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# e-GRO: More than Alerts and Blogs

*For the past seven years, e-GRO has provided easily accessible informative alerts and blogs pertaining to cultural practices or insect, disease, nutritional, environmental, or physiological growth disorders and production challenges. However, e-GRO offers much more! This alert provides an overview of e-GRO educational resources and materials that you may be missing.*

## [e-GRO University](#)

e-GRO University (Fig. 1) was created to provide greenhouse growers educational materials to train new growers or as a “refresher”. A series of recorded lectures and tutorials cover the basics of greenhouse management, plant growth management, plant nutrition, pest management, disease management and plant growth regulators (PGRs). A compilation of categorized video lectures and tutorials is provided:

### Greenhouse Management

- Vol. 1.00 Introduction to E-GRO University
- Vol. 1.01 Structure Types and Terminology
- Vol. 1.02 Glazing Materials
- Vol. 1.03 Overview of Greenhouse Heating
- Vol. 1.04 Greenhouse Cooling
- Vol. 1.05 Plant Growth and Development
- Vol. 1.06 Carbon Dioxide Injection

### Growth Management

- Vol. 2.01 Managing Photoperiod in a Greenhouse
- Vol. 2.02 Measuring and Monitoring Photosynthetic Light in a Greenhouse

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### Growth Management (cont.)

- Vol. 2.04 Effects of Light Quality and Duration on a Greenhouse
- Vol. 2.07 Measuring Temperature in a Greenhouse
- Vol. 2.08 Environmental and Cultural Management of Plant Growth
- Vol. 2.09 PGR options
- Vol. 2.10 PGR Calculations
- Vol. 2.11 Propagating Vegetative Cuttings
- Vol. 2.12 Disbudding and Flower Removal
- Vol. 2.13 Overview of Irrigation Methods
- Vol. 2.14 Physiological Disorders Caused by Environmental Stresses
- Vol. 2.15 Pinching
- Vol. 2.16 Spacing
- Vol. 2.17 Watering Potted Crops
- Vol. 2.18 Watering Plugs and Bedding Plants

### Nutrient Management

- Vol. 3.01 Media Physical Properties, Part 1
- Vol. 3.02 Media Physical Properties, Part 2
- Vol. 3.03 Mixing, Handling and Filling Root Media
- Vol. 3.04 Controlled Release Fertilizers
- Vol. 3.05 Fertilizer Calculations
- Vol. 3.06 Water Soluble Fertilizers
- Vol. 3.07 How Fertilizer Formula Influences Plant Growth
- Vol. 3.08 Injector Selection and Maintenance
- Vol. 3.09 How to take Water, Tissue and Medium Samples
- Vol. 3.10 PourThru Nutritional Monitoring
- Vol. 3.11 Understanding Alkalinity
- Vol. 3.12 Nutritional Disorders Part 1
- Vol. 3.13 Nutritional Disorders Part 2
- Vol. 3.14 Nutritional Disorders Part 3
- Vol. 3.15 Nutritional Disorders Part 4
- Vol. 3.16 Nutrient Management Triangle

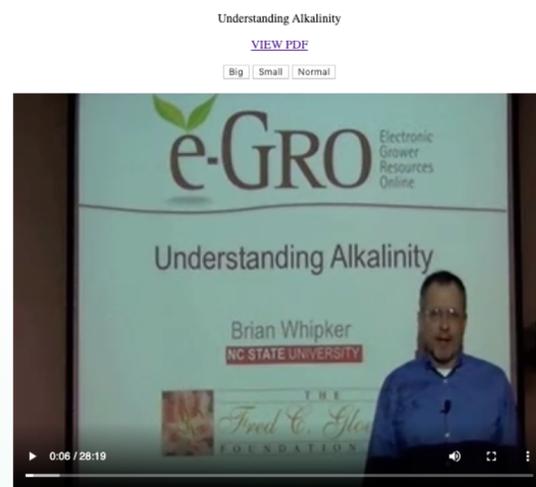


Figure 1. An example of a recorded lecture on understanding alkalinity archived in e-GRO University. Photo credit: W. Garrett Owen

### Insects and Mites

- Vol. 4.01 Insect and Mite Pest Identification and Damage Symptoms
- Vol. 4.02 How to Scout for Insect and Mite Pests
- Vol. 4.03 Sanitation
- Vol. 4.04 How to Use Pesticides Effectively
- Vol. 4.05 How to use Biological Controls Effectively

