



2nd International Webinar Conference

Recognizing Spring Annual Disorders

Brian Whipker, NCSU


2nd International Webinar Conference

Sponsored by:

11:00 to 11:25 Eastern

Recognizing Spring Annual Disorders




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Bad Plants:

Major disorders observed with vegetative annuals


- Alternanthera
- Bacopa
- Begonia, Dragon Wing
- Coleus
- Dahlia
- Ipomoea
- Petunia
- Scaevola
- Strobilanthes
- Torenia



Short Days (Flowering)

ALTERNANTHERA

Long Days vs Short Days (Flowers)



Long Days (Night Interruption)


Short Days (Flowering)

Alternanthera

Long Days vs Short Days (Flowers)



Stock Plant Lighting

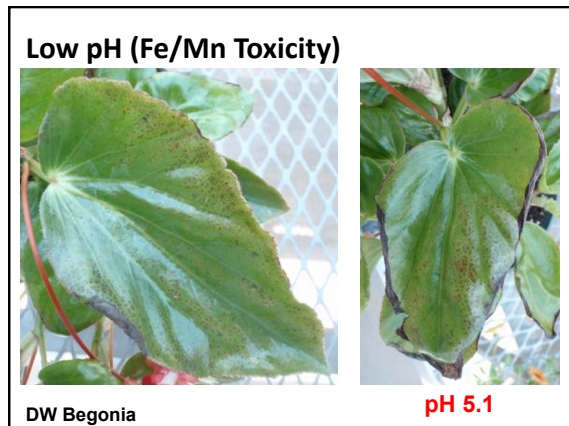
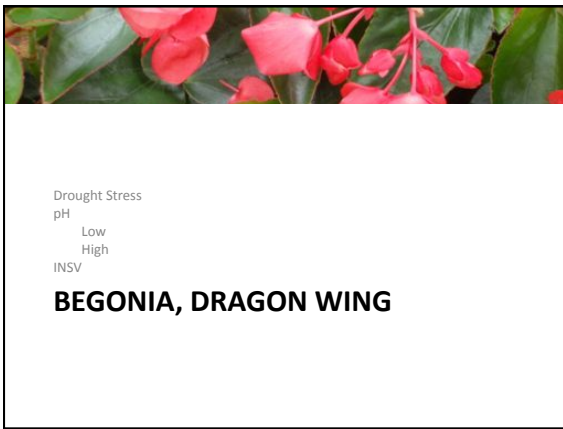
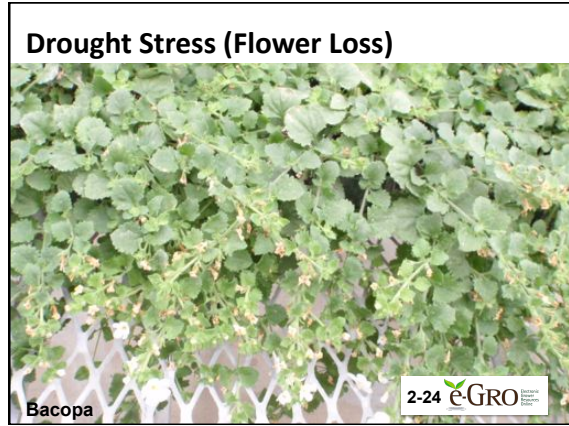
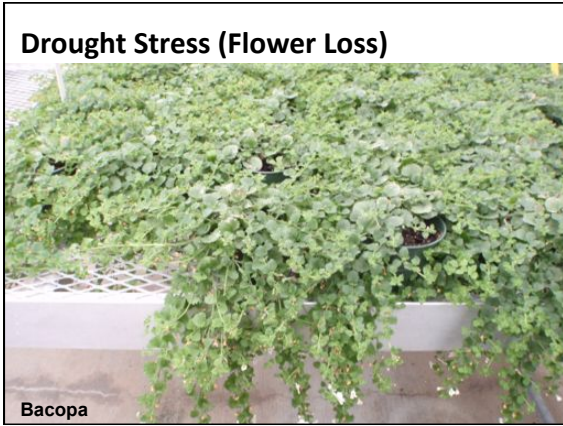


Non-flowering

BACOPA

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Low pH (Fe/Mn Toxicity)

Table 1. Leaf tissue analysis results.

