JKAU: Met., Env. & Arid Land Agric. Sci., **Vol. 22,** No. 1, pp: 3-17 (2011 A.D./14321 A.H.)
DOI: 10.4197/Met. 22-1.1

Effect of Irrigation Intervals, Nitrogen Sources and Nitrogen Levels on Some Characters of Parsley (*Petroselinum crispum Mill*)

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Abstract. Two field experiments were carried out at the Agricultural Research Experiment Station, King Abdulaziz University, Hada Alsham, Saudi Arabia, during 2007 and 2008 seasons. The aim of this investigation was to study the effects of four irrigation intervals (2, 4, 6 and 8 days), two nitrogen sources (urea and ammonium sulphate), three nitrogen levels (0, 100 and 200 kg N ha^{-1}), and their combination treatments on some vegetative growth and yield characters of parsley. The obtained results revealed significant effects of the three studied factors on vegetative growth and yield characters during the two seasons. Application of 2 days as irrigation interval, urea form as source of nitrogen and 200 kg N ha^{-1}, produced the highest mean values of plant height (32.0 cm), number of branches/ plant (7.14), number of leaflets/ plant (18.41), fresh weight of plants/ m^2 (2.852 kg) and fresh weight of 5 plants (53.74g).

Introduction

Parsley (*Petroselinum crispum*, (Mill) is a plant belonging to the family *Apiaceae*. It is biennial or short-lived perennial herb. Parsley is traditionally cultivated for its leaves, which are used either fresh or dried as a garnish or condiment. Parsley has also many medical uses such as antispasmodic carminative, diuretic; since, it contains essential oil of 0.3% in leaf, and 2-7% in the fruit. Also, parsley is a good source of carotene (pro-vitamin A), vitamins B1, B2, and C, as well as iron and other minerals (Osman and Abd El-Wahab, 2009).

Relationships between crop yield and water supply allow field quantification of water use efficiency in a given environment and can be assessed by developing local crop-yield/ water production functions of which the simplest is the yield responses to rainfall plus irrigation (Ferreira and Goncalves, 2007). In a large part of the agricultural areas in the world, water is an important factor limiting growth and productivity. So, the supply of required water to the plant is important for its growth and economic production (Chartgoulakis and Drosos, 1995).

Nitrogen is one of the essential elements for plants growth and development and plays a significant role in plants nutrition. Plants absorb nitrogen from soil in the form of nitrates, which are then converted into proteins and other nitrogen-containing substances (Cash *et al*., 2002 and Depascale *et al*., 2006).

Some investigators studied the effect of irrigation water amounts or levels on some characters of some leafy vegetables like spinach (Leskovar and Piccini, 2005; and Liphadzi *et al*., 2006). Generally, they found that spinach yield and its components were higher at either 100% or 75% Etc rates of irrigation. On the other hand, Thompson and Doerge (1995) found that excessive irrigation resulted in lower yield of spinach. Also, Sanchez (2000) and Karam *et al*. (2002) stated that water deficit reduced leaves number, leaf area and dry matter content characters in spinach plants. The effect of irrigation levels on vegetative growth and yield of some other leafy vegetables was investigated by several investigators such as Feigin *et al*. (1982), Stark *et al*. (1983), Evers *et al*. (1997), and Rozek (2007) on celery and Petropoulos *et al*. (2008a) and Stanislaw and Jacek (2008) on parsley.

Regarding the effects of nitrogen on vegetative growth and yield of some leafy vegetables, many studies were conducted by several researchers such as Rumpell and Kaniszewski (1994), and Petropoulos *et al*. (2008b) on parsley; Feigin *et al*. (1982), Stark *et al*. (1983), and Evers *et al*. (1997) on celery; Custic *et al*. (2000) on chicory. Concerning the effects of N fertilizer on growth and yield characters of some leafy vegetables, investigations were also carried out by many authors such as Peavey and Greig (1972), and Jun Liang *et al*. (2005) on spinach. They found that increasing in nitrogen fertilizer resulted in increasing effects on some vegetative and yield characters of spinach. On the contrary,

Hong Mei *et al*. (2005) found that no significant differences were observed in the yield of spinach, under different rates of nitrogen.

