

RESEARCH ARTICLE

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The European Varieties Muscat D'hambourg and Italian Riesling and their Infection with Most Economically Important Grapevine-Infecting Viruses

LUMTA DIDA¹, AGRON BUNJAKU², BEKRI XHEMAILI², GAZMEND GJINOVCI², DHURATA SHEHU, THANAS RUCI³

¹University of Prishtina, Faculty of Agriculture, Kosovo

²Kosovo Agriculture Institute

³Plant protection Department, Faculty of Agriculture and Environment Kodër- Kamëz, Tiranë

*Corresponding author; E-mail: lumtadida@hotmail.com

Abstract

In 2015, the cultivated area encompassing table grape varieties in Kosovo was 747 ha. Among these table grape variety types, the most cultivated variety is Muscat d'Hambourg comprising an area of 257 ha, followed by Italian muscat variety with 168 ha and Afuz Ali variety which covers 121 ha. As to the other varieties, they are cultivated in smaller areas and comprise 201 ha of total table grape cultivated area. This study was conducted in several farms in Rahovec municipality where viticulture is developed. During December 2017, 40 grapevine samples including Muscat d'Hambourg and Italian Riesling varieties were collected from five commercial vineyards. Each sample consisted of 3-4 cuttings which had a length of 30-40 cm. Until they were tested, the samples remained stored at a temperature of 4°C. The sanitary assessment of the collected samples was carried out by applying the Serological assays - ELISA diagnostic method. All samples (40) were tested for six viruses, including Nepovirus (GFLV), Closterovirus (GLRaV-2), Ampeloviruses (GLRaV-1, GLRaV-3), Vitivirus (GVB) and Vitivirus (GVA). According to ELISA virus detection test results, 95% of Italian Riesling variety samples were infected by GLRaV-1, GLRaV-3 and GVA viruses, whereas 65% of Muscat d'Hambourg variety samples were infected by GLRaV-1, GLRaV-3 and GVA viruses. There was not any indication signifying that the samples were infected by Nepovirus (GFLV), Closterovirus (GLRaV-2) or Vitivirus (GVB).

Keywords: Test ELISA, Nepovirus, Closterovirus, Ampeloviruses, Vitivirus.

1. Introduction

The grapevine (*Vitis* spp.) undoubtedly represents one of the woody crops most widely grown in temperate climates, and a highly valuable agricultural commodity. As most of the vegetatively propagated crops, grapevines are exposed to the attacks of a variety of pests and pathogens among which infectious intracellular agents (viruses, viroids, phloem- and xylem-limited prokaryotes) play a major role, causing heavy losses, shortening the productive life of vineyards, and endangering the survival itself of affected vines [8].

The area cultivated with varieties of table grape in Kosovo in 2015 was 747 ha. Of the variety types of table grape, the most cultivated variety is Muscat d'Hambourg in an area of 257 ha, Italian Muscat variety at 168 ha, and Afuz Ali variety at 121 ha. Other varieties are cultivated in smaller areas and comprise 201 ha of total area cultivated with table grape.

A recent study in Kosovo 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 [2].

Based on published genetic analyses, Muscat d'Hambourg was produced by crossbreeding Muscat d'Alexandrie B and Frankenthal N. There is no officially recognized synonym for this variety in France [5]. In the European Union, Muscat de Hambourg N can officially be called by other names: Black Muscat (Cyprus), Hamburgi muskotály (Hungary), Muscat of Hamburg (Cyprus), Moschato Ambourgou (Cyprus), Moscatel de

Hamburgo (Spain, Portugal), Moscatel Negro (Spain), Moscato d'Amburgo (Italy, Malta), Muscat Hamburg (Malta), Moschato Amvourgou N (Greece), Muscat de Hamburg (Romania), Muskat de Hamburg (Bulgaria), Muscat trolinger (Bulgaria), Muskat-Trollinger (Germany) [6].

In France, Muscat de Hambourg N is officially listed in the "Catalogue of vine varieties". This vine variety is likewise listed in the Catalogues of other European Union member states: Germany, Bulgaria, Cyprus, Spain, Greece, Italy, Hungary, Malta, Portugal, and Romania. In Kosovo, this variety mostly is used as table variety. Muscat de Hambourg N is sensitive to oidium, downy mildew, phomopsis in addition to mites and vine caterpillars. On the other hand, it is not very sensitive to grey rot.

