Influence Spraying Fruit Set and Soil Application on the Quality of Date Palm Fruits (*Phoenix Dactylifera* L.) Cv. Sewi

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***Abstract*—**This trail was carried out during two growing seasons 2013-2014 on date palm (*Phoenix dactylifera* L.) cv. Sewi which is one of the most important cultivar of semi dry dates in Egypt, trees were subjected as bunch spraying of boric acid (H_3BO_3) and potassium sulphate at 0.2 borax + 0.2% potassium sulphate and 0.4 % borax + 0.4 % potassium sulphate and soil fertilizers treatments with magnesium and zinc as sulphate at 200 and 400 mg/tree in the irrigation water, all spraying treatments were subjected after 15 days from pollination, and repeated in March, April, May and June, soil treatments one time/ month at March, May and June . Complete randomize design was conducted in this experiment. Results clarified, all bunch spraying and soil fertilizers treatments were increment physical fruit parameters, the highest fruit and flesh weight (g), fruit length and diameter (cm) concerning to the spraying treatment 0.4 borax + 0.4 % potassium sulphate and 400 mg/l Mg sulphate and Zn sulphate as soil treatment which achieved great interaction in between for two both seasons. Significant increasing contents of TSS %, protein, total sugars, reducing and non-reducing % sugars were recorded under spraying treatments 0.4 borax + 0.4 % potassium sulphate and soil fertilizers treatments 400 mg/l Mg sulphate and Zn sulphate for two seasons with highest interaction in between, decreasing of phenols contents related to 0.4 borax + 0.4 % potassium sulphate as bunch spraying and 400 mg/l Mg sulphate and Zn sulphate as soil treatment for both seasons. All bunch spraying and soil treatments yielded high fruit macro and micro elements. Improving quality and marketable of date palm fruits is the important target for all dates cultural, thus application of fruits spraying and trees soil subject were recommended to increasing fruits quality of date palm cv. Sewi.

***Keywords*—** boron, date palm, fruits, potassium, quality and zinc.

I. Introduction

Date palm (*Phoenix dactylifera* L.) fruits one of the most valuable fruit trees enrich in many useful components i.e. minerals, sugars, proteins, fibers, which were very important to healthy human body, in Egypt, date palm trees planted in a large scale and produced 1.3 million tons/year (**Fao** 2010). Therefore it must be increasing the valuable yield dates and quality by many treatments, many researchers supported these treatments to increasing these valuable fruits quality and quantity, spraying of fruits or soil treatments for trees were found, Spraying macro and micro nutrients have important role in fruit set, fruit retention and development and cause efficient yield and quality improvement (**Singh** 1983). Foliar nutrition is widely used to correct a specific nutrition deficiency or to prove nutrients and it is preferable especially in newly reclaimed soil where this soil is usually poor in their nutrients content (**El-Kholy** *et al*. 1994). Excessive nutrient were loss from agricultural land encourage the researchers to find more efficient ways to apply fertilizers (**Dong** *et al*. 2005). Furthermore, soil application can supply enough nutrients to increasing plant production, also causes world-wild anxiety about environmental contamination for nutrients leaching into ground water (**Dinnes** *et al.* 2002). Fruit constitutes an important part of a balanced diet as they are natural sources of food nutrient needed by human and animals, such food nutrient includes protein, carbohydrate, minerals and dietary fiber, with the global focus on increased food production and emphasis on provision of nutritive food for the world population. It is very important to consider available fruits and to determine their nutrient composition for the purpose of increasing the production of such fruits (**Ossi** *et al* 2008 on *Cola lepidota* and **Al- shahib** and **Marshall** 2003 on date palm). Many trails to supply boron (H_3 BO_3) to fruits have been confirmed that boron plays an important role for increasing pollen grains germination, pollen tube elongation, consequently, fruit set % and total yield, cell division, biosynthesis and translocation of sugars water and nutrient uptake (**Ahmad** *et al*. 2009). Spraying of 300 ppm boron increased fruit length of Picual olive (**Abd El-Migeed** *et al.* 2013). Yield of Mango cv. Fagriklan increased with boron and potassium (**Saleh** and **Abd El- Monem** 2003). Boric acid at 300 ppm + 2g/l sugar increased fruit physical and chemical properties of date palm cvs Zaghlol and Samani (**Ashour** *et al.* 2004). Potassium (K) is an essential mineral element it involved in many physiological processes, growth, yield, quality, enzyme activation, and turgor maintenance and stress tolerance (**Pettigrew** 2008). Zn treatments promote fruit set and yield in apple and Washington Navel orange *Citrus sinensis* (**Wojcik** 2007 and **Hafez** and **El-Metwally** 2007). Increment in fruit weight physical and chemical properties are due to foliar sprays of boric acid and potassium nutrient (**Attalla** *et al.* 2007 on date palm cv. Zaghloul and **Abd El- Fatah** *et al*. 2008 on *Costata persimmon*). Potassium 3% as K_2sulphate increased significantly fruit weight, acidity, TSS and N, P, K, Mg and Ca of Peach and Plum (**Ben Mimoun** *et al*. 2009).

