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# Top 10 Tablet Tools

*There is a plethora of cultural and diagnostic information available to greenhouse growers. However, who has the time to sit and search through books, notes, or browse search engines when the greenhouse industry is always on the move? We have compiled a list of resources that are worth downloading so you can be better equipped to tackle the upcoming growing season.*

Tablets are great mobile devices. They are the right size for checking email and looking at the weather radar while on the move. Given the size, these handheld devices can also be taken into greenhouses and be used as an informational library, video camera, and regular camera. With this multi-functionality, the question is, “what resources do I need to save or install to make it even better?” Below are a few items that can be loaded onto an iPad and in most cases other formatted tablets.

## 1. Need Assistance Scheduling by Production Week?

As a researcher, we are not always thinking in the terms of production weeks. When ordering plant material, the production week is required. To assist you, download the [Fred C. Gloeckner Company Flower Holiday Calendar](#) (Fig. 1). The front page has a full 2-year calendar (2020-2021), along with Weeks and the major Holidays for the next 3 years. On the back page there are guide mixing rate tables for plant growth regulators (PGRs), Insecticides, Fungicides, handy conversion information, and bulb ordering calendar. The PDF is updated annually. For a 2-page guide, it packs in a lot of information.

## 2. Disease Problems?

What is a good disease ID guide for the greenhouse? Greenhouse Product News (GPN) published the [2015 Ornamental Disease Digest](#) (Fig. 2). The PDF file is a collection of monthly articles written by Ann Chase and Margery Daughtrey. The guide covers 25

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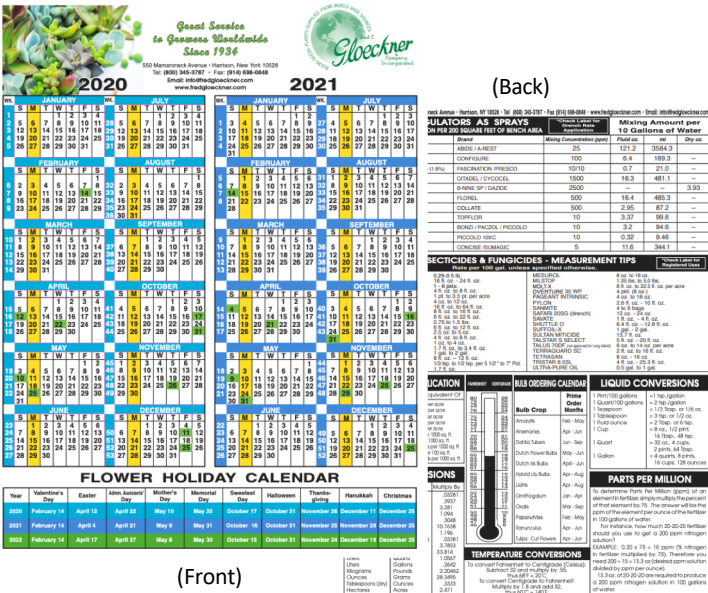


Figure 1. Calendars with production weeks and major holidays can assist with crop scheduling. Photo Source: Fred C. Gloeckner Company; Credit: W. Garrett Owen.



Figure 2. A guide to most common disease of 25 floriculture crops. Photo Source: Greenhouse Product News; Credit: W. Garrett Owen.

different floriculture crops. The file size is large, but it is the best free resource available to help you identify the most common diseases.

### 3. Virus Problems?

In 2015, Drs. Nora Catlin and Margery Daughtrey published e-GRO Alert 4.29 entitled, “[A Pictorial Guide to Common Symptoms of INSV in Greenhouse Crops](#)” (Fig. 3). This 6-page guide has 24 photos of impatiens necrotic spot virus (INSV) symptomology. It is a free download from the [e-GRO website](#).

### 4. Bedding Plant Problems?

In 2015, the 3<sup>rd</sup> edition of “**Bedding Plant Troubleshooting: Guide to Disease, Insect, Nutritional, and Physiological Disorders**” (Fig. 4) was published on the iBookstore. This version expanded to include over 100 new diagnostic photographs and highlights a total of 237 disorders. There are chapters on ageratum, begonia (wax), celosia, impatiens, marigold, salvia, snapdragon, vinca, and zinnia disorders. The beginning of each species chapter has a quick touch index for each listed disorder. The 357-page eBook is available from the iBookstore. It can be viewed on an iPad, iPhone, Mac, or on PC in your iTunes account.

