



Effect of Different Packaging Materials and Preservation Temperatures on Pesticide Residues during Storage Periods in Soft Dates (*Al-Khalas* and *Al-Sukkary*) Varieties

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Abstract:

This study was conducted for the purpose of studying the effect of some pesticide residues (Pirimophos-methyle, Diazinon, Bifenthrin and Ethion/ppm) on two varieties of soft dates (*Al-Khalas* and *Al-Sukkary*) pack in different packaging materials (plastic and carton), storage at different temperatures (freezer, refrigerator, and room temperature) and storage period nine month. The samples were taken from a farm in the Qassim area in Saudi Arabia after harvesting and some pesticide residues were tested. Result showed that the rate of analysis was no significant different ($P \geq 0.05$) for type of pesticides (Pirimophos-methyle, Diazinon, Bifenthrin and Ethion/ppm) for all date varieties during the storage period and storage temperature on carton and plastic packaged, but there was a significant different ($P \leq 0.05$) between two types of pesticide (Cypermethrin and Bromopropylate/ppm) on packaging materials (plastic and carton) during storage periods and storage temperatures where higher value was recorded in *Al-Sukkary* variety (0.000056 ppm) and lower in *Al-Khalas* variety (0.000016 ppm) for a first type, while another type was recorded higher value in *Al-Khalas* variety (0.00442 ppm) and lower value in *Al-Sukkary* variety (0.00424 ppm).

Keywords: Dates, *Al-Sukkary*, *Al-Khalas*, Pesticide residues , Variety, Storage Period, Plastic, Carton.

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Introduction

Date Palm is one of the oldest fruit trees in the Arabian Peninsula (AP) and played a key role in the life of its people. Date fruit is marketed all over the world as a high value

confectionery and as a fresh fruit it remains an important subsistence crop in most of the desert areas. It is produced largely in the hot arid regions of the world i.e. GCC countries, (William Erskine1 *et al*, 2014). Date palm is a

dioecious plant with separate male and female trees in which pollination is normally done by wind, however, to ensure and improve fruit set, pollination is done artificially in which mature male inflorescence are cut off before spathe splits, and strands are placed in the female flower cluster so pollens will be transferred onto female flowers (Asif *et al.*, 1983; Shabana *et al.*, 1985). Many published research works have confirmed the close relationship between quick freezing and high quality frozen date products and the resulting increase shelf life with maximum preservation of initial quality (Sanz *et al.*, 1999; Sun and Li, 2003; Zhang *et al.*, 2004). Date is termed to be a laxative fruit and is beneficial for people suffering from constipation. For getting the laxative effect from dates, dates are needed to be soaked for one full night in water to be consumed in the morning like syrup to get their actual advantages. Pesticides have been used on plants to protect them and their fruits since ancient times, but we are not always aware of the types of pesticides and chemicals used and how dangerous can they be to us the consumers, (Manar Fawzi. *et al.*, 2017). However, their excessive use/misuse especially in the developing countries, their volatility, long-distance transports eventually result in widespread environmental contamination. In addition, non-patented, more toxic, environmentally persistent and inexpensive chemicals are used extensively in developing nations, creating serious acute health problems and global environmental impacts (Ecobichon 2001). Further while remarkable progress has been made in the development of effective pesticides, the fact remains that a very small fraction of all applied pesticides is directly involved in the pesticide mechanism. This implies that most of the applied pesticides find their way as 'residue' in the environment into the

