

# Can a plant be altruistic?

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The concept of altruism has long been debated in philosophical circles, and more recently, evolutionary biologists have joined the debate. From the perspective of natural selection, altruism may have evolved because any action that improves the likelihood of a relative's survival and reproduction increases the chance of an individual's DNA being passed on. Social behavior, kin recognition, and altruism are well known in the animal kingdom; however, although plants have the ability to sense and respond to other plants, their ability to recognize kin and act altruistically has been the subject of few studies.

In a paper published in the November issue of the [American Journal of Botany](#), Ph.D. candidate Guillermo Murphy and Dr. Susan Dudley explore kin recognition in *Impatiens pallida*, commonly known as yellow jewelweed. Yellow jewelweed individuals are often found growing in close proximity to related individuals and are known to respond strongly to aboveground competition, making this species a likely candidate for kin recognition.

Murphy and Dudley measured plants' responses to two potential cues for competition—changes in light quality (an aboveground cue) and the presence of root neighbors (an underground cue)—for plants grown with strangers and with relatives. The researchers found that the response of *Impatiens* plants differed depending on whether the plants grew with relatives or with strangers. This demonstrates that jewelweed is capable of recognizing kin from non-kin and shows an interesting degree of complexity since both types of responses differed from plants growing with no neighbors at all.

Among close relatives, plants did not increase resource allocation to roots or leaves. Rather, they altered their aboveground morphology by increasing stem elongation and branching. This may be an example of the plants cooperating with kin by attempting to acquire needed resources without shading nearby relatives. Yellow jewelweed is found in the understory of forests, where light may be scarce but the soil is usually nutrient-rich. Because light is the limiting factor for plant growth in this environment, a plant competing with its neighbors would be most likely to allocate resources to leaves.

For *Impatiens* plants grown with strangers, the plants increased their resource allocation to their leaves relative to allocation to stems and roots, an indication of a competitive response. By moving their resources into leaves, these plants not only positively affected their own growth by enhancing their ability to acquire a limited resource but also negatively affected their competitors' growth by shading nearby plants and decreasing the competitor's light acquisition abilities.

However, these differences in response based on the presence of kin or strangers were only observed in those plants grown with root neighbors, indicating that communication among roots may be necessary for plants to recognize kin. Also, changes in allocation of resources toward roots in response to light quality only occurred in plants grown with root neighbors. This is the first instance where researchers demonstrated that a plant's response to an aboveground cue is dependent upon the presence of a belowground cue. This study demonstrates that plants are social organisms. It shows that [altruism](#) is possible among [plants](#) and that response to both kin and strangers depend on the ecology of the plant species.

More information: <http://www.amjbot.org/cgi/content/full/96/11/1990>

Source: American Journal of Botany

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