

# Irrigation Timing Affects Fruit Number and Yield of Watermelon

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## BOTTOM LINE

Deficit irrigation immediately after fruit set caused a significant reduction in the number of fruit set and first harvest of spring hybrid and seedless watermelons.

## Summary

Effects of irrigation rates and water stress timing in watermelons were investigated on growth, yield and quality in the Winter Garden of Southwest Texas (Uvalde County). Water stress related to growth stages had more influence on fruit set and early yield than on leaf and vine growth. Total marketable fruit yield ranged from 84,110 to 63,970 lbs/A when 22.4 and 14.6 inches of irrigation water were applied in spring 1995, respectively, and from 80,610 to 72,250 lbs/A when 34.7 and 22.7 inches were applied in spring 1996.

## Introduction

In South and Southwest Texas watermelons constitute the largest vegetable crop grown in the area. Pumping restrictions will reduce the supply of high quality irrigation water, affecting watermelon production and irrigation management. This study was conducted to determine how growth, yield, and quality is affected by synchronizing irrigation timing with specific growth stages in watermelons grown with subsurface drip.

## Experiment

Watermelon transplants were grown in flats and transplanted on a Uvalde soil at the Texas A&M Center on April 13, 1995, and on April 17, 1996. Preplant fertilizer (lb/A; 40N-40P-40K) was applied broadcast and

incorporated into the soil. Additional fertilizations was provided through the drip system. Each plot consisted of two 34-ft long beds covered with black mulch in 1995, and with bare-soil and black mulch in 1996. Bed spacing was 6.3 ft apart with plants 2 ft apart. Irrigation treatments (Table 1) were based on evapotranspiration (ET).

## Results

*Spring 1995.* Plants with the highest irrigation (100 % ET), retained more fruits (4.4 vs. 3.5 fruits/plant) than plants that had mild stress (60 % ET), but the latter had larger stem diameter than the no-stress plants when measured after fruit set (May 14). A concentrated first harvest produced high yields in all treatments. Yields and total fruit number were higher when 22.4 inches of water were applied as compared to 17.0 inches, but average fruit weight was unaffected (Table 2). Total yield and fruit numbers were not affected by cultivar, except that the seedless 'Super Sweet 5244' had higher yields for fruit size <18 lb and lower yields for fruit size > 18 lb than 'Summer Flavour 710' (Table 2). Second harvest yields were not affected by irrigation rates (ranged from 20,935 to 27,220 lbs/A), but fruits from plants irrigated with 14.6 inches were sweeter (11.1 vs. 10.3% soluble solids) than those with 22.4 inches.

*Spring 1996.* During this drought season, plants that had 34.7 inches of irrigation (100 % ET) only

had 11% increased yields compared to 23.9 inches. Yields were high for all treatments (80,610 to 72,250 lbs/A), but plants with 21.2 inches were more efficient since they produced 1 lb of fruits per 8.2 gallons of water compared to plants irrigated with 34.7 inches that produced 1 lb fruits per 11.7 gallons of water. Plastic mulch increased total yields by 12% compared to bare-soil.

### Conclusions

- ◆ Water stress during fruit set affects early production.
- ◆ Total production was enhanced with high irrigation, but plants were less water use efficient.
- ◆ A greater root water uptake resulted for plants subject to high irrigation (T1), which caused the soils to dry faster than when irrigated with less water.
- ◆ Fruit size by weight averaged 13-15 lb in seedless 'Super Sweet 5244' and 18-19 lb in Summer Flavor 710.

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Table 1. Percent of water requirement based on evapotranspiration (ET).

| Treatment | Early | First Fruit | Final Harvest | Total |
|-----------|-------|-------------|---------------|-------|
| 1995      |       |             |               |       |
| T1        | 100   | 100         | 100           | 22.4  |
| T2        | 100   | 60          | 0             | 17.0  |
| T3        | 100   | 60          | 40            | 15.8  |
| T4        | 100   | 60          | 20            | 14.6  |
| 1996      |       |             |               |       |
| T1        | 100   | 100         | 100           | 34.7  |
| T2        | 50    | 100         | 50            | 23.9  |
| T3        | 100   | 50          | 25            | 23.2  |
| T4        | 50    | 50          | 50            | 21.2  |

Table 2. Effect of irrigation rate and cultivar on watermelon total yield and uield by size on the first harvest. Uvalde, Spring 1995.

| Variable                    | Yield total Fruit (lb/A) | Yield by fruit size (lb/A) |      |       |                | Fruit wt. (lb) |
|-----------------------------|--------------------------|----------------------------|------|-------|----------------|----------------|
|                             |                          | (no/A)                     | <12  | 12-18 | 18-24 >24      |                |
| <i>Irrigation rate</i>      |                          |                            |      |       |                |                |
| <i>Water</i>                |                          |                            |      |       |                |                |
| <i>Moisture requirement</i> |                          |                            |      |       |                |                |
| <i>applied (in)</i>         |                          |                            |      |       |                |                |
| 100 ET+100 ET+100 ET        | 22.4                     | 61369                      | 3458 | 1650  | 27263261816274 | 17.8           |
| 100 ET+60 ET+ 60 ET         | 17.0                     | 46413                      | 2843 | 2998  | 25130158052479 | 16.3           |
| 100 ET+60 ET+40 ET          | 15.8                     | 43525                      | 2590 | 2303  | 21682155653976 | 17.0           |
| 100 ET+ 60 ET+ 20 ET        | 14.6                     | 42030                      | 2430 | 1659  | 20138168083424 | 17.0           |
| <i>Cultivar</i>             |                          |                            |      |       |                |                |
| Summer Flavor 710           |                          | 49962                      | 2603 | 464   | 15925260047569 | 19.0           |
| Super Sweet 5244            |                          | 46706                      | 3057 | 3841  | 3118211175507  | 15.3           |

ET=evapotranspiration. Transplants were set in the field on April 13, 1995 and fruits were harvested on June 26, 1995 (74 days after transplanting).