The objective of this study was to determine the effects of different irrigation intervals, nitrogen sources and levels, and their interactions on some vegetative, yield and yield characters of parsley.

Materials and Methods

A field experiment was conducted at the Agricultural Research Experiment Station, King Abdulaziz University, Hada-Alsham, Saudi Arabia, during the seasons of 2007 and 2008 in order to study the influences of four irrigation intervals, two nitrogen sources and three levels of N fertilizer on vegetative growth and yield and yield characters of parsley.

Split–split-plot design with three replicates in both experiments was used. Four irrigation intervals (2, 4, 6 and 8 days) were considered as main plot treatments, the two nitrogen sources (urea and ammonium sulphate) were arranged in sub-plots, whereas, the three nitrogen levels (0, 100 and 200 kg N ha^{-1}) were the sub-sub-plot treatments. Each sub-sub plot comprised 2m long and 2m wide. The same experimental procedures were conducted in the first and second seasons of the two seasons.

Prior to the initiation of each experiment, soil and water samples for both experimental sites were collected and analyzed according to Al-Solaimani *et al*. (2009). Results of the analyses of the experimental site soil and water are given in Tables 1, 2 and 3.

Table 1. Soil texture and physical properties of experimental soil.

Depth (cm)	Loam (%)	Silt (%)	Sand (%)	Soil texture
0-15	8.89	6.50	82.12	S.L
15-30	5.59	4.54	91.96	S

Table 2. Means of chemical analysis for soil samples from the field experiment.

Depth (cm)	O.M (%)	pH	EC dsm^{-1}	N mg/1	P mg/1	K mg/1	Ca mg/1	Na mg/1	Mg mg/1	HSO_3 mg/1
0-15	0.42	7.85	0.78	0.22	0.20	0.39	1.32	0.91	2.05	2.12
15-30	0.48	7.7	0.74	0.20	0.17	0.35	1.56	0.82	1.05	1.29

Table 3. Chemical analysis of the irrigation water.

pH	EC dsm^{-1}	Na^{+} mg/1	Ca^{++} mg/1	K^{+} mg/1	Mg^{+} mg/1	Cl^{-} mg/1	CO_3^{-} mg/1	SAR
8.6	2.42	5.85	5.9	1.98	0.8	66.5	11.07	3.9

Seeds of local cultivar of parsley were sown on January 2007 and 2008 seasons. The sprinkler irrigation system was used in this investigation.

Nitrogen fertilizer levels were applied at different rates of 100 and 200 kg N/ ha^{-1} as well as control (0 kg N / ha^{-1}). The total amount of the assigned N-fertilizer was banded at three equal portions through the vegetative stage of parsley plants. However, the calcium super phosphate (15.50 % P_2O_5) at the rate of 200 kg P_2O_5/ ha was applied during soil preparation, and potassium sulphate (50% K_2SO_4) at the rate of 200 kg K_2SO_4/ ha was added at two equal portions through the growing vegetative growth stage. During the growing season, all other recommended cultural managements were performed whenever they appeared necessary.

In each sub-sub plot, ten guarded plants were randomly chosen to measure the plant height, number of branches per plant, number of leaflet per plant, root length, fresh weight of five plants, and fresh weight of plants in one m^2.

All the collected data were statistically analyzed using Co-Stat Software (2004), computer program for statistics. Analysis of variance of all data was done for each season, then comparisons among the means of the different treatments were undertaken, using revised L.S.D. test at 0.05 level of probability as illustrated by El-Nakhlawy (2010).

Results and Discussion

According to the analysis of variance results of the studied traits which showed significant effects for the three-factor interactions, the important and mainly mean comparisons in this study were the three factor mean statistical comparisons, while the main factor mean comparisons will be rapidly discussed.

Vegetative Growth Traits

Main- Factors Effects

Results in Table 4 reflect significant differences among the mean values of all studied vegetative growth traits of parsley crop as affected by the different irrigation intervals, during the two seasons. Irrigation water every two days gave the highest mean values of all studied vegetative traits in both seasons. As irrigation interval increased, mean values of the studied traits significantly decreased. Similar findings were reported by Buntain and Chung (1996), Liphadzi *et al.* (2006), Petropoulos *et al*. (2008a) and Zotarelli (2009a).

