



University of zabol

Graduate school

Faculty of science

Department of Biology

**The Thesis submitted for the Degree of M.Sc
(in the field of Genetic)**

Title:

**Investigating the salinity and gold nanoparticle effects on
Quercetin 3-o-methyleltransferase gene expression in
*Chenopodium quinoa***

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ABSTRACT:

Quercetin 3-O-methyltransferas gene is an important gene because of its medicinal characteristics including anti-diabetic, anti-cancer and anti-alzheimer disease. The aim of this research is to study the effects of salinity stress and gold nanoparticle on expression of this gene in *Chenopodium quinoa*. First, quinoa seeds in pots were randomly planted in four concentrations of salinity and gold nanoparticles, each with three repeats. the completion of the fourth leaf, salinity treatment was performed at 4 After concentrations of 0, 200, 400 and 600mM and nanoparticles at 4 concentrations of 0, 45, 35 and 25ppm, later RNA extraction from the leaves of plant was done at 3 different time periods of 24, 48 and 72 hours after the treatments. For normalization of the data was used *18s rRNA* as control gene and gene expression was evaluated by real-time PCR. Data analysis was performed by Graphed Prism 8 and confirmatory test of correction and One way-Anova by p value<0.05. The real-time results showed that by decreasing the gold nanoparticle up to 35ppm gene expression also upregulated and its highest level occurs at 72 hours, on the other hand at 300ppm concentration of gold nanoparticle at 72 hours the aforementioned gene was downregulated. As regard to salinity stress all 3 concentration caused the upregulation of the gene at 24 hours and the decrease continued till 400ppm. Overall in the process of aging the expression of *quercetin 3-O-methyltransferas* gene enhanced under treatment of gold nanoparticles, while; gene expression under salinity stress decreased by age.

Keywords: *quercetin 3-O-methyltransferas* gene, quinoa, gene expression, salinity stress, gold nanoparticle, Real time PCR