



by Paul A. Thomas, and Jean L. Williams-Woodward
The University of Georgia

Scouting Those Plug Trays Is Essential!

After seeing insect and disease issues very early this season, it would be timely to review scouting plug trays. A good program can reduce your costs, losses and headaches significantly. Co-author Dr. Jean Woodward and I explain how to approach this methodology

“System-Wide Shrink” Begins With Your Plugs!

Growers are in the surge of plug tray deliveries this month, and with all those plug trays comes an increased workload and an absolutely certain amount of craziness among the growing staff to get things planted. It is at this stage of production that some of the largest and most costly mistakes are made. I wrote about this in an E-Gro Alert last year (See: http://www.e-gro.org/pdf/EGRO_3_11.pdf). A few folks have asked for more detail regarding scouting plug trays. Given issues I've seen lately, it's time.

The vast majority of plug trays are clean and meticulously grown, but then again, things happen. During a recent visit to a fairly well-run greenhouse, I happened to be able to look over recently arrived plug trays. Almost immediately I saw some issues. Before I could say anything, the hourly worker grabbed the tray and brought it to the planting line. With him went a tray infested with whiteflies. I watched as the staff

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Is this a virus, an insect problem, or phyto-toxicity from a recent spraying? Would you plant this without checking?

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CONTRIBUTORS

Dr. Nora Catlin

Floriculture Specialist
Cornell Cooperative Extension - Suffolk County
nora.catlin@cornell.edu

Dr. Chris Currey

Assistant Professor of Floriculture
Iowa State University
ccurrey@iastate.edu

Thomas Ford

Commercial Horticulture Educator
Penn State Extension
tgf2@psu.edu

Dan Gilrein

Entomology Specialist
Cornell Cooperative Extension - Suffolk County
dog1@cornell.edu

Dr. Joyce Latimer

Floriculture Extension & Research
Virginia Tech
jlatime@vt.edu

Dr. Roberto Lopez

Floriculture Extension & Research
Purdue University
rglopez@purdue.edu

Dr. Neil Mattson

Greenhouse Research & Extension
Cornell University
neil.mattson@cornell.edu

Dr. Rosa E. Raudales

Greenhouse Extension Specialist
University of Connecticut
rosa.raudales@uconn.edu

Dr. Beth Scheckelhoff

Ext. Educator – Greenhouse Systems
The Ohio State University
scheckelhoff.11@osu.edu

Lee Stivers

Extension Educator – Horticulture
Penn State Extension, Washington County
ljs32@psu.edu

Dr. Paul Thomas

Floriculture Extension & Research
University of Georgia
pathomas@uga.edu

Dr. Brian Whipker

Floriculture Extension & Research
NC State University
bwhipker@ncsu.edu

Heidi Wollaeger

Floriculture Outreach Specialist
Michigan State University
wolleage@anr.msu.edu

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planted in a frenzy, whiteflies flying everywhere as they handled the plugs and yet the plants went straight to the greenhouse. Later, I asked the head grower if anyone told him of the whiteflies. Nope. He hadn't heard a thing.

It is easily understood what's going on: 1) *Philosophy?* Plugs cost so much money that they should be used at all cost. 2) *What problem?* It is really easy for the harried planting crew not to have the time, training or education to recognize issues or understand their impact. It may not be realistic to expect them to be the gatekeepers. 3) *Not My Problem!* A time-stressed planting crew boss does not care if possible infected plugs or insect infestations get planted...he doesn't have the time ... that's the growers problem. Soon, however, it will be everyone's problem.

On a per-crop basis, any number of issues that could be spotted in the plug tray can easily cause a 1% loss down the line. No biggie? At the end of the money chain that 1% shrink costs you around 26% of the profit that would be attributed to that crop because you must consider the added costs of wasted pots, soil, fertilizer and labor, PGRs and several sprays of insecticide or fungicide to try to remedy the problem once discovered. Don't forget



Coleus plugs infected with virus (INSV) can easily be overlooked by planting crews...It is best to have an inspector assigned whose job it is to look for this!

the overhead costs attributed to that space and the lost opportunity to grow something else. Now ask yourself, what if it is 5% or 10% of the crop? What if that one plug tray that had just a few sickly plugs with a bacterial leaf spot wiped out 40% of the crop that was on a boom sprayer system. What if your profits were wiped out because no one told the grower, and/or your busy staff didn't catch it in time?

The expense is actually huge. It's one of the more hidden but preventable areas that cause profit shrinkage. It can be documented. It can be reduced. There is a solution to reduced and mitigate the issues.

Establish A "Lead" Plug Inspector

There is no way around this. You need one person whose job it is to scout trays when they come in. Most employees will hate this job, so find that one person in the company that is meticulous and cares. This is a temporary, "as-the-shipments-come-in" job. You do not need to hire a new employee. One company appointed the head person in charge of spraying to do this. That person has a vested interest in minimizing his/her future work. Not a bad idea.

