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# EFFECT OF POTASSIUM FERTILIZATION ON GROWTH , LEAVES NUTRIENT CONTENT, AND YIELD OF " KHALAS" DATE PALM IN AL HASSA OASIS (K. S. A.)

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## ABSTRACT

This study was carried out during the season of 2005 on a 20 years-old "Khalas" date palms *(Phoenix dactylifera,* L.), grown on sandy loam soils, varied in their K content, in Al Hassa Oasis (K. S. A), to investigate the effect of potassium fertilization on their growth, leaves nutrient content and yield. The results revealed that the best treatment of potassium fertilization was 4.5 kg / palm /year of potassium sulphate fertilizer (50% $K_2O$). Although the results indicating that the high response of K fertilization was obtained for the deficient soil in their K content. In this respect the results showed that the best method of K application was disked in holes on soil . As regard to proper time of application, the results also revealed that the application of K fertilizer at two equal doses in May and December or at three equal doses in Marsh, May and December is better. Such treatments increased yield, leaf growth as well as leaf N, P and K contents of date palm.

**Keywords**: Potassium -fertilization, nutrients content, Date-Palm, Khalas

## INTRODUCTION

Date palm (phoenix dactylifera L.) in the Kingdom of Saudi Arabia is highly considered yield in all aspects of people's life. To the normal population it is a well reputed national heritage. It provides food, shelter and all tree parts can be used in so many ways. Further more, the Kingdom of Saudi Arabia has continuously reflected and shown a keen interest and effort to improve date cultivation and production due to its central role in people's lives. Its nutritive value and economical returns are well felt by many growers and investors.

It has been well known that the mineral requirements of the date palms could be fulfilled through the fertilizers applied for the interplanted crops. However, this pattern will be differed from soil to soil and from interplant crop to another. In addition to that, these mineral requirements of the date palms differed greatly within each phase of tree life span (Johnston, 1944; Furr and Armstrong,1958; Embleton,T.W.*etal*..1974and Hussein,1993). The success of field fertilizer trials depends upon the selection of wide range deficiencies for nutrients under investigation. Al-Hassa region were gridsurveyed for appropriate sites to conduct field trials by K soil testing the $NH_4OAc$ soil testing methods were used. The soil test values were grouped, based on critical soil test levels, Cowell, (1994) into five classes the rapid build-up and maintenance concept the seed applicable for K fertilization. Thus the resulted interpolate K data was classified in different classes to identify the location that have a low K values (probable response) and those which has a high K values (No-response). The use of SURFER software and ARC/INFO geographical information system based on critical test levels for K indicated that the area of soil K tested classes as a following probable

response 17.1%, low residual 57.9%, medium residual 17.5%and high residual 7.5%.(Shahin 2005 ). The present study was carried out to study the effect of Potassium fertilization on growth, nutrients content of leaves and yield of Khalas date palm in AL- Hassa Oasis ( K.S. A)

## MATERIALS AND METHODS

This experiment was carried out during season of 2005,on about 20-years-old date palms *(Phoenix dactylifera,* L.) of "Khlasa" grown on Sandy loam soils have varied in their Potassium content. The native supply of K in soils represent different classes(varied from low to high ) as mentioned by Shahin (2005) F1 represent K Class Probable response (deficient to low), F2 , K Class Low residue (Adequate) and F3, K Class Medium residue (High). Table (1), at the Al- Hassa Oasis. This study was concerned with the effect of K fertilization on leaf growth and nutrient contents of the considered date palms. In this study, three levels of K (namely: 2, 3 and 4.5 kgs / palm year as potassium sulphate (50% $K_2O$) were used. Each K level was added through two methods of application ( broadcast on the soil surface or as a filler within soil holes) and three patterns' of dosage, as shown in Table (2). In other words, this experiment consist treatments (3 levels x 2 methods of application x 3 dosage patterns of application).

