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Impact of Transplanting Practices on Plant Establishment & Health

Even during times such as these where many growers are operating with limited staff, care on the transplanting line is still critical. Ensure that your transplanting crews are well-trained/informed, make adjustments on the transplanting line as-needed during production, and check recent transplants again once they are out in the greenhouse to ensure crop success.

Introduction. To anyone says greenhouse crop production is just unskilled labor, you obviously have never been part of a well-trained transplanting crew! Properly training staff to plant thousands of plugs and liners both correctly **AND** quickly for hours on end is a process that often spans multiple growing seasons. However, social distancing and safety practices due to COVID-19 have forced many growers to operate with limited staff. This means many experienced members of transplant crews may not have been able to work together and/or were out sick during peak transplanting time. The result of improper transplanting is often crop loss.

During times like these, growers cannot afford additional losses or reductions in sales. Maximizing health and quality of crops is essential, and setting your plants up for success in their finished containers starts with good transplanting practices.

This article will cover: **1)** Key considerations and things to pay attention to when transplanting, and **2)** Highlight some of the transplanting-related issues that growers may encounter or are already dealing with this spring.

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Important Factors. Transplanting plugs and liners is a straightforward process but requires more care and attention than many people realize. Several key factors must be considered, some which require management before your staff ever pick up a tray of seedlings, including:

- **Species:** Certain plant taxa are more tolerant of having their crowns and/or stems buried. For example, if dahlia or tomato plugs/liners become leggy, they can be planted deeper to counteract their top-heavy growth habit. Species such as tuberous begonia, however, are not receptive to deep planting, and slow growth or death due to disease will likely be the result of excessive burying of stems.
- **Plug/liner culture:** During Stage 4 of plug and liner production (bulking and toning), irrigating with clear water to flush out excess fertilizer salts is often recommended. If not leached adequately, seedlings can be slightly brittle/tender and be more prone to breaking during transplant. This can negatively affect post-transplant establishment and predispose plants to pathogen infection.
- **Substrates & container filling:** Especially if transplanting is being done by hand, containers filled too firmly with media can be more difficult to dibble (term for making a hole in the middle to put seedlings and liners into), and cause transplanters to exert more force than usual to push plugs and liners into their containers. This can result in accidental damage. Overfilling containers with substrate can cause transplants to become buried as vibrations on the cart during transit to the greenhouse causes substrate to settle over the top of plants.



Fig. 1. Post-transplant, most species take ~7–10 d for roots to reach the sidewalls of their new containers. Though these zonal geraniums (*Pelargonium X hortorum*) appear healthy above the substrate, roots have still not reached the container sidewalls 14 days after transplant. Planting deeper than usual and tight substrate fill were likely the cause of the slow growth observed. Photo by Nicholas J. Flax



Fig. 2. If young plants are over-fertilized during later stages of production, the resulting lush, tender growth can predispose young plants to damage during transplant. These zonal geranium (*Pelargonium X hortorum*) plugs were fed heavily to push growth and keep them on schedule but were very tender and broke easily during transplant. Inform transplant teams if extra care is needed to handle plugs or liners in order to reduce post-transplant crop losses. Photo by Nicholas J. Flax



Fig. 3. These snapdragon (*Antirrhinum majus*) plugs were planted into containers filled with more substrate than needed. As a result, many of these plugs were partially buried even before they reached the end of the conveyor belt. Many of these seedlings will not survive if left covered. Photo by Nicholas J. Flax

