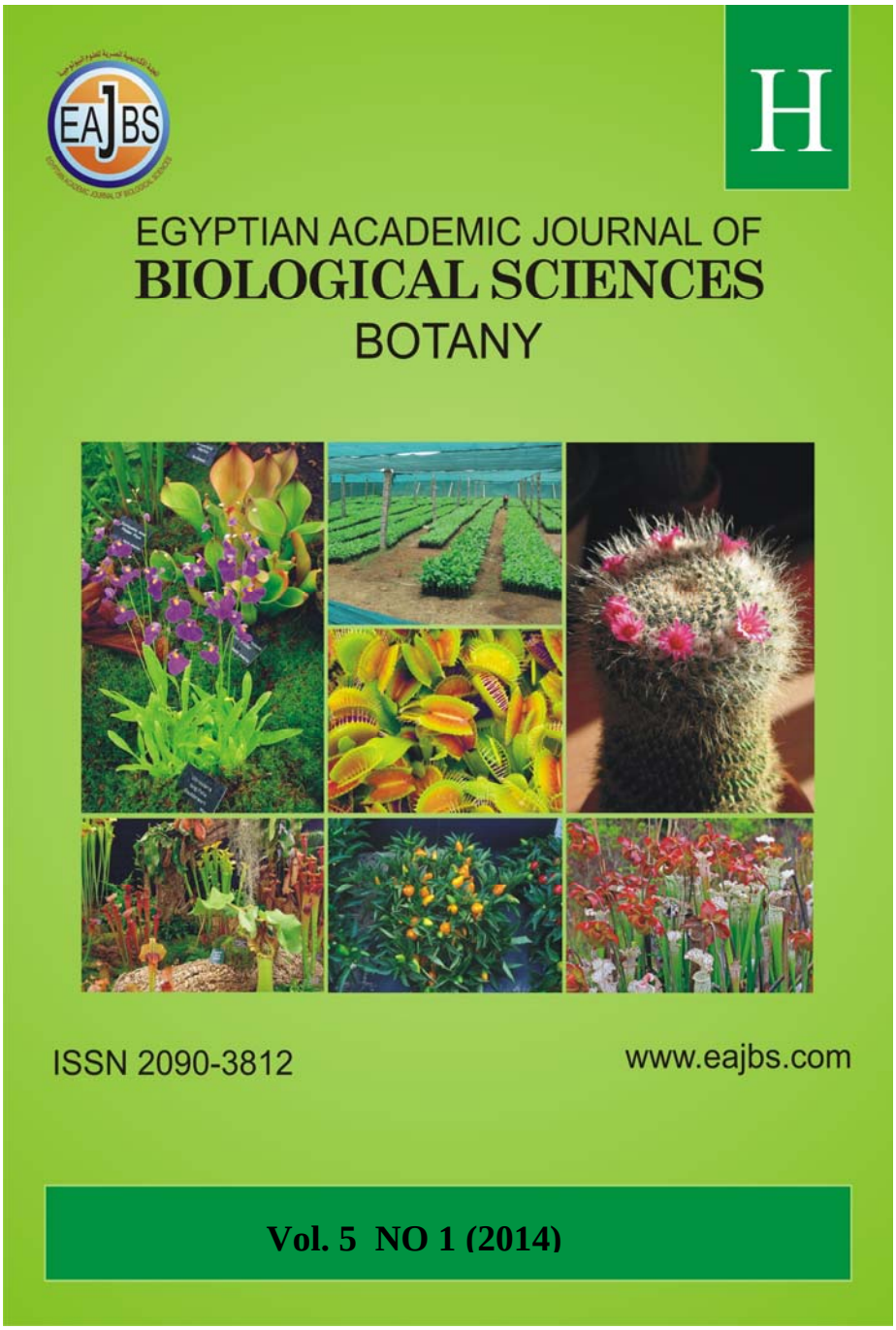

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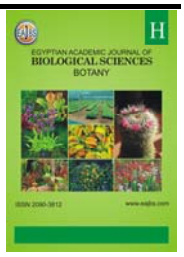

Study the Effect of Foliar Application of Nano chelate Molybdenum Fertilizer on the Yield and Yield Components of Peanut

Mehrangiz Jabbari Manjili[1*], Sirous Bidarigh[2], Ebrahim Amiri[3]
1- Islamic Azad University, Lahijan Branch
2- Department of Agriculture, Islamic Azad University, Lahijan Branch
3- Islamic Azad University, Lahijan Branch
Mehrangiz.jabbari@gmail.com

ABSTRACT

In order to study the effect of foliar application of nano chelate molybdenum fertilizer on the yield and yield components of peanut, Factorial experiment was conducted in the form of randomized complete block design with 3 replications with the amount of nitrogen fertilizer in three levels (60, 30, 0 kg per ha) and nano chelate molybdenum fertilizer as foliar application containing four levels (3, 2, 1, 0 grams per liter) in Astaneh Ashrafieh city located in the East Gilan province in the crop year of 2012. The results of analysis of variance showed that nano chelate molybdenum has a significant effect on the traits such as plant height, number of pods per plant, number of ripe pods per plant, hundred seed weight, seed number per plant, seed length and seed and pods yield and the number of lateral branches and the biological performance. Also the results of average comparison of nano chelate molybdenum fertilizer different values showed that pods and seed highest yield is obtained 2320 and 3715 kg per hectare in manure treatment of 3 g of molybdenum per liter.