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Boric acid 250 and 500 ppm and calcium nitrate 1-2% individual or in combination between them significant rising fruit set, fruit retention, bunch weight, TSS, total sugars, reducing and non- reducing sugars and decreasing tannins of date palm cv. amhat (**Sarrwy** *et al*. 2012). Boron at 0.01 % boric acid + pollen grain increased fruit set, weight, fruit size, Mg, Fe and Cu of *Pistachio vera* L. (**Hajar** *et al.*2013). Highest increasing of proteins and seeds weights of sunflower *Helianthus annuus* L. were significant under 0.5 and 1 kg/ha of boric acid (**Saad** and **Ayad** 2013). In the date palm fertilizer program in Egypt, all of the farmers were neglect the important effect of magnesium as the macro element which act as chlorophyll molecule structure that regulate photosynthesis process, enzyme activator involved in carbohydrates metabolism, nucleic acid and biological activity of ATP (**Jones** *et al.* 1991), also the important useful effect of zinc is a micro element which act as a component of almost 60 enzymes, has a role in producing the growth hormone IAA, nitrogen metabolism and protein content (**Hassan** *et al.*2010 and **Mengel** *et al*. 2001), Copper play an important role for the growth of plant, formation of vitamin A, flowering, fruit set, fruit color and quality (**Martens** and **Westermann** 1991 and **Stiles** and **Reid** 1991) Moreover, soil treatments can increasing fruit parameters of date palm, Plants usually absorb water and nutrients by their roots, therefore fertilizers are traditionally applied into the soil (**Mengel** *et al*.2002). NPK 8:16:24 + Mg magnesium chelate at 100 mg/plant or 400-1000 kg/ha as soil application + 2 % magnesium sulfate as foliar spraying increased significantly fruit quality and yield (**Mostafa** *et al.* 2007 on banana Grand Nain, **Rakicevic**, *et al*. 2007 on plum cv. Cacanska lepotica and **Fawzi** *et al.* 2010 on pear cv Le conte). Potassium at 4.5 kg/ palm on the date palm cv Bartamoda in Aswan gave the highest palm yield, bunch weight, fruit and flesh weight and length of fruit, highest moisture content, total soluble solids and non-reducing sugars and increasing contents of N, K, Ca, Mn and Cu (**Osman** 2010). Potassium as p can increased nut fresh and kernel dry mass, TSS also increasing contents of Zn and K of pistachio trees cv. Owhadi, peach, olive, citrus and Plum (**Karimi** *et al*. 2012 and **Ben Mehdi** and **Michel** 2012). Fe at 200 mg/l injection to trunk increased significant TSS, fruit set %, fruit weight, flesh weight, fruit size, total, reducing and non-reducing sugars of date palm cv. Kabkab (**Abdi** and **Hedayat** 2010), recently, 5, 2.5,5,5 and 1 kg/ha increased fruit length, diameter, number of fruits, fruit volume, TSS of peach *Prunus persical* L. (**Ali** *et al.* 2014). This study focused on the useful effect of boron and potassium as spraying and magnesium and zinc as soil treatments on the physical and chemical parameters (quality) of date palm fruits and increasing the marketable fruits).

II. MATERIALS AND METHODS

Fresh and matured date palm (*Phoenix dactylifera* L. cv. Sewi) fruits were collected from El-Wahat El- Baharia, Giza, Egypt 2013 -2014. In this experiment trees were subjected as Bunches spraying (BS) treatments with Borax (H_3BO_3) at 0.2 and 0.4 % or potassium sulphate at 0.2 and 0.4 % these treatments were done 15 days after pollination at two times/month at March, April, May and June, spraying treatments was maintained just to cover completely the bunch till drip. Soil treatments (ST) with Mg or Zn sulphate at 200 and 400 mg/tree at one time/month at March, May and June, uniform fruiting trees 15 years were selected to subject these treatments.

