EARTHGEN215, LLC

September 2024 Newsletter

ALLELOPATHY – WHAT IS IT AND WHAT DOES IT MEAN TO ME!!??

Allelopathy refers to synergistic or inhibitory interactions among chemicals produced by growing plants and microorganisms (including bacteria, fungi, etc.). **Every living plant gives off its own unique allelochemicals**. Likewise, each microorganism exudes its own unique allelochemicals. Allelochemicals from some plants inhibit growth of other plants. Allelochemicals from beneficial soil organisms generally stimulate growth hormones in growing a plant's roots, and above-ground tissue-cells. The concept of **mutually beneficial** allelopathic interactions counters the theory that plants growing in the same area always compete for the same nutritional and moisture resources. Allelopathy refers to the ecological concept while the word, allelochemical, refers to an individual molecule (or cluster of molecules) released by living plants that directly cause allelopathic effects.

Living plants' roots exude photosynthate and other materials that contain allelochemicals. Rain, and to some extent irrigation water applied above the plants, wash allelochemicals off the leaves and shoots of living plants into the soil. Allelochemicals are also released into soil when dead matter is decomposed by beneficial, decaying organisms. In decomposition situations, the allelochemicals are from the decaying materials and as well as from the microorganisms decomposing the dead matter. Allelochemicals from decomposition situations generally promote more vigorous seed germination, crop growth, and crop production, with very few if any reported inhibitory effects. Applying the biological products EarthGen215 represents as recommended boosts beneficial soil organisms to reproduce more rapidly, resulting in more prolific activities of the decomposer organisms, as well as more activities among microorganisms in the living plants' root zones. The microorganisms in the root zones and their allelochemical emissions interact synergistically with the exudates

from those roots. Those interactions boost growth and maturation of crops by fueling a crop's roots with readily plant-available nutrients and soil moisture.

Working with allelopathic interactions among plants and soil organisms can improve and strengthen growth of a primary crop. For example, some producers report that some varieties of alfalfa stymie growth of alfalfa replanted in areas of a field where the initial planting did not emerge well and evenly. Other producers report that they do not see such **inhibitory allelopathy** effects in their alfalfa. Perhaps the alfalfa inter-seeding that does not show inhibitory allelopathic effects is growing in well-structured soil that is teaming with abundant beneficial organisms.

Notice the fine-stems, and abundant, healthy leaves from top to bottom of this second-year alfalfa.

The mixture of grasses in the hayfield pictured below have been treated with the products EarthGen215 represents for several consecutive years. The grass-mix combined with healthy soil synergistically bolstered overall tonnage each year for 10+ years and continues to do so. The mixture includes timothy, orchard grass, brome grasses (meadow and smooth), festulolium, intermediate wheatgrass, and perennial rye grass. It sells out quickly each year as a mountain meadow mix.

Producers can consider using cowpeas for their **stimulatory allelopathic** effects. Compounds released by cowpeas awaken and stimulate the development of mycorrhizal fungi. Some of the most notable functions of mycorrhizal fungi are its

abilities to accumulate phosphorus in soil and transform it into plant-available forms. Mycorrhizal fungi also promote availability and uptake of potassium from soil. Cowpeas thrive in hot, moist conditions, but can tolerate drought and low soil fertility. Cowpeas seem to grow best in California, the Midwestern United States, and in east coast states south of New York.

Another example of **stimulatory allelopathy** are the interactions between buckwheat and potatoes being grown in soil with a pH higher than 6.9. The higher soil pH climbs above 6.9, the more soil calcium and phosphorus bind to each other, restricting availability of both nutrients from growing plants. Acidic root exudates help lower soil pH in root zones of growing plants. In addition to buckwheat's root exudates being acidic, they have a unique ability to cycle phosphorus in soil.

Buckwheat is an excellent companion crop for potatoes.

Reports indicate that planting buckwheat as a companion crop with potatoes liberates both the soil phosphorus and calcium. The liberated phosphorus supplies energy for the potatoes to grow, and the calcium appears to improve the color of the potatoes. An **inhibitory allelopathic** bonus from buckwheat's root exudates is that they seem to weaken red root pigweeds growing in their vicinity, by decreasing the roots' length and number of root-forks.

Exudates from corn roots share a **mutualistic allelopathy** with beneficial soil bacteria in their rootzones. The bacteria are nourished by the corn roots' exudates, and in turn the bacteria provide nitrogen and phosphorus to the corn. Another **mutualistic allelopathic relationship** thrives between corn and low-growing clover. Clovers are in the legume family, and as such make excellent companion crops with corn, a grass family member. When corn or some other grass-family member is the primary crop for the upcoming growing season, then a fall-planted cover crop or companion crop that is some type of legume (i.e., clover, birds foot trefoil, etc.), or a pulse (i.e., dry beans, dry peas, chickpeas, cowpeas,

etc.), supply nitrogen and other nutrients to the corn.

Cereal rye, planted in the fall, is used as a cover crop quite often. Cereal rye, being in the grass family, weakens the growth of grassy weeds. It is best to use cereal rye as a fall-planted cover crop ahead of a spring planted primary crop in the legume family, such as soybeans or any other type of beans.

Again, reproduction and essential functions of each beneficial microorganism (bacteria, fungi, etc.) sharing in the allelopathic interactions described in this Newsletter are bolstered when the Biological Products EarthGen215 represents are applied as recommended. In addition, applying these products as recommended helps develop soil structure and nutrient balances that foster vigorous seed germination whenever seeds are planted during a growing season, and bolster robust crop growth.

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