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Efficiency of Boron Foliar Fertilisation in Soybean (*Glycine max*)

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Abstract

Boron (B) is an essential micronutrient showing deficiency worldwide in crop production. B is particularly important for yield formation (pollination), fruit quality (storage capability) and stress tolerance. Soybean (*Glycine max* L.) is considered to be very tolerant to B deficiency in the soil, but recently effects on floral development and seed yield were reported for the Mideast of the United States and northern Thailand.

Soil applied Boron is easily bound (high soil pH) or leached after heavy rainfall (low soil pH). Since B is phloem immobile in most plant species, foliar B fertilisation is a widespread technique to cure B deficiencies. The performance of foliar sprays is still variable, depending on nutrient amount, weather conditions, timing and status quo of the plant. The aim of this work was to study the influence of plant nutritional status on foliar penetration and uptake, hypothesising an increased uptake in deficient plants.

Experiments were conducted under controlled conditions. Stable isotope enriched boric acid was applied to soybean leaves with low and adequate B nutritional status, achieved by a different preculture. At harvest, plants were separated in different segments to determine uptake, basipetal and acropetal translocation of foliar applied B in the plants. Plants with strong B deficiency showed a significant reduction in foliar uptake. This was against our hypothesis and common knowledge. B deficiency must have a direct or indirect effect on cuticula penetration and uptake mechanism.

To further investigate this effect we conducted a second experiment. We pre-cultured soybean plants with 4 different B concentrations in the nutrient solution, ranging from 0 to 15 μM , to get good, sufficient, marginal and deficient level of B in the plants. To determine the deficiency status we made nutrient analyses and measured the membrane integrity, as K-efflux.

Results will be presented and discussed.

Keywords: Boron, boron deficiency, foliar fertilisation, micronutrient, soybean