Keywords: peanut, nano chelate molybdenum, yield, yield components

INTRODUCTION

Environmental pollution is one of the most serious problems facing the world today which has many reasons and origin. One of the main causes of environmental pollution, especially water and soil, is the overuse of agricultural pesticides and chemical fertilizers with common method and formulations. Nanotechnology is one of the most dynamic and advanced available science which has a high, efficient and abundant capacities for use in various disciplines including agricultural (T, josepH and marrison, 2006). Peanut is one of the most important and economical oilseeds in tropical and subtropical regions and is mostly cultivated owing to its oil, protein and carbohydrate (Panhwar, 2005). This shrub plant is perennial, from Leguminose family and Arachis genus and has a main and direct root (Panjtandoust, 2008). China, India, the USA, Nigeria, Indonesia, Burma and Senegal are the leading manufacturers of this

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product. Peanut cultivation in Iran is done in Golestan, Khuzestan and Guilan provinces. In Guilan province, it is mainly cultivated in Astaneh-ye Ashrafieh county along Sepidroud river (Noorhosseini & Haghdoost, 2010). Molybdenum is a metal cofactor (Isavand and Ashouri, 1380). Molybdenum is essential for nitrogen fixation in plants of Leguminous family and hence its deficiency leads to symptoms of nitrogen deficiency in this specie of plants (Mahmoudi and Hakimian, 1385).

MATERIALS AND METHODS

To investigate effect of foliar application of nano chelate molybdenum fertilizer on the yield and yield components of peanut, an experiment was done in Astaneh-ye Ashrafieh county located in north of Iran with latitude of 37° and 15', longitude of 49° and 55' and average height of 7 m above sea level in crop year 2012. Meteorological data of the studied period were obtained from Meteorological Station of Astaneh-ye Ashrafieh county. This region is among temperate and humid regions and its land soil texture is silty sand with pH of 7.6. Information related to soil characteristics and meteorological data of the studied location is presented at Tables (1) and (2). This research was implemented as a factorial experiment in a randomized complete block design with three replicates in the cultivated land. First, on 5 May 2012, the cultivated land was plowed and then cultivating peanut seed (Gilbadam local cultivar, NC_2) was manually started in rows with depth of 3-4 cm. Before the cultivation, seeds were disinfected in carboxin thiram fungicide in ratio of 2 to 1000 (Craufurrd et al., 2002). Amounts of nitrogen fertilizer (from urea fertilizer source) contained no (N_1), 30 (N_2) and 60 (N_3) kg/ha nitrogen and molybdenum (from nonaochelated molybdenum source) was in foliar application including 0 (mo_1), 1 (mo_2), 2 (mo_3) and 3 (mo_4) g/lit for each unit. Half of the nitrogen fertilizer was given as the base and the remaining was provided in three equal parts 20, 30 and 40 days after the cultivation (Geetha & Varughese, 2001). Half of nanochelated molybdenum fertilizer was given at the time of branching and the rest was consumed during flowering. Protection operations which were carried out in the field included of weeding for controlling weeds and adding soil to the root surrounding. Harvesting time was on 20 September 2010. To estimate seed and pod yields, after removing two rows of plants from both sides, the ripe pods were first removed from the shrubs in the harvesting part of each unit. Then, they were placed in open air for moisture reduction for one week. The pods were then dried in an oven for 48 h until reaching constant dry weight. After taking the pods out of the oven, their dry weight was recorded using a digital scale with accuracy of 0.01. Afterward, yield value of the pod was calculated in kg/ha. The number of ripe pods per shrub was calculated by dividing total number of ripe pods by the number of plants located in each unit. After determining the number of ripe pods per unit, the pods were kept in an oven at 60 to 65 ° C for 48 h until reaching constant dry weight. After this period, ripe pods of each unit were weighed using a scale with accuracy of 0.01. Then, weight of a ripe pod was obtained by dividing weight of ripe pods in each harvested area by the number of ripe pods. To determine 100-seed weight, first, the seeds available per 200 g of ripe pods in each unit were taken out of the pods and then maintained in an over at 60° C for 48 h. Afterwards, from among the seeds out of the oven, 100 seeds were randomly selected and weighed by a digital scale in g. Moreover, at the end of the crop season, traits of plant height, grain length and width were measured. In Analysis of Variance of the data and comparing averages (LSD test at 5% level), MSTATC software was used. Microsoft EXCEL was also used for drawing the diagrams.

