researchsnapshot
summarize | mobilize

In European plums, antifungal PR5 protein may also activate secondary defences against brown rot

What is this research about?

The European plum is one of many important fruit crops that can be negatively affected by several disease-causing bacteria and fungi during the ripening process. Brown rot, caused by the fungus *Monilinia fructicola*, is a serious disease that attacks fruit at the beginning of the ripening process. If the infection isn't treated, the fungus can also return after winter and kill the next year's blossoms and fruit. Currently, breeding for resistant plum varieties is a slow process, so most plum growers rely on chemical fungicides to control brown rot. In some fruits the onset of ripening triggers increased activity of genes associated with resistance to fungal disease. In European plums, the PR5 gene contains the instructions for the production of PR5 protein, which can poke holes in the fungi cell walls to help fight off the infection. It is not well understood what role the PR5 gene plays in anti-fungal activity and in the triggering of other defence mechanisms, such as releasing enzymes to break down the fungi and making plum skins tougher to invade.

What did the researchers do?

Ripe plums were collected from four European plum varieties (two resistant and two vulnerable to brown rot disease), half of which were then infected with the brown rot fungus *M. fructicola*. Next, some *Arabidopsis thaliana* plants were genetically modified to contain the PR5 plum gene. Leaves from some of the genetically modified and some of the natural plants were then infected with the fungus *Alternaria brassicicola*. Following infection, both the fruit and leaf samples were analyzed to see how the activity of several genes, including PR5 and other defence genes, changed over time. The researchers also measured the amount of a plant defence chemical called camalexin in the *A. thaliana* leaves before and after infection.

About the University of Guelph researcher:

Jayasankar Subramanian is an Associate Professor in the Department of Plant Agriculture at the University of Guelph, Vineland Campus. Email: jsubrama@uoguelph.ca.

Project supported by: A program of the OMAFRA-U of G Partnership.

University of Guelph — Changing Lives Improving Life

Agri-Food and Rural — Mobilizing Agri-Food and Rural Research Knowledge — A program of the OMAFRA – U of G Partnership — Link

What did the researchers find?

Before infection, PR5 gene activity was higher in the two resistant varieties than in the vulnerable varieties, although there was a significant increase in PR5 gene activity at the onset of ripening in all four varieties. After infection with *M. fructicola*, the production of the PR5 protein decreased in the resistant varieties, but increased in the vulnerable varieties. *A. thaliana* plants modified with the PR5 gene showed increased resistance to *A. brassicicola*. Other defence genes, including those for producing camalexin, were also more active after infection.

Article citation:

El-kereamy, A., El-sharkawy, I., Ramamoorthy, R., Taheri, A., Errampalli, D., et al. (2011). *Prunus domestica* pathogenesis-related Protein-5 activates the defense response pathway and enhances the resistance to fungal infection. *PLoS One, 6*(3), e17973.

This summary is a project of the Institute for Community Engaged Scholarship (ICES) at the University of Guelph, with project partners: the Catalyst Centre, SPARK Program at the University of Guelph, and the Knowledge Mobilization Unit at York University. This project is part of the Pan-Canadian Research Impact Network.
http://csahs.uoguelph.ca/pps/Clear_Research

What you need to know:

At the onset of ripening, European plum varieties resistant to brown rot disease had more active PR5 genes, which helped prevent infection. The PR5 gene may also have triggered secondary plant defences by activating other defence genes and encouraging camalexin production.

How can you use this research?

Plum growers can use this research to reduce their reliance on chemical sprays by selecting European plum varieties that are better able to fight off the fungus responsible for brown rot disease

Plant breeders can use this research to develop new varieties of stone fruits (plums, peaches, cherries, apricots, etc.) that have resistance to the fungus responsible for brown rot disease.

Cite this work:

University of Guelph, Institute for Community Engaged Scholarship (2012). In European plums, antifungal PR5 protein may also activate secondary defences against brown rot. Retrieved from: http://hdl.handle.net/10214/4933

Keywords:

Plums, brown rot, fungi, bacteria, plant defences, antifungal