Ecological Benefits of Turfgrass

- Oxygen production
- Reduced erosion
- Pollutant absorption
- Reduced leaching
- Cooling
- Pesticide degradation

Turfgrass Disorders: Non-Pest

- Improper species selection
- Lack of air movement
- Too hot, dry or wet weather
- Too much or not enough nutrients
- Soil compaction
- Competition from other plants
- Excessive wear or traffic
- Too much thatch
- Improper height of cut
- Too much or little sunlight
- Poorly maintained mower
- Improper irrigation
Turfgrass Disorders: Pest

- Animal Pests
- Insect Pests
- Weeds
- Disease Pests

Pest problems are often the result, not the cause, of poor quality turf.

Requirements for Healthy Turf

- Water
- Temperature
- Sunlight

- Soil organisms
- Nutrients
- Soil type and condition

Temperature & Climate

- Cool season grasses:
  - Kentucky bluegrass, perennial ryegrass, fine fescues, tall fescue, bentgrass
- Transition grasses:
  - Tall fescue, bermudagrass
- Warm season grasses:
  - Zoysiagrass, bermudagrass, centipedegrass, bahiagrass

Water has the greatest influence on turf health and quality. Cooling takes place through transpiration.

Without sufficient water, I'll go dormant.

Colorado is a cool - cold growing zone.
Shoot growth greatest between 60-75F.
Root growth optimum with soil temperatures between 50-65F.

Sunlight

- Required for photosynthesis
- Species and cultivar preferences
- Most grasses require at least partially sunny sites
Soil

- Soil is composed of:
  - Inorganic particles (minerals)
  - Organic matter (remains of organisms)
  - Water
  - Air
  - Soil organisms

An ideal soil contains:
- 50% organic and inorganic solid particles, and
- 50% open space (soil pores).

Soil pores are filled with water or air depending on soil type, drainage, and season.

Soil Texture

- The mineral part of soil consists of sand, silt, and clay particles

<table>
<thead>
<tr>
<th>Particle Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 – 0.002 in</td>
<td>Sand</td>
</tr>
<tr>
<td>0.002 – 0.0001 in</td>
<td>Silt</td>
</tr>
<tr>
<td>Less than 0.0001 in</td>
<td>Clay</td>
</tr>
</tbody>
</table>

- The amounts of each size particle determines the textural property of the soil
  - Coarse textured, loose (more sand, less clay)
  - Fine textured, heavy (more clay, less sand)
  - Loamy (more even mix of sand, silt and clay)

Sand

- Large particles & large pores
  - Limited water and nutrient holding capacity
  - Limited compaction
  - Rapid water infiltration

Clay

- Small particles & small pores
  - Compacts
  - Slow drainage & water infiltration
  - Holds moisture
  - Holds nutrients
  - Poor aeration

Ideal Soil

- Composite of soil particle sizes and organic matter with:
  - Good water and nutrient holding capacity
  - Good aeration
  - Resists compaction
Soil pH

- pH is a measure of soil acidity

1  5  7  7.5  13
Very Acidic  Neutral  Very Alkaline

Range for turfgrass

pH affects nutrient availability, and herbicide performance. Determine pH with a soil test. Use lime to raise and sulfur to lower pH.

Aeration

Relieves compaction, stimulates root growth.

Core aerators more effective than spike or slit aerators.

Thatch

- Exists between green vegetation and soil surface.
- Tightly intermingled living and dead stems, leaves, roots.
- A thin thatch layer:
  - Reduces compaction
  - Moderates soil temperature and reduces water loss
Thatch

- Too much - over 1/2 inch:
  - restricts water, nutrient, pesticide and air movement
  - may encourage disease & insect pests
- High N and rapid growth may encourage thatch formation
- Pesticide use may increase thatch
  - Earthworm reduction with certain insecticides.

Thatch Reduction

Coring and processing the soil back into the thatch is the best way to reduce thatch.

Grass Clippings

“Don’t Bag Them”

Clippings do NOT contribute to thatch.
Recycle plant nutrients.
Keep pesticides on the lawn.

Reasons for Weed Problems in Lawns

- Poor cultural practices
- Improper species or cultivar selection
- Planting poor quality seed or sod
The turf is placed in a situation where it cannot be competitive.

