Evaluation Of Two Growing Systems For Cut Snapdragon Production: Tray vs. Ground-Bed

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Cut snapdragon (*Antirrhinum majus*) production has been on the rise in the US. Growers are finding that cut flowers can increase cash flow during periods of low bedding/pot plant sales and in some cases, provide full-time work for their employees. Many growers believe that the traditional, ground bed method (Fig. 1) produce the highest quality snaps. A few growers have grown snaps in raised benches (Fig. 2). Growers are looking new ways to make their growing facilities work harder in today's highly competitive market. This study explored the potential for using the greenhouse gravel or cement floor for different and more profitable crops. Practicality and economical feasibility were important criteria in the study which evaluated the quality of snapdragons grown in trays (Fig. 3) versus those grown in ground beds and aimed at identifying any differences in quality due to tray size.

How we grew the plants

Five snapdragon crops were grown in a commercial glass covered greenhouse located in Columbus, Ohio. Plants were grown in a single ground bed. The experiment had five treatments. Treatment one consisted of plants grown in small trays (16" x 12" x 3") on top of the ground bed. Treatment two consisted of small trays that rested on top of a turned-over tray. This upside-down tray served as a barrier to the ground bed so that roots could not grow through the bottom of the tray into the ground bed. Treatment three consisted of snapdragons grown in larger trays (19.5" x 13.8" x 3.7") laid directly on top of the ground bed. In treatment four, plants were grown in large trays resting on top of a turned-over tray. Treatment five consisted of snapdragons grown directly in the ground-bed and served as a control for the experiment since this has traditionally been the most commonly used method of production. Both small and large trays were used to observe any differences among snapdragons due to increased medium volume and depth. While the large trays were only 0.6" deeper, their volume was approximately 60% larger than the small ones. The in-ground bed plots were of equal size (area) as the small trays.

Five different plantings were conducted over 1.5 years, and three snapdragon cultivars (Potomac Pink, Potomac Light Pink, and Winter White) appropriate for the particular time of year when the plantings took place were studied in the
experiment. Common snapdragon cultural practices were used.

Plugs were planted in trays using a soil-less medium (LC1; Sun Gro Horticulture, Inc). The ground bed medium consisted of a combination of soil, peat moss, bark, styrofoam, and haydite. This medium was pasteurized by the commercial grower after two or three plantings, depending on observed disease levels.

An irrigation system consisting of three separate watering lines (Fig. 4) was developed for this experiment to satisfy the specific needs of treatments: one line was used to water small trays, a second line watered the large trays, and a third watered the ground-bed-grown snapdragons and were adapted to meet the watering needs of the individual trays.

Plants received a liquid fertilizer of 15-16-17 at a 250 ppm N concentration as a starter fertilizer. The finishing fertilizer contained 15-5-15 also at a concentration of 250 ppm N. Due to a more frequent watering schedule during the summer months, fertilization was usually applied every other watering. However, the longer intervals between watering during the cooler months required fertilization each time.

Plants were supported by three levels of wire mesh. Temperatures throughout the experiment ranged from 50 degrees F nights to 64 degrees F days in the winter months, to 70 degrees F nights to 100 degrees F days in the summer months.

Stem length, flower spike length, stem diameter at the top, middle, and bottom of the stem, and dry weights of the spike, stem, and leaves from sample plants were measured. Dry weights of the flower spike, leaves, and stem were measured after these parts had dried for 72 h at 135 degrees F. The flowering shoots were graded according to standards used by the commercial grower, which are a modified version of the Society of American Florists' (SAF) standards.

What results did we get?

- We found that the quality of flowering shoots from snapdragon plants grown in small or large trays was not significantly different from plants grown in ground beds.
- For all but one planting, there were no significant differences between the snapdragons grown in ground beds and those grown in trays on the ground.
- Tray size did not have an effect on snapdragon quality in these experiments.
- Very few roots were observed growing into the ground in the on-ground treatments.
- Flowering shoot stem diameter did not differ from the on-ground tray plants. Flower spike length, and days from planting to harvest were not affected by growing method. As an example, we are showing in Fig. 5 and Fig. 6 results of shoot dry weight and shoot length (two important characteristics of flower quality) for the cultivar Potomac Pink.

What does it mean?

Although tray or container production has been used by some snapdragon growers, this is to the best of our knowledge, the first research report comparing container with ground bed production. Snapdragon quality from plants grown in flats on the ground can be of similar to those grown in ground-beds. Snapdragons raised in trays (separated from the ground) also produced salable flowering shoots.
but of lower quality than those from trays located on the ground. The reason for the quality difference will need to be explored in future work. We speculate that higher growing mix temperatures and faster drying of the growing mix in raised containers may be the cause. It is very important to minimize water stress when growing snaps in flats!

Growers may want to try this alternative method of snapdragon production because a trays can be quickly removed from the greenhouse floor after snap harvest and a new container crop (e.g., bedding plants) can be promptly moved in. This gives growers more flexibility with their annual crop schedule. You may ask: How about support for the flowering stems? Yes, it is very important but our experience is that growers who are using this method have very light support systems that can be removed easily from the greenhouse before a new crop is moved in.
Fig. 1. Snapdragons grown in ground beds.
Fig. 2. Raised beds are used by some growers to grow snapdragons.
Fig. 3. Snapdragons grown in trays directly on top of the greenhouse floor.
Fig. 4. Trays of different sizes, lifted and directly on the bed's floor and the three irrigation lines.
Fig. 5. Shoot dry weight for each of the five treatments.
Fig. 6. Shoot length for each of the five treatments.