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Research Article

EFFECT OF BOHR NANOFERTILIZER AND CHELATED IRON ON THE YIELD OF PEANUT IN PROVINCE GUILAN, IRAN

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ABSTRACT
The aim of the present work was to study the effect of different amounts of Bohr nanofertilizer, Chelated iron fertilizer and their interactions on the yield of peanut. A factorial test in complete randomized blocks design was performed in triplicate in Astaneh Ashrafieh city which is among the subsidiaries of Guilan province in a plot of 450 m2 areas. Test factors were including bohr nanofertilizer in 5 doses (1,2,3,4g/l and control or not spraying the bohr nano-fertilizer) and Chelated iron in 4 doses (2,4,6 g/l and control group or not spraying the Control iron fertilizer). In general, the results of this study indicates that Chelated iron fertilizer has a significant effect on the yield of dry seed, yield of the pod, total biomass and the weight of 100 seeds. Bohr nanofertilizer also has a significant effect on the yield of fresh seeds, yield of dry seed, the number of seeds per bush, the number of green pods, the number of mature pods, the number of pods per bush, the yield of pod, total biomass, harvestation index and the weight of 100 seeds. Variance analysis of effect of Chelated iron fertilizer and bohr nano fertilizer indicates their influence on the yield of dry seed, yield of green seed, yield of pod, the number of seeds per bush, the number of pods per peanut bush, the number of green pods per bush, the number of mature pods per bush, total biomass, harvestation index and the weight of 100 seeds. The greatest mean yield of dry seed was obtained in the treatment of 6 g/l Chelated iron fertilizer and 2 g/l bohr nano fertilizer with mean of 2368.13 kg/h, the greatest mean total biomass was achieved in the oligo- iron control treatment and treatment of 4 g/l bohr nano fertilizer with mean of 10989.38 kg/h1. The greatest mean harvestation index was achieved in applying 4 g/l iron fertilizer and 2 g/l Bohr nano fertilizer with mean of 79.023%.

Key Words: *Peanut, Bohr Nanofertilizer, Chelated Iron Fertilizer, Yields*

INTRODUCTION
Peanut is one of most important and economic oilseeds in the tropical and semi tropical regions. It is mostly grown for its oil, protein and carbohydrate source (Panhwar, 2005). Peanut oil is rich of edible oil containing 43-55% oil and 25-28% protein (Maiti and Ebeling, 2002). China, India, Unites States of America, Nigeria, Indonesia, Senegal and Burma are among the major producers of this crop. Peanut in Iran is planted in Golestan, Khuzestan and Guilan provinces. In guilan province, it is planted mainly in Astane Ashrafieh city and alongside the sepid rood (Noorhosseini and haghdoost, 2009).
Supplying the necessary nutrients adequately is required to attain high yield in peanut. A balanced and fitted productivity program with particular focus on the usable amounts of phosphor, potassium, magnesium, sulphur, and nitrogen seems necessary to achieve considerable yield. On one hand, environmental problems due to applying the chemical fertilizer, energy and production costs, and their adverse effects on the biological cycle and on the other hand, the issue of supplying adequate and high quality foods has required the production of peanut while decreasing the application of chemical fertilizers (Khalaj *et al.*, 2009). Peanut as one of major, strategic crops of the region needs two elements of iron and Bohr such that one of limitations to realize the increased yield of peanut is supplying the nutritional elements particularly iron and other micronutrient elements such as Bohr. This problem has been overcome party through application of chemical fertilizer (Khaeh Poor, 2007).
Micronutrients are considered as trace nutrients which play a vital role on the plants growth and development and have a major contribution due to their necessity to increase the yield of the crop (Forozany, 1993). Iron nano fertilizer, copper nano fertilizer and Bohr nano fertilizer are among the nano

products in the agricultural sector. Metal ions such as iron, zinc, copper, magnesium and Bohr are necessary micronutrients and cofactors of more than 100 enzymes and protein contributing in the cell division, acid nucleic metabolism and protein synthesis (sohraby, 1994). Iron is the forth abundant element in the Earth cortex. Sortage of iron is a common problem environmental problems due to applying the comical fertilizer, energy and production costs and their adverse effects on the biological cycle and on the other hand, the issue of supplying adequate and high quality foods haverequired the revision in the techniques of increasing the production of peanut while decreasing the application of chemical fertilizers (Khalaj *et al.*, 2009). Peanut as one of major, strategic crops of the region needs two elements of iron and Bohr such that one of limitations to realize the increased yield of peanut is supplying the nutritional elements particularly iron and other micronutrient elements such as Bohr. This problem has been overcome partly through application in most plant species. A form of iron transiting between the cells is Chelated iron. Chelateds are synthesized biologically in the plant and charge the responsibility os craying the ions (Panjtandoust, 2008). In the calcic soils, iron shortage is one of most important challenges farmers are confronted during the planted in the soils alongside the sefidrood rive and coastal regions of Caspian Sea. These soils have a calcic soure bed and are rich of calcium bicarbonate and also dissolved calcium in the soil. Their PH is over 7. Thus applying iron on peanut plays an important role (panjatandoust, 2008). Shortage of iron in the plants of family leguminous is effective to decrease the nitrogen fixation and leads to decrease in the number of pods per bush and the seed yield (O'hara *et al.*, 1988). Thus, due to critical role of this element in fixation and restoration of nitrogen, its necessity will be two fold. The symptoms of iron shortage is initially observed as intra leaf vein playing, particularly in the new leaves and eventually continues with necrosis of whole leaves (Davoodi, 2007). In the southern Thailand, shortage of iron will decrease the number of seeds per pod and the number of pods in peanut plant which main cause is decreased nitrogen fixation (O'hara *et al.*, 1988).

Bohr is a very important trace element which presence is necessary for metabolic activities in the plants (Sohraby, 1994). Bohr is necessary for construction of cell wall and plays a role in the movement of sugar inside the plant, cell division and synthesis of some amino acids. Bohr function is like the calcium. Bohr is one of most important elements playing a fundamental role in the germination of pollen grain, fruit formation and transmission of photosynthetic materials to the consumption area. Bohr shortage is one of most important and wide spread shortages of nutrients worldwide which limits the yield and production of crops (Foroozany, 1993). Bore also plays an important resole in the quality and odor of peanut seeds. Bohr shortage may be observed in the sandy and deep soils in the peanut bushes. Seeds with Bohr shortage will be like a void heart. In additional, inside the surfaces of the cotyledons are made compressed and are generally dark colored. Such that these seeds are places in the damaged seeds group.

In this regard, Singh and Dayal (1992) concluded that iron spraying will increase tha peanut yield up to 38 to 42% in an alcalic soil. According to the above mentioned statements, the study on the different amounts of iron fertilizer and bohr nano fertilizer on the peanut yield is necessary which present study aims to focus on it, Abdzad Gohary and Noorhosseiny (1994) in a study on evaluation of effect of iron fertilizer on the yield and yield components of peanut indicated that the greatest yield of seeds and pod was attained by applying 4.5 g/l iron. Efficiency of nano fertilizer containing Bohr micro nutrients will increase the product qualitatively and quantitatively in the performed research plans also, application of this kind of fertilizer in the farms has led to better fertilization of the plant and improving the production (Khalaj *et al.*, 2009).

Studies on the organic nano fertilizer compared to the commonly used chemical fertilizers in the farms indicated that organic nano fertilizer will qualitatively and quantitatively increase the product as well through the adsorption and dissolution of environmental contaminants such as carbon dioxide , azotes and nitrite and effect of the iron present in this fertilizer on the plants respiration cycle, it may have considerable effects as an environmental oxygen increasing factor on the biological cycle and environment health, in addition to increase the yield. In addition, this kind of fertilizer carries other elements such as sulphur, magnesium and micronutrient metals such as iron, zinc and Bohr which is

completely environment friendly. In addition to increase the soil organic compounds, it turns the iron solution and other microelements to the accessible and useful forms for the plant. According to the improvement of yield in the craps and positive environmental effects, study on this issue is necessary. Mean while, the cost of applying this nano fertilizer is such that the farmer's income will become fivefold using this kind of fertilizer (Khalaj *et al.*, 2009). Nowadays, attempts to find the strategies being effective to increase the yield of the plants such as peanut while decreasing the application of chemical fertilizers continues, while preserving the health of water and soil resource for this purpose, in present study the effect of bohr nano fertilizer alongside with Chelated iron on the yield of local cultivar peanut.