Additional crop-specific e-GRO eBooks available include:

#### e-GRO Books

##### Vol. 1 Poinsettia

This book discusses fertility management, and offers a useful pictorial guide to nutrient disorders of poinsettia.

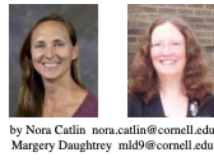
##### Vol. 3 Primula

A pictorial guide to nutrient disorders of Primula.



e-GRO Books (cont.)

- Vol. 5**     ***Plectranthus***  
Cultural and troubleshooting guide covering plant culture information, problem solving, and details about the major cultivars.
- 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. 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. 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*.



**A Pictorial Guide to Common Symptoms of INSV in Greenhouse Crops**

*INSV can cause a broad range of symptoms and symptoms can be quite variable on different hosts. In this e-Gro Alert, we've compiled for reference a few photos of symptoms of INSV on plants that are commonly affected.*

Impatiens necrotic spot virus (INSV) is one of the most commonly encountered plant viruses in greenhouse production. This virus has an incredible large host range, known to infect over 300 species from 50 plant families. Hosts include many commonly grown ornamentals—and also weeds and vegetables such as tomato and pepper.

The first step in managing this virus is to recognize it. INSV can cause a broad range of symptoms and symptoms can be quite variable on different hosts. Sometimes symptoms can vary a great deal within a plant species. This often results in the symptoms going unnoticed, or misinterpreted.



*INSV on Impatiens*

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Figure 3. A pictorial guide to common symptoms of impatiens necrotic spot virus (INSV) in greenhouse crops. Photo Credit: W. Garrett Owen.

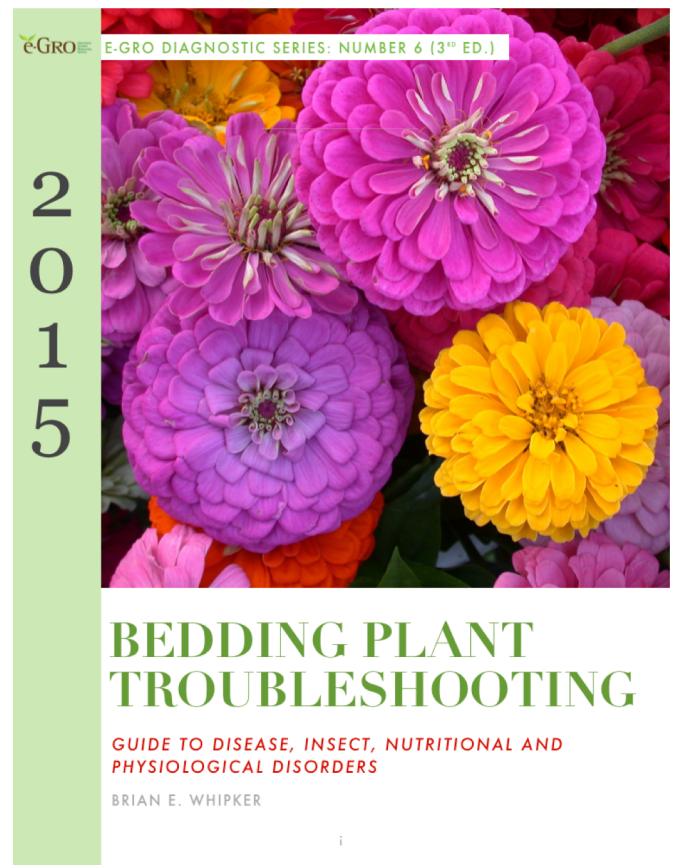


Figure 4. A diagnostic iBook highlighting common disorders of ageratum, begonia (wax), celosia, impatiens, marigold, salvia, snapdragon, vinca, and zinnia. Photo Credit: W. Garrett Owen.



## 5. pH Problems?

In 2015, Brian Whipker published e-GRO Alert 4.02, “[pH Management: Problem ID, Optimal Ranges, and Corrective Procedures](#)” (Fig. 6). This guide has a mega-table that continues over 12 pages of optimal pH ranges for most floriculture crops. Photos are also provided to help you identify low and high pH disorder.

Need to correct low or high pH or electrical conductivity problems or disorders? Growers can download e-GRO Alert 7.02, “[Corrective Procedures for Modifying Substrate pH and EC](#)” (Fig. 7). This Alert provides step-by-step instructions on how to apply corrective procedures.