terrestrial and aquatic food chains where they undergo concentration and exert potential, long term, adverse health effects (Ekström *et al.*, 1996; Osman and Al-Rehiayan 2003; Osman 2011; Schreinemachers and Tipraqsa 2012). The main 55 recorded utilization of bug sprays is around 4500 years prior by Sumerians who utilized sulfur mixes to control bugs and parasites (Unsworth, 2010). Pesticide is any chemical which is used to control pests. The pests may be insects, plant diseases, fungi, weeds, nematodes, snails, slugs, etc. Pesticides can be categorized in various ways, but can mainly split into 7 types depending on the pest it can affect, Insecticides, Herbicides, Rodenticides, Bactericides, Fungicides, Parricides and Lures (insects towards a much stronger pesticide). Also we would like to mention that not all pesticides are created to kill pests, some pesticides especially insecticides are sometimes designed to stop the reproductive cycle of a certain insect available on a certain crops that need protection, (Manar, *et al* 2017). Dates have full nutritive value and are considered to be a principal food in Arab countries. Date palm fruits are very rich in nutritive components, carbohydrates, fats, minerals, proteins, vitamins and dietary fibers, as well as used in folk medicine for treatment of liver diseases and are highly recommended to be consumed by pregnant women before and after delivery. So, with respect to the high 56 consumption of dates in the Middle East, more attention should be given toward health risks due to insecticide residues (Fayadh and Al-Showiman, 1990; Al-Shahib and Marshall, 2003; Al-Hootiet *et al.*, 1997). The pesticide trunk injection technique has many advantages such as minimizing the adverse effects of chemicals, environmental safety and protection of non-target organisms, water savings, and reduction in labor cost (Al Samarrie and Abo Akela, 2011). Residue of organ chlorine

pesticides in the environment is still a world-wide problem although the use of chlorinated hydrocarbon insecticides has been sharply curtailed or banned, but they are still the active ingredients of some pest control products (Moore 1986). People are mainly exposed to pesticide residues through the ingestion of contaminated foods (such as cereals, vegetables, and fruits), which are directly treated with pesticides or are grown in contaminated fields. Therefore, the pesticide residues in food have been strictly regulated by governments of all countries in order to determine whether the concentration of pesticides used exceed their maximum residue limits (MRLs) (European Commission directive, 1993; FAO, 2010). The MRLs are established by each country and sometimes cause conflicts, because different residue levels are acceptable in one country but not in another. Therefore, there is an urgent need to standardize the different MRLs. Based on statistical data for 19 countries, the WHO working group estimated that worldwide, there have been as many as 50,000 cases annually of pesticide poisoning. The mortality rate has been 1% in countries where medical treatment is readily available, so deaths are estimated to be about 5000 a year. However, it is reckoned that the real number of poisonings is considerably greater at about 2 million. About 5740,000 persons die and admittedly 70% of the lethal cases occur in developing countries. This shows that every 17 min a person dies due to pesticide poisoning, and every 10 min 28 subjects are poisoned by pesticide (Roy *et al.*, 1995; Ekstrom *et al.*, 1996; Neidert and Saschenbrecker, 1996). Most dates were heavily infested by multiple chemical compounds some were pesticides others were not supposed to be there, through using the GC-MS we were able to analyze and discover all types of chemicals on the dates (Hladik and McWayne, 2012 and Wylie, and

Meng, 2009). Insecticides, fungicides, acaricides and herbicides have been excessively used in agriculture including date palm farms, which put the health of the consumers at risk with adverse effects (Blanco *et al.*, 2002a, b; Columeet *et al.*, 2000; Fernandez *et al.*, 2000, 2001; Polzhofer, 1977; Akiyama *et al.*, 2002; Pico *et al.*, 2000; Torres *et al.*, 1996; Ripley *et al.*, 2003; FDA, 1993). It is quite apparent that such state of affairs calls for the need of more accurate, cost-effective and rapid analytical techniques capable of detecting the minimum concentrations of multi pesticide residues (EL-Saeid and Shaht, 2000; Valenzuela *et al.*, 2000; Chen and Wang, 1996; Navarro *et al.*, 2000; Nishikawa, 1993; Anastassiades and Schwack, 1998; Khan, 1982; Okihashiet *et al.*, 2005). Supercritical Fluid Extractor (SFE) and Microwave Solvent Extractor (MSE) were recommended and applied as rapid, efficient, and sensitive techniques for the extraction of different groups of pesticides from fruits, vegetables, soils, and water (France and Voorhees, 1988; Ahmed *et al.*, 1998; Christer *et al.*, 2004; Sannino, 1995; Muccio *et al.*, 1999; Stejnbaheret *et al.*, 2003). 58 Recently, few studies in the KSA focused on estimation of a single pesticide residues in dates (Suleiman and Osman, 2005; Suloiman and Osman, 2003), and residue of three pesticides were analyzed in Saudi.