### Diseases

- Vol. 5.01 What is a Plant Disease
- Vol. 5.02 Diagnosis of Plant Diseases
- Vol. 5.03 Powdery Mildews



### Diseases (cont.)

Vol. 5.04	Downy Mildews
Vol. 5.05	Botrytis Blight
Vol. 5.06	Fungal and Bacterial Leaf Spots
Vol. 5.07	Rusts
Vol. 5.08	Vascular Wilts
Vol. 5.09	Damping off and Root Rot Diseases
Vol. 5.10	Diagnosis of Plant Diseases
Vol. 5.11	Diseases of Geraniums
Vol. 5.12	Geranium Disease Management

### [e-GRO Videos](#) and Webinars

To date, over 180 videos and recorded webinars are available on the [e-GRO YouTube](#) channel. Videos range from basic to advanced concepts, cover research findings, and educate greenhouse growers with varying skill sets. These videos cover topics including plant diseases, growth management, light (supplemental and photoperiodic), plant nutrition (Fig. 2), nutritional monitoring, insect pests and control, PGRs (Fig. 3), physiological disorders, propagation, substrate, and water. A compilation of all videos and recorded webinars is provided:

#### Disease

How to Use Strip Kits to test for Plant Viruses  
 Rose Agrobacterium species Infection  
 Tips for Diagnosing Impatiens Necrotic Spot Virus (INSV) in Greenhouse Crops

#### Growth Management

Bust the Winter Blahs with Pineapple Lily (*Eucomis*)  
 Diagnosing Disorders of Vegetative Annuals  
 e-GRO Webinar - Growing Lettuce and Culinary Herbs Hydroponically  
 e-GRO Webinar - Osteospermum  
 e-GRO Webinar - Snow Princess Lobularia  
 Graphical Tracking of Greenhouse Crops  
 Measuring Substrate, Canopy, and Plant Temperature  
 Plant Diagnostic Tips: Use of Plant Nutrition to Control Snapdragon Growth  
 Plant Diagnostic Tips: Use of Plant Nutrition to Control Tomato Growth  
 Plant Growth Control Tips: New Methods of Controlling Marigold Stretch

#### Light

Advances in Supplemental Lighting for Ornamentals  
 Dahlia Photoperiod Control  
 e-GRO Webinar - Supplemental lighting  
 e-GRO Webinar - Uncovering the potential used for LEDs  
 e-GRO Webinars - Photoperiod Strategies  
 Edible Photoperiodic Strategies

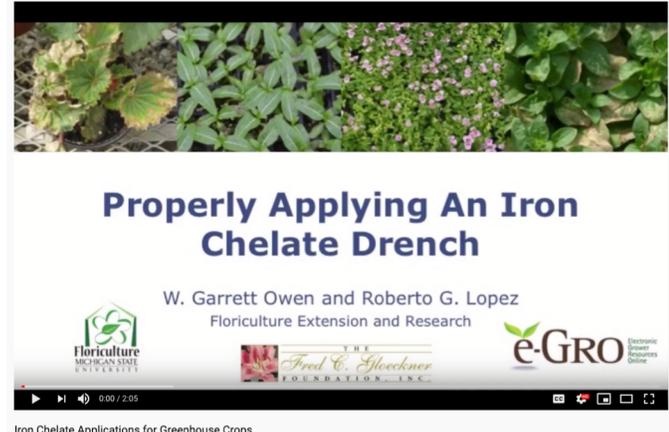


## Light (cont.)

Greenhouse Photoperiodic Lighting Strategies  
 Light Transmission Under Different Greenhouse Glazing Materials  
 Lighting Part 1: Introduction and Benefits of Supplemental Lighting  
 Lighting Part 2: Comparing Plant Responses Under Supplemental Lighting from HPS Lamps and LEDs  
 Lighting Part 3: Lighting Strategies and Costs  
 Measuring Light from LEDs  
 Measuring Light in the Greenhouse  
 New Daily Lighting Integral Maps  
 Ornamental Photoperiodic Strategies

