IECPS 2020 The 1st International Electronic Conference on Plant Science
1-15 December 2020

ARISTOTLE UNIVERSITY OF THESSALONIKI

"Black Aspergilli" in vineyards of conventional and organic farming: Investigating the population structure and mycotoxigenic capacity of *Aspergillus* species section *Nigri*.

S. Testempasis[1], N. Kamou[2], U. Menkissoglu-Spiroudi[2] , G. Karaoglanidis[1]

[1] *Faculty of Agriculture, Forestry and Natural Environment, Laboratory of Plant Pathology, Aristotle Universitity of Thessaloniki. POB 269, 54124, Thessaloniki, Greece.*
[2] *Faculty of Agriculture, Forestry and Natural Environment,* Pesticide Science Laboratory*, Aristotle Universitity of Thessaloniki, POB 251, 54124, Thessaloniki, Greece.*

testempa@agro.auth.gr.

Aim:
Investigation of the population structure and determination of the *in vitro* mycotoxigenic capacity of black *Aspergilli* species collected from conventional and organic vineyards.

Introduction:
Grapevines considered to be one of most important crops worldwide as well as in Greece. Grape's Black rot disease caused by several mycotoxigenic species of Black *Aspergilli* section *Nigri*, is one of the most important pre- and post-harvest diseases of grapevines, while contaminated grape products and derivatives with *Aspergillus* mycotoxins (OTA, FB_2) may have an important impact on consumers health.

Materials & Methods:
- Asymptomatic grape berries were collected for 2 consecutive years (2018 & 2019) from organic and conventional vineyards located in different regions all over Greece.
- Fungal isolation was performed in petri dishes amended with a semi-selective medium DRBAC (Dichloran Rose Bengal Agar Chloramphenicol)
- In total, 300 isolates of *Aspergillus* spp. were collected and identified by amplicon sequencing of 3 reference genes (*ITS, β-tubulin, calmodulin*).
- The *in vitro* production of mycocotoxins was evaluated in YESA (Yeast extract Sucrose Agar) growth medium, after cultures incubation for 7 and 15 days.
- Overall, *in vitro* mycotoxin capacity of 110 Aspergillus isolates originating from organic (n=55) and conventional (n=55) vineyards, was tested.
- The liquid chromatographic analysis was performed on a ExionLC AC system consisting of an in-line degasser, two LC pumps, an autosampler and a column oven associated with a X500R QTOF mass spectrometer (AB Sciex, Framingham, MA, USA).

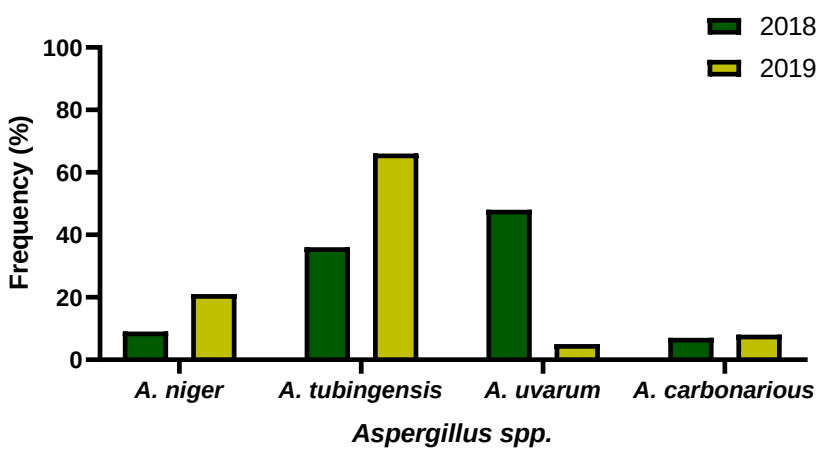

Figure 1. Frequency of *Aspergillus* species collected from asymptomatic grape berries during 2018 (dark green columns) and 2019 (light green columns)

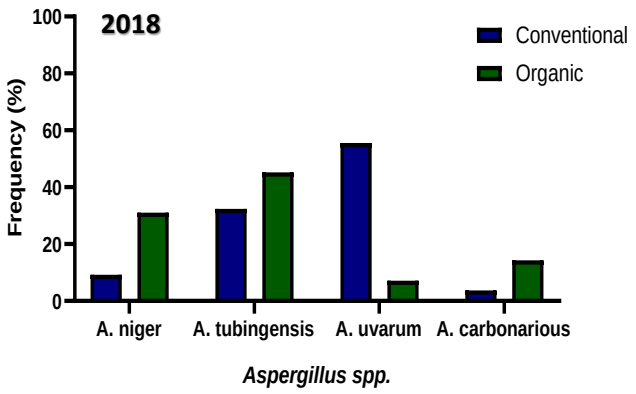

Figure 2. Frequency of *Aspergillus* species on grape berries originating from conventional and organic vineyards (2018 sampling).

