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TaNTF2, a contributor for wheat resistance to the stripe rust pathogen

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Abstract

Nuclear Transport Factor 2 (NTF2) functions as a critical regulator in balancing the GTP-and GDP-bound forms of Ran, a class of evolutionarily conserved small GTP-binding protein. During the incompatible interaction between wheat-*Puccinia striiformis* f. sp. *tritici* (*Pst*), a cDNA fragment encoding a putative wheat NTF2 gene was found to be significantly induced, suggesting a potential role in wheat resistance to *Pst*. In this work, the full length of *TaNTF2* was obtained, with three copies located on 7A, 7B and 7D chromosomes, respectively. QRT-PCR further verified the up-regulated expression of *TaNTF2* in response to avirulent *Pst*. In addition, *TaNTF2* was also induced by exogenous hormone applications, especially JA treatment. Transient expression of *TaNTF2* in tobacco cells confirmed its subcellular localization in the cytoplasm, perinuclear area and nucleus. And virus induced gene silencing (VIGS) was used to identify the function of *TaNTF2* during an incompatible wheat-*Pst* interaction. When *TaNTF2* was knocked down, resistance of wheat to avirulent*Pst* was decreased, with a bigger necrotic spots, and higher numbers of hyphal branches and haustorial mother cells. Our results demonstrated that *TaNTF2* was a contributor for wheat resistance to the stripe rust pathogen, which will help to comprehensively understand the NTF2/Ran modulating mechanism in wheat-*Pst* interaction.

Highlights:

1. The expression of wheat *TaNTF2* was responsive to *Pst* challenge.
2. TaNTF2 was located in both nucleus and cytoplasm of tobacco epidemic cells.
3. *TaNTF2* was a positive regulator for wheat resistance to *Pst*.

Key words: nuclear transport factor 2, plant resistance, *Pucciniastriiformis* f. sp. *tritici*, wheat