## Nutrition

Alkalinity: Focus on the Water Alkalinity, Not the Water pH  
 Angelonia: Comparing Nitrogen and Sulfur Deficiencies  
*Carinata* Nutrient Disorders  
 Comparing Calcium and Boron Deficiencies: Angelonia  
 Comparing Magnesium and Manganese Deficiencies  
 Comparing Magnesium and Potassium Deficiencies: Angelonia  
 Dahlia Nutrient Disorders  
 Getting Phosphorus Right: Optimizing Your Fertilization Strategy  
 Gloxinia Boron Deficiency  
 Gloxinia Boron Toxicity  
 Gloxinia Magnesium Deficiency  
 Gloxinia Manganese Deficiency  
 Gloxinia Nitrogen Deficiency  
 Gloxinia Phosphorus Deficiency  
 Gloxinia Potassium Deficiency  
 Gloxinia Sulfur Deficiency  
 Gloxinia: Diagnosing Calcium Deficiency  
 Gloxinia: Iron Deficiency  
 How Basic Fertilizers Can Lower Substrate pH  
 Hydrangea Blue Coloration  
 Identification of Nutrient Deficiencies  
 Iron Chelate Applications for Greenhouse Crops  
 Managing Nutrient Solutions for Hydroponics Part 1  
 Managing Nutrient Solutions for Hydroponics Part 2  
 Nutrient Programs for Hydroponic Crops  
 Organic Fertilizers: Successfully Making the Switch  
 Phosphorus Fertility Part 1: Growth Control of Greenhouse Crops  
 Phosphorus Fertility Part 2: Red Color Enhancement  
 Phosphorus Fertility Part 3: Reproductive Stage P Deficiency  
 Plant Diagnostic Tips: Magnesium Deficiency of Tomato



Iron Chelate Applications for Greenhouse Crops

Figure 2. Example of an e-GRO YouTube video on plant nutrition specifically, properly applying an iron chelate drench. Photo credit: W. Garrett Owen

**Nutrition (cont.)**

Plant Nutrition Sherlock Holmes Style  
Poinsettia Calcium  
Poinsettia Magnesium  
Poinsettia Molybdenum  
Poinsettia pH  
Poinsettia Phosphorus  
Poinsettia Sulfur  
Poinsettia Trouble Shooting Part 1  
Poinsettia Troubleshooting Part 2  
Poinsettia Troubleshooting Part 3  
Properly Applying CRFs to Greenhouse Crops  
Recognizing Phosphorus Deficiency of Garden Mums  
Revising Your Phosphorus Fertilization Strategy  
Silicon Fertilizer Enhances Stress Tolerance of Bedding and Potted Plants  
Visual Symptoms of Sub-optimal pH

**Nutritional Monitoring**

Diagnosing Low pH Disorder Webinar  
e-GRO Injector calibration  
e-GRO PourThru  
e-GRO Substrate Sampling  
e-GRO Tissue Sampling  
e-GRO Water Sampling  
e-GRO Webinar - pH Drift  
GroZone Tracker App Introduction  
How to Calibrate a pH and EC Meter  
In-House Nutrient Monitoring Website for Greenhouses  
Measuring Alkalinity in Irrigation Water  
Measuring Initial Substrate pH  
New (Free) PourThru App  
Plant Nutrition Sherlock Holmes Style  
Poinsettia Calcium  
Poinsettia Magnesium  
Poinsettia Molybdenum  
Poinsettia pH  
Poinsettia Phosphorus  
Poinsettia Sulfur  
Poinsettia Trouble Shooting Part 1  
Poinsettia Troubleshooting Part 2  
Poinsettia Troubleshooting Part 3  
Properly Applying CRFs to Greenhouse Crops  
Setting Up and Conducting a PourThru Test for Greenhouses



## Pests

Biocontrol Webinar - A Proactive Approach with a Biological Control Strategy  
 Biocontrol Webinar - Are you ready to start a biocontrol program  
 Biocontrol Webinar - Biological Control on Herbs  
 Biocontrol Webinar - Case Study for Using Biocontrols for Disease Control  
 Biocontrol Webinar - Fundamentals of Biological Controls of Fungal and Bacterial Diseases  
 Biocontrol Webinar - Grower Experience with Banker Plants for Aphid Control  
 Biocontrol Webinar - Pesticides Are They Ever Compatible with a Biocontrol Program  
 e-GRO Webinar - Thrips  
 Foliar Nematodes: Diagnosis  
 How to Correctly Diagnosis Insect and Mite Pest Problems  
 How to Effectively Scout for Pest Problems (Revised)  
 How to Implement A Biological Control Program  
 Insect Pest Identification  
 Understanding Pesticide Labels  
 Ways to Maximize Pesticide Performance  
 Western Flower Thrips

