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نمو ومحصول البصل وصفات الجودة وتأثيرها بالتسميد النيتروجينى والري على فترات مختلفة

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الملخص العربي :

أجريت تجربة حقلية في قرية كفر الأكرم – مركز قويسنا – محافظة المنوفية خلال الموسمين الشتويين المتتالين لعامي ٢٠٠٧/٢٠٠٨ ، ٢٠٠٨/٢٠٠٩ لدراسة تأثير كل من الري على فترات مختلفة (١٤–٢١ –٢٨ يوم) وأربعة معدلات من التسميد النيتروجيني (صفر – ٦٠ –٩٠ –١٢٠ كيلو جرام نيتروجين / فدان) والتفاعل بينهما على صفات النمو الخضري (طول النبات – قطر العنق والبصلة – الوزن الجاف للبصلة بعد ١٠٠ يوم من الشتل) وكذلك محصول البصل (صنف جيزة ٢٠) وجودته ومحتواه من العناصر الغذائية الكبرى والصغرى .

وقد أوضحت النتائج المتحصل عليها أن :

- **أدى تقليل فترات الري (كل ١٤ يوم) إلى زيادة كبيرة في قياسات النمو الخضري وعلى العكس من ذلك فان زيادة فترات الرى نتج عنها انخفاض في نمو النبات**
- **أوضحت النتائج أن أعلى إنتاجية للمحصول وكذلك أفضل الصفات المحصولية (قطر البصلة ومتوسط وزن البصلة والوزن الجاف للبصلة ومحتوى البصلة من المواد الصلبة الذائبة والبروتين) وكذلك محتوى البصلة من المغذيات الكبرى (نيتروجين . فوسفور . بوتاسيوم) والمغذيات الصغرى (حديد – زنك – منجنيز – نحاس) قد تحقق مع ري النباتات كل ١٤ يوم في حين أن الري كل ٢٨ يوم سجل أقل القيم لجميع الصفات السابقة**
- **أدى إضافة المستوى الأعلى من التسميد النيتروجيني (١٢٠ كم نيتروجين / فدان) إلى زيادة معنوية في قياسات النمو الخضري ومحصول البصل وجودته ومحتواه من العناصر الغذائية مقارنة بالكنترول ومستويات الإضافة الأقل (٦٠ ،٩٠ كم نيتروجين / فدان) .**
- **أوضحت نتائج الدراسة التأثير الإيجابي لفترات الري والتسميد النيتروجيني على جميع القياسات تحت الدراسة وعلى ضوء النتائج السابقة يمكن القول بأن رى نباتات البصل كل ١٤ يوم مع إضافة ١٢٠ كم نتروجين لكل فدان يؤدى لزيادة محصول البصل وتحسين قياسات الجودة ومحتوى البصلة من العناصر الغذائية**

GROWTH, YIELD AND SOME YIELD QUALITY OF ONION (*Allium cepa* L.) AS AFFECTED BY DIFFERENT IRRIGATION INTERVALS AND NITROGEN FERTILIZERS

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ABSTRACT: ***A field experiment was conducted at Kafer El-Akram Village, Quessna region (30°-36˙ N 31° - 09˙ 16˝ E). Menufiya Governorate during the two successive winter seasons of 2007/ 2008 and 2008/ 2009 to study the effect of combination between three irrigation intervals (14, 21 and 28 days) and four nitrogen fertilizer rates (0, 60, 90 and 120 kg N/fed) on vegetative growth, bulb yield and its quality of onion plants. Total soluble solids, N, P, K, Fe, Zn, Mn and Cu in bulb were determined.***

- Irrigation of onion plants at short intervals (14 days) enhanced plant growth parameters (plant height, number of tubulars blades/ plant, diameters of neck and bulb and dry matter of nick and bulb). However, the pro-longing irrigation period decreased plant growth.

- The highest yield of onion bulbs and the best quality (bulb diameter, average bulb weight, bulb dry matter, TSS and protein content) were associated with the plant received irrigation water at 14 days intervals, however the lowest one was associated with plant received irrigation water at 28 days intervals.

- Nutrients content of the bulb tissues i.e. N, P, K Fe, Zn, Mn and Cu recorded the highest values when onions plants were irrigated at 14 days interval, whereas the longest interval of irrigation (28 days) induced the lowest values of above mentioned bulb contents. Application of 120 kg N/fed, significantly increased vegetative parameters of plant growth, total yield, TSS, protein content and mineral contents in bulb tissues compared to the lowert levels and control. The results exhibited that the interaction between irrigation intervals and nitrogen application particularly, had a significant effect on the studies parameters of plant growth, bulb yield and the quality of onion bulbs.

