

Soil Biofumigants

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Abstract

Use of mustard green manures has been associated with decreased incidence of several soil borne diseases such as verticillium wilt, root lesion nematode, and Rhizoctonia. The putative mode of action is from release of compounds derived from glucosinolates which suppress soil pathogens. When the plant cells are disrupted, glucosinolate molecules are broken down by an enzyme called “myrosinase”. This creates a range of breakdown products, some of which are active against a number of soil pathogens and insects. The glucosinolate content of the crop depends on variety grown, the environment it is produced in, and the total amount of biomass tilled into the ground. In order to maximize the benefit of a mustard green manure a grower should: (1) select a variety known to have biofumigant properties, (2) grow it with adequate fertilization to promote biomass production; (3) at the time of incorporation, macerate tissue as well as possible and till it into the soil as fast as possible; (4) avoid incorporation if the soil is dry; (5) if possible irrigate or roll the soil after tillage to seal the surface. Research work with mustard green manures for potatoes in Maine has shown improved potato yield and decreased incidence of Rhizoctonia on tubers. Mustard meal has also been a good source of organic N. However, white mold has been observed in mustard green manures, and clubroot may be another issue to consider for the following crop. So these two diseases need to be thought about in a program using mustard green manures in a humid region like New England. Sowing the mustard green manure in the summer so it flowers and is tilled in during the fall may potentially be one avenue to help avoid white mold infection, but this needs more research.