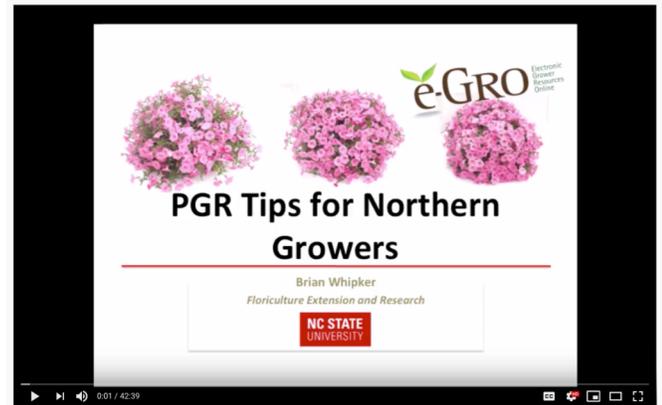
## Plant Growth Regulators (PGRs)

Biocontainers and Growth Regulators: Strategies for Effective Control  
 Branching Out with PGRs  
 Combinations: 2-way and 3-way Sprays - Screening the Effectiveness of Combination Foliar Sprays  
 Concise Liner Soaks Labeled  
 Configure Enhances Bulking Perennial Liners  
 Configure Foliar Sprays Increase Christmas Cactus Flower Buds  
 Configure Plus Dazide - Tank Mixes?  
 Controlling Flower Stalk Height in Lavender 'Phenomenal'  
 Controlling Growth of Seed-Propagated New Guinea impatiens Flats  
 Dazide Pre-Plant Liner Soak Experimental Trial  
 Determining PGR Drench Rates  
 Determining the Proper Timing for a PGR Application  
 Does Configure [BA] Affect Vase Life Cut Flowers?  
 Early Configure Applications to Enhance Plant Quality  
 Early Growth Regulation with Liner Soaks and Drenches  
 Early Growth Regulation with Liner Soaks vs Liner Drenches  
 Echinacea Paradox: Daylength vs PGRs  
 Enhancing Plant Growth with Fresco  
 Evening Out Results with Piccolo 10XC  
 Expanding Your PGR Toolbox: Improving *Sempervivum* Quality with Configure  
 Fresco Foliar Sprays Counter Paclobutrazol in Irrigation Water  
 Growth regulation of Echinacea  
 How Fresco Overcomes Low Dose Paclobutrazol in Recirculating Irrigation Water  
 Improve the Quality of Herbaceous Perennial Liners with Configure



## Plant Growth Regulators (PGRs; cont.)

Increasing PGR Foliar Spray Efficacy  
 Mixing and Measuring Small Amounts of PGRs and Pesticides  
 More on Liner Soaks vs. Liner Drenches  
 New Herbaceous Perennials PGR Resource Guide  
 New PGR Guide for Perennials  
 New PGR Resource for Herbaceous Perennials  
 New PGR Resources: Perennial Guide and Apps  
 PGR Effects on Root Growth  
 PGR Efficacy vs Phytotoxicity: The Role of Drying Conditions  
 PGR Tips for Northern Growers  
 PGR University - Anti-GAs  
 PGR University - Branching Agents  
 PGR University - Drenches and Bulb Soaks  
 PGR University - Goals and Other Benefits  
 PGR University - Other Considerations  
 PGR University - Sprays and Liner Soaks  
 PGR University - Wrap Up Questions  
 PGR Preplant Liner Soaks  
 PGRs Make you Money  
 PGRs on Peonies - A Progress Report  
 PGRs on Perennials Configure on Summer Hosta  
 PGRs on Perennials Growth Regulation of Monarda  
 PGRs on Perennials *Heuchera*  
 PGRs on Perennials Increasing Pot Fill with Configure  
 PGRs on Perennials Pinching vs Branching Agents  
 PGRs on Perennials: *Perovskia atriplicifolia*  
 PGRs: Four Ideas to Use with Your Spring Crops - 2017  
 Plant Growth Regulator Electronic Resources  
 PGRs Adhering to Plastic - The Effects and What It Takes to Remove It.  
 Recognizing PGR Overdoses, Other Mimics, and How to Get Back on Track  
*Rudbeckia*: Which Application Method to Choose?  
 Selecting the “Right” Plant Growth Regulator  
 Solving Mysteries of Using PGRs on Herbaceous Perennials  
 The Impact of Environmental Conditions on PGR Absorption  
 The Importance of Application Volume in PGR Efficacy  
 The Value of Multiple Applications of Configure  
 Timing of Configure Application Affects Pot Fill of Echinacea  
 Tips on Applying PGR Foliar Sprays  
 Tips on Applying PGR Pre-plant Liner Soaks  
 Tips on Applying PGR Sprences  
 Tips on Applying PGR Substrate Drenches  
 Tips on Using Preplant Bulb Soaks to Control Plant Growth