Element	Normal Plant	Symptomatic Plant
Nitrogen (%)	4.42	4.04
Phosphorus (%)	0.35	0.47
Potassium (%)	2.15	3.98
Calcium (%)	1.13	1.69
Magnesium (%)	0.87	1.34
Sulfur (%)	0.27	0.28
Iron (ppm)	787	1870
Manganese (ppm)	193	618
Zinc (ppm)	48.9	53.4
Copper (ppm)	12.7	16.9
Boron (ppm)	53.1	66.1

DW Begonia 2-23 e-GRO

pH Corrective Procedures



Diagnosing Signs of High and Low pH

While signs of high pH induced iron deficiency commonly occur, do you know what to look for when the substrate pH is too low?

The greenhouse production in the Southeastern U.S. offers a unique situation of experiencing both high and low pH induced plant disorders.

with low alkalinity levels and low content of mineral salts (low electrical conductivity). The water quality is excellent and many Midwestern green-

houses would love to have it! Low alkalinity water requires a change in management strategy. There is no buffering in the water because of the lack of

The coastal portion of North Carolina has high levels of alkalinity which can lead to iron deficiency induced by elevated substrate pH. Production there necessitates acid injection similar to the Midwest and Great Plains.

When moving away from the coast, one enters new territory with drastically different management requirements. This area has pure irrigation water


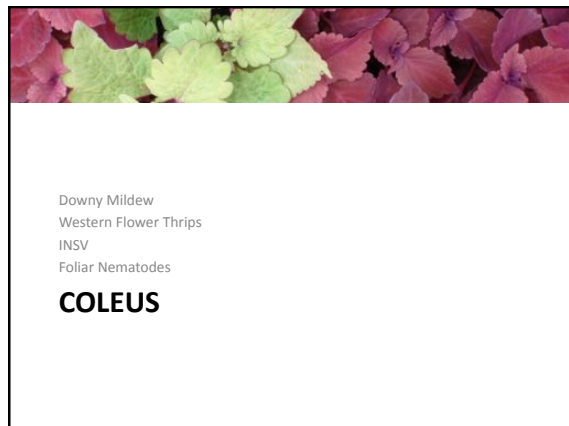
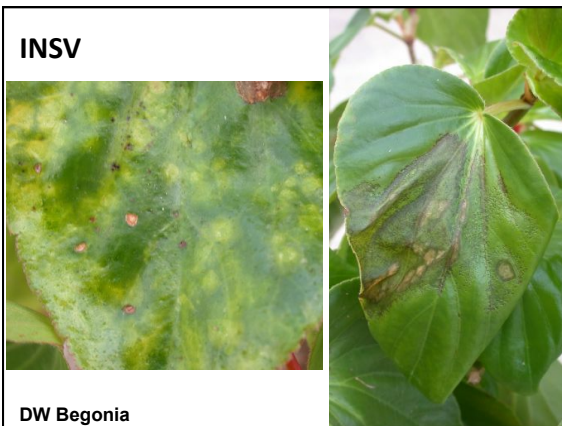
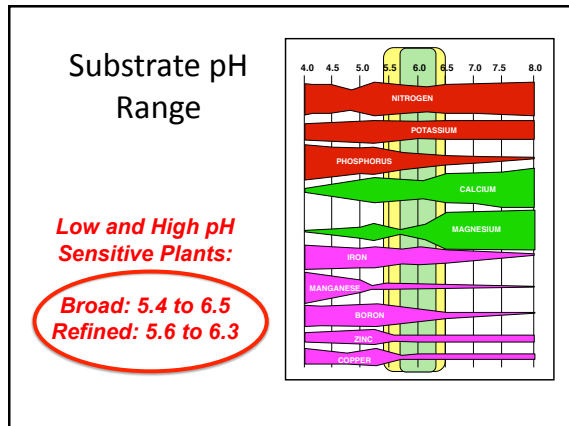
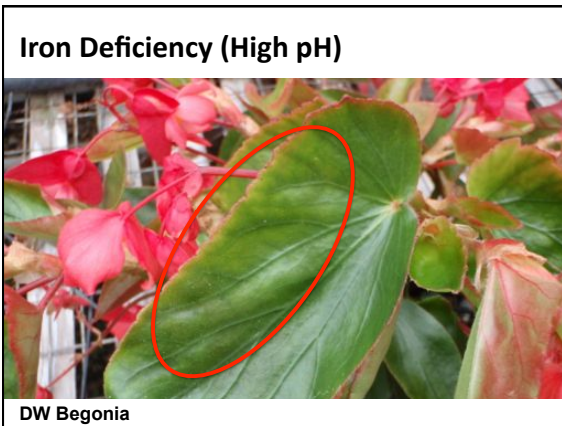


