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IMPACT OF DIFFERENT SOURCES OF NITROGEN FERTILIZERS ON PERFORMANCE GROWTH OF DATE PALM (*Phoenix dactylifera* L. cv. Bartomouda)

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ABSTRACT

A green house experiment was carried out in two successive seasons on date Palm plantlets (*Phoenix dactylifera* L. cv. Bartomouda) from 2012 to 2013, to evaluated the effectiveness of different sources of nitrogen fertilizer at four treatments as (T2) 5 g/l ammonium sulfate 20 % (1 g nitrogen), (T3) 3 g/l potassium nitrate 33% (1 g nitrogen) and (T4) 2 g/l urea (46%) with the irrigation water one time/ week. The design of the experiment was randomized complete with three replicates. The results revealed that, plant height cm, leaves numbers, root length cm and numbers, and fresh and dry weights of leaves and roots were increasing highly significantly with 3 g/l of potassium nitrate graduated by 2 g/l urea and 5 g/l ammonium sulfate respectively at both seasons. Chlorophyll a, b and carotenoids contents showed significant rising with 3 g/l potassium nitrate. Greatest significant contents of indole and proline were obtained under T3 for two seasons. Leaves nitrogen content N was increased by 2 g/l urea in the two seasons; on the other hand, root nitrogen content was increased with treatment 3 g/l potassium nitrate, sequenced by T2 and T4 treatments. Leaves and roots phosphorus P content significantly raising under 3g/l potassium nitrate and 5 g/l ammonium sulfate for two seasons. In the presence of 5 g/l ammonium sulfate and 3 g/l potassium nitrate leaves and root potassium content K were largest at two seasons respectively. This research shows that the nitrogen formula as potassium nitrate > ammonium sulfate > urea were recommended to highly increasing growth of date palm plantlets in the green house.

INTRODUCTION

Date palm (*Phoenix dactylifera* L.) yield and fruit quality are mostly dependant on cultivar, pollination, fertilization, and water relations **(Iqbal et al 2004)**. Date palm is one of the oldest fruit trees in the world. It is known as “tree of life” because of its resilience, its need for limited water inputs, its long term productivity and its multiple purpose qualities. In Egypt, dates are important traditional crops. Egypt is considered as the first country of the top ten date producers (1,130,000 tones) **FAO (2010).** Huge reductions in soil minerals content must be compensated annually by good fertilization programs in order to maintain the high yield and good quality of dates. The use of chemical fertilizer is necessary for supplying the nutrient requirements. However, the continuous use of chemical fertilization leads to deterioration of soil characteristics and fertility as well as it might lead to the accumulation of heavy metals in plant tissues which contribute to fruit nutrition value and edible quality **(Shimbo et al 2001)**. Quick-release sources are water-soluble (e. g., ammonium nitrate, urea, ammonium sulfate); they will release nitrogen into the soil solution rapidly with rainfall or irrigation, Ammonium (NH_4^+) and nitrate (NO_3^-) are the most important inorganic N sources in soils readily available to plants. For many plants, NH_4^+, when supplied solely at high concentrations, is toxic and impairs plant growth **(Britto and Kronzucker 2002)**. The forms and levels of nitrogen, the cultivars and the physico-chemical properties of the soil are all related to the use of nitrogen by plants **(Li et al 2007)**.

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Different growth characteristics were affected by different sources of nitrogen application as ammonium (NH_4^+), nitrate (NO_3-) and urea are the forms of nitrogen generally applied. Different nitrogen sources may be preferred for use with different plant species, The form of nitrogen applied can play a significant role in plant growth and productivity, Fertilizers are extremely important factors in determining horticultural crop yield, quality and nutritional content **(Marschner 1995, Martinez-Ballestra et al 2008 and Sady et al 2008)**.

