

Effect of silicon on biotic and abiotic stress mitigation in horticultural and field crops

Wpływ krzemu na ograniczanie stresów biotycznych i abiotycznych w uprawach ogrodnich i rolnych

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Silicon is the second most abundant element in the Earth crust. Its beneficial role in plant growth was discovered years ago but mostly using soil application of solid compounds. INTERMAG R&D team developed technology of production liquid product (OPTYSIL) for foliar application. OPTYSIL induces resistance of plants to stress and supports the natural defense system. Cell walls become more resistant to enzymes produced by pathogens. The aim of this work was to evaluate effect of liquid silicon application on leaf on plant growth and stress mitigation.

The effect of the application of liquid silicon based fertilizer OPTYSIL (Si) on drought stress reduction was conducted in laboratory on wheat and on small plots field trials on soya. The trials were conducted in Department of Plant Physiology of Polish Academy of Science. The effect of OPTYSIL application on drought stress reduction resulted in very promising effects. The number of pods on soya increased by 18% and average seed weight per plant increased by 21%. Laboratory tests on wheat in stimulated drought condition showed lower electrolyte leakage by 41% and in the same time protein production increased by 40%.

Effect on biotic stress mitigation was evaluated in Research Institute of Horticulture. In this study OPTYSIL was applied by foliar application on apple cv. Golden Delicious against apple scab (*Venturia inaequalis*) and on strawberry plants cv. Senga Sengana against grey mould (*Botrytis cinerea*) and leather rot (*Phytophthora cactorum*). Field trials were conducted in 2013 when the weather conditions were very favorable for the development and spread of the diseases. The severity of apple scab on unprotected trees has reached in early June up to 40% and in July 82% on leaves and 60% on fruits. The effectiveness of OPTYSIL applied at 0.5 and 1.0 l/ha six times from 'pink bud' (BBCH 57) ranged from 67 to 81% and from 78 to 80%, respectively in control of scab on leaves and fruits and it was similar (on leaves) or lower (on fruits) to that obtained with standard fungicides captan and ditianon. The severity of gray mold and leather rot on unprotected plants of strawberry was respectively 10 and 14%. The severity of both diseases were lower on plots where OPTYSIL were used at 0.5 and 1.0 l/ha four times from beginning of flowering. Its efficacy ranged from 40 to 80% depending on dose and term of assessment and it was lower (1st assessment) or similar (2nd assessment) to that obtained with standard fungicides cyprodinil + fludioxonil, piraclostrobin + boskalid and biological product based on *Pythium oligandrum*. The yield from plots treated with OPTYSIL was significantly higher than that from control plots.