EFFECTIVENESS OF CORN GLUTEN MEAL AS A NATURAL HERBICIDE

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Guidance of Dr. Michael Bomford
Corn gluten meal (CGM) is a byproduct of corn (Zea mays L.) wet milling process.

Corn gluten meal has been proposed as a naturally-derived pre-emergent herbicide, suitable for use on organic farms.

When CGM is exposed to moisture it releases dipeptides that inhibit root formation in germinating seedlings.

As a plant food, corn gluten meal has a N-P-K ratio of 9-1-0, or 9% nitrogen by weight (eartheasy).
Objectives

- Determine effect of CGM application rate on weed germination and growth
- Determine if incorporation of CGM enhances its effectiveness
Methods

- CGM was applied at 0, 50, 100, 200, and 400 g/m² to 30 freshly-cultivated 1 m² plots arranged in a completely randomized design.

- CGM was incorporated into the soil by raking after application or left on the soil surface by raking before application.

- Plots were irrigated twice after treatment to stimulate germination of weeds from the existing seedbank and to release dipeptides from CGM.

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<th>Plots sampled</th>
<th>[CGM] I vs. U</th>
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<td>2</td>
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<td>3</td>
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<td>2</td>
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Methods Continued

- Eight weeks after treatment all weeds from a 0.1 m² area (31.6 x 31.6 cm) in the center of 19 plots were identified, counted, dried and weighed.

- Regression analysis was used to test for effects of CGM concentration and incorporation.
Results

- Henbit (*Lamium amplexicaule* L.) was the dominant weed, accounting for 87% of the plants counted.

- Other prominent weeds included:
  - Lambsquarters (*Chenopodium album* L.),
  - Wild garlic (*Allium vineale* L.),
  - Dandelion (*Taraxacum officinale* Weber),
  - Chickweed (*Stellaria media* Cyrill.),
  - Narrow leaved plantain (*Plantago lanceolata* L.), and
  - Canada thistle (*Cirsium arvense* L.)
Regression Analysis: Weed count at each concentration of corn gluten meal

Slopes of calculated regression lines are not significant
Results: Incorporated vs. Unincorporated

Differences significant at $P < 0.05$
Results

- CGM rate had no effect on the survival or growth of different weed species
- Soil incorporation of CGM reduced emergence by 43%, relative to unincorporated treatments ($\frac{\#I}{\#U}$)
- Soil incorporation of CGM reduced biomass production by 45%, relative to unincorporated treatments
Conclusion

- CGM incorporation reduced weed emergence and growth
- As the concentration of CGM increased, the amount of weeds did not decrease
- Weed control under the field conditions tested was not sufficient to recommend CGM use by organic growers as a pre-emergent herbicide
Acknowledgements

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- Thistle Photo. Michigan State University. East Lansing, MI. 1 March 2009. @ www.msuweeds.com/.../canada_thistle/