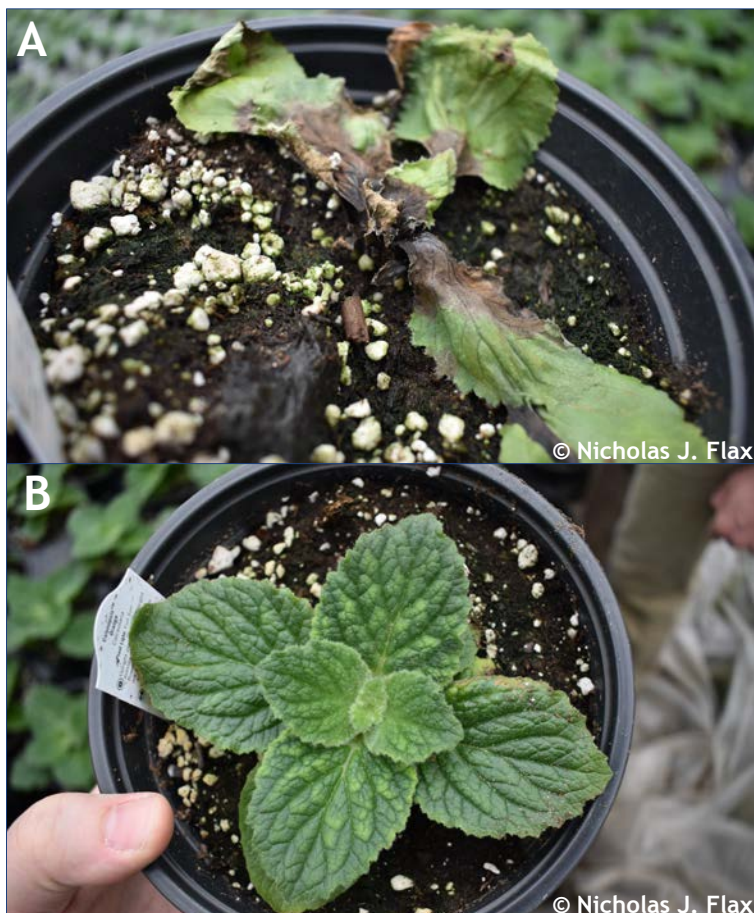


Fig 4A & B. After containers for these calceolaria (*Calceolaria hybrida*) were filled, transplanting duties were delegated to two transplanting crews (#1 & 2). Crew #1 dibbled (formed holes in which to transplant liners) much deeper than Crew #2. As a result, many of the liners transplanted by Crew #1 died due to pathogen infection on the buried portion of the stem (Fig. 4A). The group of plants handled by Crew #2, which were dibbled and transplanted appropriately, resulted in healthy, uniform plants (Fig. 4B). Photo by Nicholas J. Flax



Fig. 5. This grower appeared to be doing everything correctly when their crew planted these strawberry (*Fragaria spp.*) crowns. However, by the time these newly transplanted strawberries reached the greenhouse and were watered-in, many of these plants were buried. As a result, fungal pathogens began causing disease, and many of these plants were dead or dying in their containers within a week of transplanting. Photo by Nicholas J. Flax

Important Factors (cont.)

- **Dibbling:** If containers are dibbled too deeply prior to transplanting, plugs and liners can very easily become buried. On the other hand, dibbling too lightly can result in transplants heaving out of their pots when watered (depends somewhat on substrate components) or falling out of containers during transit to the greenhouse. If possible, use some form of automation or dibbling tools to standardize planting depth and ensure transplants aren't buried or fall out of pots before they reach the bench.
- **Initial watering:** Even if plant containers are run through a "water tunnel" post-transplant, the initial irrigation event once containers are placed in the greenhouse will often cause plugs and liners to settle into their substrate even further. Check newly planted material immediately after its first thorough irrigation to ensure that plants are not washed under.
- **Final depth:** The process of container filling, dibbling, sticking, carting, and watering-in varies from greenhouse to greenhouse. Take time to go through newly transplanted crops and assess whether any of these steps in the process need to be adjusted. If errors have been made and plugs/liners were planted improperly, take steps to correct the problem in their finished containers ASAP. This may mean employees have to come back through the crop and lift/settle plugs and liners into the growing medium by hand. Though this is not ideal, it is preferable to losing a large percentage of plants due to crop failure.



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Fig. 6. These 13-inch pots were planted with four New Guinea impatiens (*Impatiens hawkeri*) and an ornamental grass (*Carex*; species unknown). In this group, anywhere from 1–3 New Guinea impatiens were mostly buried after their initial watering-in. Liners will likely die if not unburied, pots will lack uniformity, and many of these pots will become pest/disease reservoirs and be discarded. Photo by Nicholas J. Flax

Summary. If you are looking to save some time and labor this spring season, seek ways to tighten your belt that do not sacrifice precision and consistency on the transplanting line. Remember to take the following steps and precautions in order to avoid crop issues due to mismanaged transplanting:

- 1) Thoroughly train new or less-experienced members of your transplanting crews, and have their supervisor keep a close eye on their work throughout a given shift.
- 2) Assess the health and quality of plugs and liners before sending them to the planting lines. If young plants are “soft”/tender, be sure to alert your planting crews in order to reduce potential damage during transplant.
- 3) Be aware of which species can tolerate covering of stems/crowns when transplanting. In general, most species with a rosette-type growth habit (leaves unfolding from central, basal growth point) do not prefer stems/crowns being buried.
- 4) Adjust and dial-in pot/flat fillers carefully, especially when switching over to a new container configuration or plug/liner size. Overfilling or accidental compaction of growing media in containers will likely have a negatively impact the transplanting process and crop establishment times.
- 5) If your operation uses automation to transplant plugs/liners, be sure to keep a close eye on planting depth. Make necessary adjustments on-the-fly if planting depth and position begin to drift from their original setpoints.
- 6) Go through crops in the greenhouse that have been recently transplanted, set down, and thoroughly watered-in. Adjust plug/liner depth in finished containers as much as possible to improve the rate of establishment and reduce the likelihood of crop failure due to pathogens (stem/crown rot).

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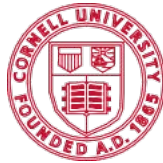
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