Fertilizing Woody Plants in Utah

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Fertilizer Recommendations for Landscape Plants

- Why fertilize?
- When to fertilize?
- How much to fertilize?
- What kind of fertilizers should I use?
- Where and how to fertilize?

Fertilizer Recommendations for Landscape Plants

- Why fertilize?
  - To supply nutrients to achieve a defined objective such as:
    - increasing growth
    - establishing new plants
    - enhancing appearance
    - correcting or preventing nutrient deficiencies

Fertilizer Recommendations for Landscape Plants

- Fertilize to supply nutrients to increase growth

Fertilizer Recommendations for Landscape Plants

Fertilize to establish new plants or grow them in a nursery

Fertilizer Recommendations for Landscape Plants

- Fertilize to enhance appearance

Fertilizer Recommendations for Landscape Plants

Fertilize to correct or prevent nutrient deficiencies

Fertilizer Recommendations for Landscape Plants

- When to fertilize?
  - Fertilization may NOT be required:
    - if your plants look good
    - if plants are established
    - if plants flower or fruit well
    - unless deficiencies show for trees

Fertilizer Recommendations for Landscape Plants

- Fertilization may NOT be required if your plants look good

Fertilizer Recommendations for Landscape Plants

- Fertilization may NOT be required if plants are established

Fertilizer Recommendations for Landscape Plants

- Fertilization may NOT be required if plants flower or fruit well

Fertilizer Recommendations for Landscape Plants

Fertilization may NOT be required if deficiencies do not show

Fertilizer Recommendations for Landscape Plants

- Plants with chronic deficiencies are unsuitable; replace them with adapted species

Chronic Problem Plants

- Silver Maple
- Azaleas and Rhododendrons
- Pin Oaks
- White Pines
- Sweetgum
- Red Maple

Fertilizer Recommendations for Landscape Plants

- When to fertilize?
  - Fertilization MAY be needed:
    - If there are newly planted trees/shrubs
    - if you are forcing faster growth
    - if soil is lacking nutrients
    - if trees/shrubs are NOT near fertilized turfgrass
    - if plants with deficiencies cannot be replaced

Fertilizer Recommendations for Landscape Plants

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Fertilizer Recommendations for Landscape Plants

- Plants with chronic deficiencies are unsuitable; replace them with adapted species

Fertilizer Recommendations for Landscape Plants

- Fertilize newly planted trees/shrubs

Fertilizer Recommendations for Landscape Plants

Fertilize to force faster growth

Fertilizer Recommendations for Landscape Plants

- Fertilize if soil lacks nutrients

Fertilizer Recommendations for Landscape Plants

Fertilize if
- trees/shrubs are NOT near fertilized turfgrass

Fertilizer Recommendations for Landscape Plants

- How much to fertilize?

Level of Maintenance	Amount of N Fertilizer (lbs. N/1000ft²/yr)
Basic	0 - 2
Moderate	2 - 4
High	4 - 6

Fertilizer Recommendations for Landscape Plants

- How much to fertilize?
  - Apply micronutrients only when there are deficiencies