Treatments

Con treatment

T1= (BS) 0.2 % Borax + 0.2% potassium Sulphate + (ST) 200 mg/tree Mg sulphate

T2= (BS) 0.2 % Borax + 0.2% potassium Sulphate + (ST) 400 mg/ tree Mg sulphate

T3= (BS) 0.2 % Borax + 0.2% potassium Sulphate + (ST) 200 mg/ tree Zn sulphate

T4 = (BS) 0.2 % Borax + 0.2% potassium Sulphate + (ST) 400 mg/ tree Zn sulphate

T5 = (BS) 0.4 % Borax + 0.4 % potassium Sulphate + (ST) 200 mg/tree Mg sulphate

T6 = (BS) 0.4 % Borax + 0.4 % potassium Sulphate + (ST) 400 mg/ tree Mg sulphate

T7= (BS) 0.4 % Borax + 0.4 % potassium Sulphate + (ST) 200 mg/ tree Zn sulp

T8= (BS) 0.4% Borax + 0.4 % potassium Sulphate + (ST) 400 mg/ tree Zn sulphate

These treatments subjected with ammonium nitrate 33% at 0.5 kg/tree in three times March, May and July, potassium hydroxide at 0.5 kg/tree in March, May and July, farmyard manure was applied at 20 kg/tree in Dec. Twenty fruits were random picked to estimate physical and chemical characteristics

Physical characteristics

plant height (cm) - Fruit number//bunch - fruit diameter - fruit weight/bunch (g)- flesh weight (g) - fruit length (cm) – seed weight- seed length- seed diameter- bunch numbers-

Chemical characteristics

Total soluble solids T.S.S.% in fruit juice was determined by hand refractometer..

Total sugar, reducing sugars as described by **Shales** and **Schales** (1945)

non-reducing sugars by differentiate between total and reducing sugars

Total Soluble Protein: Total soluble protein levels were measured method of **Bradford** (1976).

Total phenols:- mg/g f.w. as described by **A.O.A.C.** (1980) and means of the standard curve of pyrogalol

N,P,K, Fe, Zn, B, Mg- Cu, Ca: according by (**Jackson** 1973).

Statistical Analysis

The experiment was arranged in Randomized Complete Block Design (RCBD) with 8 treatments and 3 replications (**Snedecor** and **Cochran** 1990)

III. Results and Discussion

Regarding to the fruit weight (g) of date palm Phoenix dactylifera L.cv. Sewii in response to bunch spraying (BS) 0.2 % borax + 0.2 % potassium sulphate and 0.4 % borax + 0.4 % potassium sulphate with soil treatments (ST) 200 and 400 mg/l Mg and Zn sulphate, (Table 1) that revealed, the weighted fruits were accomplished significant with (BS) 0.2 % borax +0.2% potassium sulphate + (ST) 400 mg/tree Mg sulphate and Zn sulphate treatments 21.5 and 26.7 g and 21.3 and 26.8g for treatments and two experimental seasons, moreover maximum weighty fruits recorded under (BS) 0.4 % borax + 0.4 % potassium sulphate + (ST) 400 mg/tree Mg sulphate and Zn sulphate 27.6 and 28.6 and 27.3 and 28.8 g for two treatments and seasons respectively without differs in between compared to control treatment 18.9 and 20.6 g for both seasons, Data presented in (Table 1) on the flesh weight of date palm cv. Sewii attained higher significant in response of bunch spraying treatment (BS) 0.4 % borax + 0.4 % potassium sulphate + (ST) 400 mg/tree Mg sulphate and Zn sulphate 26.1 and 26.9 and 25.6 and 27.1 for two treatments and seasons, meanwhile treatment (BS) 0.2 % borax +0.2% potassium sulphate + (ST) 400 mg/tree Mg sulphate and Zn sulphate treatments produced 19.8 and 25.1 and 19.6 and 25.1 g for two treatments and seasons, less flesh weight was obtained by control treatment 16.9 and 18.8 g for two seasons. Fruit length of date palm cv. Sewii (Table 2) that exhibited significant results under bunch spraying (BS) and soil treatment (ST) 0.2 % borax + 0.2 % potassium sulphate + 200 and 400 mg/tree Mg sulphate and Zn sulphate and (BS) 0.4% borax + 0.4% potassium sulphate + 200 and 400 mg/tree Mg sulphate and Zn sulphate, longest fruits realized with (BS) 0.4 % borax + 0.4 % potassium sulphate + (ST) 400 mg/tree Mg sulphate and Zn sulphate 5.7 and 5.9 and 5.7 and 5.8 cm respectively for two studied treatments and seasons, followed by (BS) 0.2% borax+ 0.2 % potassium sulphate + 400 mg/tree Mg sulphate and Zn sulphate 4.9 and 5.7cm and 4.9 and 5.5 cm for both treatment and seasons, control treatment which gave shortest fruits 4.4 and 4.5 cm respectively for two studied seasons. it is definite from the data presented in Table (2) that assumed of date palm cv. Sewii fruit diameter was markedly performed significantly under all bunch spraying treatment, the superiority of fruit diameter was returned to (BS) 0.4 borax + 0.4 % potassium sulphate + (ST) 400 mg/tree Mgsulphate and Znsulphate 2.7 and 2.8 and 2.7 and 2.8 cm for two treatment and seasons without variance between them, also positive effect was detected under 0.2 % + 0.2 % potassium sulphate + 400 mg/tree Mgsulphate and Zn sulphate 2.5 and 2.6 and 2.4 and 2.5 cm, control treatment bringing thin fruit which determined 2.3 and 2.3 cm for two seasons Physical of date palm fruits were significantly affected by borax and potassium spraying with soil treatment Mg and Zn sulphate, great response was recorded under 0.4 % Borax + 0.4% potassium sulphate + (ST) soil treatment 400 mg/tree Mg sulphate and Zn sulphate, these results accordance with.

