Protein study shows evolutionary link between plants, humans

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(PhysOrg.com) -- Inserting a human protein important in cancer development was able to revive dying plants, showing an evolutionary link between plants and humans and possibly making it easier to study the protein's function in cancer development, a Purdue University study has shown.

The aminopeptidase M1 protein, or APM1, is critical for root development in plants. Arabidopsis plants lacking the protein will die, but can be rescued if the protein is restored.

During experiments, Wendy Peer, a research assistant professor of horticulture, found that inserting a similar protein found in humans, called insulin responsive aminopeptidase, or IRAP, also rescued the plants.

"APM1 and IRAP are in the same group," said Peer, whose results were published in the early online version of the journal *Plant Physiology*. "M1 aminopeptidase activity is such a fundamental process that it's been conserved evolutionarily. This protein has changed very little over time."

Peer said the finding could advance the understanding of this class of proteins because it might make it possible to conduct studies with plants instead of animals, offering researchers more control and options. Humans with altered function of the equivalent proteins often have leukemia or other cancers.

"There are more tools available in Arabidopsis to study this class of proteins than are available in animals," Peer said. "This research could be translational and helpful in the animal field or with human health. If humans have changes in these peptidases, they're very sick. Understanding how these proteins work in plants will help us understand how they work in humans."

APM1's function isn't entirely understood in plants. M1 aminopeptidases are thought to remove amino acids from proteins, thereby either activating or deactivating those proteins. M1 aminopeptidases also break down accumulations of proteins related to Alzheimer's disease.

"APM1 can alter the function of other proteins with its activity," Peer said.

Peer wants to understand which proteins APM1 targets and how it changes those proteins, thereby affecting changes in a plant's development. She is working to discover which amino acids in APM1 are necessary for it to function.

Peer and Angus Murphy, a Purdue professor of horticulture, have been working on this problem for several years. They identified Arabidopsis mutants that were missing APM1 and inserted modified APM1 proteins missing particular amino acids into the mutants to determine whether the modified APM1 protein could rescue the seedlings.

More information: Catalytic and Protein-Protection Interaction Domains Are Required for APM1 Function, Fazeeda N. Hosein et al., *Plant Physiology*.

Provided by Purdue University