

Effect of Transplant Age and Pruning Procedure on Yield and Fruit-set of Bell Pepper

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Abstract. In 1976, pruning and transplanting at 11 weeks increased the number of early marketable fruit from all cultivars compared to 11-week, nonpruned plants and plants transplanted at 8 weeks, whether pruned or not. Eight-week, nonpruned plants produced larger fruits than 11-week plants in early season regardless of cultivar. Effect of transplant treatments on fruit-set varied with cultivar. The greatest fruit-set was on 8-week, nonpruned 'Bell Boy' transplants and the least on 8-week, nonpruned 'Emerald Giant' transplants. Eleven-week-old transplants generally set more fruit than 8-week transplants, regardless of cultivar.

Bell pepper yields have been increased by pruning flowers, flower buds, small fruits, and terminal shoots weekly from plants up to 3 weeks prior to transplanting. The removal of flowers and developing fruits for 23 days prior to transplanting in Florida has been shown to stimulate plant growth and increase yields (6).

Clipping the terminal bud, upper leaves, and the first flower cluster 12 days before transplanting 'Keystone Resistant Giant' and 'Hungarian Yellow Wax Hot' peppers frequently increased yields significantly (2). Matta (3) reported that hand-pinching the apical meristem and 3 mm of the main stem 2 weeks after transplanting 3 cultivars of chili pepper did not influence plant height or total yield. In that study, neither cultivar or cultivar-treatment combinations influenced plant height significantly in comparison to the control. Nicklow (5) found that pepper plants without flower buds or with flower buds only (i.e., no fruit) at the time of transplanting produced greater early and total yields of large fruit than did plants with open flowers or developing fruit. Total fruit yield from plants with developing fruit at transplanting time was lower than from pruned plants or other treatments.

The tendency of the bell pepper to drop many of its flowers and small fruits, result-

ing in a low early season yield and a corresponding loss of market advantage, has been a recognized problem for many years in many areas of the United States (1, 4). Under normal conditions in Kansas, plants 15 cm tall transplanted 15 May should be in production by late July (75-80 days from transplant). Early-season flower and fruit drop, however, often reduce yield or delay it until late August or September. If early-season flower and fruit drop could be prevented, bell pepper would be a more attractive crop for commercial growers and home gardeners. This research was conducted to determine how various pruning procedures and transplant ages influence fruit-set and yield of pepper.

'Emerald Giant', 'Bell Boy Hybrid', 'Early Set', and 'Keystone Resistant Giant' bell peppers of 2 different ages and stages of physiological maturity were subjected to 4 different transplant treatments and field grown to determine that effect on yield during the summers of 1975 and 1976.

Seeds were sown in the greenhouse in pasturized river sand on 2 seeding dates, 21 days apart. Plants were replanted at the cotyledonary stage into 7.6 × 7.6-cm peat pots containing a 3 soil : 2 sand : 1 peat (by volume) medium. Plants were transplanted to the field at 11 and 8 weeks of age, respectively. At transplanting, the 11-week-old plants were about 30 cm tall with open flowers and fruits 2.5 cm or less in diameter. The 8-week-old plants were at the 10-leaf stage (about 15 cm tall) and without visible flower buds.

Prior to transplanting into the field on 2 June 1975 and 10 May 1976, the Haynie fine sandy loam soil was disked to incorporate a broadcast application of 50.5 and 54.0 kg·ha⁻¹ of N and P, respectively. The transplants then were sized and graded (using stage of physiological maturity as the criterion) and

set in single row plots with rows 91 cm apart and plants 46 cm apart in the row. A randomized complete block design with 4 replications was used, and the experimental unit consisted of 4 competitive plants.

The day after transplanting, plants were pruned to achieve the following treatments: 1) eleven-week-old nonpruned plants, with open flowers and fruits 2.5 cm or less in diameter; 2) eleven-week-old plants with open flowers and fruits removed by pruning manually with thumb and forefinger; 3) eight-week-old plants with apical meristem and about 3 mm of stem removed by pruning manually with thumb and forefinger; and 4) eight-week-old nonpruned plants without visible flower buds.

Plots were clean-cultivated, and, 3 weeks after transplanting, 4.5 kg of diphenamid (*N,N*-dimethyl- α -phenylbenzeneacetamide) herbicide and 35 kg·ha⁻¹ of N from ammonium nitrate were applied. Hand-weeding was performed as needed. Insects and diseases were controlled with weekly pesticide applications.

Fruits were harvested at the mature green stage. Yield within 80 days of transplanting was considered early yield, and harvests after 80 days (2 harvests each year) were considered late yield.