Herbicide Programs

- Two types of programs typically used:
  - Pre-Emerge Program
    - Herbicide applied prior to weed emergence
    - Active ingredient applied alone, tank-mixed or on fertilizer
  - Post-Emerge Program
    - Herbicide applied after weed has emerged
    - Active ingredient applied alone or tank-mixed, some available on fertilizer

Weeds In Turf

- The most economical, efficient way to control weeds in all turf site locations is to create competition.
- WEEDS HATE COMPETITION
- Best way to create competition is to have a dense, vigorous stand of turf grass plants.
- Weeds must have soil contact in order to germinate.
Weeds in Turf

- Two separate weed types
  - Grassy Weeds
    - Crabgrass, Sandbur, Foxtail, Barnyard Grass
  - Broadleaf Weeds
    - Dandelion, Clover, Spurge, C. Thistle, etc.

- Annuals vs. Perennials

<table>
<thead>
<tr>
<th>Weeds seeds produced by 1 plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weed</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Fall Panicum</td>
</tr>
<tr>
<td>Yellow Foxtail</td>
</tr>
<tr>
<td>Giant Foxtail</td>
</tr>
<tr>
<td>Crabgrass</td>
</tr>
<tr>
<td>Lambsquarter</td>
</tr>
</tbody>
</table>

High weed populations may require more herbicide for effective control. (Low rate versus high rate)

Water Consumption

<table>
<thead>
<tr>
<th>Weeds</th>
<th>lbs. water</th>
<th>Gal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocklebur</td>
<td>415</td>
<td>50</td>
</tr>
<tr>
<td>Lambsquarter</td>
<td>658</td>
<td>79</td>
</tr>
<tr>
<td>Pigweed</td>
<td>305</td>
<td>36</td>
</tr>
<tr>
<td>Ragweed</td>
<td>912</td>
<td>109</td>
</tr>
</tbody>
</table>
Spring: Time to use Preemergents

- Summer annual control
  - Spurges
  - Cupgrass
  - Crabgrass
  - Goosegrass
- DNA preemergents
  - Treflan
  - Pendimethalin
  - Barricade
  - Balan (weak on spurge)

Pre-Emerge Product Choices

- Pendulum Fert, AquaCap, EC, 2G
- Ronstar Fert, WP, 2G
- Barricade Fert, WDG, Liquid
- Pennant Fert, Liquid
- Surflan Fert, AS
- Team Pro Fert, 2G
- Dimension Fert, EW
- Gallery DF

How do you decide when to put your pre-merge herbicide out?

A. Specific date on calendar?
B. Air temperature?
C. Soil temperature? (44 degrees in Chaffin Field this morning)
D. Soil temperatures must be 58 degrees, for 3 consecutive days for crabgrass germination.

How Many Times To Apply?

- **Barricade** Once per season
- **Dimension** Once per season
- **Pendulum** Once or Split apps.
- **Ronstar** Once or Split apps.
- **Surflan** Split applications
- **Team Pro** Split applications
- **Pennant** Split applications
- **Gallery** Once per season

Does It Move?

- **Barricade** Least
- **Pendulum**
- **Team Pro**
- **Dimension**
- **Ronstar**
- **Pennant**
- **Surflan** Most

Water Solubility

- **Barricade**
- **Pendulum**
- **Team Pro**
- **Dimension**
- **Ronstar**
- **Pennant**
- **Surflan**
How Long Does It Last?

- Barricade: 120 days
- Dimension: 100 days
- Pendulum: 90 days
- Surflan: 75 days
- Pennant: 60 days
- Ronstar: 60 days
- Team Pro: 60 days
- Roundup: 0 days

Factors Affecting Pre-emerge Herbicide Degradation

- Microbial degradation
- Moisture
- Heat
- Environment: turf canopy verses bare soil

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- Environment: turf canopy verses bare soil

SOIL APPLIED HERBICIDES

- Chemical breakdown (triazines)
- Microbial decomposition (all)
- Leaching (pyridines, sulfonyleureas and imidazolinones)
- Photochemical Decomposition (dinitroanilines)
- Run off and erosion (all)
- Volatilization (dinitroanilines)
- Plant uptake (all)

Herbicide Fate In The Turfgrass Ecosystem

- Applied after germination
- Lack of moisture
- Overabundance of moisture
- Thin, stressed turf grass
- Weeds not covered by label

Post-Emerge Products

- Lots of products labeled for turf use
- Stage of growth important for selection and rate of application
- Annual or Perennial weed?
- Temperature considerations (ester/amine)
- Most are 2,4-D based and many with dicamba added
- New label restrictions on some products (Confront-mulch)
2,4-D Containing Products

