

Assessment of foliar application of nano and micro sodium silicate on leaf photosynthetic characters of potato seedling at stolen-initiation stage

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Abstract

Although silicon (Si) is a non-essential element for most crops, but has shown beneficial roles in growth of crop plants. Therefore, evaluation of nutritional role of Si and nano Si components in crop production is necessary. For this purpose, a factorial experiment, based on randomized complete blocks design with three replications, was conducted at the Research Greenhouse of College of Agriculture, Ferdowsi University of Mashhad, in 2013. Treatments included size of the sodium silicate particles (nano and micro) and foliar application of Si [zero (without foliar application), distilled water, 100, 200, 300 and 400 mg/L]. Results showed that Si had beneficial effects on chlorophyll index, maximum chlorophyll fluorescence, quantum yield of photosystem II, photosynthesis, water use efficiency and mesophyll conductance of potato (cultivar Agria) leaves. Conversely, stomatal conductance, transpiration and intercellular CO₂ decreased with application of Si. In most traits, effect of nanoparticles of sodium silicate showed a higher performance than micro particles, and 400 mg/L of nano-Si had maximum effects. Overall, nano-Si particles showed the highest efficiency compared to micro-Si. Therefore, using nanoparticles of sodium silicate at optimum level improves plant photosynthetic traits.

Keywords: Silicon, Transpiration, Chlorophyll index, Nano-particles, Stomatal conductance.

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