Riesling is a white grape variety which originated in the Rhine region of Germany. Riesling is an aromatic grape variety displaying flowery, almost perfumed, aromas as well as high acidity. It is used to make dry, semi-sweet, sweet, and sparkling white wines. Riesling has a long history, and there are several written references to the variety dating from the 15th century, although with varying orthography [7].

2. Materials and Methods

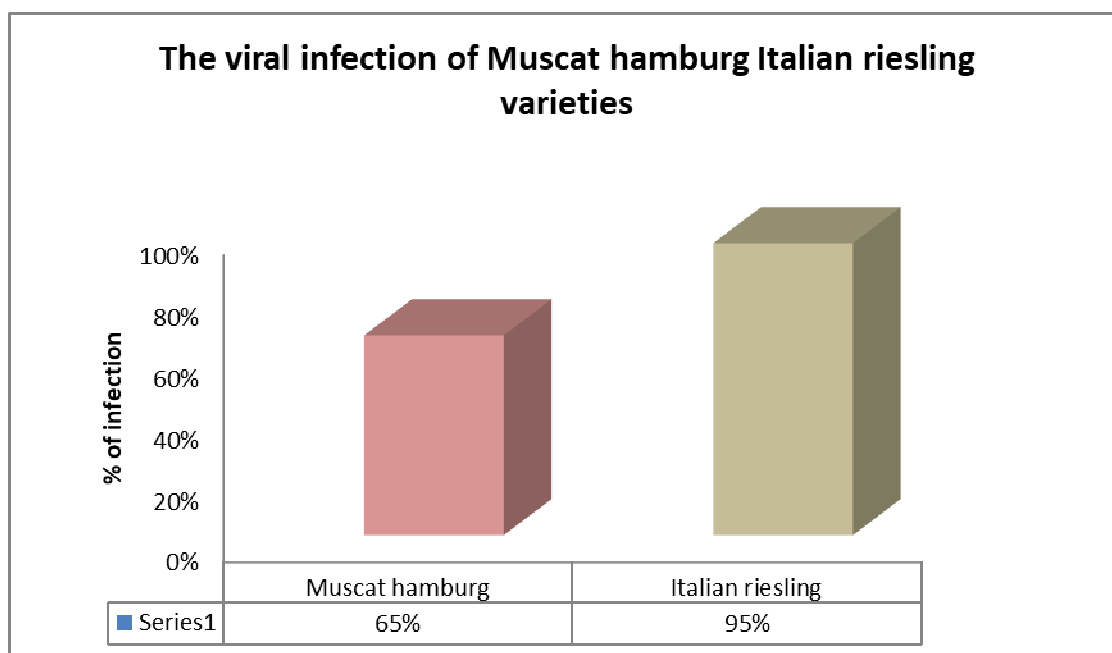
This study was conducted in several farms in Rahovec municipality where viticulture is developed. During December 2017, 40 grapevine samples including Muscat d'Hambourg and Italian Riesling varieties were collected from five commercial vineyards. Each sample consisted of 3-4 cuttings which had a length of 30-40 cm. Until they were tested, the samples remained stored at a temperature of 4°C. The sanitary assessment of the collected samples was carried out by applying the Serological assays - ELISA diagnostic method.

Serological tests:

