

Abstract

Brassica Biofumigants for Improved Soil Health †

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Abstract: Biofumigation involves growing specialised cover crops that have the ability to suppress certain soil-borne diseases. Species such as those in the *Brassicaceae* family, (e.g., radish, mustard and rocket) are known to have this capability. Biofumigation activity is initiated by the degradation of glucosinolates within the tissues of the plant when the crop is incorporated into the soil at approx. 25% flowering rate. In this experiment, nine bio-fumigant varieties were assessed over six planting dates for biomass yield, irrigation management, glucosinolate concentration and efficacy against three soilborne pathogens, namely; *Sclerotium rolfsii*, *Sclerotinia sclerotiorum* and *Macrophomina phaseolina*. Preliminary results showed incorporation dates varied across varieties and planting times. Winter planting had highest biomass yield across all varieties, compared with the summer plantings (e.g., 14.82 t/ha in winter, versus 5.02 t/ha in summer for Caliente). The efficacy of disease suppression was variable between variety and planting date. For example, Nemfix and BQ Mulch produced a higher percentage mortality rate (100% and 98%) against *S. sclerotiorum*, compared with autumn (22% and 12%) and winter (37% and 13%) planting. High glucosinolate production was observed during the summer plantings, where irrigation treatments including drought conditions (Low; 0.75 ML/ha), moderate watering (Medium; 2 ML/ha) and field capacity (High; 2.5 ML/ha) were applied. Increased glucosinolate concentrations were observed in the Low irrigation treatments (e.g., Mustclean; 32.31 $\mu\text{mol/g DW}$), versus High irrigation (e.g., Mustclean; 17.11 $\mu\text{mol/g DW}$). Summer data pending analysis. These findings can help growers to identify biofumigant varieties that compliment rotation program and optimise disease management practices.

Keywords: biofumigation; soilborne pathogens; efficacy; incorporation; irrigation; glucosinolates

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