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Crop Water Use and Irrigation Scheduling Guide for North Florida[1]

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Introduction

This guide presents AVERAGE daily water use for 13 north Florida crops that can be used to help schedule irrigation. Knowledge of crop water use and field soil water-holding capacity allows a grower to develop a realistic irrigation schedule that minimizes plant water stress, saves water, and reduces nutrient leaching.

Crop water use as defined in this guide is a combination of **evaporation** and plant **transpiration**. **Evapotranspiration**, abbreviated **ET**, is the term used to describe these two processes acting together.

Major factors that affect daily crop water use include:

- Crop TYPE.
- Crop AGE.
- Plant spacing and/or percent ground coverage.
- Weather or climatic conditions, such as
    - Amount of sunshine – ET is much greater on a sunny day compared with a cloudy day.
    - Air temperature – ET increases from winter to spring to summer.
    - Amount of wind – ET is greater on a windy day compared with a calm day.
    - Humidity – ET is greater on a dry day compared with a humid day.

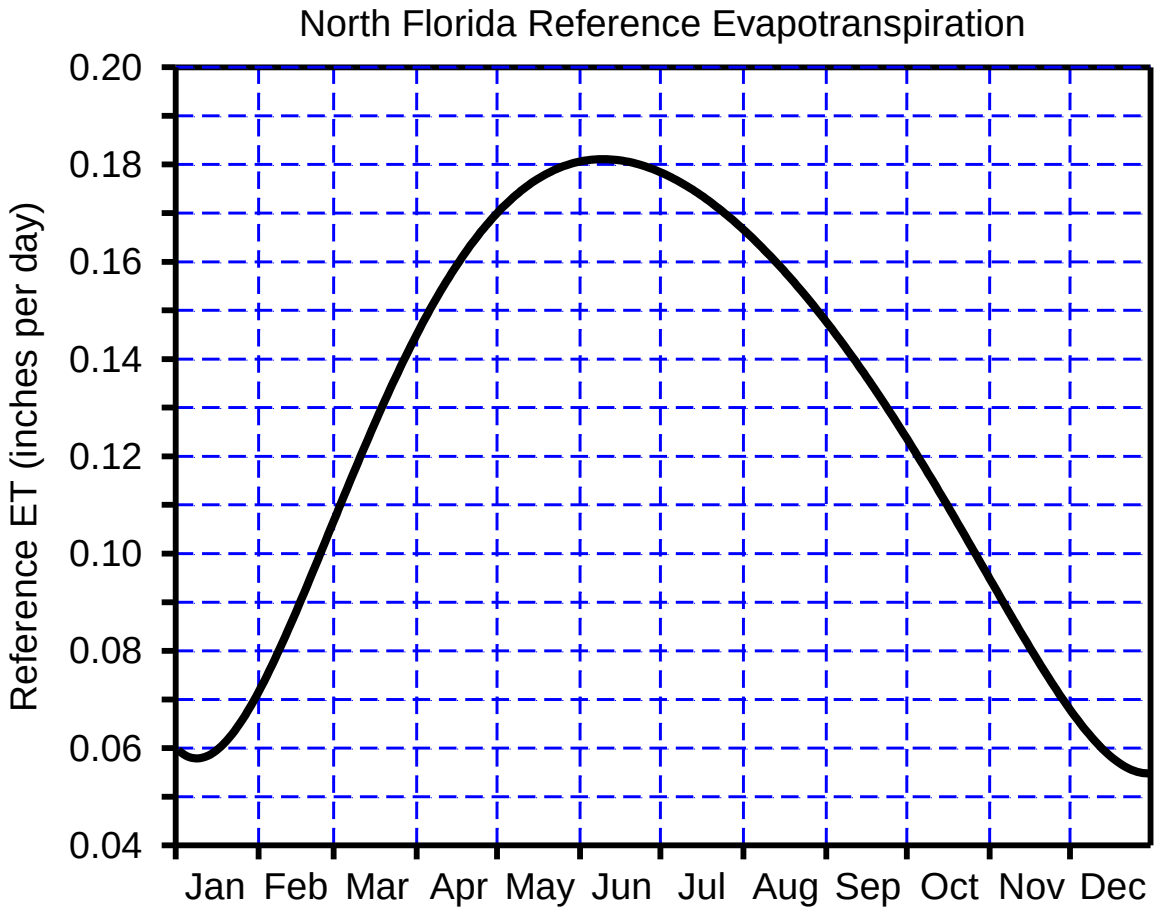
The average daily crop water use estimates in this guide were determined by multiplying **reference ET** by a factor that takes crop type and age into account. Reference ET is the ET rate of a short, healthy, well-watered grass. Depending on crop type, crop factors ranged between 0.2 for emerging plants to 1.2 for actively growing plants with a large canopy volume.

