Taking vitamins

Stronger human

Less sickness
More energy

LESS DRUGS NEEDED!
How does sound fertility reduce pesticides?
Sound fertility

Stronger turf
Stronger turf prevents WEEDS

- Thick turf crowds weeds
- Low fertility - clover & other legumes
- Excess fertility weakens turf
- Low pH - sorrel
- High pH - plantain
Excess fertility
Broadleaf plantain

http://www.agry.purdue.edu/TURF/weeds/plantain/plantain.htm
Stronger turf masks insect damage

- Strong turf tolerates more munching
- Strong turf recovers quicker from munching
Armyworm damage
Armyworm damage
Stronger turf prevents disease

- Low N - dollar spot, rusts, red thread
- Excess N - brown patch, leaf spot, pythium, snow mold
- Strong turf can more effectively:
  - Resist
  - Tolerate
  - Recover
Dollar spot
Red Thread
Pythium blight
Sound fertility

Stronger turf

Less weeds
Less disease
More insect tolerance

LESS PESTICIDES NEEDED!
What’s “Sound fertility”?

Essential plant nutrients are available in adequate, controlled amounts during the growing season.
Sound fertility includes:

- What to apply?
- How much to apply?
- When to apply?
- How to apply?
What to apply?
Nitrogen

- Turf most responsive to N
- Plants take-up N as NO$_3$ & NH$_4$
- Quick release vs Slow release N sources
- No practical soil test
Phosphorus

- Use soil test to correct deficiencies
- Excess levels do not cause toxicity
- Keep levels high during establishment
Feed me P!
Potassium

- Use soil test to correct deficiencies
- Excess levels do not cause toxicity
- Adequate levels $\uparrow$ stress tolerance
Micronutrients

- Fe, Mn, Zn, Cu, Mo, Cl, B
- Adequate in most natural soils
- Direct application is rarely necessary
- Get soil tested if possible deficiency
Lime

- Maintain soil pH 6.0-7.0
  - Nutrients are more available to plants
  - Microbial activity is greatest
- Get soil tested annually
- Apply lime to raise pH
Soil pH and nutrient availability

http://www.ext.colostate.edu/pubs/garden/07727.html#avail
How much to apply?
Depends on:

- Grass species
- Use
- Length of season
- Soil
- Climate
- Time of season
- Cost
- Application method
Nitrogen

- No practical soil test
- Proper rate requires “feel” by monitoring color, clippings, and density
- Tissue tests?
Amount of clippings
Too much N  (too much food)

- Excess clippings
- ↑ Mowing
- Lush, succulent plants
  - ↓ cold, heat, drought tolerance
  - ↑ disease – pythium, brown patch, snow molds
  - ↑ thatch
Too little N (starving)

- Yellowing & stunted growth
- Thin turf
- Slow recovery
- ↑ disease – dollar spot, rusts, red thread
# P, K, & Lime

<table>
<thead>
<tr>
<th>Soil Nutrient Levels</th>
<th>Below Optimum</th>
<th>Optimum</th>
<th>Above Optimum</th>
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<tbody>
<tr>
<td>Soil pH</td>
<td>7.1</td>
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<tr>
<td>Phosphorus (ppm)</td>
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<tr>
<td>Potassium (ppm)</td>
<td>66</td>
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</tbody>
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## Recommendations for: *Golf Green-To Plant Bentgrass*

Prior to planting, incorporate the following into the root zone mix.

- **Limestone:** NONE
- **Phosphate** ($P_2O_5$): NONE
- **Potash** ($K_2O$): 4 lb/1000 square feet

Apply a starter fertilizer just prior to seeding and work lightly into the soil.

Apply a starter fertilizer at an approximate rate of 0.5 to 1 lb of nitrogen per 1000 square feet, 0.5 to 1.0 lb of $P_2O_5$ per 1000 square feet, and 0.5 to 1.0 lb of $K_2O$ per 1000 square feet using a fertilizer with an approximate 1:1:1 or 2:1:1 ratio of N:P$_2$O$_5$:K$_2$O.
General amounts for lawns

- **N** 2 - 4 lbs N/1000 sq ft/season
  - Slow release N ≤ 2 lbs N/1000/application
  - Quick release N ≤ 1 lb N/1000/application
- **P & K** base rate on soil test
- **Lime** base rate on soil test
When to apply?
Cool-season grasses

When to apply fertilizer?

- Late summer/early fall - apply the majority
- Early spring - encourages root growth
- Other times - use slow release products and/or low rates of soluble fertilizer
How to apply?
Spread uniformly over target area at desired rate
Is sound fertility all you need for a strong turf?
Strong turf results from...

- Sound fertility
- Sound irrigation
- Sound mowing
- Sound cultivation
- Sound species selection
- Sound shade management
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LESS PESTICIDES NEEDED!
Sound fertility includes:

- What to apply?
- How much to apply?
- When to apply?
- How to apply?
Reduced Pesticide Use Through Sound Fertility

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