Kay words: ***Bulb yield, Irrigation intervals, Nitrogen fertilizers, Nutrients uptake, Onion plants.***

INTRODUCTION

In Egypt, onion (Allium cepa L.) is one of the most important vegetable crops. The total grown area of winter season 87.47 thousands/ fed.,

producted about 1147.6 thousands ton and by average 13.12 ton/fed (AERI 2006).

The total area of agricultural land in Egypt around 3.5 million hectar (nearly 8.3 million fed.). Whereas, the rapid increase in the population of Egypt together with a limited cutivated area results in an acute need for additional production of various crops. The low production of onion is due to improper utilization of fertilizers. The recommendation rates are 90-120 kg N, 30 kg P_2O_5 and 24 kg K_2O per feddan for the old soils. Increasing productivity of onion with good quality is an important target by the growers for local market and exportation. The productions of the best fields require that the soil must have favorable physical, chemical nutritional and biological conditions. Moreover, the successful fertilization strategy aims to supply the growing crop with its need of nutrients at suitable time, place and dose.

Irrigation and fertilization are two seriously important factors that may affect productivity and quality of onion. Moreover, most growing plants contain about 90% water, since, water is the medium for photosynthesis tranfer within the plant and is the solvent system of the cell. Water is one of the raw materials for photosynthesis required for the production of new compounds. Moisture stress is generally detrimental to plant growth reduction.

However, the growth rate may never return to the level it was before the stress. Generally, plant growth is associated with the available irrigation water, it means that, the irrigation before the available water reaches the critical limit gains the vigor plant growth and the highest crop yield. Onion plant is often considered to be a medium water use crop, this arises from the facts that onion is sensitive to water stress, has a relatively shallow root zone depth and is often grow in soils with low to medium water holding capacities. These conditions necessitate reliable irrigation system capable of light, frequent and uniform water application.

Onion plant growth and its bulbs yield as well as some physical and chemical properties are strongly affected by water regime (Kadam *et al.,* 2006, Sen *et al.,* 2006, Ali H. Aisha 2007, Samson and Tilahum, 2007 and Satyendra *et al.,* 2007).

Nitrogen is one of the major nutrients for various plants especially onion plant as sake of producing the economic yield. Its essential role may be attributed to one or all of these reasons (1) nitrogen is constituent of all proteins and nucleic acids and hence of all protoplasm, (Russell, 1973). (2) nitrogen enhances the meristematic acivities consequently, increasing the cell size that manifested in internode elongation (Osman *et al.,* 2000) (3) nitrogen increases the nutrients uptake, capacity of photosynthesis assimilation in building metabolits, its translocation and accumulation in the sink (Fathi *et al.,* 2003 and Nassar *et al.,* 2004). Rana and Sharma (1994) revealed that N application up to 120 kg ha^{-1} gave significant higher dry

matter bulb, 100 bulb weight, bulb diameter and bulb yield. Shaheen *et al,* (2010) found that, the vigor plant growth parameters, (Plant length, average number of leaves per plant, fresh and dry weight of whole onion plant and its different organs as well as the heaviest bulbs yield and its better physical and chemical properties, all of them were associated with addition the higher nitrogen rate (120 kg N/fed).

The aim of study is to investigate the effect of irrigation intervals and nitrogen fertilizer rates and their possible combinations on growth parameters of onion, bulb yield and its nutrients content.

MATERIALS AND METHODS

A field experiment was conducted at Kafer El-Akram Village, Quessna region, Menufiya Governorate during the two successive winter seasons of 2007/ 2008 and 2008/ 2009 to study the effect of the combination between three irrigation intervals and four levels of nitrogen fertilizer on vegetative growth, bulb yield and physical and chemical quality properties of onion plants. Some physical and chemical properties of the experimental soil were determined according to Black (1965) and Page *et al.,* (1982) and are presented in Table (1).

Seeds of onion (Allium cepa L., cv. Giza 20) were sown in the nursery on the 14^{th} and 21^{th} October for the first and second seasons, respectively. After 60 days, uniform transplants were planted at 10 cm apart on both sides of ridges. The experimental plot area was 10.5 m^2, which included 5 rows, with 3.5 m in length and 60 cm in width for each one.

