

# Preliminary study on the microbiota associated with *Cimiciato* hazelnuts

Flavia de Benedetta<sup>1,2</sup>, Giovanna Avventura<sup>2</sup>, Giovanna Ceriello<sup>2</sup>, Umberto Bernardo<sup>2</sup>, Matteo Giaccone<sup>3</sup>,  
Francesco Vinale<sup>2,4,5</sup>, David Turrà<sup>1,4</sup>

<sup>1</sup> Department of Agricultural Sciences, University of Naples "Federico II", 80055 Portici, Italy

<sup>2</sup> Institute for Sustainable Plant Protection, National Research Council, 80055 Portici, Italy

<sup>3</sup> Institute for Agriculture and Forestry Systems in the Mediterranean, National Research Council, 80055 Portici, Italy

<sup>4</sup> Center for Studies on Bioinspired Agro-Environmental Technology, Department of Agricultural Sciences, University of Napoli Federico II, 80055 Portici, Italy

<sup>5</sup> Department of Veterinary Medicine and Animal Production, University of Naples "Federico II", 80137 Naples, Italy

E-mail: flavia.debenedetta@ipsn.cnr.it

## Introduction

The feeding activity of various species of stink bugs leads to the development of the *Cimiciato* defect in hazelnuts. This defect is characterized by the presence of dry and necrotic tissues on the kernel, changes in the lipid composition profile, and an increased susceptibility to lipid oxidation. These factors have a detrimental impact on the organoleptic qualities (taste and aroma) and the shelf-life of the product. Insects, when biting into hazelnuts, release enzymes found in their saliva that

trigger biotic responses in plant tissues and lead to metabolic changes in the kernels.

Furthermore, microbial inoculation during the feeding process is a well-documented phenomenon, as observed with the causal agent of kernel dry rot in hazelnuts, *Eremothecium coryli* (Peglion) Kurtzman. Our study aims to investigate the microbiota associated with the *Cimiciato* defect observed in insect-bitten hazelnuts.