Table I

Fruit And Flesh Weight (G), Fruit Length And Diameter (Cm) Of Date Palm (Phoenix Dactylifera L.) As Affected By Bunch Spraying (BS) Treatments And Soil Treatments (ST) For Two Seasons

Measurements / treatments	Fruit weight (g)		Flesh weight (g)		Fruit length (cm)		Fruit diameter (cm)	
	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
Con	18.9	20.6	16.9	18.8	4.4	4.5	2.3	2.3
(BS) 0.2 % Borax + 0.2% potassium sulphate + (ST) 200 mg/tree Mg SO_4	20.5	21.9	18.9	20.3	4.8	4.9	2.4	2.5
(BS) 0.2 % Borax + 0.2% potassium sulphate + (ST) 400 mg/ tree Mg SO_4	21.5	26.7	19.8	25.1	4.9	5.7	2.5	2.6
(BS) 0.2 % Borax + 0.2% potassium sulphate + (ST) 200 mg/ tree $ZnSO_4$	20.2	21.5	18.5	19.8	4.9	5.2	2.4	2.5
(BS) 0.2 % Borax + 0.2% potassium sulphate + (ST) 400 mg/ tree $ZnSO_4$	21.3	26.8	19.6	25.1	4.9	5.5	2.4	2.5
(BS) 0.4 % Borax + 0.4 % potassium sulphate + (ST) 200 mg/tree Mg SO_4	26.3	28.2	24.8	26.5	5.5	5.6	2.6	2.6
(BS) 0.4 % Borax + 0.4 % potassium sulphate + (ST) 400 mg/ tree Mg SO_4	27.6	28.6	26.1	26.9	5.7	5.9	2.7	2.8
(BS) 0.4 % Borax + 0.4 % potassium sulphate + (ST) 200 mg/ tree $ZnSO_4$	26.0	28.0	24.4	26.5	5.4	5.5	2.6	2.7
(BS) 0.4% Borax + 0.4 % potassium sulphate + (ST) 400 mg/ tree $ZnSO_4$	27.3	28.8	25.6	27.1	5.7	5.8	2.7	2.8
L.s.d.	0.8	0.9	0.7	0.9	0.1	0.1	0.1	0.2