Nitrogen is the element in highest demand in terms of quantity and makes up about 2% to 3% of plant dry matter, Nitrate NO_3 application increased leaves weight, plant growth, root/shoot ratio, total nitrogen uptake, the contents of leaves N, P and K **(Kim et al 2000** on pecan *Carya illioensis,* and **Carrington et al 2000** on Saw palmetto (*Serenoa repens*). Total N, P, K, Fe, Mg, Zn and Mn, amino acids leaves content, biomass increased by application of NH_4^+ + NO_3 (**Ruan et al 2007** *on Camellia sinensis* L). Ammonium sulfate, ammonium nitrate and urea at 350 to 1050 g/tree increased N, P, and K leaves contents of date palm **(Saleh, 2009 and Kassem, 2012)**. Potassium sulfate 3 kg/tree (48% K_2O) and potassium nitrate increased number of leaves of date palm cv. Kabkab and chlorophyll contents of peach **(Abdi and Hedayat 2010** on date palm *Phoenix dactylifera* L. and **Sarfaraz**, **2010** on peach *Prunus persica* L. cv. Early coronet)). 150 kg/ha as urea increased plant height, leaves numbers shoot fresh and dry weights and total P in carrot *Daucus carrota* L. **(Mehedi et al 2012)**. Therefore, the main object of this work was to determined the evaluated of different sources of nitrogen fertilizers on the growth of date palm under greenhouse condition.

MATERIALS AND METHODS

This work conducted to identify the effect of different sources of nitrogen fertilizer as ammonium sulfate, potassium nitrate and urea on the growth of date Palm plantlets (*Phoenix dactylifera* L. cv. Bartomouda) in two seasons 2012-2013 in the green house of Central Laboratory for Research and Development of Date Palm (ARC), Giza. These plantlets were achieved by tissue culture technique and subjected with treatments after 6 months from acclimatization stage and cultured in the plastic bags (40 cm length and 25 cm for width) which filled in peat moss + sand 2:1, the plantlets described as (20-25 cm in length, 4-5 leaves/ plantlet, 3-4 roots/plantlet and 30-35cm for root length). All plantlets were subjected with four treatments of different nitrogen forms one time/week:

1- (T1) control treatment (tap water)
2- (T2) 5 g/l ammonium sulfate 20% N (1 g nitrogen)
3- (T3) 3 g/l potassium nitrate 33% N (1 g nitrogen)
4- (T4) 2 g/l urea (46%)

The plantlets were received 0.5 g/l potassium sulfate as K_2O + 0.5 g/l P_2O_5 as single super phosphate before three days from nitrogen treatments, plantlets were irrigated at two times per week., vegetative growth and chemical contents were determined after each seasons.

Vegetative growth

1- Plant height (cm) 2- leaves numbers/plantlet
3- length (cm) and number of roots
4- Fresh and dry weight of leaves and roots (g)

Chemical contents

1- Chlorophyll a,b and carotenoids
2- Indoles mg/g f.w.
3- Proline mg/g d.w.
4- N, P and K %. leaves and roots contents

Chlorophyll as described by **Lichtentaler and Wellburn (1985)**.
Indoles as according to **Larsen et al (1962).**
Proline as **Bates et al (1973).**
N, P and **K** as described by **Jackson (1973)**.

Experimental design: Complete randomized block design with three replicates and three plantlets for each one, two growth seasons (8 months for each). Data were analyzed by analysis of variances (ANOVA) and the means were compared following t- test using L.S.D. values at 5% level **(Snedecor and Chocran 1980)**.

RESULTS

Vegetative characteristics of date palm plantlets plant height, leaves numbers, length and numbers of roots, fresh and dry weights of leaves and roots showed significant growth response to different sources of nitrogen fertilizers applications, ammonium sulfate T2, potassium nitrate T3 and urea T4.

Plant height cm

Plants heights of date palm **(Table 1)** were varied significantly from 24.0 and 27 cm in control (tap water only) to 67.3 and 89.7 cm respectively for 1st

and 2nd seasons in plants that received T3 potassium nitrate at 3 g/l sequenced by (T4) 2g/l urea and (T2) 5 g/l ammonium sulfate were recorded 65.0 and 84.7 cm and 57.3 and 70.0 cm respectively for two treatments and 1st and 2nd seasons.

Leaves numbers

Data of both seasons presented in **(Table 1)** elucidated that, significant increasing of leaves numbers /plantlet under different sources of nitrogen fertilizers at 1st and 2nd seasons, leaves numbers/plantlet of date palm were highly significant performed from 7.9 leaves/plantlet in 1st season to 12.4 leaves/plantlet in the 2nd season under (T3) 3 g/l potassium nitrate followed by other nitrogen sources (T2) and (T4), fewer numbers of leaves were found with control treatment 5.0 and 6.3 leaves respectively in 1st and 2nd seasons.

