

## Daily Lesson Plan (DLP)

<b>Topic. Plot your Plants.</b>		Day :1
<b>Grade: 4-5</b>	<b>Lesson Name: What is the evapotranspiration rate for the hottest month in your location?</b>	<b>Time :(60 Mins.)</b>

Topic	<b>What is the evapotranspiration rate for the hottest month in your location?</b>		
Weekly key words	simultaneously, millimeter, factor, weather, parameters, 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

<b>Objectives:</b> ➤ <b>The students will be able to:</b>	➤ Learn about the rate of evapotranspiration for the hottest month
<b>Teaching Resources:</b>	Laptop/multimedia, pictures, writing board, notebook, piece of paper, pen/pencil, plants, worksheet
<b>Teaching Learning Strategies</b>	
<b>Introduction: 5 mins.</b> Start the lesson by asking the students to tell if they know about evaporation and transpiration. Listen to their responses and give feedback. <b>Methodology: (20 mins.)</b> The teacher will discuss evapotranspiration, its units, and other weather parameters. Evapotranspiration (ET) Evaporation and transpiration occur simultaneously and there is no easy way of distinguishing between the two processes. Apart from the water availability in the topsoil, the evaporation from a cropped soil is mainly determined by the fraction of the solar	

radiation reaching the soil surface. This fraction decreases over the growing period as the crop develops and the crop canopy shades more and more of the ground area. When the crop is small, water is predominately lost by soil evaporation, but once the crop is well developed and completely covers the soil, transpiration becomes the main process. In Figure 2 the partitioning of evapotranspiration into evaporation and transpiration is plotted in correspondence to leaf area per unit surface of soil below it. At sowing nearly 100% of ET comes from evaporation, while at full crop cover more than 90% of ET comes from transpiration.

### Units

The evapotranspiration rate is normally expressed in millimetres (mm) per unit time. The rate expresses the amount of water lost from a cropped surface in units of water depth. The time unit can be an hour, day, decade, month or even an entire growing period or year.

As one hectare has a surface of 10000 m<sup>2</sup> and 1 mm is equal to 0.001 m, a loss of 1 mm of water corresponds to a loss of 10 m<sup>3</sup> of water per hectare. In other words, 1 mm day<sup>-1</sup> is equivalent to 10 m<sup>3</sup> ha<sup>-1</sup> day<sup>-1</sup>.

Water depths can also be expressed in terms of energy received per unit area. The energy refers to the energy or heat required to vaporize free water. This energy, known as the latent heat of vaporization (l), is a function of the water temperature. For example, at 20°C, l is about 2.45 MJ kg<sup>-1</sup>. In other words, 2.45 MJ are needed to vaporize 1 kg or 0.001 m<sup>3</sup> of water. Hence, an energy input of 2.45 MJ per m<sup>2</sup> is able to vaporize 0.001 m or 1 mm of water, and therefore 1 mm of water is equivalent to 2.45 MJ m<sup>-2</sup>. The evapotranspiration rate expressed in units of MJ m<sup>-2</sup> day<sup>-1</sup> is represented by l ET, the latent heat flux.

Table summarizes the units used to express the evapotranspiration rate and the conversion factors.

### Conversion factors for evapotranspiration

	depth	volume per unit area		energy per unit area *
	mm day <sup>-1</sup>	m <sup>3</sup> ha <sup>-1</sup> day <sup>-1</sup>	l s <sup>-1</sup> ha <sup>-1</sup>	MJ m <sup>-2</sup> day <sup>-1</sup>
1 mm day <sup>-1</sup>	1	10	0.116	2.45
1 m <sup>3</sup> ha <sup>-1</sup> day <sup>-1</sup>	0.1	1	0.012	0.245
1 l s <sup>-1</sup> ha <sup>-1</sup>	8.640	86.40	1	21.17

1 MJ m<sup>-2</sup> day<sup>-1</sup>      0.408      4.082      0.047      1

\* For water with a density of 1000 kg m<sup>-3</sup> and at 20°C.

### Factors affecting evapotranspiration

Weather parameters

Crop factors

Management and environmental conditions

Weather parameters, crop characteristics, management and environmental aspects are factors affecting evaporation and transpiration.

### Activity: (30 mins.) (Group Work)

#### EXAMPLE 1. Converting evaporation from one unit to another

On a summer day, net solar energy received at a lake reaches 15 MJ per square meter per day. If 80% of the energy is used to vaporize water, how large could the depth of evaporation be?

From Table 1:      1 MJ m<sup>-2</sup> day<sup>-1</sup> =      0.408 mm day<sup>-1</sup>

Therefore:      0.8 x 15 MJ m<sup>-2</sup> day<sup>-1</sup> = 0.8 x 15 x 0.408 mm d<sup>-1</sup> =      4.9 mm day<sup>-1</sup>

The evaporation rate could be 4.9 mm/day

### FIGURE 3. Factors affecting evapotranspiration with reference to related ET concepts

**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 factors affecting evapotranspiration?**

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