

Reality Bites-What Organic Turf Regulations Would Mean

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- Why Go Organic?
 - Dislike for pesticides, synthetic fertilizers
 - Capture “niche” market
 - Environmental concerns
 - Water
 - Natural Resource Defense Council Petition 2008
 - Biota
 - Human health
 - Food Quality Protection Act 1996

■ Obstacles to Organic Turf Management

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

- Landscapers Views of Barriers to IPM
(Ingram, Stier, Bird, 2008. Journal of Extension 46(1):1FEA4 (12 pgs))

- 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
- Products
- Fertilizers
 - Low analysis (< 20% N)
- Pest control
- Biostimulants
- Most from small companies
- 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 (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
- Greater Fertilizer Volumes Needed
 - For 1 lb N/1000ft²;
 - Scotts Turf Builder: 3.4 lbs fertilizer (29-3-4)
 - Chickity-Doo-doo: 20 lbs fertilizer (5-3-2.5)
 - Will “success” be measured in lbs fertilizer used by industry?
 - Shipping and storage costs



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
- 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
- *Sclerotinia minor*
 - Fungal pathogen
 - Broadleaf weed control
 - Canada
 - Efficacy similar to 2,4-D, etc.

- Bioterrorist agent in U.S.
 - Lettuce pathogen
- “Organic” Herbicides
 - Contact
 - Consistent applications for perennial weeds
 - Non-selective
 - 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
 - Biogenic Weed & Grass Killer
 - AI: Eugenol 2%
2-phenethyl-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
- Scythe Herbicide
(Dow Agrosiences)
 - Non-selective, contact
 - AI: Pelargonic & other fatty acids
 - Similar to Quik II
 - Rapid membrane destruction
 - Effective
 - Signal Word: Warning
- Efficacy of Acetic Acid Products
- 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
- 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
- Does NOT degrade!
- Corn Gluten Meal
 - Accidental discovery
 - Research-based!
 - Activity
 - Herbicidal
 - Fertility (10% N)
- 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 Sources
 - Exempt from EPA registration (not hydrolysate form)
 - Feed mills
 - Dyna-weed-Soil Technologies Inc.

- Amazing Lawn-Gardens Alive
- Many others
- Iowa state website: www.iastate.edu/gluten/home.html

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

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

■ 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

■ Corn Gluten Meal for Weed Control

- Patent 5,030,268 (1991)
- 1993 revision
 - Broadened claims

- Hydrolyzed form
- Dipeptides
- Current/future research
 - Water-soluble spray

■ Endemic Natural Enemies



However...

No predators or parasites of turfgrass insects are commercially available in the USA!

■ Biological Insecticides

Pathogenic microbes

- Bacteria & fungi
- Insect-parasitic Nematodes
- Viruses

Microbial derivatives

- *Bacillus thuringiensis* (Bt)
- Spinosad



Pathogenic Bacteria and Fungi



Why Nematodes Haven't Been "The Answer"



Sensitive to heat and sunlight



Require high soil moisture



Limited shelf life & availability



Inconsistent performance



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- *this is changing*



Impact on Sports Management



Expense



Time



Sourcing/verifying products



Applications



Seeding/sodding



Problems w/out solutions



Snow mold, Pythium blight, insects



Educational requirements



Organic Turf Care Program

- Soil Test: pH, nutrient deficiencies, soil type
- Mow using 1/3 rule
- Fertilize w known products
 - Available and slow release N
 - Beware of local P restrictions
- Irrigate
- Organic Turf Care Program
 - Overseed
 - Pest control
 - Corn gluten meal—fert., pre-emergent (early)
 - Post-emergent weed control (Scythe, etc.)
 - Sod/nursery
- Industry Needs to Define Organic Turf Rules
 - Politicians/advocacy groups
 - Foley Bill-NY
 - Require standards
 - % water-solubility of N
 - Rapid permitting/allowance of salvation chemical applications
 - Allow synthetic analogs/biorational
 - Allow GMOs