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Effect of Injection Nitrogen Fertilization on The Chemical and Physical Characteristic and Quality of Three Date Palm Cultivar

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Abstract: This study was carried out in private orchard at Abul Khaseeb region in Basrah Governorate, Iraq, to study the effect of four concentration of urea fertilization (0, 0.2, 0.5 and 1)% Urea by injection on trunk of Date palm, and three cultivars of date palm (Hillawi, Barhi, Khudrawi), on physical, chemical fruit characteristics and yield properties during Rutab stage of fruit. This experiment was designed as randomized complete block with three replicates. The results indicated that rate of increase in fresh weight of whole fruit, pulp and seed, fruit volume and fruit dimensions were higher in the treatment of injection Urea at 1% concentration, the total and reducing sugar were reached a maximum value at the Urea fertilization at 1% in Rutab stage for all cultivars. and the water content it was decreased with Urea concentration increased, whereas the sucrose and tetra table acidity were not significant changes with changes level of fertilization injection Urea.

Key words: Date Palm, Fertilization, Injection, Fruit characteristics.

Introduction

The date palm (*Phoenix dactylifera* L.) is a subtropical fruit tree native of Iraq and other parts of the Middle East and it has been a staple food in those regions since first recording history. Palm tree is a sacred tree which play an important role in the life of Iraqi and Arabs throughout the history and mention the date in the Quran, it is the first food to eat from fasting in Ramadan, People not only benefited from date fruits, but they benefited from all parts of that tree, including trunk, rachis base and fiber sheath as well as pits for animal nutrition.

In Iraq, many cultivar are grown in deferent regions according to the diversity of their climatic necessity, Al-Baker (2) reported more than 500 cultivar spirited in meddle and south of Iraq spatially south of Iraq in Basrah Area, in this area palm trees are planted in small distances about 5-6m apart, the soil is heavy soil and water table is not deep. Irrigation is carried out by tidal stream or what called fingers irrigation (5). During the last 20 years, salinity is become a main problem in this area. Under such conditions, palm trees depend wholly on lateral roots for absorption of water and nutrients, and the soil fertilization practices some time is not good because native of soil and nutrients or farmer practicing (7).

We are know the date palm need fertilization to increase the production and compensation mineral nutrient which losses when collected the production a rather part of plant such as leaves, El-Shurafa (10) reported that the amount of mutants lost yearly by one palm tree var. Taboni (Libia), through date fruit and leaf pruning is 472, 47, 422g for N, P and K respectively. Nitrogen fertilization is very good for growth vegetative part of plant and interred in many physical possessing (4; 3).There are many fertilization methods such as add the nutrition directly to soil or spray the nutrition on vegetative part of plant, this method there were many limitation to used such as the methods of direct addition is more expensive compare with other methods spatially in date palm

fertilization (3; 9), and in other side this method spatially in nitrogen fertilization may be suffer washing or volatizing from soil compare with other method (6), spray method is not good to date palm fertilization because a cuticle league is vary decreased abstraction the nutrients (17). The method which was used in this paper it was hope to treatment the problem in anther methods by injection the nutrition (nitrogen fertilization in our case) in the trunk of tree by injector designed for this method, this method which used successfully to injection some pesticide in to trunk of date palm trees (11;14) and some nutrients (1; 13). For this method we are choose three famous cultivar of date palm (Berhi, Hillawi and Khdrawi) to practice this methods.

Materials and methods

Three date-palm from each of Berhi, Hilawi and Khdrawi cultivar, 10 years of age, were randomly selected and divided into four groups with three replicates in each group. The study was conducted in completely randomized block design (RCBD) at one of private farms in Abol-Khaseeb city, Basrah Governorate, Iraq. The selected trees were treated according to the usual farm management, for example, artificial pollination, pruning, irrigation, ..etc.

Research treatments including injector trunk methods, by low pressure injection units by using 1.5 l plastic bottles with transfusion sat (such as patient treatment in hospitals) which was content a canola apparatus by rubber tube, the syringe was inserted into the hole in the trunk (2.5 mm Diameter and 15 cm in Depth with slop 45 degree) and the flow rate was adjusted to prevent over flow out of the injection pore. This hole situated at 1.5 meter above the ground. the bottles fixed on the trunk one meter above the injection pore.