Twelve treatments were applied in this experiment, i.e., three irrigation intervals : irrigation after 14, 21 and 28 days intervals and four levels of nitrogen fertilizer as ammonium sulphate (20.6% N) at rate of (0, 60, 90 and 120 kg N/fed) were applied. Treatments were arranged in split plot design with three replicates, where irrigation intervals were assigned as the main plots and nitrogen fertilizers were arranged as the sub plots. All plants were irrigated normally up to 45 days from planting, then the irrigation treatments were applied. Moreover, no irrigation was performed for all experimental plots, 21 days before harvesting. The different amounts of nitrogen fertilizer were divided into two equal portions which were applied at 45 and 60 days after transplanting. All experiments were fertilized by phosphorus as calcium mono phosphate (15% P_2O_5) at rate of 30 kg P_2O_5/fed and 50 kg/fed potassium sulphate (48.0% K_2O). Super phosphate was broadcasted during soil preparation. Potassium fertilizers were added in two equal doses at 45 and 60 days after transplanting. The other usual agronomic processes of onion plants were practiced as recommended by the Ministry of Agriculture and Land Reclamation.

Data recorded:

Vegetative growth:

After 100 days from transplanting, random samples of five onion plants were taken from the outer rows of each subplot to determine plant height (cm), number of tubular blades/plant, diameter of bulb or neck and dry weight of different organs of onion. Plant organs were dried at 70°C for 72 hours and were wet digested for determining N, P, K, Fe, Zn, Mn and Cu. Total N was determined using kjeldahl method according to Jackson (1973). Phosphorus was determined color-metrically as described by Jackson (1973). Potassium was determined by flame photometerically as described by Chapman and Pratt (1961). Fe, Zn, Mn and Cu were determined by using atomic absorption spectrophotometer as described by Page *et al.* (1982). The protein percentage in bulbs were accounted by multiplying nitrogen content by 6.25.

Yield:

At harvest time (150 days from transplanting) the total bulb yield in each plot was weighted and recorded in ton/fed. In addition, random samples of 10 bulbs were chosen from every plot to determine the average weight of bulb (g), bulb diameter and percentage of dry matter content. The total soluble solids (T.S.S) in fresh bulbs (Juice) were estimated using carizeiss refractometer (A.O.A.C. 1990). N, P, K, Fe, Zn, Mn and Cu in bulb were detemined according to Page *et al.* (1982).

Data obtained were statistically analyzed using the combined analysis of the growing season according to Gomez and Gomez (1984). The significant differences among the means were tested using the least significant difference (L.S.D.) at the 5% level of significance.

RESULTS AND DISCUSSION

Results of onion characters of the study growing seasons gave nearly the same trends. So, the obtained data was statistically analyzed using the combined analysis of the two growing seasons according to Gomez and Gomez (1984). L.S.D. test at 5% levels of significance was used for comparing between the mean of different treatments.

I : Vegetative growth parameters:

Data presented in Table (2) clearly showed the effect of irrigation intervals on the plant growth parameters expressed as plant height (cm), number of tubular blades/plant, diameter of neck and bulb and the dry weight of onion

organs. It worthy to mention that, irrigation intervals had a significant effect on onion plant growth parameter. It is clear from data that the short irrigation intervals, i.e., irrigation every 14 days, resulted in the vigor plant growth, the tallest plants which obtained the heaviest dry weights of different plant organs (tubular blades, neck and bulb).

On the contrary prolonging the irrigation intervals caused an inhibition in plant growth parameters. The superiority of onion plants which were irrigation at the short interval (14 days) might be attributed to that, water is one of the main raw materials for photosynthesis and required for translocation of nutrients from roots media to different plant organs. The obtained results are in good harmony with those recorded by Orta and Ener (2001), Haque, *et al.,* (2004), Channagoudar and Janawade (2006) and Abd El-Al *et al.* (2010) on onion plants.

Table(2): Some growth parameters of onion plants at 100 days from transplanting as affected by irrigation intervals and nitrogen levels.

