

宿主範囲の広い *Fusarium graminearum* の生産する宿主特異的な毒素

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植物病原菌の生産する二次代謝産物は病原性に関与する毒素を含むと予想されるが、その多くは実際の生理機能が明らかになっていない。*Fusarium graminearum* は小麦やトウモロコシ、大麦などの主要な穀物を含む多くの植物に感染する植物病原糸状菌である。本菌のゲノム中には多くの二次代謝関連遺伝子が存在しており、そのことが宿主範囲の広さに寄与していると考えられてきた。今回は *F. graminearum* が実際に宿主に合わせて毒素を使い分けていることが明らかになった論文を紹介する。

## 紹介論文

**Gramillin A and B: Cyclic Lipopeptides Identified as the Nonribosomal Biosynthetic Products of *Fusarium graminearum***

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**Abstract**

The virulence and broad host range of *Fusarium graminearum* is associated with its ability to secrete an arsenal of phytotoxic secondary metabolites, including the regulated mycotoxins belonging to the deoxynivalenol family. The *TRI* genes responsible for the biosynthesis of deoxynivalenol and related compounds are usually expressed during fungal infection. However, the *F. graminearum* genome harbors an array of unexplored biosynthetic gene clusters that are also co-induced with the *TRI* genes, including the nonribosomal peptide synthetase 8 (*NRPS8*) gene cluster. Here, we identify two bicyclic lipopeptides, gramillin A (**1**) and B (**2**), as the biosynthetic end products of *NRPS8*. Structural elucidation by high-resolution LC-MS and NMR, including <sup>1</sup>H-<sup>15</sup>N-<sup>13</sup>C HNC(O) and HNCA on isotopically enriched compounds, revealed that the gramillins possess a fused bicyclic structure with ring closure of the main peptide macrocycle occurring via an anhydride bond. Through targeted gene disruption, we characterized the *GRA1* biosynthetic gene and its transcription factor *GRA2* in the *NRPS8* gene cluster. Further, we show that the gramillins are produced *in planta* on maize silks, promoting fungal virulence on maize but have no discernible effect on wheat head infection. Leaf infiltration of the gramillins induces cell death in maize, but not in wheat. Our results show that *F. graminearum* deploys the gramillins as a virulence agent in maize, but not in wheat, thus displaying host-specific adaptation.