

## Plant Scientist Looks at Roots of Regeneration

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A University of Guelph plant scientist is hoping to uncover the mystery of plant regeneration using a sophisticated microscope and genes from common fireflies. Manish Raizada says a plant's ability to regenerate an entire new plant from a single severed leaf or branch is "an incredible process."

Scientists have yet to uncover exactly how plants are able to regenerate so routinely. They believe that a handful of genes produce specific proteins that trigger the process in response to environmental changes, and that these same genes govern that process in all plant species. Raizada hopes to pinpoint the genes responsible for regeneration and to learn more about the environmental cues that cause those genes to switch on or off.

He is inserting a gene that makes the luciferase enzyme— responsible for allowing a firefly to light up— into wild mustard plants. Out of tens of thousands of resultant copies of the plants, he expects that in many specimens, that light-up gene will have inserted itself near one of the plant regeneration genes he's interested in.

He plans to expose the plants to various environmental factors, such as changing temperature or salt concentrations, introducing toxic metals or pathogens, and mechanically wounding the tissues like a gardener would. Then he'll determine which genes switch off or on in response by seeing which plants light up. The flashes of light from the firefly gene are far too fleeting and minute to be seen with the naked eye, so Raizada will use a sophisticated microscope and camera, as well as a device for detecting and measuring minute amounts of light.

Raizada recently received more than \$125,000 to support his research from the Canada Foundation for Innovation's New Opportunities program. With additional funding from the province, industry supporters and the university, he expects to receive a total of more than \$300,000.

The ultimate goal is zeroing in on the genes that Raizada and other scientists believe allow plants to do their regeneration trick, and using that knowledge to enhance plant breeding and agricultural practices. This includes improving weed control by preventing regeneration, enabling Third World farmers to develop new plants from rootstock instead of having to buy hybrid seeds each year, and helping farmers develop even more intensive practices to produce more food with fewer resources such as water and land.

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