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Managing Phytophthora Blight with Biofumigation

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INTRODUCTION.

One of the most destructive diseases of cucurbit crops, pepper, and eggplant is *Phytophthora* blight. The pathogen, *Phytophthora capsici*, can survive in soil for many years. While there are several fungicides with targeted activity registered for managing blight, an integrated program with cultural practices is considered necessary to achieve effective control.

The goal of a series of experiments conducted on Long Island, NY, was to evaluate biofumigation using mustard varieties selected for this purpose. They have a high concentration of 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.

METHODS.

Two replicated experiments and three observational studies were conducted during 2008 - 2012. Mustard variety Caliente 199 was the main one used. It was seeded at 10 lb/A with fertilizer (50 – 100 lb/A N) during late March to early April most years. In mid-June, 2-4 wks after first bloom, when mustard was full grown and seed were still immature (Fig 1), it was flail chopped then immediately incorporated (Fig 2). Next the soil surface was sealed with a cultipacker, then irrigated if rain wasn't imminent (Fig 3). Squash or pumpkin was direct-seeded or transplanted 1-3 wks later.



Phytophthora blight symptoms



RESULTS

Biofumigated plots had fewer symptomatic plants and fruit, yield was increased and fruit had higher Brix levels. With increasing rate of fertilizer there was a trend toward greater mustard biomass and less blight (Fig 5 and charts). Three observational studies were also conducted. In the 2008 study, when blight was first observed, symptoms were found on most zucchini plants in the non-fumigated strip (Fig 4a) whereas only end plants were affected in the adjacent biofumigated strip. In 2011 there were several atypical intensive rain events creating very favorable conditions for blight, which was severe in all sections of this study as well as in other cucurbit plantings where fungicides were used. In 2012 an integrated management program was implemented that began with biofumigation in a field where blight was severe in pumpkin the previous season. Fungicides with targeted activity for oomycetes were applied weekly. The program was successful: fewer than 9% of pumpkins rotted (Fig 6).

Charts below: Impact of nitrogen fertility on mustard cover crop height and biomass production, and *Phytophthora* fruit rot incidence in acorn squash.