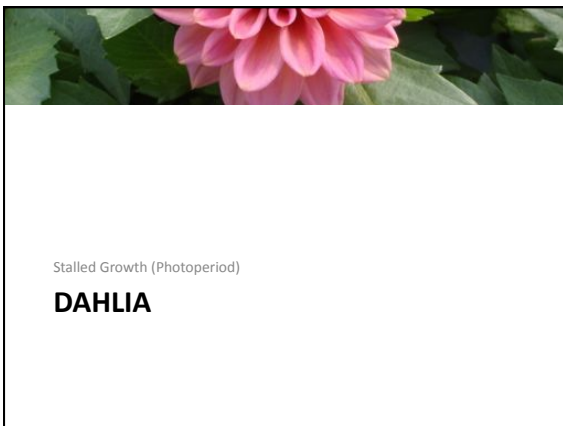
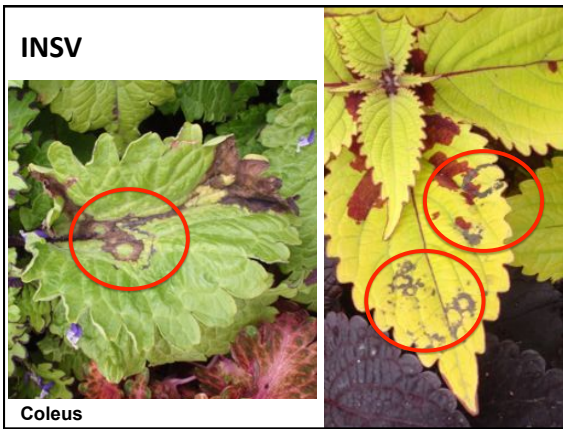
Figure 1. Initial signs of iron-induced chlorosis of the upper leaves. This indicates that iron is limited, most likely due to elevated substrate pH levels above 6.0.