Treatments		Plant height (cm)	No. of tubular blades/ plant	Diameter (cm)		Dry weight (g/plant)		
Irrigation intervals	Nitrogen levels (kg/fed)			Bulb	Neck	Tubular blades	Bulb	Whole plant
14	0	72.33	6.42	5.36	3.13	4.48	4.73	9.31
	60	75.55	6.93	5.73	3.32	5.07	5.58	10.65
	90	78.32	7.53	6.13	3.51	5.84	6.32	12.16
	120	81.13	8.60	6.42	3.83	6.68	6.83	13.51
Mean		76.83	7.37	5.91	3.44	5.51	5.86	11.37
21	0	70.13	5.83	5.10	2.93	4.08	4.29	8.37
	60	73.62	6.66	5.50	3.21	4.73	4.88	9.61
	90	76.03	7.26	5.86	3.35	5.16	5.87	11.03
	120	79.10	8.14	6.13	3.62	5.77	6.15	11.92
Mean		74.72	6.97	5.64	3.27	4.93	5.29	10.22
28	0	66.83	5.43	4.63	2.76	3.36	3.80	7.16
	60	69.91	6.25	4.98	2.97	3.78	4.15	7.93
	90	72.81	6.83	5.37	3.19	4.26	4.46	8.72
	120	75.72	7.56	5.74	3.30	4.53	5.16	9.69
Mean		71.31	6.51	5.18	3.05	3.98	4.39	8.37
Mean of N levels	0	69.76	5.89	5.03	2.94	3.97	4.27	8.24
	60	73.02	6.61	5.40	3.16	4.52	4.87	9.39
	90	75.72	7.20	5.78	3.35	5.08	5.55	10.63
	120	78.65	8.10	6.09	3.58	5.66	6.04	11.70
L.S.D. of 5%								
Irrigation		1.62	0.31	0.11	0.05	0.09	0.12	0.17
Nitrogen		1.12	0.22	0.06	0.04	0.05	0.08	0.09
Interaction		2.60	0.56	0.19	0.10	0.07	0.18	0.14

Data presented in Table (2) Cleary showed significant increments in all studied growth characters of onion plants due to nitrogen application, e.g., plant height (cm), nick and bulb diameters (cm) and dry weight of onion organs, which were augmented corresponded to increase nitrogen levels. Application of 120 kg N/fed gave a significant higher mean values for all studied growth characters as compared with those of the control or 60 and 90 kg N/fed. The obtained results were in good accordance with those of Balemi *et al.* (2007), Shaheen *et al.* (2010) and Abd El-Samad *et al.* (2011). It is of interest to note that nitrogen is an indispensable elementary constituent of numerous organic compounds of general importance (amino acids, protein, nucleic acids and chlorophyll). It is a formation of protoplasm and new cells, encouragement for elongation and it is considered as a limiting nutrient for high plant growth (Marschner, 1995). The increment of vegetative growth parameters of onion plant by using the highest rate of nitrogen fertilization was probably due to that nitrogen plays an important role in plant photosynthesis by improving leaf area index and chlorophyll contents thus resulting in higher photosynthetic rate and higher plant vegetative growth (Murata 1969).

The interaction between irrigation intervals and different nitrogen fertilizer rates on onion plant growth parameters is shown in Table (2). It was clear from data that the tallest onion plants and the heaviest dry matter of different plant organs were achieved in plants irrigated at 14 days interval and fertilized by 120 kg N/fed.

II. Total bulb yield and its Quality:

Data shown in Table (3) indicated that, the total onion bulbs yield as ton/fed., is significantly influenced by the different irrigation intervals treatments. It is obvious that, irrigation at short period (14 days interval) resulted in obtaining the highest yield of bulbs (17.93 ton/fed.), followed in a descending order by onion plant which received its required irrigation water at interval of 21 days (16.95 ton/fed.). However, the lowest bulbs yield/fed (16.18 ton/fed.), was associated with plants received irrigation water at 28 days interval.

In addition, the response of onion bulb parameters (bulb diameter, average bulb weight, bulb dry matter, TSS % and Total Protein %) followed the same trend as previously mentioned in bulbs yield. The best extension for irrigation period is every 14 days, due to achieving the highest bulb yield as well as the best bulbs quality, Moreover, yield reductions due to prolonging irrigation interval could be attributed to poor soil moisture, decreased absorption and transfer of nutrients from root zones to plant tissues, hence decreasing the photosynthesis processes. Consequently, this caused a reduction in bulb yield as well as its quality. Similar results were attained by Hanson and May (2004), Kadam, *et al.* (2006), Bolondzar, *et al.* (2007) and Abd El-Al, *et al.* (2010). Ali *et al.* (2007) and Satyendra *et al.,* (2007)

reported that, the best bulbs yield was obtained with irrigation after 20% depletion of soil moisture.