MATERIALS AND METHODS

Present study was performed as a factorial test using complete randomizes blocks design in triplicate in astaneh ashrafieh city of the subordinates of Guilan province in a 450m2 plot. Test factors were nano fertilizer in 5 doses(1,2,3,4 g/l and control group or not spraying the bohr nano fertilizer) and Control iron in 4 doses (2,4,6 g/l and control group or not spraying the Chelated iron). Before performing the test, a mixed sample of soil was taken and its physical and chemical properties were defined. Steps of soil preparation and providing the bed were including deep plowing, two perpendicular disks, rotator plowing and using the trowel to level the land before performing the test. Before the plantation, preys contaminated to were used or poison spraying was performed to combat mole-crickets. Also, per plant herbicide mixed to the soil (terfolan) was used at 2.5 l/h to fight against the weeds. N.P.K base composts were placed in deep soil as a strip with a distance form planted seeds based on the soil decomposition rate and the plant's need at the plantation time. Dimension of each plot was 5×2 and sampling area per plot was 1m2, taken the 40×40 plantation distance, about 9 bushes per bush are used for sampling. Since peanut is the host for pests and disease such as caradina butterfly larva, silk weaver larva, cricket and fungal disease such as peanut leaf spot. If pest occurrence during the growth steps was observes, spraying with diazinone in 2/1000 ratio according to the life cycle of the pest and disease in several steps. Bore nano fertilizer and Control iron were transferred from solid from to the solution and were applied in the 10T flowering stage using desired doses on the plants with precise handy spray(with 3 bp pressure and 400 l/h spraying volume). After spraying (in the 10% flowering stage) leaves chlorophyll concentration was measured each 15 days using spad. Harvestation was performed in the physiologic maturity. After harvestation, seeds were placed in the ambient temperature under the sun light to lose its moisture in order to perevent the acivity of aspergillus fungi and to preserve the germination power. After final harvestation, dry seed yield, green seed yield, pod yield, the number of immature pods per bush, the number of pods per bush, The number of seeds per bush, total biomass, harvestation index and the weight of 100 seeds will be measures, SAS software was used to analyze the data and mean comparisons and other statistics analysis and Excel was used to map the diagrams.

RESULTS AND DISCUSSION

Dry Seed Yield

Variance analysis results in figure 1 indicated that the effect of Chelated iron, Bohr nano fertilizer and their interaction to the yield of peanut pod was significant in 1% probability level ($p<0.01$). The highest mean yield of dry seed was achieved with 6 g/l Chelated iron (1704.544 kg/ha) and the lowest mean yield was achieved with Control iron treatment (1344.419 kg/ha) (figure 1). Also the highest mean yield of dry seed was in 2 g/l bohr nano fertilizer(1673.428 kg/h1)and the lowest mean was in control treatment by bohr nano fertilizer (967.815 kg/h1)(figure2). In the interaction also, the highest mean yield of dry seed was achieved in the treatment of 6 g/l Chelated iron and 2 g/l Bohr nano fertilizer with mean of 2368.13 kg/h1 (figure 3).

Morady Zadeh Zavareh *et al.*, (2012), Abdzad Gohary *et al.*, (2010), Farah Bakhsh *et al.*, (2007) and Rahimy and Mazahery (2004) in their study concluded that iron fertilizer has a significant effect on the

seed yield with ($p<0.01$). Azizy *et al.*, (2011) on their study concluded that Bohr fertilizer has a significant influence on the seed yield ($p<0.01$).

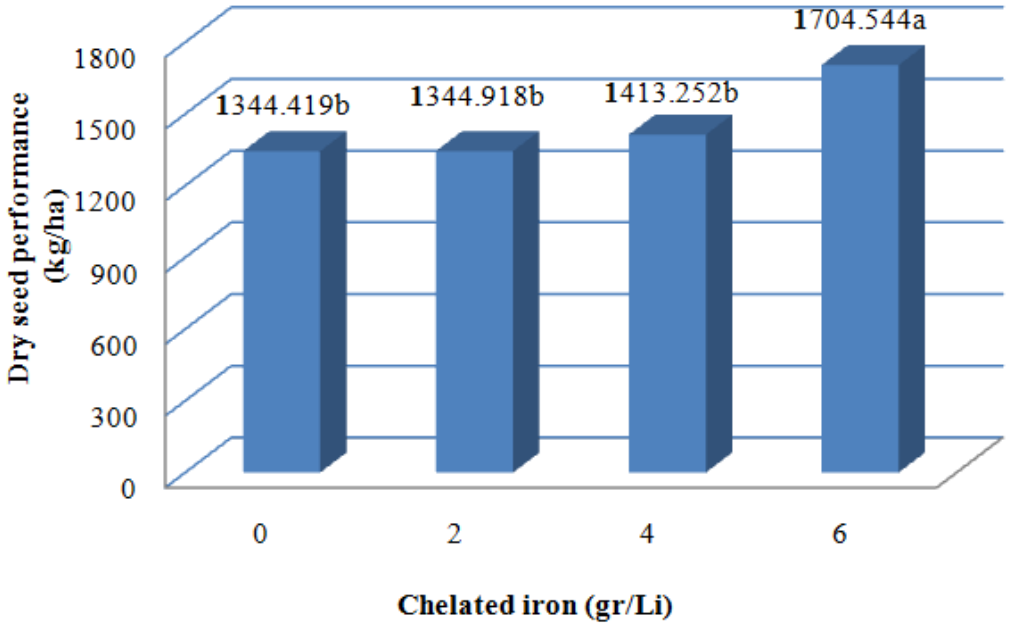

Figure 1: The effect of Chelated iron on Dry seed yield peanut

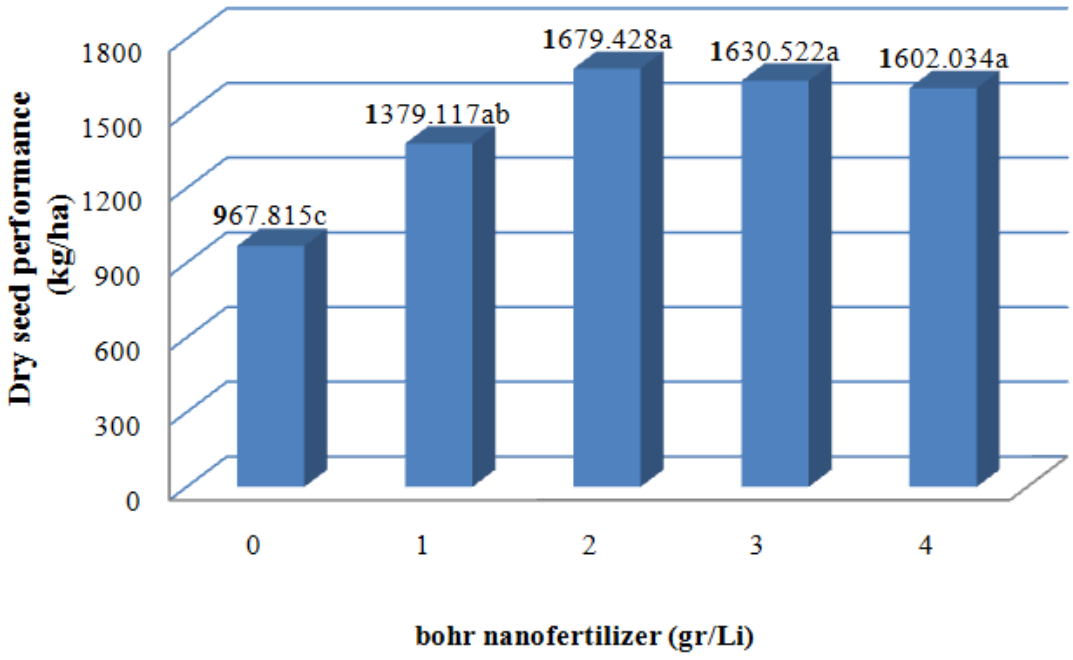

Figure 2: The effect of Bohr nanofertilizer on Dry seed yield peanut

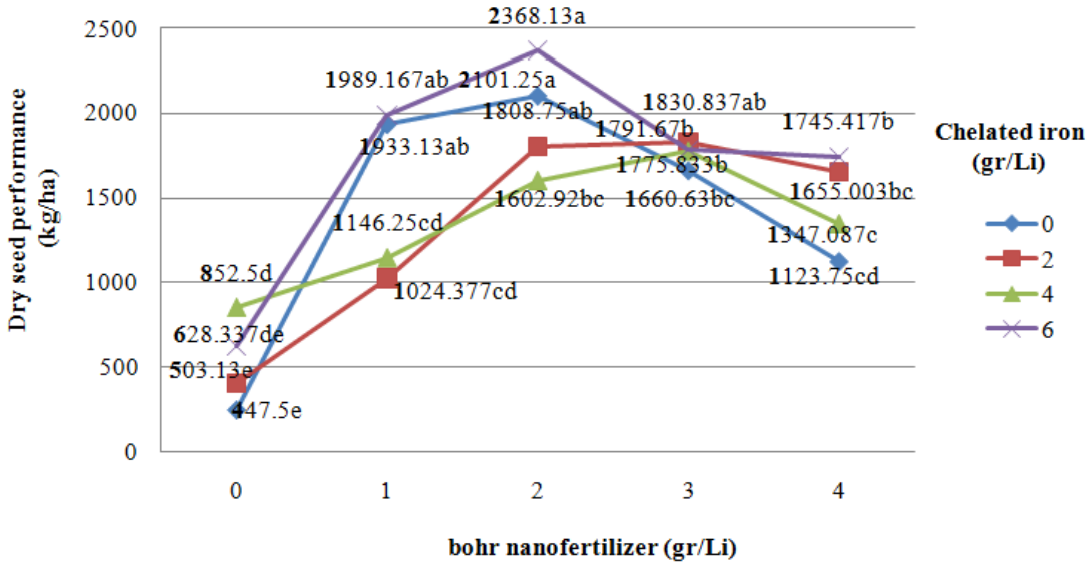

Figure 3: The effect Interaction of Chelated iron and Bohr nano fertilizer on Dry seed yield peanut

Wet Seed Yield

Results of variance analysis in the table 1 indicated that the effect of Bohr nano fertilizer and their interaction with wet seed yield were significant ($p<0.01$). The highest mean yield of wet seed was achieved in 4 g/l Bohr nano fertilizer (3017.449 kg/ha) and the lowest mean was achieved in the control treatment of Bohr nano fertilizer (1260.318 kg/h1) (figure 4). Also, on the interaction, the highest mean of wet seed yield was achieved in the control treatment of iron fertilizer and 4 g/l Bohr nano fertilizer with mean of 3886.25 kg/ha (figure 5). While, the simple effect of Chelated iron on the yield of peanut wet seed was not significant (table1).

