

# EFFECT OF TIMING OF HARVEST ON ONION YIELD AND STORABILITY

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## Introduction

Onion harvest for long-day varieties in the Treasure Valley generally extends from mid-August into early October. Optimal dates for onion harvest are not known. Harvest timing guidelines (calendar date or percentage of tops that are down) need to be determined. The effect of harvest timing on yield at harvest and storage losses due to decomposition is unknown. This trial evaluated the effect of harvest timing on bulb yield and storability.

## Materials and Methods

Trials were conducted in furrow-irrigated and drip-irrigated fields at the Malheur Experiment Station in 2009 with storage prolonged into 2010. Cultural practices for the drip-irrigated field can be found in Shock et al. (2010a) and cultural practices for the furrow-irrigated field can be found in Shock et al. (2010b). The furrow-irrigated field was managed to maintain soil water tension below 25 cb. The last furrow irrigation was on August 27. Varieties 'Calibra' (Bejo), 'Montero' (Nunhems), and 'Joaquin' (Nunhems) were replicated five times. The drip-irrigated field was managed with three irrigation criteria: 10, 20, and 30 cb. Varieties 'Vaquero' (Nunhems) and Joaquin were sampled from each irrigation treatment (10, 20, and 30 cb) and were replicated four times at each irrigation criterion. The last drip irrigation was on September 5. Optimal soil water tension for onions on silt loam is in the range of 20 to 25 cb for furrow irrigation and 15 to 20 cb for drip irrigation (Shock et al. 2005).

Each sample of harvested onions consisted of all bulbs from 6.8 ft of one double row on a 22-inch bed from a 23-ft-long, four-double-row plot. The samples were taken on August 13, August 20, August 27, September 3, and September 10. The bulbs from each sample were topped, put in burlap bags, and placed on bare dry soil adjacent to the field to cure for 7 days. At each sampling date, the onions in each plot were visually rated for the percentage of tops that were down. After curing, the bulbs were graded. During grading, bulbs were separated according to quality: bulbs without blemishes (No. 1s), split bulbs (No. 2s), neck rot (bulbs infected with the fungus *Botrytis allii* in the neck or side), plate rot (bulbs infected with the fungus *Fusarium oxysporum*), and black mold (bulbs infected with the fungus *Aspergillus niger*). The No. 1 bulbs were graded according to diameter: small (<2.25 inches), medium (2.25-3 inches), jumbo (3-4 inches), colossal (4-4.25 inches), and supercolossal (>4.25 inches). Bulb counts per 50 lb of supercolossal onions were determined for each plot of every variety by weighing and counting all supercolossal bulbs during grading.

After grading, one slice from each of 10 randomly chosen bulbs from each sample was placed in a pre-weighed can for each plot. The wet onion tissue plus can were weighed, dried in a forced air oven at 140°F, and weighed again to determine dry weight percentages. The remaining bulbs were weighed and put in a cooler at 34°F. Starting on November 10, all samples were taken out of storage monthly and the rotten bulbs from each sample were removed and weighed. The remaining onions were weighed and put back in storage. The final weighing and removal of rotten bulbs was on March 3, 2010. The actual maximum storage durations were 6.25, 6, 5.75, 5.5, and 5.25 months for the August 13, August 20, August 27 September 3, and September 10 harvests, respectively.

## Results and Discussion

### Yield

#### *Furrow-irrigated field*

A severe iris yellow spot virus (IYSV) infestation in the furrow-irrigated field in 2009 resulted in premature onion top death, lack of onion top breakover, poor bulb curing, and high storage decomposition. Consequently, the effects of harvest timing on tops down, yield at harvest, and yield after storage could not be properly evaluated.

#### *Drip-irrigated field*

There was no significant effect of irrigation treatment on the response of the onions to harvest timing. Only the results for the 20 cb treatment are reported here, since 20 cb is the optimum soil water tension for drip-irrigated onion.

