

**Abstract of PhD thesis entitled: “The effect of indole-3-acetyl-aspartate on the response of pea (*Pisum sativum* L.) seedlings to osmotic shock”.**

Indole-3-acetic acid (IAA), a member of auxins, mostly occurs in plants as conjugates which are the bound form of this phytohormone. We can distinguish IAA ester conjugates with a sugar, *myo*-inositol, alcohol or glycoprotein molecule attached to the phytohormone, and IAA amide conjugates with an amino acid, peptide or protein molecule linked to auxin. The main amide conjugate in pea (*Pisum sativum* L.) tissues is indole-3-acetyl-aspartate (IAA-Asp) which is formed in an ATP-dependent reaction catalyzed by amidosynthetases from the Gretchen Hagen 3 (GH3) family. IAA-Asp, unlike most amide conjugates serving as a source of free auxin, mainly participates in the oxidative degradation of this phytohormone. On the other hand, this conjugate also has a specific, IAA-independent effect on plant response to abiotic stress, including thermal, salt and heavy metal stress, and biotic stress caused by fungal and bacterial pathogens. However, it should be noted that knowledge about the effect of IAA-Asp as a biologically active molecule is still limited. This study investigated the effect of exogenous IAA-Asp on the response of pea (*Pisum sativum* L.) seedlings to osmotic shock caused by a three-hour incubation of plants with NaCl or a 48-hour incubation with polyethylene glycol (PEG). In the first stage of the study, the lack of IAA-Asp hydrolysis to IAA was observed which proves that the changes occurring in seedlings after IAA-Asp administration are the effect of the conjugate and not the increase in auxin concentration. Next, it was demonstrated that IAA-Asp does not affect the level of antioxidants, proline and ascorbate, lipid peroxidation and methylglyoxal content in pea seedlings exposed to osmotic shock. However, exogenous IAA-Asp, under osmotic shock conditions caused by PEG, changes the activity of enzymes regulating glutathione content (glutathione reductase (GR) and glutathione S-transferase (GST) and S-glutathionylation of proteins and as a consequence modulates the thiol status in pea seedlings. Moreover, in plants treated with NaCl, the conjugate has an effect on the thiol group status by changing GR activity and induces protein carbonylation. IAA-Asp also regulates the level of phytohormones (jasmonic acid (JA), abscisic acid (ABA) and salicylic acid (SA)) in pea seedlings. It affects ABA and SA content under optimal growth conditions, as well as JA in plants incubated with sodium chloride and not exposed to osmotic shock. However, the tested conjugate does not modulate the IAA level, despite its effect on the expression and activity of IAA-Asp amidosynthetase in NaCl-treated pea seedlings and the activity of the IAA-Asp amidosynthetase and IAGlc synthase, the enzyme catalyzing the first step in the formation of ester conjugates, in plants incubated in PEG solution.

The presented research broadens the current knowledge about the biological effects of IAA-  
Asp.

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