Establish A Point of Entry Holding Zone

Most plugs come in through the shipping/delivery dock. From there, I have seen them go directly to the greenhouse, a production line, an automated planting machine, the head grower's office and in one case, into an out building designated for new arriving materials. Plugs should be inspected before they enter the growing spaces, planting line and absolutely positively before they go into an automated planting machine that potentially can spread the issue across

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hundreds of plants. Where in shipping you set up doesn't matter...just have a table set up that is easily accessed when shipments come in.

Provide A Strong Free-Hand Light Source And Hand Lens to The Inspection Station.

Shipping docks universally have minimal lighting. Sure, a person can see what's going on easily on a macro-scale but when it comes to inspection of plugs, the subdued lighting in a shipping dock doesn't cut it. Have a high intensity LED lamp at the ready, and a decent hand lens for looking at roots when something doesn't look right with leaves. Make sure the inspector wears gloves. Latex or nitrile gloves can be dipped in disinfectant between boxes if issues are found. Make sure the gloves are discarded when the delivery is processed.

Establish An Inspection Protocol and Picture Guide

All plug shipments come through the inspection station (A long table for opening boxes with a light at one end. No plug tray goes to the planting crew that hasn't been inspected. This takes no more than 2 minutes per box more time than the unpacking and passing to planting process already used.

1). Inspector notes condition of plugs in box. Upset, crushed? No notation needed for good condition trays.

2). Inspector looks over the tray under the spotlight, from different angles. Looks for dead/off color leaves.

3). If found, Inspector pulls any plugs that do not look normal to the other plugs in the tray. Under the spot light, the roots and leaves are closely inspected. Save suspect plugs in a sealed plastic bag in the refrigerator for evaluation by a University or private plant disease diagnostic laboratory, if needed.

4). Inspector sends electronic message to upper management with issues found in that delivery, and plug tray numbers. The inspector may be authorized to set aside trays with potential bacterial and viral issues for management to review before sending to a lab. (See "jump-reporting" below). What is important is that if the issue is severe enough that a claim may be needed to be filed, the plugs should NOT be brought into the production range at any time. This eliminates the "the issue came from your greenhouse" when claims are made.

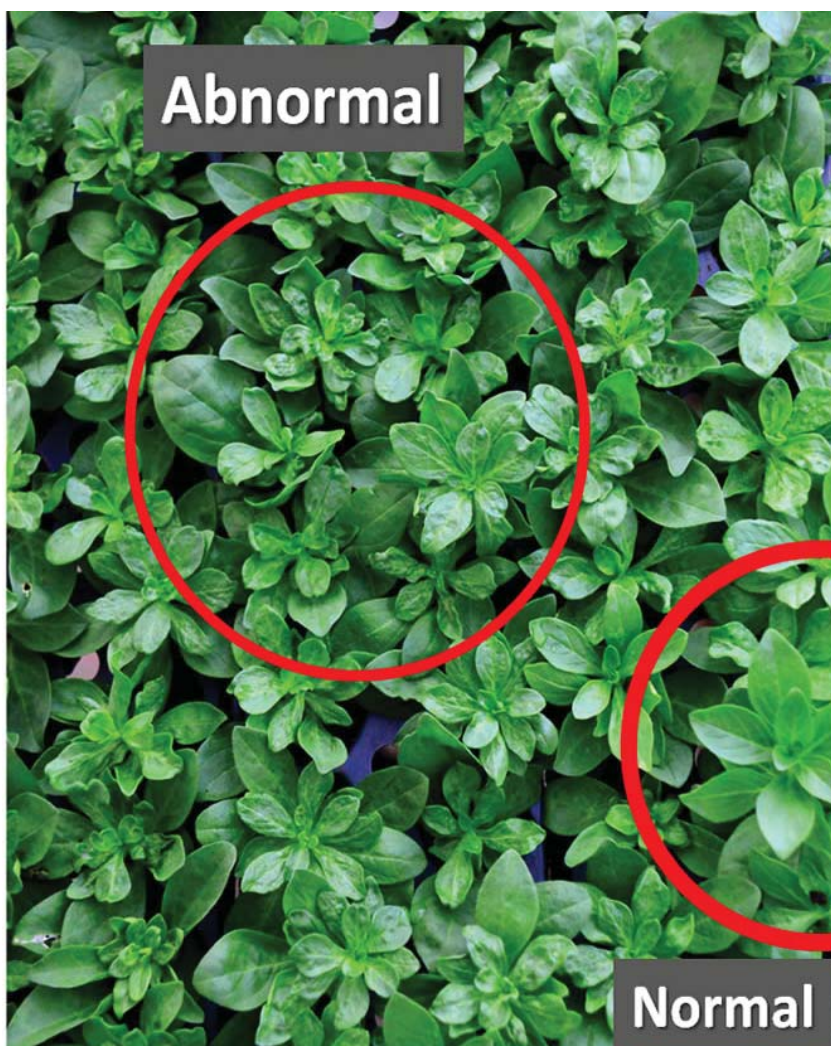
5). There are in-house testing kits available for some viral, bacterial, and fungal/oomycete pathogens that can be easily conducted by inspectors after minimal training. Tests work by detecting pathogen antibodies similar to how a home pregnancy test works. ImmunoStrip® (Agdia Inc.; www.agdia.com) and lateral flow devices (Pocket Diagnostic®; www.pocketdiagnostic.com) are two examples. Tests are available to detect common viruses on ornamentals (TMV, CMV, Potyvirus, INSV, TSWV, Hosta Virus X), bacterial pathogens such as *Xanthomonas hortorum pv. pelargonii* (bacterial blight of geranium), and fungal/oomycete pathogens (*Phytophthora sp.*). Cost varies, but it is less than sending a sample to a plant disease diagnostic laboratory and

results are provided within minutes. The important thing here is to plan ahead and have the kits available before the shipment of plugs begins.