PGR Tips for Northern Growers

Figure 3. Example of an e-GRO YouTube video on plant growth regulators (PGR) specifically, PGR tips for northern growers. Photo credit: W. Garrett Owen



### Plant Growth Regulators (PGRs; cont.)

Tis the Season: Tips for Using Configure [BA] on Perennial Liners  
 What are the Benefits of Using Plant Growth Regulators?

### Physiological Disorders

Part 1. Blisters, Bumps and Lesions: The Physiological Disorders of Intumescence and Edema  
 Part 2. Blisters, Bumps and Lesions: The Physiological Disorders of Intumescence and Edema

### Propagation

Successfully Rooting Vegetative Cuttings  
 Thinking Inside the Box: What the Shipping Environment Does to Your Cuttings

### Substrate

Vermicompost Usage as an Organic Fertilizer  
 Whole Hog about Whole Tree Based Substrates  
 Wood is Good! The Future of Fiber in Growing Media

### Water

Precision Irrigation in Greenhouses  
 Watering Practices & Techniques  
 Watering Science and Art

### [e-GRO e-Books](#)

e-Books were created for those greenhouse growers who want to learn more about diagnostics and troubleshooting (Fig. 4), greenhouse pests (Fig. 5) or diseases, and also want a photographic guide. To date, 14 e-GRO e-books are available for either direct download (free of charge) or for purchase through the iTunes iBookstore. A compilation of all e-book and a short description is provided:

### e-GRO Books

- |               |   |
|---------------|---|
| <b>Vol. 1</b> | <b>Poinsettia</b><br>This book discusses fertility management, and offers a useful pictorial guide to nutrient disorders of poinsettia.               |
| <b>Vol. 2</b> | <b>2012 e-GRO Alerts</b><br>This collection continues to deliver important, relevant, and useful information for growers.                             |
| <b>Vol. 3</b> | <b>Primula</b><br>A pictorial guide to nutrient disorders of Primula.   |
| <b>Vol. 4</b> | <b>Sclerotinia</b><br>A pictorial guide to symptoms of white mold in greenhouse ornamentals.  |
| <b>Vol. 5</b> | <b>Plectranthus</b><br>Cultural and troubleshooting guide covering plant culture information, problem solving, and details about the major cultivars. |



## e-GRO Books (cont.)

- Vol. 6**     **2014 Bedding Plant Troubleshooting**  
Guide to disease, insect, nutritional, and physiological disorders of ageratum, begonia (wax), celosia, impatiens, marigold, salvia, snapdragon, and zinnia.
- Vol. 7**     **Tomatoes: Troubleshooting Guide to Nutritional Disorders.**  
A pictorial guide to identify nutritional disorders of tomatoes.
- Vol. 8**     ***Ipomoea* (Sweet potato vine)**  
Information and pictorial guide to disease, insect, nutritional, and physiological disorders of *Ipomoea*.
- Vol. 9**     **Insect and Mite Pests of Floriculture Crops: Identification Guide**  
A pictorial guide of primary pests attacking flowering ornamentals.
- Vol. 10**    **Insect and Mite Pests of Floriculture Crops: Identification Guide**  
A pictorial guide of primary pests attacking flowering ornamentals.
- Vol. 11**    ***Scaevola*: Troubleshooting Guide to Disease, Insect, Nutritional and Physiological Disorders.**  
Information and pictorial guide to disease, insect, nutritional, and physiological disorders of *Scaevola*.
- Vol. 12**    **Fert, Dirt, and Squirt: Nutritional Monitoring of Greenhouse Crops**  
Compendium of nutritional monitoring factsheets covering popular seed and vegetatively propagated annual bedding plants, potted plants, and edible and vegetables plants.
- Vol. 13**    **Tobacco: Diagnosing Nutritional Disorders.**  
A pictorial guide to nutritional disorders of tobacco.
- Vol. 14**    ***Sansevieria*: Greenhouse Production Guide**  
Guide to culture, disease, insect, nutritional, and physiological disorders of *Sansevieria*.