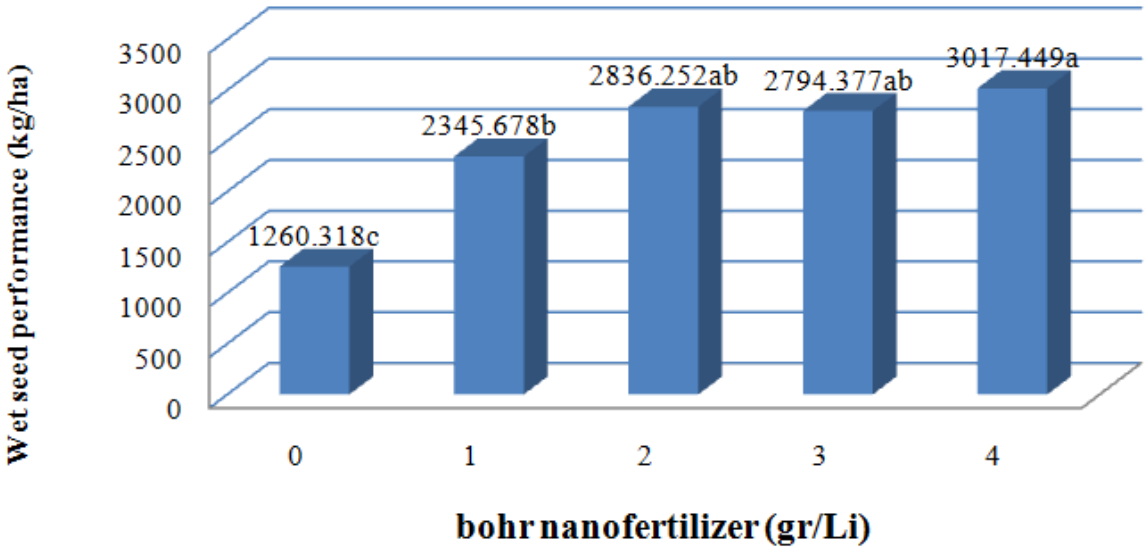

Figure 4: The effect of Bohr nanofertilizer on Wet seed yield peanut

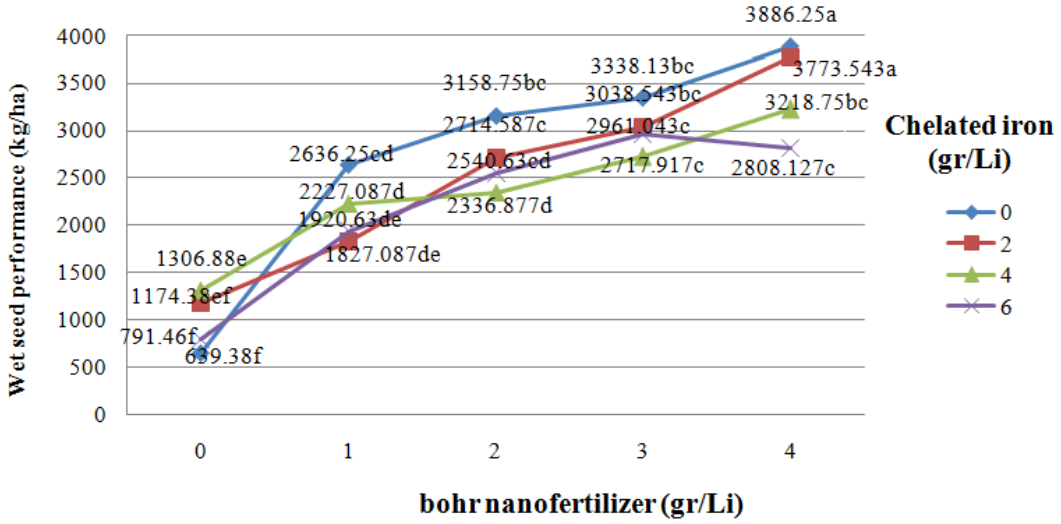

Figure 5: The effect Interaction of Chelated iron and Bohr nano fertilizer on Wet seed yield peanut

Pod Yield

Results of variance analysis in table 1 indicated that the effect of Chelated iron, Bohr nano fertilizer and their interaction on the peanut pod yield were significant in 1% probability level ($p<0.01$). The heist mean yield of the poor was achieved in 6 g/l Chelated iron (4953.502 kg/ha) and the lowest mean was achieved in the control treatment of Chelated iron (4292.294 kg/ha) (figure 6). Also, the highest mean yield of the pod was in 4 g/l Bohr nano fertilizer (5561.046 kg/ha) and the lowest mean was achieved in the control treatment by Bohr nano fertilizer (3250.157 kg/ha) (figure 7). In the interaction also the highest mean yield of the pod was achieved in the control treatment of Chelated iron and 4 g/l Bohr nano fertilizer with mean of 7113.13 kg/h1 (figure 8).

Abdzad Gohary *et al.*, (2010) concluded on their study that iron fertilizer is significant on the pod yield in 1% probability level ($p<0.01$).