## *Cimiciato* defect on hazelnuts affect:

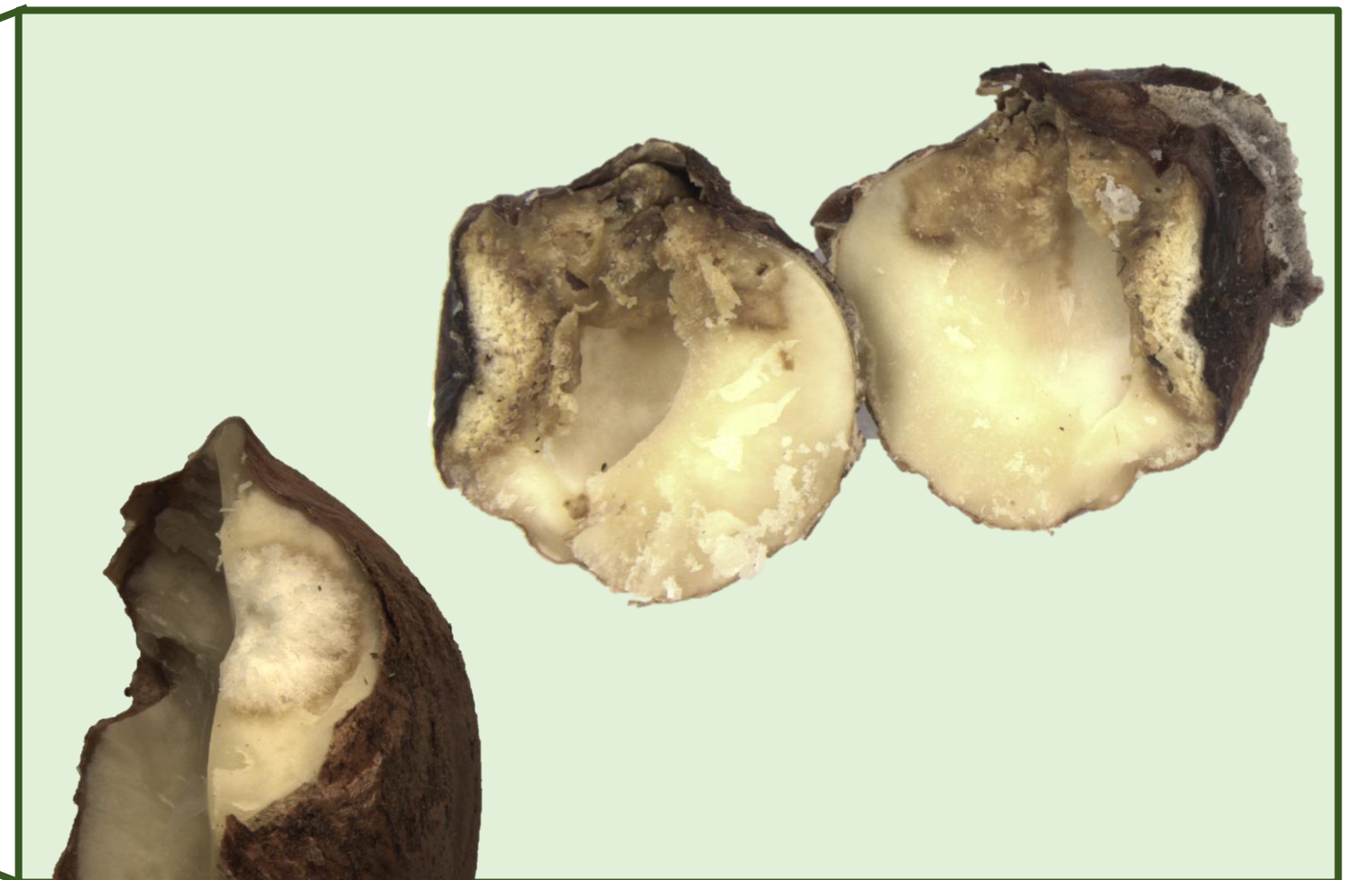
Taste

Aroma

Shelf-life



## *Cimiciato* symptoms on hazelnut



## Materials and Methods

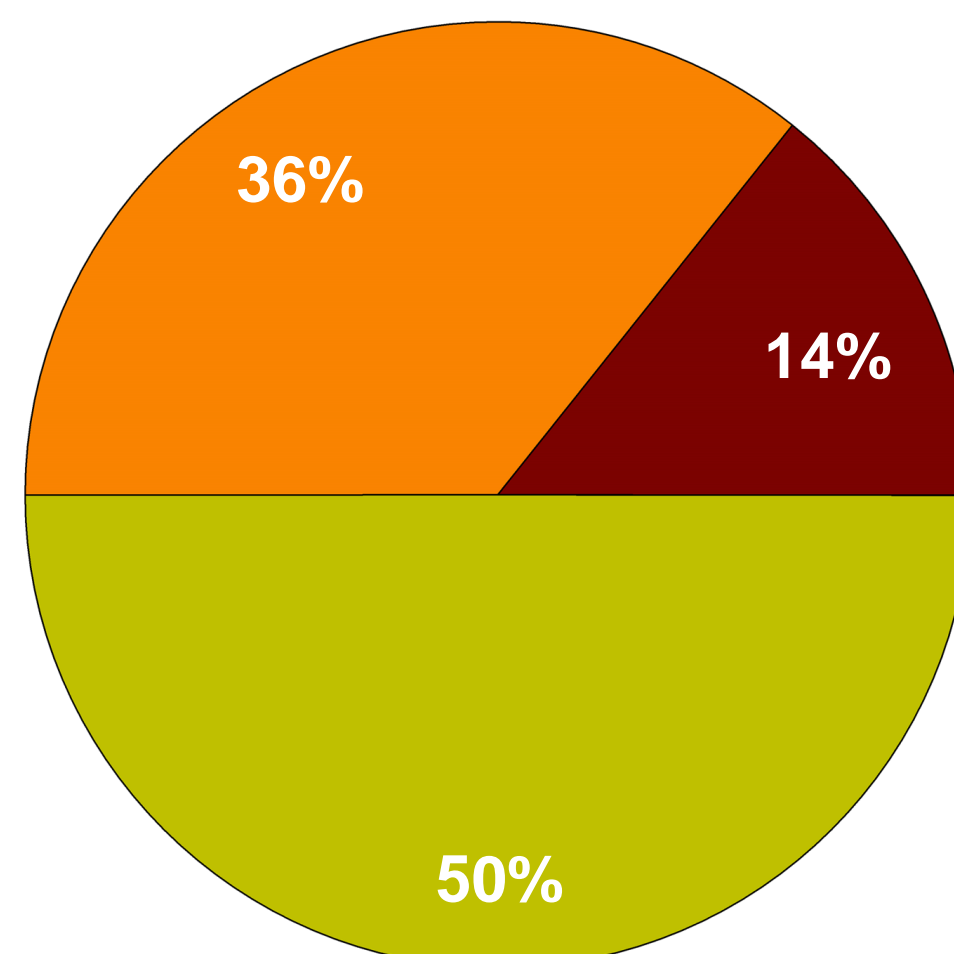
The hazelnuts (San Giovanni cultivar) used in this study were harvested in Teano (CE), Campania region. Fruits were externally sterilized with 20% bleach and rinsed with sterile water.

