Slide 1

Managing Plant Nutrition of Greenhouse Ornamentals

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Slide 2

Common Nutrient Problems Of Spring Greenhouse Crops

- Too much or too little fertilizer?
- pH problem - Iron deficiency on petunia and pansy.
- pH problem - Iron/manganese toxicity on some species.
- Water quality as it affects nutrient problems.

Slide 3

Fertility & pH for Vegetative Annuals

	Low pH 5.5-5.8	Medium pH 5.8-6.2	High pH 6.2-6.5
Low fertility 150-200 ppm	Snapdragons	Coleus New Guinea impatiens Double impatiens Trailing impatiens	
Medium fertility 200-250 ppm	Scaveola Bacopa	Bracteantha Plectranthus Diascia Sanvitalia Verbena	Argyranthemum Brachyscome Osteospermum
High fertility 250-300 ppm	Calibrachoa Petunia		

Slide 4

pH Ranges for Bedding Plants

(North Carolina Plug Research Group)

Plant	pH	Why?
Most bedding plants	5.4-6.8	pH tolerant
American marigolds	6.0-6.8	Prevent Fe/Mn toxicity
Celosia	6.0-6.8	Prevent Fe/Mn toxicity
Geranium	6.0-6.8	Prevent Fe/Mn toxicity
Dianthus	6.0-6.8	Prevent Ca deficiency & ammonium toxicity
Pansy	5.4-5.8	Prevent B & Fe deficiencies
Petunia	5.4-5.8	Prevent B & Fe deficiencies
Salvia	5.4-5.8	Prevent B deficiency
Snapdragon	5.4-5.8	Prevent B & Fe deficiencies
Vinca	5.4-5.8	Prevent B & Fe deficiencies

Slide 5

Excess Soluble Salts

- Excess soluble salts is still a common problem. High EC results from too much fertilizer, poor drainage, or root disease.
- Symptoms can be confusing.

Slide 6

Iron Deficiency

Plants that are susceptible to iron deficiency are often called “iron-inefficient” or the “petunia group”. Symptoms occur when pH is >6.5.

- Azalea
- Bacopa
- Calibrachoa
- Dianthus
- Nemesia
- Pansy
- Petunia
- Scaveola
- Snapdragon
- Verbena
- Vinca

Slide 7

Preventing Iron Deficiency

- Target pH 5.5-5.8 (below 6.5).
- Acidic water-soluble fertilizers (15-15-15, 15-16-17, 20-10-20, 21-7-7).
- Acid injection with alkaline water.
- Use supplemental or corrective iron chelate drench.

Slide 8

Iron Chelate Fertilizer

- Apply iron chelate every 2-3 weeks or at every watering.
- Sprint 330 (DTPA) is effective up to pH 7, but is less so at higher pHs.
- Sprint 138 (EDDHA) is effective above pH 7.

Slide 9

Water pH, Alkalinity & Iron Deficiency

- pH 7-8, alkalinity below 100 mg $CaCO_3$
  Iron deficiency? Probably not.
  Why? Growing mix and fertilizer are the major influences on pH.
- pH 7-8, alkalinity well above 100 mg $CaCO_3$
  Iron deficiency? Yes, for susceptible species.
  Why? "Liming" effect of water may be great enough to raise pH.

Slide 10

I. Match Fertilizers to Water Quality

Water alkalinity test (mg $CaCO_3$)	Fertilizer analysis	% Acidic nitrogen (ammonium & urea)	Potential reaction A-acidic or B Basic (CCE)
300	21-7-7	100%	A 1560
200	20-10-20	40%	A 429
100	17-5-17	20%	B 0
50	15-0-15	13%	B 420

Rosa

Slide 11

Iron/manganese Toxicity

- Geraniums, marigolds, celosia, and impatiens are very susceptible to iron/manganese toxicity.
- Plants susceptible to toxicity are called "iron effiicient" or "geranium group". Symptoms occur at pH<6.0.
- The toxicity is often called "bronze speckle" disorder.

Slide 12

Causes of Bronze Speckle

- Low growth medium pH.
- Use of acidic fertilizers.
- Inappropriate use of acid injection.
- Use of supplemental micronutrient fertilizers.

Follow the "Iron Out" program from UNH.