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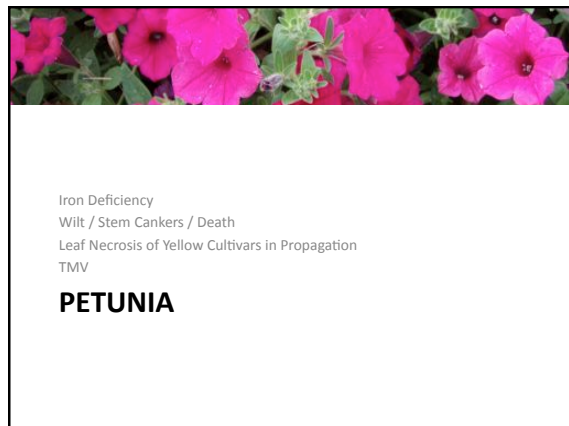
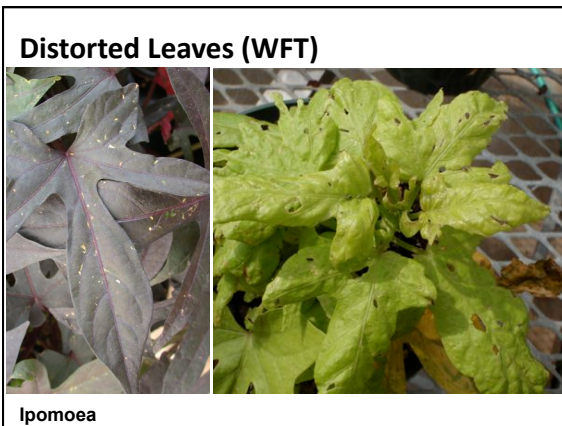
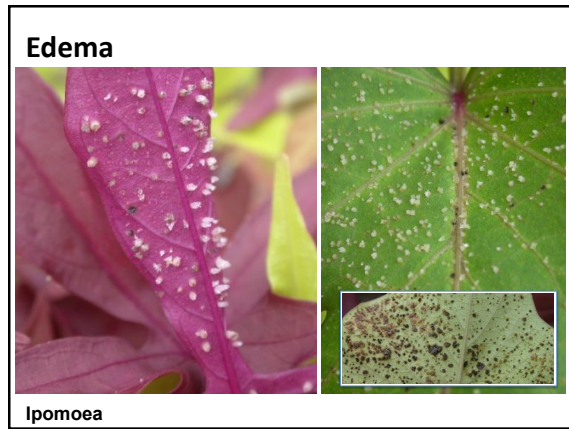
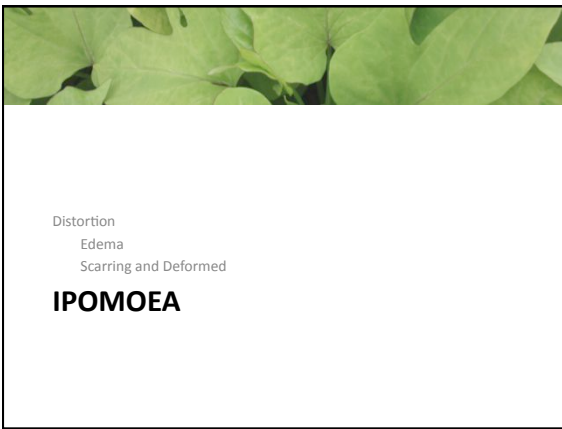
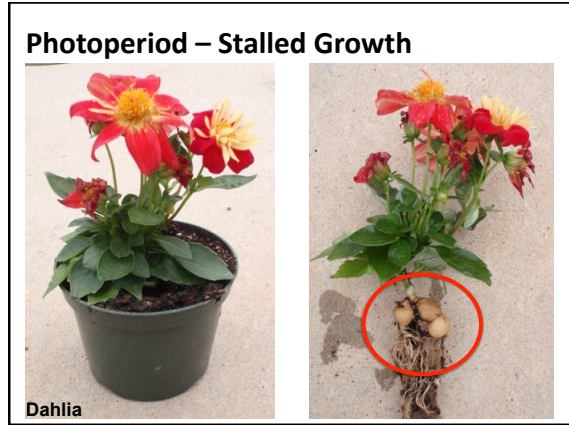
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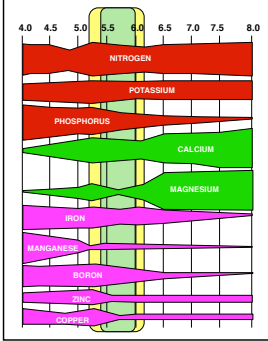
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High pH (Iron Deficiency)



Initial: Slight interveinal chlorosis of recently matured leaf	Moderate: Interveinal chlorosis more pronounced, spread to other leaves	Advanced: Bleached (white) interveinal chlorosis
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Substrate pH Range