Table (3): Effect of irrigation intervals and nitrogen levels on onion bulbs yield and its quality parameters.

Treatments		Total yield of bulb (ton/fed)	Bulb diamerer (cm)	Average bulb weight (g)	Bulb dry matter content (%)	Total soluble solids (%)	Total protein (%)
Irrigation intervals	Nitrogen levels (kg/fed)						
14	0	16.83	7.13	133.73	14.43	14.03	8.93
	60	17.21	7.96	138.21	15.76	14.33	10.06
	90	18.65	8.33	140.01	15.85	14.48	11.81
	120	19.06	8.69	145.23	16.11	14.63	12.81
	Mean	17.93	8.02	139.29	15.53	14.36	10.90
21	0	16.00	5.98	127.26	12.13	13.13	8.37
	60	16.43	6.54	136.33	13.32	13.46	9.62
	90	17.36	7.62	138.79	13.46	13.78	10.75
	120	18.03	7.97	140.82	14.58	14.01	11.43
	Mean	16.95	7.02	135.8	13.37	13.59	10.04
28	0	15.43	5.32	124.83	9.83	11.66	7.62
	60	15.95	6.05	126.93	10.98	11.97	8.93
	90	16.36	7.16	130.36	11.21	12.36	9.87
	120	17.00	7.58	133.46	12.38	12.61	10.75
	Mean	16.18	6.52	128.89	11.10	12.15	9.29
Mean of N Levels	0	16.08	6.14	128.6	12.13	12.94	8.30
	60	16.53	6.85	133.82	13.35	13.25	9.53
	90	17.45	7.70	136.38	13.50	13.54	10.81
	120	18.03	8.08	139.83	14.35	13.75	11.66
L.S.D. of 5%							
Irrigation		0.30	0.25	1.93	0.23	0.11	0.10
Nitrogen		0.26	0.15	1.71	0.19	0.18	0.14
Interaction		0.46	0.27	2.63	0.33	0.26	0.19

As regard to the effect of N fertilization rates, the same data in Table (3) indicated that increasing the nitrogen level led to significant increase in onion bulbs yield and its quality. For all parameters, the greatest values were observed for N applied at 120 kg/fed., compared with the other treatments and control one. It could be concluded that the highest yield and the best values of all parameters for onion bulb may be attributed to the reflection of vigorous of vegetative growth of onion plant which received the highest rate of nitrogen fertilization as previously described and shown in Table (2). The results of this study were in good accordance with the finding of Balemi, *et al.* (2007); Biesiada and Kolota (2009); Shaheen, *et al.* (2010) and Abd El-Samad, *et al*. (2011). All of them reported that increasing nitrogen fertilization rate led significantly to increase onion bulb yield as well as its quality. In contrast, Al-Moshileh (2002) stated that the highest onion yield was obtained

by using nitrogen application of rate of 200 kg N/ha (about 83 kg N/fed) and an excess application of nitrogen over 200 kg N/ha will not be economically feasible for higher crop production.

The interaction effect recorded significant differences effect on bulb yield as well as its quality. The highest onion bulbs yield and its quality were recorded in plants irrigated at the shortest interval (14 days) with applied 120 kg N/fed.

III. The nutritional values :

Tables (4 and 5) showed clearly that, the concentration and uptake of N, P, K, Fe, Zn, Mn and Cu in onion bulbs tissues were influenced significantly by irrigation intervals and nitrogen treatments. The results showed that irrigation onion plant at short interval (14 days) results in the highest values of all nutrients concentration and uptake. Whereas, the longest interval of irrigation had the lowest values of the above mentioned bulb contents. It is know that, water is the medium of transfer and is the solvent in the system of the cell. Whereas, moisture stress is generally detrimental to plant growth and reduces both yield and its nutritional value. The degree and duration of the stress will determine how severely yield and quality of it is reduced. As moisture stress increases, stomata close and phytosynthesis is reduced. These findings are in accordance with that obtained by Mohamed and Gomie (2000), Ansary, *et al.* (2006), Ali, *et al.* and Abd El-Al *et al.* (2010).

Table (4): Macronutrients contents of onion bulbs as affected by irrigation intervals and N fertilization rates .