Root length cm and roots numbers

The results on the effect of different nitrogen fertilizers treatments on root length are presented in **(Table 1)** illustrated, the superiority for significant longest roots with the treatment (T3) 3g/l potassium nitrate which produced 64.0 and 66.7cm in the 1st and 2nd seasons respectively, graduated by (T2) ammonium sulfate 5g/l and (T4) 2g/l urea, these higher increment of root length not found with untreated plantlets (control treatment) which attained the shortest roots 28.3 and 35.1 cm in the 1st and 2nd seasons respectively. However, in the same trend the numbers of roots were significant increasing under (T3) treatments in the 1st and 2nd season, the plantlets were received (T4) 2g/l urea had left fewer number of roots at 1st and 2nd seasons respectively in compared to other nitrogen treatments.

Fresh and dry weights of leaves and roots (g)

The survey results cleared that, the plantlets leaves fresh and dry weights were differs between the treatments of different nitrogen sources **(Table 2)**, the plantlets which received T3 3g/l potassium nitrate scored the highest weights of leaves 6.7 and 7.4 g in 1st and 2nd respectively for fresh weight and 2.9 and 3.3 g in 1st and 2nd respectively for dry weights of leaves, significant differences between two other sources of nitrogen T2 5g/l ammonium sulfate and T4 2g/l urea on the fresh and dry weights of leaves, moreover, smallest fresh and dry weights of leaves were found under control treatment. Regarding to the different nitrogen sources on the fresh and dry weights of roots **(Table 2)** clarified that, different supplements of nitrogen sources were significant performance fresh and dry weights of roots compared to control treatments, highly performance was obtained with T3 in 1st and 2nd season sequenced by two other nitrogen sources T2 and T4

Chlorophyll a, b and carotenoids mg/g f.w.

In conducted to determine the chlorophyll a, b and carotenoides content of leaves date palm under different nitrogen sources in **(Table 3)**, it's appeared that T3 as 3g/l potassium nitrate proved the significant leave chlorophyll a contents 0.88 mg/g f.w. for 1st season and 0.91 mg/g f.w for 2nd season, graduated by two other nitrogen sources T2 as 5 g/l ammonium sulfate (0.85 mg/g f.w. for 1st season and 0.87 mg/g f.w. for 2nd season) and T4 as 2g/l urea (0.61 mg/g f.w. for 1st season and 0.65 mg/g f.w. for 2nd season), the biggest significant of chlorophyll b contents came out under T3 recorded 0.45 and 0.46 mg/g f.w. for 1st and 2nd seasons respectively, whereas T4 had 0.28 and 0.30 mg/g f.w. for 1st and 2nd seasons respectively, lowest contents was achieved with control treatment, carotenoides leave contents were greatest with T3 produced 0.51 and 0.55 mg/g f.w. respectively for 1st and 2nd seasons, on the other hand sequenced results were found with two other nitrogen sources T2 and T4.

Indole contents mg/g f.w.

It's appeared that results recorded in **(Table 3)** the indole leaves of date palm contents was significant varied from different nitrogen sources ammonium sulfate T2, potassium nitrate T3, urea T4, the treatment T3 resulted the majority for the higher indole contents 22.5 and 23.3 mg/g f.w. respectively in 1st and 2nd seasons in comparing other nitrogen sources, T2 recorded 19.4 and 20.4 mg/g f.w. and T4 had 17.4 and 18.1 mg/g f.w. with significant variance in between, meanwhile smallest contents of indole contents was achieved with control treatment.

Proline mg/g d.w.

It's to be come to light that, there were significant variance clarified among different nitrogen sources on the leaves proline contents **(Table 3)** compared to control treatments which caused the

Table 1. Effect of different sources of nitrogen fertilizer on vegetative growth of date palm plantlet (*Phoenix dactylifera* L.) in the green house in the 1st and 2nd seasons

Vegetative growth / treatments	Plant height (cm)		Leaves numbers		Root length (cm)		Roots numbers	
	first season	Second season	first season	Second season	first season	Second season	first season	Second season
T1	24.0	27.0	5.0	6.3	28.3	35.1	6.3	7.0
T2	57.3	70.0	6.3	9.5	47.0	55.3	9.0	10.0
T3	67.4	89.7	7.9	12.4	64.0	66.7	10.3	12.0
T4	65.0	84.7	5.4	8.2	44.7	55.0	8.3	9.3
L.S.D.	= 1.9	= 3.8	= 2.1	= 3.3	= 4.7	= 4.0	= 0.9	= 1.0

Table 2. Effect of different sources of nitrogen fertilizer on fresh and dry weights of leaves and roots of date palm plantlets (*Phoenix dactylifera* L) in the green house in the 1st and 2nd seasons