How to Use This Guide

Caution: Actual ET on a given day can differ substantially from the average daily ET values shown in this guide, depending on weather conditions. For example, crop water demand will be higher than average on days that are warmer and/or windier than normal, and demand will be lower on days that are cooler and/or cloudier than normal. However, when estimating crop water demand for a period of several days, the values shown in this guide are of sufficient accuracy to help guide irrigation scheduling.

1. Locate the table for the crop of interest.
2. Find the current month along the left side of the table.
3. Determine the point of interest in the growing season using plant growth stage, key points in the growing season, or week after planting. (Note: Week after planting is the least accurate method to estimate plant growth stage due to effects of planting date and weather. Use weeks after planting with caution.)
4. Estimated crop water demand in inches per day is shown at the intersection of month (horizontal row) and plant growth stage (vertical column).
5. Determine the crop rooting depth, then find a base irrigation schedule from the tables at the back of this guide. Suggested irrigation schedules apply for these conditions:
    a. Overhead irrigation systems with an application efficiency of 75%.
    b. Soil water-holding capacity of 0.7 inches per foot or 1.0 inches per foot.
    c. Available soil moisture depletion of 50%.

If irrigation system, soil, or allowable depletion differs from above, the irrigation schedule should be adjusted accordingly.

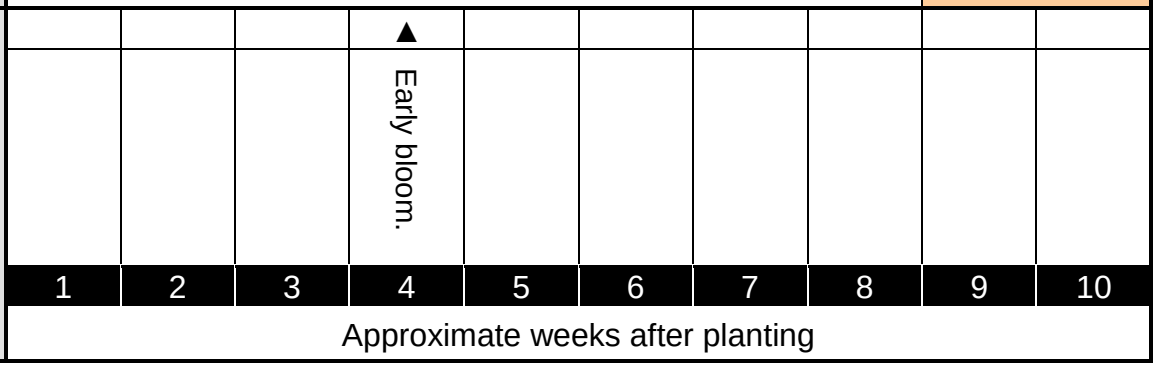


Average water use for **BERMUDAGRASS** (full ground cover) in inches/day.

Month	inches/day
Mar	0.13
Apr	0.16
May	0.18
Jun	0.18
Jul	0.17
Aug	0.16
Sep	0.14
Oct	0.11
Nov	0.08

Average water use for **BEAN (SNAP)** in inches/day.

Month	Small plants	Growing plants		Pods enlarge		Pods mature
Mar	0.04	0.05	0.08			
Apr	0.05	0.07	0.10	0.14	0.15	
May	0.05	0.07	0.11	0.13	0.17	0.17
Jun				0.13	0.17	0.17
Jul						0.16
Aug	0.05	0.07	0.10			
Sep	0.04	0.06	0.09	0.12	0.13	
Oct	0.04	0.05	0.07	0.09	0.10	0.10
Nov				0.07	0.08	0.08
Dec						0.06



Average water use for **CABBAGE** in inches/day.