Treatments							
Irrigation intervals	Nitrogen levels (kg/fed)	Nitrogen		Phosphorus		Potassium	
		%	content (kg/fed)	%	Content (kg/fed)	%	content (kg/fed)
14	0	1.43	240.66	0.32	53.85	1.18	198.59
	60	1.61	277.08	0.53	91.21	1.39	239.21
	90	1.89	352.48	0.58	108.17	1.54	287.21
	120	2.05	390.73	0.61	116.26	1.73	329.73
	Mean	1.75	315.24	0.51	92.37	1.46	263.68
21	0	1.34	214.40	0.27	43.20	1.11	177.60
	60	1.54	253.02	0.48	78.86	1.29	211.94
	90	1.72	298.59	0.53	92.00	1.46	252.45
	120	1.83	329.94	0.59	106.37	1.58	284.87
	Mean	1.60	273.98	0.46	80.1	1.36	231.71
28	0	1.22	188.24	0.24	37.03	0.94	145.04
	60	1.43	228.08	0.42	66.99	1.17	186.61
	90	1.58	274.28	0.49	80.16	1.36	222.49
	120	1.72	292.40	0.52	88.40	1.47	249.90
	Mean	1.48	245.75	0.41	68.14	1.23	201.01
Mean of N Levels	0	1.33	214.43	0.27	44.69	1.07	173.74
	60	1.53	252.72	0.47	79.02	1.28	212.58
	90	1.73	308.45	0.53	93.44	1.45	254.05
	120	1.86	337.69	0.57	103.67	1.59	288.16

L.S.D. of 5%						
Irrigation	-	1.76	-	0.40	-	1.26
Nitrogen	-	1.29	-	0.29	-	0.76
Interaction	-	1.93	-	0.35	-	1.32

Table (5): Micronutrients contents of onion bulbs as affected by irrigation intervals and N fertilization rates .

Treatments		Fe		Zn		Mn		Cu	
Irrigation intervals	Nitrogen levels (kg/fed)	mg kg^{-1}	Content (kg/fed)	mg kg^{-1}	Content (g/fed)	mg kg^{-1}	Content (g/fed)	mg kg^{-1}	Content (g/fed)
14	0	230	3.87	35	589	20	336	8.3	139
	60	251	4.32	39	671	23	395	9.7	166
	90	272	5.07	43	801	26	484	10.6	197
	120	280	5.34	46	876	30	571	11.3	215
	Mean	258	4.65	41	734	25	446	10.0	179
21	0	211	3.38	32	512	18	288	7.5	120
	60	235	3.86	35	575	20	328	9.1	149
	90	249	4.32	40	694	23	399	9.7	168
	120	256	4.62	44	793	27	486	10.5	189
	Mean	238	4.04	38	643	22	375	9.2	156
28	0	198	3.06	28	432	16	246	6.3	97
	60	216	3.44	32	510	18	287	8.5	135
	90	229	3.75	35	572	20	327	9.1	148
	120	240	4.08	41	697	23	391	9.8	166
	Mean	221	3.58	34	552	19	313	8.4	136
Mean of N Levels	0	213	3.43	32	511	18	290	7.4	119
	60	234	3.87	35	585	20	337	9.1	150
	90	250	4.38	39	689	23	403	9.8	171
	120	258	4.68	44	788	27	482	10.5	190
L.S.D. of 5%									
Irrigation		-	0.21	-	11.4	-	4.9	-	3.2
Nitrogen		-	0.16	-	6.9	-	3.6	-	2.4
Interaction		-	0.27	-	11.8	-	6.2	-	4.0

The data in Tables (4 and 5) also showed that, under irrigation intervals, increasing the rate of nitrogen application caused a gradual enhancement in values of N, P, K, Fe, Zn, Mn and Cu concentration and content in onion bulbs. As a general, the highest values of macro and micronutrients contents in bulb tissue were recorded with the highest rate of nitrogen fertilization. Moreover, the statistical analysis of the obtained data reveals that, significant differences were detected between nitrogen fertilization rates on macro and micronutrients in bulb tissues.

A general improvement in nutrients content of onion bulbs might be due to that the good supply of nitrogen stimulates plant growth parameters as well as total bulbs yield and its quality, consequently, these might be

reflected on the nutrients uptake of onion bulb. The obtained results are in good accordance with those of Ali, Aisha *et al.* (2007), Shaheen, *et al.* (2010) and Abd El-Samad, *et al.* (2011).