Vegetative growth / treatments	Leaves fresh weight (g)		Leaves dry weight (g)		Root fresh weight (g)		Roots dry weight (g)	
	first season	Second season	first season	Second season	first season	Second season	first season	Second season
T1	2.3	2.6	0.9	1.2	2.1	2.4	0.6	0.8
T2	5.8	6.4	2.5	3.1	3.6	3.9	1.1	1.8
T3	6.7	7.4	2.9	3.3	3.8	4.9	1.5	2.0
T4	5.5	6.6	2.4	2.8	2.4	2.7	0.6	1.5
L.S.D.	= 0.2	= 0.3	= 0.1	= 0.4	= 0.2	= 0.5	= 0.1	= 0.1

Table 3. Effect of different sources of nitrogen fertilizer on chlorophyll a, b and carotenoides mg/g f.w., indoles mg/g f.w. and proline mg/g d.w. of date palm plantlets (*Phoenix dactylifera* L) in the green house in the 1st and 2nd seasons

Vegetative growth / treatments	Chlorophyll a mg/g f.w		Chlorophyll b mg/g f.w		Carotenoides mg/g f.w		Indoles mg/g f.w.		Proline mg/g d.w.	
	first season	Second season	first season	Second season	first season	Second season	first season	Second season	first season	Second season
T1	0.54	0.56	0.17	0.18	0.40	0.41	6.2	6.3	0.3	0.4
T2	0.85	0.87	0.28	0.30	0.49	0.53	19.4	20.4	2.2	2.6
T3	0.88	0.91	0.45	0.46	0.51	0.55	22.5	23.3	3.2	3.6
T4	0.61	0.65	0.28	0.30	0.45	0.47	17.4	18.1	2.9	3.1
L.S.D.	= 0.02	= 0.03	=0.03	= 0.04	= 0.01	= 0.01	= 1.2	=1.4	= 0.1	= 0.1

little proline contents, greatest significant contents of proline was recorded with treatment T3 which increasing from 3.2 mg/g d.w. in 1st season to 3.6 mg/g d.w. for 2nd season, meanwhile, 2.9 mg/g d.w. in 1st season to 3.1 mg/g d.w. in 2nd season given by treatment T4 graduated by T2 produced 2.2 and 2.6 mg/g d.w. respectively in 1st and 2nd seasons

Leaves contents of N,P and K %

As shown in **(Table 4)** N, P and K % leaves contents varied according to the sources of nitrogen fertilizer, mean values of N percent % was graduated from T4, T3, T2 with differs among them, higher contents was scored 3.4 and 3.8 % in the 1st and 2nd seasons under T4 as 2 g/l urea,

T3 as 3 g/l potassium nitrate created 2.9 and 3.3% in the 1st and 2nd seasons, lowest nitrogen contents obtained by un fertilized plantlets (control treatment). Highest percent of phosphorus was appeared under T2 and T3 with no differences was found in between. Leaves potassium accumulation was highest in the 1st and 2nd seasons under T3 graduated by T4 treatment. Lowest potassium contents were found with control treatment.

Root contents of N, P and K %

In relation to the root contents N,P and K percent % **(Table 4)** root nitrogen percent was bringing highly with T3 as 3 g/l potassium nitrate scored 2.3% in 1st season to 2.6% in 2nd season, while two other nitrogen sources were given 2.0 and 2.4 % in the 1st and 2nd seasons respectively for T2 and 2.2 and 2.4 in the 1st and 2nd seasons for T4, the plantlets un received fertilizers showed the smallest percent of root nitrogen content. Highly phosphorus percent root content **(Table 4)** was related to the nitrogen source application that T3 and T4 compared with control treatment (un fertilized plantlets). Concerning the root potassium percent %, the rising potassium contents given under T2 as 5g/l ammonium sulfate in the 1st and 2nd seasons, in compared to the other nitrogen sources T3 and T4, as well as control treatment had the smallest percent root potassium content.

DISCUSSION

Results on the date palm growth characteristics showed that, the different application of nitrogen sources which included the macronutrient NPK were produced healthy growth of date palm plantlets. The establishment and growth performance of nursery plants of several tree species is positively related to the amount of nitrogen (N) reserves at planting. For this reason, increasing the amount of N reserves has become a goal of orchard and nursery management **(Dong et al 2002)**, most compound fertilizers will contain three elements essential for plant growth: NPK which stands for nitrogen (promotes leaf growth, chlorophyll component, and it promotes vegetative growth and green colouration of foliage), phosphorus (root, flower, and fruit, plays a major role in photosynthesis, respiration, energy storage, cell division, and maturation), and potassium (stem and root growth and important in plant metabolism, protein synthesis **(Chude et al 2004 and Remison 2005)**, fertilizers play an important role in increasing crop production. The main macronutrients present in inorganic fertilizers are nitrogen, phosphorus, and potassium which influence vegetative and reproductive phase of plant growth **(Patil, 2010)**.

