

Compost as a Mulch and Corn Gluten Meal as a Preemergence Natural-based Product for Roadside Vegetation Control

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Compost consists of organic matter, such as leaves, landscape trimmings, food scraps, or woody debris, that has undergone varying degrees of decomposition. Applications are made to roadsides on a limited basis for vegetation control. Corn gluten meal (CGM), the protein fraction of corn and a byproduct of corn wet-milling, is a natural-based granular applied material. Research at Iowa State University has shown CGM, which is 10% nitrogen by weight, to be an effective preemergence weed control and fertilizer treatment in turf grass settings. Initial root development was found to be inhibited by five biologically active dipeptides that were isolated from CGM.¹ ISU researchers continue to study the mechanism(s) by which CGM and the dipeptides exert their inhibitory effects; it is apparent that the combination of a CGM-restricted plant rooting system and a period of water stress can cause seedlings to wilt and die.^{2,3} However, without proper application timing of CGM during which the drying-out period is adequate, seedlings will continue root and shoot development, using CGM as a plentiful nitrogen source. This is an important reason why CGM is effective in controlling weed seedlings in turf grass: seedlings with poor root formation under water stress cannot compete well with the established plants (turf).

Based on testimonials and observations, CGM has been either effective or ineffective for vegetation control in vineyards, home gardens and non-crop rights-of-way. We determined that CGM should be applied and tested in a scientific manner, in both greenhouse and field studies, to determine its potential for control of vegetation along roadsides. Experiments were conducted to determine whether compost and CGM could effectively control vegetation along roadsides by combining shade effects and biological activity, respectively, at a cost comparable to currently registered herbicides.

Field sites were established at the Hopland Research and Extension Center (HREC1 and HREC2) and Jackson Demonstration State Forest (JDSF1 and JDSF2). Vegetation at HREC was dominated by a few annual grasses with several broadleaf species, while a mix of annual forbs and grasses, jubatagrass (*Cortaderia jubata* Lemoine) and French broom (*Cytisus monspessulanus* L.) were most common at JDSF. Following the removal of existing vegetation, CGM was applied at 12206, 24412, and 48824 kg/ha with and without compost at both HREC and JDSF on October 1, 2000. Compost alone and a preemergence herbicide treatment of isoxaben and oryzalin at 1.1 kg ai /ha and 4.5 kg ai /ha, respectively, were also applied. October 1, 2001, repeat applications of CGM at 12206 and 24412 kg/ha with and without compost were applied in addition to compost alone and isoxaben and oryzalin at the same rates as the previous

¹ Christians, N.E. 1993. The use of corn gluten meal as a natural preemergence weed control in turf. R.N. Carrow, N.E. Christians, R.C. Shearman (Eds.) International Turfgrass Society Research Journal 7. Intertec Publishing Corp., Overland Park, KS. 284-290.

² Bingaman, B. R. and N. E. Christians. 1995. Greenhouse screening of corn gluten meal as a natural control product for broadleaf and grass weeds. HortScience 30:1256-1259.

³ McDade, M. C. and N. E. Christians. 2000. Corn gluten meal – a natural preemergence herbicide: Effect on vegetable seedling survival and weed cover. Am. J. of Alternative Agriculture. Vol. 15. No. 4:189-191.

year. March 2001, the highest rate of CGM (48824 kg/ha) without compost was the most effective treatment for controlling vegetation at HREC1 and JDSF1.

Initial indications after one year of control showed that the highest rate of CGM alone (48824 kg/ha) was the most effective treatment for controlling vegetation at HREC1 and JDSF1. The lower rates (12206 and 24412 kg/ha with and without compost) did not consistently control vegetation for all locations. The addition of compost as a mulch to all treatments played a role in lowering weed pressure, especially at HREC

In 2002, vegetation control was less than 68% for single applications of CGM with or without compost and greater than 65% for two applications of CGM with compost at HREC1 and with or without compost at JDSF1. Vegetation control for the remaining treatments at HREC1, 2 and JDSF 2 was unacceptable (near 0) in 2002. Except at HREC1, weed control with compost declined between 2001 and 2002. Vegetation vigor and cover increased as the control decreased more significantly for CGM than for the standard treatment. Annual applications of CGM at \$11,230/ha (48824 kg/ha) for roadside vegetation control is not comparable to synthetic preemergence herbicides, isoxaben and oryzalin at \$303/ha and \$159/ha, respectively, even in urban interchanges. The cost of a roadside application of 48824 kg/ha of CGM was \$11,230/ha (\$1.12/kg of CGM⁴). The cost of a standard synthetic preemergence treatment of isoxaben (\$303/ha⁵) and oryzalin (\$159/ha⁶) would equal approximately \$462/ha.

Annual applications of CGM for roadside vegetation control are not comparable to synthetic preemergence herbicides, isoxaben and oryzalin, even in urban interchanges. CGM is not a viable alternative for vegetation control along Caltrans rights-of-way. The high cost and poor efficacy are the major limiting factors in using CGM.

⁴ Price from CGM distributor in California.

⁵ Prices quoted from Caltrans District 1 Vegetation Control Specialist

⁶ Prices quoted from Caltrans District 1 Vegetation Control Specialist