

BRASSICA GREEN MANURE USE IN COMMERCIAL POTATO PRODUCTION

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The demands of growing high yields of quality potatoes in short rotations can be very hard on most soils. When short potato rotations are combined with high fertilizer and fumigation, the organic matter levels and soil structure can be severely impacted. While chemical inputs can help to reduce disease pressure, they do not help in rebuilding soil structure necessary for successful and sustainable potato production. Adding a quick growing green manure crop before planting potatoes has the potential to help rejuvenate the soil and not interfere with standard crop rotation practices in many areas. While fitting the agronomic requirements for quick growth, high biomass, and frost tolerance, mustard and other brassicas have the potential to produce compounds (glucosinolates) that can suppress many potato pest issues.

The ability for green manures to improve organic matter levels, increase water penetration, and reduce wind and water erosion was easily measured. In replicated trials on potatoes and other vegetables, it was found that not all brassica species provided positive results on subsequent crops. Of the over 100 glucosinolates produced by brassica species, only a few have the biocidal activity to suppress soil pests. Many of the available varieties were developed for human consumption and were bred to have low glucosinolate levels to improve taste. Some of these low glucosinolate edible varieties increased disease and nematode levels following incorporation. The Research Institute for Industrial Crops (ISCI) in Bologna, Italy identified the glucosinolate/myrosinase system responsible for this “biofumigation” effect of brassicas in the 1980’s and has developed several varieties specifically for green manure use. Testing of these varieties has shown excellent disease, nematode, and weed suppression in many cases while rapidly rebuilding soil structure and microbial diversity. When used in Integrated Pest Management (IPM) systems, these varieties have reduced chemical inputs significantly while improving yields and quality. Potato growers on five continents have successfully incorporated this practice in conventional and organic production.

Equally important to variety selection is proper management. High biomass production requires proper timing, seeding, fertilizer, and adequate water. Thorough chopping with a flail chopper is important to rapidly release the volatile compounds contained in the foliage. The chopped biomass must be quickly incorporated into moist soil to maximize the pest suppression potential. In moist, warm soils, crops can be planted 2 weeks following incorporation.