Fertilizer Recommendations for Landscape Plants

- Apply no more 1/2 lb. N/1000ft^2/yr of water soluble fertilizer

Fertilizer Recommendations for Landscape Plants

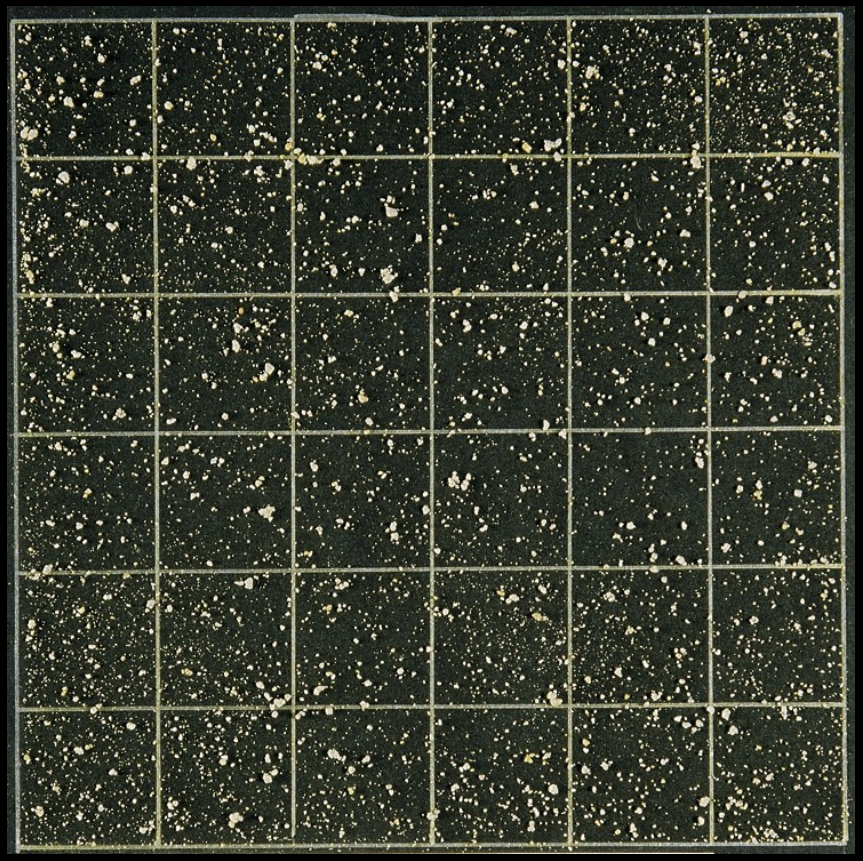
- Application rates of controlled release fertilizers depend on release rates of the product

Fertilizer Recommendations for Landscape Plants

- Where and How to fertilize?
  - Broadcast uniformly over area and consider root location, fertilization objectives and plant species

Fertilizer Recommendations for Landscape Plants

Check amounts and uniformity



Fertilizer Recommendations for Landscape Plants

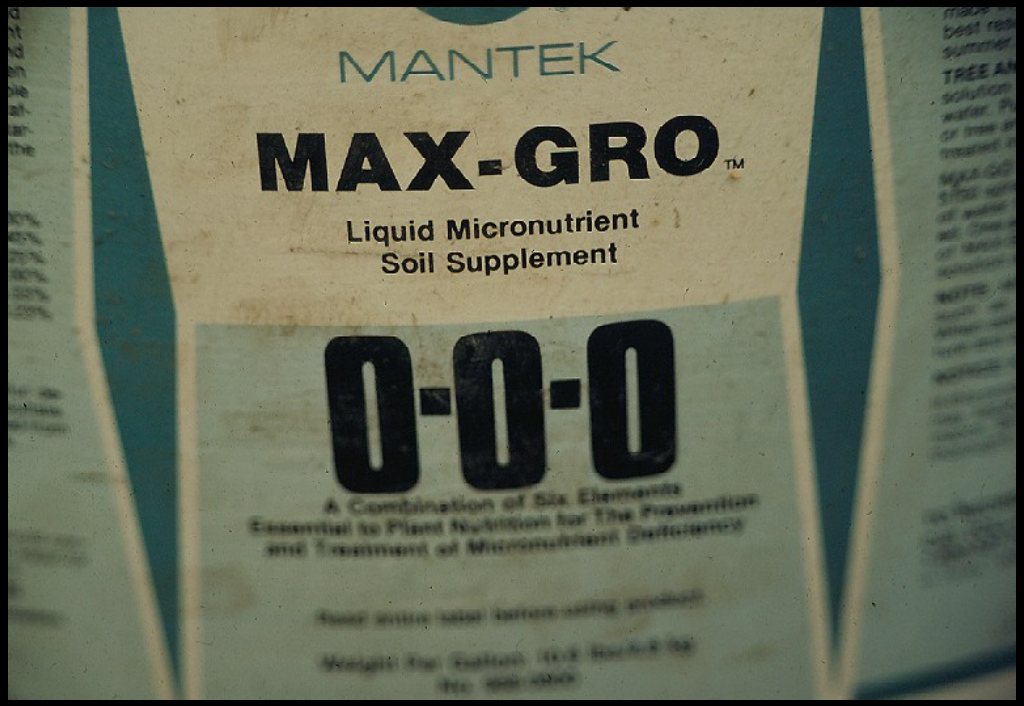
- Fertilize areas that overlap with lawns one, not two, fertilizations

Fertilizer Recommendations for Landscape Plants

- Use foliar applications, injections or implants only if soil applications are impractical or ineffective

Fertilizer Recommendations for Landscape Plants

What Fertilizers to Use?