Khayyat 2007 on date palm cv Shahany fruits that increased length, diameter and flesh weight with spraying with Borax 1500 and 2500 ppm + potassium sulphate 1 and 2%**,** **Soliman and Al-Obeed** 2011 and **El-Sabagh** and **Said** 2012 improved weight and flesh weight, length and diameter under spraying of Borax 0.6 % + sugar 2 g/l, and potassium nitrate 1

and 2% and potassium sulphate 1 and 2% and potassium citrate at 3%. Spraying calcium + micro nutrient + amino chelate produced greater date palm fruit cv Kabkab weight, length and diameter in the khalal stage **Naseri** *et al.* 2013. Moreover, Kinnow (*Citrus reticulate* Blanco) fruit weight, length and flesh weight were increased when fruits sprayed borax 0.4% and potassium and Zn sulphate **Ullah** 2012 and **Ashraf** et al. 2013. $ZnSO_4$ soil treatment and injection of $FeSO_4$, $ZnSO_4$, $CuSO_4$ and $MnSO_4$ increased fruit and flesh weight, length and diameter **Moreira** *et al.* 2007 on Banana, and **Rahnama** *et al.* 2012 on date palm cv. Barhee and **Al-Bamarny** 2010 on Peach (*Prunus persica* L.) cv. Early coronet. fruit and flesh weight, length and diameter of date palm cv. Sayer fruits were increased attributed with potassium sulphate 1000 and 1300 g/tree soil treatment **Dialamy** and **Alihori** 2010, foliar spraying of potassium nitrate 4% increased fruit length and diameter and flesh weight of olive cv.pecual **Hegazi** *et a.*, 2011, recently foliar spraying and soil treatment of potassium sulphate K2SO4 and K2O increased fruit and flesh weight, length and diameter of Seweda date palm **Awad** 2014.

In compared to control treatment all spraying and soil treatments were multiplied measures of proteins contents of Sewii date palm (Table 3) bunch spraying treatment 0.4 % borax + 0.4 % potassium sulphate + soil treatment 400 mg/tree Mg sulphate showed the superiority for largest proteins contents 5.5 and 5.6 mg/g f.w. for two experimental seasons, bunch spraying treatment 0.4 % borax + 0.4 % potassium sulphate + soil treatment 400 mg/tree Zn sulphate have left 5.4 and 5.5 mg/g f.w. for both seasons, on the other hand the fewer amount of fruits proteins contents associated with treatment (BS) 0.2 % borax + 0.2% potassium sulphate + 200 mg/tree Mg sulphate and Zn sulphate 5.2 and 5.2 and 5.3 and 5.3 mg/g f.w. moreover, control treatment lack amount of fruit proteins 5.1 and 5.1 mg/g f.w. for two growing seasons The positive effect was found with all spraying and soil treatments on the decreasing date palm cv.

TABLE II
DATE PALM (PHOENIX DACTYLIFERA L.) FRUIT CONTENTS OF PROTEIN, PHENOL MG/G F.W., TSS % AND TOTAL, REDUCING AND NON-REDUCING SUGARS AS AFFECTED BY BUNCH SPRAYING (BS) AND SOIL TREATMENT (ST) TREATMENTS FOR TWO SEASONS

Measurements / treatments	Proteins mg/g f.w.		Phenols mg/g f.w.		TSS%		Total sugars %		Reducing sugars %		Non-reducing sugars %	
	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
Con	5.1	5.1	3.2	3.2	27.0	27.2	64.8	65.9	36.5	36.5	29.4	28.4
(BS) 0.2 % Borax + 0.2% potassium sulphate + (ST) 200 mg/tree $MgSO_4$	5.2	5.2	2.8	2.6	27.8	27.9	65.4	66.8	37.9	38.8	27.5	27.9
(BS) 0.2 % Borax + 0.2% potassium sulphate + (ST) 400 mg/ tree $MgSO_4$	5.3	5.4	2.7	2.5	32.3	32.3	67.2	69.8	38.9	39.7	28.3	30.1
(BS) 0.2 % Borax + 0.2% potassium sulphate K_2SO_4 + (ST) 200 mg/ tree $ZnSO_4$	5.3	5.3	2.8	2.7	30.1	30.5	64.8	66.7	36.5	37.0	28.3	29.7
(BS) 0.2 % Borax + 0.2% potassium sulphate K_2SO_4 + (ST) 400 mg/ tree $ZnSO_4$	5.2	5.3	2.6	2.5	30.1	30.5	66.4	68.6	37.7	38.8	27.5	29.8
(BS) 0.4 % Borax + 0.4 % potassium sulphate + (ST) 200 mg/tree $MgSO_4$	5.3	5.4	2.4	2.3	36.2	36.4	71.5	71.9	42.1	42.3	29.4	29.6
(BS) 0.4 % Borax + 0.4 % potassium sulphate + (ST) 400 mg/ tree $MgSO_4$	5.5	5.6	2.4	2.2	37.8	36.9	73.9	76.5	43.4	45.8	30.5	30.7
(BS) 0.4 % Borax + 0.4 % potassium sulphate + (ST) 200 mg/ tree $ZnSO_4$	5.2	5.4	2.4	2.3	36.2	36.4	71.5	71.7	41.2	41.7	30.3	30.0
(BS) 0.4% Borax + 0.4 % potassium sulphate (ST) 400 mg/ tree $ZnSO_4$	5.4	5.5	2.5	2.2	37.3	37.6	73.5	73.6	43.1	45.1	30.3	30.5
L.s.d.	0.1	0.2	0.1	0.2	1.5	0.7	1.3	1.3	1.4	1.4	1.3	1.3