Each treatment was in four replicates including control with two palms for each replicate. Thus, K treatments were carried out on 144 palms. It is also interesting to say that the experimental design was randomized in complete block design. The statistical analysis of the obtained data was carried out using Statistical System-Analysis of Variance (SAS,1989).

All the routine agrotechnical operations were carried out during the traditional schedule for date palm plantation, taking into consideration the bunch number was constant for each palm (12 bunch/ palm ), either N or P fertilizer was added to soil at rate of 4 and 3 Kg/ palm as Urea(46.5N%) and triple calcium superphosphate (45% $P_2O_5$)), all palms grown in the experimental plantation were sprayed with malathion solution (0.2%) as insecticide before the blooming. In mid – October, 20 pinnae samples were detached from the leaves located just over the fruiting leaf zone, cleaned and washed then oven dried at 70°C till constant weight, ground and digested according to *Chapman and Pratt (1967)* .A sample of 50 fruits was taken from each palm tree for the physical investigation.

**Table (1): Chemical and physical characteristics of experimental soils under investigation.**

| Farm No. | pH | E.C,dS/m | O.M% | $CaCO_3$% | Soluble Ions in Soil Past Extract meg/L | | | | | | | | Available K⁺ mg/L | Mechanical analysis | | | Soil Texture |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Cotions | | | | Anion | | | | | Sand % | Silt % | Clay % | |
| | | | | | $Ca^{++}$ | $Mg^{++}$ | $Na^{+}$ | $K^{+}$ | $CO_3^{=}$ | $HCO_3^{-}$ | $Cl^{-}$ | $SO_4^{=}$ | | | | | |
| F.1 | 7.4 | 2.33 | 0.62 | 9.45 | 8.58 | 1.36 | 12.6 | 0.75 | - | 6.23 | 11.1 | 5.9 | 49.0 | 74.1 | 20.8 | 5.1 | Sandy Loam |
| F.2 | 7.38 | 2.21 | 0.62 | 7.30 | 6.50 | 2.5 | 11.16 | 1.9 | - | 5.65 | 10.2 | 5.19 | 131.0 | 71.9 | 18.6 | 9.5 | Sandy Loam |
| F.3 | 7 | 2.18 | 0.94 | 5.4 | 7.31 | 1.56 | 9.13 | 3.8 | - | 4.9 | 12.0 | 4.82 | 251.0 | 71.0 | 15.0 | 14.0 | Sandy Loam |

**F.1 = K Class Probable response (deficient to low)**
**F.2 = K Class Low residue (Adequate)** **F.3 = K Class Medium residue (High)**

**Table (2): Potassium applied to soils at three rates by two methods of application through different periods to palms of "Khalas" cultivars.**

| Treat. No. | k levels/palm/year | Method of application | Period of K application | | |
|---|---|---|---|---|---|
| | | | March | May | December |
| 1 | 2000 | B* A | - | 1000 | 1000 |
| 2 | 2000 | H** A | - | 1000 | 1000 |
| 3 | 2000 | B b | 666.7 | 666.7 | 666.7 |
| 4 | 2000 | H b | 666.7 | 666.7 | 666.7 |
| 5 | 2000 | B C | - | 2000 | - |
| 6 | 2000 | H C | - | 2000 | - |
| 7 | 3000 | B | - | 1500 | 1500 |
| 8 | 3000 | H | - | 1500 | 1500 |
| 9 | 3000 | B | 1000 | 1000 | 1000 |
| 10 | 3000 | H | 1000 | 1000 | 1000 |
| 11 | 3000 | B | - | 3000 | - |
| 12 | 3000 | H | - | 3000 | - |
| 13 | 4500 | B | - | 2225 | 2225 |
| 14 | 4500 | H | - | 2225 | 2225 |
| 15 | 4500 | B | 1500 | 1500 | 1500 |
| 16 | 4500 | H | 1500 | 1500 | 1500 |
| 17 | 4500 | B | - | 4500 | - |
| 18 | 4500 | H | - | 4500 | - |
| Control @ 0000 | | - | - | - | - |

Control Palms control were left to receive the normal fertilizer program without any potassium addition

B* Broadcasted on the soil surface. H** Disked in holes.

