

TEACHER KEY



Growing Energy: Interpreting the Units Worksheet

Note to Instructor: Have students work through these questions in small groups, then discuss answers as a class and use accompanying Power Point slides to help visualize these units. If time is limited, you can just walk through the examples and illustrations in the PowerPoint as a class.

Below are the data you will use to answer the scientific questions.

Crop	Type	Harvest yield (Mg DM ha ⁻¹)	standard error
corn	annual	14.2	0.6
prairie	perennial	3.3	0.2
switchgrass	perennial	6.5	0.3
miscanthus grass	perennial	14.0	0.9
poplar trees	perennial	8.5	1.4
weed field	perennial	2.7	0.2

The amount of dried plant material (biomass) is measured in “megagrams of dry matter per hectare (Mg DM ha⁻¹).” Answer these questions to help make sense of these units.

1. What is a megagram?

1000 kilograms, 1 million grams, 2205 pounds or 1.102 tons (U.S.)

2. The average person weighs about 150 pounds or 68 kg. How many people would it take to weigh a megagram?

$$\frac{2,205 \text{ lbs/Mg}}{150 \text{ lbs/person}} \text{ or } \frac{1000 \text{ kg/Mg}}{68 \text{ kg/person}} = 14.71 \text{ people per megagram}$$

3. What is a hectare?

10,000 m²; 11960 sq yards; 107,639 sq feet or 2.47 acres

4. The area of a football field is 120 yards by 53.3 yards or 5351 m². How many football fields would it take to make a hectare?

$$\frac{10,000 \text{ m}^2/\text{ha}}{5,351 \text{ m}^2/\text{football field}} = 1.87 \text{ football fields per hectare}$$

In other words a hectare is the size of just under two football fields.

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5. What is 1 Megagram per a hectare (Mg/ha) in people per a football field?

$$\frac{14.71 \text{ people/Mg}}{1.87 \text{ football fields/ha}} = 7.86 \text{ people per football field}$$

This means for one Mg/ha of biomass is equivalent to approximately 8 people standing on a football field.

6. Express the average corn harvest weight in “people per a football field.” How many people per football field is 14.2 Mg/ha?

As noted above, 1 Mg/ha = 7.86 people/football field.

So 14.2 Mg/ha = 14.2 Mg/ha x 7.86 people/football field = 111.6 people/football field

In other words, if you were growing corn in a football field, you could expect to harvest dry biomass equal to the weight of about 112 people.