Sewii fruits phenols contents (Table 3) fruit phenols contents was descending from control treatment which determined 3.2 and 3.2 mg/g f.w. for two studied seasons, 0.2 % borax + 0.2 % potassium sulphate + 400 mg/tree Mg sulphate and Zn sulphate 2.7 and 2.5 and 2.6 and 2.5 mg/g f.w. for both treatments and seasons to 0.4 % borax + 0.4 % potassium sulphate + (ST) 400 Mg sulphate and Zn sulphate that recorded the greatest decreasing phenols contents 2.4 and 2.2 and 2.5 and 2.2 mg/g f.w. for both treatments and seasons. Results on fruit TSS percent contents in (Table 3) proved bunch Sewii date palm spraying treatment 0.4 % borax + 0.4% potassium sulphate + 400 mg/tree Mg sulphate and Zn sulphate whose yielded the highest gradually rising of TSS 37.8 and 36.9 and 37.3 and 37.6 % for two experimental seasons, descending by (BS) 0.2 % borax + 0.2 % potassium sulphate + 400 mg/tree Mg sulphate and Zn sulphate 32.3 and 32.3 and 30.1 and 30.5 % respectively for two treatments and

seasons, above control treatment which had the smallest contents of TSS for two studied seasons 27.0 and 27.2. Superior significant differences were exhibited on the total, reducing and non-reducing sugars of Sewii date palm fruits under all bunch spraying and soil treatments (Table 4) when bunch sprayed with borax and potassium sulphate + soil treatment the total sugars were graduated increasing from control treatment 64.8 and 65.9 % for both seasons,67.2 and 69.8 % under 0.2% borax + 0.2% potassium sulphate + 400 mg/tree Mg sulphate and 66.4 and 68.6 0.2% borax + 0.2% potassium sulphate + 400 mg/tree Zn sulphate for both seasons and finally 0.4% borax +0.4% potassium sulphate + 400 mg/tree Mg sulphate and Zn sulphate that gave the great percent of total sugars 73.9 and 76.5 % and 73.5 and 73.6 % for two treatments and seasons. Regarding to reducing sugars, date palm trees which un- subjected by spraying and soil treatment recorded the little percent of reducing sugars 36.5 and 36.5 % for both seasons, all spraying and soil treatments clearly confirmed the significant effects on the reducing sugars from (BS) 0.2 % + 0.2% potassium sulphate + 400 mg/tree Mgsulphate38.9 and 39.7 % and 37.7 and 38.8 % for (BS) 0.2 % + 0.2% potassium sulphate + 400 mg/tree Zn sulphate. Maximum values of reducing sugars were attributed with 0.4% borax +0.4 % potassium sulphate + 400 mg/tree Mg sulphate and Zn sulphate 43.4 and 45.8 and 43.1 and 45.1 % for both treatments and seasons. results of non-reducing sugars percent presented rising belonging to 0.4% borax + 0.4% potassium sulphate + (ST) 400 mg/tree Mg sulphate and Zn sulphate 30.5 and 30.7 and 30.3 and 30.5 % for two treatments and seasons upon un-treated trees 29.4 and 28.4 % for two seasons. Impact of spraying with soil treatments of date palm fruits was to be seemed that markedly increasing of proteins contents mg/g f.w. related to 0.4 % borax + 0.4 % potassium sulphate + 400 mg/tree Mg and Zn sulaphate, in this respect, **Saad** and **Ayad** 2013 they stated borax spraying 0.5 and 1 kg/ha increased protiens contents in the seeds of *Helianthus annus* L., boron involved in process synthesis of protein of *Costate persimmon* **Abd El- Fatah** *et al* 2008. Concerning to phenols mg/g f.w of date palm fruit that were decreasing with spraying and soil treatment, spraying of potassium citrate 2% decreased tannins of date palm fruit cv. Amhat **Abd El-Migged** *et al.* 2013. Greatest contents of TSS %, total sugars %, reducing sugars and non-reducing sugars were respected to (BS) 0.4% borax + 0.4 % potassium sulphate + (ST) 400 mg/tree Mg and Zn sulphate as agreement with **Desouky** *et al.* on cv. Barhee 2007, **Abd El- Razek** *et al*. 2011 on grap (crimson seedling) and **Sarrwy** *et al.* 2012 on date palm cv. Amhat and **Omar** *et al*. 2014 date palm cv. Mnifi they proved Borax 250 – 500 ppm, potassium sulphate and calcium nitrate 1-2 % proliferated TSS, total, reducing and non-reducing sugars %, spraying of potassium nitrate and calcium chloride increased TSS ,total sugars and reducing sugars of plum fruits *Prunus salicina* **Abdel- Hafeez** *et al*. 2010, **Shahin** *et al.* 2010 on Anna apple, Mn sulphate and zinc sulphate increased TSS, total, reducing and non-reducing sugars of Pomegranate *Punica granatum* cv. Malase Torsh esaveh **Hasani** *et al*. 2012, soil treatment Mg, Fe,Zn an Mn 0.6 g/l accelerated TSS, total, reducing and non-reducing sugars in and **El-Shewy** and **Abdel- Khalek** 2014 on Peach cv. florida prince and desert red.

