# Organic Lawn Care 101

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## Overview

- Discuss "Organic"
  - Obstacles & Legislation
- Understanding Fertilizers
- Pest Control Products: The Good, the Bad, and the Ugly
- Developing an Organic Lawn Care Program

## Why Go Organic?

- Dislike for pesticides, synthetic fertilizers
- Capture "niche" market
- Environmental concerns
  - Water
  - Biota
  - Human health
- Food Quality Protection Act 1996

## Obstacles to Organic Lawn Care

- No clear definition
- Customer desire lacking
- Less than perfect lawn quality
- Expense
- Unproven products
- Workforce education lacking

## Organic Food Production Act of 1990

- USDA regulated
- Fee-based certification
  - Application and review process
- Recordkeeping required
  - Audits
- 3 Levels:
  - 100% organic
  - Organic
  - Made with organic

## Organic Food Production

- No synthetic chemicals
- Exceptions:
  - Copper and Sulfur-based compounds
  - Bacterial toxins
  - Pheremones
  - Soaps
  - Dormant/plant oils
  - Fish emulsions
  - Vitamins and minerals
  - Federal or state Emerging Pest or Disease Program

## National Organic Program

- www.ams.usda.gov/nop/NOP/NOPhome.html
- ≤ $10,000 penalty for misusing "organic" terminology
- Components (e.g., compost) need to meet NOP standards
- Prohibits use of GMOs

## Products

- Fertilizers
  - Low analysis (< 20% N)
- Pest control
- Biostimulants
- Most from small companies


## Fertilizer Examples

- Alfalfa Meal 3-2-2
- Aragonite ($CaCO_3$)
- Azomite 0-0-2.5, 5% Ca
- Blood & Bone Meal
- Boron 14.3%
- Calcium 25
- Chilean Nitrate 16-0-0
- Corn Gluten Meal 10-0-0
  - Contains P
- Crab Meal 5-2-0.5
- Epsom Salt
- Feather Meal 12-0-0
- Fish Meal 10-0-0
- Gypsum ($CaSO_4$)
- Kelp Meal
- Natural No-P 6-06
- Peanut Meal
- Phosphate Rock
- Pro-Booster 10-0-0
  - Vegetable + animal protein + nitrate of soda
- Sulfate of Potash 0-0-52
- Sul-Po-Mag
- Zinc-granular

## Biostimulants


- Seaweed extract, plant hormones, vitamins, etc.
- May have scientific basis (antioxidants)
- Marketed for Stress Conditions
  - Likely small impact-plant production OK
- Little testing
  - Lab results > field

## Organic Pest Control

- Usually small companies
- Products may be:
  - Good
  - Limited efficacy
    - Contact, non-selective herbicides
  - Ineffective
  - Illegal
    - 10% bleach/ammonia concoctions (Fitchburg Star newspaper, 2004)
- Offerings may contain conventional chemistry (e.g., glyphosate)

## Sources of Alternative Products

- Viruses
- Bacteria
  - *Xanthomonas campestris*
- Fungi
- Insects
- Plant products
  - Corn gluten meal

Fungus growing in agar

## Challenges for Microbial Products

- Infection requirements
  - Free-water
  - Wounds (bacteria)
  - Stabilize cells in dry-state
  - Sufficient inoculum
    - > $10^7$ cells
    - UV light degradation
- Affected by other pesticides
- USDA-APHIS Restrictions
  - May harm non-target plants

## Why Aren't There More Biological Products?

- Lack of funding
  - Poor government support
  - Insufficient margin for chemical companies
- Difficult to develop
  - Finicky microbes, etc.
- Lack of researchers
  - Biotechnology
- Poor track record
- Less effective than conventional compounds

## Post Emergent Herbicides

- Burnout Weed & Grass Killer
  - AI: Clove Oil 12%
    Sodium Laurel Sulphate 8%
  - Inert: Vinegar, Lecithin, Water, Citric Acid, Mineral Oil 80%
  - "Made of special blend of vinegar and lemon juices"
  - Wilting w/in 20 minutes, dead plants by morning
  - Hailed by Gardener Broadcaster Ralph Snodsmith, University Researchers, and Botanical Gardens


## Post Emergent Herbicides

- Bioganic Weed & Grass Killer
- AI: Eugenol 2%
  2-pheneythyl-propionate 2%
  Corn gluten meal 2%
- "10 yrs research"
  - Peer-reviewed?
- "100% organic"
- EPA: 25(b) product
- Not registered in AZ, CO, IN, NE, NM, ND, WA, WI