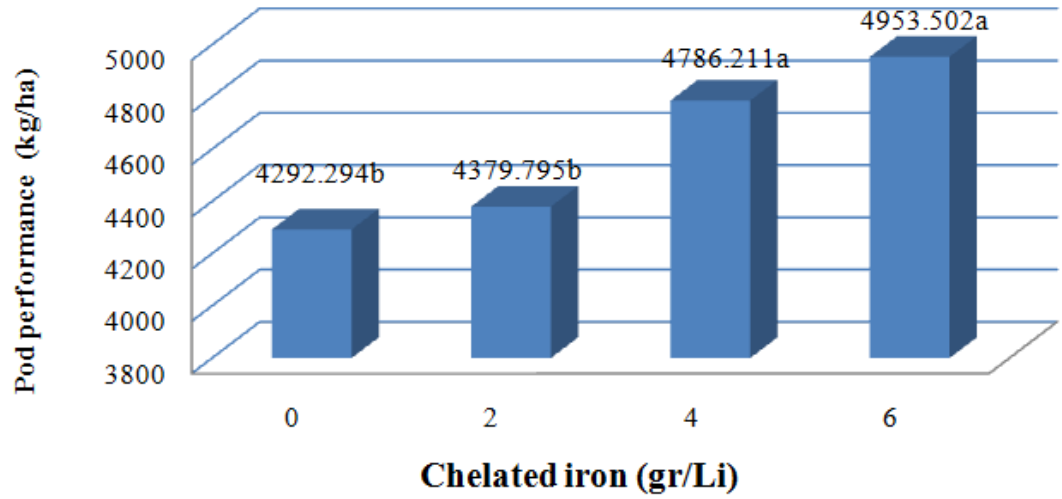

Figure 6: The effect of Chelated iron on Pod yield peanut

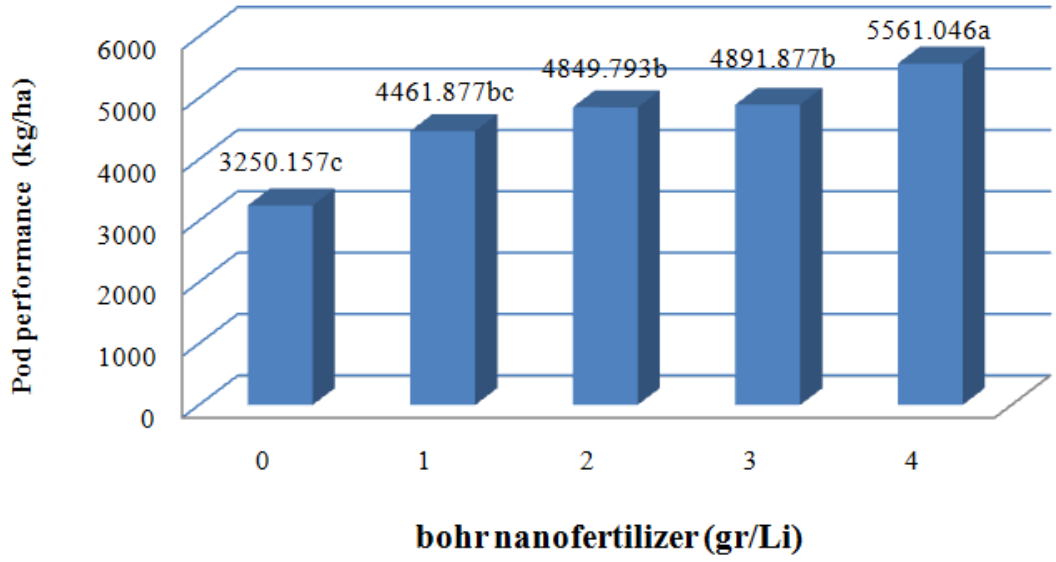

Figure 7: The effect of Bohr nanofertilizer on Pod yield peanut

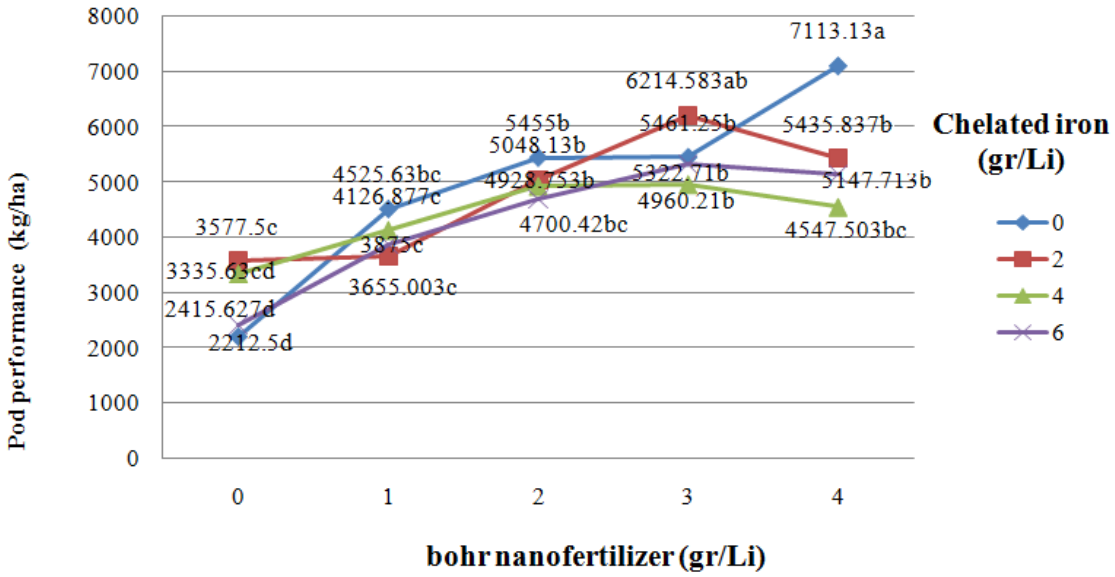

Figure 8: The effect Interaction of Chelated iron and Bohr nano fertilizer on Pod yield peanut

The Number of Pods in the Bush

Results of variance analysis in table 1 indicated that the effect of Bohr nano fertilizer and its interaction to the number of pod per peanut bush was significant in 1% probability level ($p<0.01$). The highest mean number of pods per bush was achieved by 2 g/l bohr nano fertilizer (30.92 pods) and the lowest mean was achieved in the control treatment of bohr nano fertilizer (24.625 pods) (figure 9). In the interaction also, the highest mean was achieved in the control treatment of iron fertilizer and 4 g/l Bohr nano fertilizer with mean of 39.9 pods/bush (figure 10). While, the simple effect of Chelated iron on the number of peanut bushes was not significant (table 1).

Rahimy and mazahery (2004) on their study concluded that iron fertilizer has a significant effect on the number of pods per bush. Azizy *et al.*, (2011) in their study concluded that Bohr fertilizer is significant on the number of pods per bush in 1% probability level ($p<0.01$).

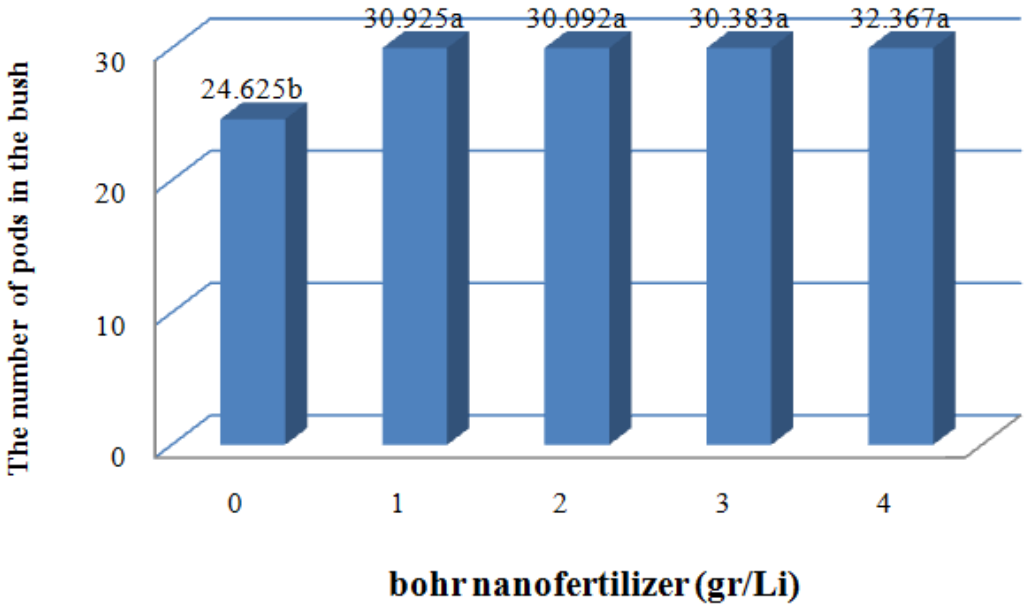

Figure 9: The effect of Bohr nanofertilizer on The number of pods in the bush peanut

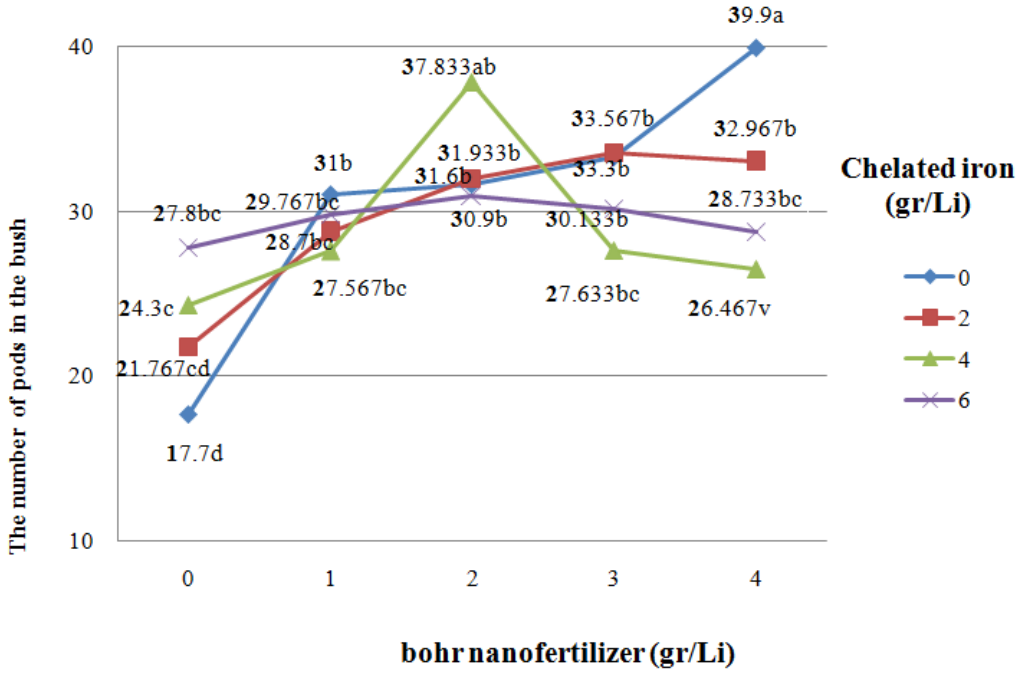

Figure 10: The effect Interaction of Chelated iron and Bohr nano fertilizer on the number of pods in the bush peanut

The Number of Immature Pods per Bush

Results of variance analysis in table 1 indicated that the effect of Bohr nano fertilizer and its interaction to the number of immature pods per bush were significant ($p<0.01$). the highest mean number of immature pods per bush was achieved by applying 2 g/l bohr nano fertilizer (8.5 immature pods) and the lowest mean was achieved in the treatment of 4 g/l bohr nano fertilizer (6.54 immature pods) (figure 11). In the interaction also the highest mean was achieved in the control treatment of iron fertilizer with mean of 11.4 immature pods per bush (figure 12). While the simple effect of Chelated iron on the number of immature pods per bush was not significant (table 1).

