



Management of *Verticillium* wilt of hop by using green manure crops and soil solarisation

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Abstract

Hop (*Humulus lupulus* L.) is a dioecious, perennial climbing plant of the family Cannabaceae, which is native to the temperate Northern Hemisphere. Female plants are cultivated for their inflorescences, termed cones, which are primarily used in the production of beer to provide flavor, bitterness and aroma. One of the major limiting factors in hop production is *Verticillium* wilt, caused by the soil borne fungus *Verticillium albo-atrum* Reinke & Berthold. Since its first discovery on hops in 1927, the fungus has evolved several highly virulent pathotypes, which induce severe plant symptoms and cause the plants to die. Control of the fungus is particularly difficult due to its production of dark resting mycelium, formed from melanised hyphae, which can persist in the soil for several years. After eradication of infested hop gardens, reduction of the soil borne inoculum is usually based on at least a 4-year crop rotation using non-host plants. However, such lengthy sanitation measurements are incompatible with the demand for quick re-establishment of hop production. Green manures of various crop plants, particularly from the Brassicacea family and genus *Sorghum*, have been shown to reduce the inoculum of some soil-borne diseases and could be effective in suppressing of *Verticillium* wilts. Both groups of these plants act through a biofumigation effect, which is attributed to the pathogen's toxic volatile compounds released during degradation of plant metabolites, such as glucosinolates and cyanogenic glucosides. The biofumigation effect can also be supplemented with soil solarisation, which is another non-chemical method of suppressing soil pathogens. In our study, we evaluate the efficacy of various green manure plants and soil solarisation in several field trials aimed at the suppression of *V. albo-atrum* in eradicated hop gardens. Measurement of efficacy was based on analysis of fungal inoculum in incorporated nylon meshes before and after treatments. Current trials are focused on studying the effect of intercropping of green manure plants between rows of hop plants in order to reduce fungal soil infection potential and the spread of disease in infected hop gardens.