GROWING HIGHER YIELDING BELL PEPPER TRANSPLANTS WITH COMPOST

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Amending field soils with stabilized compost can produce many benefits in addition to the inorganic nutrients contained in the compost. Compost, characteristically high in organic matter, can increase the soil's cation exchange capacity, chelating activity and buffering ability and help reduce compaction and improve water infiltration and retention (Hoitink and Keener 1993). In addition, suppression of soilborne plant pathogens and nematodes has also been observed (Granastein 1997, Hoitink and Fahy 1986). In combination, these beneficial effects often result in enhanced growth and productivity of field crops. Also, compost and/or other organic materials such as tree bark, have been shown to be beneficial in potting mixes. There are numerous reports documenting plant disease suppression in compost-amended potting media (Hoitink, Boehm and Hadar 1993).

In the fall of 2000, an experiment was conducted to determine the effects of compost-amended media on bell pepper transplant growth and on subsequent pepper yields after transplanting to the field.

I. Effects of Compost Amended Media on Transplant Growth in the Greenhouse

Seed of bell pepper cultivar *X3R Wizzard* were planted in styrofoam flats (128 inch cells per flat) on June 24, 2000. Seed were germinated and transplants grown in a greenhouse using current commercial transplant recommendations for production of Bell pepper transplants. The two treatments were: (1) commercial transplant growing media routinely used by the cooperating plant grower to produce bell pepper transplants and (2) the same media amended with 20% by volume high quality compost. The media routinely used by the grower consisted of a proprietary mix of peat moss, perlite and vermiculite without added fertilizer. The grower has had excellent success over many years growing bell pepper plants with this mix.

During the first week after germination, the pepper plants received a fertigation of 13-2-13 at a concentration of 100 ppm nitrogen. No additional fertilizer was applied until after transplanting.

Plant Height and Canopy Width Fifteen Days after Seeding

Fifteen days after seeding (DAS) transplant heights and canopy widths were measured. The average plant height of plants grown in media not amended with compost was 1.23 inches whereas transplants grown in compost-amended media averaged 1.81 inches. The average canopy width of plants grown in non-amended media was 1.99 inches whereas transplants grown in compost-amended media averaged 3.08 inches. Differences in both transplant height and canopy width were highly significant (Table 1).

Plant Height and Plant Stem Diameter Twenty-four Days after Seeding

Twenty-four DAS transplant heights and transplant stem diameters (taken at the base of the plant, level with top surface of media) were determined. The average plant height of plants grown in non-amended media was 1.87 inches whereas transplants grown in compost amended media averaged 3.05 inches. Stem diameter of plants grown in non-amended media was 0.065 inches whereas transplants grown in compost amended media had an average stem diameter of 0.084 inches. Differences in transplant height and stem diameter were highly significant (Table 1).

Plant Growth Measurements Fifty-One Days After Seeding

Fifty-one DAS leaf area, leaf dry weight, stem dry weight, shoot dry weight, root dry weight, and plant height were measured. In all cases, measurements for transplants grown in amended media were significantly higher than for transplants grown in non-amended media (Table 2).

II. Effects of Compost Amended Transplant Media on Transplant Growth In The Field

On August 10th, approximately seven weeks after seeding, plants were transplanted to the field. The pepper crop was grown using plastic film mulch (1.5 mil, black with aluminum tint) and drip irrigation. Bed width was 32 inches and plants were planted in double rows centered on the bed with 18 inches between rows and 14 inches apart in the row. Prior to plastic installation, sufficient lime was applied to bring the pH to 6.3 and 600 lb/acre of 4-8-12 was applied. Throughout the growing season, fertilizer, pest management control practices, irrigation and fertigation were applied according to University of Georgia Extension Service recommendations.

Plant Height and Plant Stem Diameter Thirty-Five Days After Transplanting

Thirty-five days after transplanting (DAT) transplant heights and transplant stem diameters (taken at the base of the plant, level with top surface of the soil) were measured. The average plant height of plants grown in non-amended media was 7.6 inches whereas transplants grown in compost-amended media had an average height of 9.0 inches. The average stem diameter of plants grown in non-amended media was 0.221 inches whereas transplants grown in compost- amended media had an average stem diameter of 0.252 inches. Differences in both plant height and stem diameter were highly significant.

Plant Height and Plant Stem Diameter Fifty-Six Days After Transplanting

Fifty-six DAT plant heights and stem diameters were measured again. Although both plant height and stem diameter had increased and were greater for transplants grown in compost amended media, there were no significant differences.

III. Effects of Transplant Media on Fruit Set, Early and Total Yield

Fruit Set Fifty-Six Days After Transplanting

Fifty-six DAT counts were made of the number of fruit on five randomly selected plants in each plot. Plants that had been grown in compost-amended media set more fruit than plants grown in non-amended media.

Early Fruit Yield Seventy Days After Transplanting

Seventy DAT plots were harvested and fruit were counted and weighed. Only jumbo and extra large fruit were harvested and there were no defective or cull fruit. Plants grown in non- amended media produced an average of 5.46 fruit per plot whereas plants grown in compost amended media produced an average of 12.8 fruit per plot. Average weights per plot were 2.8 pounds for plants grown in non-compost-amended media and 6.6 pounds for transplants grown in compost-amended media. The average fruit weight for plants grown in non-amended and compost-amended media was 233 grams and 234 grams, respectively. Differences in number of fruit per plot and weight of harvested fruit per plot were highly significant.

Total Yield

After the fourth harvest on November15th, a freeze severely damaged the plants and all fruit remaining on the plants. With the four harvests combined, plants grown in compost-amended media outyielded plants grown in non-amended media by 20%.

Summary:

Amendment of transplant growing media with 20% high quality compost enhanced transplant growth in the greenhouse and increased dry weight of transplant roots. Thirty-five days after transplanting, transplants grown in compost-amended media were significantly taller and had a significantly larger stem diameter. Fifty-six days after transplanting, more fruit was set on plants that had been grown in compost amended media. Total yield was 20% greater for plants grown in the compost-amended transplant media.

Although the mechanism(s) responsible for enhanced transplant growth and greater yields in the field were not determined, increased leaf area, stem diameter and root mass at transplanting are likely contributors. Additional studies of the effects of compost-amended media on growth and yield of bell pepper and other vegetable transplants are planned.

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Table 1. Effect of compost addition to the potting mixture on the growth of bell pepper (cv. X3R Wizard) transplants. Plants were measured at 15 and 24 days after seeding.

Compost	Plant height (inch)	Canopy width (inch)	Stem diameter (inch)
	15 days after seeding		
NO	1.23	1.99	—
YES	1.81 **	3.08 **	—
	24 days after seeding		
NO	1.87	—	0.065
YES	3.05 **	—	0.084 **

**, Significant at P > 0.001

Table 2. Effect of compost addition to the potting mixture on the growth of bell pepper (cv. X3R Wizard) transplants. Plants were measured 51 days after seeding.

Compost	Leaf area *area* (cm2)	*Leaf dry wt (g)*	*Stem dry wt. (g)*	*Shoot dry wt. (g)*	*Root dry wt. (g)*	*Plant ht. (inch)*
NO	29.7	0.146	0.100	0.246	0.106	5.04
YES	39.2 **	0.169 **	0.161 **	0.330 **	0.135 **	5.54 ** **,

Significant at P > 0.001