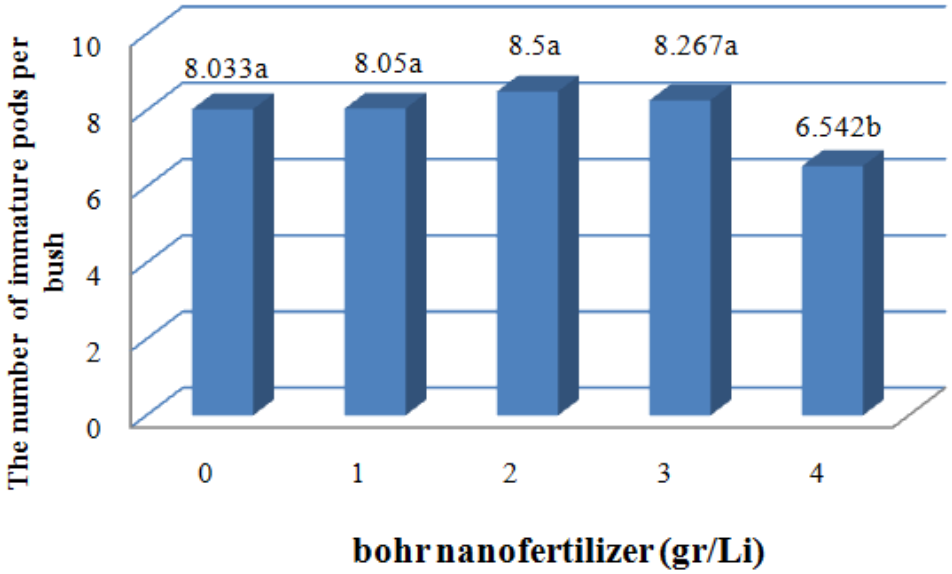

Figure 11: The effect of Bohr nanofertilizer on the number of immature pods per bush peanut

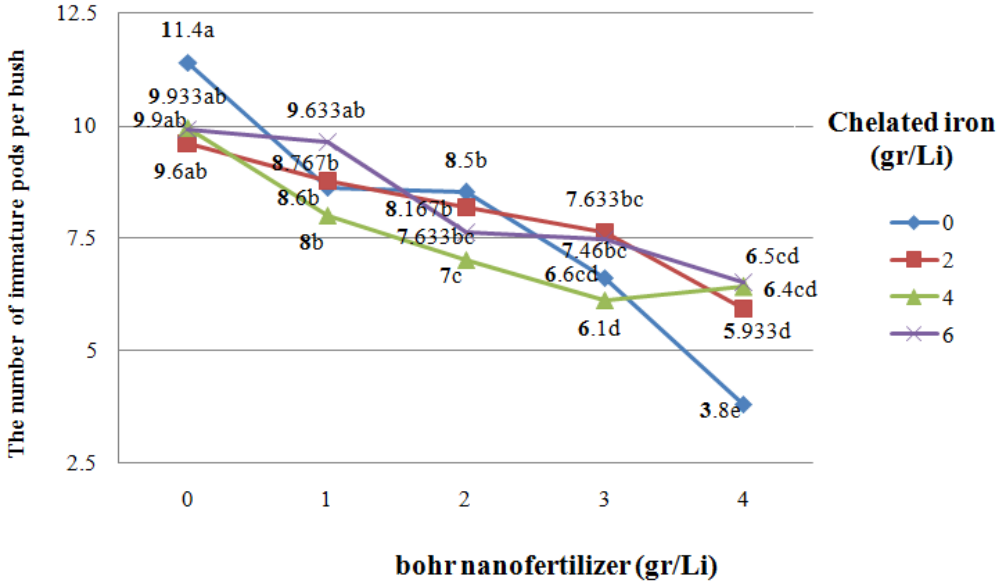

Figure 12: The effect Interaction of Chelated iron and Bohr nano fertilizer on the number of immature pods per bush peanut

Table 1: Results of analysis of Chelated iron and Bohr nano fertilizer on yield and Components of peanuts

Source changes	df	Mean square				
		Dry seed yield	Wet seed yield	Pod yield	number of pods in the bush	number of immature pods per bush
Block (B)	2	225664.342^{ns}	274423.879^{ns}	110476.092^{n}s	53.628^{ns}	8.727^{ns}
Chelated iron (Fe)	2	441599.158**	753190.351^{ns}	1520093.211**	93718^{ns}	1.522^{ns}
Bohr nano fertilizer (B)	3	1037553.184**	6048028.354**	8736921.633**	104.956**	7.132**
Interaction	6	1156.373**	1873419.751	3492101.505**	82.986**	11.969**
Error	22	119739.524	313797.751	618712.084	21.545	1.427
CV (%)		13.84	12.86	17.09	15.64	15.16

*ns, **, *: the difference is meaningless, statistically significant at 1% and 5%*

The Number of Mature Pods per Bush

Results of variance analysis in table 2 indicated that the effect of Bohr nano fertilizer and their interaction to the number of mature pods per bush were significant ($p<0.01$). the highest mean number of mature pods per bush was achieve through applying 4 g/l bohr nano fertilizer (24.108 mature pods) and the lowest mean was achieved in control treatment of bohr nano fertilizer (16 mature pods) (figure 13). In the interaction also, the highest mean was achieved in the treatment of 4 g/l iron fertilizer and 4 g/l Bohr nano fertilizer with mean of 28.5 mature pods per bush (figure 14). While the simple effect of Chelated iron on the number of mature pods per bush was not significant (table 2).

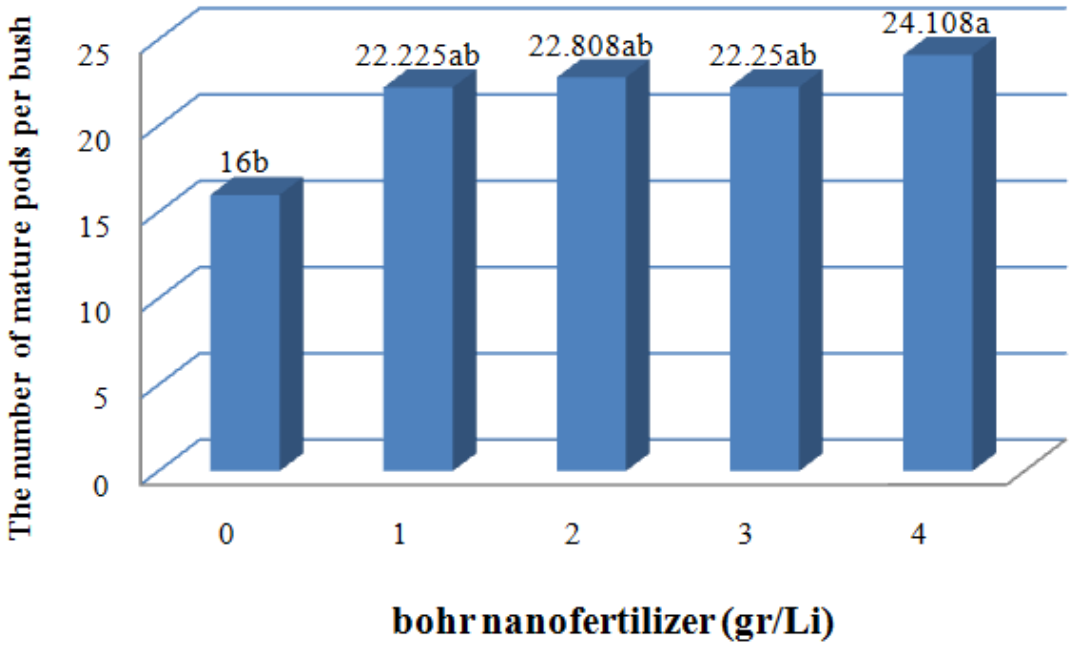

Figure 13: The effect of Bohr nanofertilizer on the number of mature pods per bush peanut

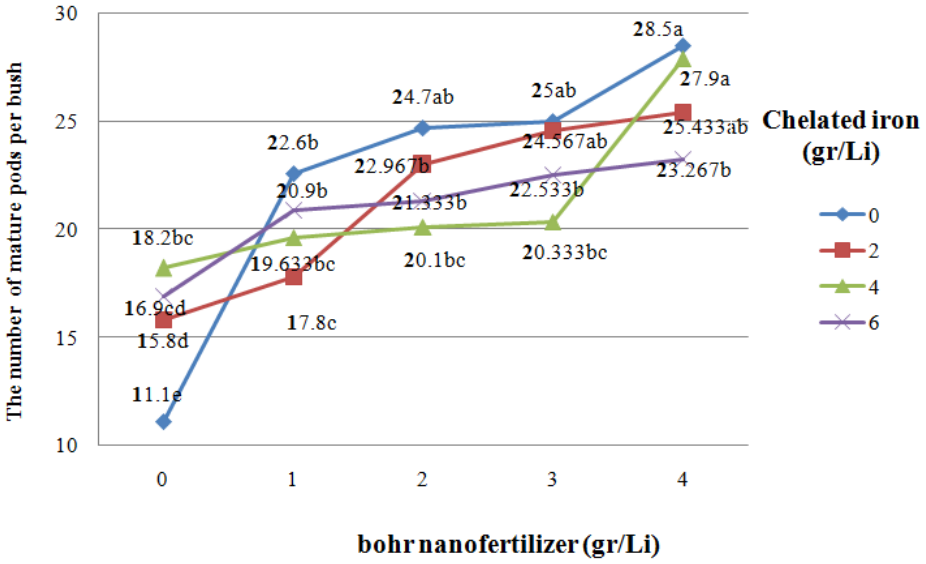

Figure 14: The effect Interaction of Chelated iron and Bohr nano fertilizer on the number of mature pods per bush peanut

The Number of Seeds per Bush

Results of variance analysis in table 2 indicated that the effect of Bohr nano fertilizer and its interaction to the number of seeds per bush were significant ($p<0.01$). The highest mean number of seeds per bush was achieved by applying 3 g/l bohr nano fertilizer (42.708 seeds per bush) and the lowest mean was achieved in the control treatment of bohr nano fertilizer (24.15 seeds per bush) mean number of seeds per bush was achieved by applying 2 g/l iron fertilizer and 3 g/l bohr nano fertilizer with mean of 55.067 seeds per bush (figure 16). While the simple effect of Chelated iron on the number of seeds per bush was not significant (table2). Mazahery nia *et al.*, (2010) on their study concluded that the iron fertilizer has a significant effect on the weight of seed in the ear with 5% probability level. Azizy *et al.*, (2011) in their study demonstrated that Bohr fertilizer has a significant effect on the number of seeds per pod with 1% probability level ($p<0.01$).

