

# Economic Analysis of Grafted Tomato Production with Drip Irrigation in Sandy Soils in Florida

Desire Djidonou and Xin Zhao  
Horticultural Sciences Department, University of Florida, FL 32611



## INTRODUCTION

- ❖ Grafting with vigorous interspecific hybrid rootstocks has the potential to improve plant resistance to soil-borne diseases and enhance growth and fruit yields in tomato production;
- ❖ Interest in grafted vegetable production under field conditions is growing recently in the U.S.;
- ❖ Limited information is available as to whether grafting can be used economically beyond disease control in open field production.



### Objective:

Determine the costs and benefits of using grafted transplants for field production of fresh market tomato in fumigated sandy soils in Northeast Florida

## MATERIALS AND METHODS

### Field Production of Fresh Market Tomato

- ❖ Field experiments were carried out during the 2010 and 2011 spring growing seasons at the Suwannee Valley Agricultural Extension Center in Live Oak, FL;
- ❖ Non-grafted 'Florida 47' (FL) and grafted 'Florida 47' with "Beaufort" (FL/BE) and 'Multifort' (FL/MU) rootstocks were grown with recommended irrigation and nutrients programs.

### Costs of Grafted and Non-Grafted Transplants

- ❖ All materials, supplies, and labor associated with the production of grafted and non-grafted transplants were estimated and used to determine transplant costs.

### Base Production Cost Model

- ❖ A base cost model for growing, harvesting, and marketing 'Florida 47' in a 1-acre field with raised-beds, polyethylene mulch, and drip irrigation was established.



### Partial Budget Analysis of Tomato Production

#### Grafted vs. non-grafted:

- ❖ Total negative effects due to grafting, i.e., the summation of the added costs and reduced returns
- ❖ Total positive effects due to grafting, i.e., the summation of reduced costs and added returns

## RESULTS AND DISCUSSION

### Costs of transplant production

Item	Grafted		Nongrafted	
	Labor	Material	Labor	Material
	(\$/1000 plants)		(\$/1000 plants)	
<b>Seeds</b>				
Scion ('Florida 47')		83.26		74.94
Rootstock ('BE' or 'MU')		254.41		
<b>Seedling Production</b>	92.95	35.72	59.15	16.81
<b>Grafting Process</b>	68.07	54.66		
<b>Healing Chamber</b>	16.90	64.15		
<b>Subtotal</b>	177.92	492.20	59.15	91.75
<b>Total</b>		670.12		150.90
<b>Cost/plant</b>		0.67		0.15
<b>Cost/acre</b>		3,892.05		876.42
				<b>\$3,015.63</b>

- ❖ With the planting density of 5808 tomato plants per acre used in this study, grafting with either 'Beaufort' or 'Multifort' rootstock added approximately \$3,015.63 per acre to the total pre-harvest production costs in field production of 'Florida 47'.

### Base budget to produce, harvest, and market 'Florida 47' using nongrafted transplants

Category	2010	2011
	(\$/acre)	
<b>Operating Costs</b>		
Transplants	876.42	876.42
Fertilizer and Irrigation	746.47	746.47
Other Operating Costs	4,555.19	4,555.19
<b>Total Operating Costs</b>	6,178.08	6,178.08
<b>Total Fixed Costs</b>	3,608.68	3,608.68
<b>TOTAL PREHARVEST COSTS</b>	9,786.76	9,786.76
<b>Total Harvest and Marketing Costs</b>	4,935.84	5,173.14
<b>Total Costs</b>	14,722.61	14,959.91

- ❖ Total costs per acre required to produce, harvest, and market 'Florida 47' tomatoes in the area of Live Oak, FL using the raised-bed polyethylene mulch system were estimated at \$14,722.61 and \$14,959.91 in the spring production seasons of 2010 and 2011.

### Total negative and positive effects of grafting

- ❖ Negative effects (added costs) related to the use of grafted transplants: increased costs of transplants and harvest;
- ❖ Total negative effects: \$4,937.24/acre and \$4,485.17/acre with grafting 'Florida 47' onto 'Beaufort' and 'Multifort', respectively, in 2010;
- ❖ Positive effects associated with using grafted transplants: increased returns on the tomato fruit values, ranging from \$4,748.45/acre to \$7,646.64/acre over the two spring production seasons;
- ❖ Additional net returns of grafting relative to non-grafting ranged from \$263.28/acre to \$2,461.82/acre, depending on the seasons and rootstocks.

Treatment	Avg marketable fruit yield (25-lb cartons/acre)	Gross returns <sup>2</sup>	Total negative effects of grafting (\$/acre)	Total positive effects of grafting (\$/acre)	Additional net return relative to non-grafting
			<b>2010</b>		
FL	1,457	15,948.89	0.00	0.00	0.00
FL/BE	2,024	22,158.09	4,937.24	6,209.20	1,271.96
FL/MU	1,890	20,697.35	4,485.17	4,748.45	263.28
			<b>2011</b>		
FL	1,526	18,235.93	0.00	0.00	0.00
FL/BE	2,166	25,882.56	5,184.82	7,646.64	2,461.82
FL/MU	2,138	25,554.18	5,091.66	7,318.25	2,226.59

<sup>2</sup> Gross returns are based on tomato selling prices of \$10.95 and \$11.95 per 25-lb carton in 2010 and 2011 seasons, respectively.

## CONCLUSIONS

- ❖ Growing grafted tomato demonstrated higher production costs due to the increased costs associated with grafted transplants and harvest;
- ❖ Yield improvement as a result of using grafted transplants led to higher returns that eventually increased the net return relative to that of the use of non-grafted transplants;
- ❖ More on-farm trials under different commercial growing conditions are needed to help growers decide whether grafting can be integrated as an economically viable component into their existing production systems.

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