After shelling, the kernels were visually inspected for any signs of damage. Both healthy hazelnuts and those with *Cimiciato* defect were sterilized by immersion in 70% ethanol for 10 minutes, rinsed with sterile water for 60 s, and dried on sterile filter paper under laminar flow.

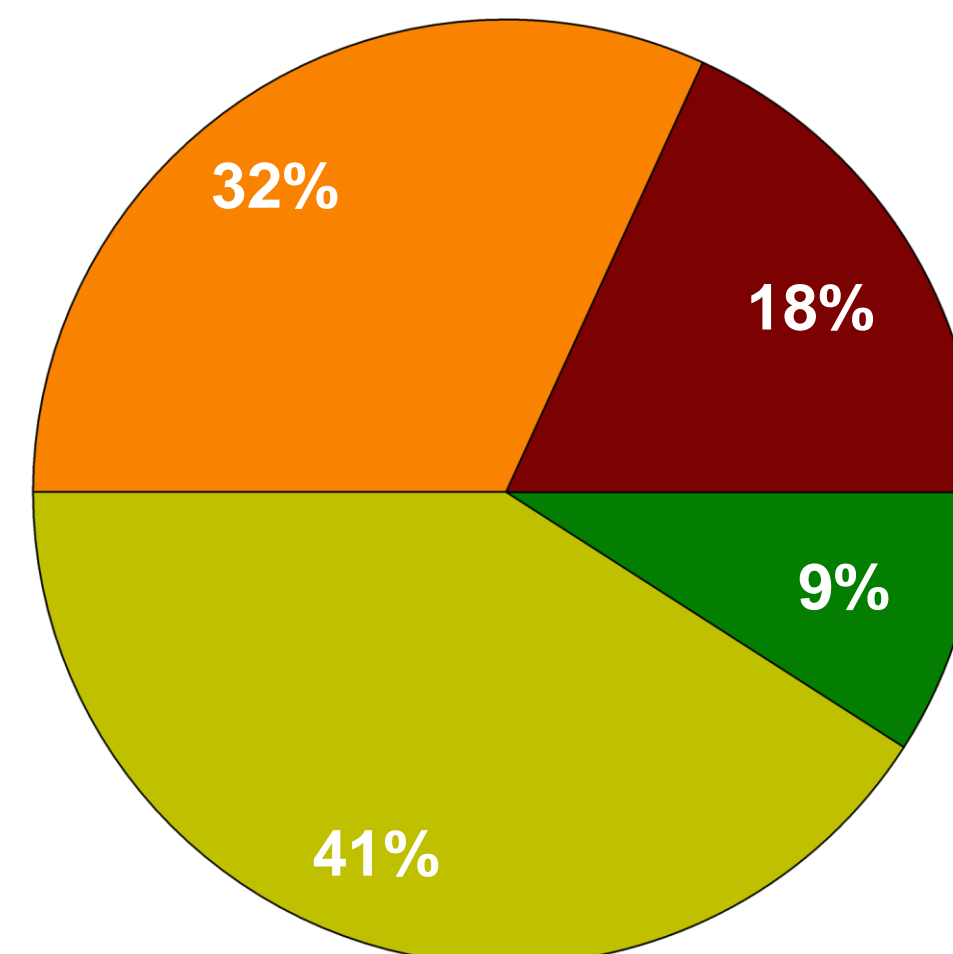
Subsequently, the kernels were placed on potato dextrose agar (PDA) or PDA supplemented with 1% lactic acid (to better observe the outgrowth of fungal colonies) in Petri dishes and transferred to a controlled growth chamber (25°C for 48h). Outgrowth of fungal and bacterial colonies was observed and quantified to determine presence/absence in each tested fruit.