[Mobile Web Apps](#)

Mobile web apps or advisor tools (Fig. 6) where create keeping in mind that greenhouse growers are always on the go. Within minutes, greenhouse growers have access to disease, insect and mite, nutritional monitoring, PGRs for floral crops, and PGRs for herbaceous perennial advisory tools and GROzone Tracker. In short, the disease, insect, and mite advisory tools allow growers to search by crop and control method. The PGR advisory tools allow growers to search by crop and provides a crop-specific list of labelled PGRs, purpose of PGR application, rates, and precautions and remarks when considering applying the specific PGR. The in-house nutritional monitoring tool (Fig. 7) allows growers to search over 500 crops by scientific name to determine optimal substrate pH and electrical conductivity (EC) using the 1:2 Dilution, Saturated Media Extraction (SME), or PourThru Methods. In addition, this app provides optimal fertility rates and notes of susceptibility to low or high substrate pH and/or EC. The GROzone Tracker was created to assist growers with managing and monitoring plant nutrition.

## [PGR MixMaster](#)

The PGR MixMaster (Fig. 8A) was designed to allow greenhouse growers to easily calculate PGRs concentration. Growers are able to select the desired PGR from a list of autopopulated PGRs and the unit of measure (standard or metric). To calculate, growers are required to enter the final solution amount (in gallons or liters) and PGR concentration (parts per million; ppm). The PGR MixMaster will then calculate how much or the volume of PGR concentrate to mix with water to obtain the desired concentration and final solution amount (Fig. 8B).

Overall, we hope that you will continue to find e-GRO Alerts and Blogs informative but also find the additional educational resources and materials useful during the 2020 spring production season and beyond.

[The Fred C. Gloeckner Foundation](#), [American Floral Endowment](#), [Fine Americas, Inc.](#), [Griffin Greenhouse Supply](#), and [P.L. Light Systems](#) is gratefully acknowledged for funding and support.

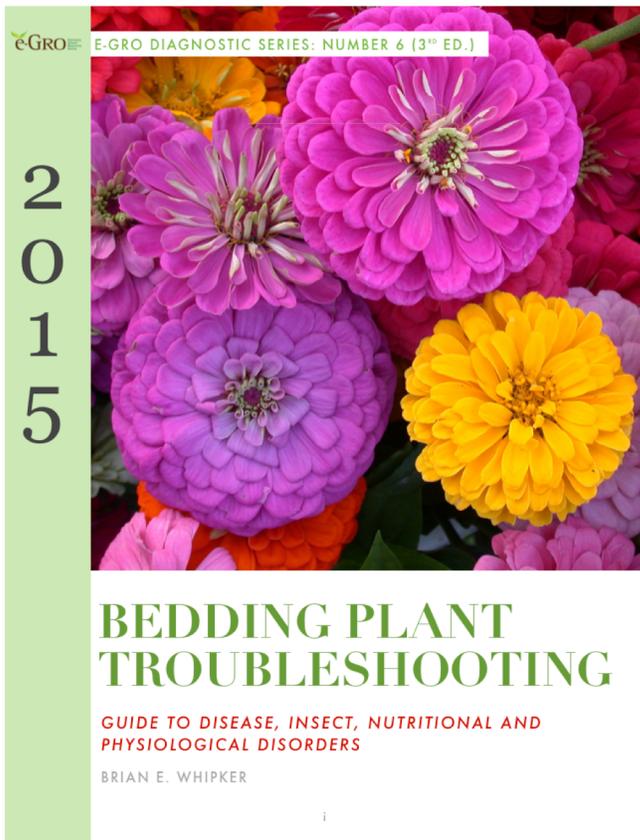


Figure 4. Example of an e-GRO e-Book on bedding plant diagnostics and troubleshooting. Photo credit: W. Garrett Owen



Figure 5. Example of e-GRO e-Books on greenhouse pests. Photo credit: W. Garrett Owen

