

A Review on Silicon Based Induced Resistance in Plants against Insect Pests

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Abstract : Development of resistance in insect pests against various groups of insecticides has prompted the use of alternative integrated pest management approaches. Among these induced host plant resistance represents an important strategy as it offers a practical, cheap and long lasting solution to keep pests populations below economic threshold level (ETL). Silicon (Si) has a major role in regulating plant eco-relationship by providing strength to the plant in the form of anti-stress mechanism which was utilized in coping with the environmental extremes to get a better yield and quality end produce. Among biotic stresses, insect herbivore signifies one class against which Si provide defense. Silicon in its neutral form (H_4SiO_4) is absorbed by the plants via roots through an active process accompanied by the help of different transporters which were located in the plasma membrane of root cells or by a passive process mostly regulated by transpiration stream, which occurs via the xylem cells along with the water. Plants tissues mainly the epidermal cell walls are the sinks of absorbed silicon where it polymerizes in the form of amorphous silica or monosilicic acid. The noteworthy function of this absorbed silicon is to provide structural rigidity to the tissues and strength to the cell walls. Silicon has both direct and indirect effects on insect herbivores. Increased abrasiveness and hardness of epidermal plant tissues and reduced digestibility as a result of deposition of Si primarily as phytoliths within cuticle layer is now the most authenticated mechanisms of Si in enhancing plant resistance to insect herbivores. Moreover, increased Si content in the diet also impedes the efficiency by which insects transformed consumed food into the body mass. The palatability of food material has also been changed by Si application, and it also deters herbivore feeding for food. The production of defensive compounds of plants like silica and phenols have also been amplified by the exogenous application of silicon sources which results in reduction of the probing time of certain insects. Some studies also highlighted the role of silicon at the third trophic level as it also attracts natural enemies of insects attacking the crop. Hence, the inclusion of Si in pest management approaches can be a healthy and eco-friendly tool in future.

Keywords : defensive, phytoliths, resistance, stresses

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