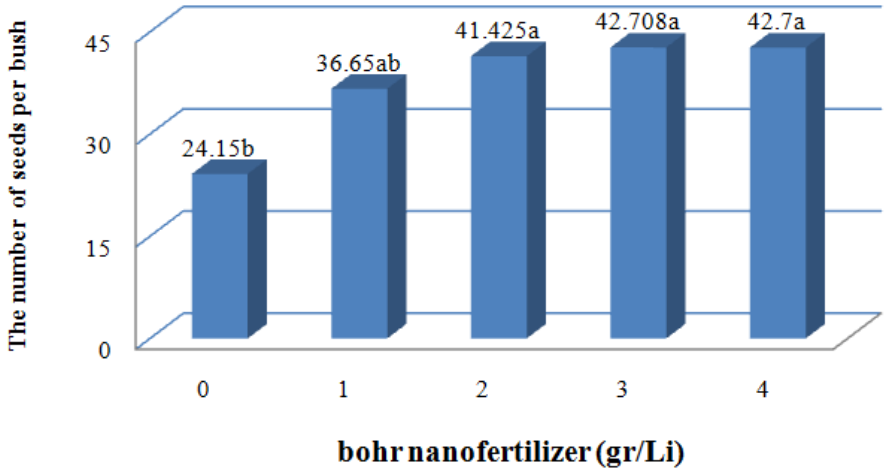

Figure 15: The effect of Bohr nanofertilizer on the number of seeds per bush peanut

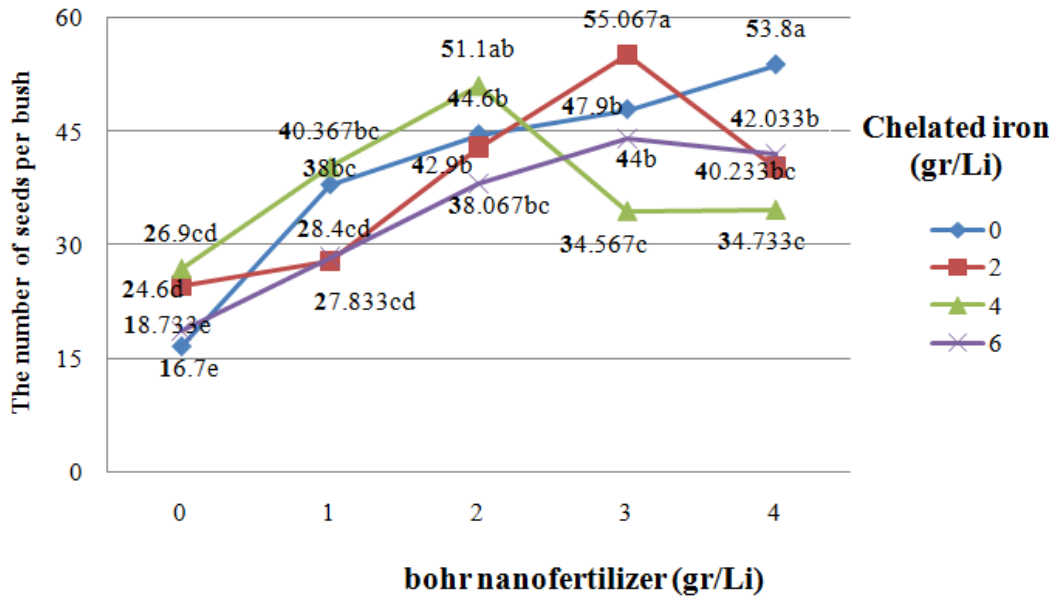

Figure 16: The effect Interaction of Chelated iron and Bohr nano fertilizer on the number of seeds per bush peanut

Total Biomass

Results of variance analysis in table 2 indicated that the effect of Chelated iron, Bohr nano fertilizer, and their interaction on the total biomass of peanut were significant ($p<0.01$). the highest mean of total biomass was achieved by applying 4 g/l Chelated iron (7649.254 kg/h1) and the lowest mean was achieved by treatment of 6 g/l Chelated iron (7118.043 kg/ha) (figure 17). Also, the highest mean of total biomass was achieved by 4 g/l Bohr nano fertilizer (9028.701 g/ha) and the lowest mean was achieved in the control treatment of Bohr nano fertilizer (5162.347 kg/ha) (figure 18). In interaction also, the highest mean of total biomass was achieved in the control treatment of Chelated iron and 4 g/l Bohr nano fertilizer with mean of 10989.38 kg/h1 (figure 19).

