

REBUILDING SOILS WITH BRASSICA COVER CROPS

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The economic demands to produce high value crops that require high levels of chemical inputs to control diseases, nematodes, insects, and weeds and nourish plants has resulted in the loss of soil tilth and poor microbial diversity in productive soils in many areas of the world. The lack of crop residues and other carbon sources in the soil has led to increased wind and water erosion, lower organic matter, CEC, aggregate stability, and water holding capacity. Chemical fumigants necessary to control soil pests can also significantly reduce beneficial soil organisms. This combination of low residue/high value crops in short rotations has reduced the use of high residue/low value crops that were providing the food source to replenish soil microbial levels necessary for sustainable soils. In many highly productive soils, organic matter has steadily decreased in the last 50 years.

To combat this loss of soil health, green manures were popular choices in the 1930's and 40's. Taking a full season out of a production cycle to produce a cover crop is not acceptable for many growers today. The use of quick growing, high biomass crops that can provide significant green manure in as little as 45-60 days appeared to be a possible solution. After researching agronomic traits of available plant species, the Brassica family had the best combination of quick growth, frost and drought tolerance, and ease of incorporation. As with most good ideas, there are some possible drawbacks and potential negative side effects. Fortunately, ISCI, The Industrial Crop Research Institute, in Bologna, Italy had been developing plants to suit this purpose. Besides providing good biomass production these varieties were also developed to maximize the glucosinolate/myrosinase system responsible for the "biofumigant" properties of the mustard family.

Early research and commercial attempts at using brassica green manures for their biofumigant effect many times produced mixed results on the following crop. Brassica species contain over 120 different glucosinolates, but only a handful produce the desired pest suppression. Poor variety/species selection led to increased pest levels in numerous trials and some selections became weed problems. With the use of properly developed and tested varieties combined with good incorporation techniques, the potential to help solve soil health problems and reduce pest pressure is possible in many situations.

The overall improvement in most important soil health parameters has been measurable in many regions of the world. Wind and water erosion can be significantly reduced and combined with IPM programs, chemical inputs can be lowered. The cumulative effects of proper variety selection and incorporation have allowed steady soil health improvement when applied repeatedly in intensive crop rotations while improving the yield and quality of the following crops.