



Fig. 1: Necrotic rachis (a), necrotic lesion on shoot (b), and dark spot with yellow halo on grapevine leaf (c) are characteristic symptoms of *P. syringae* BIR. Natural fluorescence of cultured *P. syringae* pv *syringae* (d), and gram stain showing gram negative *P. syringae* cells (e).

Disease: Bacterial Inflorescence Rot (BIR)

Classification: K: Bacteria; P: Proteobacteria; C: Gammaproteobacteria; O: Pseudomonadales; F: Pseudomonadaceae; G: *Pseudomonas*.

Bacterial inflorescence rot (BIR) is proving to be a serious problem for the Australian wine industry. BIR is caused by the bacterium *Pseudomonas syringae* pathovar *syringae* (Pss) and results in a sudden loss of young inflorescences. Once this pathogen establishes infection, it can overwinter within the plant, resulting in more harmful symptoms for later seasons. This problem has led to the severe losses of crop yields across cool climate Australian vineyards.

The Pathogen: *P. syringae* pv. *syringae* (Pss) was first documented as a weak pathogen to grapevine in Argentina in 1976 where necrotic lesions on the leaves and shoots were observed. The first Australian report was in Adelaide 2000, with similar symptoms, however these symptoms worsened the following season (Hall McMahon, Noble, Cother and McLintock, 2002).

The first report of loss of crop by Pss was not until 2006 in Tumbarrumba, NSW. After a particularly wet spring dark spots with yellow haloes were observed on the leaves, necrotic lesions on the shoots, and there was a sudden loss of inflorescences. Some of these losses have been reported to be over 80% of total crop yield in later years. This particular pathogen is known for its motility (flagella), ice nucleating activity (ability to freeze water at relatively warm temperatures), and can produce virulence factors/toxins that may have a role in their pathogenesis (ability to evade the host defence response).

Phylogenetic studies on *rpoB* gene sequences have shown that isolates of Pss from Adelaide (2000) and Tumbarrumba (2011) are closely related, while other vineyards contain a mixed infection of closely related Pss.

Distribution: The first Australian report was in the Adelaide Hills in 2000, however more recently there have been confirmed reports of similar symptoms in East Gippsland, Canberra and the Hunter Valley. Although we are still unsure how the pathogen is spread from each vineyard, or how widely its distribution is, it is believed that careful consideration should be taken by pruning crews

Host Range: First isolated from *Syringa* (lilac), this pathogen has been isolated from *Vitis vinifera* (grapevine), *Prunus* (stone fruit), *Phaseolus* (bean) and *Persea* (avocado).

Impact: Pss had the potential to reduce the amount of crop yield dramatically and can be easily spread through cuttings and contaminated equipment. With this in mind, Pss could have devastating effects on the Australian wine industry and other economically important crops.

Detection and control: Because this pathogen is considered new to the Australian grapevine, cool climate growers should be on the look out for the symptoms of BIR, especially in cool climates with wet springs as Pss thrives in humid conditions. Identification is traditionally done by sample submission to a diagnostics service with cultivation of the bacterium. Currently there is no known control for this pathogen, however we are currently researching control measures with promising results.

Further Reading: Whitelaw-Weckert, M.A., Whitelaw, E.S., Rogiers, S.Y., Quirk, L., Clark, A.C. & Huang, C.X. (2011). Bacterial inflorescence rot of grapevine caused by *Pseudomonas syringae* pv. *syringae*. *Plant Pathology*, 60, 325-337.

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