

Cover Crop Benefits

Cover crops offer farmers many benefits including protecting soil from wind and water erosion. Live plants provide the energy for soil microbes to recycle and store nutrients to build soil carbon and organic matter. Soil microbes should be considered “soluble bags of fertilizer” since they consume and process 85-90% of chemical reactions involving soil nutrients. Cover crops and microbes together improve soil structure which improves water infiltration and water holding capacity. Cover crops may also reduce weed, insect, and soil disease pressures by adding diversity. Live plants and healthy soils purify and clean air and water.

Soil erosion and sedimentation are major agricultural problems worldwide. Dr. David Montgomery (2012) says if farmers lose four to five tons/acre/year of topsoil (USDA-NRCS acceptable rate), they will lose approximately one inch of top soil every sixty years. Farmers are losing 0.5% of our soils every year worldwide due to soil erosion and it takes 500 years to replenish one inch of topsoil. Cover crops protect the soil by slowing down the wind at ground level. Blowing snow and dirt, also called “SNIRT,” is a common problem on bare soils. Seen any black snow lately? Reducing wind and water erosion is a huge soil conservation benefit of cover crops (Hoorman, 2008).

Plants and microorganisms are critical in recycling soil carbon, nitrogen, phosphorus, sulfur, and micronutrients. Carbon ties up and stores major nutrients (water, N, P, S) and micronutrients (zinc, boron, copper). A PHD thesis (Aziz, 2011) at Piketon, Ohio shows that 65-70% of the soil’s carbon originates from plant roots. Carbon and soil organic matter tie up nitrogen (90%) and phosphorus (55-80%) in a stable form that is plant available. The soils in Illinois and Iowa are so productive because they are high in soil organic matter. Increasing soil carbon and soil organic matter is the key to improving soil productivity long-term and solving our ecological problems with nutrient runoff.

Increasing crop residue at the soil surface increases water infiltration and soil water holding capacity. Every one percent soil organic matter holds one to two acre inches of additional water depending on soil texture (Hudson, 1994). With the depletion of soil organic matter levels by 50% in the last 50-100 years, our soils are becoming harder and denser. Without the continual addition of organic residues from live plants, water runs off the soil surface rather than infiltrating the soil, causing soil compaction and nutrient rich sediment to flow to our surface water. Soil organic matter is needed to improve soil structure so that our soils become more like a sponge, soaking up water and storing soluble soil nutrients. Our dense soils are also contributing to flooding, a major issue in the Blanchard River (Hoorman, 2013).

Soils with diverse microbial species, predators and soil fauna keep disease organisms and insects in balance. By promoting a healthy soil ecosystem “with cover crops,” many pests are kept in balance and the economic impacts of these pests are greatly reduced. As mankind starts to rely

on manmade solutions like chemicals (herbicides, insecticides, fungicides); resistant weeds, damaging insects, and harmful disease organisms tend to prosper and adapt to render many of these products less effective. Cover crops promote a healthy soil by increasing the number and species of beneficial microorganisms to compete with or consume these harmful species. The ecological goal is no longer to eliminate all bad actors (weeds, insect pests, and plant diseases) but to simply reduce their levels to acceptable levels. If you eliminate all pests, what will the predators have to eat once another pest comes along to replace it? (Hoorman, 2013)

Planting a flowering cover crop like buckwheat and/or sunflower or a flowering legume crops around the edges of fields improves the population of beneficial insects and may reduce the need for some pesticides. Cover crops promote beneficial organisms which inhibit *Phytophthora*, *Rhizoctonia*, *Phythium*, and *Fusarium*; which are common soybean diseases (Amaranthus and Simpson, 2011). Ground beetles (*Carabidae* beetles) and lightning bugs (*Lampyrida*) consume many soft bodied insects (aphids, slugs, caterpillars). A ground beetle may eat its weight in weed seed or insect larva per day (Altieri et al, 2005). Cover crops compete with weeds for sunlight and nutrients, reducing weed populations and seed production. By using chemical inputs less often and only when needed, farmers promote beneficial insects and predators and may extend the chemicals useful life so that these pests do not become resistant (Hoorman, 2013).