**Abstract**

Nanotechnology plays an important role in increasing agricultural productivity using bio nanoparticles. In recent years, the use of nanoparticles in plants has been considered as pesticides, protective agents and nutrients. *Melissa Officnalis L.* is a medicinal plant of the family of Lamiaceae, which has antibacterial, anticancer and antiviral properties. The effects of different nanoparticles on growth and metabolism are different in plants. In this study, the effects of different concentrations of silver nanoparticles (AgNPs) (20, 60 and 100 ppm) were studied on the growth rate and physiological and biochemical preperties of the *M. Officnalis L.* at different times. The amount of phenolic compounds and flavonoids were measured by Folin ciocalteu and aluminum chloride colorimetric method, respectively. In addition, the rate of peroxidation of membranes, the activity of antioxidant enzymes (Catalase, Guiacol peroxidase, Ascorbate peroxidase), proline and carbohydrate were also measured. The results showed that different growth preperties including root and stem weight, root and shoot length, protein content and photosynthetic pigments significantly increased under AgNPs, with the highest amount at 60 ppm AgNPs on day 15. Proline and carbohydrate also increased under different concentrations of AgNPs compared to control, with highest content at 100 ppm AgNPs on day 15. The maximum content of secondary metabolites, including phenol and flavonoids, was observed the at 100 ppm AgNPs on day 20. The maximum increase in the anthocyanin content was observed at concentration of 60 ppm AgNPs on day 15. The increased activity of antioxidant enzymes (catalase, guaiacol peroxidase and ascorbate peroxidase) under different concentrations of AgNPs led to a decrease in MDA content. According to the results of this study, AgNPs are suggested as a suitable stimulant for increasing growth and production of secondary metabolites.

**Keywords**: *Melissa officinalis*, Silver nanoparticles, physiological properties, secondary metabolites

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# Study on effect of silver nanoparticles on growth and physiological and biochemical properties *Melissa officinalis*

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