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## INFLUENCE OF HARVEST DATE AND CULTIVAR ON SEMIMECHANICALLY HARVESTED FRESH MARKET TOMATO YIELDS<sup>1</sup>

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**Abstract.** 'MH-1', 'Burgis', and 'Hayslip' tomatoes were evaluated for yields using the IFAS semi-mechanical fresh market tomato harvester. Once-over harvesting was performed on separate plots at 85 and 99 days after transplanting. 'Burgis' had a significantly higher total fruit weight than 'MH-1' or 'Hayslip', regardless of harvesting date. 'MH-1' had significantly smaller colored fruit size but a larger colored fruit number than 'Hayslip' or 'Burgis' at both harvesting dates. On a weight basis, both 'Hayslip' and 'Burgis' had a lower percent of fruit in the pink and red-ripe stages of maturity than 'MH-1' at both harvests. The later harvest had a larger percent and weight of colored fruit than the first harvest, although no significant total yield differences occurred between harvest dates. Sand damage detracted from fruit appearance, especially after ripening. Nevertheless, based on fruit color, size, and yield, 'Hayslip' and 'Burgis' appeared better adapted than 'MH-1' for mechanical harvest of fresh market tomatoes.

Seasonal labor for manual harvesting is becoming a larger cost component for fresh market tomato production in Florida. Energy requirements for mechanical harvesting were reported to be 46 and 58 % less per acre and per pound of tomato, respectively, as compared with manual harvesting (2). Florida's projected share of U. S. winter fresh tomatoes will only increase from 49 to 51% during 1979 to 1985, respectively (6). Therefore, Florida growers may need to convert to mechanical harvesting to remain competitive with domestic and foreign markets.

In past years, growers have directed their interest primarily to mechanical harvesting of mature green tomato fruits. In an attempt to improve the yield and quality of machine harvested tomatoes a modified IFAS semimechanical harvester was designed and tested in Florida (4). A

unique feature of this machine is the ability to sort and handle colored fruit separately from mature green fruit on the harvester.

The purpose of this investigation was to evaluate tomato fruit yields of several cultivars at two harvesting dates using the IFAS semimechanical fresh market harvester.

### Materials and Methods

'MH-1' and two new jointless Florida tomato releases, 'Burgis' and 'Hayslip', were evaluated for yield characteristics with the IFAS semimechanical fresh market harvester during the fall 1980 at the Agricultural Research Center, Fort Pierce, Florida.

Dolomitic limestone (1 ton/A) (2.24 mt/ha) was pre-plant incorporated into an Oldsmar fine sand soil. Raised beds were spaced at 7 ft. (2.1 m) centers with 43 ins (109 cm) width. A fertilizer application of 1,400 lbs/A (1,568 kg/ha) 4-16-4 (N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O) was banded in 43 ins (109 cm) strips and bedded over. An additional application of 2,100 lbs/A (2,352 kg/ha) 8-21-20 (N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O) was banded under a 10 inch (25 cm) strip of black plastic offset from the center of each bed (3). Seedlings were transplanted 2 feet (61 cm) apart in a single row within the center of each bed on October 8, 1980. Each plot was 50 ft (15.2) in length. Recommended pest control practices were followed.

Plots were harvested either 85 or 99 days after transplanting with the IFAS semimechanical fresh market harvester. All culls were removed and colored and green fruit were separated by an 8 person crew on the harvester. Further separation of colored fruit into red and pink fruit was completed after the harvest operation. Mature green, pink, and red marketable fruit yields were weighed and pink and red fruit counted. Average fruit size was determined by dividing total marketable colored fruit weight by the total number of colored fruit per plot. The experiment was a randomized complete block design with three replications. Data were subjected to analysis of variance. This was performed by the computer program, (SAS) (1).

### Results and Discussion

The first harvest date (85 days after transplanting) had significantly more green fruit and less colored fruit than the second harvest (99 days after transplanting) (Tables 1, 2). However, no significant difference for total marketable yields occurred between the two harvest dates. No significant harvest date X cultivar interaction occurred for any measured variable.

'Burgis' had significantly higher total yields than 'Hayslip' or 'MH-1', regardless of harvesting date (Table 1). The higher yields of 'Burgis' resulted from the larger number of colored fruit when compared to 'Hayslip' since the mean color fruit sizes were not significantly different between the two cultivars (Table 3). 'Hayslip' had more

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Table 1. Mean marketable fruit yield for three tomato cultivars harvested at two different dates with the IFAS semi-mechanical fresh market harvester.

Cultivar	Harvesting date (days after transplanting):								Mean			
	85				99				Green	Pink	Red	Total
	Green	Pink	Red	Total	Green	Pink	Red	Total				
..... 30 lb boxes/A .....												
Burgis	1,093	180	40	1,313	587	633	240	1,460	840a <sup>z</sup>	407a	140b	1,387a
Hayslip	1,034	93	13	1,140	714	333	133	1,180	874a	213b	73c	1,160b
MH-1	721	213	53	987	240	527	353	1,120	481b	370a	203a	1,054b
Mean												
Green <sup>z</sup>	949*				514							
Pink		162*				500						
Red			35*				242					
Total				1,147				1,253				

<sup>z</sup>Mean separation within columns by Duncan's multiple range test, 5% level.

\*Significant F-test (5% level) for harvesting date.

Table 2. Mean percentage of green and colored fruit yields for three tomato cultivars harvested at two different dates with the IFAS semi-mechanical fresh market harvester.

Cultivar	Harvesting date (days after transplanting):				Mean	
	85		99		Green	Pink + Red
	Green	Pink + Red	Green	Pink + Red		
..... % by Wt. ....						
Burgis	83	17	40	60	61b	38b
Hayslip	91	9	61	39	76a	24c
MH-1	73	27	21	79	47c	53a
Mean						
Green	82*		41			
Pink + Red		18*		59		

<sup>z</sup>Mean separation within columns by Duncan's multiple range test, 5% level.

\*Significant F-test (5% level) for harvesting date.

Table 3. Mean colored fruit size for three tomato cultivars harvested at two different dates with the IFAS semimechanical fresh market harvester.

Cultivar	Harvesting date (days after transplanting):		
	85	99	Mean
	..... lbs/fruit .....		
Burgis	0.34	0.35	0.35 a <sup>z</sup>
Hayslip	0.34	0.35	0.35 a
MH-1	0.26	0.27	0.27 b
Mean	0.31	0.32	

<sup>z</sup>Mean separation within column by Duncan's multiple range test, 5% level.

green fruit than 'Burgis' (Table 2). Yield responses among the three cultivars were similar to those reported for a fall 1980 unstaked tomato variety trial (5).

Sand damage was observed on all fruit during the harvesting operation. Most of this occurred at the fruit separation stage. Damage was severe enough to detract from fruit appearance following ripening.

Both 'Hayslip' and 'Burgis' had larger fruit size and higher yields, when compared with 'MH-1'. Our results suggest that both 'Hayslip' and 'Burgis' were more conducive to mechanical harvesting with the IFAS semimechanical harvester than 'MH-1'. The ratio of colored versus green fruit can be regulated by different harvesting dates without adversely affecting yields.

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