MODIFICATION OF SOME SYNTHETIC TRANSCRIPTION FACTORS FOR CONTROL OF GENE EXPRESSION IN PLANTS

By

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ABSTRACT

Ahmed Atef Mohamed, Modification of Some Synthetic Transcription Factors for Control of Gene Expression in Plants. Unpublished Ph.D. Thesis, Department of Genetics, Faculty of Agriculture, Ain Shams University, 2018.

Transcription activator like effector (TALE) protein isolated from *Xanthomonas sp.* was adapted as a synthetic transcription factor (syTF). This syTF controls gene expression in different eukaryotic organisms, although it has limited applications in plants. One of drawbacks of this technology is the pathogenic origin of this protein, which could induce unwanted responses in plant cells. However, another TALE-like protein was identified in non-pathogenic *Paraburkholderia rhizoxinica*. Transcription activation protein was designed to complement *Paraburkholderia* TALE-like protein by fusing nuclear localization signal (NLS) and transactivation domain from herpes simplex virus protein namely VP16. A new protein sequence was reverse translated and modified to be recipient scaffold (pdBAT) for customly designed DNA binding domain. A 96 DNA-binding-direpeat library was generated using site directed mutagenesis. This library arranged in six sequential direpeats and 16 combinations of repeats. Custom synthetic transcription activator was generated using this system targeting mBS3 promoter. Generated transcription activator was tested in tobacco plants using agro-infiltration method. Strong signal was detected after two days as an indicator of gene activation. This result suggests that new dBAT system could be customly used as transcription activator in plants.

Keywords: Paraburkholderia rhizoxinica; TALE; dBAT; transcription factors, agro-infiltration, DNA binding domain.

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