For Vaquero, the percentage of tops down increased over time from 30 percent at the first harvest (21 days before the last irrigation) to 80 percent at the last harvest (7 days after the last irrigation) (Fig. 1). For Joaquin, the percentage of tops down increased over time from 10 percent at the first harvest (21 days before the last irrigation) to 30 percent at the last harvest (7 days after the last irrigation). For both Vaquero and Joaquin, total yield at harvest increased with increasing tops down up to the last harvest (Figs. 2-5). For both Vaquero and Joaquin, packout on March 3, 2010 was highest when onions were harvested at the last harvest and the highest tops down.

### Storability

For both Vaquero and Joaquin, bulb loss to decomposition in storage was more rapid for the first three harvest dates (August 13, 20, and 27) (Figs. 6 and 7). The last two harvest dates (September 3 and 10) had slower bulb loss in storage.

### Comparison with 2008–2009

The 2009 harvest timing trial results are similar to the 2008 harvest timing trial (Shock et al. 2010c) results. In both years, for the drip-irrigated onions, yield at harvest and storability increased for Vaquero and Joaquin as tops went down.

## References

- Shock, C.C., E.B.G. Feibert, L.D. Saunders, L. Jensen, S. K. Mohan, R.S. Sampangi, and H. Pappu. 2010a. Management of onion cultural practices as a means to control the expression of iris yellow spot virus. Oregon State University Agricultural Experiment Station Special Report 1094:41-59.
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- Shock, C.C., E. Feibert, and J. Taberna. 2010c. Effect of harvest timing on onion yield and storability, 2009. Oregon State University Agricultural Experiment Station Annual Report 2009: 81-91.
- Shock, C.C., R. Flock, E. Feibert, C.A. Shock, A. Pereira, and L. Jensen. 2005. Irrigation monitoring using soil water tension. Oregon State University Extension Service EM 8900.

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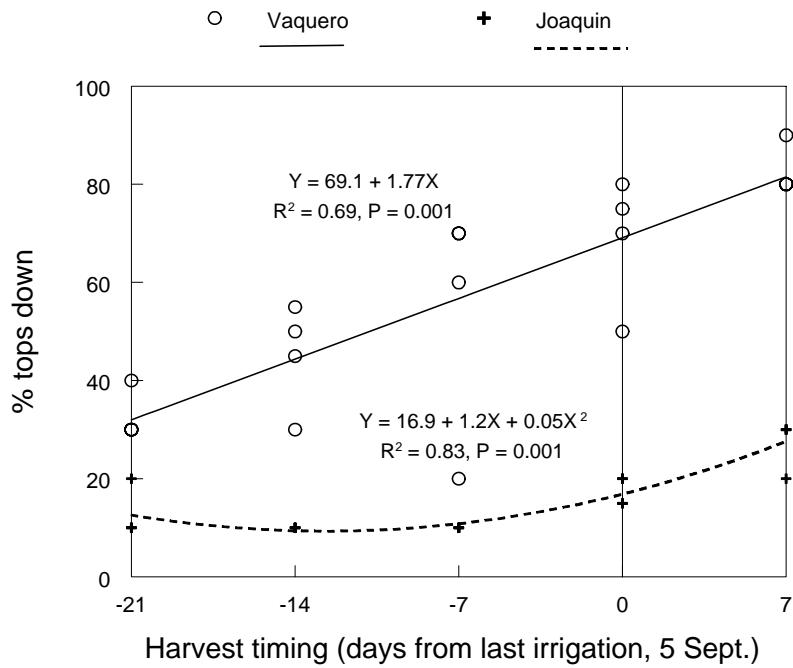


Figure 1. Percentage of tops down over time in relation to the last drip irrigation for onion varieties Vaquero and Joaquin. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009-2010.

