**Exogenous silicon improves photosynthetic machinery, biological nitrogen fixation, antioxidant systems and tolerance of fenugreek (*Trigonella foenum-graecum* L.) under salt stressed conditions**

1LAMSAADI Nadia, 2HIDRI Rabaa, 2ZORRIG Walid, 3EL MOUKHTARI Ahmed, 2DEBEZ Ahmed, 4SAVOURÉ Arnould, 3ABDELLY Chedly, 1FARISSI Mohamed

*1Laboratory of Biotechnology & Sustainable Development of Natural Resources, Polydisciplinary Faculty of Beni-Mellal, Sultan Moulay Slimane University, PO Box 592, Mghila, 23000, Beni-Mellal, Morocco.*

*2Laboratory of Extremophile Plants, Centre of Biotechnology of Borj-Cedria, BP 901, Hammam-Lif 2050, Tunisia.*

*3Laboratory of Ecology and Environment, Faculty of Sciences Ben M’Sick, Hassan II University of Casablanca, PB7955 Sidi Othman, Casablanca, Morocco.*

*4Institut d’Écologie et des Sciences de l’Environnement de Paris, iEES, Sorbonne Université, CNRS, IRD, INRA, UPEC, PARIS 7, Paris F-75005, France.*

*\*Corresponding author: Pr. FARISSI Mohamed, Biology Department, Polydisciplinary Faculty of Beni- Mellal, Sultan Moulay Slimane University,* *Mghila, PO Box. 592, Beni Mellal 23000, Morocco.*

*E-mail:* [farissimohamed@gmail.com](mailto:farissimohamed@gmail.com) / [mohamed.farissi@usms.ac.ma](mailto:mohamed.farissi@usms.ac.ma)

**ABSTRACT**

In the present study, we investigate the impact of treatment with exogenous silicon (Si) on agronomic traits, photosynthesis, oxidative markers, antioxidant systems and biological nitrogen fixation on salt stressed fenugreek (*Trigonella foenum-graecum* L.) plants. The experiment was carried out in a growth chamber at 25 ± 1 °C, 60% - 80% relative humidity and a photoperiod of 16h. Fenugreek seedlings were submitted 200 mM NaCl (*vesrus* 0 mM NaCl for control) and treated or not with 3 mM Si (CaSiO3). Our results indicated that salinity stress significantly decreased growth parameters, chlorophyll content and all assessed photosynthetic traits. However, Si supplementation in rooting medium mitigated the negative effects observed. In fact, Si treatment alleviated the salinity effect on the plant growth parameters, relative water content, photosynthetic pigments, and the functions of photosystems (PSI and PSII). Interestingly, Si had a great beneficial effect on the function of PSII in comparison to PSI. Nodule number and nitrogen content, as symbiosis-related parameters, were significantly improved in salt-stressed plants by Si treatment compared to untreated and stressed plants. The ameliorative effects of Si could be explained by significant induction of antioxidant activities leading to significant decrease in oxidative stress markers. Taken together, Si mediated salt tolerance of fenugreek plants by enhancing photosynthesis and biological nitrogen fixation, which are among the vital processes for legume development, thus in return, their application could be a promising way to overcome the harmful effects of salinity on agricultural production.

**Keywords**: Fenugreek, Silicon, Salt stress, Photosynthesis machinery, Biological Nitrogen Fixation, Antioxidant activity, Salt tolerance.

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