Materials and Methods

Study Area: Fresh soft date fruits (Al-sukkary and Al-khalas) at maturity were obtained from a commercial farm in Qassim, Saudi Arabia. Samples collected were packaging in two types of materials (Cartons and Plastic cans), The plastic cans were sterilized by alcohol 70% before usage. Fresh date fruits were stored in three type conditions (freezing, refrigerator and room temperature) for nine months. All carton containers and plastic cans that kept at room

temperature were taped to prevent environmental pollution and accidental contamination.

ROCEDURE

Extraction Sample was homogenized using a blender with the same volume of distilled water. A 15 g of homogenized sample was weighed into a clean 50 mL tube (provided in roQ Extraction Kits, and 15 g of acetic acid/acetonitrile (1:99) and internal standard were added. The content of the included packet dispensed into the 50 ml tube contained homogenized sample, and shook vigorously by hand for 1 minute. Centrifugation for 5 min (at 4000 rpm) was done to making sure that the solid material is at the bottom of the tube and a liquid layer

form on top of the solid (AOAC 2007.01 method and Anastassiades *et al.*, 2003).

Dispersive Solid Phase Extraction (DSPE) 1.0 mL of the supernatant from extraction process was transferred into 2.0 mL tube, (provided in roQdSPE Kits), and shook vigorously by hand for 30 seconds. Centrifuged for 5 minutes (4000 rpm) to separate solid material from the liquid layer. Desired supernatant was transferred into an auto sampler vial and analyzed by GCMS (QP2010 Ultra – SHIMADZU) methods (AOAC 2007.01 method and Anastassiades *et al.*, 2003). The following equation was used to calculate the (ppm) of pesticide residues from original sample:

$$\text{Residue level (ppm)} = \frac{\text{peak height of the sample}}{\text{peak height of the standard}} \times \frac{\mu\text{L of the standard injected}}{\mu\text{L of the sample injected}} \times \frac{\text{final volume of the sample extract (ml)}}{\text{mass in gram of the sample}} \times \text{conc. In ppm of ref solution}$$

Results

Primiphos-methyle/ppm in Al-Sukkary variety

As shown in Fig 1 the results showed that the primiphos-methyle/ppm in soft date (*Al-Sukkary variety*) was found to be (0.00015) is control samples. The results showed that the different packaging materials (carton & plastic), preservation condition (freezer, refrigerator and room temperature) and storage periods were affected pesticide residue (primiphos-methyle) by decreased to 0.0 ppm and there was no significantly difference ($P \geq 0.05$). Study showed that there was no significantly difference ($P \geq 0.05$) between storage temperatures, and no significantly difference ($P \geq 0.05$) between packaging materials for all month of storage

periods and the results were decreased, except 3th and 4th months of storage on carton at refrigerator was increased, also 3th month on plastic at freeze and carton at room temperature. The increase may be explained by homogenized samples, changing chemical extraction, apparatus and analysis condition, apparatus sensitivity and other reactions. The Primiphos-methyle (ppm) in soft dates *AL-Sukkary* was decreased in carton and plastic packing materials it might be attribute to snow, low temperature and high temperature in freezer, refrigerator and room condition respectively. were being crushed the pesticide residues during storage period at different storage temperatures, and might be attribute to type of pesticide and concentrations used.