Data included number and fresh weight of marketable fruit, fruit set as indicated by total number of fruit harvested (marketable plus cull), and plant height.

The transplant treatments had no effect on number or fresh weight of fruit in 1975. In 1976, the 11-week-old pruned transplants yielded a significantly greater number of early marketable fruit than other transplant treatments. However, fruits from 8-week-old nonpruned plants were larger than in all other treatments (Table 1). This response is consistent with Nicklow's (5) reported increase in yield of large fruit from unpruned transplants with or without flowers or flower buds. Jaworski and Webb (2) reported a similar yield increase from 'Keystone Resistant Giant' plants following pruning below the first flower cluster. Plant size, as determined by measured height at the last harvest, showed that 11-week-old plants (whether pruned or not) and 8-week-old nonpruned plants attained comparable size in both years, although the height of 11-week plants was almost twice that of 8-week plants at transplanting (Table 1). Eight-week-old pruned plants were shorter both years, significantly so in 1975 (Table 1). Matta (3), on the other hand, reported no significant effect on final plant size following pinching of chili pepper transplants.

The rapid growth rate of the younger, unpruned plants may have led to reduced fruit number, since 11-week-old nonpruned plants set significantly more fruit than younger plants in 1975, whether pruned or not (Table 2). Eleven-week-old pruned plants set significantly more fruit than 8-week-old plants in 1976, whether pruned or not (Table 2).

The 4 cultivars responded differently to transplant treatments in 1975 and 1976. The greatest fruit-set in 1975 was on 8-week-old nonpruned 'Bell Boy' plants, while 8-week-

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Table 1. Effect of transplant treatments on the early season fruit number (per ha), size (g), fresh weight (MT·ha⁻¹), and plant height (cm) of peppers (mean of 4 cultivars).

Transplant treatment	Marketable fruit (1975)			Plant height (cm)	Marketable fruit (1976)			Plant height (cm)
	Number (per ha)	Weight (MT·ha ⁻¹)	Size (g)		Number (per ha)	Weight (MT·ha ⁻¹)	Size (g)	
11-week nonpruned	38,255	4.1	107.1	52.6	24,283	3.0	119.8	56.6
11-week pruned	28,691	2.7	94.1	53.1	41,095	5.1	130.2	60.3
8-week pruned	28,696	3.5	122.0	47.2	20,547	2.7	138.1	55.6
8-week nonpruned	31,082	3.8	122.2	54.3	29,881	4.6	164.2	58.0
LSD (0.05)	NS	NS	NS	3.8	10,413	1.4	18.1	NS

^{NS}Not significant.

Table 2. Effect of transplant treatment and cultivar-transplant interaction on total number of fruit set per plant.

Cultivar	Transplant treatment	No. of fruit set per plant			
		1975		1976	
		Mean	Mean of 4 cultivars	Mean	Mean of 4 cultivars
Emerald Giant	11-week nonpruned	12.9		8.2	
Bell Boy	11-week nonpruned	14.8		11.2	
Early Set	11-week nonpruned	15.0		10.8	
Keystone Resistant Giant	11-week nonpruned	15.4	14.5	9.0	9.8
Emerald Giant	11-week pruned	12.6		9.7	
Bell Boy	11-week pruned	14.6		12.9	
Early Set	11-week pruned	12.3		11.2	
Keystone Resistant Giant	11-week pruned	12.0	12.9	10.3	11.0
Emerald Giant	8-week pruned	10.2		8.7	
Bell Boy	8-week pruned	13.5		9.3	
Early Set	8-week pruned	10.4		9.2	
Keystone Resistant Giant	8-week pruned	10.0	11.0	6.8	8.5
Emerald Giant	8-week nonpruned	8.2		6.7	
Bell Boy	8-week nonpruned	15.6		11.5	
Early Set	8-week nonpruned	12.2		8.4	
Keystone Resistant Giant	8-week nonpruned	10.9	11.7	7.7	8.6
LSD (0.05)		2.7	1.3	NS	1.3

^{NS}Not significant.

old nonpruned 'Emerald Giant' plants set the least in 1975 and 1976. In both years, the trend was toward increased fruit-set from older transplants among all cultivars (Table 2).

In general, 11-week-old transplants yielded more but smaller early marketable fruit than the 8-week-transplants, whether pruned or not. The trend was toward an increased fruit-set from older transplants of all cultivars. Young pruned plants remained short while the final height of young unpruned plants

and older plants (whether pruned or not) was not statistically different.

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