The injection fertilization treatment were include

*Control (distilled water only)

*Urea (0.2, 0.5 and 1% in distilled water)

All treatment were applied injection at spring season when pollinated the tree. Besides, amounts of animal manure necessary fertilizers were uniformly used for each tree, this fertilizer was added to the soil by cycle around the trees with 70 cm in depth and 40 cm in diameter. Fruit thinning was done with extra clusters deletion regarding the ratio of 10 leaves to 1 cluster in the kimri stage (in the kimri stage, fruits are hard and crisp and bright green in color, with a moisture content of 84-85.5%). Production was harvested and weighted in Rutab Stage (The time when the fruit ripens and get a soft structure due to pectin precipitation with a dark-honey or dark-red color). The fruit samples were collected at the early Rutab stage by selected twelve strands were randomly per each replicate (6 bunches for each tree), from the 50-60 strands that composed a bunch, to determine following fruit characteristics in selected time: Fruit chemical characters include TSS, moisture, dray matter, and titeratable acidity the analysis was carried out according to the methods of A.O.A.C. (8). The total , reducing sugar and Non-reducing sugar were determined in Dry mater by Howrtiz (12), the percentage of TSS was determined in the fruit juice using hand refract meter according to (15).

Fruit physical characters: Samples of 60 fruits per each palm, 10 fruits were taken randomly from each bunch (replicate) to determine fruit weight, Pulp weight, seed weight (g), fruit dimensions (length and diameter "mm"), fruit size (cm^3).

The statistical analysis of the data was done using the general liner model (GLM).

Table (1): Effect of nitrogen fertilizer by injection method in date palm trunk on Physical characteristics of Barhi fruits.

Nitrogen concentration	Fruit Weight			Fruit Dimension			Bunch Weight(g)
	Fruit Weight (g)	Pulp Weight (g)	Seed Weight (g)	Fruit Length (cm)	Fruit Diameter (cm)	Fruit Size (cm^3)	
Control	11.67	10.78	0.89	2.98	2.89	11.70	14104
0.2%	12.04	11.11	0.93	3.06	2.99	12.10	14548
0.5%	12.01	11.10	0.91	3.08	3.01	12.09	14512
1%	12.46	11.49	0.97	3.54	2.79	12.53	14852
LSD	0.23	0.09	0.11	0.21	0.22	0.21	50.23

Table (2): Effect of nitrogen fertilizer by injection method in date palm trunk on Physical characteristics of Khdrawi fruits.

Nitrogen concentration	Fruit Weight			Fruit Dimension			Bunch Weight(g)
	Fruit Weight(g)	Pulp Weight(g)	Seed Weight(g)	Fruit Length(cm)	Fruit Diameter(cm)	Fruit Size (cm^3)	
Control	10.62	9.66	0.96	3.01	1.77	10.76	12644
0.2%	10.96	10.01	0.95	3.06	1.89	10.88	13352
0.5%	11.37	10.30	1.07	3.33	2.01	11.30	13744
1%	11.93	10.80	1.13	3.61	2.29	11.94	14516
LSD	0.25	0.23	0.12	0.26	0.22	0.13	59.77

Table (3): Effect of nitrogen fertilizer by injection method in date palm trunk on Physical characteristics of Hallawi fruits.

Nitrogen concentration	Fruit Weight			Fruit Dimension			Bunch Weight (g)
	Fruit Weight(g)	Pulp Weight(g)	Seed Weight(g)	Fruit Length(cm)	Fruit Diameter(cm)	Fruit Size (cm^3)	
Control	6.31	5.27	1.04	3.11	1.47	6.29	7472
0.2%	6.55	5.47	1.08	3.16	1.76	6.59	7760
0.5%	6.70	5.62	1.08	3.42	1.79	6.80	8140
1%	7.00	6.00	1.00	3.51	1.88	7.10	8500
LSD	0.21	0.20	0.09	0.19	0.18	0.18	60.33

and one-way analysis of variance (ANOVA) technique. The means were separated by least significant difference (LSD) as described by Snedecor (16). The statistical analysis was performed with the help of statistical software package (SPSS v. 19).

Results and Discussion

Yield: Higher and lower yield were obtained from Urea 1% and control respectively in each Barhi and Gkdrahwi cv. were as in Hillawi, the higher and lower yield were obtained from Urea 0.5% and control respectively (Table,1, 2 and 3), the nitrogen increased the yield by increase the physical characteristic, and the type of fertilizer and the dose of nitrogen application can also affect the yield and yield components (6; 4; 3).

Fruit, Pulp and seed weight: the results on the effect of deferent fertilization treatments on the Fruit, Pulp and seed weight of three cultivar of date are presented in Table (1-3). Significant deference we are noted in this characteristics compeer with control treatment and recorded a higher weight in Fruit and Pulp in three cultivar at treatment Urea 1% but indicated that fruit and seed development is independent because the seed weight in Hillawi cultivar was not affected by fertilization treatment compeer with author cultivar,the pulp weight increment could be due to improving cell size or cell number by nitrogen fertilization and this reflected to fruit weight and size (4 ; 3).

