



September-October 2005; Volume 4, Issue 5

BUILDING SOIL ORGANIC MATTER WITH COVER CROPS

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When growing vegetables and specialty crops, a soil high in organic matter is very desirable. When examining soils in Virginia, we struggle to find soils that are naturally high in organic matter. Soils with 3 to 5 % soil organic matter would need little additional fertilizer, if any, for producing some crops. Since our native soils don't come anywhere near this level, fertilizers must be added to reach profitable yields. Higher amounts of soil organic matter generally mean greater plant productivity whether crops are being grown by traditional or organic methods.

Research over the years has found that there are several factors that affect the level of organic matter that can be maintained in a soil. Among these are organic matter additions, moisture, temperature, tillage, nitrogen levels, cropping, and fertilization. In fact the level of organic matter present in the soil is a direct function of how much organic material is being produced or added to the soil versus the rate of decomposition. One way to increase the organic matter content over the decomposition rate is by using cover crops.

There are a lot of different plants that can be used as cover crops. There's an extensive list in a book called *Managing Cover Crops Profitable* by the Sustainable Agriculture Network. Listed nonlegume cover crops include: annual ryegrass, barley, oats, cereal rye, winter wheat, buckwheat, and sorghum sudangrass. Legume cover crops listed include Berseem clover, cowpeas, crimson clover, field peas, hairy vetch, medics, red clover, sweetclover, subterranean clover, white clover and woolpod vetch. Others that were

considered up and coming at the time of its publication include Balansa clover, fava bean, black oats, foxtail millet, and lupin.

For winter cover consider crimson clover, red clover, white clover, hairy vetch or the cereal grains (including rye, wheat, or barley). The clovers should be planted 30 to 45 days prior to the first frost but the grains could still be planted.

It's amazing at how much nitrogen cover crops can supply to the soil. Amounts range from 70 to 200 pounds per acre. Table 1 below provides specific examples.

Table 1. shows dry matter production of several winter-annual legume cover crops grown in the southern U.S. Approximately 2.2 tons per acre per year of crop residue is considered adequate to maintain soil organic matter at constant levels in continuously cropped soils. This figure will vary according to climate, region, and cropping system.

Table 1. Average biomass yields and nitrogen yields of several legumes.

Cover Crop	Biomass	Nitrogen
	Tons/acre	Lbs/acre
Sweet clover	1.75	120
Berseem clover	1.10	70
Crimson clover	1.40	100
Hairy vetch	1.75	110

Taken from ATTRA, Overview of Cover Crops and Green Manures by Preston Sullivan.

If you've never used cover crops as a part of your production cycle, you should consider it. It's remarkable to see the differences in soils that are managed to build up organic matter. If you're the type of person who must see things first, then visiting Dr. Ron Morse's research plots at the Kentland Station near Blacksburg would make you a believer in their benefits. He has several projects where he's looking at organic and no-till production with a major component of the no-till program being providing significant biomass for weed control through cover crops. We look forward to having more research based data from his work.

There are other benefits from cover crops in addition to increasing organic matter including providing weed control, increasing soil microorganisms, reducing soil erosion, and serving as a habitat for beneficial insects.

Organic growers must use cover crops as the backbone of sustainable production but I would say that they should play an integral role in all of our vegetable and specialty crop production in Virginia. If you'd like to learn more about cover crops the ATTRA website has an in-depth publication, Overview of Cover Crops and Green Manures, prepared by Preston Sullivan. It can be found at <http://attra.ncat.org/attra-pub/covercrop.html#4>.

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