Date palm plantlets are much needed to fertilizers NPK in the acclimatization stage in the greenhouse for highly promote growth and possibility cultured them in the open field, date palm is a most important fruit crops. In Egypt, date palm ranked the third crop after orange and grape because of date palm can grow and produce under a wide rang of soil and climatic conditions, growers have mistakenly believed that it does not require much attention. The successful orchard management practices are directed toward obtaining a suitable yield with good fruit quality (**Agric. Econ. Bull., 2005)**, Potassium is also an important nutrient for date palm growth and productivity (**Al-Kharusi et al 2009)**, Potassium is necessary for basic physiological functions, such as the formation of sugars and starch, the synthesis of proteins, cell division and growth, fruit formation and could improve fruit size, flavour and colour (**Abbas and Fares 2008)**.

Different vegetative growth of date palm were significant affected by application of various nitrogen sources potassium nitrate, urea, ammonium sulfate. The form of nitrogen applied can play a significant role in plant growth and productivity Ammonium (NH4+), nitrate (NO_3-) and urea are the forms of nitrogen generally applied (**Sady et al 2008)**. A balance of nitrate and ammonium nutrion is recommended for optimal plant growth, ammonium should not exceed 50% of the total nitrogen supply, and nitrate should not exceed 60% of total nitrogen supply (**Charles 1998 and Fageria 2006**)

Plant height (cm), leaves numbers/plantlet **(Table 1)** scored higher significant increasing with potassium nitrate sequenced by urea, 920 g N+ 700 g P2O5 + 1000 g K2O increased number of strands/spathe of date palm cv. Dhakki **(Muhammad et al 1992)**, 1300 g -4.5 Kg/tree potassium sulfate, urea at 1300 g increased number of leaflet of date palm cv sayer (**Diyalami and Garshasbi 2009)**, 38g/tree and urea (46%) increased trees height, leaves numbers and branches length of peach tree **(Jassim 2010)**, urea at 0.75 and 112.50 mg increased significantly plant height and number of leaves of *Khaya senegalensis* African Mahogny **(Focho et al 2011),** urea at 180 Kg/ha and NPK at 361 Kg/ha increased plant height and number of leaves of (*Glycin max* L.) soybean **(Yagoub et al 2012).**

Table 4. Effect of different sources of nitrogen fertilizer on leaves and roots N, P% and K % of date palm plantlets (*Phoenix dactylifera* L.) in the green house in the first season 1st and 2nd seasons

Vegetative growth / treatments	Leaves nitrogen %		Leaves phosphorus %		Leaves potassium %		Roots nitrogen %		Roots Phosphorus %		Roots Potassium %	
	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd
T1	1.0	1.0	0.36	0.36	0.98	1.0	0.99	1.0	0.23	0.24	0.58	0.62
T2	2.3	2.6	0.91	0.93	1.04	1.1	2.0	2.4	0.84	0.85	1.6	1.6
T3	2.9	3.3	0.91	0.93	2.7	2.8	2.3	2.6	0.86	0.87	0.91	0.97
T4	3.4	3.8	0.83	0.89	2.4	2. 5	2.2	2.4	0.86	0.87	1.2	1.3
L.S.D.	=0.4	=0.6	= 0.01	= 0.01	= 1.6	= 1.3	= 0.2	= 0.1	= 0.02	= 0.01	= 1.1	= 1.1

Root length and numbers **(Table 1)** exhibited significant longest roots and greatest numbers under potassium nitrate followed by ammonium sulfate, these results reflected to the importance of potassium in root growth by enhancing carbohydrates formation of all plants, complete fertilizers NPK (ammonium nitrate, superphosphate P2O5 and potassium sulfate 48%) increased root length and numbers (**Waheed et al 2001** on tea trees (*Camellia sinensis*), 100 Kg N/ha, 60 Kg/ha of P_2O_5 and 30Kg/ha of K_2O increased root length of *Amaring anthus curentus* (**Akande, 2006)**, potassium sulfate at 125 g as 48% K_2O , 387.1 g as 15.5 P_2O_5 (calcium superphosphate) and urea 46% at 391.3 increased roots numbers of *Senna occidentalis* (**Kamel and Weam 2009)**.

