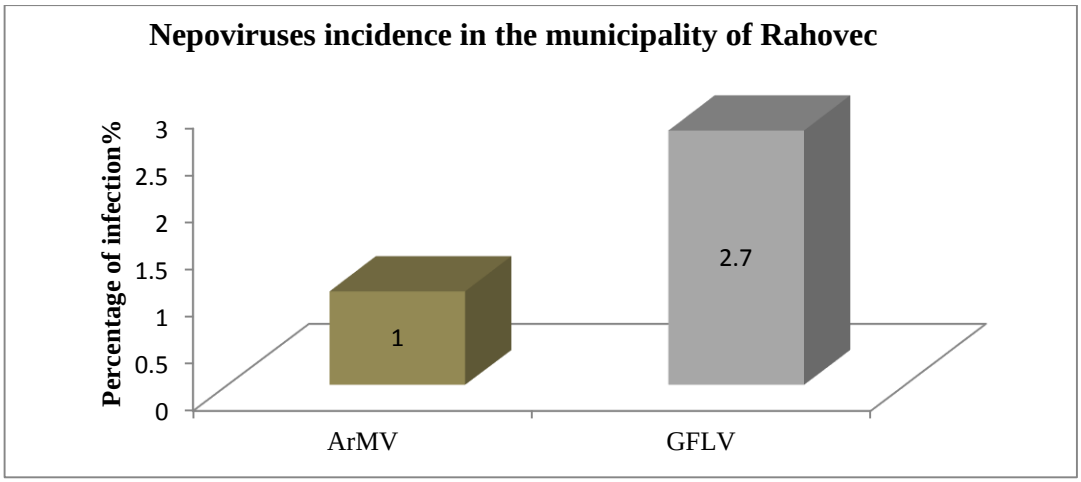

Figure 1. Nepoviruses incidence in the municipality of Rahovec.

Of the varieties tested: Procupe, Afuzali, DemirKapi, Plovdina, Zhillavka, Simple Game and Italian Rizling, the percentage of the rate of infection with the Arabia mosaic virus ArMV is 0%, none of the samples has proved to be positive. The Vranac variety from 25 tested samples, resulted with 2 infected plants and Smederevka from 25 samples tested, resulted in very low infection, with 1 plant being infected.

Regarding the Grapevine fanleaf virus GFLV, in the above varieties, the Smederevka variety in 25 samples tested, resulted with 3 infected samples, Plovdina also with 3 infected samples and Zhillavka in 15 samples tested, resulted with only 1 plant showing positive reaction to the Grapevine fanleaf virus GFLV.

	Samples			
Variety	**Tested**	**Infected**	**Viruses (%)**	
	No	**%**	**ArMV**	**GFLV**
Vranac	25	1.25	2	3
Smederevka	25	0.25	1	0
Procupe	20	0	0	0
Afuzali	15	0	0	0
Demirkapi	15	0	0	0
Plovdina	10	0.3	0	3
Zhillavka	15	0.15	0	1
Simple Game	20	0	0	0
Italian Rizling	20	0	0	0
Number of Infected plants per each virus			**3**	**7**

Figure 2. ELISA test-detected nepoviruses in some grape varieties in the Rahovec municipality.

4. Conclusions

Low cases of nepoviruses (sporadic recordings of GFLV and ArMV) are consistent with the absence of field symptoms and confirm that these viruses are less important in the Rahovec vineyards (Kosovo) than they are in some Mediterranean areas [1]; [2];[4].

However, if the low incidence of nepoviruses in Kosovo vineyards depends on the limited spread of vectors - nematodes, remains to be explored.

5. Acknowledgements

The authors thank the Department of Vineyards and Viticulture in Rahovec for their support in collecting data and securing samples.

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