

WATER USE IN VEGETABLES— DRY BULB ONIONS

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Introduction

Onion production in Arizona has remained relatively stable since 2001, varying from 1000-2000 planted acres, with an average yield of 487 cwt./acre. Market prices have fluctuated greatly in the past four years from \$8.80 per cwt. in 2004 to \$12.00 per cwt. in 2007. Onions are grown in Maricopa, La Paz, Pinal, Yuma and Cochise counties.

Commercial Irrigation Management

Most dry onions in the state are irrigated using furrow irrigation. There are some fields utilizing drip irrigation, but economics make it difficult for most growers to switch. However, it is quite common for growers to use sprinklers for germination. The use of sprinklers help to reduce the amount of water needed and reduces the potential for salts to enter the seed row and cause emergence problems. Onions are sensitive to salts; therefore, an EC_e of 1.2 or less should be used for irrigation.

Onions should be kept stress free throughout the growing cycle. However, the most critical period for onions is during bulb swelling. An irrigation threshold of 40% soil water deficit should be targeted to avoid water stress. If using tensiometers or resistance blocks, -40 to -60 centibars should be used to trigger irrigation. Set the tensiometer or resistance block at a depth of 6 to 12 in. This will give an accurate representation of the moisture within the plant's rootzone.

Water Use by Dry Onions

Onions are grown in the winter, with planting starting sometime in September or October, and harvesting taking

place in March, April and May. Peak water use occurs towards the end of the growing cycle when the stems begin to swell and the onions mature. At this point, the water is removed, the tops are knocked down and the onions are allowed to "dry down" in the field. Dry onions use approximately 20 in. total water for the season.

Two graphs illustrate water use by dry onions throughout the growing season. Figure 1 shows the consumptive use of dry onions as a function of Heat Units After Planting (HUAP). The temperatures used to develop this curve were 43°F for the lower threshold and 68°F for the upper threshold. The heat units should be calculated using the sinusoidal approach developed by Snyder (1985). Information on daily maximum and minimum temperatures can be obtained from AZMET. Total heat units required for dry onions is about 2300.

Figure 2 shows the average daily water use for dry bulb onions in central Arizona. This information was developed using crop water use information obtained in studies at the Maricopa Agricultural Center and applying it to weather data gathered at the Maricopa Agricultural Center AZMET station (Martin et al., 2001).

When determining irrigation water needs, do not forget to incorporate the system's efficiency. For example, if the irrigation system has an efficiency of 75% and the crop requirement is 2 in., apply about 2.7 in. to account for the system's inefficiency (2 in./0.75).

Maximum water use by dry onions is about 0.2 in. of water per day. This can be as high as 0.35 inches, depending on planting date and location. This peak occurs late in the season when the stalks begin to swell, just prior to terminating irrigation. The rootzone calculation used for water management in onions is a depth of one foot.

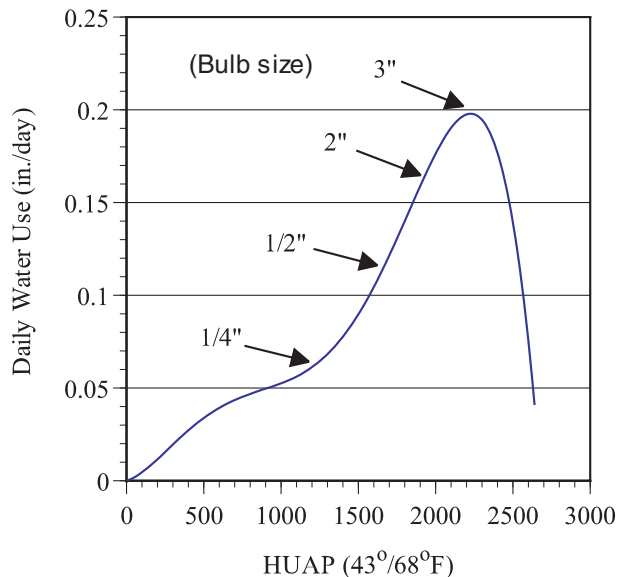


Figure 1. Average daily water use as a function of Heat Units After Planting (HUAP) for dry onions planted in mid-September.

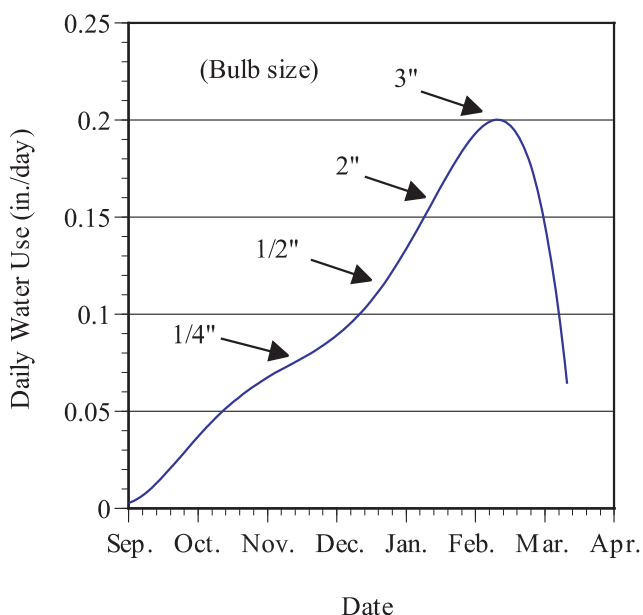


Figure 2. Average daily water use for dry onions utilizing a calendar schedule for a mid-September planting date.

References

AZMET, Arizona Meteorological Network on the web at <http://ag.arizona.edu/azmet>

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