Growers are encouraged to download, “[Fert, Dirt, and Squirt: Nutritional Monitoring of Greenhouse Crops](#)” (Fig. 8) which is a compendium of nutritional monitoring factsheets covering popular seed and vegetatively propagated annual bedding plants, potted plants, and edible and vegetables plants.

## 6. Insect Problems?

An iBook for identification of common insect pests, “[Insect and Mite Pests of Floriculture Crops: Identification Guide](#)” is now available (Fig. 8). The free iBook was funded with a grant from the Fred C. Gloeckner Foundation. The iBook can be viewed on iPads, iPhones, Macs and PC Computers (via your iTunes account). This version has 91 pages and covers aphids, fungus gnats, leafminers, shoreflies, thrips, and whiteflies.

## 7. Need an Overall Greenhouse Resource Guide?

The team of floriculture Extension specialists at the University of Maryland



Figure 5. A guide to pH management, emphasizing problem identification, optimal pH ranges, of crops, and corrective procedures. Photo Credit: W. Garrett Owen.

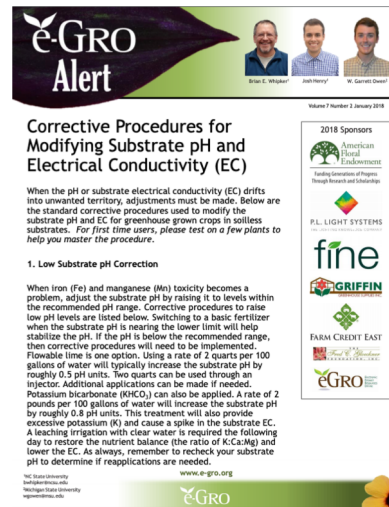


Figure 6. A guide to corrective procedures of high or low substrate pH and electrical conductivity. Photo Credit: W. Garrett Owen.



Figure 7. An all-in-one nutritional monitoring book with crop-specific factsheets covering popular seed and vegetatively propagated annual bedding plants, potted plants, and edible and vegetables plants. Photo Credit: W. Garrett Owen.



Have updated their [Total Crop Management for Greenhouse Production](#) guide (Bulletin 363, Revised 2016; Fig. 9). This guide focuses on IPM and nutrient management. The major sections include: 1. IPM for Greenhouse Operations; 2. Insect and Mite Management; 3. Disease, Weed, and Algae Management; 4. Cultural, Water and Fertility Management; and 5. Greenhouse Structures and Environment. The 449-page guide is a free download for the PDF version.

### 8. Figuring Out PGR Rates for Herbaceous Perennials?

There are two guides sponsored by [Fine Americas](#) and published by [GrowerTalks](#) magazine which helps growers determine PGR application rates.

Dr. Joyce Latimer of Virginia Tech has created a guide to [Plant Growth Regulators for Containerized Herbaceous Perennial Plants](#) (Fig. 10). The 76-page guide contains 11 articles, recommended rate tables by species, and a mixing table. The update 2020-2021 is now available.

### 9. Figuring Out PGR Rates for Annual Bedding Plants?

Dr. Brian Whipker of NC State has updated the [2019-2020 Plant Growth Regulators for Annuals](#) guide (Fig. 11). The 68-page guide lists recommended rates for most floriculture crops and contains 10 PGR related articles, rate tables by species, and a mixing table.

### 10. How Many Pots Does a Bag or Bale of Substrate Fill?

For our research studies, we work in smaller volumes of substrate. We need to figure out how many bags are needed to fill the number of pots in an experiment.



Figure 8. A diagnostic and identification iBook guide highlighting common insect pests of floriculture crops. Photo Credit: W. Garrett Owen.



Figure 9. A guide focusing on integrated pest management and nutrient management among other aspects of greenhouse production. Photo Source: University of Maryland Extension; Credit: W. Garrett Owen.