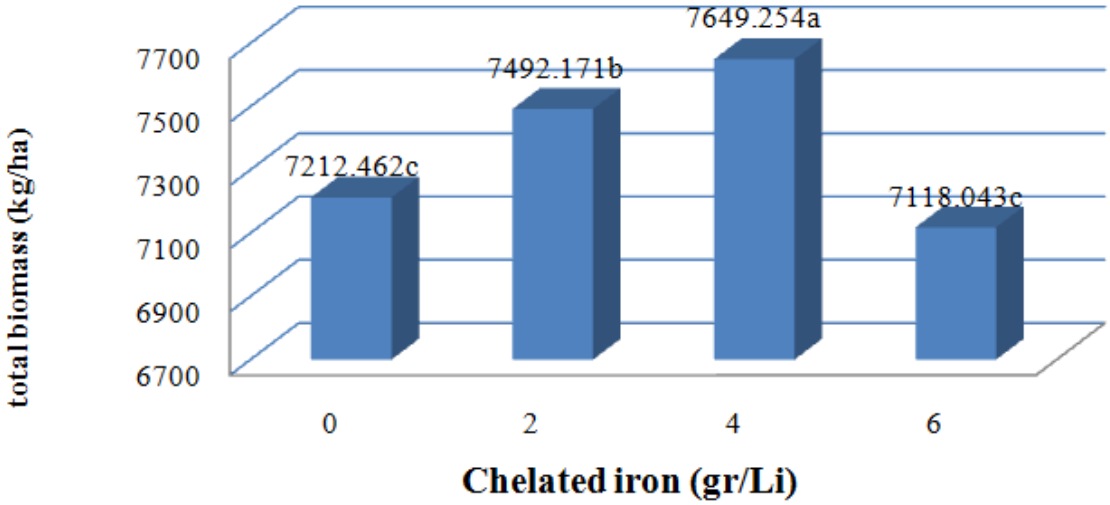

Figure 17: The effect of Chelated iron on total biomass peanut

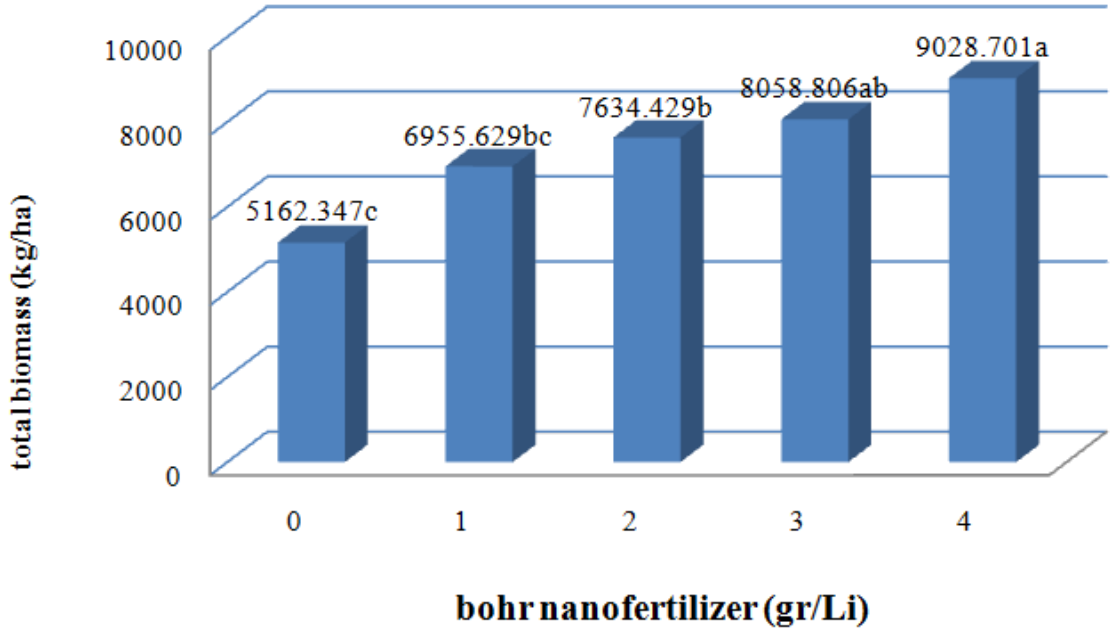

Figure 18: The effect of Bohr nanofertilizer on total biomass peanut

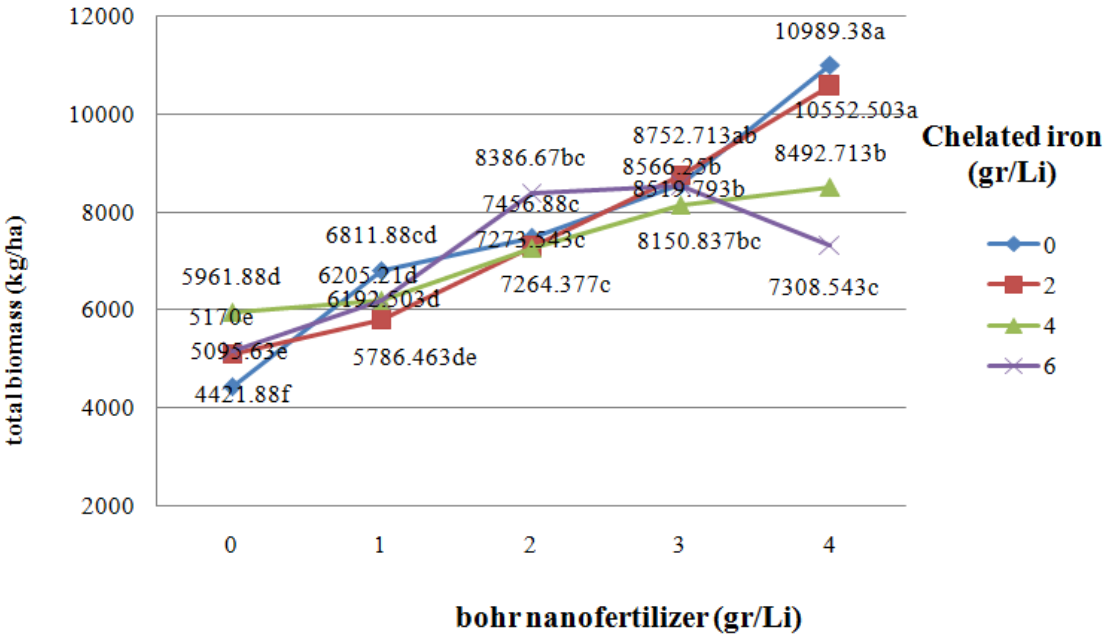

Figure 19: The effect Interaction of Chelated iron and Bohr nano fertilizer on total biomass peanut

Harvestation Index

Results of variance analysis in table 2 indicated that the effect of Bohr nano fertilizer and their interaction on the harvestation index was in 5% and 1% probability levels, respectively. The highest mean of harvestation index was achieved in 3 g/l Bohr nano fertilizer (70.877%) and the lowest mean was

achieved in the control treatment of Bohr nano fertilizer (58.94%) (figure 20). In interaction also, the highest mean of harvestation index was achieved in the treatment of 4 g/l iron fertilizer and 2 g/l Bohr nano fertilizer with mean of 79.023 % (figure 21). While the simple effect of Chelated iron on the harvestation index of peanut was not significant (table 2).

Rahimy and Mazahery (2004) on their study concluded that iron fertilizer had not significant effect on the harvestation index.

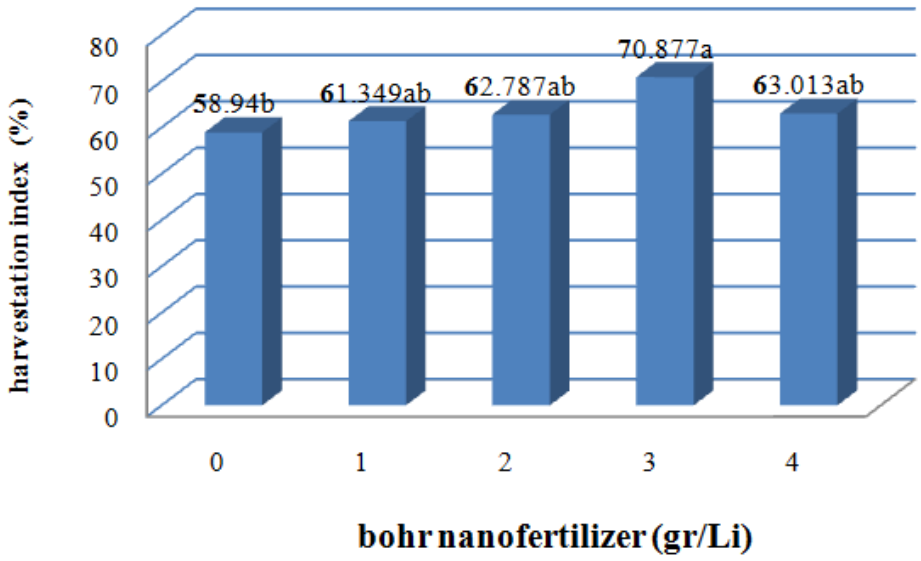

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Figure 20: The effect of Bohr nanofertilizer on harvestation index peanut

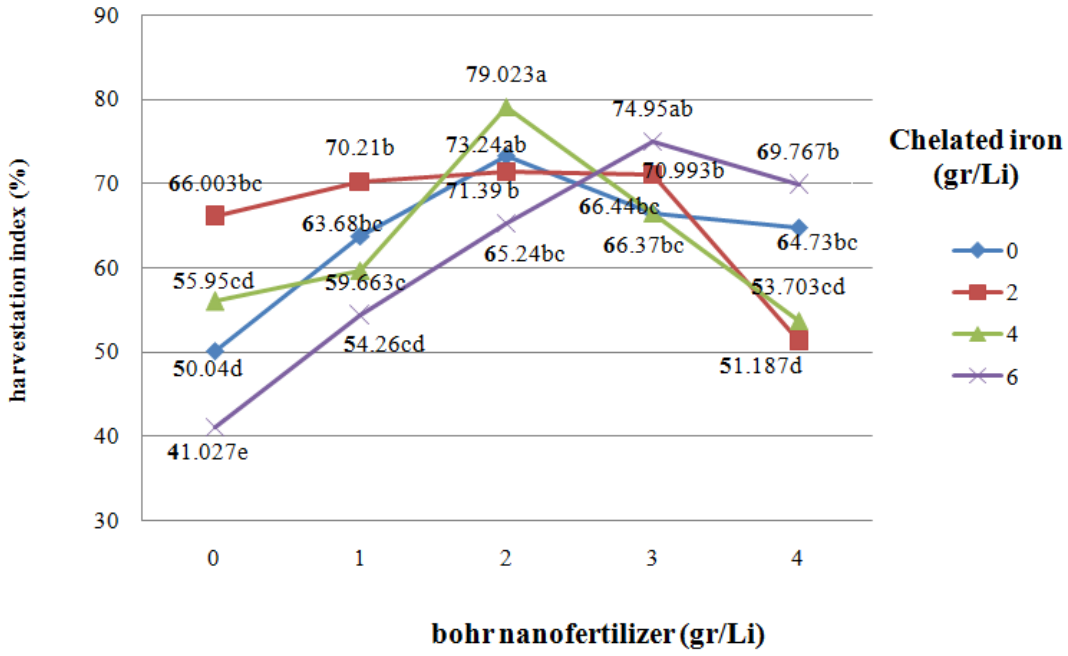

Figure 21: The effect Interaction of Chelated iron and Bohr nano fertilizer on harvestation index peanut

The Weight of 100 Seeds

Results of variance analysis in table 2 indicated that the effect of Chelated iron fertilizer, bohr nano fertilizer and their interaction on the weight of 100 seeds of peanut were significant in 5%, 1% and 5% probability levels, respectively. The highest weight of 100 seeds per bush was achieved by applying 2 g/l Chelated iron (104.687 g) and the lowest mean was achieved in the control treatment of Chelated iron (87.176 g) (figure 22). Also, the highest mean of 100 seeds weight was achieved by applying 2 g/l bohr nano fertilizer (120.463 g) and the lowest mean was achieved in the control treatment of bohr nano fertilizer (73.345 g) (figure 23). In the interaction also, the highest mean weight of 100 seeds was achieved in treatment of 2 g/l Chelated iron and 3 g/l Bohr nano fertilizer with mean of 139.587 g (figure 24). Morady zadeh zavareh *et al.*, (2012), Mazahery nia *et al.*, (2010) and Rahimy and Mazahery (2004) on their studies concluded that iron fertilizer has significant effect on the weight of 1000 seeds in 5% probability level. Azizy *et al.*, (2011) on their study concluded that Bohr fertilizer didn't have significant effect on the weight of 1000 seeds.