A K fertilizer was added in two equal doses in May and December.

b K fertilizer was added in three equal doses in March, May and December.

C K fertilizer was added in one dose in May

## MEASUREMENTS

a) Growth measurements were carried out by counting the average number of new growing leaves / palm during the growth season. Also, the average length of a certain leaf tagged on each palm was recorded.

b) Leaf N, P, K, Ca and Mg contents were determined in the pinnae samples taken from the middle portion of the leaf recommended by Chapman and Pratt (1967) and calculated as percentages on the dry matter basis.

c) The fruit fresh weight of each treated palm was determined through weighing a sample of 50 dates then the date length, width, volume, were determined according to the standard methods in this respect.

# RESULTS AND DISCUSSION

### 1.Effect of potassium fertilization on leaf growth of "Khalas" date palms:

In general the results of Tables (3) indicated the K fertilization led to a significant increase of leaf number and leaf length of palm as compared with control treatment. This was true for all (rates, method and period of application). In case of soil have low content of available K; the highest values of leaf number and leaf length were obtained at rate of 4.5 kg K/palm

added to soil in three equal doses by method of filling holes in soil. While in the case of high available k content, the highest value of leaf number and leaf length were obtained at rate of 2.0 kg K/palm added to soil in the three equal doses by method of filling holes. The beneficial effect of K fertilization may be attributed to the essentiality of this element in regulating plant metabolism such as translocation of carbohydrates, with plant organs; proteins synthesis and rate of transpiration through the close and opening of stomatal leaf Mayer and Anderson (1970). The results also indicate that the high response of K fertilization added to palm tree was in case of soil have low available K content. These results are accordance with those obtained by Shahin (2005) who reported that K fertilizer applications might be needed for the date palm soil, for response, probable response or the maintenance of soil fertility K seemed to be the growth-limiting factor for date palm in Al-Hassa region.

**2. Effect of potassium fertilization on the content (%) of N, P, K, Ca and Mg in leaf "Khalas" date palm.**

The results of Table (4) revealed that K fertilization gave a significant increase in the content of N, P, K and Ca, but the increase of Mg content was insignificant. The highest value of all nutrients content under investigation were obtained as the rate of 4.5 kg K/palm added to soil in three equal doses by disking in holes through March, May and December months. This was true for all K treatments, also noticed K fertilization had little significant on phosphorus content in leaf of date palm this may be due to the phosphorus content in the soil tended to fluctuate from season to another. However, it seems to be, that "Khalas" date palms grown under the experimental orchard are not in need to

**Table(3):Effect of Potassium fertilization on leaf growth of "Khalas" date Palms.**

| Treatment | Average number of new growing leaves/ palm | | | Average leaf length. Cm. | | |
|---|---|---|---|---|---|---|
| | F1 | F2 | F3 | F1 | F2 | F3 |
| 1- Potassium Level (Kgs/ palm/ year) | | | | | | |
| 2.0 Kg | 23.06 | 24.15 | 24.60 | 35.60 | 35.40 | 36.00 |
| 3.0 Kg | 24.40 | 24.10 | 24.20 | 36.10 | 35.70 | 36.20 |
| 4.5 Kg | 24.90 | 21.00 | 24.10 | 28.60 | 35.90 | 35.90 |
| Control | 16.20 | 20.12 | 21.9 | 28.00 | 32.00 | 34.00 |
| L.S.D at (0.05) | 0.60 | 0.51 | 0.12 | 0.56 | 0.47 | 0.1 |
| 2- Method of fertilizer application | | | | | | |
| Broadcasting | 18.70 | 22.90 | 22.00 | 36.00 | 34.80 | 35.7 |
| Filling in holes | 22.60 | 23.10 | 23.20 | 37.40 | 35.50 | 35.90 |
| Control | 16.20 | 20.12 | 21.90 | 28.00 | 32.00 | 34.00 |
| L.S.D at (0.05) | 0.8 | 0.4 | 0.15 | 0.6 | 0.12 | 0.08 |
| 3- Dosage Pattern | | | | | | |
| A | 23.10 | 21.90 | 22.00 | 33.90 | 34.00 | 35.50 |
| B | 24.16 | 22.50 | 23.20 | 36.50 | 35.60 | 36.80 |
| C | 22.14 | 21.00 | 22.60 | 31.90 | 33.60 | 34.90 |
| Control | 16.20 | 20.12 | 21.90 | 28.00 | 32.00 | 34.00 |
| L.S.D at (0.05) | 0.9 | 0.5 | 0.14 | 0.4 | 0.31 | 0.11 |