As for the effects of the two nitrogen sources (urea and ammonium sulphate) on vegetative growth characters of parsley, data in Table 4 illustrate that application of nitrogen in urea form gave significant higher means of all the studied traits than that of the ammonium sulphate nitrogen form, in the two seasons. These results are confirmed with the results obtained by Elia *et al*. (1998).

Concerning the effects of the three nitrogen levels on the vegetative growth traits, the obtained results (Table 4) showed significant increase in all studied traits as nitrogen level increased. These results seem to agree with the findings of Feigin *et al*. (1982); Zotarelli *et al*. (2009b) and Erdem *et al.* (2010) who found that increasing nitrogen fertilizer rates increased growth parameters.

Effect of the Interactions between Irrigation Intervals, Nitrogen Sources and Levels

The obtained results in Tables 5 a and b show the means of the studied vegetative traits of parsley under the effects of the irrigation intervals, nitrogen sources and nitrogen levels interaction during 2007 and 2008 seasons.

As for plant height means under the three factor interaction, data of Tables 5 a and b show that plant height ranged from 32.0 to 13.36cm in 2007 season and from 31.24cm to 12.51cm in 2008 season under the treatments of (2 days irrigation interval and fertilized with 200 Kg N / ha^{-1} as urea) and 8 days as irrigation interval followed by the treatments of (2 days and 100 kg N/ ha^{-1} of urea) and (4 days and 200 kg N/ ha^{-1} urea) with mean values of 28.31cm and 28.48cm in 2007 season respectively,

and 26.10cm under (2 days with 100kg N/ ha^{-1} urea) in 2008 season. While, the shortest plant heights were produced under the effects of the treatments of (8 days) and Ammonium sulphate with 0 and 100 Kg N/ ha^{-1} with the values of 13.36 cm and 15.59 cm, respectively in 2007 season and 12.51 cm and 14.17 cm, respectively in 2008 season.

Concerning the number of branches/ plant under the three-factors interaction, data of Tables 5 a and b reveal that the highest number of branches/plant in the two seasons were found under the treatment of (2 days and 200 kg N / ha^{-1} urea) with values of 7.14 and 7.78 in 2007 and 2008 seasons, respectively. The second treatment in number of branches/ plant was the treatment of (2 day and 200 kg N/ ha^{-1} as ammonium sulphate) with values of 6.89 and 7.78 in the two seasons, respectively. The lowest significant number of branches/ plant was produced under the 8 days irrigation interval and ammonium sulphate with 0 and 100 kg N/ ha^{-1} with values of 2.31 and 3.22 in the first season and 1.57 and 2.16 in the 2007 and 2008 season respectively.

The same response was found for the number of leaflets/ plant, where the highest values were shown under the treatment of (2 days and 200 kg N/ ha^{-1} urea) with values of 18.41 and 21.65 in 2007 and 2008 seasons, respectively as shown in Tables 5a and b, while the lowest number of leaflets/ plant were produced under the effects of 8 days irrigation interval and without nitrogen fertilizer with the valued of 3.17 and 5.10 in 2007 and 2008 seasons respectively.

Root length response to the three-factors interaction was similar to the previous traits, where the tallest roots were produced under the treatment of 2 days and 200 kg N/ ha^{-1} urea with length of 15.50 cm followed by 4 days and 200 kg N/ ha^{-1} urea with root length mean 12.90 cm while the lowest root length mean was 12.90 cm and the lowest values were produced under 0.00 nitrogen in 8, 6 and 4 days as irrigation intervals.

Also, the highest leaf dry matter values as shown in Tables 5a and b were found under the 2 days irrigation interval and 200 kg N/ ha^{-1} urea with values of 17.31% and 17.64% in 2007 and 2008 seasons respectively; while the lowest values were found under the effect of 8 days irrigation interval and 200 kg N/ ha^{-1} of ammonium sulphate with values of 7.98% and 8.11% in 2007 and 2008 seasons respectively.

