

NEUROTRANSMITTERS IN PLANTS

Perspectives and Applications

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GABA/BABA Priming Causes Signaling of Defense Pathways Related to Abiotic Stress Tolerance in Plants

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13.1 INTRODUCTION

Abiotic stresses are the most significant factors leading to extensive and erratic loss in agricultural productivity across the world. Owing to the sessile nature of plants, they must cope with adverse environmental conditions, and therefore they must possess a variety of responses to cope with various environmental stresses (Gao et al. 2007). In plants, these stresses adversely affect the growth and productivity by triggering a series of morphological, biochemical, and molecular mechanisms (Vang et al. 2001). Even though the plants have developed specific mechanisms during the course of evolution to sense the subtle changes of growth conditions that trigger many signal transduction cascades (Gao et al. 2007), certain treatments activate stress responsive genes and finally leads to changes at the physiological and biochemical levels in plants.

The quick signaling for inducing the defense mechanism against the adverse environmental conditions requires a stress signal, which gets transduced like a neurotransmitter. Major neurotransmitters found in plants include acetylcholine, epinephrine, γ -aminobutyric acid (GABA), dopamine, levodopa, melatonin, serotonin, and so on (Fait et al. 2006). Later, it was discovered that GABA is largely and rapidly produced in plants in response to various biotic and abiotic stressors. For example, when insects walk across a leaf, rapid accumulation of GABA was monitored within seconds (Scholz et al. 2015). In addition, β -aminobutyric acid (BABA) a close structural

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