Progesterone and β-Estradiol Stimulate Seed Germination in Chickpea by Causing Important Changes in Biochemical Parameters

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Z. Naturforsch. **65 c**, 239–244 (2010); received October 15/December 11, 2009

Effects of progesterone and β-estradiol on morphologic (germination velocity, root and shoot length) and biochemical (activities of α-amylase, superoxide dismutase, peroxidase and catalase, H_2O_2 content, lipid peroxidation) parameters during germination and post-germination stages of chickpea seeds were studied. The seeds germinated at various hormone concentrations (10^{-4}, 10^{-6}, 10^{-9}, 10^{-12}, 10^{-15} M) were harvested at the end of the 1st, 3rd, and 5th day. With comparison to the control, these hormones caused an increment in the number of germinating seeds at the end of days 1 and 3 by accelerating the seed germination. Root and shoot lengths were augmented by both hormones at all hormone concentrations tested. The highest elongation was recorded in 10^{-6} M progesterone and 10^{-9}–10^{-12} M β-estradiol. Similarly, activities of α-amylase and superoxide dismutase were increased by all concentrations of both hormones, and maximum increases were obtained with 10^{-6} M progesterone and 10^{-9}–10^{-12} M β-estradiol. In the case of superoxide dismutase activity, not only the H_2O_2 content but also the peroxidase and catalase activities increased. Lipid peroxidation decreased depending on an increase in the antioxidant enzyme activities. In the present study, it was demonstrated that progesterone and β-estradiol even at low concentrations increase the germination velocity and resistance to stress conditions by changing the activities of some biochemical pathways.

Key words: Chickpea, Seed Germination, Biochemical Activity