Ochratoxin A producing fungi in grapes and their biocontrol

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Introduction

Ochratoxin A is a mycotoxin produced by filamentous fungi from the genera *Aspergillus* and *Penicillium* found in a variety of food products. Its prolonged consumptions has been showed to be detrimental to human health, causing kidney damage as well as immunotoxic, theratogenic and neurotoxic effects. Wine was found to be the second most important dietary source of ochratoxin A in Europe.

Objectives

To characterise the main ochratoxin A producing fungi in grapes, understand the contamination process and determine biocontrol techniques to lower their incidence.

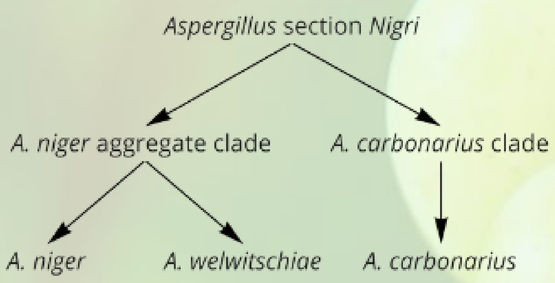

Figure 1: Main OTA producing fungi in grape

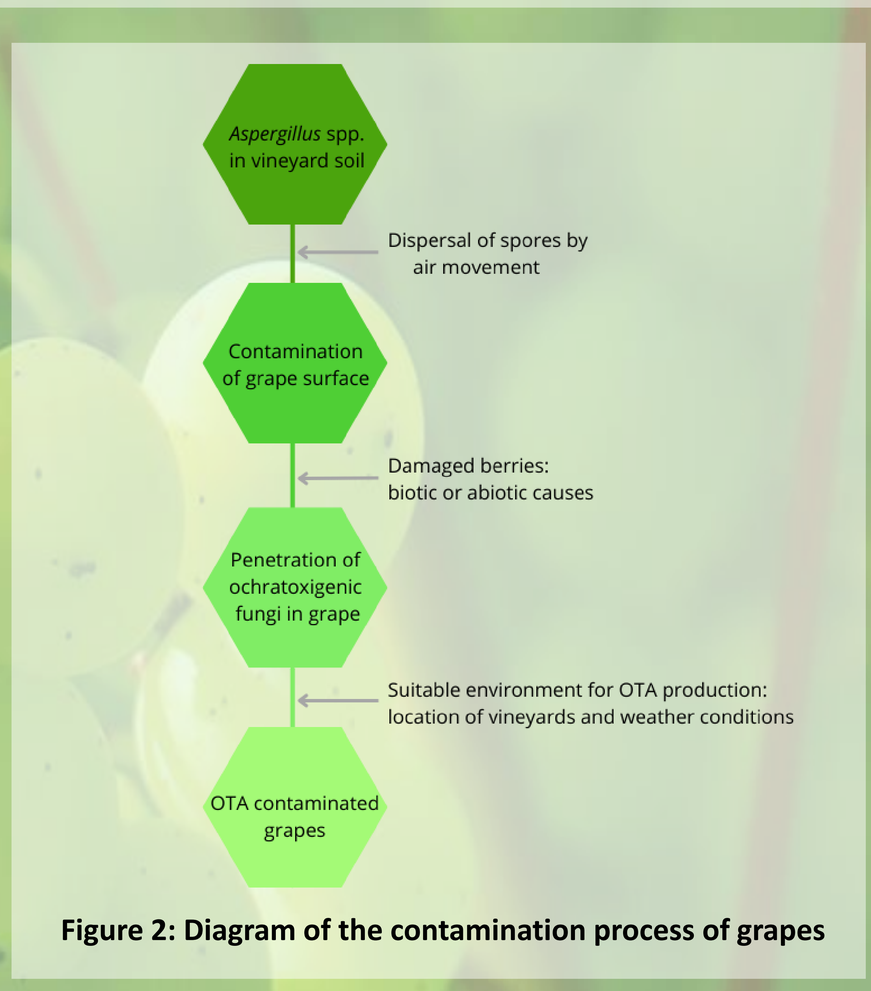

Figure 2: Diagram of the contamination process of grapes

Because of the contamination mechanisme of ochratoxigenic *Aspergillus* spp., the use of preventive methods in vineyard management are essential to reduce the possible damages inflicted to berries during maturation. Biocontrol has also been explored as a direct and environmentaly friendly and safe method to control *Aspergillus* spp. growth.

Table 2: Biocontrol strategies to reduce OTA levels in grapes and grape products

	Competition against *Aspergillus* spp.	**Growth inhibitors of *Aspergillus* spp.**	**Detoxifying action**
Lactic Acid Bacteria	*Pediococcus pentosaceus* [1] *Lactobacillus plantarum* [1]		*Pediococcus pentosaceus* [2] *Pediococcus parvulus* [3] OTA adsorption in celular wall [11][12]
Yeast	*Candida guillermondii* [4] *Issatchenkia orientalis* [5] *Metschnikowia pulcherrima* [5] *Issatchenkia terrícola* [5] *Candida incommunis* [5] *Lanchacea thermotolerans* [6]	Volatile Organic Compounds produced by: *Candida friedrichii* [7] *Candida intermedia* [8] *Lachancea thermotolerans* [8]	*Aureaobasidium pullulans* [9] [10] OTA adsorption in celular wall [11][12]
Filamentous Fungi	*Penicillium adametzioides* [13] Non ochratoxigenic *Aspergillus carbonarius* [14]		

Conclusion

- The Spanish population is exposed to high OTA doses from their diet
- *Aspergillus carbonarius* is the major cause of ochratoxin A production in grapes
- The Mediterranean climate is favorable to *Aspergillus* spp. development
- Good agricultural practices are essential to reduce grape contamination
- Various investigations point to biocontrol as a potential method to protect vineyards effectively while preserving the environment

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