Table 4. Means of the vegetative growth traits of parsley under the effects of irrigation intervals, nitrogen sources and nitrogen levels during 2007 and 2008 season.

Seasons	2007					2008				
Traits / Treatments	Plant height (cm)	No. of branches plant^{-1}	No. of leaflets plant^{-1}	Root length (cm)	Leaf dry matter (%)	Plant height (cm)	No. of branches plant^{-1}	No. of leaflets plant^{-1}	Root length (cm)	Leaf dry matter (%)
Irrigation intervals (days)										
2	26.26 a	5.99 a	13.80a	12.17 a	14.54 a	25.51 a	6.36 a	17.91 a	12.79 a	14.94 a
4	23.22 b	5.11 b	12.41 b	10.49 b	14.00 b	21.80 b	4.81 b	14.07 b	10.98 b	14.96 a
6	20.23 c	4.15 c	8.38 c	9.00 c	13.04 c	18.48 c	3.50 c	9.57 c	8.67 c	12.65 b
8	17.45 d	3.62 d	6.70 d	8.20 d	9.28 d	15.65 d	2.17 d	6.75 d	7.85 d	9.33 c
Nitrogen sources										
Urea	23.93 a	5.30 a	12.15 a	11.02 a	13.51 a	22.29 a	4.62 a	12.94 a	11.27 a	13.73 a
Ammonium Sulphate	19.66 b	4.13 b	8.49 b	8.91 b	12.06 b	18.44 b	3.80 b	11.20 b	8.87 b	12.20 b
Nitrogen levels (kg N ha^{-1})										
0	18.53 c	3.91 c	7.64 c	8.35 c	12.09 c	18.88 c	3.28 c	9.28 c	9.28 c	12.13 c
100	21.89 b	4.94 b	10.91 b	10.42 b	12.59 b	19.83 b	4.13 b	12.21 b	10.15 b	13.03 b
200	24.94 a	5.30 a	12.42 a	11.12 a	13.67 a	22.37 a	5.23 a	14.72 a	10.78 a	13.74 a

Means followed by the same letter, within a comparable groups of means of main effects, are not significantly different, using revised L.S.D test at 0.05 level of probability.

Table 5-a. Means of vegetative growth characters of parsley under the effects of the interaction between the irrigation intervals, nitrogen sources and levels during 2007 season.

			2007				
Irrigation Interval (day)	**N Source**	**N levels (kg/ha)**	**Plant height (cm)**	**No. of branches plant^{-1}**	**No. of leaflets plant^{-1}**	**Root length (cm)**	**Leaf dry matter (%)**
2	**Urea**	**0**	24.89 e	5.74 e	10.51 h	12.37 c	14.89 c
		100	28.31 b	6.53 c	18.13 ab	13.12 b	14.02 d
		200	32.00 a	7.14 a	18.41 a	15.50 a	17.31 a
	Ammonium Sulphate	**0**	20.28 h	3.99 j	8.35 j	9.35 h	13.89 d
		100	23.57 f	5.65 e	11.43 f	11.38 d	13.03 e
		200	28.52 b	6.89 b	16.31 c	11.30 d	14.02 d
4	**Urea**	**0**	20.61 h	4.53 hi	10.37 h	10.16 fg	12.03 f
		100	27.50 c	6.61 c	12.45 e	11.20 d	16.11 b
		200	28.48 b	6.29 d	18.09 b	12.90 b	15.95 b
	Ammonium Sulphate	**0**	16.41 lm	3.72 k	8.44 j	7.16 l	13.10 e
		100	22.04 g	4.61 gh	10.61 h	10.60 ef	14.14 d
		200	24.30 e	4.94 f	14.22 d	10.92 d	15.37 c
6	**Urea**	**0**	18.67 j	3.93 j	9.30 i	8.16 jk	12.41 f
		100	19.37 i	4.50 hi	12.53 e	12.02 c	13.06 e
		200	26.46 d	5.58 e	9.53 i	10.93 de	16.31 b
	Ammonium Sulphate	**0**	16.78 kl	2.70 m	5.98 l	5.72 m	11.03 g
		100	19.51 i	3.64 k	5.95 l	8.29 j	12.27 f
		200	20.58 h	4.57 h	6.96 k	8.89 hi	12.48 f
8	**Urea**	**0**	17.26 k	4.37 i	5.03 n	7.00 l	10.00 h
		100	20.29 h	4.77 fg	11.11 g	9.05 hi	10.06 h
		200	23.25 f	3.65 k	10.41 h	9.89 g	10.26 h
	Ammonium Sulphate	**0**	13.36 o	2.31 n	3.17 o	6.92 l	9.35 i
		100	15.59 n	3.22 l	5.06 n	7.73 k	8.03 j
		200	15.95 m	3.37 l	5.44 m	8.64 ij	7.98 j