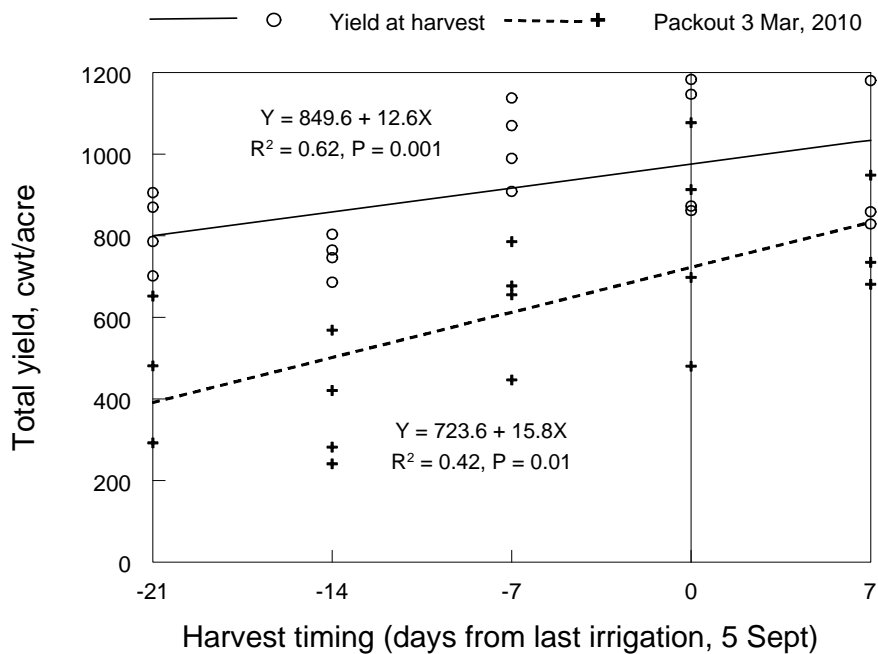


Figure 2. Total onion yield at harvest in 2009 and after storage on March 3, 2010 for five harvest timings for drip-irrigated Vaquero. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009-2010.

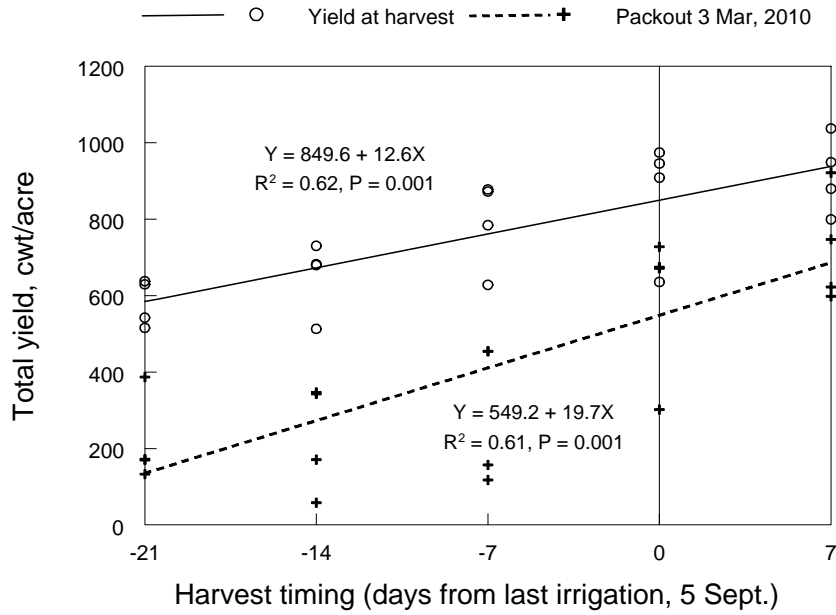


Figure 3. Total onion yield at harvest in 2009 and after storage on March 3, 2010 for five harvest timings for drip-irrigated Joaquin. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009-2010.