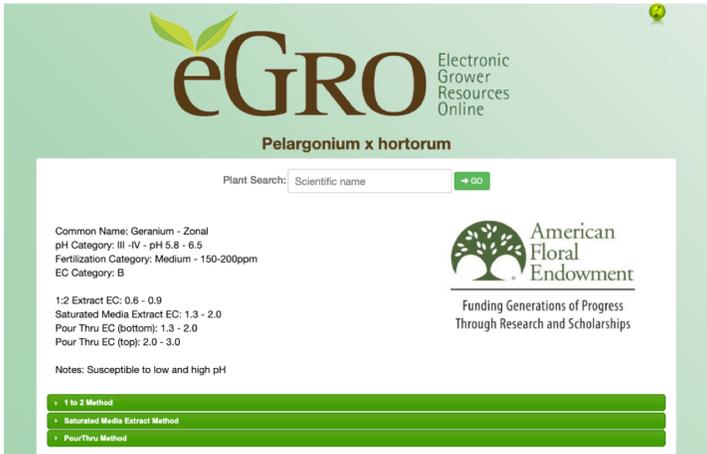


Figure 7. Example of nutritional monitoring mobile web app. Photo credit: W. Garrett Owen



Figure 6. Example of the disease, insect and mite, nutritional monitoring, PGRs for floral crops, and PGRs for herbaceous perennial advisory tools and GROzone Tracker mobile web apps or advisor tools. Photo credit: W. Garrett Owen

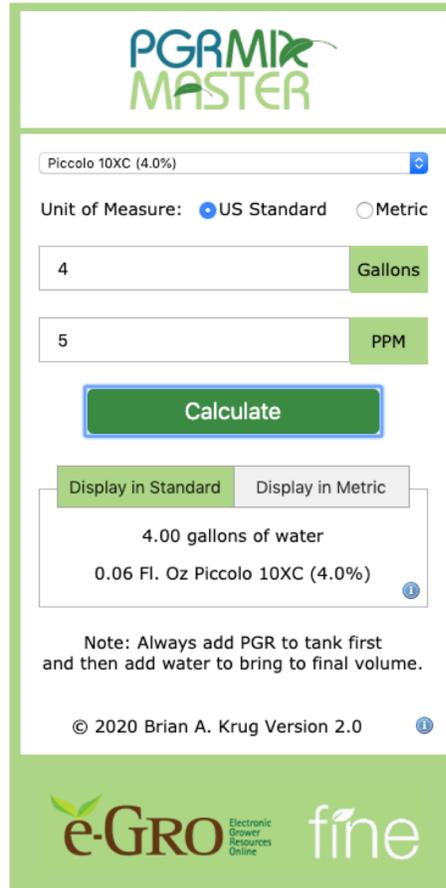
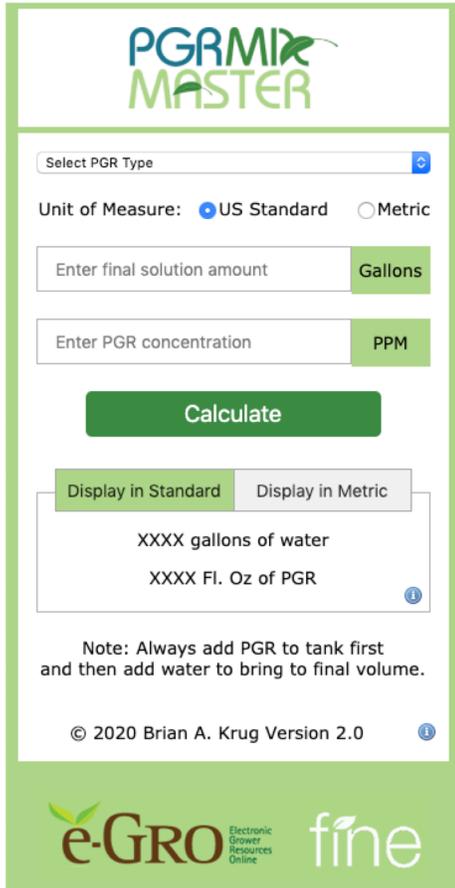


Figure 8. (A) Example of the PGR MixMaster interface which allows greenhouse growers to easily calculate PGRs concentration. (B) Calculation example of the PGR MixMaster that determined the volume of PGR concentrate to mix with water to obtain the desired concentration and final solution amount. Photo credit: W. Garrett Owen.

**e-GRO Alert**

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Metro Detroit Flower Growers Association