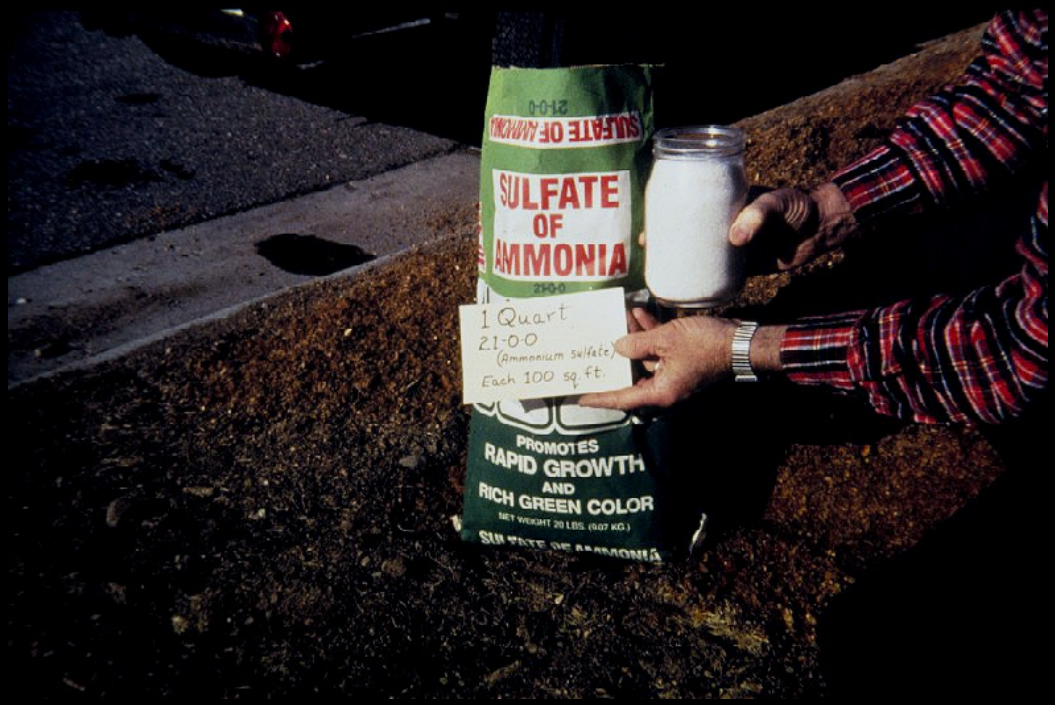


Fertilizer Recommendations for Landscape Plants

- What Fertilizers to Use?
- Use a Soil Test for Greatest Accuracy

Fertilizer Recommendations for Landscape Plants

- What Fertilizers to Use?
- Utah Landscapes Need Mostly Nitrogen



Fertilizer Recommendations for Landscape Plants

- What Fertilizers to Use?
- Add Other Nutrients Only If Soil or Foliar Testing Indicate a Need or If Deficiency Symptoms are Present

Fertilizers Do Not Cure Sick Plants!!!

- The Kevorkian Cure is to Add Fertilizers to Most Stressed, Diseased or Insect Damaged Plants

Vitamins and Minerals for Plants

General classes of products

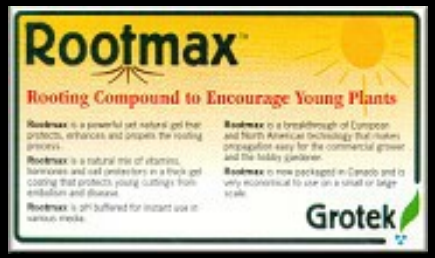
- Mineral supplements and fertilizers
- Biostimulators
- Vitamins
- Seaweed extract, yeast extract

First, the ‘hype’

Why does this deserve attention?

