EFFECTS OF IRON APPLICATION TO SOIL ON GROWTH AND YIELD OF BROAD BEAN PLANT IN ERBIL CITY OF NORTH IRAQ

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ABSTRACT

The study was carried out in some glass house in Erbil city north of Iraq, during winter to spring season in 2014 to study the effect of iron on growth and yield of broad bean plant (*Vicia faba* Flip). Mature seeds of faba bean are good sources of protein (about 25% in dried seeds), starch, cellulose, vitamin C and minerals. It is considered as one of the main sources of cheap protein and energy in some countries around the world, where most people cannot afford meat sources of protein. View the above discussion, the objectives of the study was to examine the effect of chelated iron on the growth and yield of broad bean plant and create a comprehensive baseline data for bean plant in Erbil city north of Iraq.

KEY WORDS

Iron, faba bean, Erbil, North Iraq.

Faba bean, is one of the most domesticated foods belonging to the legume family, has been developed for any rate 5000 years and has since spread throughout Asia, Europe and Africa. It spread to China over 2,000 years ago to South America in the Columbian period and more recently to Canada and Australia. The exact geographical origin of *V. faba* is still debated, although the high rainfall regions of Asia and Mediterranean region have proposed as possible origin (Zohary and Hopf, 1973). Mature seeds of faba bean are good sources of protein (about 25% in dried seeds), starch, cellulose, vitamin C and minerals. It is considered as one of the main sources of cheap protein and energy in some countries around the world, where most people cannot afford meat sources of protein (Tharanathan and Mahadevamma 2003).

Micronutrients play a vital role in plant growth and development and play an important role because of their essential role in increasing yields. In fact, their essential role in plant nutrition and increased soil productivity increases their importance (Tripathi et al 2015).

Figure 1 – Location of studied area (Iraq map) [Hussein, 2019]

Iron deficiency (Fe) is a common disorder that affects plants in many parts of the world and is primarily associated with high pH limestone soils. Fe deficiency in plants is economically important because crop quality and yields can be seriously compromised and the use of costly corrective methods is often necessary. Despite the ubiquitous presence of iron in the earth's crust, the low solubility of Fe compounds in many soils prevents iron absorption by plants and induces the development of Fe deficiency symptoms (Fageria et al 2008). View the above discussion, the objectives of the study was to examine the effect of chelated iron on the growth and yield of broad bean plant and create a comprehensive baseline data for bean plant in Erbil city north of Iraq.

The study was conducted in Erbil city north Iraq. The governorate of Erbil is located in the northern Kurdistan region of Iraq (Fig. 1), an area with a semi-arid continental climate. The summer season (June-September) is hot and dry, while the winters are colder and wet. Rainfall is limited to the period between October and November, averaging 543 mm annually. The governorate is bordered by the converging Tigris and Little Zab rivers in the south, while the Zagros Mountain range forms the northeastern part of the area (Bapper 2004).

MATERIALS AND METHODS OF RESEARCH

This study was carried out in some glass house in Erbil city north of Iraq, during winter season to spring season in 2014 to study the effect of iron on growth, and yield of broad bean plant (*Vicia faba* Flip). The plastic pots with a diameter of 24 cm and 21 cm in depth were used in the experiment. Each pot was filled with 7 kg of dried sandy loam soil. In each pot 3 seeds were sown, NP fertilizer was added before sowing as Di-ammonium phosphate (DAP) which contain 18% N and 46% P at the level of 50 ppm and 30 ppm K as potassium chloride 52.34% K. on the other hand, Fe 5, 10, and 20 ppm concentration was prepared from Fe-EDTA (13.2 gm% Fe). Soil application was carried out twice after 30 and 40 days from (Grimme and Huttli, 1991).

Figure 2 – Bean plant during the study

Plant height, number of branches/plant, number of leaves/plant, shoot dry weight, wet shoot weight, leaf area, root dry weight, numbers of flowers/plant, pod weight, number of pod, number of seeds/pod and weight of 100 seeds were recorded at the end of the experiment.

RESULTS OF STUDY

The result shows that (table 1) the effect of soil application of iron on vegetative growth of broad bean plant. Overall, it can be seen that the vegetative growth regarding the height of plant between 57^a – 66.33^b and number of branches and leafs on the other hand leave

numbers ,wet Shoot weight (gm), Shoot dry weight (gm) and root dry weight (gm). In (table 2) shows that the effect of soil application of iron on yield of broad bean plant number of flowers including pod weight (gm), number of pod, number of seed/ pod, Weight of 100 seeds (gm) by regarding some treatment.

Table 1 – Effect of soil application of iron on vegetative growth of broad bean plant

Vegetative growth	Treatments (iron-ppm)			
	Control	5	10	20
Plant height (cm)	57.00 ^a	61.00 ^b	62.83 ^b	66.33 ^b
Number of branches	1.66 ^a	2.00 ^a	2.33 ^a	2.00 ^a
Number of leaves	16.33 ^a	18.00 ^{ab}	18.00 ^{ab}	19.00 ^{bc}
Leaf area (cm ²)	40.66 ^a	45.00 ^b	45.00 ^b	45.33 ^b
Wet Shoot weight (gm)	54.33 ^a	60.00 ^b	60.00 ^b	64.00 ^b
Shoot dry weight (gm)	15.50 ^a	15.66 ^{ab}	17.66 ^b	17.66 ^b
Root dry weight (gm)	4.55 ^a	4.53 ^a	5.70 ^b	5.75 ^b

Table 2 – Effect of soil application of iron on yield of broad bean plant

Yield	Treatments (iron-ppm)	Treatments (iron-ppm)	Treatments (iron-ppm)	Treatments (iron-ppm)
	control	5	10	20
Number of flowers	13.00 ^a	14.00 ^b	13.00 ^a	14.00 ^{ab}
Pod weight (gm)	1.08 ^a	1.69 ^{ab}	1.81 ^{ab}	1.85 ^b
Number of pod	5.66 ^a	5.33 ^{ab}	6.33 ^{ab}	7.00 ^b
Number of seed/ pod	2.52 ^a	2.50 ^b	2.23 ^{ab}	2.73 ^b
Weight of 100 seeds (gm)	37.50 ^a	40.00 ^b	37.00 ^{ab}	43.33 ^b

CONCLUSION

Generally, add some new data in Erbil city about bean plant and effect of vegetative growth. Maintenance of distribution system and methods must be planned, implemented and operation- protection of the treatments must be undertaken (Hussein, 2019).

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