



Role of Organic Fertilizer on Quality and Nutrient Content of Three Green Onion Cultivars

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Keywords

Onion, Cultivars,
Magic Leon,
Organic fertilizer
Bio 20.

Abstract

This paper has been conducted at the researches station, college of agriculture, Kirkuk University, during the winter growing season 2019/2020 to investigate the effect of organic fertilizers "Magic Leon" at two levels 0, 300 kg/ha, as soil application which is added to the soil two weeks before planting. Also, spraying three times of Bio20 at a concentration of 2 ml/l, in 15-day intervals after one month of planting until a drip of 2-3 drops/litter of tween-80 was added to the solution as a surfactant agent, on quality and nutrients content of three local cultivars, Which were planted in 1/November/2019 by using onion sets of cultivars namely, Red and White (Iraqi cultivars) and White Syrian cultivar. The data that were recorded have been the percentage of nitrogen, phosphorous, potassium, sulphurs, carbohydrate, and protein in the bulbs; also, the percentage of bulbs doubling—factorial experiment 2x2x3 in RCBD design with three replicates. The results show that 'Magic Leon' gave a significant increase in carbohydrate percentage 5.83%, while Iraqi cv. significantly affected bulb doubling 28.33%. The white Syrian cv gave a significant value in carbohydrate content which reached 5.93%.

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1. Introduction

Onion *Allium cepa* L. belongs to the Alliaceae family; it is a major world food crop consumed in most countries (Welbaum, 2015). It is one of the most important spices and vegetable crops; it is known as the queen of the kitchen, it is used as a fresh and dry crop. Onion has a fair amount of vitamin B and folic acid. It is very rich in carbohydrates, thiamin, riboflavin, ascorbic acid, and vitamin A, besides nutrient elements, K, Ca, P and Fe. Onion is a source of amino acids and anthocyanins and has a high medical value (Sing and Kumar, 2016). AL-Obedee (2012) in her study in Iraq was found that the nutrient content of green onion was influenced by the organic fertilizer in Texas Early Grano cultivar. In Iraq Khalel (2013) was found that the organic fertilizer gave a positive effect on green onion of the Iraqi cultivar (white local). Also in Iraq Alhandany *et al.*,(2018) were found that the organic fertilizer caused a positive effect on the Iraqi cultivar onion (Red

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local) . Mohammed and Ibraheem (2020) in their study in Iraq were found that the organic fertilizer significant influenced on the green onion of the Iraqi red and white local cultivars. Fresh onion production faces constraints or obstacles, which results in the reduction of cultivated area and reduction of the production for each unit area (Raheem 2020, Cosit, 2011, 2008) due to the genetic shifting of local cultivars and implementation of traditional farming. Nowadays, the world is moving towards organic farming, which is one of the technologies for overcoming constraints, increasing productivity, and improving quality. As we know, organic farming aims to maintain human health and protect the environment (Holcha *et al.*, 2004). Our study has the aim of investigating the effects of the organic fertilizers 'Magic Leon' and Bio 20 on three local cultivars on green onion under Kirkuk region conditions.

2. Materials and Methods

This study has been performed in the research center college of Agriculture, Kirkuk University, during winter season 2019/2020. Also, three local cultivars, namely, Red, White (Iraqi), and White (Syrian) which were planted in 1/November /2019 by using onion sets of the cultivars namely, Granular organic fertilizer 'Magic Leon' was added at two levels, 0 and 300 kg/ha as a soil application, two weeks before planting (Turkish company by Zhrat Kirkuk Co.) . Plants were sprayed three times with two concentrations of 'Bio 20, 0, 2 ml/l. Bio20 fertilizer contains 20% total nitrogen , 20% P₂O₅ . 20 K₂O , 1.5 %MgO , 1.4% Fe , 0.073 Cu, 0.073 Mn , 0.029 B and 28% seaweed. After one month of planting(Omex Company .limited U.K), until drip off, 2-3 drops /liter of tween-80 was added to the solution as a surfactant agent, the first one 1/12/2019 , the second 15/12/2019 and the third at 1/1/2020 Soil analysis results S follow . 20 mg /kgN , 7.5 mg .Kg ,80 mg.Kg K₂O , 20% clay , 35% silt , 45% sand , 1.3 % O.M , 7.85 pH, 1.2 Ds.m⁻¹.Nutrient content , carbohydrate , protein , sulphar which were determinted as follow : Nitrogen (Black , 1965) , phosphorous (Olsen and Sommers , 1982) , potassium (Richards , 1954 , sulphar (Raheem, 2020) , protein (A.O.A.C.1980) , carbohydrate (Raheem , 2020). Drip irrigation had been used in this study ,the green yield had been harvested in 1/3/2020 . Data that have been recorded were the percentage of nitrogen, phosphorous, potassium, sulphur, carbohydrate, and protein in the bulbs, also the percentage of bulb doubling. Factorial experimentation has been conducted in randomized complete blocks design that has 3 replicates. The data has been statistically analyzed based on (SAS 2004) program. Results have been compared depending on Duncan's multiple range test at a 0.05 probability.