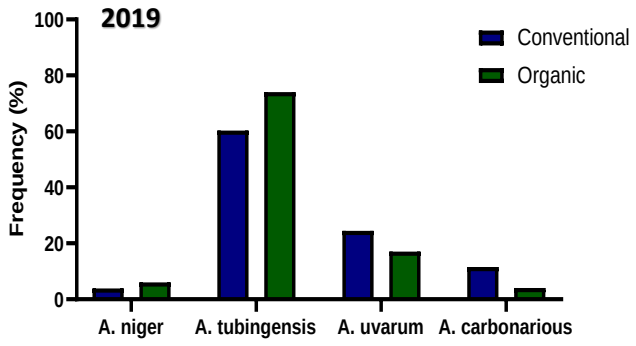

Figure 3. Frequency of *Aspergillus* species on grape berries originating from conventional and organic vineyards (2019 sampling).

Table 1. Minimum and maximum *in vitro* production of OTA and FB2 from *Aspergillus* species.

Aspergillus species	Concentration (μg/gr)	
	OTA	FB_2
A. niger	0.01 to 0.3	20 to 60
A. carbonarious	0.1 to 20	nd
A. tubingensis	nd	nd
A. uvarum	nd	nd

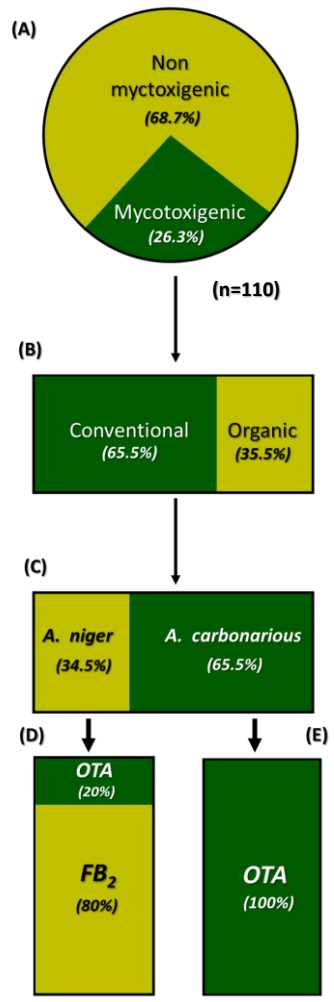

Figure 4. Panel of pie charts and bars that demonstrate: (A) Frequency of mycotoxigenic isolates within the tested population (n=110). (B) Frequency of mycotoxigenic strains originating from conventional and organic vineyards in Greece. (C) Frequency of mycotoxigenic strains within the *A. niger* and *A. carbonarious* subpopulations. (D & E) Frequency of OTA and FB2 producing isolates of *A. niger* and OTA-producing isolates of *A. carbonarious.*

Key Results:

- *A. tubingensis*, *A. uvarum*, *A. carbonarious* and *A. niger* were identified as the casual agents of Black rot disease in Greece.
- *A. uvarum* and *A. tubingensis* considered to be the predominant species for 2018 and 2019, respectively.
- For both sampling years, higher frequencies of *A. tubingensis* and *A. uvarum* were found in the organic and in the conventional grapevines, respectively.
- In total, 26.3% of the selected isolates were capable to produce mycotoxins *in vitro.*
- The majority of the mycotoxigenic isolates originating from conventional (65.5%) vineyards and only 35.5% derived from organic grapevines.
- Among all tested *Aspergillus* isolates, *A. niger* and *A. carbonarious* were identified as the main OTA and FB_2 producers.
- Most of *A. niger* isolates produced only FB2, while only 20% produced both mycotoxins.
- *A. carbonarious* strains produced only OTA.

European Union European Social Fund
Operational Programme Human Resources Development, Education and Lifelong Learning
Co-financed by Greece and the European Union
ΕΣΠΑ 2014-2020

"This research is co-financed by Greece and the European Union (European Social Fund- ESF) through the Operational Programme «Human Resources Development, Education and Lifelong Learning 2014-2020» in the context of the project "Organic Vs Conventional vineyard growing systems: Exploring the population structure of Black Aspergilli species in relation to grape berries microbiome and mycotoxigenic risk" (MIS 5047881)."