High pH Sensitive Plants:

Broad: 5.2 to 6.2
Refined: 5.4 to 6.0


Leaves – Lower

• Description: Growth stunted with low pH




# Lime/Yard ³ :	0	5	10
Resulting pH:	3.3	4.8	5.1
Dry weight Reduction:	-59%	-29%	--

Wilt / Stem Death



Petunia

Rooting Problems – Yellow Cultivars



Petunia

2-10 e-GRO

Rooting – Yellow Cultivars

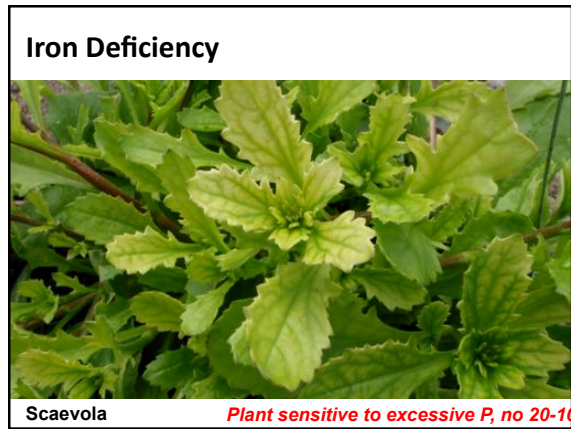
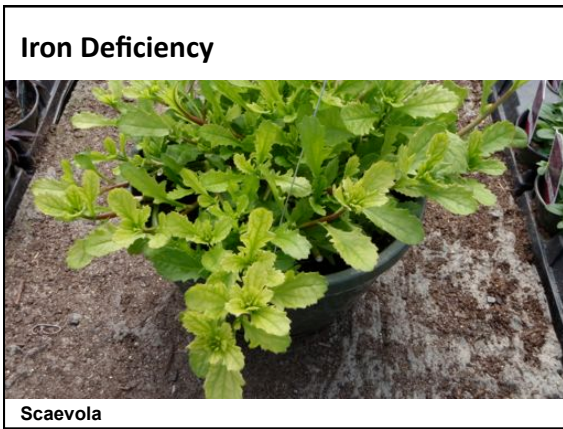
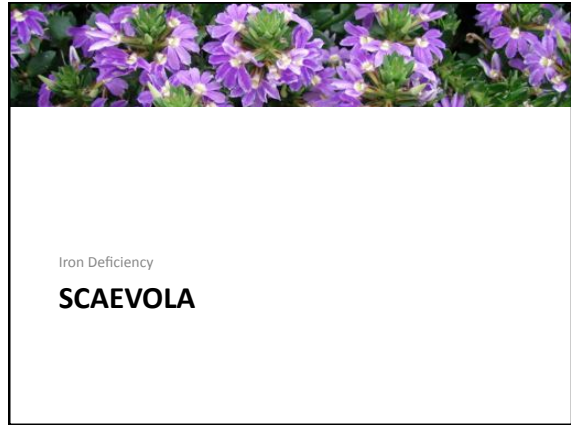
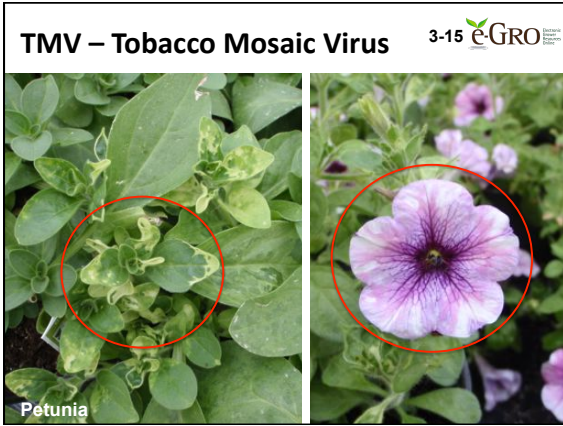
- Plants root well, but top growth problematic.
- Purdue University Group found:
 - Tissue sampling: after 2 days under mist, tissue Fe, Mn and Ca dramatically decline.
 - If fertilization begins on Day 6, takes to Day 13 to regain levels equal to “arrived cutting”
- Recommendation
 - Fertilize by Day 4 to 6.
 - Use 60 ppm N of balanced feed (with Ca, B, and 1:1 of Fe to Mn), or incorporate slow release fertilizer (10 to 15 g/L)