Means followed by the same letter, within a comparable group of means of interaction effects, are not significantly different, according to revised L.S.D. test at 0.05 level of probability.

Table 5-b. Means of vegetative growth characters of parsley under the effects of the interaction between the irrigation intervals, nitrogen sources and levels during 2008 season.

			2008				
Irrigation Interval (day)	**N Source**	**N levels (kg/ha)**	**Plant height (cm)**	**No. of branches plant^{-1}**	**No. of leaflets plant^{-1}**	**Root length (cm)**	**Leaf dry matter (%)**
2	**Urea**	**0**	27.01 b	6.17 c	16.82 d	13.55 c	16.17 c
		100	26.10 c	7.23 b	20.51 b	14.18 b	15.14 d
		200	31.24 a	7.78 a	21.65 a	15.13 a	17.64 a
	Ammonium Sulphate	**0**	22.77 fg	4.12 f	12.32 gh	9.65 i	13.00g
		100	22.47 g	5.02 d	16.62 d	10.50 g	13.52 f
		200	23.49 e	7.82 a	19.53 c	13.72 c	14.18 e
4	**Urea**	**0**	23.21 ef	5.04 d	12.69 f	12.50 e	12.99 g
		100	23.57 e	5.01 d	14.66 e	12.87 d	16.76 b
		200	24.91 d	7.17 b	20.45 b	12.44 e	14.85 d
	Ammonium Sulphate	**0**	17.30 l	3.00 i	9.41 k	8.60 l	14.00 e
		100	18.33 k	3.80 g	12.16 hi	8.51 lm	15.07 d
		200	23.52 e	4.86 e	15.04 e	10.94 f	16.10 c
6	**Urea**	**0**	19.18 j	2.74 j	7.32 o	8.54 lm	11.11 i
		100	20.68 i	3.71 g	10.57 j	9.42 j	13.20 g
		200	21.44 h	4.12 f	11.74 i	9.85 h	16.88 b
	Ammonium Sulphate	**0**	14.90 n	2.05 k	5.86 g	7.06 p	10.73 j
		100	16.46 m	3.37 h	8.73 l	8.27 n	11.88 h
		200	18.19 k	5.03 d	13.19 e	8.86 k	12.13 h
8	**Urea**	**0**	14.17 o	1.58 l	4.74 r	8.36 mn	9.88 k
		100	16.87 lm	2.17 k	6.46 p	9.44 j	10.11 k
		200	19.05 j	2.74 j	7.77 no	8.93 k	10.10 k
	Ammonium Sulphate	**0**	12.51 p	1.57 l	5.10 r	5.96 g	9.14 l
		100	14.18 o	2.16 k	8.02 mn	7.00 p	8.61 m
		200	17.15 l	2.84 j	8.44 lm	7.42 o	8.11 n

Means followed by the same letter, within a comparable group of means of interaction effects, are not significantly different, according to revised L.S.D. test at 0.05 level of probability.

The obtained results of the positive effect of the shortest irrigation interval with 200kg N/ ha as urea fertilizer may be referred to as a result of increasing the root absorption from nitrogen and reflected into the large root and shoot systems, since increasing the photosynthetic rate and dry matter accumulation of parsley. These findings are similar to the results of Elia *et al*. (1998), Zatarelli *et al*. (2009a) and Erdem *et al*. (2010).