Table 1: Some chemical and physical characteristics of cultivated soil of the experimental location

Soil acidity	Absorbable potassium (mg per kg)	Soil phosphorus (mg per kg)	Total nitrogen (%)	Electrical conductivity (Deci siemens/ m)	Silt **(%)**	Sand **(%)**	Clay **(%)**
7.62	209.68	2.24	0.1	0.491	54	23	23

Table 2: Information related to meteorological data

Month	Rainfall (mm)	Maximum Temperature (C)	Minimum temperature (C)	Maximum humidity (%)	Minimum humidity (%)	Sunny hours (h)	Evaporation (mm)	Wind speed (m/s)
May	6.3	25.3	14.5	94	59	190.6	123.8	8
June	109.2	29.1	17.9	90	54	252.8	172.8	8
July	203.8	28.1	20.2	93	66	164.3	131.8	8
August	38	32.7	21.6	91	54	256.3	166.7	6
September	156.3	26.6	19.5	95	70	115.4	88.8	6

RESULTS AND DISCUSSION

The results from analysis of variance for the trait number of seeds per plant showed that there are significant differences at 1% probability level between the different levels of nitrogen fertilizer as well as between different amounts of nano chelate molybdenum fertilizer and their interaction at 1% probability level (Table 3). The results of average comparison of nano chelate molybdenum fertilizer different values at a rate of 3 g per liter caused the number of seeds per plant to be 58.62. Also between the two manure treatment of M3, M4, no significant differences were observed but in the treatment without nano chelate molybdenum fertilizer, the number of seeds per plant is 46.18 (Table 4). Increased molybdenum increases the height, the number of branches and pods per plant and the number of seeds per plant and seed yield in lentil (tigayat et al, 2008). The results from analysis of variance for the trait of number of lateral stem showed that there is a significant difference between various levels of nitrogen fertilizer and various amounts of nano chelate molybdenum at 1% probability level, as well as their interactions at 1% probability level (Table 3). The results of average comparison of nano chelate molybdenum fertilizer different values at a rate of 3 g per liter caused the number of seeds per plant to be 80.44. Also between the two manure treatment of M3, M4, no significant differences were observed but in the treatment without nano chelate molybdenum fertilizer, the number of seeds per plant is 67.78 (Table 4). One kilogram of Molybdenum per ha significantly increases root and shoots and dry matter content and treatment yield (Bhuiyan, *et al*, 2008). The results of average comparison of nano chelate molybdenum fertilizer different values for the trait of seed yield showed that the use of nano chelate molybdenum fertilizer at the rate of 3 g of molybdenum per liter caused the seed yield to be 80.44 kg per ha. and also between the two manure treatment of M3, M4, no significant differences were observed. But in the treatment without nano chelate molybdenum fertilizer, the seeds yield is 1607 kg per ha (Table 4) (Quaggio *et al*, 2004). Leaves analysis showed that the availability of soil molybdenum and lime increases the leaves of Peanut. Molybdenum fertilizer lead to increased nitrogen of leaves and increased yield of peanut in the treatment with a low dose of lime.

Table 3: Analysis of variance of the effect of nano chelate molybdenum fertilizer foliar application

Sources of changes	Degree of freedom	Mean squares				
		Number of seeds per plant	Number of pods per plant	Number of ripe pods per plant	Number of lateral branches	Biological yield
Iteration	2	3.408	2.300	0.823	0.288	96436.000
Nitrogen fertilizer	2	1672.668	410.345	417.610	4.721	10083325
Molybdenum Fertilizer	3	346.626	188.813	91.344	3.723	7649979.667
Nitrogen × molybdenum	6	163.791	49.095	40.896	1.118	1671995.667
Error	22	30.186	10.385	7.546	0.273	255909.455
Coefficient of Variation (%)		10.24	8.16	10.24	7.03	7.40

Table 4: Comparison of the simple average of the measured parameters in the conditions of foliar application of nano chelate molybdenum

Treatments	Number of seeds per plant	Number of pods per plant	Number of ripe pods per plant	Number of lateral branches	Biological yield
Lack of the use of molybdenum fertilizer	46.18 B	34.16 B	23.09 B	6.778 B	5672 C
1 g of molybdenum per liter	50.58 B	37.29 B	25.29 B	7.22 B	6537 B
2 g of molybdenum per liter	59.27 A	42.67 A	29.64 A	7.933 A	7431 A
3 g of molybdenum per liter	58.62 A	43.91 A	29.31 A	8.440 A	7703 A

CONCLUSIONS

In general, the present research results implying that nano chelate molybdenum fertilizer had affect on all traits. Therefore, the manure treatment of 3 grams molybdenum per liter can be proposed as the proper management of fertilizer for peanuts plant in the area conditions. Since molybdenum increases absorption of nitrogen, and will increase the performance, thus optimal use and easy access to micro nutrients increases the elements concentration in plants and thereby enriching agricultural crops to feed humans.

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