**The effect of interaction was not significant.**

**A : K fertilizer was added in two equal doses in May and December.**

**b : K fertilizer was added in three equal doses in March, May and December.**

**C : K fertilizer was added in one dose in May**

Table (4): Effect of Potassium fertilization on the content (%) of N, P, K, Ca and Mg in leaf of "Khalas" date palm

| Treatment | F1 | | | | | F2 | | | | | F3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Macronutrients content (%) | | | | | | | | | | | | | | |
| | N | P | K | Ca | Mg | N | P | K | Ca | Mg | N | P | K | Ca | Mg |
| Potassium level (Kgs / Palm / year) | | | | | | | | | | | | | | | |
| 2.0 Kg | 1.25 | 0.13 | 0.44 | 1.95 | 0.30 | 1.41 | 0.14 | 0.51 | 2.11 | 0.34 | 1.56 | 0.16 | 0.61 | 2.18 | 038 |
| 3.0 Kg | 1.34 | 0.14 | 0.58 | 2.10 | 0.30 | 1.46 | 0.15 | 0.58 | 2.16 | 0.33 | 1.49 | 0.17 | 0.64 | 2.21 | 038 |
| 4.5 Kg | 1.38 | 0.15 | 0.66 | 2.16 | 0.31 | 1.48 | 0.14 | 0.62 | 2.14 | 0.32 | 1.54 | 0.18 | 0.68 | 2.20 | 0.39 |
| Control | 1.15 | 0.12 | 0.31 | 1.70 | 0.29 | 1.32 | 0.14 | 0.46 | 1.95 | 0.31 | 1.38 | 0.15 | 0.51 | 2.00 | 0.38 |
| L.S.D at (0.05) | 0.40 | 0.30 | 0.60 | 0.80 | N.S | 0.30 | 0.40 | 0.40 | 0.20 | N.S. | 0.40 | 0.20 | 0.20 | 0.40 | N.S |
| Method of application | | | | | | | | | | | | | | | |
| Broadcasting | 1.36 | 0.14 | 0.62 | 2.07 | 0.30 | 1.42 | 0.15 | 0.61 | 2.10 | 0.32 | 1.52 | 0.16 | 0.66 | 0.18 | 0.38 |
| Disking in holes | 1.42 | 0.15 | 0.68 | 2.13 | 0.32 | 1.48 | 0.16 | 0.65 | 2.18 | 0.34 | 1.59 | 0.17 | 0.69 | 2.25 | 0.39 |
| Control | 1.15 | 0.12 | 0.31 | 1.70 | 0.29 | 1.32 | 0.14 | 0.46 | 1.95 | 0.31 | 1.38 | 0.16 | 0.51 | 2.00 | 0.38 |
| L.S.D.at (0.05) | 0.90 | 0.50 | 0.80 | 0.40 | N.S | 0.60 | 0.30 | 0.20 | 0.60 | N.S | 0.5 | 0.40 | 0.20 | 0.15 | N.S |
| Dosage pattern | | | | | | | | | | | | | | | |
| A | 1.32 | 0.14 | 0.59 | 2.00 | 0.31 | 1.44 | 0.16 | 0.65 | 2.14 | 0.34 | 1.49 | 0.16 | 0.64 | 2.16 | 0.40 |
| B | 1.39 | 0.13 | 0.64 | 2.12 | 0.31 | 1.52 | 0.17 | 0.69 | 2.19 | 0.32 | 1.56 | 0.16 | 0.68 | 2.21 | 0.41 |
| C | 1.36 | 0.13 | 0.50 | 1.90 | 0.30 | 1.40 | 0.15 | 0.60 | 2.08 | 031 | 1.43 | 0.16 | 0.59 | 2.13 | 0.40 |
| Control | 1.15 | 0.12 | 0.31 | 1.70 | 2.29 | 1.32 | 0.14 | 0.46 | 1.95 | 0.31 | 1.38 | 0.16 | 0.51 | 2.00 | 0.40 |
| L.S.D.at (0.05) | 0.70 | 0.60 | 0.90 | 0.60 | N.S. | 0.20 | 0.40 | 0.40 | 0.60 | N.S | 0.11 | N.S. | 0.50 | 0.70 | N.S |