Month	Small plants		Growing plants				Head development			
Aug	0.05		0.07							
Sep	0.04		0.06		0.09	0.12				
Oct	0.02		0.05		0.08	0.10	0.11			
Nov	0.02		0.04		0.06	0.08	0.08			
Dec	0.01		0.03		0.04	0.06	0.06			
Jan	0.01		0.03		0.04	0.06	0.06			
Feb	0.02		0.04		0.06	0.08	0.09			
Mar		0.02	0.06		0.09	0.11	0.13			
Apr					0.10	0.14	0.16			
May							0.18			
	1	2	3	4	5	6	7	8	9	10	11	12
	Approximate weeks after planting											

Average water use for **CARROT** in inches/day.

Month	Small plants	Growing plants			Root development					Final growth		
Aug	0.05	0.07	0.11	0.15								
Sep	0.06	0.06	0.09	0.13	0.14							
Oct	0.05	0.05	0.08	0.10	0.12					0.11		
Nov	0.03	0.04	0.06	0.08	0.09					0.07		
Dec	0.02	0.03	0.04	0.06	0.06					0.05		
Jan	0.02	0.03	0.04	0.06	0.06					0.05		
Feb	0.04	0.04	0.06	0.08	0.09					0.08		
Mar	0.05	0.06	0.09	0.12	0.13					0.11		
Apr	0.07	0.07	0.11	0.15	0.17					0.14		
May				0.17	0.19					0.16		
Jun								0.19		0.16		
	1	2	3	4	5	6	7	8	9	10	11	12	13
	Approximate weeks after planting												

Average water use for **CORN (FIELD)** in inches/day.

Month	Small plants				Stalk growing rapidly				Ear filling								Ear maturity			
Feb	0.03																			
Mar	0.04				0.06		0.11													
Apr	0.05				0.08		0.13		0.18	0.19										
May	0.05				0.09		0.15		0.20	0.21										
Jun					0.09		0.15		0.20	0.22							0.19		0.13	
Jul										0.21							0.18		0.13	
Aug													0.19				0.16		0.12	
Sep																0.17	0.14		0.10	
Oct																		0.09		
	▲ Germination.	▲ Seedling emergence.			▲ 4 to 8 leaves expanded.		▲ Top two ear shoots developing rapidly.	▲ Tassel emerging.	▲ All leaves expanded and tassel emerged.	▲ Kernels in blister stage.	▲ Kernels in dough stage, gaining weight.		▲ Kernels at 50% milk stage.	▲ **Approximate maturity for silage harvest.**	▲ Kernels at early dent stage.		▲ Kernels fully dented.	▲ Black layer formation.		▲ Kernels ready for combining.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	Approximate weeks after planting																				

Average water use for **CORN (SWEET)** in inches/day.

Month	Small plants	Large plants	Ear development
Feb	0.03	0.04	
Mar	0.04	0.06	0.09	0.12	
Apr	0.05	0.08	0.11	0.15	0.16	
May	0.05	0.08	0.12	0.17	0.18	
Jun		0.09	0.13	0.17	0.18	
Jul				0.17	0.17	
Aug					0.16	

▲ Emergence.
▲ 4 to 8 leaves expanded.
▲ Tassel emerging.
▲ Kernels in blister stage.
▲ Approximate harvest.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Approximate weeks after planting

Average water use for **COTTON** in inches/day.

Month	Early vegetative	Juvenile	Reproductive	Maturation
Mar	0.04			
Apr	0.06	0.09	0.13	
May	0.06	0.10	0.14	0.20
Jun	0.06	0.10	0.14	0.20	0.22
Jul	0.07	0.10	0.14	0.20	0.21
Aug			0.13	0.17	0.19	0.17	0.13
Sep				0.16	0.16	0.15	0.10
Oct					0.13	0.12	0.08
Nov						0.09	0.06

▲ Emergence. ▲ First square. ▲ First bloom. ▲ Last effective bloom. ▲ First open boll. ▲ Harvest.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Approximate weeks after planting

Average water use for **CUCUMBER** in inches/day.

