

Fusarium graminearum 의 ZEB2 동형단백질에 의한 지랄레논 생합성 자가조절

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The ascomycete fungus *Fusarium graminearum* is the most common pathogen of Fusarium head blight (FHB), a devastating disease for major cereal crops worldwide. FHB causes significant crop losses by reducing grain yield and quality as well as contaminating cereals with trichothecenes and zearalenone (ZEA) that pose a serious threat to animal health and food safety. ZEA is a causative agent of hyperestrogenic syndrome in mammals and can result in reproductive disorders in farm animals. In *F. graminearum*, the ZEA biosynthetic cluster is composed of four genes, *PKS4*, *PKS13*, *ZEB1*, and *ZEB2*, which encode a reducing polyketide synthase, a nonreducing polyketide synthase, an isoamyl alcohol oxidase, and a transcription factor, respectively. Although it is known that ZEB2 primarily acts as a regulator of ZEA biosynthetic cluster genes, the mechanism underlying this regulation remains undetermined. In this study, two isoforms (*ZEB2L* and *ZEB2S*) from the *ZEB2* gene in *F. graminearum* were characterized. It was revealed that *ZEB2L* contains a basic leucine zipper (bZIP) DNA-binding domain at the N-terminus, whereas *ZEB2S* is an N-terminally truncated form of *ZEB2L* that lacks the bZIP domain. Interestingly, ZEA triggered the induction of both *ZEB2L* and *ZEB2S* transcription. In ZEA producing condition, the expression of *ZEB2S* transcripts via alternative promoter usage was directly or indirectly initiated by ZEA. Physical interaction between *ZEB2L* and *ZEB2L* as well as between *ZEB2L* and *ZEB2S* was observed in the nucleus. The *ZEB2S*-*ZEB2S* interaction was detected in both the cytosol and the nucleus. *ZEB2L*-*ZEB2L* oligomers activated ZEA biosynthetic cluster genes, including *ZEB2L*. *ZEB2S* inhibited *ZEB2L* transcription by forming *ZEB2L*-*ZEB2S* heterodimers, which reduced the DNA-binding activity of *ZEB2L*. This study provides insight into the autoregulation of *ZEB2* expression by alternative promoter usage and a feedback loop during ZEA production.