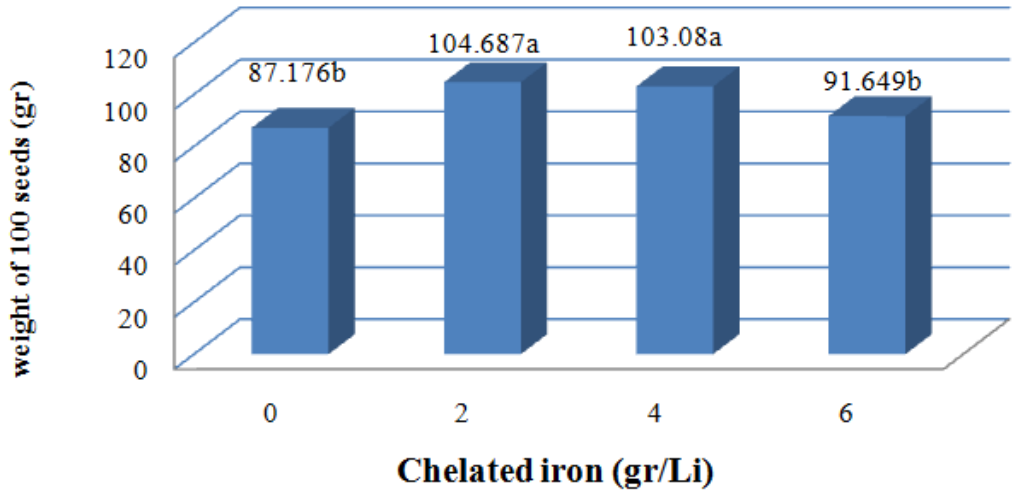

Figure 22: The effect of Chelated iron on weight of 100 seeds peanut

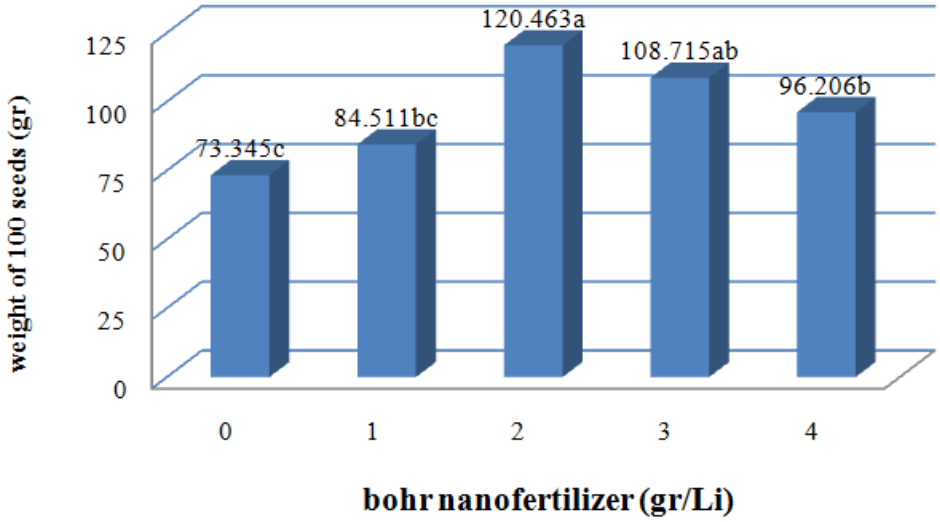

Figure 23: The effect of Bohr nanofertilizer on weight of 100 seeds peanut

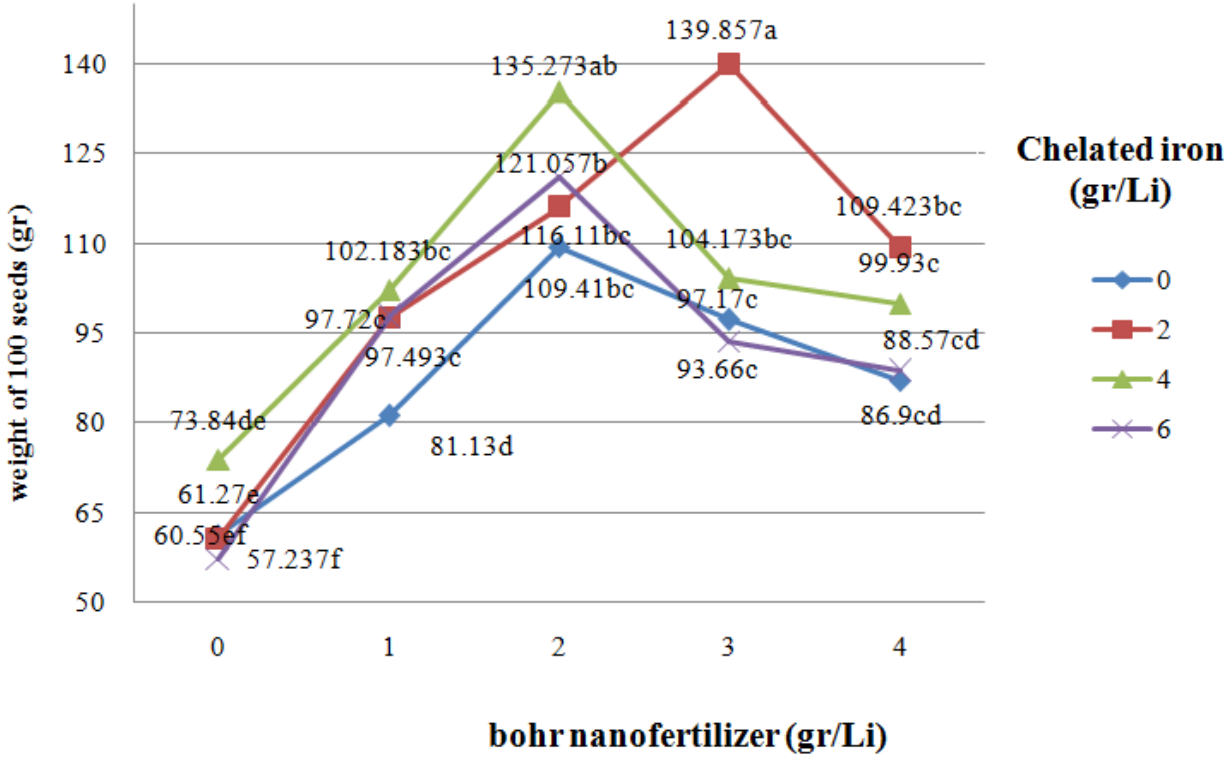

Figure 24: The effect Interaction of Chelated iron and Bohr nano fertilizer on weight of 100 seeds peanut

Table 2: Results of analysis of Chelated iron and Bohr nano fertilizer on yield and Components of peanuts

Source changes	df	Mean square				
		Number of mature pods per bush	Number of seeds per bush	Total biomass	Harvest ation index	Weight of 100 seeds
Block (B)	2	23.662^{ns}	1.502^{ns}	1127257.116^{ns}	63.004^{ns}	140.066^{ns}
Chelated iron (Fe)	2	5.710^{ns}	91.326^{ns}	905962.703**	61.630^{ns}	1103.515*
Bohr nano fertilizer (B)	3	119.553**	745.541**	25023231.616**	241.567*	4209.837**
Interaction	6	43.334**	299.186**	5701927.037**	351.082**	770.306*
Error	22	14.919	54.121	2107786.826	90.785	323.708
CV (%)		17.98	19.60	19.70	15.03	9.73

*ns, **, *: the difference is meaningless, statistically significant at 1% and 5%*

Conclusion

In general, results of this study indicated that Chelated iron fertilizer had a significant effect on the yield of dry seed, yield of pod, total biomass and the weight of 100 seeds, bohr nano fertilizer also had a significant effect on the yield of wet seed, yield of dry seed, the number of deeds per bush, the number of immature pods, the number of mature pods, the number of pods per bush, yield of the pod, total biomass,

harvestation index and the weight of 100 seed, variance analysis of interaction of Chelated iron fertilizer and bohr nano fertilizer indicated their effect on the yield of dry seed, yield of wet seed, yield of pod, the number of seeds per bush, the number of pods per bush, the number of immature pods per bush, total biomass, harvestation index and the weight of 100 seeds, in general, the results of comparison of mean interaction indicated that the greatest mean number of pods per bush was achieved control treatment of Chelated iron and 4 g/l bohr nano fertilizer with mean of 39.9 pods / bush. The highest mean number of immature pods per bush was achieved by treatment of 4 g/l iron fertilizer and 4 g/l bohr nano fertilizer with mean weight of 100 seeds was achieved using the treatment of 2 g/l Chelated iron and 3 g/l bohr nano fertilizer with mean of 139.857 g. the highest mean number of seeds per bush was achieved by treatment of 2 g/l iron fertilizer and 3 g/l bohr nano fertilizer with mean of 55.067 seeds per bush, the highest mean yield of the pod was achieved in the control treatment of Chelated iron and 4 g/l bohr nano fertilizer with mean of 7113.13 kg/ha the highest mean of wet seed yield was achieved by control treatment of iron fertilizer and 4 g/l bohr nano fertilizer with mean of 3886.25 kg/ha. The highest mean yield of dry seed was achieved in treatment of 6 g/l Chelated iron and 2 g/l Bohr nano fertilizer with mean of 2368.13 kg/h1. The highest mean total biomass was achieved using control treatment of Chelated iron and 4 g/l bohr nano fertilizer with mean of 10989.38 kg/h1 and the highest mean of harvestation index was achieved in treatment of 4 g/l iron fertilizer and 2 g/l bohr nano fertilizer with mean of 79.023%.

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