Scientists identify gene for resistance to parasitic 'witchweed'

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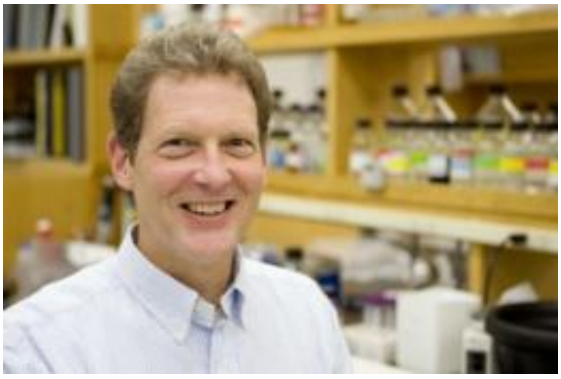

Michael Timko. (Photo: Dan Addison)

(PhysOrg.com) -- The parasitic flowering plant Striga, or "witchweed," attacks the roots of host plants, draining needed water and nutrients and leaving them unable to grow and produce any grains. Witchweed is endemic throughout sub-Saharan Africa, causing crop losses that surpass hundreds of millions of dollars annually and exacerbating food shortages in the region.

Among the crops heavily parasitized by witchweed is black-eyed pea, known in Africa as "cowpea" or "niebe" in Francophone countries.

About 80 percent of the world's cowpea crop is grown in sub-Saharan Africa, mostly by subsistence farmers who lack the resources to purchase expensive herbicides and fertilizers. In this region, cowpea is

the primary protein source for millions of people, who consume the entire plant - the pea for soups, stews and breads, the leaves as fresh greens, the stems as hay and fodder for cattle.

As the use of cowpea expanded over time, so did the prevalence of Striga gesnerioides, the type of witchweed adapted to parasitize it. Today, witchweed is so virulent that farmers in this semi-arid region must relocate their cowpea crop to new soil every few years.

Now, scientists at the University of Virginia have identified a gene in cowpea that confers resistance to witchweed attack. This discovery will help researchers better understand how some plants can resist Striga, while others, such as corn and sorghum, are susceptible.

The findings are presented in the Aug. 28 issue of the journal *Science*.

"Discovery of this resistance gene is not only important for improving cowpea, but may help us develop strategies for improving resistance to Striga in other affected crops," said Michael P.Timko, the U.Va. biology professor who led the study.

Currently there are no natural sources of Striga resistance in corn or sorghum, both of which are major cereal grains in the African diet.

"Making plants durably resistant to Striga could have a significant impact on food security for Africa," Timko said.

In recent years, he and other scientists have sequenced the cowpea genome and are using this information to develop cowpea plants with multiple improved agronomic traits.

"It is now possible for us to identify all possible genes for Striga resistance in cowpeas, as well as resistance to other cowpea pathogens,"

Timko said. "We may even eventually breed a more drought-resistant plant and varieties that have higher levels and a better balance of nutrients. We've reached a point where we can manipulate this plant for the good of millions of people."

Timko's approach is to improve the performance of plants by identifying genes that control key characteristics, and then using selective breeding to emphasize those traits.

While he is finding success breeding parasite-resistant hybrids, there are at least seven different races of Striga, each capable of adapting to changing varieties of cowpeas.

"We are trying to create a plant that is resistant across the board," he said. "Striga is hyper-virulent. This is warfare between the cowpea plant and its parasite, and we keep trying to stay ahead of the enemy."

Source: University of Virginia (news : web)