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**The Myth of Weed-Killing Gluten:
*"Corn meal gluten is an effective organic herbicide"***

The Myth

In terms of a holy grail, a safe and effective weed-and-feed product is what every landscape manager continually seeks. In the 1990's, such a product was reported and patented by researchers at Iowa State University. Corn gluten meal (CGM), the protein by-product of corn milling, is a high (10%) nitrogen, natural compound with documented success in reducing seed germination of many species. A pre-emergent herbicide, CGM inhibits root development during seed germination, at least partially by desiccating the soil and reducing water uptake.

Usage of CGM as a pre-plant herbicide and as a weed inhibitor in existing landscapes has exploded, especially within the organic gardening and farming communities. Corn gluten meal can be incorporated into the soil as a pre-plant treatment or broadcast over existing landscapes. Current recommendations for use include turf grass landscapes and commercial as well as residential small fruits and vegetable production. Though the drawbacks of the product are occasionally mentioned (specifically its cost and lack of control over existing weeds), they are overshadowed by the promise of an all-natural magic bullet.

The Reality

The principal researcher and patent-holder of CGM, Dr. Nick Christians, is cautious in his recommendation of CGM for weed control. He and his students and staff have published a number of papers in the scientific and popular literature. These researchers are careful to point out that CGM does not affect existing weeds, and that the nitrogen in CGM will benefit existing weeds as well as desirable plants. Therefore, inadequate weed removal prior to treatment can actually result in an increased weed problem.

CGM is not a selective product, nor is it effective on all weed types. Several species of weeds, flowers, and vegetables are inhibited by CGM, while others are not. Effectiveness in greenhouse trials generally increases with application rate (as does the cost).

While greenhouse trials in other parts of the country have demonstrated that CGM application can inhibit seed germination of a number of both weed and desirable species, field trials in these same locations often have not. Researchers in California studying weed control of containerized plantings report that CGM had little effect on either broadleaf or grass weed species. Use of mulch was more effective, and sub-irrigation was the best weed control strategy of all. Similarly, control of turf grass weeds was not affected by CGM, though the turf responded well to the addition of this high nitrogen fertilizer.

Washington State University researchers at the Mt. Vernon station found no differences in weed control on field-grown strawberries, though yield was slightly improved. The Iowa State group had similar disappointing results in their strawberry trials, with no significant differences in either weed control or strawberry yield even after multiple treatments with CGM.

Why the disparate results between greenhouse and field trials, or between different climatic regions? Part of the reason may lie in the mechanism of control. Since desiccation of the germinating seed is necessary for its demise, environmental conditions must first be perfect for seed germination and then for seedling

death. Weed seeds require adequate levels of moisture, warmth, and light to germinate and these factors vary among species. While it is relatively easy to control these conditions (and species composition) in the greenhouse, it is impossible to control them completely in a field situation. Seeds will germinate over the entire growing season, providing a continuous source of weeds. Secondly and perhaps most importantly, the soil cannot remain moist if CGM is to function as a desiccant. The Iowa State researchers found that “affected plants may recover and resume rooting” if the soil is moist enough to overcome the drying effects of CGM, and that a short drying period is critical between seedling germination and root establishment. In much of the coastal Western US, spring is generally the wettest season; hence it is not surprising that field-testing of CGM efficacy is not successful in these climates.

Finally, the cost of CGM is very high compared to other weed control strategies. This is not a one-time control strategy, and the Iowa State University research approach utilizes repeated applications throughout the season and from year to year. Recent prices on the Internet range from \$30-\$40/50 lb. bag not including shipping and handling. In some cases, shipping and handling costs exceed the stated price so that a 50 lb. bag could cost \$100 (\$2 per pound). With a recommended application rate of 20-40 lbs/1000 sq. ft., plus the need for repeated applications to improve effectiveness, costs can become prohibitive for all but the smallest landscapes.

Corn gluten meal does bind and release water, which may benefit a landscape in the drier parts of the year. It is also an excellent source of nitrogen, and a healthy lawn or landscape will be more resistant to weed invasion than an under-fertilized site. But there are much cheaper ways to maintain soil moisture, provide slow-release nutrients, and control weeds than using a product whose practicality thus far is questionable.

The Bottom Line

- Corn gluten meal (CGM) is a protein-based, natural product with potential pre-emergent herbicide activity
- CGM has no effect on established weeds
- CGM is not selective and can inhibit germination of desirable plant seeds as well as weeds
- Though it may be effective in the Midwest US, CGM is not as effective in other climate zones, such as those in the Western US
- There are no scientific data from field trials in the Western US to support the use of CGM in weed control
- Other environmentally friendly weed-control treatments (such as sub-irrigation, mulch, or soil solarization) are cheaper and often more effective than CGM

For more information, please visit Dr. Chalker-Scott’s web page at <http://www.theinformedgardener.com>.