## Efficacy of Acetic Acid Products

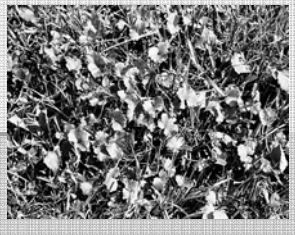
| | % Control (crabgrass & broadleaf plantain) | | |
|---|---|---|---|
| | 24 hrs | 2 wks | 9 wks |
| Nature's Glory (25% aa) | 96.0 | 94.7 | 48.3 |
| Burnout (25% aa) | 96.7 | 97.7 | 53.3 |
| 5% acetic acid* | 93.3 | 74.7 | 33.3 |
| 20% acetic acid | 98.3 | 96.0 | 76.0 |
| Glyphosate | 53.3 | 97.7 | 96.7 |

*Concentration in household vinegar

Source: www.extension.psu.edu/cnregion/hort/newsletter/hort_may02.htm

## Borax for Ground Ivy Control

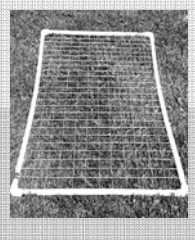
- Ground Ivy (Creeping charlie)
  - *Glechoma hederacea*
  - Perennial
  - Stoloniferous
  - Difficult to control
  - Confused w/ henbit



- Univ. Wisconsin, Iowa State Univ.

## Borax for Ground Ivy Control-UW 1995

- Application strategies
  - Full bloom (125-150 Growing degree days)
  - After first frost (1994)
- Point quadrat evaluations



## Borax for Ground Ivy Control-UW 1995

| Treatment | Rate (lb ai/A) | Timing† | % Control 28 Apr | % Control 9 Jun |
|---|---|---|---|---|
| Triplet | 1 | Spring | 55 | 100 |
| Triplet | 1 | Fall | 98 | 88 |
| 20-Muleteam | 35 oz/gal | Spring | 8 | 24 |
| 20-Muleteam | 35 oz/gal | Fall | 44 | 38 |
| LSD (0.05) | | | 15 | 12 |

† Spring applications at 125-150 GDD in 1995, fall applications in 1994

Source: Rossi, F., A. Sausen, H. Berg. 1996. Effective timing for postemergence ground ivy control. Wisc. Turf Res. XIII. p. 90-93.

## Borax for Ground Ivy Control

- Results differ: UW vs. Iowa State
  - Ecotype differences
  - Iowa State had inconsistencies between years
- Liquid borax >> dry borax
- Temporary Kentucky bluegrass injury

## Scythe Herbicide
### (Dow Agrosciences)

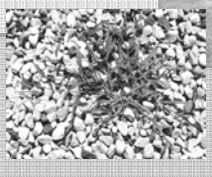
- Non-selective, contact
- AI: Pelargonic & other fatty acids
  - Similar to Quik II
  - Rapid membrane destruction
- Signal Word: Warning
- Effective


## Corn Gluten Meal

- Accidental discovery
- Research-based!
- Activity
  - Herbicidal
  - Fertility (10% N)


## Corn Gluten Meal Application

- 12-20 lb/M
  - Early spring
  - Late summer
- Irrigate



## Weeds Controlled by Corn Gluten Meal

| Weed spp. | [illegible] lb/1000 ft²) | | |
|---|---|---|---|
| | 65 | 142 | 199 |
| Annual bluegrass | 60 | 81 | 72 |
| Barnyardgrass | 31 | 35 | 41 |
| Black medic | 49 | 63 | 63 |
| Buckhorn plantain | 80 | 95 | 96 |
| Dandelion | 75 | 90 | 100 |
| Large crabgrass | 51 | 70 | 82 |
| Smooth crabgrass | 51 | 85 | 97 |
| LSD (0.05) | | 40 | |

Adapted from: Bingaman, B.R., & N.E. Christians. 1995. Greenhouse screening of corn gluten meal as a natural control product for broadleaf and grass weeds. HortScience 30(6):1256-1259.

## Crabgrass Control With Corn Gluten Meal

| Rate | Corn gluten meal | Milorganite |
|---|---|---|
| (lb/1000 ft²) | No. plants dm⁻² | |
| 0 | 94 | 101 |
| 40 | 35 | 93 |
| 79 | 22 | 77 |
| 119 | 5 | 55 |
| 159 | 0 | 41 |
| 199 | 0 | 21 |

Adapted from: Christians, N.E. 1993. The use of corn gluten meal as a natural preemergence weed control in turf. I.T.S. No.7. R.N. Carrow, N.E. Christians, R.C. Shearman (eds). Intertec Publishing Corp., Overland Park, KS. p.284-290.