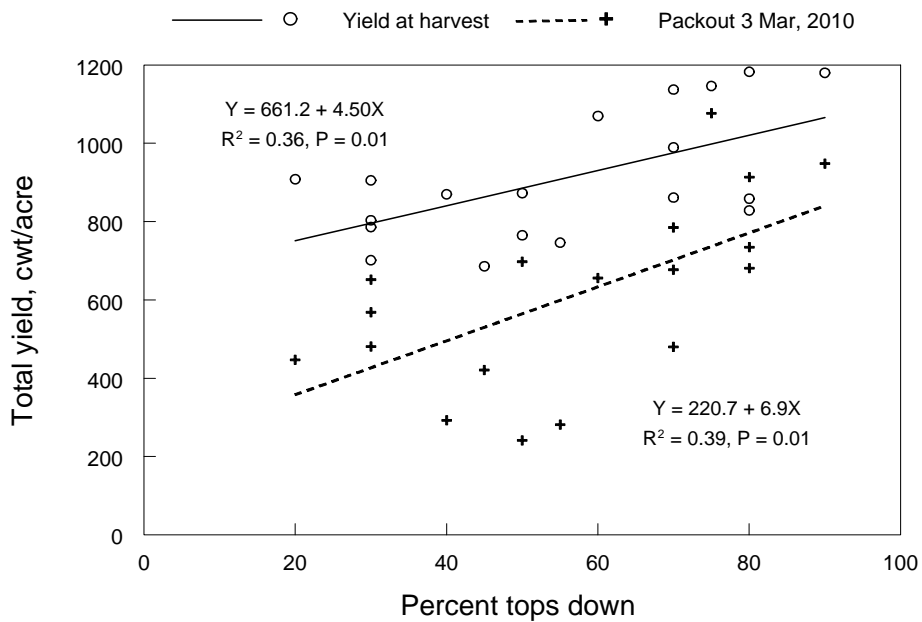


Figure 4. Total onion yield at harvest in 2009 and after storage on March 3, 2010 in relation to percentage of tops down for drip-irrigated Vaquero. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009-2010.

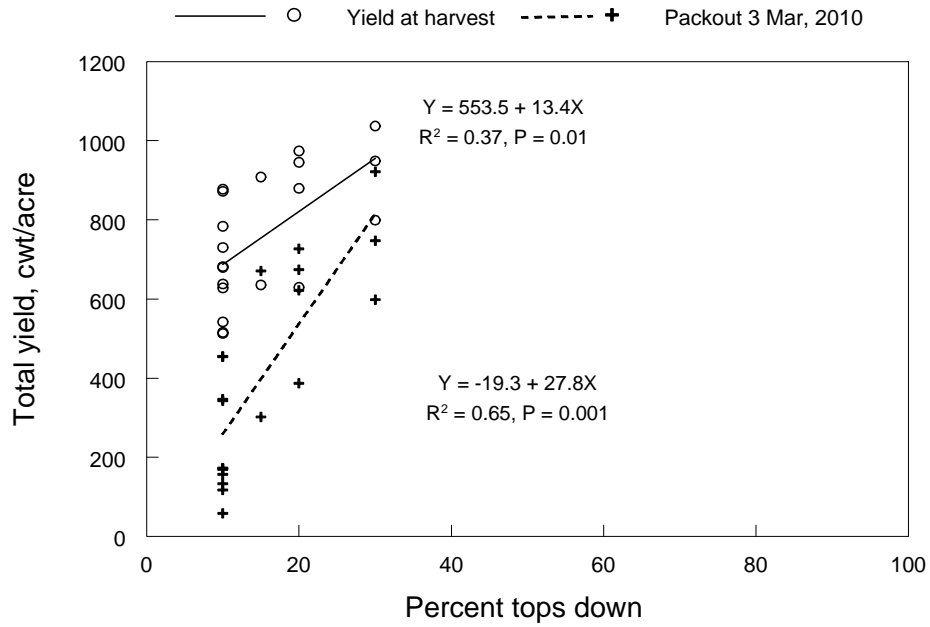


Figure 5. Total onion yield at harvest in 2009 and after storage on March 3, 2010 in relation to percentage of tops down for drip-irrigated Joaquin. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009-2010.