F1 = K class probable response (deficient to low)
F2 = K class low residue (Adequate)
F3 = K class Medium residue (High)
A : K fertilizer was added in two equal doses in May and December.
b: K fertilizer was added in three equal doses in March, May and December.
C : K fertilizer was added in one dose in May
N.S. = non-significant

fertilization. This indicates that P content in soil was sufficient to supply palm tree by their P requirements. This results are agree with those obtained by M.A.Bacha *et al.*(1993). Who reported that the addition of K fertilizers did not significant effect on the P content in leaves of date palm.

It is interesting to say that the high response of palm tree to K fertilization was observed in soil have low content of K. This was very clear in case of potassium content in leaves of date palm, were the highest content of potassium was obtained when palm received 4.5 kg K/palm/year followed by 3 and 2 kg in decreasing order. This results are agree with those obtained by El- Deeb, *et al.*.(2000)

### 3. Effect of potassium fertilization on yield of "Khalas" date palm (kg/palm)

The results of table (5) showed that K fertilization gave a high significant increase of the date yield. The highest increase was observed in soil have low available K content (deficient to low), where the relative increase in the soil reached to 81%. While in case of the soil have high content of available K the relative increase equal 39% this indicating that high essentiality of K fertilization was more pronounced in soil have low available K content. Further more, the yield of "Khalas" date palm was increased by the method of application the relative increase in disking holes method reached

to 75% while in broadcast method the relative increase was 47% in soil have low available K content. However the effect of potassium fertilization on the yield of "Koalas" date palm the relative increase were 39% at the treatment of 4.5 kg K/palm applied through three equal doses and by disking in holes of soil have high available K content. These findings are in accordance with those reported by Hussein *et al.* (1977) Nixon and Carpenter (1978), Youns (1986), Khairi *et al.* (1993), Hussein *et al.* (1993), , Mohammad *et al.* (1998) and Abdullatif *et al.*. (2000) . They found that the potassium fertilization increase the size and fresh weight of date palm fruit and yield.

**4.The effect of Potassium fertilization on the physical characteristic (weight, volume, diameter and length ) of fruits "Khalas" date palm.**

Concerning the effect of potassium fertilization on the physical characteristics ( fruit weight, volume, diameter and length) of fruits "Khalas" date it is clear from Table (6) that potassium fertilization treatment significantly increased fruit weight for all experimental treatment. The increased (%) were 40.7, 10.32 and 8.63 for F1, F2 and F3 soils respectively in comparison with control treatment of each soil. These results might be due to the effect of potassium essential for water regulation and uptake as well, as movements of sugars. Sourour,M.M.,*et al.*.(1998) David *et al.*. (2000) and P.Klein *et al.*. (2000).Generally, it could be notice that both fruit volume , diameter and it length has similar trends of fruit weight. The best results was obtained from treatment received 4.5 Kg K/ palm tree added to soil by filling in holes through three equal doses in March, May and December . These results could be attributed to the effect of potassium on weight and size of fruits due to their stimulation for fruit growth.

