

Gene discoveries may aid fight against wheat disease

WASHINGTON, USA: Two genes that are resistant to fungal wheat disease may help ward off a growing epidemic of stem rust that threatens crops in Africa, the Middle East and beyond, researchers said.

International scientists have spent years trying to pin down the sections of the wheat genome that are resistant to Ug99, a pathogen that was first found to be killing wheat crops in Uganda in the late 1990s and has since appeared in Kenya, Ethiopia, Sudan, Yemen and Iran.

The last major outbreak of wheat stem rust in the 1950s was quelled two decades later with the introduction of a resistant strain of plants, a pioneering project by Nobel Peace Prize winner Norman Borlaug, the father of the Green Revolution.

Concerns resurfaced when the Ug99 pathogen appeared, packing the potential to infect 90% of the crop globally and risking unrest linked to shortages and high prices since wheat provides about 20% of the world's food.

Two genes, Sr35 and Sr33, appear to confer resistance by acting as part of the plant's immune system and fighting off the deadly fungal disease.

"This is a very significant development," said Ronnie Coffman, international professor of plant breeding at Cornell University who was not involved in the two companion studies published in the US journal Science.

"It puts us in a position eventually to stack multiple genes, tightly linked, that will provide durable resistance against the pathogen," he told AFP.

The hunt for resistant genes has taken many years and was made harder by the complexity of the wheat genome, which has almost twice as much genetic information as the human genome, researchers said.

One of the resistant genes, Sr35, was identified in an ancient and rarely planted form of wheat known as einkorn, found in Turkey.

"Until now, however, we did not know what kind of gene confers resistance to Ug99 in this wheat accession," said researcher Eduard Akhunov, associate professor of plant pathology at Kansas State University.

"The Sr35 gene, when bred into commercial varieties, confers near-immunity against Ug99 and other related strains," said a blog post from the US Department of Agriculture, which helped fund the study.

"The gene has already been deployed by ARS wheat geneticists into US wheat varieties."

Ug99 wheat rust disease has not been found in the United States. The other gene, Sr33, was described in the journal Science by researchers in Australia, the US and China.

"Combining resistance genes to develop durable resistance is the prevailing strategy for gene deployment in wheat," the researchers wrote, describing an approach that mingles Sr33 and Sr35 as "very attractive."

Stem rust spores can travel with the wind and destroy crops by gutting the plants, leaving blackened stems and zero grain.

Some farmers have been able to kill the fungus with chemicals, but that approach can raise costs to the economy and the environment.

"Biotechnological approaches can be used to control this disease," wrote Jennifer Martin of the National Institute of Food and Agriculture and Sean Adams of the Agricultural Research Service, on the USDA blog.

"This work shows promise for developing more durable strategies to control this devastating disease."

Source: AFP

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