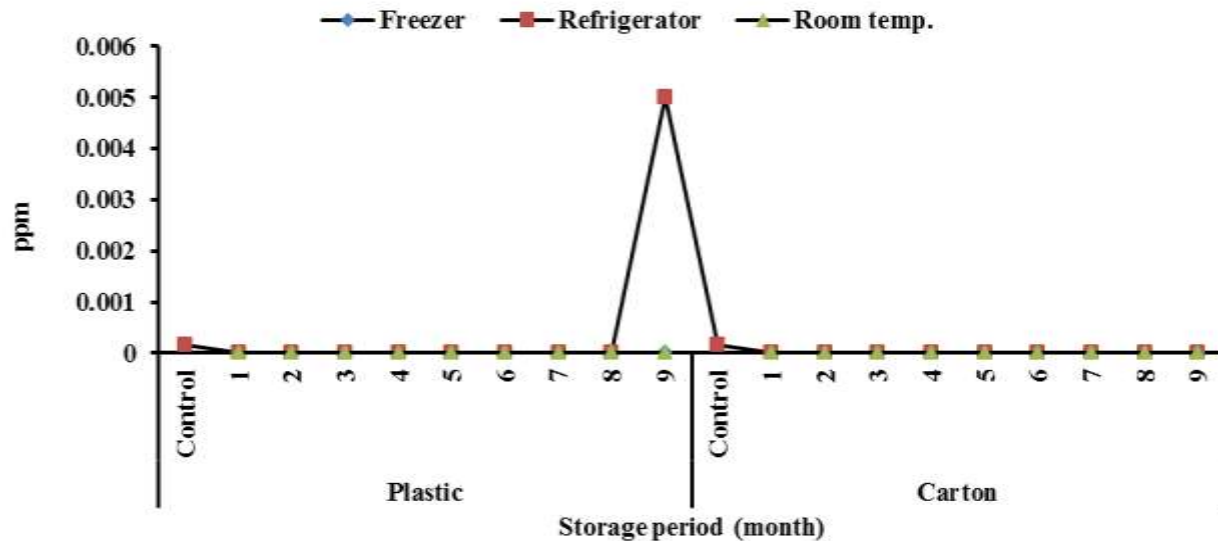


Fig. (1): Pirimophos-methyle of Al-Sukkary date

Pirimophos-methyle / ppm in Al-Khalas variety

The results in Fig 2 showed that the primiphos-methyle/ppm in soft date (*Al-Khalas variety*) was found to be 0.00015 in control samples .The results showed that the different packaging materials (carton & plastic), preservation condition (freezer, refrigerator and room temperature) and storage periods were affected on pesticide residue (primiphos-methyle) by decreasing it to 0.0 ppm and there was no significantly difference ($P \geq 0.05$).Study showed that there was no significantly difference ($P \geq 0.05$) between storage temperatures, and no significantly difference ($P \geq 0.05$) between packaging materials for all month of storage periods and the results were decreased,

except 3th and 4th months of storage on carton at refrigerator where it increased, Also 3th month on plastic at freeze and carton at room temperature. The increase may be explained by homogenized samples, changing chemical extraction, apparatus and analysis condition, apparatus sensitivity and other reactions.The Pirimophos-methyle (ppm) in soft dates *Al_Khalas cultivar* was decreased in carton and plastic packing materials that might be attribute to snow, low temperature and high temperature in freezer, refrigerator and room condition respectively, were being crushed the pesticide residues during storage period at different storage temperatures, and may attribute to type of pesticide and concentrate was used.