- Thousands of products are currently on the market, and more are appearing daily.
- Some products make wild claims.
- Some products are expensive.
- Some products have clever labels.
- *Some products work and some don’t.*

Thousands of products!!!



Some of the wild(er) claims

- “...puts oxygen into soil.”
- “…can be used as a plant, livestock, or human mineral supplement.”
- “…increases overall plant size while reducing water and nutrient requirements.”
- “...replaces all other fertilizer needs.” (but only contains 3 essential nutrients)

Price

- Wide variation, from $10 per gallon to $750 per gallon.

Clever labels

- “…contains all 16 essential plant nutrients in a natural, organic form.”
- “…contains hormones that have been shown to promote root and shoot growth, and flowering.”
- “…contains trace amounts of …”
- “…enhances plant growth…”

A clever label?

Nature's Wonder

HV-DHMO

1. Contains large quantities of 2 essential elements required by plants, smaller quantities of the remaining 14 essential elements, and trace levels of other elements shown to be beneficial for some plants;
2. Can be used as a solvent and carrier for other fertilizer salts, as well as vitamins and hormones;
3. Is compatible with virtually all herbicides and insecticides;
4. Relieves temperature stress;
5. Stimulates plant growth;
6. Colorless and odorless; no MSDS or special handling required.

A clever label?

Nature's Wonder

HV-DHMO

Directions for use:

1. Apply HV-DHMO in concentrated form at the rate of one gallon per plant. Reapply every 5 to 7 days.

Supporting research:

Compared to controls (no HV-DHMO), Utah State University research trials have shown that HV-DHMO may increase plant growth 200% or more.

Warning: Do not exceed the recommended dosage.

A clever label?

Nature's Wonder

HV-DHMO

=

Happy Valley Dihydrogen Monoxide

=

Happy Valley Water

Now, the research

Scientific evidence to support product claims?

- Limitations:
  - Each product is a little/lot different.
  - Products do not list specific ingredients.
  - Products have ingredients with unknown properties or effects.
  - Products have beneficial ingredients at very low concentrations.

Minerals and fertilizers

- Demonstrated, recognized beneficial effects of 13 essential elements supplied by mineral supplements and fertilizers:

Nitrogen	Phosphorus	Potassium
Calcium	Magnesium	Sulfur
Iron	Zinc	Copper
Manganese	Chlorine	Molybdenum
Boron		

Ib. Minerals and Fertilizers

- Contains 11 essential elements (-Ca,Mg).

NET WT. 1½ LBS.

STERN'S Miracle-Gro 15-30-15

GUARANTEED ANALYSIS

720-1013

Total Nitrogen (N)	15%
6.8% Ammoniacal Nitrogen	
8.2% Urea Nitrogen	
Available Phosphoric Acid (P_2O_5)	30%
Soluble Potash (K_2O)	15%
Boron (B)	0.02%
Copper (Cu)	0.07%
Iron (Fe)	0.15%
0.15% Chelated Iron	
Manganese (Mn)	0.15%
0.15% Water Soluble Manganese	
Molybdenum (Mo)	0.0005%
Zinc (Zn)	0.06%

Nitrogen from Ammonium Phosphates and Urea; Phosphoric Acid from Ammonium Phosphates; Potash from Muriate of Potash; Boron from Boric Acid; Copper from Copper Sulfate; Chelated Iron from Iron EDTA; Manganese from Manganese Sulfate; Molybdenum from Sodium Molybdate; Zinc from Zinc Sulfate.
Chlorine, max. avail. . . . 12.5%

STERN'S MIRACLE-GRO PRODUCTS, INC.
Port Washington, N.Y. 11050 U.S.A.

HOW TO HAVE A "MIRACLE GARDEN"

Ic. Other mineral sources

- Organic products:
  - generally contain a broad spectrum of essential elements, but at a high cost per pound;
  - proven beneficial if applied at realistic rates.
- Ground rock products:
  - contain some essential elements but little or no nitrogen;
  - limited research supports benefits.
- Seaweed extracts:
  - contain some essential elements, some excess sodium

Id. Minerals and fertilizers

- Considerations
  - What is needed - soil test? historic needs?
  - What is in the product?
  - Are the elements in an available form?
  - What does the product cost?