Month	6-inch vines	12-inch vines		Fruit production					Late season
Mar	0.04	0.06	0.09	0.11					
Apr	0.05	0.07	0.12	0.14					0.11
May			0.13	0.16					0.12
Jun							0.16		0.13
Jul									
Aug	0.05	0.07	0.12	0.14					
Sep	0.04	0.06	0.10	0.12					
Oct			0.08	0.10					0.08
Nov					0.07				0.06
		▲ First flower.		▲ 3-inch fruits.		▲ Approximate first harvest.			
	1	2	3	4	5	6	7	8	9	10
	Approximate weeks after planting									

Average water use for **GRAIN SORGHUM** in inches/day.

Month	Small plants	Stalk growing rapidly	Head development	Maturity
Feb	0.02			
Mar	0.04	0.08		
Apr	0.05	0.10	0.15	0.17
May	0.06	0.12	0.17	0.19
Jun		0.12	0.17	0.19	0.16	0.10
Jul				0.18	0.15	0.09
Aug				0.17	0.14	0.08
Sep				0.15	0.13	0.07
Oct					0.10	0.07

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
▲ Germination.	▲ Seedling emergence.	▲ Collar of 3rd leaf visible.		▲ Collar of 5th leaf visible.	▲ Growing point differentiation.		▲ Final leaf visible in whorl.	▲ Boot. Head extended into flag leaf sheath.		▲ Half-bloom. Half of plants at some stage of bloom.	▲ Soft dough.	▲ Hard dough.		▲ Physiological maturity. Max. dry matter accumulation.				

Approximate weeks after planting

Average water use for **PEANUT** in inches/day.

Month	Planting to emergence	Emergence to pegging/ flowering		Flowering/pegging and pod formation		Pod formation to maturity		
Apr	0.05	0.08						
May	0.05	0.09	0.13	0.18				
Jun	0.05	0.10	0.14	0.19	0.22			
Jul			0.13	0.17	0.21	0.19		
Aug					0.19	0.17	0.14	
Sep					0.16	0.15	0.12	0.09
Oct						0.12	0.10	0.08
Nov								0.06

▲ Emergence. ▲ Beginning bloom. ▲ Beginning peg. ▲ Beginning pod. ▲ Beginning seed. ▲ Beginning maturity. ▲ Harvest maturity.

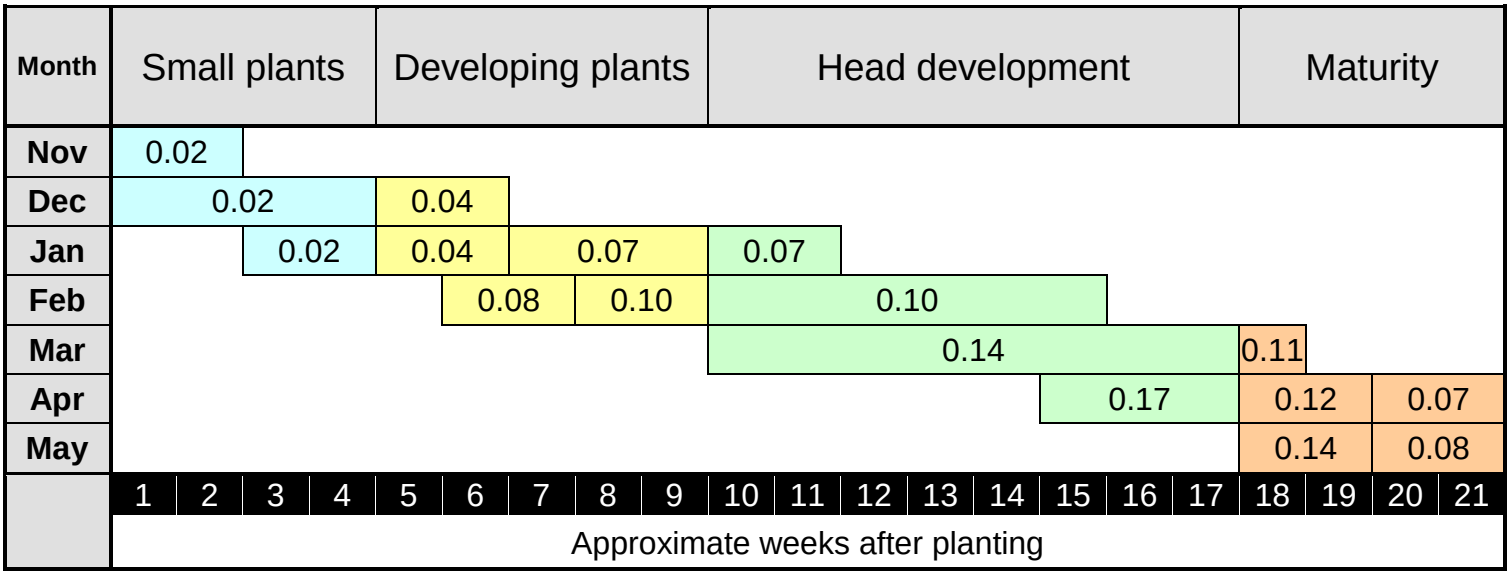
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

