

## **Research Underway on LI to Evaluate Biofumigant Mustard Cover Crop for Managing Phytophthora Blight and Weeds**

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Following a successful observational study at LIHREC in 2008, research is being conducted now at LIHREC to evaluate a mustard biofumigant cover crop. Biofumigation reportedly is being adopted by growers in the Pacific Northwest to control nematodes, other soil-borne pathogens and insects as well as to improve soil health (increased water infiltration and soil tilth). Mustard produces glucosinolates, which breakdown as the plant decomposes into allyl-isothiocyanate, which is similar to methyl isothiocyanate, the active ingredient in the chemical fumigant Metam Sodium.

To obtain preliminary information on the potential of biofumigation for suppressing Phytophthora blight, Caliente 199 mustard blend (Siegers Seed Company) was grown during spring 2008 in a non-replicated planting in a field where Phytophthora blight occurred on squash in 2007. It was followed by a planting of zucchini. The field was prepared by plowing, tilling, and incorporating 10-10-10 fertilizer at 1000 lb/A. Fertilizer was applied to ensure ample biomass production. Mustard was drilled at 10 lb/A on 6 May using a Sukup no-till seeder because it could handle the small seed size which our standard grain drill could not do as it doesn't have a small-seed attachment. By 12 Jun the plants had started to flower. Seed development was monitored to ensure the plants would be incorporated before seed matured, which reportedly takes 6 wks. Seed were still immature on 7 Jul when the mustard plants were flail chopped and immediately incorporated by rototilling, then the soil surface was sealed by rolling with a cultipacker followed by irrigation (about 0.5 inch water). This was done early in the morning and quickly to minimize loss of biofumigant through volatilization. Mustard plants had grown another 4 ft after the start of flowering to reach a final height of about 5 ft 6 in. Caliente 199 was selected because it has a high concentration of glucosinolates. Zucchini was direct seeded on 23 Jul into the strip where the mustard was incorporated and an adjacent strip that had been fallow during the spring. Crop plants and weeds that grew where the mustard was incorporated were stunted relative to the fallow strip, indicating that planting was done too soon after mustard incorporation; however, the soil surface was not disturbed, such as by scratching before seeding, which would have helped release remaining biofumigant. On 15 Aug symptoms of Phytophthora blight were observed on almost all plants in the non-fumigated strip whereas only end plants were affected in the biofumigated strip. Zucchini plants were not stunted in a second seeding done 4 weeks after biofumigation.

Research planned for 2009 includes evaluating an early spring planting date, comparing seeding methods, examining fertilizer needs for mustard and subsequent vegetable crop, and determining the shortage interval after incorporating the mustard

before a crop can be planted or transplanted without adverse effects on the crop. In 2009 mustard is being seeded as soon as soil can be prepared in the spring. It will be drilled and broadcast. A high fertilizer rate is recommended for mustard (N at 100 lb/A) to obtain adequate growth. While this is an expensive practice for a cover crop, biofumigation is still less expensive than chemical fumigation, and some of this N is returned to the subsequent vegetable crop. A lower fertilizer rate for the mustard will be tested in 2009, to document the need for the high rate under LI conditions, as well as reducing the fertilizer rate for the subsequent vegetable crop following use of the full fertilizer rate for the mustard. Impact of biofumigation on both Phytophthora blight and weeds as well as the subsequent vegetable crop will be examined. Transplanted and direct-seeded crops will be compared to determine whether seedlings can tolerate residual biofumigant better than germinating seeds.