LINCOLN UNIVERSITY
TE WHARE WĀNAKA O AORAKI

Pest and disease Series

VITICULTURE FACT SHEET

BOTRYTIS CINEREA

Photo credit: Alejandra Ruiz, Bankhouse Estate, Marlborough.

Introduction

Botrytis cinerea, Is a filamentous pathogenic fungus that affect a wide variety of hosts, among which are horticultural and fruit crops of great importance, such vineyards. It is the cause of the typical bunch Rot, a major disease in vineyards of the temperate zones of the world.

The impact of Botrytis

Losses in viticulture and fruit cultivation due to *B. cinerea* are estimated at approximately 2,000 million dollars annually (Vivier and Pretorius, 2002). Under favourable climatic conditions for it's development Botrytis Cinerea can destroy the crop completely, while it can also affect the quality of wine when it is made from bunches with only 5% of infected Grapes. It produces an enzyme called laccase that promotes oxidisation of phenolic compounds in juice. This can lead to a loss of colour in red wine and off flavours, odours (e.g. earthy, mushroom) and other biochemical changes which cause a reduction in wine quality. (Ky et al., 2012).

The best conditions for Botrytis development

Temperature determines how fast infection occurs. The optimum temperature for spore germination is 20–22°C (Latorre et al., 2002a) although some spores still germinate at temperatures below 10°C or above 30°C. A film of free water is essential for spore germination. Surface moisture can be created by rain, dew, mist or fog while high humidity. Temperature, relative humidity and wind speed determine the duration of surface moisture, and as a result, the level of infection. The proportion of berries developing rots after latent infection appears to be correlated to high relative humidity, and possibly high soil water content.

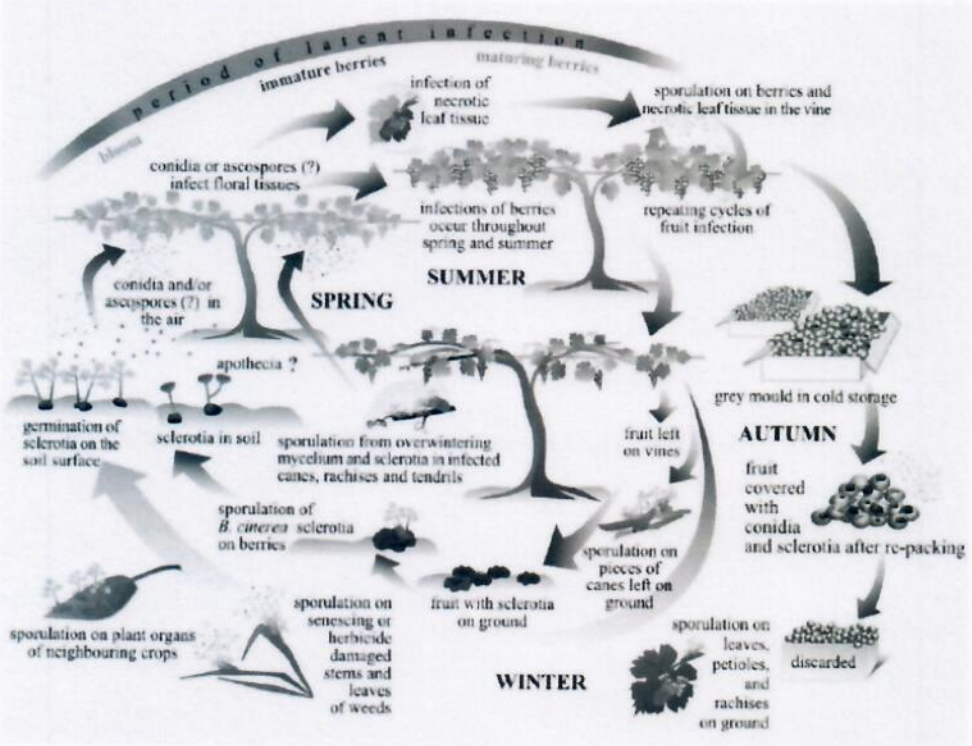
Critical Phenological stages for Botrytis infection

Flowering is the first opportunity for infection of berries (Latorre et al., 2002a), but latent infection may occur at any time after that. The frequency of latent infection can vary during a growing season and between seasons and sites, and it may increase after pre-bunch closure. Rain that causes berries to split often leads to direct infection of ripening berries.

Split berry and direct infection. Photo credit: Alejandra Ruiz, Bankhouse Estate, Marlborough.

The Life Cycle in the vineyard

The sources of inoculum are multiple, given their possibility of infecting and surviving in alive and dead tissue and in many types of plants like adjacent weeds (Holz et al., 2004). Given the multiplicity of host plants susceptible to infection and the variety of biological forms of B.cinerea, the biological cycle of the pathogen in the vineyard is relatively complex.



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Symptoms

Botrytis can develop on soft, young leaves with no apparent damage other than a darkening of damaged tissue, it usually has a V shape. Other infected tissues develop patches of soft brown rot with grey to buff coloured fungal growth (grey mould) Most berries and bunch rots caused by botrytis develop in late summer and autumn (early- to mid-summer in warm/hot areas) as grape berries mature. The first signs of infection are small, round water-soaked spots that may be lighter in colour on red grapes. When berries are rubbed, the skin over these spots cracks and slips freely (slip skin), revealing the firm inner-berry pulp.

Botrytis in leaves. Source: https://www.lodigrowers.com/botrytis-cinerea/ and Botrytis in Berries, Personal source, Alejandra Ruiz.

The control and Management

The control of this disease in the vineyard is difficult due to its biological cycle, that apart from infecting green plant tissues, it develops saprophytically in necrotic and senescent tissue, resulting in multiple sources of primary and secondary inoculum. The most widely used control methods today are the application of chemical fungicides. However, B. cinerea has developed resistance to numerous chemical compounds used, making them inefficient (Latorre and Torres, 2012, Rosslenbroich and Stuebler, 2000). Nowadays Biological control with multiple types of microorganism such as bacteria and different type of fungus that act in different ways, competing for substratum and space that suppress the action of Botrytis, biological control it's starting to be widely used. Mechanical control such as Mechanical Shaking, lately developed in New Zealand, uses a harvester machine with a different setup to shake up the vines with the aim of getting rid of latent inoculum stuck in the new and young bunches, this method has to be done between fruit set and before bunch closure (Personal communication with Mark Allen, Viticulture Consultant,2018). The trauma of shaking might also thicken or toughen berry skins, or activate biochemical pathways for antifungal compounds, therefore improving the berry's inherent resistance to botrytis infection. Mechanical shaking, used alongside standard botryticides, has been shown to reduce rot at harvest by around 50%, however effects of shaking on berry skin toughness and biochemical responses have not been determined to date.

Photo credit: Alejandra Ruiz, Bankhouse Estate, Marlborough.