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
  - Pheromones
  - 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

Fertilizer Examples

- Alfalfa Meal 3-2-2
- Aragonite (CaCO₃)
- 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 (CaSO₄)
- Kelp Meal
- Natural No-P 6-0-6
- 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

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)

Products

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

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

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”
  - Willing w/in 20 minutes, dead plants by morning
  - Hailed by Gardener Broadcaster Ralph Snodsmith, University Researchers, and Botanical Gardens

Efficacy of Acetic Acid Products

<table>
<thead>
<tr>
<th>Product</th>
<th>% Control (crabgrass &amp; broadleaf plantain)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 hrs</td>
</tr>
<tr>
<td>Nature’s Glory (25% aa)</td>
<td>96.0</td>
</tr>
<tr>
<td>Burnout (25% aa)</td>
<td>96.7</td>
</tr>
<tr>
<td>5% acetic acid*</td>
<td>93.3</td>
</tr>
<tr>
<td>20% acetic acid</td>
<td>98.3</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>53.3</td>
</tr>
</tbody>
</table>

*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**

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**Results differ: UW vs. Iowa State**

- Ecotype differences
- Iowa State had inconsistencies between years
- Liquid borax >> dry borax
- Temporary Kentucky bluegrass injury

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**Scythe Herbicide**
(Dow Agrosciences)

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

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**Corn Gluten Meal**

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

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**Corn Gluten Meal Application**

- 12-20 lb/M
  - Early spring
  - Late summer
  - Irrigate
Weeds Controlled by Corn Gluten Meal

<table>
<thead>
<tr>
<th>Weed spp.</th>
<th>Rate (lb/1000 ft²)</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual bluegrass</td>
<td>60</td>
<td>81</td>
</tr>
<tr>
<td>Barnyardgrass</td>
<td>31</td>
<td>35</td>
</tr>
<tr>
<td>Black medic</td>
<td>49</td>
<td>63</td>
</tr>
<tr>
<td>Buckhorn plantain</td>
<td>80</td>
<td>95</td>
</tr>
<tr>
<td>Dandelion</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>Large crabgrass</td>
<td>51</td>
<td>70</td>
</tr>
<tr>
<td>Smooth crabgrass</td>
<td>51</td>
<td>85</td>
</tr>
</tbody>
</table>

LSD (0.05) 40


Crabgrass Control With Corn Gluten Meal

<table>
<thead>
<tr>
<th>Rate (lb/1000 ft²)</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSD (0.05) 40</td>
<td>5</td>
</tr>
</tbody>
</table>


Corn Gluten Meal as a Fertilizer for Kentucky Bluegrass Turf

<table>
<thead>
<tr>
<th>Rate Week</th>
<th>Treatment lb/M²</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Urea 0.5</td>
<td>67</td>
</tr>
<tr>
<td>4</td>
<td>Urea 1.8</td>
<td>88</td>
</tr>
<tr>
<td>8</td>
<td>Turf Restore 1.5</td>
<td>6 9</td>
</tr>
<tr>
<td>12</td>
<td>Turf Restore 2</td>
<td>9</td>
</tr>
<tr>
<td>16</td>
<td>Greens Restore 2</td>
<td>9</td>
</tr>
<tr>
<td>20</td>
<td>Corn Gluten 1.6</td>
<td>94</td>
</tr>
<tr>
<td>LSD (0.05) 6 5 7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


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

<table>
<thead>
<tr>
<th>Rate (lb/M)</th>
<th>1988</th>
<th>1991</th>
</tr>
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<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>40</td>
<td>50</td>
<td>86</td>
</tr>
<tr>
<td>81</td>
<td>65</td>
<td>40</td>
</tr>
<tr>
<td>122</td>
<td>80</td>
<td>61</td>
</tr>
<tr>
<td>162</td>
<td>95</td>
<td>122</td>
</tr>
<tr>
<td>203</td>
<td>92</td>
<td>101</td>
</tr>
</tbody>
</table>


Corn Gluten Meal Derivatives Affect Grass Germination In Vitro

<table>
<thead>
<tr>
<th>Treatment</th>
<th>0.6 lb/M</th>
<th>1.2 lb/M</th>
<th>4.5 lb/M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn gluten meal+hulls, germ</td>
<td>81</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>CGM</td>
<td>100</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>CGM + bacterial proteinase</td>
<td>12</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>CG hydrolysate, ion-exchanged</td>
<td>62</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Soluble corn starch solid</td>
<td>75</td>
<td>88</td>
<td>94</td>
</tr>
<tr>
<td>Insoluble CSLS</td>
<td>100</td>
<td>94</td>
<td>0</td>
</tr>
</tbody>
</table>

LSD (0.05) 12


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 ft²)
  - One to two applications/yr
- Expensive
  - $25-$45 per application/1000 ft²
- Pre-emergent only
- Weed spp. controlled: crabgrass, dandelion, plantain, etc.
- Overseeding limitations
- Fertility effect

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 deficiencies, 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 ft²) (early)
  - Beware of local P restrictions
- August: Maintain irrigation
  - Overseed (late)
- September: Fertilize (1 lb N/1000 ft²) (early)
  - Overseed
- October/November: Fertilize (1 lb N/1000 ft²) (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