One-way ANOVA test, was used to evaluate the incidence of fungal and bacterial infections in both *Cimiciato* and healthy hazelnuts. All statistical analyses were carried out using SPSS 28 (IBM, Chicago, IL, USA).

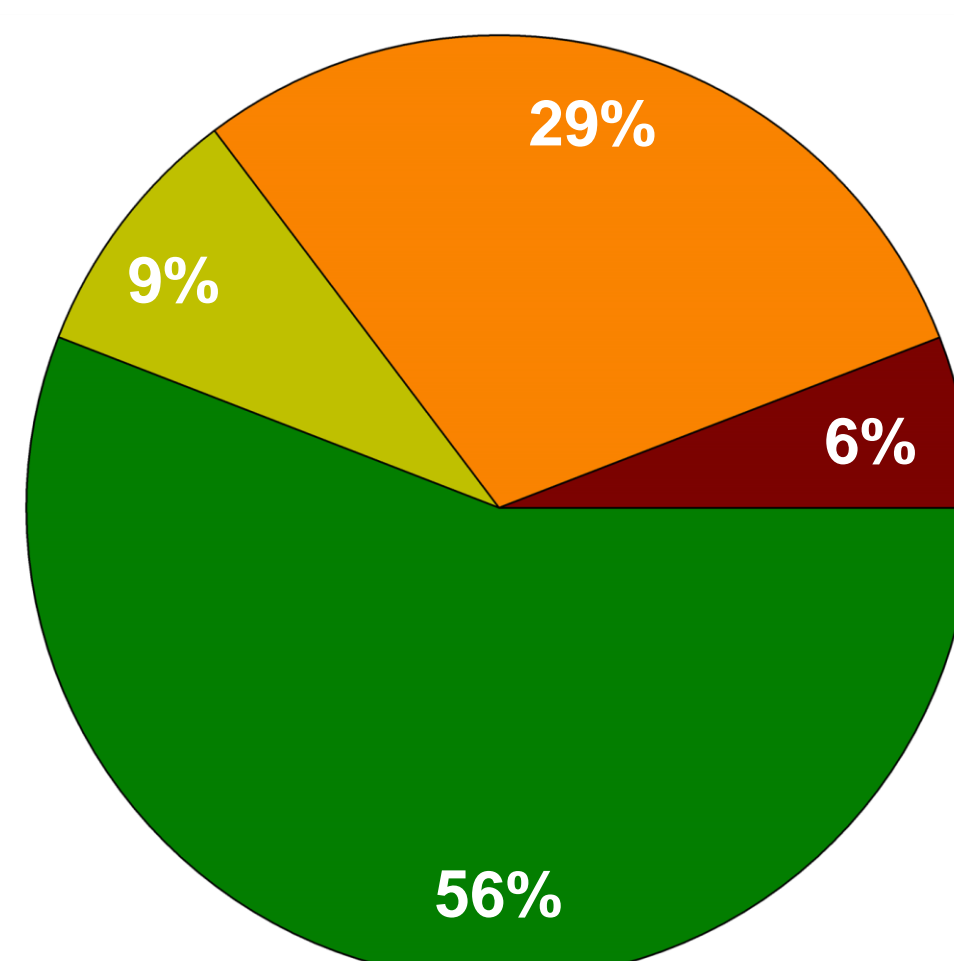
PDA  
*Cimiciato* hazelnuts



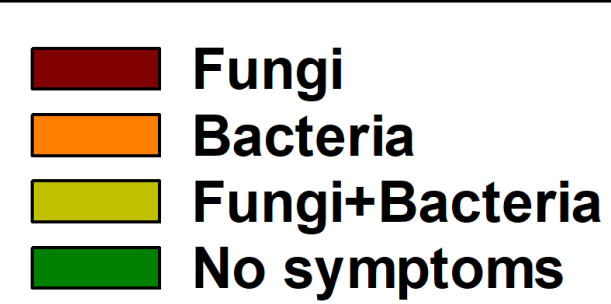
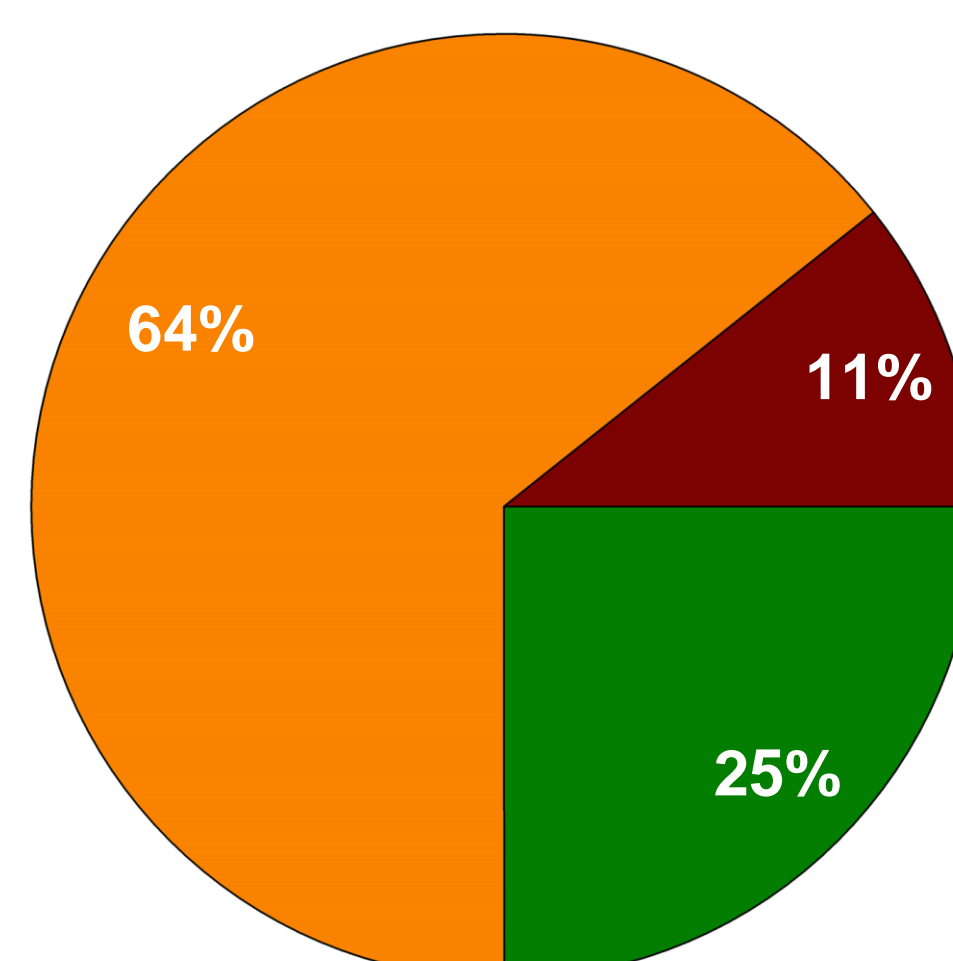
PDA + 1% Lactic acid  
*Cimiciato* hazelnuts



PDA  
Healthy hazelnuts



PDA + 1% Lactic acid  
Healthy hazelnuts



## Results

Noteworthy, "*Cimiciato*" hazelnuts showed a higher incidence of fungal outgrowth when compared to healthy hazelnuts. In contrast, no significant differences were observed for bacterial presence in the two tested conditions. Further studies will be necessary to conduct molecular and phenotypic characterization of *Cimiciato*-associated microbes together with metabolomic analysis, to determine how they contribute to the development of this defect.

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