6). Take images as you go and make an inspection guide for the future. Having images will help new inspectors and old stay focused on what to look for. It also helps document the plug tray condition when it arrived if something comes up later in the crop cycle.

Have A "Jump" Reporting/Flagging Policy For Newly Planted Plugs.

Give the inspector the authority and mandate to let the head grower/owner know potential issues have been found in X plug trays. Had I not been introduced to this and seen it work, my "chain of command" background would not have thought it would be appropriate or effective. The idea behind this is based in reality. Range growers are swamped with information and are inundated with deadlines and tasks, including their own scouting. They are worried about



In a perfect digital world, the inspector would take an image of the plug tray in question and send it, along with the bar code, to the head grower. On modern smartphones, this takes all of 12-15 seconds. As easy as this sounds, it's actually very powerful.

1). It makes a legally admissible time-stamped photo indicating when the problem was discovered.

2). It provides a sharable image to share with others in the company to aid in decision making.

3). It provides another entry into the library, or plug issue guide card, the company provides to the inspector(s) and planting crews.

what's in front of them and what's due in shipping next week. During planting rushes, verbal messages from a subordinate in shipping don't sink in. Use electronic media or however you transmit orders in your company to notify the boss of the "issues." This policy gives upper management the heads up and allows them to pass the "watch out for this" down to the growers. Range growers pay attention when the head grower or boss sends them a communiqué. Quite often it can take 10 days for a diagnosis of virus or bacterial disease to come back from a professional lab. Under the jump policy, healthy-looking plugs planted from trays with suspect or "watch" issues are flagged with a bright purple color coded wire flag and scrutinized for problem spread or expression - by the head grower! If results are negative, the flag is pulled. If positive, remediation can begin to prevent/reduce spread. Try it, It works.

Establish a Code System For Flagging And Notification...Make It Fast And Easy!

Here is an example of suggested listings and labeling for the publically visible purple flag. That's right, you don't want the flags to transmit to visitors or sales reps from other companies what's up in your greenhouse. Make your own code!

Upset Box: Code 10-6

Plugs scattered in box, out of the tray, likely some broken stems, broken petioles. Invitation to disease.

Growers can take several steps to reduce likelihood of the damaged tissues getting infected.

Dry/Wet Box Code 10-11

This code gives growers an idea of why their planted plugs may have a slow establishment, or non-normal new growth.

Nutritional: Code 10-15

This gives the growers a heads up to make sure their first fertilizations have remedied the situation.

Insect: Code 10-34

Clearly essential, especially valuable if the inspector knows his or her greenhouse insects. Clearly a sound head's up with an easy fix can be obtained here.

Bacterial: Code 10-56

Gives the growers fast warning to inspect and consider if watering and fertilizing should happen before a preventative drench. Bacterial diseases are virtually impossible to successfully manage once present. If plugs are infected with a foliar bacterial pathogen, discard them. Bacterial pathogens are easily spread through mechanical planters and effective management options are few. Even with the best water management and bactericide use, losses can exceed 50%.

Fungal: Code 10-78

Easily sends the message that potential fungal issues exists. Likely this code will trigger a preventative broad-spectrum fungicidal spray earlier in the production cycle than usually planned. Look at both roots and foliage. Applying a fungicide drench just after transplanting can limit the spread of root pathogens such as *Thielaviopsis basicola* and *Pythium spp.*

Possible Virus: Code 10-99

Any Code 10-99 should be pulled before planting and discussed with management. You need a quarantine site, a lab that does rapid testing and a person designated to get the sampled shipped overnight. Anyone remember a certain TMV virus outbreak that caused tens of thousands of plants to be destroyed a few years ago? Ok. If you can catch it, and true, not many viruses express at this stage, it can potentiall save you hundreds of thousands of dollars in legal, operational and remediation costs. If it is just a few plugs in one tray, take samples, toss the rest of the tray in a sealed plastic garbage bag...do not toss the plugs in the old-plug pile for insects to vector the virus back in the greenhouse. If you have many trays from that cultivar, isolate them if possible and flag them 10-99 until samples clear the lab as negative.

There will always be skeptics that say that this will add time, costs and it's not worth pulling a few bad plugs. I can only respond that given the significant down-strem impact that just a small percentage of shrink can cause, you should be looking at plug scouting as your next area to adjust to increase overall profits.