

Same gene protects from 1 disease, opens door to another

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Botanists at Oregon State University have discovered that a single plant gene can cause resistance to one disease at the same time it produces susceptibility to a different disease – the first time this unusual phenomenon has ever been observed in plants.

The finding, published this week in *Proceedings of the National Academy of Sciences*, may help scientists better understand the pathways that genetic disease resistance can take. Plant diseases are a multi-billion dollar problem in agriculture, and scientists for decades have been trying to develop new varieties of plants with resistance to one disease or another.

The research also explains why an epidemic of “Victoria blight,” a fungal disease, occurred in the United States in the 1940s. The Pc-2 gene in a widely-planted, imported variety of oats provided good resistance to oat rust, which is a costly crop disease – but the same gene also caused susceptibility to Victoria blight, and its use had to be discontinued as a result.

“The blight fungus makes a toxin that causes disease in susceptible plants – that is, only plants that carry this gene,” said Jennifer Lorang, an OSU research associate. “But it also turned out that the same gene can provide disease protection. This is very unusual, and should provide insight into genetic influences on disease resistance and susceptibility.”

Most work that has been done on plant diseases is focused on disease

resistance, the researchers said, and less has been done on the genetic basis for disease susceptibility.

Among other things, the study suggests that plants bred for resistance to one disease may inadvertently be changed in ways that make them susceptible to a different disease. It also indicates that the physiological basis for disease resistance and susceptibility may have some similarities.

The actual plant used to identify these genetic pathways was Arabidopsis, a small plant in the mustard family, which is frequently used for genetic research. The scientists put the Pc-2-like gene in Arabidopsis, which has a similar function in oats, and were able to determine that it causes disease susceptibility, although it looks like a resistance gene.

Source: Oregon State University

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