Approximate weeks after planting

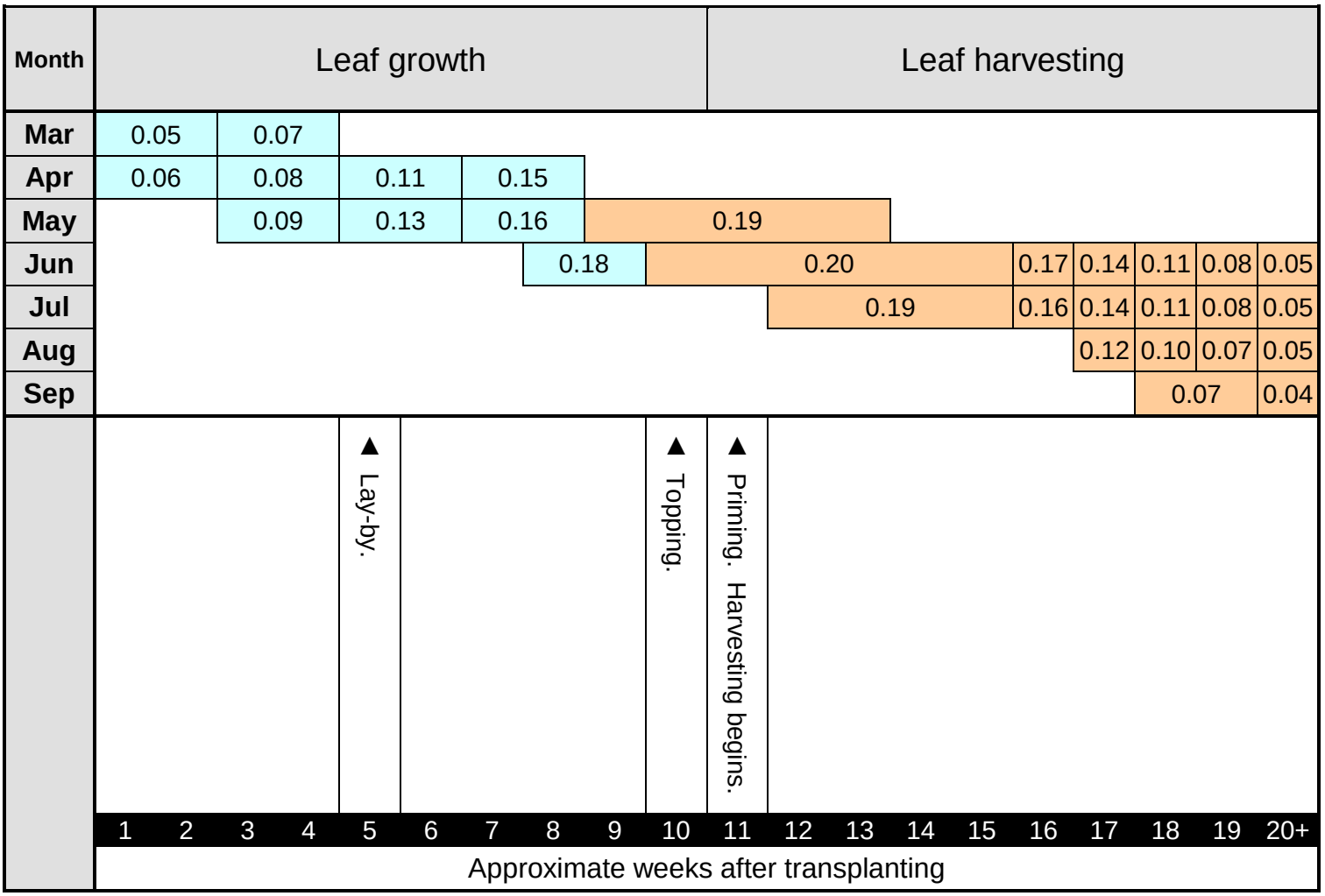
Average water use for **POTATO** in inches/day.

