

Sustainable wine production through biological control of diseases

Supervisory team:

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CASE partner: Vinescapes

Project description:

Between 10-20% of crops are lost to decay after harvest, during storage or transport. One important culprit is the grey mould fungus, *Botrytis cinerea*, which causes decay of fresh fruits and vegetables. Economic losses by grey mould are over £7.3 billion worldwide.

Preventing decay usually means application of fungicides, but growing concern of health risks and environmental impacts mean that we are now searching for alternative ways of reducing losses. That means using alternatives like beneficial bacteria and companion plants that can act as biological controls of disease. At the same time, climate change is affecting what crops we can grow, and also how well biological controls will work. As the UK warms, wine production is growing, and vineyards are interested in sustainable, organic production. UK wine production has quadrupled since the early 2000s.

Working with our partner Vinescapes, we will evaluate biological controls for grey mould at sites in the UK and France, and study how vineyard management and climate change could influence their effectiveness. Our goal is to help winemakers reduce their losses to grey mould, now and in the future.

Firstly, we will conduct laboratory experiments on the efficacy of commercially available biocontrols, like *Bacillus* bacteria and *Trichoderma* fungi. We will do this under different temperature and moisture conditions, so we know how the local climate in the vineyard, and potential future climate change, will affect control. Second, we will conduct further experiments to test whether grey mould and biocontrols can adapt to increasing temperatures and changing climates, to improve our models. Third, we will test whether certain companion plants, like lavender and *Artemisia*, are able to activate plant defences against grey mould, in the laboratory and also by experiments in vineyards in the UK and France. We will also set up temperature and humidity sensors within vineyards, to monitor how the microclimate within the canopy changes over time. Finally, we will use our new findings to create mathematical models of grey mould risk and biological control efficacy under different climate scenarios.