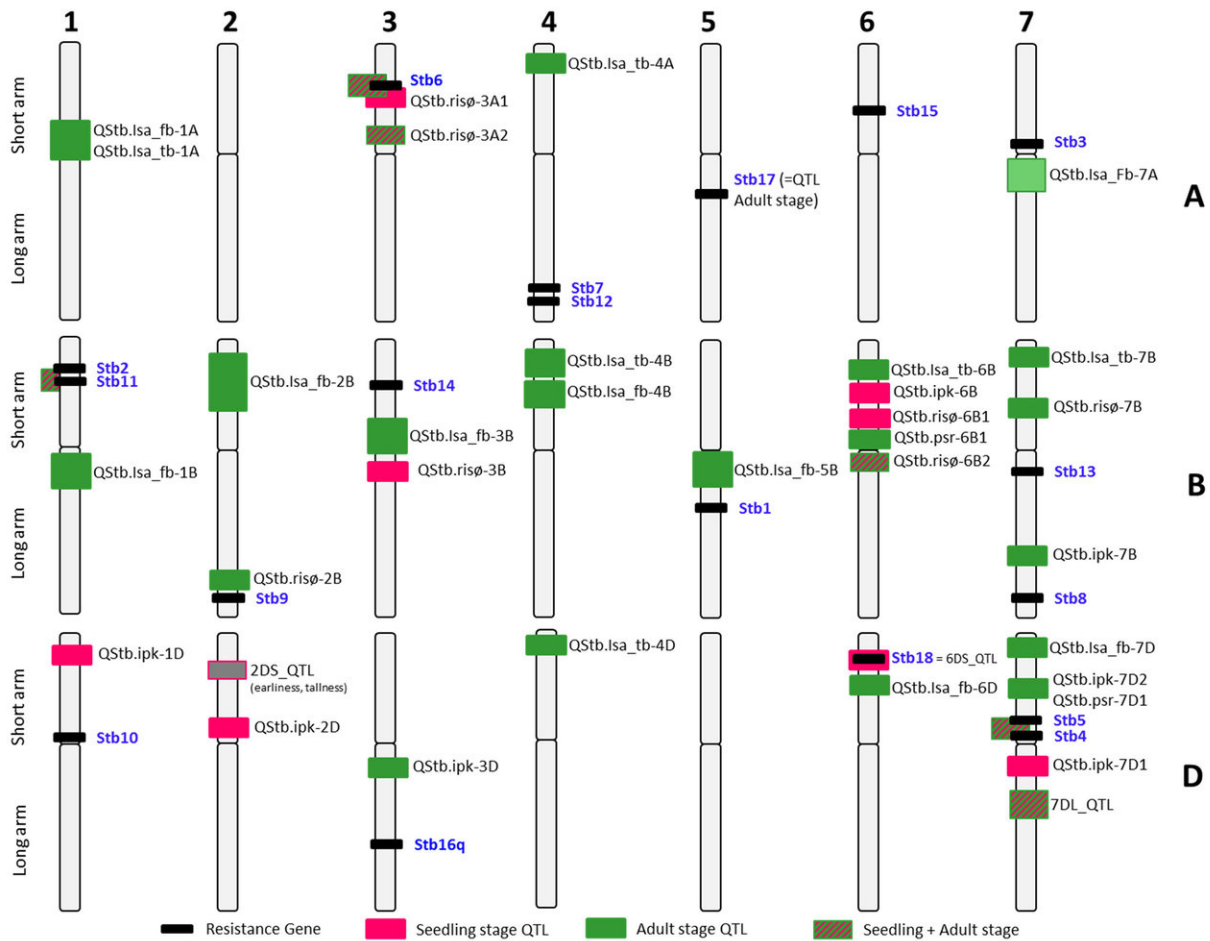


# For the first time, researchers have isolated a natural resistance gene to Septoria

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Time to combine forces: this schematic map of wheat's 21 chromosomes shows the main resistance (Stb) genes and the locations, or Quantitative Trait Loci (QTL), of subsidiary resistance genes that are available during the plant's seedling and adult stages. Credit: Rothamsted Research

What is so encouraging about the first successful unpicking of a wheat gene that confers resistance to a devastating fungal disease is the promise it holds for deciphering other resistance genes, en route to a natural barrier to infection, at a time when the fungus has already developed tolerance to most types of fungicides.

The gene, called *Stb6*, confers [resistance](#) to *Septoria tritici* blotch (STB, or *Septoria*), the main leaf disease of wheat in temperate regions and a major threat for [wheat production](#) globally, capable of halving crop yields. The disease is caused by the resilient fungal pathogen, *Zymoseptoria tritici*.

Although the presence of the gene has been known for nearly 20 years, the gene's mapping and isolation have taken five years to complete. The work, from an Anglo-French team led by Kostya Kanyuka at Rothamsted Research and Cyrille Saintenac at the National Institute for Agricultural Research (INRA), is reported today in *Nature Genetics*.

"Isolation of *Stb6* is a major breakthrough that will allow deeper understanding of disease resistance mechanisms operating in wheat against this important pathogen," says Kanyuka. "In the long term, it should also help us to develop better disease control strategies."

Saintenac agrees: "Identification of the *Stb6* gene was made possible through the dedicated efforts of international collaborators. It paves the way to new *Stb genes*' discoveries and to a better management of this devastating wheat disease."





Around 70 percent of the fungicides used on wheat in Europe are aimed at controlling the fungal pathogen that causes *Septoria* leaf blotch, which can cut yields by up to 50 percent in humid and temperate areas. Credit: Rothamsted Research

Kanyuka notes that the *Stb6* gene is effective against only a fraction of fungal strains, specifically those strains that secrete a matching protein, called *AvrStb6*. The *Stb6* protein somehow recognises this fungal protein, which leads to activation of the defence response in wheat.

"Nevertheless, this gene will be useful in combination with other STB resistance genes, and our study provides tools for rapid lab-based tracing of *Stb6* in wheat breeding lines," says Kanyuka.

Kanyuka also highlights the gene's importance in better understanding of the fundamental science of [disease](#) control. Most resistance genes, in wheat and other plants, code for protein receptors located inside cells; the *Stb6* gene codes for a receptor protein on the cell's surface.

"This knowledge will facilitate identification and isolation of additional [resistance genes](#) for improved control of *Septoria*," adds Kanyuka.

For Cristobal Uauy, a [wheat](#) geneticist at the John Innes Centre who was also part of the Anglo-French team, the work "exemplifies the collaboration between Rothamsted and JIC in developing sequenced mutant populations and how sharing these resources with our international partners allowed the team to identify and characterise more quickly this important gene."

**More information:** Cyrille Saintenac et al, Wheat receptor-kinase-like protein *Stb6* controls gene-for-gene resistance to fungal pathogen



Zymoseptoria tritici, *Nature Genetics* (2018). [DOI: 10.1038/s41588-018-0051-x](https://doi.org/10.1038/s41588-018-0051-x)

Provided by Rothamsted Research

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