

Daily Lesson Plan (DLP)

Topic. Plot your Plants.		Day: 1
Grade: 4-5	Lesson Name: How long will you need to run your system each week to provide sufficient water?	Time :(60 Mins.)

Topic	How long will you need to run your system each week to provide sufficient water?		
Weekly keywords	Mulch, drip water, medium flow, row spacing, etc.		
Seating plan	<input type="checkbox"/> Individual	<input type="checkbox"/> Pairs	Group of 4
Skill development	<input checked="" type="checkbox"/> Reading <input type="checkbox"/> Reflection <input type="checkbox"/> Other (Specify)	<input checked="" type="checkbox"/> Writing <input type="checkbox"/> Illustration	<input checked="" type="checkbox"/> Discussion <input type="checkbox"/> Presentation <input type="checkbox"/> Collaboration <input type="checkbox"/> Observation <input type="checkbox"/> Research

Objectives: ➤ The students will be able to:	Learn about how long will you need to run your system each week to provide sufficient water
Teaching Resources:	Laptop/multimedia, pictures, writing board, notebook, piece of paper, pen/pencil, plants, worksheet
Teaching Learning Strategies	
Introduction: 5 mins. Start the lesson by asking the students to share for how many times they water their plants. Listen to their responses and give feedback. Methodology: (20 mins.) The teacher will discuss: When plants are small, aim for the lower end and when they are large, the upper end. Additionally, when it is excessively hot and/or windy, plants may need more than 1.5 inches of water in a week. When using a plastic mulch the entire 1 - 1.5 inches will need to be applied weekly regardless of rain events. With bare ground or when using water permeable mulches (for example, straw	

or paper mulch), the amount of water applied by irrigation should be reduced by the amount of rainfall the field receives. For example, if it rains ¼ inch, reduce the amount of irrigation water applied by ¼ inch for that week. The time it takes a drip system to apply 1 inch of water to the soil depends on the drip tube flow rate and width the roots extend which is generally the same as the width of most beds: about 30 inches.

Activity: (30 mins.) (Group Work)

The table below shows how long, in hours, to run a drip system to apply 1 inch of water to the 30 inch width based on the drip tube flow rate.

	Emitter Spacing (inches)	Drip tube flow rate @ 8 psi (gph/100 ft)	Drip tube flow rate @ 8 psi (gpm/100 ft)	Time to apply (hours)
Low flow	12	13.2	0.22	
Low flow	8	20.4	0.34	
Medium flow	12	20.4	0.34	
Medium flow	8	30.6	0.51	
High flow	12	27	0.45	
High flow	8	40.2	0.67	
High flow	4	80.4	1.34	

If you have a drip tape with a flow rate of 0.45 GPM per 100 ft it would take 5.8 hours to apply 1 inch of water to the 30 inch beds. Typically this is applied through several weekly applications.

How the values in the table were determined

Visualize an acre with beds on 6 ft centers.

The values needed are the:

width of the bed, which is generally 30 inches or 2.5 feet;

number of gallons in an acre inch of water: 27,154;

number of square feet in an acre: 43,560; and,

drip tube flow rate: this varies, for the example we'll use 0.45 gpm/100 ft.

First, determine how much drip tape is needed by dividing the area in an acre by the row spacing. $43,560 \text{ ft}^2 \div 6 \text{ ft} = 7,260 \text{ ft}$ of drip tape needed.

Next, determine the area of the acre to which the water will be applied. $7,260 \text{ ft drip tape} \times 2.5 \text{ ft wide beds} = 18,150 \text{ ft}^2$. (0.42 acre.)

Determine the number of gallons of water needed to apply. $27,154 \text{ gal/acre-in} \times 0.42 \text{ acre} = 11,405 \text{ gal}$.

Determine the number of 100 foot units of drip tape used. $7,260 \text{ ft} \div 100 \text{ ft} = 72.6 \text{ units}$.

Determine the number of gallons per minute needed using the drip tube flow rate. $72.6 \text{ units} \times 0.45 \text{ gpm} = 32.67 \text{ gpm}$. If your well does not have this capacity, you will need to water in zones.

Lastly, determine the amount of time to run the system. $11,405 \text{ gal needed} / 32.67 \text{ gpm} = 349 \text{ minutes}$ or 5.8 hours.

Soil texture and available water holding capacity determine the rate at which water moves through the soil and therefore how long to run the drip system per application.

To determine how long to run the drip system at one time, first find the available water holding capacity of the soil using a table such as the one below.

Soil Texture	Available water holding capacity (inch of water/inch depth of soil)
Coarse sand / compacted sands	
Fine sand	
Loamy sand	
Sandy loam	
Fine sandy loam / compacted loam	
Loam and silt loam	
Clay loam and silty clay loam	
Silty clay and clay	

For example, if you have a sandy loam, available water holding capacity is 0.11 to 0.15 inch of water/inch depth of soil. Pick a number within the range, say 0.12.

Then, using the table below and the drip tube flow rate, find the maximum time in minutes to run the drip system at one time.

For our example the available water holding capacity is 0.12 inch of water/inch depth of soil and the drip tube flow rate is 0.45 gpm per 100 ft. Using the table below the drip system would be run 110 minutes for each irrigation event, typically in a 24 hour period, to avoid leaching and runoff. Repeat events until the system is run for 5.8 hours in a week to apply 1 inch of water.

Available water holding capacity (inch of water/inc depth of soil)	Tubing flow rate (gpm per 100 ft)			
	0.2	0.3	0.4	0.45
	(maximum minutes per application - assumes 10-inch deep root zone and irrigation moisture depletion)			
0.02	41	27	20	18
0.03	61	41	31	28
0.04	82	54	41	37
0.05	102	68	51	46

0.06	122	82	61	55	49	4
0.07	143	95	71	64	57	4
0.08	163	109	82	74	65	5
0.09	184	122	92	83	73	6
0.10	204	136	102	92	82	6
0.11	224	150	112	101	90	7
0.12	245	163	122	110	98	8
0.13	255	177	132	119	106	8
0.14	266	190	142	128	114	9
0.15	276	204	153	138	123	10
0.16	287	217	163	147	131	10
0.17	297	231	173	156	139	11

Wrap up (5mins.): Wind up the lesson by asking the students randomly to share their findings.

Home Assessment:

The students will do the worksheet as homework.

Worksheet

Lesson Evaluation:

- Teacher was able to accomplish all aspects of the lesson well ☐
- Teacher was not able to do warm up activity ☐,
- develop lesson plan well ☐,
- do the learning activity ☐,
- do wrap up ☐,
- accomplish lesson objective ☐,
- manage time well ☐,
- manage class well ☐



Worksheet Day

Name: _____

Class: _____

Topic: Plot the Plants

Subject: Science

1. What are the irrigation methods, explain:

[illegible]
