

Index

- Abbreviation list	7
- Abstract.....	8
- Resumen	10
- Resum	12
- Chapter I – Introduction	14
1.1. <i>Vitis vinifera</i> – One of the oldest and most important crops worldwide.....	15
1.2. Focus on Biotic factors inducing plant diseases, as a challenge to productivity.....	16
1.3. Plant defenses to biotic stresses.....	18
1.4. Fungal trunk diseases: A challenge for grapevine productivity.....	25
1.5. Are there any cultivar traits for tolerance or susceptibility of <i>Vitis vinifera</i> against GTDs?	30
1.6. Events that occur between the time spores of GTD pathogens encounter the plant and the appearance of symptoms: Focus on Botryosphaeriaceae and their virulence factors	33
1.7. Grapevine protection and defenses when facing pathogens leading to GTDs: Focus on <i>Neofusicoccum parvum</i>	40
1.8. Does GTD pathology may ultimately depend on a fine tune regulation of grapevine microbiome?	44
1.9. Microorganisms with biocontrol potential against GTDs: Focus on <i>Bacillus</i> spp. and <i>Trichoderma</i> spp.....	47
1.10. How to develop a durable sustainable management of GTDs? From nursery to vineyard	52
1.11. Objectives	56

- Chapter II – Genome sequence analysis of the beneficial <i>Bacillus subtilis</i> PTA-271 isolated from a <i>Vitis vinifera</i> (c.v. Chardonnay) rhizospheric soil: Assets for sustainable biocontrol	58
2.1. Introduction	59
2.2. Material and methods	61
2.3. Results and discussion	65
2.4. Conclusion	79
- Chapter III – Cultivar contributes to the beneficial effects of <i>Bacillus subtilis</i> PTA-271 and <i>Trichoderma atroviride</i> SC1 to protect grapevine against <i>Neofusicoccum parvum</i>	80
3.1. Introduction	81
3.2. Material and methods	84
3.3. Results	90
3.4. Discussion	101
3.5. Conclusion	107
- Chapter IV – Dual RNA sequencing of <i>Vitis vinifera</i> Chardonnay and Tempranillo during its beneficial interaction with <i>Trichoderma atroviride</i> SC1 and <i>Bacillus subtilis</i> PTA-271 against <i>Neofusicoccum parvum</i>	108
4.1. Introduction	109
4.2. Material and methods	112
4.3. Results	114
4.4 Discussion	126
4.5 Conclusion	133

- Chapter V – Evaluation of <i>Bacillus subtilis</i> PTA-271 and <i>Trichoderma atroviride</i> SC1 to control <i>Botryosphaeria dieback</i> and Black-foot pathogens in grapevine propagation material	135
5.1. Introduction	136
5.2. Material and methods	138
5.3. Results	143
5.4 Discussion	149
5.5 Conclusion	152
- Chapter VI – Effect of <i>Bacillus subtilis</i> PTA-271 and <i>Trichoderma atroviride</i> SC1 on grapevine defenses and temporal dynamics of fungal and bacterial microbiome in grapevine rhizosphere	154
6.1. Introduction	155
6.2. Material and methods	157
6.3. Results	162
6.4 Discussion	178
6.5 Conclusion	182
- Concluding remarks and perspectives	184
- Bibliography	189
- Appendix	242
- Support to <i>Chapter II</i>	243