**Table (5) :The effect of Potassium fertilization on yield ( kg/palm ) of "Khalas" date palm.**

| Treatment | F1 | | F2 | | F2 | |
|---|---|---|---|---|---|---|
| | Yield kg/palm | Increase (%) | Yield kg/palm | Increase (%) | Yield kg/palm | Increase (%) |
| Potassium level (Kgs /Palm/ year) | | | | | | |
| 2.0 Kg | 65.0 | 33% | 79.0 | 27% | 87.0 | 22% |
| 3.0 Kg | 78.0 | 59% | 86.0 | 38% | 94.0 | 32% |
| 4.5 Kg | 89.0 | 81% | 91.0 | 46% | 99.0 | 39% |
| Control | 49.0 | - | 62.0 | - | 71.0 | - |
| L.S.D at (0.05) | 0.6 | 0.6 | 0.4 | 0.4 | 0.35 | 0.35 |
| Method of application | | | | | | |
| Broadcasting | 72 | 46% | 82.0 | 32% | 84 | 18% |
| Disking in holes | 86 | 75% | 89.0 | 43% | 96 | 35% |
| Control | 49 | - | 62.0 | - | 71.0 | - |
| L.S.D at (0.05) | 0.5 | 0.5 | 0.5 | 0.5 | 0.3 | 0.3 |
| Dosage pattern | | | | | | |
| A | 70 | 43% | 80.0 | 29% | 85.0 | 19% |
| B | 83 | 69% | 91.0 | 46% | 93.0 | 31% |
| C | 64 | 32% | 78.0 | 26% | 91.0 | 28% |
| Control | 49 | - | 62.0 | - | 71.0 | - |
| L.S.D at (0.05) | 0.8 | 0.8 | 0.6 | 0.6 | 0.5 | 0.5 |

F1 = K class probable response (deficient to low).F2 = K class low residue (Adequate). F3 = K class Medium residue (High). A : K fertilizer was added in two equal doses in May and December.

b : K fertilizer was added in three equal doses in March, May and December.

C : K fertilizer was added in one dose in May N.S. = non-significant

**Table(6):The effect of Potassium fertilization on the physical characteristic (weight, volume, diameter and length ) of "Khalas" date palm fruits .**

