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## **Tco1 is a Hybrid Histidine Kinase Essential for the Sexual Development and Virulence of *Ustilago maydis***

**Yeo Hong Yun and Seong Hwan Kim \***

*Department of Microbiology and Institute of Biodiversity, Dankook University, Cheonan 330-714, Republic of Korea;*

*\*Email: piceae@dankook.ac.kr*

Hybrid histidine kinase is a part of two-component system that is required for various stress responses and pathogenesis of pathogenic fungi. In the present study, Tco1, a homologue of human pathogen *Cryptococcus neoformans* Tco1 encoding a hybrid histidine kinase, was identified in corn smut pathogen *Ustilago maydis* by bioinformatic analysis. To explore the role of Tco1 in the virulence of *U. maydis*, mutants in which the *tco1* gene was partially deleted were constructed by allelic exchange. The *U. maydis tco1* mutants did show unaltered growth rate on axenic medium but were unable to produce conjugation tubes and develop fuzzy filaments, resulting in impaired mating of compatible strains. The expression levels of *prf1*, *pra1*, and *mfal* which are involved in the pheromone pathway significantly decreased in the *tco1* mutants. In inoculation tests to host, the *tco1* mutants showed significantly reduced ability in the production of anthocyanin pigments and tumor development on maize leaves. Overall, the combined results indicated that Tco1 plays important roles in sexual development and virulence of *U. maydis* by regulating the expression of the genes involved in the pheromone pathway.