Yield Traits

Main Factors Effect

The obtained data in Table 6 show that as irrigation interval increased, fresh weight of five plants and fresh weight of plants/ m^2 significantly decreased in the two seasons. The highest fresh weight/ 5 plants were 35.63g and 42.214 g under 2 days irrigation interval in 2007 and 2008 season respectively. These results seem to agree with the results of Stark *et al*. (1983), Buntain and Chung (1996), Leskovar and Piccini (2005), Liphadzi *et al*. (2006), Rozek (2007) and Stanislaw and Jacek (2008).

As for the effects of two nitrogen sources on the yield traits of parsley plants, data of Table 6 show that application of nitrogen in the form of urea gave the highest mean values of fresh weight of five plants, and fresh weight/ m^2 in both seasons. These results indicate generally that using nitrogen fertilizer in urea form gave the most favorable effect on the yield traits of parsley, and gave the higher mean values of the yield characters than those of ammonium sulphate form. However, Bassioni (2007) found that differences among three nitrogen sources: Ammonium sulphate, calcium nitrate and urea resulted in insignificant effects on the yield of spinach.

Concerning the nitrogen levels effects on fresh weight plants, results of Table 6 reflect generally that increasing nitrogen levels from 0, 100 to 200 kg N/ ha^{-1} progressively increased the yield traits under consideration; *i.e*., fresh weight of five plants and fresh weight/ m^2 during 2007 and 2008 seasons. These results seem to match with that reported by Peavy and Greig (1972), Stark *et al*. (1983), Rumpell and Kaniszewski (1994), Behtash (1995), Evers *et al*. (1997), Custic *et al*. (2000), Jun Liang *et al*. (2005), Liphadzi *et al*. (2006) and Stanislaw and Jacek (2008).

Table 6. Means of fresh weight of five plants (g) and fresh weight /m^2 (kg) of parsley under the effects of irrigation intervals, nitrogen sources and nitrogen levels during the 2007 and 2008 seasons.

Seasons	2007		2008	
Traits / Treatments	Fresh weight of five plants (g)	Fresh weight / m^2 (kg)	Fresh weight of five plants(g)	Fresh weight / m^2 (kg)
Irrigation intervals (days)				
2	35.63 a	1.977 a	42.214 a	0.952 a
4	31.84 b	1.836 b	32.251 b	0.728 b
6	23.19 c	1.395 c	23.880 c	0.501 c
8	19.45 d	0.962 d	15451 d	0.373 d
Nitrogen sources				
Urea	30.38 a	1.736 a	31.870 a	0.692 a
Ammonium Sulphate	24.47 b	1.349 b	25.030 b	0.585 b
Nitrogen levels (kg N ha^{-1})				
0	21.28 c	1.391 b	22.464 c	0.504 c
100	28.37 b	1.341 b	28.573 b	0.680 b
200	32.93 a	1.896 a	34.310 a	0.732 a

Means followed by the same letter, within comparable groups of means of main effects, are not significantly different, using revised L.S.D. test at 0.05 level of probability.

Effects of Three-Factors Interaction on Yield Traits

Data of Table (7) reveal that the fresh weight of 5 plants significantly differed under the different interaction treatments. The highest fresh weight of 5 plants was found under the effects of 2 days irrigation interval with 200 kg N/ ha^{-1} as urea with mean values of 53.74 g and 59.18 g in 2007 and 2008 seasons, respectively. The lowest 5 plants weights under the treatments of 6 days without nitrogen fertilizer in the first season produced 13.16 g, while under the treatment of 8 days without nitrogen the mean value was 12.857g in the second season.

Also, the trend of fresh weight of plants/ m^2 mean values was similar to the 5 plants weight, where under the effects of 2 days irrigation interval and 200 kg N/ ha^{-1} as urea with mean values of 2.852 kg and 1.243 kg in 2007 and 2008 seasons, respectively as shown in Table 7. The lowest values were shown under 8 days irrigation interval and 100 kg N/ ha^{-1} ammonium sulphate in 2007 season with a value of 0.75 kg/m^2 and under 8 days without nitrogen fertilizer in 2008 season with a value of 0.277 kg/m^2. The obtained fresh plant weight results may be due to the response of the yield components of plant height, number of branches/

plant, number of leaflets/ plant and leaf dry weight to the interaction between irrigation intervals, nitrogen fertilizer form and nitrogen levels treatments.

