

## **Appraisal of fertilizer practices alleviating stress conditions**

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Plants encounter various forms of biotic and abiotic stress from sowing to harvest. Accordingly, fertilizer applications have been developed to strengthen the resistance of plants against various stressors. Instinctive management practices feeding plants can be traced back to the Neolithic agricultural revolution. In the 19<sup>th</sup> century plant nutrition became an area of research in the field of agricultural chemistry. Liebig's 'Law of the Minimum' (1855) still is the basic principle of plant nutrition. It states that the exploitation of the genetically fixed yield potential of crops is limited by the variable, which is insufficiently supplied to the greatest extent. With view to abiotic and biotic stress factors this postulation should be extended by the phrase 'and/or is impaired by the strongest stress factor'. Interactions between mineral elements and plant diseases are well known for essential macro and micro plant nutrients, and aluminum and silicon. The concept of Sulfur Induced Resistance (SIR) is meanwhile acknowledged in plant pathology and targeted sulfur fertilization is a backbone for promoting growth and plant health in intensive cropping systems. In comparison, the potential of fertilization to alleviate abiotic stress has not been compiled in a user-orientated manner. Abiotic stress factors comprise nutrient and water deficiency, soil pH, temperature, oxygen supply, mechanical pressure, injury and chemical compounds. Though various essential macro- and micro-nutrients are involved in tolerance mechanisms against abiotic stress, only a limited number of elements proved to alleviate stress conditions under field conditions. It is the objective of this contribution to summarize the influence of nutrient deficiency in general and the nutritional status of sodium, potassium and silicon in particular on resistance of crop plants against abiotic stress factors such as drought, salinity and frost. In addition, the significance of seed priming with various nutrients for tolerance against abiotic stress is discussed.

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