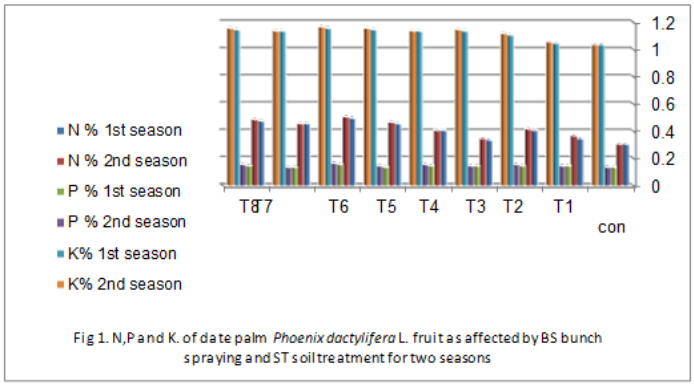

Fig 1. N,P and K. of date palm *Phoenix dactylifera* L. fruit as affected by BS bunch spraying and ST soil treatment for two seasons

(T1) 0.2% Borax + 0.2% K2SO4 + 200 mg MgSO4 (T2) 0.2% Borax + 0.2% K2SO4 + 400 mg MgSO4
(T3) 0.2% Borax + 0.2% K2SO4 + 200 mg ZnSO4 (T4) 0.2% Borax + 0.2% K2SO4 + 400 mg ZnSO4
(T5) 0.4% Borax + 0.4% K2SO4 + 200 mg MgSO4 (T6) 0.4% Borax + 0.4% K2SO4 + 400 mg MgSO4
(T7) 0.4% Borax + 0.4% K2SO4 + 200 mg ZnSO4 (T8) 0.4% Borax + 0.4% K2SO4 + 400 mg ZnSO4

It was clearly noticed from (Figures 1,2 and 3) that all of date palm cv. Sewii bunch spraying with 0.2 % borax + 0.2 % potassium sulphate + (ST) 200 and 400 mg/tree Mg sulphate and Zn sulphate and (BS) 0.4% borax + 0.4 % potassium sulphate + (ST) 200 and 400 mg/tree Mg sulphate and Zn sulphate significant performed macro N, P, K, Ca and Mg % and micro fruit nutrients Fe, Mn, Zn B and Cu mg/kg, however, (BS) 0.4% borax + 0.4 % potassium sulphate + (ST) 400 mg/tree Mg sulphate and Zn sulphate was to be exhibited the major treatment for higher fruits contents of macro and micro nutrients, minimum fruits contents of these nutrients was produced from un treated bunch and soil treatment. Previous results showed increasing macro and micro nutrient in the fruit contents as a result of spraying and soil treatment which produced high quality of these fruits in this respect, potassium in some plants cause cell turgidity then improves uptake of nutrients and carbohydrates **El-Sheikh** *et al.* 2007. spraying potassium sulphate 0.5% + at 0.05% and borax at 174 and 348 mg/l and Zn 1050 and 1750 mg/l increased N, P, K,Ca,Mg,Mn,Zn,Cu B, Zn and Fe **Harhash** and **Nasser** 2010 and **Al-Obeed** *et.al.*2013 on the fruit date palm cv. Khalas, **Keshavarz** *et al.* 2011 on *Juglans regia* and, **Ibrahim** and **Al Wasfy** 2014 on Valencia orange, spraying potassium at 0.25 and 5.33 mm increased