Fruit and Seed Dimensions: The fruit and seed length, diameter and size was shown in Tables (1, 2 and 3). The higher fruit size and dimensions (Length and Diameter) were recorded at Urea 1% treatment in all cultivar compeer with control treatment, that was in agreement with some studies (4; 3). The higher and lower pulp/seed ratio were resulted from Urea 1% and control, Nitrogen fertilization may be play role to increase the promotion hormone levels in fruit thin this hormone take care to increase the number and size of cell in pulp fruit (6; 7) then the Diminutions fruit and size was increased.

Chemical Characteristics:

Injection of 1% Urea in the trunk of date tree caused the highest concentration of Total and reducing sugar, the results indicated that the acidity percentage between treatments were not significant in all cultivar. The results in Tables (4-6) clearly indicate there was a significant deferens of fertilization treatment on T.S.S., Also fruit sugar percentage was decreased in all treatments compared with control. These results are due to the fact

Table (4): Effect of nitrogen fertilizer by injection method in date palm trunk on Chemical characteristics of Barhi fruits.

Nitrogen concentration	Fruit Chemical characteristics					
	Total Sugar%	Reducing Sugar%	Non-Reducing Sugar%	TSS%	Moister	Protein
Control	79.01	75.67	3.24	79.93	18.78	2.11
0.2%	79.00	75.58	3.42	82.31	18.79	2.21
0.5%	80.65	77.76	2.89	82.26	17.14	2.67
1%	86.10	83.14	2.96	87.51	16.79	2.89
LSD	0.53	0.59	0.48	0.51	0.31	0.15

Table (5): Effect of nitrogen fertilizer by injection method in date palm trunk on Chemical characteristics of Khdrawi fruits.

Nitrogen concentration	Fruit Chemical characteristics					
	Total Sugar%	Reducing Sugar%	Non-Reducing Sugar%	TSS%	Moister	Protein
Control	75.44	71.67	3.77	77.12	20.22	2.33
0.2%	75.56	71.88	3.68	76.87	19.34	2.26
0.5%	76.65	73.55	3.10	76.88	19.56	2.56
1%	82.13	79.14	2.99	85.01	18.04	2.87
LSD	0.38	0.28	0.29	0.25	0.26	0.19

Table (6): Effect of nitrogen fertilizer by injection method in date palm trunk on Chemical characteristics of Hallawi fruits.

Nitrogen concentration	Fruit Chemical characteristics					
	Total Sugar%	Reducing Sugar%	Non-Reducing Sugar%	TSS%	Moister	Protein
Control	70.71	68.32	2.39	72.87	21.98	2.87
0.2%	71.21	68.14	3.07	73.77	22.98	2.79
0.5%	72.65	69.76	2.89	73.89	19.65	2.90
1%	75.19	73.14	2.05	80.01	18.66	2.99
LSD	0.14	0.17	0.19	0.27	0.22	0.28

that nitrogen activates the enzymes involving in sugar biosynthesis and helps in translocation of sugars to fruits (6; 7). The obtained results appeared to be in close agreement with the finding reported in some studies (4; 3).

The nitrogen injection method of the cv. Hillawi date palm, which was found very suitable method my could properly is more better than the other fertilization method without nitrogen losses and more efficient to yield increment.

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تأثير التسميد النيتروجين بواسطة الحقن الجذعي على الخصائص الكيميائية والفيزيائية و النوعية لثلاثة أصناف من نخيل التمر

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المستخلص: أجريت هذه الدراسة في بستان اهلي في منطقة أبو الخصيب في محافظة البصرة، العراق لدراسة تأثير أربعة تركيز لتسميد اليوريا (0، 0.2، 0.5 و 1)٪ من اليوريا عن طريق الحقن في جذع نخيل التمر ولثلاثة أصناف (الحلاوي، البرحي، الخضراوي)، على الخصائص الفيزيائية والكيميائية للثمار وكميه الانتاج خلال مرحلة الرطب . تم تصميم هذه التجربة بطريقة القطاعات العشوائية الكاملة مع ثلاث مكررات. أشارت النتائج إلى أن معدل الزيادة في الوزن الطازج للثمار ولبها ووزن البذور وحجم الثمار كانت أعلى في معاملة اليوريا بالحقن عند تركيز 1٪، وتم التوصل إلى ان السكريات الكلية والمختزلة بلغت اقصى قيم لها عند تسميد اليوريا عند 1٪ في مرحلة الرطب ولجميع الأصناف. وانخفض محتوى الماء مع زياده تركيز اليوريا، في حين أن السكروز الحموضة الكلية لم يلاحظ لها تغيرات معنوية مع تغيرات مستوى الحقن باليوريا.

الكلمات المفتاحية: نخيل التمر. التسميد. التسميد بالحقن. صفات الثمرة.