| Treatment | F1 | | | | F2 | | | | F3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fruit weight (g) | Fruit volume (cc) | Fruit diameter (cm) | Fruit length (cm) | Fruit weight (g) | Fruit volume (cc) | Fruit diameter (cm) | Fruit length (cm) | Fruit weight (g) | Fruit volume (cc) | Fruit diameter (cm) | Fruit length (cm) |
| Potassium level (Kgs /Palm/ year) | | | | | | | | | | | | |
| 2.0 Kg | 9.15 | 8.20 | 2.03 | 3.10 | 11.0 | 9.8 | 2.40 | 4.00 | 11.25 | 10.10 | 2.46 | 4.18 |
| 3.0 Kg | 10.86 | 9.9 | 2.05 | 3.16 | 11.5 | 10.07 | 2.48 | 4.02 | 11.40 | 10.36 | 2.54 | 4.22 |
| 4.5 Kg | 11.40 | 10.40 | 2.08 | 3.25 | 11.82 | 10.95 | 2.61 | 4.08 | 11.95 | 10.95 | 2.61 | 4.27 |
| Control | 8.10 | 6.9 | 1.98 | 3.00 | 10.60 | 9.00 | 2.02 | 3.60 | 11.00 | 9.48 | 2.12 | 4.03 |
| L.S.D at (0.05) | 0.4 | 0.3 | 0.12 | 0.11 | 0.2 | 0.15 | 0.2 | 0.11 | 0.3 | 0.4 | 0.2 | 0.2 |
| Method of application | | | | | | | | | | | | |
| Broadcasting | 10.8 | 9.65 | 2.06 | 3.14 | 11.40 | 9.96 | 2.36 | 4.04 | 11.51 | 10.15 | 2.40 | 4.16 |
| Disking in holes | 11.25 | 10.27 | 2.09 | 3.26 | 11.61 | 10.50 | 2.44 | 4.10 | 11.89 | 10.62 | 2.58 | 4.20 |
| Control | 8.10 | 6.90 | 1.98 | 3.00 | 10.6 | 9.00 | 2.02 | 3.60 | 11.00 | 9.48 | 2.12 | 4.03 |
| L.S.D at (0.05) | 0.5 | 0.4 | 0.21 | 0.19 | 0.50 | 0.25 | 0.22 | 0.13 | 0.18 | 0.34 | 0.14 | 0.21 |
| Dosage pattern | | | | | | | | | | | | |
| A | 11.29 | 10.14 | 2.10 | 3.18 | 11.40 | 9.96 | 2.30 | 4.02 | 11.61 | 10.20 | 2.37 | 4.16 |
| B | 11.85 | 10.30 | 2.19 | 3.31 | 11.63 | 10.21 | 2.41 | 4.08 | 11.75 | 10.41 | 2.59 | 4.39 |
| C | 9.95 | 9.91 | 2.03 | 3.10 | 11.34 | 9.60 | 2.22 | 4.00 | 11.49 | 10.00 | 2.19 | 4.26 |
| Control | 8.10 | 6.90 | 1.98 | 3.00 | 10.60 | 9.00 | 2.02 | 3.60 | 11.00 | 9.48 | 2.12 | 4.03 |
| L.S.D at (0.05) | 0.4 | 0.4 | 0.19 | 0.16 | 0.11 | 0.14 | 0.16 | 0.10 | 0.14 | 0.25 | 0.16 | 0.4 |

F1 = K class probable response (deficient to low).F2= K class low residue (Adequate). F3 = K class Medium residue (High). A : K fertilizer was added in two equal doses in May and December. b: K fertilizer was added in three equal doses in March, May and December. C : K fertilizer was added in one dose in May N.S. = in-significant

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## تأثير التسميد البوتاسى على النمو ومحتوى الأوراق من العناصر الغذائية ومحصول نخيل التمر صنف "الخلاص" بواحة الأحساء بالمملكة العربية السعودية

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أجريت هذه الدراسة خلال موسم ٢٠٠٥م على أشجار نخيل صنف "خلاص" عمرها حوالي ٢٠ سنة نامية فى أراضى تختلف فى محتواها من البوتاسيوم القابل للافادة (أرض ذات محتوى منخفض، أرض ذات محتوى متوسط، أرض ذات محتوى عالى من البوتاسيوم القابل للأفادة ) بواحة الأحساء بالمملكة العربية السعودية.

أوضحت النتائج أن أحسن معاملة بالبوتاسيوم كانت٤,٥ كجم سلفات بوتاسيوم (٥٠% بو٢أ )/نخلة /سنة. وأن أعلى أستجابة للتسميد البوتاسى كانت فى الأراضى ذات المحتوى المنخفض من البوتاسيوم القابل للأفادة.

وكانت طريقة أضافة السماد فى حفرة على عمق حوالى ١٠سم تحت سطح التربة حول جذع النخلة أفضل من اضافته نثراً على سطح التربة. كذلك أوضحت النتائج أن أنسب موعد للأضافة هو أضافة السماد على ثلاث دفعات متساوية خلال أشهر مارس ، مايو، وديسمبر يليها أضافته على دفعتين متساويتين فى شهرى مايو وديسمبر أفضل من أضافتها دفعة واحدة خلال شهر مايو.