
GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

Institute of Geography
Department of Physical Geography

MASTER THESIS

"Investigating the Link between Soil and Plant Silica
Content in the Context of Research on Wheat Resistance
to Drought Stress under Mediterranean Climate."

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ABSTRACT

Silicon (Si) is a beneficial nutrient for many plants as it mitigates the negative impacts of various abiotic and biotic stresses. Wheat (*Triticum aestivum*), for instance, benefits from Si through an increased resistance towards drought stress. Plants take up Si from soil solution and wheat is known to be an active Si accumulator. Silicon occurs in soil in various forms, ranging from easily mobilised dissolved and adsorbed Si to more immobile forms like amorphous or in pedogenic oxides occluded Si. However, the circumstances of Si uptake by wheat from soil under field condition are poorly studied, especially in the Mediterranean region. In collaboration with ICARDA (International Center for Agricultural Research in the Dry Areas) and with IAV (Hassan II Institute of Agronomy and Veterinary Sciences), the relationship between Si contents in wheat plants and in different soil Si pools was examined in samples from various wheat fields in Morocco. Silicon contents in wheat shoots varied widely between the investigated fields, while the size of the plant-available Si pool in soil (dissolved Si) showed little differences. No direct link could be established between plant Si contents and Si pools in soil. These findings suggest that the size of the Si pools in soil is not the only driver of plant Si uptake. Plant Si uptake is further influenced by multiple aspects. Moreover, no direct interdependences were found between the different Si pools in the soil. Factors such as climate or agricultural practice are important variables for Si uptake by plants and the fluxes of Si in soil. Further research is needed to assess the importance of these factors for the plant-soil cycle of Si.