

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Period: \_\_\_\_\_

Weekly Reading HW

HW Wk \_\_\_\_\_

*Directions: Read and annotate the passage below. Then answer the questions.*

### Plants With Family Values

The greenhouse at McMaster University overflows with life. But it's a scene of fierce competition. Leaves, pods, and vibrant flowers sprout in all directions, fighting for the light. "Our view of nature is sometimes that every organism is out for itself," says biologist Susan Dudley. But in her laboratory here, Dudley has shown that even plants can embrace family values.

Dudley has shown that plants can recognize their siblings and give them preferential treatment. In 2007 she tested a hypothesis: that plants from the same mother would compete less for resources (like root space in the soil) than plants that were strangers. Amazingly, she found exactly what was predicted. The plants seemed to act altruistically toward their relatives. But this doesn't necessarily mean that the plants are being selfless. This altruism is most likely a strategy that evolved to increase the odds that a plant will pass on its genes. "If your relative does better, then your relative's genes are passed on and you share some of those genes," says Dudley.

The altruistic behavior the scientists saw in this first study was passive. The plants were not being aggressive toward their siblings. So Dudley wondered, can sibling plants cooperate? To find the answer, Dudley turned to ragweed. She chose it because ragweed often forms a partnership with a special type of fungus that live among the roots of plants in the soil. A plant will provide sugars to the fungus to help it grow. In return, the fungus gives the plant nutrients, water, and protection from disease. But there's a catch. Since multiple plants work together to help the fungus grow, there is an incentive to "cheat." A plant could donate no sugar but still receive nutrients from the fungus.

Dudley wondered if plants would instead be more generous, in the presence of siblings. In a second study, she grew pots of siblings and pots of unrelated plants. She found that plants that were related did, in fact, work together to help the fungus to grow. And, in turn, the siblings grown together were healthier overall. Dudley concluded that plants not only change their behavior in the presence of siblings, but they may benefit from the presence of siblings. There are still many questions left to answer. For example, how do plants know who their siblings are? One theory holds that plants detect chemicals emitted by roots, but what those chemicals are and how plants sense them remain unclear.

1. (RST.9-10.2) The purpose of the first paragraph is to:
  - a. Explain that plants can literally fight and kill each other trying to obtain resources like light or water.
  - b. Introduce how Dudley's research contradicts the long-held belief that plants compete against each other.
  - c. Showcase the diversity of plants that Dudley studies and how dedicated she is to her work.
  - d. Promote the biology department at McMaster University by describing the wealth of plants grown in the greenhouse.
  
2. (RST.9-10.4) As it is used in the passage, the term *altruistically* means:
  - a. Inconsiderately
  - b. Unselfishly
  - c. Amazingly
  - d. Uncomfortably

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3. (RST.9-10.1) According to the last paragraph, which detail supports the conclusion that plants that are related will cooperate to help each other?
- a. “she grew pots of siblings and pots of unrelated plants.”
  - b. “plants detect chemicals emitted by roots, but what these chemicals are and how plants sense them remain unclear.”
  - c. “ragweed often forms a partnership with a special type of fungus that live among the roots of plants.”
  - d. “plants that were related did, in fact, work together to promote the growth of the helpful fungus.”
4. (RST.9-10.2) It can logically be inferred from the last paragraph that:
- a. Plants can release and detect chemicals released from their roots.
  - b. There is no way to answer the question of how plants know who their siblings are.
  - c. Dudley is continuing to research how plants behave altruistically toward each other.
  - d. Dudley’s work is complete and she is now awaiting recognition from other scientists.

5. (RST.9-10.1) Why is altruism a beneficial quality to have?

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6. (RST.9-10.1) How do the ragweed plant and fungus both benefit from their mutualistic relationship?

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*Adapted from the article, “Plants with Family Values” by Anna Rothschild for NOVA, on April 11, 2013.*