

Abstract

In order to examine effects of drought stress and nano chelated iron on growth characteristics and antioxidant enzymes of chamomile genotypes, a factorial experiment in a randomized complete block design with three replications was conducted at Greenhouse Research farm of the University of Zabol in 2015. Experimental treatments included drought stress at 2 levels (control or 90% of capacity of pot and 70% capacity of pot) and nano iron chelate at 2 levels (control or non-use of nano chelated iron and a concentration of 2 mg/l) and 13 chamomile genotypes. Traits under investigation included plant height, flowering shoot height, stem diameter, number of leaves, diameter of head, length of head, plant and root's fresh weight, Economic yield and biological yield, chlorophyll a, chlorophyll b, total chlorophyll, anthocyanin, manganese, zinc, iron, proline, soluble sugars and enzymes catalase, peroxidase and the peroxidase ascorbate. The results of variance analysis showed that there were significant differences between different levels of drought and nano chelated iron and genotype of the characteristics under investigation. Due to significant interaction between stress×genotype, genotype×nano iron condition and The effects of triple of genotypes at each drought stress level and nano chelated iron had different trends. Spraying at drought conditions resulted in significant increases of the characteristics under investigation. Due to the stress nano chelated iron interaction of genotype, the biological yield (665/0 g) the treatment of stress and the consumption of 2 ml of nano chelated iron were obtained from genotype Kerman. The lowest amount of traits as stress treatment and of genotype Arak was obtained of foliar non application. The economic yield in a genotypes of Mashhad, Shiraz, Arak and Safashahr increased and decreased in the other genotypes. In complete irrigation consumption of nano chelated iron on the genotypes of Shiraz, Arak, Safashahr, Gachsaran, Khuzestan and Hungary reduced the economic yield in the genotypes, increase The economic yield caused. Drought stress also decreased consumption of nano chelated iron in the economic yield of genotypes Mashhad, Arak was Nain. The simple coefficients of correlation characteristics showed that under the stress conditions compared to full irrigation system, the correlation between attributes with each other and with the economic yield increased. Head diameter and head length under the stress condition had the highest coefficients of correlation with economic yield. Cluster analysis at control level and drought stress conditions divided genotypes into 3 and 2 groups. Under the control condition, genotypes Kazeroon, Hungary, Safashahr, Kerman, Khuzestan and Nain were placed in the first and genotypes Shiraz, Arak, Mashhad and Ardestsn were placed in the second group and genotypes Isfahan, Germany and Gachsaran took the third place. The first group under stress included genotypes Isfahan, Shiraz, Mashhad, Ardestsn, Arak, Gachsaran, Kerman, Safashahr and Germany and the second group included genotypes Nain, Hungary, Khuzestan and the Kazeroon. The regression results showed that in under complete irrigation condition totally 3 characteristics entered the regression model of economic yield. However, under stress condition, 7 traits, entered the models of economic yield. Also component analysis results showed that under normal and stressed condition and stress the first three components explained about 58/26 and 65/91 percent modifications and variations respectively also was observed that based on first and second components, Arak, Shiraz, Mashhad, Safashahr and Kazeroon genotypes under normal conditions and Shiraz, Mashhad and Ardestsn genotypes under stressed condition were the superior ones. According to the Biplot diagrams, under normal conditions Safashahr genotype is the favorable and Hungary genotype is the unfavorable one. Also under drought stress, Shiraz and Mashhad genotypes were recognized as the superior genotypes. Results of Path analysis showed that characteristics of economic yield, amount morphological characteristics length and diameter head were the most direct effect on economic yield, among physiological characteristics amount of photosynthetic pigments had the highest direct effect on economic yield.

Keywords: chamomile, genotype, nanoparticles, drought, cluster, antioxidant enzymes.



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**The Thesis Submitted for the Degree of Master of Science (M.Sc)
(In the field of modification of garden plants Science)**

**Effects of drought stress and nano iron chelated on
vegetative growth and antioxidant enzymes activity
of chamomile (*Matricaria chamomile* L.) genotypes**

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September 2015