## Corn Gluten Meal as a Fertilizer for Kentucky Bluegrass Turf

| Treatment | lb/M | 2 | 6 | 12 |
|---|---|---|---|---|
| | | Quality | | |
| Urea | 0.5 | 6 | 7 | 8 |
| Urea | 1 | 8 | 8 | 8 |
| Turf Restore | 1.5 | 6 | 9 | 9 |
| Turf Restore | 2 | 6 | 9 | 9 |
| Greens Restore | 1 | 6 | 8 | 9 |
| Corn Gluten | 1 | 6 | 8 | 9 |
| Corn Gluten | 2 | 8 | 9 | 9 |
| LSD (0.05) | | 6 | 5 | 7 |

Adapted from: Christians, N.E. 1993. The use of corn gluten meal as a natural preemergence weed control in turf. I.T.S. No.7. Intertec Publishing Corp., Overland Park, KS. p.284-290.

## Crabgrass Reduction in Field Trials of Corn Gluten Meal on Kentucky Bluegrass

| 1988 (4 wks pre-) | | 1991 (1 wk pre-) | |
|---|---|---|---|
| Rate (lb/M) | % Control | Rate (lb/M) | % Control |
| 0 | 0 | 0 | 0 |
| 40 | 50 | 20 | 58 |
| 81 | 65 | 40 | 86 |
| 122 | 80 | 61 | 97 |
| 162 | 95 | 122 | 87 |
| 203 | 92 | 101 | 79 |

Adapted from: Christians, N.E. 1993. The use of corn gluten meal as a natural preemergence weed control in turf. I.T.S. No.7. Intertec Publishing Corp., Overland Park, KS. p.284-290.

## Corn Gluten Meal Derivatives Affect Grass Germination *In Vitro*

| | % Germination | | |
|---|---|---|---|
| Treatment | 0.6 lb/M | 1.2 lb/M | 4.5 lb/M |
| Corn gluten meal-hulls, germ | 81 | 100 | 0 |
| CGM | 100 | 100 | 30 |
| CGM + bacterial protease | 12 | 0 | 0 |
| CG hydrolysate ion-exchanged | 62 | 12 | 0 |
| Soluble corn steep liquor solids | 75 | 88 | 94 |
| Insoluble CSLS | 100 | 94 | 0 |
| LSD (0.05) | | 12 | |

Adapted from: Liu, D.L., N.E. Christians, J.T. Garbutt. 1994. Herbicidal activity of hydrolyzed corn gluten meal on three grass species under controlled environments. J. Plant Growth Regul.

## Attributes of Corn Gluten Meal

- Non-toxic to animals
  - Used in feed, dog food
- Little/no effect on established turf
- Biodegradable
- Slow-release N source
- Not water-soluble
- High rates required

## Corn Gluten Meal for Weed Control

- High use rates (12-20 lb/1000 $ft^2$)
  - One to two applications/yr
- Expensive
  - $25-$45 per application/1000 $ft^2$
- Pre-emergent only
- Weed spp. controlled: crabgrass, dandelion, plantain, etc.
- Overseeding limitations
- Fertility effect

## Corn Gluten Meal for Weed Control

- Patent 5,030,268 (1991)
- 1993 revision
  - Broadened claims
  - Hydrolyzed form
  - Dipeptides
- Current/future research
  - Water-soluble spray

## Corn Gluten Meal Sources

Exempt from EPA registration (not hydrolysate form)

- Feed mills
- Dynaweed-Soil Technologies Inc.
- Amazing Lawn-Gardens Alive
- Many others
- Iowa state website: www.iastate.edu/gluten/home.html

## Developing an Organic Lawn Care Program

- Rely on the Basics:
  - Mowing, fertilizing, irrigation, cultivation, overseeding
- Choose products wisely
  - Scythe, corn gluten meal
- Educate customer
  - Lawn quality may be different
  - More frequent applications possible

## Organic Lawn Care Program

- Soil Test: pH, nutrient deficiences, soil type
- April: Overseed
- May: Mow using 1/3 rule
  Corn gluten meal—fert., pre-emergent (early)
  Post-emergent weed control (Scythe, etc.)
- July: Fertilize, organic source (1 lb N/1000 $ft^2$) (early)
  - Beware of local P restrictions
- August: Maintain irrigation
  Overseed (late)
- September: Fertilize (1 lb N/1000 $ft^2$) (early)
  Overseed
- October/November: Fertilize (1 lb N/1000 $ft^2$) (late)
  Overseed

## How Can You Increase the Demand for Organic Lawn Care?

- Ask questions
  - University personnel, extension agents, chemical companies
- Make it an issue with legislators
- Support Research & Development, Extension
  - WTA/UWEX Turf Field Day
  - Lake Monona Watershed IPM Program
- Participate in local issues
- Don't eschew conventional lawn care