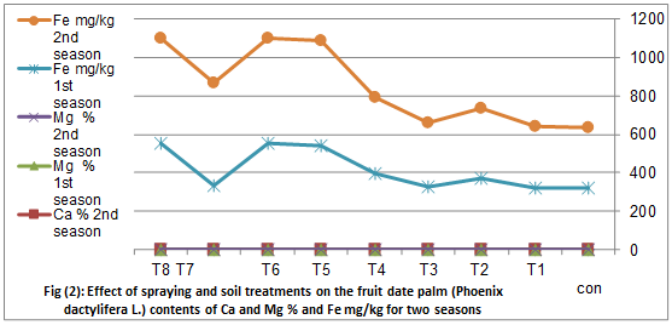

Fig (2): Effect of spraying and soil treatments on the fruit date palm (Phoenix dactylifera L.) contents of Ca and Mg % and Fe mg/kg for two seasons

(T1) 0.2% Borax + 0.2% K2SO4 + 200 mg MgSO4 (T2) 0.2% Borax + 0.2% K2SO4 + 400 mg MgSO4
(T3) 0.2% Borax + 0.2% K2SO4 + 200 mg ZnSO4 (T4) 0.2% Borax + 0.2% K2SO4 + 400 mg ZnSO4

(T5) 0.4% Borax + 0.4% K2SO4 + 200 mg MgSO4 (T6) 0.4% Borax + 0.4% K2SO4 + 400 mg MgSO4
(T7) 0.4% Borax + 0.4% K2SO4 + 200 mg ZnSO4 (T8) 0.4% Borax + 0.4% K2SO4 + 400 mg ZnSO4

N,P and K of olive fruit **Ran Erel** *et al*. 2013.soil treatment as Mg carbonate 400 kg/ha and Mg EDTA 12.5 % Mg and Mg sulphate 9.9 % Mg increased Ca, Mg of apple fruit **Tojnko** *et al.* 2012 and **Salama** *et al*. 2014 on date palm cv. Hayani. K sulphate 25 g/plant, Zn 10.89 %, Fe 6.78%, S 17.72% and Cu sulphate increased Cu,Fe and Zn of *Pistacia vera* L. **Soliemanzadeh** *et al.* 2013 and **Razzaq** 2013 on *Citrus reticulate* Blanco (Kinnow)

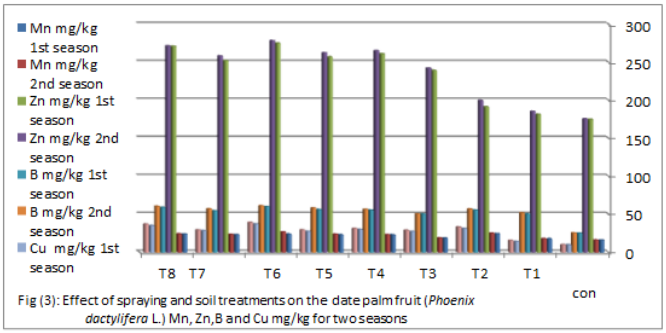

Fig (3): Effect of spraying and soil treatments on the date palm fruit (*Phoenix dactylifera* L.) Mn, Zn,B and Cu mg/kg for two seasons

(T1) 0.2% Borax + 0.2% K2SO4 + 200 mg MgSO4 (T2) 0.2% Borax + 0.2% K2SO4 + 400 mg MgSO4
(T3) 0.2% Borax + 0.2% K2SO4 + 200 mg ZnSO4 (T4) 0.2% Borax + 0.2% K2SO4 + 400 mg ZnSO4
(T5) 0.4% Borax + 0.4% K2SO4 + 200 mg MgSO4 (T6) 0.4% Borax + 0.4% K2SO4 + 400 mg MgSO4
(T7) 0.4% Borax + 0.4% K2SO4 + 200 mg ZnSO4 (T8) 0.4% Borax + 0.4% K2SO4 + 400 mg ZnSO4

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