- Millenium Ultra II (commercial turf only)
  - 2,4-D + Clopyralid + dicamba
- Escalade 2
  - 2,4-D + fluoxypyr + dicamba
- Trimec Bentgrass, Classic, Super, Vessel
  - 2,4-D + MCPA + dicamba
- Speedzone
  - 2,4-D (ester) + carfentrazone + dicamba
- Surge
  - 2,4-D + sulfentrazone + dicamba

Non-2,4-D Products

- Cool Power, Horsepower
  - MCPA + Triclopyr + dicamba
- Confront (commercial turf only)
  - Clopyralid + Triclopyr
- Trimec 959/Encore
  - MCPA + MCPP + dicamba

Herbicide Considerations

- Dormant or Non-dormant
- Pre or Post Emergent Control
- Outside Temperature
- Weed Spectrum (Annual or Perennial)
- New or Mature Grass
- Spray Equipment
- Is Turf Stressed

Buffalograss Herbicides

Pre-emergent
- Pendulum
- Barricade
- Dimension
- Guardrail
- Specticle

Post-emergent
- Surge
- Onetime
- Vanquish
- Drive XLR 8
- Trimec Bentgrass Formula
- Tenacity
- Glyphosate (dormant)

“Dinged, but not Dead”

Why pre-emerge herbicide products fail and how to make sure they work for you

Mel Shumway
Van Diest Supply Co.

“Dinged, but not Dead”

“Good weed control with pre-emergence herbicides depends on many factors”
  - Soil moisture
  - Moisture after application
  - Soil temperature
  - Soil type
  - Weed type and weed species
“Dinged, but not Dead”

Factors contributing to poor pre-emerge herbicide performance

Failure to read the label:
- Wrong herbicide for the target weeds
- Wrong rate of application

“Dinged, but not Dead”

Poor turf health:
- Drought
- Insufficient moisture
- Excessive moisture

“Dinged, but not Dead”

Poor distribution of product
- Non-uniform application
- Skips and misses
- Clippings collected before pre-emerge incorporated

“Dinged, but not Dead”

Split application prolongs weed control:
- Use 3/4 rate followed by another 1/2 rate 6-8 weeks after first application
- Not a concern in industrial sites where rates are much higher to begin with.

“Dinged, but not Dead”

Application timing:
- Applied too late
- Applied too early
“Dinged, but not Dead”
Herbicide applied incorrectly:
- Applied prior to final grade
- Applied prior to mulch

“Dinged, but not Dead”
Wrong Herbicide for the job:
- Pre-emerge products as a rule have little
  no post emerge activity.
- Combine a post-emerge product when
  targeting industrial sites to start clean.

What Defines “Reduced Competition” in Turf?

• Weed seed needs soil contact for germination.
• Dense, healthy turf stand with no exposed soil will eliminate, or reduce weed plant establishment.

Brand versus Generic

<table>
<thead>
<tr>
<th>Brand Name Products</th>
<th>Generic/Alternative Products</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRODUCT</strong></td>
<td><strong>COST/UNIT</strong></td>
</tr>
<tr>
<td>Chipco 26 GT</td>
<td>$ 127.46/gallon</td>
</tr>
<tr>
<td>Daconil Weather Stik</td>
<td>$ 36.30/gallon</td>
</tr>
<tr>
<td>Daconil Ultrex</td>
<td>$ 7.75/pound</td>
</tr>
<tr>
<td>Banner Maxx</td>
<td>$ 215.00/gallon</td>
</tr>
<tr>
<td>Merit 75 WSP</td>
<td>$ 22.22/ounce</td>
</tr>
<tr>
<td>Astro</td>
<td>$ 52.91/gallon</td>
</tr>
<tr>
<td>Talstar</td>
<td>$ 92.91/gallon</td>
</tr>
<tr>
<td>Turex Maxx</td>
<td>$ 499.00/gallon</td>
</tr>
<tr>
<td>Prime Maxx</td>
<td>$ 127.12/gallon</td>
</tr>
<tr>
<td>Prody</td>
<td>$ 25.13/gallon</td>
</tr>
<tr>
<td>Orpie</td>
<td>$ 12.24/quart</td>
</tr>
<tr>
<td>Trimec 992</td>
<td>$ 22.00/gallon</td>
</tr>
<tr>
<td>Barricade 65 WG</td>
<td>$ 24.00/pound</td>
</tr>
</tbody>
</table>