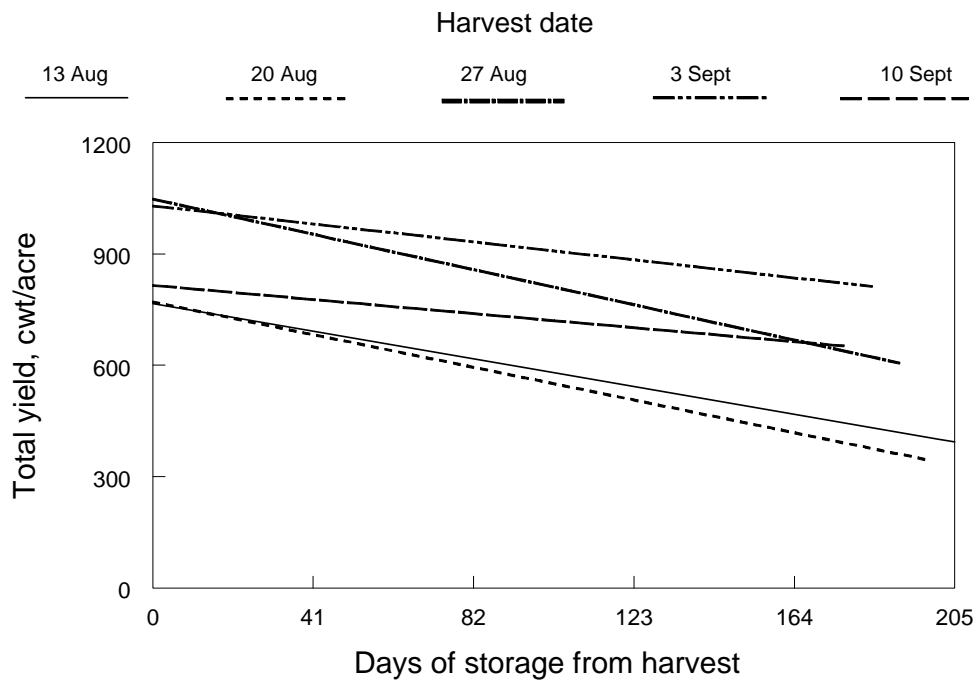


Figure 6. Total onion yield over time in storage for drip-irrigated Vaquero harvested on five dates. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009-2010.

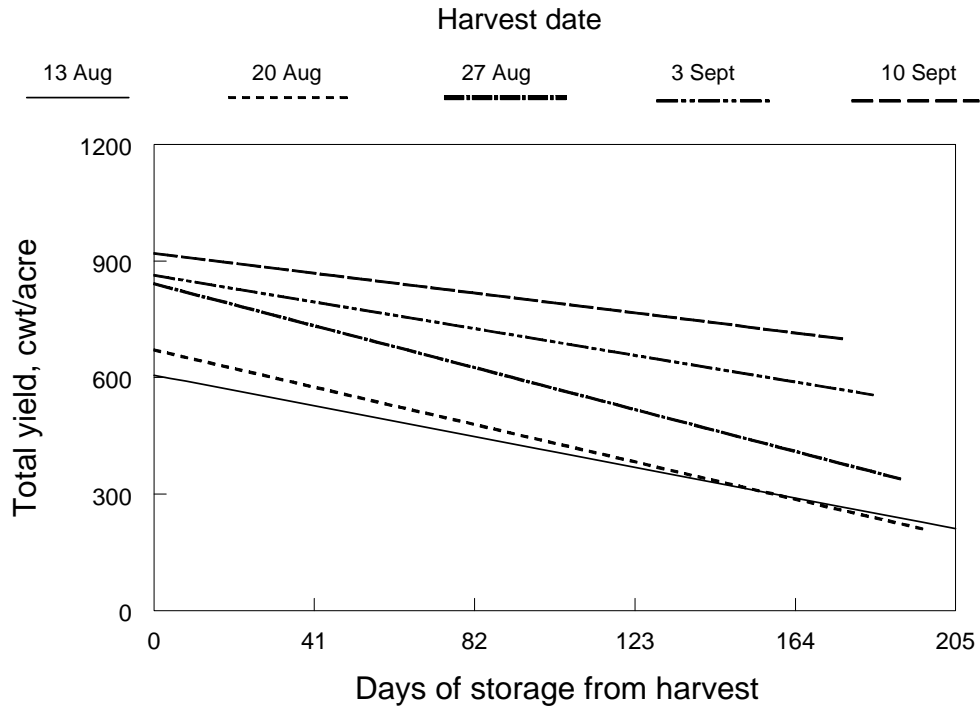


Figure 7. Total onion yield over time in storage for drip-irrigated Joaquin harvested on five dates. Malheur Experiment Station, Oregon State University, Ontario, OR, 2009-2010.