

Effect of low-plasma treatment for GABA content and plant growth of barley

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[Introduction]

Plasma, which is often regarded as the 'fourth state of matter', is a partially ionized gas, which contains a mixture of electrons, photons, atoms, radicals and various excited and non-excited molecules. The use of low-plasma in agriculture and food applications has been newly launched and has been recently investigated in the field of agricultural science as an alternative to the traditional pre-sowing seed treatment such as physical scratching, heat treatment and chemical treatment.

[Materials and Methods]

Barley (*Hordeum vulgare*) was harvested in 2016 at National Institute of Crop Science, Rural Development Administration. Naked barley and covered barley cultivars were saessal, saechal, Hyeyang and Quenal1. Plasma treatment on seeds has carried out using atmospheric pressure Surface Dielectric Barrier Discharge. Power is 400 W and N₂ (3 lpm) mixed with bubbled air (0.1 lpm, O₂ 0.65% containing) was used as feed gas. Plasma exposure time was 0, 3, 20 min. GABA content was analyzed by HPLC.

[Results and Discussions]

The influence of low-plasma treatment on barley seeds (*Hordeum vulgare* L.) has investigated using a surface dielectric barrier discharge at atmospheric pressure and room temperature. We investigated the seed germination, surface morphology, plant growth and functional material changes. Plasma treatment induced significant changes in the seed surface. It was cracked and eroded after plasma treatment. Germination ratio was not significantly different according to plasma treatment. Hypocotyl and root length of barley treated for 3 minute with plasma increased. But they did not show the tendency. GABA content of saessal and Heyang did not show a big difference by plasma treatment, while in saechal and quenel 1 showed an increasing tendency. After 3 germination days, GABA content increased and DPPH activity was slightly decreased as increased plasma treatment time.

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