

Review Article

Biogenic Role of Silicon in Abiotic and Biotic Stress Management in Plants

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Abstract

Silicon (Si), the beneficial element occurs as the second most abundant element, after oxygen, in Earth's crust and comprises up to 70 per cent of soil mass. Application of Si have been reported to mediate various abiotic stresses such as salt stress, drought stress, metal toxicity, nutrient disorder *etc.* The mechanism involves reduced osmotic stress by increasing water uptake, reducing ion toxicity, stimulating osmolyte production and enhancing antioxidant defense system regulating reactive oxygen species generation. Silicon induced resistance to plant-pathogen interaction is associated with improving cell wall rigidity, reinforcement and elasticity impeding fungal penetration, whereas, Si enhanced biochemical resistance involves activation of defense-related enzymes (Chitinase, β -1, 3-glucanase, phenylalanine ammonia lyase, peroxidases) and stimulating antimicrobial compounds production (phenols, lignin, and flavonoids) regulating complex network of signalling pathways. Application of Si plays a pivotal role in improving nutritional status of both monocot and dicot plants as well as an ecologically compatible and environmentally friendly technique to stimulate plant growth directly or indirectly by combating various biotic and abiotic stresses.

Key words: Abiotic and biotic stress, antimicrobials, defense, management, silicon

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