



UNIVERSITY OF TALCA (Chile)
FACULTY OF AGRICULTURAL SCIENCES
Agricultural Science PhD. Program

BOTRYTIS BUNCH ROT RISK INDICATORS : AN APPROACH TO RATIONAL DISEASE MANAGEMENT

Carolina Paz Pañitrur De la Fuente

A thesis submitted to the University of Talca in fulfilment of the requirements for the Degree of Doctor in Agricultural Sciences

Evaluation committee:

- Dr. Héctor Valdés Gómez (Tutor), Departamento de Fruticultura y Enología, Pontificia Universidad Católica, Chile
- Dr. César Acevedo Opazo, Departamento de Producción Agrícola, Universidad de Talca, Chile
- Dr. Mauricio Lolas, Departamento de Producción Agrícola, Universidad de Talca, Chile
- Dr. Christian Gary, UMR SYSTEM, Montpellier SupAgro, France
- Dr. Marc Fermaud, UMR SAVE, INRA Bordeaux, France

Abstract

Botrytis bunch rot (BBR), caused by the fungus *Botrytis cinerea*, can reduce both yield and wine quality, leading to substantial economic losses in vineyards worldwide. The control of this disease is still largely based on the use of repetitive synthetic fungicide applications and therefore, disease management must be optimized.

Thus, the main objective of this doctoral thesis was to study factors related with BBR development to be used as risk indicators in a rational disease management. Particularly, permanent (cultivar) and variable (berry skin components, vigor and floral calyptra infection) grapevine factors were investigated. Information originating from different field trials performed in Chile (Maule Region) and France (Bordeaux Region) between 2010 and 2016 was used.

First, the cultivar susceptibility to *B. cinerea* and its relation to fruit maturity were investigated. For that, BBR incidence and severity were evaluated at harvest, and indices of susceptibility (SI) and maturity (FMat) were calculated. Also, vine features related to the potential susceptibility to *B.*

cinerea, i.e. pectin and tannin content in berry skins and the vegetative growth, were evaluated early in the season and correlated with the disease development at harvest. Additionally, the relationship between floral calyptra infections and BBR development in mature berries was also studied.

Results showed a similar cultivar classification according to their susceptibility to *B. cinerea* in the two contrasting conditions of Chile and France. Sauvignon Blanc and Gewürztraminer were the most susceptible cultivars, whereas Petit Verdot, Cabernet Sauvignon, Mourvèdre and Syrah were rather resistant or highly resistant. Moreover, an exponential and positive relationship was established between SI and FMat.

Otherwise, tannin content in berry skins and grapevine vigor, measured via NDVI, were significantly correlated with both BBR incidence and severity at harvest, whereas pectins only showed significant correlations with BBR severity. Lastly, no significant correlation between floral calyptra infections and BBR development in mature berries were observed.

The findings of this study showed that grapevine factors could be used as disease risk indicators. Thus, this information was used to propose an improvement to the Decision Support Rule previously developed in France for the rational management of *B. cinerea* in grapevines.

Keywords: *Botrytis cinerea*, Grape maturity, Susceptibility Index, *Vitis vinifera*, Integrated Pest Management (IPM), Decision Support Rule, Disease Risk Indicator, Vegetative Growth, NDVI, pectin content, tannin content.