Fresh and dry weights of leaves and roots affected by different nitrogen sources, the highest weights of leaves as fresh and dry was found with potassium nitrate T3 succeeded by urea T4 and ammonium sulfate T2. Increasing of fresh weights of leaves and roots of saffron (*Crocus sativus* L.) under different sources of nitrogen as ammonium nitrate and sulfate, urea and calcium ammonium nitrate (**Mesude and Aysun, 2005**), N have a strong effect on various growth parameters, such as biomass and yield (**Salvagiotti and Miralles 2008)**, potassium sulfate and P_2O_5 increased fresh weight of roots of (*Rhapis excelsa*) lady palm (**Petterson et al 2008)**, 120 Kg N/ha increased fresh and dry weights of peach leaves *Prunus persica* L. (**Xavier**, **2010**), Recently, ammonium nitrate 33% N and urea increased fresh and dry weights (**Ibrahim** on *Datura innoxia* Mill 2013 and **Priyadarshani et al** on Vetiver (*Vetiveria zizanioides* L.) **2013)**.

As for the chemical characteristics, chlorophyll a,b and carotenoides contents which have the main role of photosynthesis process and formation of carbohydrates and other important substances for plant life, data **(Table 3)** showed significant effect for different applications of nitrogen sources. Moreover, the nitrogen source as potassium nitrate performed the greatest contents of chlorophyll a,b and carotenoides sequenced by ammonium sulfate and urea, 33% N and NPK increased chlorophyll contents significantly (**Baset Mia et al 2009** on banana and **Ebtihaj, 2012** on date palm cv Barhi), urea 46% N (200 kg/hat) increased chlorophyll contents of *Solanum tuberosum* L (**Taha**, **2010**), urea at 1Kg/tree, 350 gr/tree P_2O_5 and 450gr/tree potassium sulfate significant greatest the chlorophyll content (**Ayad**, **2010** on peach *Prunus persica* L. and **Bybordi, 2013** on apricot *Prunus armeniaca*),

Indoles contents **(Table 3)** was found higher under potassium nitrate and urea with significant differs in between, these results attributed to the important of nitrogen in the protein metabolism process in which reflected in strongly increased key enzyme activities and improved indoles metabolism in the plant cell which involved to all plant build up, 33% NH_4NO_3, P_2O_5 and potassium sulphate increased contents of indoles (**Darwesh 2010 on *Phoenix dactylifera* L. cv medjol)**.

The proline contents **(Table 3)** was significantly affected by potassium nitrate sequenced by urea, The higher protein content of N treated plants could be related with the positive effect of N on some important physiological processes (**Chaturvedi 2005**), 20 mM N from NH_4NO_3 increased protein contents of 'Fuji'apple (*Malus domestica* Borkh.) trees on M.26 rootstock (**Cheng et al 2004)**, N at 45 Kg/ha, (NH_4) NO_3, Urea and P2O5 increased proteins contents (**Akanbi et al 2007** on *Telfairia occidentalis*, **Omar 2010** on *Solanum tuberosum* and **Khalid 2012** on anise (*Pimpinella anisum* L.).

These results from the N, P and K percent leaves and root content **(Tables 4)** give an explanation for the highest percent contents in the leaves above the roots contents, these notice showed that highest contents of macronutrients in the leaves in which its fast transformation from roots to leaves to used these nutrients in all bio process and photosynthesis process in the plants. Nitrate is taken up by roots and is immediately moved upward in the plant to the stems and leaves, the plant must convert the nitrate to ammonium, which it does with nitrate reductase enzymes, the conversion is done in the stems and leaves, young plants have not developed the nitrate reductase enzyme yet as soon as the plants were olderd have immediate movement of nitrate into the leaves (**Charles, 1998**), potassium sulfate and P_2O_5 and ammonium sulfate increased the contents of P and K of Citrus (*Citrus aurantium* Lush) cv. Ponkan (**He** *et al.* 2000 on (white marsh) grape, **Yang, 2000** on citrus and **Johnson et al** on **Peach 2001**), Potassium sulfate, and ammonium sulfate increased N,P and K of date palm cvs. Barhi and Bartomouda (**Harhash and Abdel-Naser 2007**, **Osman 2010 and Al-Kahtani and Soliman, 2012)**.

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