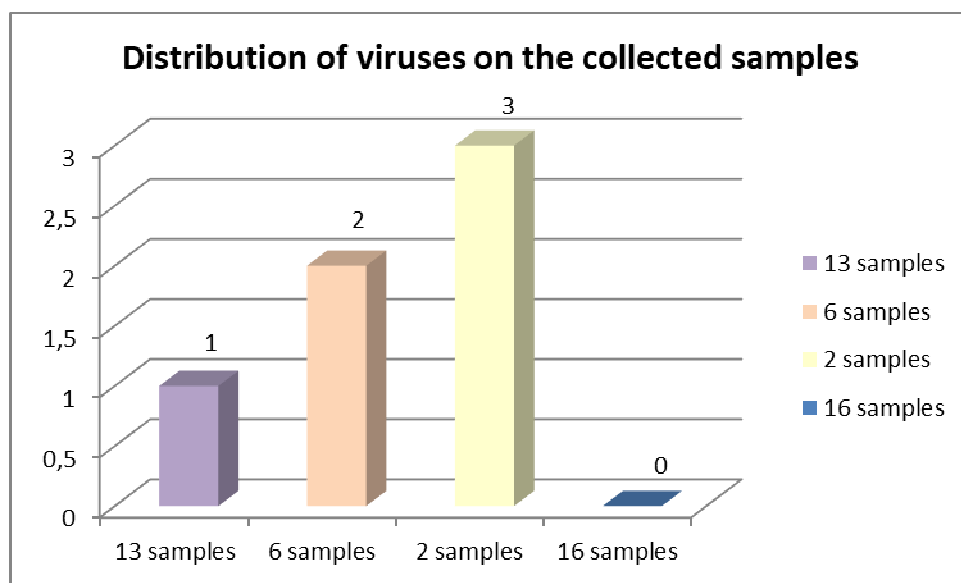
The following ELISA protocols were applied for the virus detection: (i) DAS-ELISA for *Grapevine fanleaf virus* (GFLV), *Grapevine leafroll associated virus -1, -2 and -3* (GLRaV-1, GLRaV-2 and GLRaV-3) [4]; and *Grapevine virus B* (GVB) [1]; and (iii) Protein-A (A-DAS ELISA) for *Grapevine virus A*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

3. Results and Discussion

All samples (40) were tested for six viruses, including Nepovirus (GFLV), Closterovirus (GLRaV-2), Ampeloviruses (GLRaV-1, GLRaV-3), Vitivirus (GVB) and Vitivirus (GVA). According to ELISA virus detection test results, 95% of Italian Riesling variety samples were infected by GLRaV-1, GLRaV-3 and GVA viruses, whereas 65% of Muscat d'Hambourg variety samples were infected by GLRaV-1, GLRaV-3 and GVA viruses. There was not any indication signifying that the samples were infected by Nepovirus (GFLV), Closterovirus (GLRaV-2) or Vitivirus (GVB).



Regarding the presence of viruses, out of 40 samples from both varieties, 22 of them were infected by GLRaV-2 and GLRaV-3 and 10 of the samples with GVA. None of the samples were infected by GFLV, GLRaV-1 and GVB.



Infections by at least one virus were detected in 13 samples. Among infected vines, mixed infection by two or more viruses were commonly recorded in 8 samples. 16 of the samples were healthy.

4. Acknowledgment

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5. References

1. Al Moudallal Z, Altsch D, Briand JP, Van Regenmortel MHV: **Comparative sensitivity of different ELISA procedures for detecting monoclonal antibodies**. Journal of Immunological Methods 1984, 68, 35–43.
2. Myrta A.: **Bazat e virusalogjise bimore**: 2015; 213-214.
3. Boscia D, Aslouj E, Elicio V, Savino V, Castellano MA, Martelli GP: **Production, characterization and use of monoclonal antibodies to grapevine virus A**. Archives of Virology 1992, 127: 185–194.
4. Clark MF, Adams AB: **Characterization of the microplate method of enzyme-linked immunosorbent assay for the detection of plant viruses**. Journal of General Virology 1977, 34: 475–483.
5. **Catalogue des variétés et clones de vigne cultivés en France**. Collectif, Ed. IFV, Le Grau-du-Roi. 2007.
6. **Documentation interne du Domaine de Vassal**. 1949-2011, INRA, Marseillan-plage.
7. Freddy Price, **Riesling Renaissance Mitchell Beazley** 2004; 16-18.
8. Marteli: **Directory of virus and virus-like diseases of the grapevine and their agents**, Journal of Plant Pathology 2014, 96 (1S), 1-4
9. MAFRD (ed.): **Statistical and Cadastral Data of Vineyards and Wine Industry in Kosovo**. Department of Viticulture and Oenology of Rahovec, Republic of Kosovo; 2015.