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Osmotin: a plant defense tool against biotic and abiotic stresses**Running Title: Osmotin protein in plants**

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Abstract

Plants are prone to a number of pathogens and abiotic stresses that cause various disorders. However, plants possess a defense mechanism to cope with these stresses. The osmotin protein belongs to the PR-5 family of Pathogenesis-related (PR) proteins, which are produced in response to diseases caused by various biotic and abiotic stresses. Osmotin uses a signal transduction pathway to inhibit the activity of defensive cell wall barriers and increases its own cytotoxic efficiency. However, in response to cytotoxic effects, this pathway stimulates a mitogen-activated protein kinase (MAPK) cascade that triggers changes in the cell wall and enables osmotin's entrance into the plasma membrane. This mechanism involves cell wall binding and membrane perturbation, although the complete mechanism of osmotin activity has not been fully elucidated. Osmotin possesses an acidic cleft that is responsible for communication with its receptor in the plasma membrane of fungi. Osmotin is also involved in the initiation of apoptosis and programmed cell death, whereas its overexpression causes the accumulation of proline in transgenic plants. A higher concentration of osmotin can cause the lysis of hyphae tips. This review highlights the role of osmotin protein in the plant defense mechanism and its mode of action against numerous pathogens in wild and transgenic plants.

Keywords: Plant defense mechanism, pathogenesis-related (PR) proteins, PR-5, osmotin protein, apoptosis

Abbreviations

PR	Pathogenesis-related proteins
TLPs	Thaumatococcus-like proteins
OLPs	Osmotin-like proteins
SAR	Systemic acquired resistance
HR	Hypersensitive response
PCD	Programmed cell death
TMV	Tobacco mosaic virus
pI	Isoelectric point
PEG	Polyethylene glycol
ABA	Abscisic acid
ET	Ethylene
ROS	Reactive oxygen species
MAPK	Mitogen-activated protein kinase
GM	Genetically modified

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