Oregon State University
Western Oregon
Bulb Onion Irrigation Guide

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November 1997

Total Seasonal Evapotranspiration [in]	25.4 (mean)
Peak Evapotranspiration Rate [in/day]	0.25
Maximum Allowable Depletion [percent]	30
Critical Moisture Deficit Period	Bulbing, bulb expansion

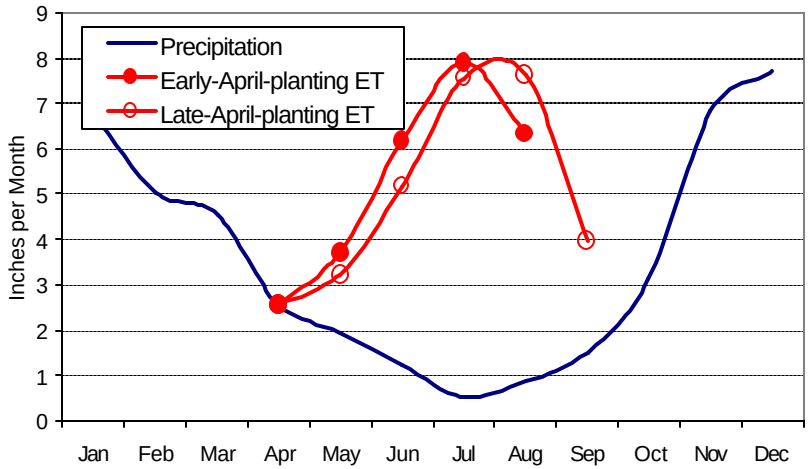

Figure 1: Typical precipitation and bulb onion evapotranspiration (ET) in the Willamette Valley. Tabulated values of ET are provided on the back of this sheet.

Onions in Western Oregon are grown on both mineral and organic soils. They are sensitive to soil crusting. Maintaining uniform soil moisture on organic soils is simpler than on mineral soils, but on both soil types, uniform surface soil moisture should be maintained until the stand is established. Onions are shallow-rooted, and unless moisture supply is constant, they bulb early and the resulting sizes may be small. Also, maintaining even soil moisture is important in reducing incidence of double-center bulbs. Light, frequent irrigation should be used when onions are small to minimize leaching of nitrogen from the root zone. Increase water applications as plants and roots increase in size. Maintaining moisture near the surface, at the onion stemplate, is important since roots will be generated only when moisture is present. Proper moisture management is important in alleviating pink root problems, general root health, and bulb growth vigor. Watering should be terminated after the bulbs have reached full size, and tops have begun to fall.

The peak mid-summer water use for bulb onions is approximately 0.25 inches per day for both the early and late April plantings.

On the back side of this page is a worksheet to aid in calculating irrigation schedules for bulb onions. These calculations are most straightforward for those using side-roll, hand-move, or solid set sprinkler irrigation. For those with linear move or center pivot systems, all information applies except for the set time, which must be gauged to the tower travel speed. For basic schedule information, sprinkler nozzle diameters, operating pressures, and spacing and soil type must be known. To more accurately describe individual systems, the uniformity coefficient of the system and available water capacity of your soil is also needed. This worksheet was designed to be progressed through sequentially starting with item *a*). Equations listed under item headings use item letters for reference. Although the rooting depth is already supplied in the worksheet, if you have reason to believe your site is an exception (e.g. shallow restrictive layer), this may be altered. Evapotranspiration rate estimates for both the early and the late April plantings are listed in the worksheet. Use estimates from the closest planting date.

References

1. Sanders, D.C. 1993. Vegetable Crop Irrigation, Leaflet No: 33-E (North Carolina State University, Raleigh).

Note: For additional background information and references, see "Western Oregon Irrigation Guides: Background and References."

Irrigation Schedule Worksheet: Bulb Onion

Use values for your specific soil and depth range from the Appendix, if available.

Otherwise use Table 1 below.

Table 1

Soil Texture	AWC [in/in]
Sandy	0.07 to 0.10
Sandy Loam	0.09 to 0.15
Loam	0.14 to 0.19
Clay Loam	0.17 to 0.22
Clay	0.20 to 0.25

A. Determine Irrigation Interval

Available Water Capacity [in/in]	***a.***	
Maximum Allowable Depletion [percent]	***b.***	30
Effective Rooting Depth [in]	***c.***	18
Peak ET [in/day]	***d.***	0.25
Maximum Irrigation Interval [days]	***e.***	
e = (a * b * c) / (d * 100)		
Your Irrigation Interval [days]	***f.***	

Note: f should be equal to or shorter than e.

Table 2

Irrigation System	Uniformity Coefficient (*)	
Solid set	70	63
Hand move or Side-roll	82	74
Pivot or Linear Move	90	81
Offset Managed Handm.	90	81

B. Determine Combined Efficiency

Uniformity Coefficient	***g.***	
Combined Efficiency	***h.***	
h = (0.01583 * g) - 0.6327		

C. Determine Depth of Irrigation

		Planting	April	May	June	July	August	September
Monthly Evapotranspiration Rate [in/day]	***i.***	*Apr.1*	0.09	0.12	0.21	0.25	0.20	
		Apr.20	0.09	0.10	0.17	0.24	0.25	0.13
Depth of Irrigation per Set [in]	***j.***							

j = (i * f) / h.

D. Determine Set Time

Application Rate [in/hr]	***k.***	

Measure or see Tables 3 and 4 below to determine your application rate.

		April	May	June	July	August	September
Irrigation Set Time [hrs]	***l.***						

l = j / k

Table 3

Pressure [psi]	Discharge [gpm] Standard Tapered Nozzle Diameter [in] 3/32	1/8	9/64	5/32	11/64	3/16	13/64	7/32
35	1.5	2.7	3.40	4.16	5.02	5.97	7.08	8.26
40	1.6	2.9	3.63	4.45	5.37	6.41	7.60	8.87
45	1.7	3.2	3.84	4.72	5.70	6.81	8.07	9.41
50	1.8	3.1	4.04	4.98	6.01	7.18	8.49	9.88
55	1.9	3.3	4.22	5.22	6.30	7.51	8.87	10.30

How to use these tables:

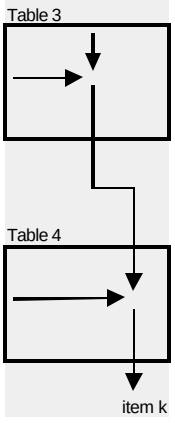

Table 4

Sprinkler Spacing [ft] -by- [ft]	Application Rate [in/hr] Discharge per Nozzle [gpm] 2	3	4	5	6	8	10
20	20	0.48	0.72	0.96	1.20	1.44	1.93	2.41
20	40	0.24	0.36	0.48	0.60	0.72	0.96	1.20
30	30	0.21	0.32	0.43	0.54	0.64	0.86	1.07
30	40	0.16	0.24	0.32	0.40	0.48	0.64	0.80
30	50	0.13	0.19	0.26	0.32	0.39	0.51	0.64
40	40	0.12	0.18	0.24	0.30	0.36	0.48	0.60
40	50	0.10	0.14	0.19	0.24	0.29	0.39	0.48
40	60	0.08	0.12	0.16	0.20	0.24	0.32	0.40

(*) If your sprinkler spacing/discharge combination falls into gray-shaded area, use uniformity coefficient from the right, also gray-shaded column. Otherwise use values from the left column.