IIa. “Biostimulators”

- Mainly products containing natural and artificial hormones (growth regulators):
  - Auxins (cell elongation and root initiation)
    - indoleacetic acid (IAA)
    - indolebutyric acid (IBA)
    - naphthaleneacetic acid (NAA)
  - Cytokinins (elongation and bud growth)
  - Giberellins (cell division and organ formation)

IIb. “Biostimulators”

- Hormones
  - Substantial research supports the effects of hormones on plants.
  - Hormones are effective at *micro*molar concentrations.
  - Overapplication or hormones will often have opposite effect - stunting, defoliation, premature fruit drop.

IIc. “Biostimulators”

- Research - mixed results:

Plant type	Response	Reference
Turf - KBG	+shoot; +root	Agron. J. 82: 901-
Turf - KBG	no shoot; +root	Hortsci. 26:254-
Zoysiograss	no response	Hortsci. 31:972-
Pin oak	no response	Carl Whitcomb
Turf - 14 products	no shoot; +root	K. Karnok, GA

IId. “Biostimulators”

- Why the inconsistent results?
  - Carl Whitcomb:
    - 1. Hormone concentrations in many products are too low to be effective.
    - 2. Hormones applied to soil are consumed by microorganisms.
  - Keith Karnok:
    - 1. Under normal growth conditions, turf produces adequate levels of hormones.
    - 2. Hormones work under stress conditions.

IIIa. Vitamins

- Select functions in plants:
  - B1 (thiamine) - Kreb’s cycle (metabolism)
  - B6 - (pyridoxine) - metabolism
  - Vitamin D - IAA-like, root initiation
- Manufactured within the plant.
- Standard component in tissue culture media.

IIIb. Vitamins

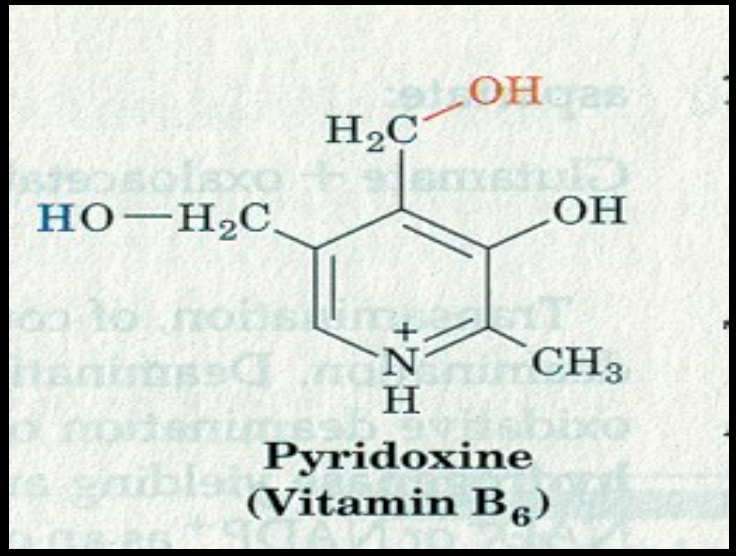
- Research?
  - Research shows that vitamins (B and D) are absorbed in limited quantities by plants growing in solution culture.
  - Little or no research on the growth effects of added vitamins on plants.

Salisbury and Ross, *Plant Physiology:*

No evidence to to support claims that exogenous supplies of various B vitamins promote plant growth or root formation.

IIIc. Vitamins

- Why the inconsistent results?
  - When applied to soil, vitamins may be used or consumed by microorganisms.



= FOOD!

IVa. Other products

- Yeast extracts - a source of B vitamins.
- Seaweed extracts - a source of minerals and cytokinins.
  - + responses in turf and forage grasses.
  - - response in tomato (salinity issue?).
  - no response in barley.

Summary

- Minerals and fertilizers - considerable research support.
- Biostimulants - some research support.
- Vitamins - little research support.

Recommendations

- Avoid products that make claims beyond common sense.
- Read the label - what’s really in there?
- Stick with proven products.
- Test materials on small areas yourself.
- Don’t rely on testimonials; request university research trial results.

Questions?