The interaction between irrigation intervals and nitrogen fertilizer rates was significant regarding its effects on macro and micronutrients uptake of onion bulbs. Generally, the best values of the nutritional elements were obtained with onion plants received irrigation water at 14 days interval and which supplied with nitrogen fertilizers at rate of 120 kg N/fed.

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نمو ومحصول البصل وصفات الجودة وتأثيرها بالتسميد النيتروجينى والري على فترات مختلفة

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الملخص العربي :

أجريت تجربة حقلية في قرية كفر الأكرم – مركز قويسنا – محافظة المنوفية خلال الموسمين الشتويين المتتالين لعامي ٢٠٠٧/٢٠٠٨ ، ٢٠٠٨/٢٠٠٩ لدراسة تأثير كل من الري على فترات مختلفة (١٤–٢١ –٢٨ يوم) وأربعة معدلات من التسميد النيتروجيني (صفر – ٦٠ –٩٠ –١٢٠ كيلو جرام نيتروجين / فدان) والتفاعل بينهما على صفات النمو الخضري (طول النبات – قطر العنق والبصلة – الوزن الجاف للبصلة بعد ١٠٠ يوم من الشتل) وكذلك محصول البصل (صنف جيزة ٢٠) وجودته ومحتواه من العناصر الغذائية الكبرى والصغرى .

وقد أوضحت النتائج المتحصل عليها أن :

– أدى تقليل فترات الري (كل ١٤ يوم) إلى زيادة كبيرة في قياسات النمو الخضري وعلى العكس من ذلك فان زيادة فترات الرى نتج عنها انخفاض في نمو النبات

– أوضحت النتائج أن أعلى إنتاجية للمحصول وكذلك أفضل الصفات المحصولية (قطر البصلة ومتوسط وزن البصلة والوزن الجاف للبصلة ومحتوى البصلة من المواد الصلبة الذائبة والبروتين) وكذلك محتوى البصلة من المغذيات الكبرى (نيتروجين . فوسفور . بوتاسيوم) والمغذيات الصغرى (حديد – زنك – منجنيز – نحاس) قد تحقق مع ري النباتات كل ١٤ يوم في حين أن الري كل ٢٨ يوم سجل أقل القيم لجميع الصفات السابقة

– أدى إضافة المستوى الأعلى من التسميد النيتروجيني (١٢٠ كم نيتروجين / فدان) إلى زيادة معنوية في قياسات النمو الخضري ومحصول البصل وجودته ومحتواه من العناصر الغذائية مقارنة بالكنترول ومستويات الإضافة الأقل (٦٠ ، ٩٠ كم نيتروجين / فدان) .

- أوضحت نتائج الدراسة التأثير الإيجابي لفترات الري والتسميد النيتروجيني على جميع القياسات تحت الدراسة وعلى ضوء النتائج السابقة يمكن القول بأن رى نباتات البصل كل ١٤ يوم مع إضافة ١٢٠ كم نتروجين لكل فدان يؤدى لزيادة محصول البصل وتحسين قياسات الجودة ومحتوى البصلة من العناصر الغذائية

Table (1): Some physical and chemical properties of the experimental soil during the two investigated seasons:

a) $CaCO_3$, organic matter and particle size distribution.

Season	Total $CaCO_3$ %	Organic matter %	Partical size distribution %				
			Coarse sand	Fine sand	Silt	Clay	Texture class
2007/2008	2.33	1.65	2.06	15.40	32.95	49.59	Clayey
2008/2009	2.28	1.88	1.86	14.68	34.84	48.62	Clayey

b) Chemical analysis of soil paste extract and available nutrients

Season	pH (1: 2.5 soil susp.)	EC (dSm^{-1})	Soluble ions (m mole L^{-1})								Available nutrients						
			Cations				Anions				(mg/kg^{-1})			($\mu g/kg^{-1}$)			
			Ca^{++}	Mg^{++}	Na^{+}	K^{+}	$CO^{=}_3$	HCO^{-}_3	Cl^{-}	$SO^{=}_4$	N	P	K	Fe	Zn	Mn	Cu
2007/2008	7.80	2.40	7.60	4.30	11.40	0.70	--	3.10	12.90	8.00	42	5	286	68.70	25.11	15.01	0.84
2008/2009	7.70	2.33	7.72	4.21	10.80	0.59	--	3.00	11.00	9.32	48	7	305	81.30	28.73	18.16	0.97