

Station 3: Kelp Resistance to Stress**Materials**

Binder clip (2-inch size)

2 scouring pads (thick green mats)

Empty 1-gallon plastic jug or 5-liter bucket

Nylon string

Single-hole punch

Meter stick

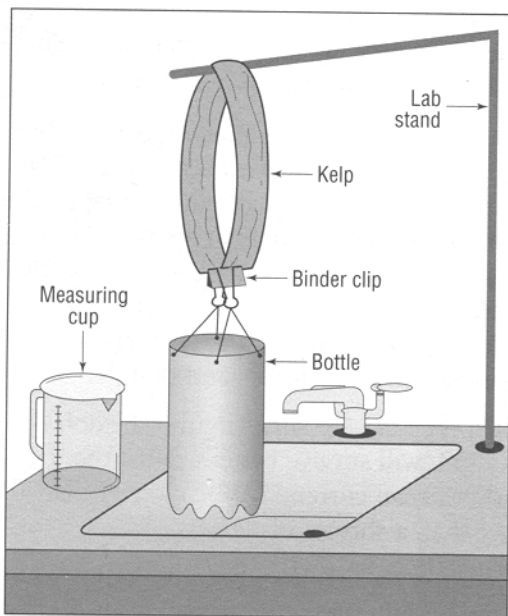
500-milliliter measuring cup

Lab stand or other device to hang the kelp rack

Sink

5 or 6 dried kelp or kombu sheets (from a health food store or an Asian grocery store, or fresh if you live near the seashore)

10 to 12 banana leaves (or similar land plant leaves)

**Procedure**

1. Select a partner(s). Review the materials needed to build the kelp rack.
2. Soak the kelp in water for at least an hour.
3. If you do not have enough blades for each group, cut the kelp blades in two lengthwise. Each group can use one half.

4. Cut the scouring pads into pieces small enough to fit inside the binder clips.
5. Cut off the top of the jug. Punch four evenly spaced holes around the top of the jug. Place a piece of string in each hole on the jug and tie a firm knot. Tie the other end of the string in a firm knot to a clip. The kelp rack is ready.
6. Before you start your experiment, try to guess how many liters of water the kelp blade will support before it breaks. Write down your estimate.
7. Hang the wet kelp blade on the stand as indicated in the diagram.
8. Place a piece of scouring pad on both sides of the kelp blade, and clip the kelp and scouring pad pieces together using the binder clip.
9. Student 1: hold on tightly to the binder clip connecting the kelp to the plastic jug so the kelp blade does not slide out of the clip.
10. Student 2: pouring slowly, add 500 milliliters of water to the jug.
11. Repeat step 10 until the kelp begins to tear. Disconnect the full jug from the kelp rack as soon as you notice that the kelp is starting to break, and record the amount of water poured in. Were your predictions accurate? Did you expect the kelp to be so strong? Why is it advantageous for kelp blades to be so strong?
12. Conduct the same test with a land plant leaf. Which of the two is more resistant to stress, the kelp or the land plant leaf?

Conclusion

1. What are the differences between kelp's structure and the structure of the land plant?
2. Does a land plant have to withstand the same stresses as kelp?

For Further Exploration

Conduct research and compare kelp's life cycle to that of land plants. How are they similar? How are they different? Why wouldn't it be a good idea for kelp to reproduce by way of flowers?