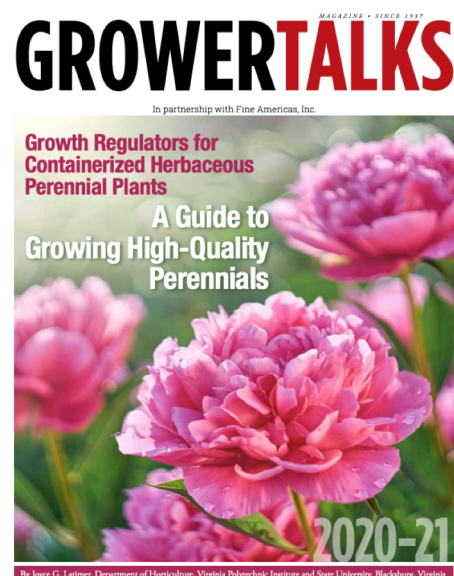


Figure 10. A guide to plant growth regulators of herbaceous perennials. Photo Source: GrowerTalks; Credit: W. Garrett Owen.

The calculations are time consuming to figure out. SunGro has solved this and provided a cheat sheet. They have developed a 1 page PDF entitled “[What One Bale or Bag Fills](#)” (Fig. 12). For most any sized pot or inserts, an approximate number that can be filled is listed. There are also handy tables for Fertilizer Calculations, Drench Rates, Spray Coverage, and Common US to Metric Conversions.

Berger has also designed a web-based “[Potting Chart](#)” (Fig. 13) that allows you to either calculate the number of bags or pallets required to fill your desired container(s) or calculate the number of containers you can fill with a given number of bags or pallets. They also give the option to select container type and manufacture, shape, size, quantity, and if the substrate is pre-moistened or not.

Also remember that the e-GRO website has web-based rate apps for [Insect](#), [Disease](#), and PGR ([Annuals](#) and [Perennials](#)), and [Nutritional Monitoring](#) (Fig. 14). These apps require a connection to the internet. In addition, there is the [PGR MixMaster](#) (Fig. 15), which can help you calculate how much or the volume of PGR concentrate to mix with water to obtain the desired concentration and final solution amount.

The above list is a good start of turning your tablet into a greenhouse resource. This will increase the functionality of your tablet and help you become a better problem solver this spring.

# GROWERTALKS

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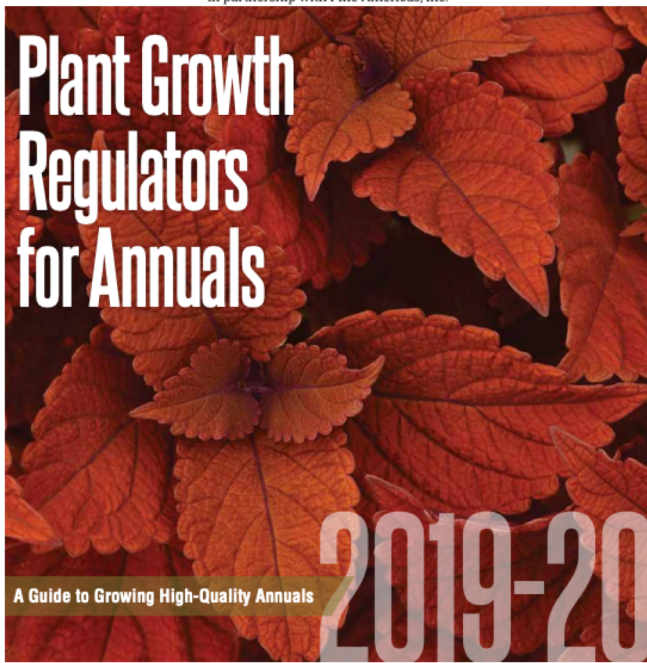


Figure 11. A guide to plant growth regulators of annual bedding plants. Photo Source: Fine Americas; Credit: W. Garrett Owen.

**sunagro** HORTICULTURE **What One Bale or Bag Fills**

Pot Size	Pots per 3.8 c/bale	Pots per 2.8 c/bag
2.5"	1550	620
3"	900	360
4"	363	145
5"	195	78
6"	105	42
8"	50	20
10"	24	9.5
12"	14	5.4

Pot Size	Pots per 3.8 c/bale	Pots per 2.8 c/bag
2.5"	1313	525
3"	875	350
3.5"	525	210
4"	325	130
4.5"	275	110
5.5"/5"	110	44

Pot Size	Pots per 3.8 c/bale	Pots per 2.8 c/bag
6"	125	50
8"	58	23
10"	30	12
12"	16	6.5
14"	10	4

Pot Size	Pots per 3.8 c/bale	Pots per 2.8 c/bag
6"	128 cell	65
8"	288 cell	98
10"	405 cell	110
12"	512 cell	113

