HS814

UF UNIVERSITY of FLORIDA
IFAS Extension

Bigger Is Actually Better:A Study of Transplant Container Cell Size[1]

Charles S. Vavrina[2]

Bigger Is Actually Better

The recent trend in vegetable transplant tray design has been toward more cells per tray. More cells per tray means more plants per house, and more plants per house means greater production efficiency. But it also means a smaller cell volume per plant. We have all heard that a "root-bound" plant is more problematic than an actively growing plant. So why would we want to produce plants in smaller and smaller cells?

We posed this question last fall in a study on fresh market tomatoes. We chose 26 cc trays with 200 cells, 38 cc cells(150), and 46 cc cells (72) and grew the seedlings for five weeks. At field planting, plants grown in the larger cells were considerably larger than those grown in the smaller cells in almost every respect (see Table 1). This growth difference continued for about 45 days in the field, at which point plants from the smaller cell sizes appeared to catch up.

Figure 1. Bigger cells mean bigger plants, and that increased growth continues after transplanting, according to research by Charles Vavrina of the University of Florida and others. Some researchers have had success with plugs as large as 12-inches that were grown in 4-inch pots.

Colorful Results

The trial was designed to let fruit color develop as a measure of maturity. At first harvest, 62% of the fruit from the 72-cell flats had attained some level of color compared to 55% from the 150-cell flats and 52% from the 200-cell flats. This advanced maturity was evident in all size grades (medium, large, and extra-large). Overall yield for two harvests showed

1. This document is HS814, one of a series of the Horticultural Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date June 2001. Reviewed April 2008 and March 2011. Visit the EDIS website at http://edis.ifas.ufl.edu.

2. Charles S. Vavrina, professor, Horticultural Sciences, SWFREC-Immokalee, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida Gainesville, 32611

no difference due to cell size in the weight of fruit produced. However, the 72 -cell flats produced a few more large fruit than the other cell sizes, which may again reflect advanced maturity. Earliness is an advantage when trying to hit a market window.

Our data may not be very dramatic, but it adds to the information on the benefits of larger cell size noted around the country in numerous crops over the past 30 years. Table 1 lists eight notable studies where researchers compared growing transplants in cells of varying volume. In most of the studies, transplants grown in bigger cells led to significantly increased early and/or total yield. The trend toward higher yield with larger cells was also noticed in the trials that did not show statistically based differences. All trials exhibited larger transplant at planting when larger cells were used.

Size Matters

Why is bigger, better? Researchers have suggested a general reduction in stress, greater availability of water and fertilizer, unrestricted root growth, and greater shoot development as possible answers. Also, more rapid field growth of the plants from larger cells aids in their ability to combat and resist insects, diseases, and other mechanical or physical stresses.

Larger cell sizes may add from $ 10 to $ 40 (depending on size) to your cost per thousand, and this becomes costly for crops like pepper where the planting density is high. However, in crops such as tomato or watermelon, the increase in yield and earliness could cover that small investment up front. Small growers who grow their own transplants would be advised to use large cells simply for the competitive advantage.

So why not try a few trays of a considerably larger cell size than you are using now in a side-by-side comparison on your farm? We think you will agree that this is one case where beigger is better!

Table 1. A summary of 30 years of researching transplant cell volume and yields

crop	Location	Cell Volume (cm3)			Transplant Ht. (inches)			Observed Yields		
Tomato	KY	2-	3-	4-in.pots	7.0	8.0	12	1.0	1.4	1.8 lbs (early fruit/plant)
Broccoli	MN	4	15	31	1.1	1.6	1.9	5.3	5.8	6.7 tons/acre (total)
Tomato	MI	4	19	39	3.9	7.9	8.3	3.6	4.0	8.0 tons/acre (early)
Cabbage	MO	8	28	39	3.9	3.5	4.7	1.9	2.1	2.2 lbs/head
Pepper	KY	6	19	39	7.5	7.9	8.7	0.7	1.0	1.9 tons/acre (early)
Watermelon	GA	19	--	39	--	--	--	23.6	--	25.4 tons/acre (total)
Pepper	Israel	5	35	65	4.7	6.3	6.7	28.0	27.0	28.0 tons/acre (total)
Watermelon	FL	19	31	66	--	--	--	22.0	22.0	23.0 tons/acre (total)

Contact the author for specifics on any or all the studies listed.
Not all data is represented in each study for ease of table format and presentation.