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Novel perspectives on the molecular crosstalk mechanisms of serotonin and melatonin in plants.

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Key words: auxin, brassinosteroids, jasmonates, melatonin, nitric oxide, reactive oxygen species, serotonin.

Abbreviations:

ABA, Abscisic acid; ASMT, n-acetyl serotonin methyl transferase; BR, Brassinosteroids; CK, Cytokinin; ET, Ethylene; GA, Gibberellic acid; JA, Jasmonates; NO, Nitric oxide; RNS, reactive nitrogen species; ROS, Reactive oxygen species.

Abstract

Current review focuses on the significant role of serotonin and melatonin in various molecular crosstalk mechanisms in plants. In this context phytohormones (like auxin, gibberellins, ethylene or abscisic acid), plant growth regulators, and associated biomolecules like reactive oxygen species, nitric oxide, brassinosteroids and hydrogen sulphide have been discussed in a wider context. Long distance signaling responses of serotonin in association with auxin, jasmonic acid, salicylic acid and ABA have been critically reviewed. Auxinserotonin crosstalk in relation to PIN protein functioning and root growth regulation appears to be a major advancement in the context of phytoserotonin signaling in plants. Auxin and serotonin share structural similarities which bring possibilities of auxin receptors being surrogated for serotonin transport in plants. The modulation of root apex architecture is highly regulative in terms of serotonin-jasmonic acid crosstalk. Reactive oxygen species (ROS) appears to be a primary mediator of serotonin mediated root growth response. Serotonin induced signalling therefore involve ROS, auxin, JA and ethylene action. Although there exists handful of critical reviews on the role of phytomelatonin in plants, recent advancements on its regulatory role in modulating plant hormones, ROS scavenging enzymes, ROS/RNS and glutathione levels need attention. Melatonin signaling associated with nitrogen metabolism and nitrosative stress are recent developments in plants. Interesting relationship between nitric oxide and melatonin has been established in relation with biotic Download English Version:

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