Month	Small plants (after hilling)			Large plants (vegetative growth)				Tuber initiation and bulking				Maturation (top dies)	
Jan	0.02			0.02									
Feb	0.03			0.04		0.07	0.09						
Mar	0.04			0.06		0.10	0.13	0.14					
Apr					0.10		0.15	0.17				0.16	0.12
May								0.19				0.19	0.14
Jun												0.18	0.14
					▲ 8-inch plants.		▲ First open flower.	▲ 50% open flowers.	▲ 100% open flowers.			▲ Tops falling over.	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Approximate weeks after planting													

Average water use for **SMALL GRAINS** in inches/day.



Average water use for **TOBACCO** in inches/day.



Approximate irrigation interval and application amount for soils with **0.7 inches per foot** water-holding capacity

Amounts shown are based on 50% allowable soil moisture depletion (AMD) and the average application efficiency for a well-designed and maintained center pivot or lateral move irrigation system of 75%.

Rooting depth (AMD)	**Crop water use (inches per day)**						
	0.04	0.08	0.12	0.16	0.20	0.24	0.28
	---------- Irrigation interval and application amount ----------						
3” 0.09” AMD	0.11” every 2 days	0.11” every 1 day	0.16” every 1 day	X	X	X	X
6” 0.18” AMD	0.21” every 4 days	0.21” every 2 days	0.24” every 1½ days	0.21” every 1 day	0.27” every 1 day	0.32” every 1 day	X
12” 0.35” AMD	X	0.32” every 3 days	0.48” every 3 days	0.43” every 2 days	0.40” every 1½ days	0.48” every 1½ days	0.37” every 1 day
18” 0.52” AMD	X	X	0.64” every 4 days	0.64” every 3 days	0.53” every 2 days	0.64” every 2 days	0.75” every 2 days
24” 0.70” AMD	X	X	0.80” every 5 days	0.85” every 4 days	0.80” every 3 days	0.64” every 2 days	0.75” every 2 days
36” 1.05” AMD	X	X	X	1.3” every 6 days	1.3” every 5 days	1.3” every 4 days	1.1” every 3 days

Approximate irrigation interval and application amount for soils with **1.0 inches per foot** water-holding capacity

Amounts shown are based on 50% allowable soil moisture depletion (AMD) and the average application efficiency for a well-designed and maintained center pivot or lateral move irrigation system of 75%.

Rooting depth (AMD)	**Crop water use (inches per day)**						
	0.04	0.08	0.12	0.16	0.20	0.24	0.28
	---------- Irrigation interval and application amount ----------						
3” 0.13” AMD	0.16” every 3 days	0.11” every 1 day	0.16” every 1 day	X	X	X	X
6” 0.25” AMD	0.27” every 5 days	0.21” every 2 days	0.24” every 1½ days	0.21” every 1 day	0.27” every 1 day	0.32” every 1 day	X
12” 0.50” AMD	X	0.53” every 5 days	0.48” every 3 days	0.43” every 2 days	0.53” every 2 days	0.48” every 1½ days	0.37” every 1 day
18” 0.75” AMD	X	X	0.80” every 5 days	0.64” every 3 days	0.80” every 3 days	0.64” every 2 days	0.75” every 2 days
24” 1.00” AMD	X	X	0.96” every 6 days	1.06” every 5 days	1.06” every 4 days	0.96” every 3 days	0.75” every 2 days
36” 1.50” AMD	X	X	X	1.5” every 7 days	1.6” every 6 days	1.6” every 5 days	1.6” every 4 days