Slide 13

Water pH, Alkalinity & Fe/Mn Toxicity

- pH 7-8, alkalinity below 100 mg $CaCO_3$

  Problem? By itself, probably no effect.

  Why? Growing mix and fertilizer are the major influences on pH.

- pH 7-8, alkalinity well above 100 mg $CaCO_3$

  Problem? No, irrigation with this water might help prevent toxicity.

  Why? "Liming" effect of water may be great enough to raise pH.

Slide 14

II. Potential Nutrient Problems Due Related to Water Quality

Problem	Solution
Low calcium (<30 ppm)	Use Ca-containing fertilizers
Low magnesium (<15 ppm)	Use Mg-containing fertilizer or epsom salts
High boron (>0.5 ppm)	Use Ca-containing fertilizers and maintain pH >6
High sodium (>50 ppm)	Use Ca and Mg containing fertilizers and leach.

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Slide 15

Overview of Organic Fertilizers for Spring Greenhouse Crops

Slide 16

Using Organic Greenhouse Fertilizers

The ideal approach to using organic fertilization is to try the "3-legged stool". Providie nutrients from several organic sources to prevent nutrient deficiency and achieve normal growth of greenhouse plants.

1. Growth medium components (especially compost).
2. A granular organic fertilizer mixed in the growth medium preplant.
3. Postplant application of liquid organic fertilizer.

Slide 17

Nature's Source (OMRI-certified) Espartan Sustane (OMRI-certified)

Slide 18

Promising Organic Fertilizers

Fertilizer	Type	Nutrient sources
Nature's Source 3-1-1	Liquid	Oilseed extract.
Eco-Vita 7-5-10 (up to 100 day release)	Granular	Feather meal, fermented sugar beet and sugar cane molasses, bone meal, soybean meal, and cocoa shell meal.
Sustane 8-4-4 (45 day slow-release)	Granular	Composted turkey litter, feather meal and potassium sulfate.

Slide 19

Tips & Recommendations

Mixing and applications of liquids. Syrupy texture, spoilage after dilution leads to smell. Best to mix and then use immediately.

Fertilizer analysis. Additional nutrient sources may be necessary for unbalanced types like 9-0-0. Consider Sustane or similar preplant granular fertilizer.

Effects on growing medium EC.

Acid vs. basic pH reaction?

Overcoming reduced growth vs. chemical WSF. Add more?

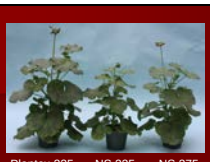
Plant species-specific responses. Do trials.

Slide 20

Interveinal Chlorosis

Interveinal chlorosis is most likely caused by excess ammonium. Overall yellowing indicates N deficiency. Chlorosis occurs on some species. Use organic fertilizers in combination.

Slide 21



Plantex 225 NS 225 NS 275

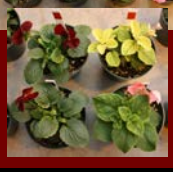
Does increasing fertilizer level make plants grown with organics the same same size as chemically grown ones?

Plant species may respond differently to organic fertilizers.

Slide 22

Nature's Source

Plantex



Plant response to Nature's Source vs. Plantex 20-2-20

Slide 23

Take Home Tips on Organics

1. For best results use a liquid and a granular fertilizer in combination.
2. Do a trial before applying to all plants.
3. Best use is for short-term crops of less than 6 weeks duration. Reduce or stop use before growth differences or chlorosis becomes apparent.

Slide 24

Slide 25

Nutrient Problems
Zonal Geraniums

- Fe/Mn toxicity due to low pH (top).
- High soluble salts due to excess fertilizer versus growth rate (bottom). Check roots for disease!

Slide 26

Factors Affecting the Success of a Fertilizer Program

- Fertilizer level (ppm).
- Fertilizer type.
- Frequency of application.
- Volume of fertilizer solution applied.
- Clear water irrigations and leaching.
- Environment and plant growth rate.
- Interactions.

Slide 27

Slide 28

Fertilizer Strategy
Zonal Geraniums

- pH 6.2-6.5. pH can drop suddenly.
- Begin fertilizing shortly after potting with 200 ppm. Monitor pH and EC regularly. Continue 200-250 ppm to finish.
- Make an application of liquid limestone?
- Use Cal-Mag 15-5-15, 15-5-25, 15-0-15 or other low acidity fertilizers. Don't go too long with 0 P fertilizers!