

Exploring the Potential of Biotechnology for Enhancing Crop Resilience and Health Protection

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Abstract

Biotechnology harnesses the potential of living organisms to innovate and enhance various sectors, spanning from healthcare to agriculture, providing solutions to complex global challenges. Among its pivotal applications is the improvement of crop quality to ensure food production security against environmental stressors induced by climate change. In pursuit of this goal, our research group has been established with the aim to exploit biotechnology for enhancing crop yields, nutrient efficiency, and resilience to stresses. Our research methodologies cover a wide range of approaches to achieve the objective of improving crop quality under stress conditions. We primarily focus on investigating the biological functions of the transcription factor family NACs as well as the phytohormones cytokinin (CK), and exploring their potential application for developing stress-tolerant crops. To this end, we have successfully identified several gene candidates, including *GmNAC019*, *GmNAC085*, *GmNAC109*, *GmHP08* or *GmRR34*. Through a combination of physiological, biochemical and molecular assessments, we demonstrated that these genes significantly enhance plant drought and salinity stress tolerance in both the model plant *Arabidopsis* and the crop soybean. Beside agriculture, biotechnology also holds promise for applications in the healthcare industry. For example, we are currently engaged in evaluating and refining plant-based natural compounds with biological properties like antioxidant, antibacterial, anti-inflammatory, and anticancer effects. This effort present opportunities for interdisciplinary collaboration to develop health protection products against infectious diseases and cancer. During this presentation, we will unveil our noteworthy discoveries in biotechnology research, elucidating their implications for potential applications and collaboration opportunities in the future.