Canada-Saskatchewan Irrigation Diversification Centre

# PUMPKIN IRRIGATION SCHEDULING

*July 2006*

## INTRODUCTION

Moisture requirements for vegetables are high; therefore, production is restricted in areas with limited water. Trickle irrigation can provide efficient delivery of water while plasticulture techniques can lower the total water requirements of a crop.

In Saskatchewan, data is required to determine water consumption and water efficiencies of pumpkin under our climatic conditions using plasticulture techniques.

## STUDY DESCRIPTION

Pumpkin cv Spirit was grown using trickle irrigation and infrared transmissible (IRT) plastic mulch at CSIDC to demonstrate irrigation scheduling and determine total water use and water use efficiency of the pumpkin.

A four-year trial was conducted at the Centre with pumpkin seeded in a double row configuration. A drip tape ran between the two rows and below the plastic mulch. The pumpkin seedlings were hand seeded with a water wheel planter.

Irrigation treatments consisted of W1, irrigation initiated to maintain soil available water (A.W.) content above 85%; W2, irrigation initiated to maintain soil above 70% A.W.; and Dry, no irrigation. Irrigations were scheduled based on soil available water in the top 30 cm of the profile utilizing tensiometers. The quantity of irrigation water applied (mm) was calculated from the trickle tape emitter flow rate (L/hr), irrigation time interval (hr) and area irrigated ($m^2$). Soil moisture monitoring was conducted with a neutron moisture meter.

At harvest, yield estimates were obtained by weighing each individual pumpkin from a subset area.

## RESULTS

Growing season conditions varied among the four years that the trial was conducted. 2002 and 2003 were warmer than average, while 2004 and 2005 were cooler than average. Precipitation also varied. 2002 was similar to the long term precipitation average, while 2003 was below average and 2004 and 2005 were well above.

Total water use for the growing season increased as the quantity of irrigation water applied increased (Table 1). Water use was highest in the warmest, driest year.

Yield response of the pumpkin to irrigation applications varied and appeared to be related to growing season conditions (Figure 1).

**Table 1.** Total water use by pumpkin cv Spirit.

| Treatment | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|
| | Total Water Use (mm) | | | |
| W1 | 245 | 405 | 285 | 272 |
| W2 | 150 | 310 | 211 | 235 |
| Dry | 101 | 142 | 185 | 229 |

In 2002 and 2003, when growing conditions were generally warmer and drier than average, pumpkin yield increased as the quantity of water applied was increased. Both irrigation treatments produced significantly greater pumpkin yield than the dryland treatment. However, yield increases were due to pumpkin size and not numbers. There was no significant difference in quantity of pumpkins produced based on treatment (Figure 2). Also, in 2004 and 2005, when growing conditions were cooler and wetter than average, pumpkin yields showed no response to the irrigation water applications.

Water use efficiency (kg pumpkin produced / mm water use) varied among the years and appeared to be related to growing conditions (data not shown). In hot years, when water demand was high, water use efficiency decreased as the quantity of water application increased. In cool years with low water demand, water use efficiency showed little response to the different water application treatments.

**Figure 1.** Pumpkin yield cv Spirit averaged from 2002-2005.

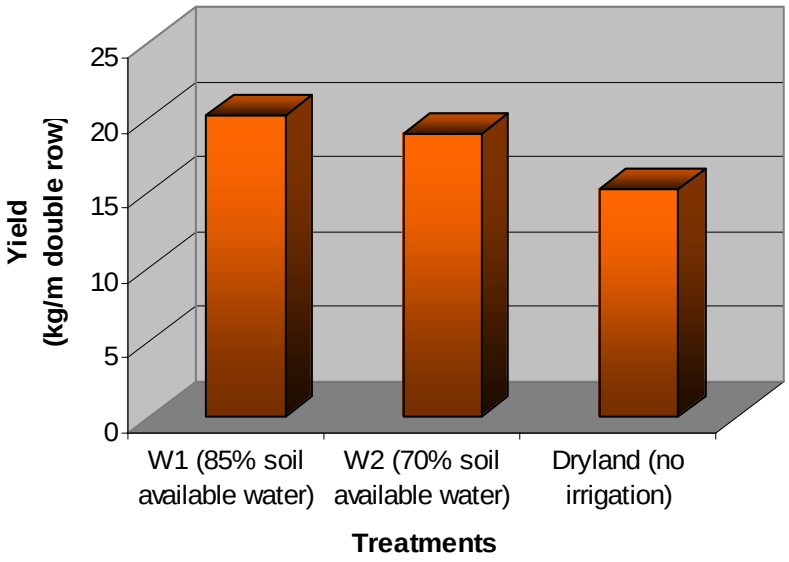
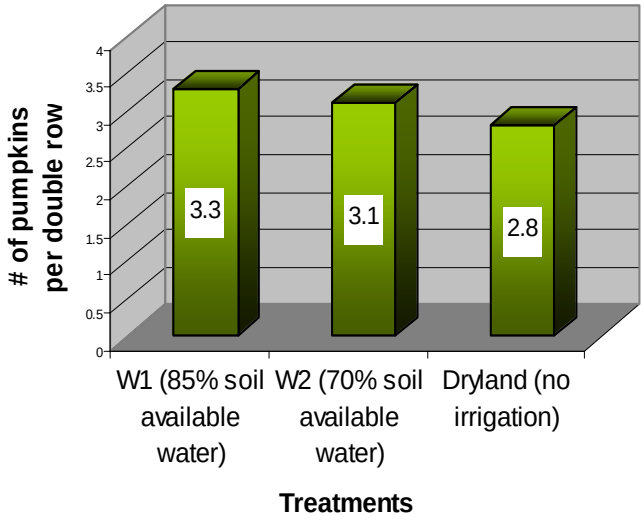



**Figure 2.** Number of harvested pumpkins cv Spirit averaged 2002-2005.

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**The Bottom Line…**

- **Heat and moisture are required for optimum pumpkin production.**
- **Pumpkin yield increases may reflect increased size of pumpkins harvested, instead of increased pumpkin numbers.**

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