Pot Size	Pots per 3.8 c/bale	Pots per 2.8 c/bag
6"	50	20
8"	45	18
10"	63	25
12"	100	40
14"	125	50
16"	150	60

Pot Size	Pots per 3.8 c/bale	Pots per 2.8 c/bag
6"	40	16
8"	15	6
10"	8	3

Pot Size	Pots per 3.8 c/bale	Pots per 2.8 c/bag
6"	58	23
8"	28	11
10"	23	9

Pot Size	Pots per 3.8 c/bale	Pots per 2.8 c/bag
6"	150	60
8"	70	28
10"	38	15
12"	23	9

Pot Size	Pots per 3.8 c/bale	Pots per 2.8 c/bag
6"	138	55
8"	65	26
10"	35	14
12"	21	8.5

Pot Size	Pots per 3.8 c/bale	Pots per 2.8 c/bag
804	43	17
806	50	20
1203	50	20
1204	53	21
1801	40	16
1802	43	17
1204IS	43	17

**Fertilizer Calculations**  
Pounds (oz) of fertilizer per 100 gallons of solution

Desired ppm N	20% N	18% N	15% N
400	1.67 (27)	1.86 (30)	2.22 (35)
300	1.25 (20)	1.39 (22)	1.67 (27)
250	1.04 (17)	1.15 (19)	1.39 (22)
200	0.83 (13)	0.92 (15)	1.11 (18)
150	0.63 (10)	0.70 (11)	0.83 (13)
100	0.42 (6.7)	0.47 (7.5)	0.56 (9.0)

**Drench Rates for Soilless Media**

Drench Definition	Volume of solution (liters of solution)	Percent of dry substrate
Sprinch, very light drench, heavy spray	25	2.5
Light drench	50	5.0
Moderate drench - STANDARD	100	10.0
Heavy drench	150	15.0
Very heavy drench, full saturation	200	20.0

**Spray Coverage**

Spray Definition	Acre	100 sq ft	10 sq meter
Very light, surface spray (glistening)	50 pints	0.125 gallons	0.5 pints
Light spray	100	0.25	1.0
Moderate spray - STANDARD	200	0.50	2.0
Heavy spray, full plant coverage	300	0.75	3.0
Very heavy spray, full coverage, dripping	400	1.00	4.0

**Common US to Metric Conversions**

1 pound/100 gallons = 1.2 g/liter = 4.56 g/gallon  
 1 pound/cubic yard = 0.6 g/liter of mix = 0.6 kg/liter of mix = 16.8 g/cubic foot of mix

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Figure 12. Cheat sheet to determine how much substrate from a compressed bale or bag can fill growing containers. Photo Source: SunGro; Credit: W. Garrett Owen.



Calculate the number of bags or pallets required to fill your containers  
 Calculate the number of containers you can fill with a given number of bags or pallets

**Product**  
 Serie : Please make a choice  
 Family :  
 Product :

**Container**  
 Type : Please make a choice  
 Shape :  
 Size :  
 Quantity :

Water added :  Yes  No



Figure 13. A web-based potting chart to calculate how much substrate is require or can fill growing containers. Photo Source: Berger; Credit: W. Garrett Owen.

**eGRO** Electronic Grower Resources Online  
**MOBILE ADVISOR TOOL**

Disease Advisor      GROzone Tracker      PGR Advisor Floral Crops  
 Insect & Mite Advisor      Nutritional Monitoring Advisor      PGR Advisor Herbaceous Perennials

Figure 14. Web-based apps provided by e-GRO to help with insect, disease, plant growth regulation, and nutritional monitoring. Photo Credit: W. Garrett Owen.

**PGR MIX MASTER**

Select PGR Type

Unit of Measure:  US Standard  Metric

Enter final solution amount

Enter PGR concentration

XXXX gallons of water  
 XXXX Fl. Oz of PGR

Note: Always add PGR to tank first and then add water to bring to final volume.

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e-GRO Electronic Grower Resources Online fine

**PGR MIX MASTER**

Piccolo 10XC (4.0%)

Unit of Measure:  US Standard  Metric

4

5

4.00 gallons of water  
 0.06 Fl. Oz Piccolo 10XC (4.0%)

Note: Always add PGR to tank first and then add water to bring to final volume.

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Figure 15. (Left) Example of the PGR MixMaster interface which allows greenhouse growers to easily calculate PGRs concentration. (Right) 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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