Table 7. Means of fresh weight of five plants (g) and fresh weight of plants / m^2 (kg) under the effects of the interaction between the irrigation intervals, nitrogen sources and nitrogen levels during 2007 and 2008 seasons.

Treatments			2007		2008	
Irrigation Interval (day)	N Source	N levels (kg / ha^{-1})	Fresh weight of five plants (g)	Fresh weight of /m^2 (kg)	Fresh weight of five plants (g)	Fresh weight of /m^2 (kg)
2	Urea	0	27.39 f	2.058 c	44.303 c	0.787 fg
		100	38.48 c	2.057 c	50.750 b	1.083 b
		200	53.74 a	2.852 a	59.180 a	1.243 a
	Ammonium Sulphate	0	24.20 h	1.596 ef	24.690 i	0.630 hi
		100	31.25 d	1.372 h-i	32.770 g	0.927 de
		200	38.70 c	1.925 cd	41.593 d	1.043 bc
4	Urea	0	24.79 h	1.787 de	32.416 g	0.587 ij
		100	39.64 b	1.934 cd	38.647 e	0.983 cd
		200	38.77 c	2.633 b	41.353 d	0.867 ef
	Ammonium Sulphate	0	20.10 jk	1.317 h-k	21.527 k	0.537 j-l
		100	28.02 f	1.458 f-h	25.096 i	0.693 h
		200	39.75 b	1.885 cd	34.437 f	0.703 gh
6	Urea	0	24.82 h	1.396 g-i	17.926 l	0.480 k-m
		100	26.11 g	1.140 kl	24.590 i	0.457 l-n
		200	28.90 e	1.968 cd	29.416 h	0.593 ij
	Ammonium Sulphate	0	13.16 n	1.113 lm	15.430 m	0.393 no
		100	24.10 h	1.184 j-l	23.467 j	0.530 j-l
		200	22.06 i	1.570 fg	32.447 g	0.553 i-k
8	Urea	0	19.43 kl	0.926 mn	10.563 o	0.343 op
		100	20.66 j	0.832 n	14.837 m	0.427 m-o
		200	21.89 i	1.250 i-e	18.427 l	0.457 l-n
	Ammonium Sulphate	0	16.36 m	0.933 mn	12.857 n	0.277 p
		100	18.71 l	0.75 n	18.427 l	0.343 op
		200	19.68 k	1.083 lm	17.600 l	0.393 no

Means followed by the same letter, within comparable groups of means of main effects, are not significantly different, using revised L.S.D. test at 0.05 level of probability.

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تأثير فترات الري ومصادر ومستويات التسميد النيتروجينى على بعض صفات البقدونس

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المستخلص. نفذت تجربتان حقليتان في محطة الأبحاث الزراعية – التابعة لكلية الأرصاد والبيئة وزراعة المناطق الجافة بجامعة الملك عبد العزيز – بمنطقة هدى الشام – المملكة العربية السعودية خلال العامين ٢٠٠٧، و٢٠٠٨م. الهدف من الدراسة هو دراسة تأثير الري (٢، و٤، و٦، و٨ أيام)، ومصادر النيتروجين (يوريا وكبريتات الأمونيوم) ومستويات من السماد النيتروجيني (٠، و١٠٠، و٢٠٠ كجم/هكتار)، ومعاملة التفاعل بين المعاملات على بعض صفات النمو الخضري والمحصول لنباتات البقدونس. أوضحت نتائج الدراسة أن هناك اختلافات معنوية بين المعاملات على صفات النمو الخضري والمحصول فى كلا الموسمين، وأن الري كل يومين مع استخدام اليوريا كمصدر للينتروجين بمعدل ٢٠٠ كجم نيتروجين/ هكتار أعطى أعلى القيم لكل من طول النبات (٣٢ سم)، وعدد الأفرع/نبات (٧,١٤)، وعدد الوريقات/نبات (١٨,٤١)، والوزن الطازج في المتر المربع (٢,٨٥٢ كجم)، والوزن الطازج/ ٥ نباتات (٥٣,٧٤ جم).