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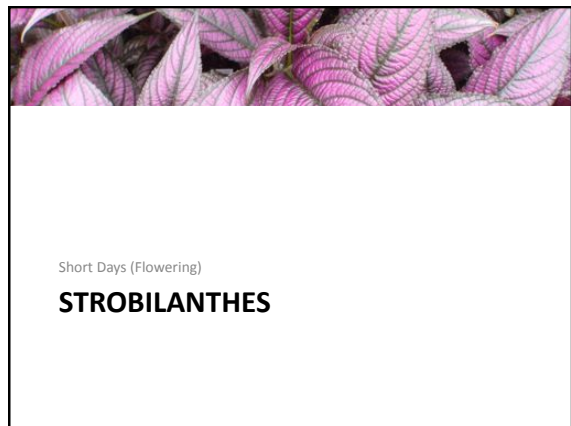


Substrate pH Range

High pH Sensitive Plants:

Broad: 5.6 to 6.2
Refined: 5.8 to 6.0

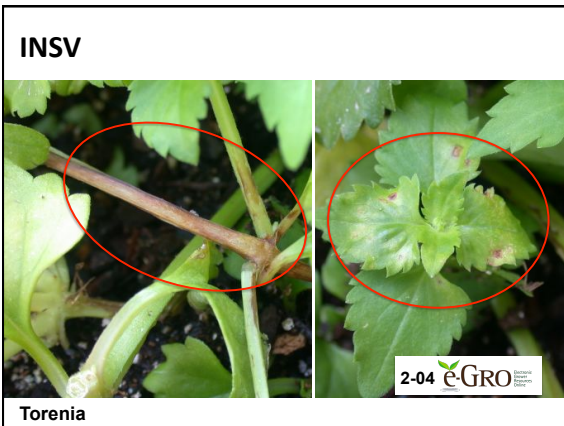
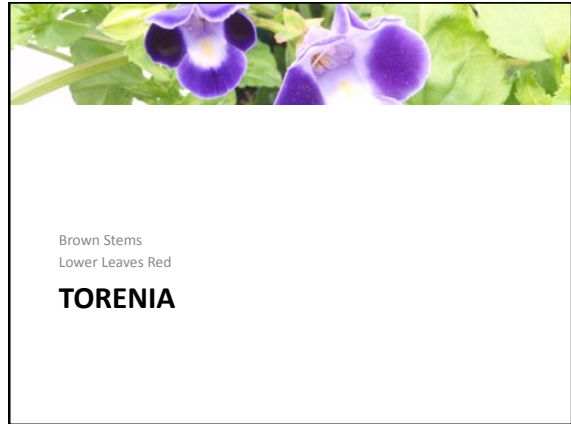
Nutrient	High Availability pH Range (approx.)
NITROGEN	4.0 - 6.0
POTASSIUM	4.0 - 8.0
PHOSPHORUS	4.0 - 6.5
CALCIUM	6.0 - 8.0
MAGNESIUM	6.0 - 8.0
IRON	5.0 - 6.5
MANGANESE	5.0 - 6.5
BORON	5.5 - 7.0
ZINC	5.5 - 7.0
COPPER	5.5 - 7.0



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Summary

- Vegetative annuals are wonderful crops to grow.
 - Sometimes challenges appear.
- Update information available from e-GRO Alert.

QUESTIONS?