



WATER USE IN VEGETABLES—DRY BULB ONIONS

ARIZONA WATER SERIES No. 25

Edward C. Martin, Donald C. Slack, E. James Pegelow

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 continued to grow over the years from \$8.80 in 2004, \$12.00 in 2007 to \$18.80 per cwt. in 2012. 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 ECe 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 8 inches. 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 Aft Planting (HUAP). The temperatures used to develop this curve were 43°F for

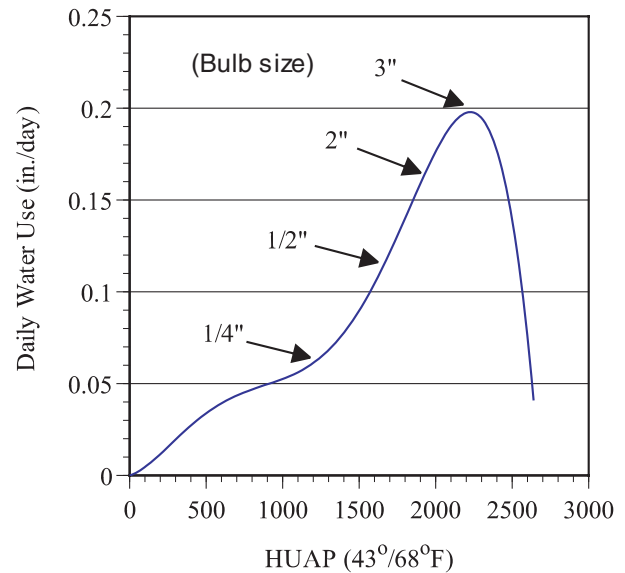


Figure 1. Average daily water use as a function of Heat Units After Planting (HUAP) for dry onions planted in mid-September.

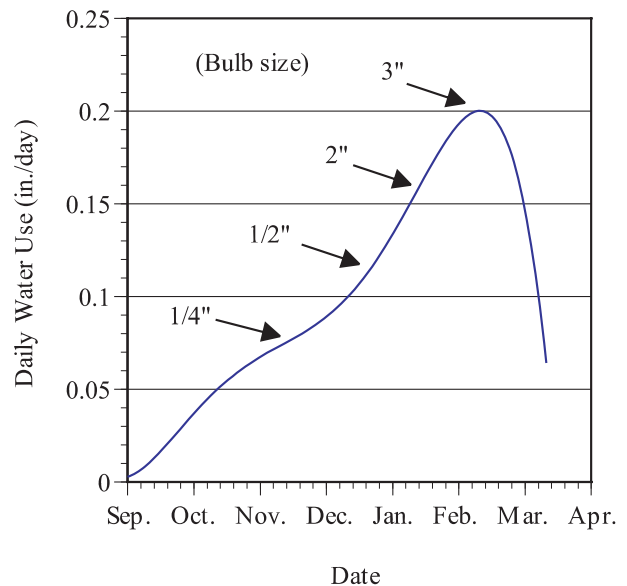


Figure 2. Average daily water use for dry onions utilizing a calendar schedule for a mid-September planting date.

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.

Reference

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

Martin, E.C., A.S. de Oliveira, A.D. Folta, E.J. Pegelow and D.C. Slack. 2001. Development and testing of a small weighing lysimeter system to assess water use in shallow rooted crops. *Transactions of the ASAE*. 44(1):71-78.

Snyder, R.L. 1985. Hand calculating degree days. *Agric. Forest Meteorol.*, 35: 353-358.

For additional information, contact your local Cooperative Extension office.



COLLEGE OF AGRICULTURE & LIFE SCIENCES

Cooperative
Extension

THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
TUCSON, ARIZONA 85721

EDWARD C. MARTIN

*County Extension Director
Maricopa County Cooperative Extension
Professor And Irrigation Specialist
Department Of Agriculture & Biosystems Engineering*

DONALD C. SLACK

Dean's Chair for Excellence, Cecil Miller Families

E. JAMES PEGELOW

Former Senior Research Specialist

CONTACT:

EDWARD C. MARTIN
ecmartin@email.arizona.edu

This information has been reviewed by University faculty.
extension.arizona.edu/pubs/az1131-2014.pdf

Originally published: 2009

Other titles from Arizona Cooperative Extension can be found at:
extension.arizona.edu/pubs

Any products, services or organizations that are mentioned, shown or indirectly implied in this publication do not imply endorsement by The University of Arizona.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Jeffrey C. Silvertooth, Associate Dean & Director, Extension & Economic Development, College of Agriculture Life Sciences, The University of Arizona.

The University of Arizona is an equal opportunity, affirmative action institution. The University does not discriminate on the basis of race, color, religion, sex, national origin, age, disability, veteran status, or sexual orientation in its programs and activities.