3. Results and Discussion

Table1. Showed that 'Magic Leon' fertilizer had no significant effects on the concentrations of nitrogen, phosphorous, potassium, and sulphur. Table 1 indicated that plants that were sprayed with 'Bio 20' did not differ significantly in the nutrient content. As table 1 showed, the cultivars differed in the nutrient concentrations. These un significant results may be due to the low concentration and the number of application which is used of the organic fertilizers. Red Iraqi cv gave the highest value in nitrogen concentration, 1.04%, while white Syrian cv gave the highest value in phosphorous and potassium concentrations 0.35%, 2.011%, respectively. Red and white Iraqi cultivars were superior to the white

Syrian cv. in sulphur concentration, which reached 0.89%. That is may be due to the adaptation of the two local Iraqi cultivars to the environmental conditions.

Table 2 indicated that the organic fertilizer 'Magic leon' caused a significant increase in bulb doubling and carbohydrate percentage, which reached 22.84%, 5.83%, respectively, while Bio 20 caused no effects in these traits. Cultivars differed significantly in bulb doubling and carbohydrate percentage. The difference between the cultivars may be due to the genetic factors and their interaction with the environmental condition (Esho *et al.*, 2019).

Table 1. Effects of organic fertilizers on nutrient content in three onion cultivars.

Treat	N%	P%	K%	S%
Magic leon (kg/ha.				
0	1.04 a	0.34a	2.06a	0.96a
300	1.01a	0.34a	1.89a	0.88a
Bio 20 (ml/l.				
0	1.05a	0.32a	2.01a	0.91a
2	0.99a	0.32a	1.93a	0.92a
Cultivars				
White Iraqi	1.01a	0.31a	1.94a	0.98a
Red Iraqi	1.04a	0.33a	1.88a	0.98a
White Syrian	1.02a	0.35a	2.11a	0.79a

*Means with identical letters did not have any considerable differences based on Duncan's multiple range test at a 0.05 probability.

White Iraqi cv. was superior to the other cultivars in bulb doubling value, which reached 28.33%, while white Syrian cv gave the highest value in carbohydrate content, which reached 5.93%. The results have shown that there has been no significant difference amongst the three cultivars in protein content. Results were in agreement with (Mohammed and Ibraheem, 2020), who have found that the organic fertilizers positively affect the same local Iraqi cultivars. Hanin (2019) and Esho *et al.* (2019) have found positive effects in some local Iraqi cultivars under the same condition of our research.

Table 2. Effects of the organic fertilizer on quality of the three onion cultivars.

Treat	Doubling(%)	Carbohydrate (%)	Protein (%)
Magic leon (kg/ha.			
0	20.83b	5.21b	6.51a
300	22.84a	5.83a	6.32a
Bio 20 (ml/l.			
0	22.29a	5.76a	6.58a
2	21.38a	5.28b	6.25a
Cultivars			
White Iraqi	28.33a	5.55b	6.34a
Red Iraqi	16.25c	5.09c	6.54a
White Syrian	20.93b	5.93a	6.38a

*Means with identical letters did not have any considerable differences based on Duncan's multiple range test at a 0.05 probability.

Regarding the organic fertilizers 'Magic Leon ' it includes humic and fulvic acid as well as organic matter, in turn improving the growth, increasing the capability of the plant in resisting the stress as well as the levels of the organic hormone in the

plant (Piccola *et al.*, 1992). In addition to that, the humic acid processes the nutrient elements that are more available due to the increase in absorption of some of the elements from the soil like the Mg, P, Ca, and K (Evans & Hartwigson, 2000). Regarding Bio 20, it contains N, P₂O₅, Mg, O, Fe, Zn, Cu, Mn, and B in addition to seaweed extract, these nutrient elements are necessary for plant nutrition which improves growth and development, in addition to the role of seaweed extract on plant growth and development. According to the results mentioned above, these organic fertilizers should affect the nutrients content and the percentage of carbohydrates and protein as well as their effects on bulb doubling. The carbohydrates and proteins were considered important quality traits in the onions. Bulb doubling has also been considered an important trait in this crop, resulting from the presence of multiple growing points in a single bulb, which is varietal characteristics (Singh and Kumar, 2016). Methyl and propyl disulfides and thiopropanyl sulfoxide, in particular, are responsible for pungency (Rabinowitch and Currah, 2002). Sulphur is a part of these compound molecules that cause pungency. In our study, the sulphur content differs in the cultivars studied. Red and white Iraqi cultivars gave the highest value in sulphur content than white Syrian (table 2).

4. Conclusions

The conclusions that have been derived from this study include the fact that the organic fertilizers had slight effects upon the studied traits. There are clear differences between the cultivars that have been studied. The recommendations are to use high levels of 'Magic Leon ' and Bio 20; also, the study was recommended to cultivate the white and red Iraqi cultivars.

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