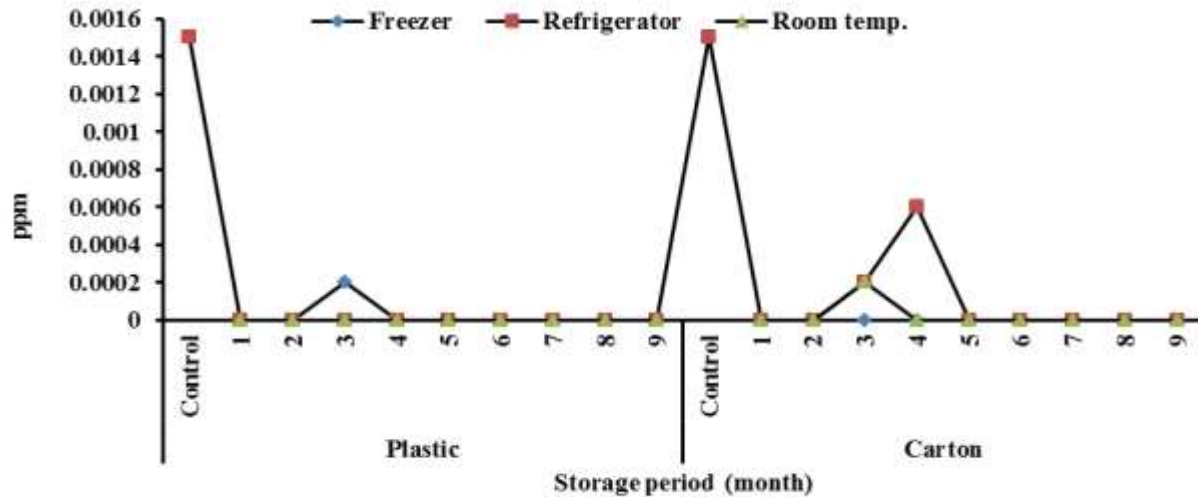


Fig. (2): Pirimophos-methyle of Al-Khalas date

Diazinon/ppm in Al-Sukkary variety

As shown in Fig 3 the results showed that the Diazinon (ppm) of soft dates (*Al-Sukkary variety*) was found being 0.00 in control samples. Packaging Materials (plastic & carton), storage temperatures (freezer, refrigerator & room temperature) and storage periods effected Diazinon by constant results (ppm) and there was no significantly difference ($P \geq 0.05$), except first four months of storage on carton packaged during storage period at a different temperature with a significantly difference ($P \leq 0.05$) was increased. The study showed that The packed material (plastic) was kept the results on

(0.0/ppm) and there was no significantly difference ($P \geq 0.05$) during storage, except one result on 3th month of storage was increased. On packed material (carton) showed the results was affected by increased only on first four months of storage, then the results were to be keeping up to last month of storage. The results showed that there were no significantly difference ($P \geq 0.05$) between packaging materials (plastic & carton), also there were no significantly difference ($P \geq 0.05$) between preservation temperatures (freezer, refrigerator and room temperature) during storage periods, except first four months of storage on carton packaged results had changed significantly.

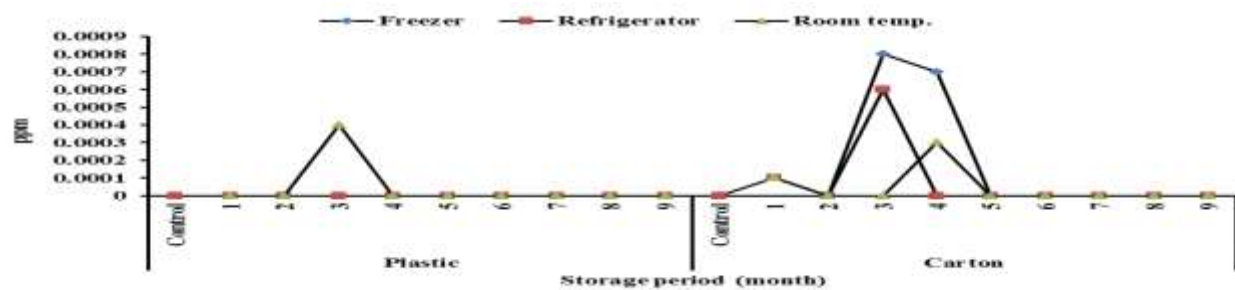


Fig. (3): Diazinon of Al-Sukkary date

Diazinon/ppm in Al-Khalas variety

As shown in Fig 4 the results showed that the Diazinon (ppm) of soft dates (Al-Khalas variety) was found 0.001 as control samples. Packaging Materials (plastic & carton), storage periods and storage temperatures (freezer, refrigerator & room temperature) were affected on Diazinon/ppm by decreased results significantly ($P \leq 0.05$). The study showed that the results were affected by decreased preservative temperatures with no significantly during storage temperature. Also showed had no significant difference ($P \geq 0.05$) between packaging materials during storage periods. In general,

the results showed a small difference between the results of the samples at the beginning (control) of the analysis and the result after the storage. The Diazinon/(ppm) was decreased on *Al-Khalas variety* while packaged in carton and plastic materials it may attribute to snow, low temperature and high temperature in room condition were crushed the pesticide residues during storage period at different storage temperatures, and may attribute to type of pesticide and concentrate was used. And increased during first months of storage on Al-Sukkary variety may attribute to samples contaminated, extraction condition and other reactions.

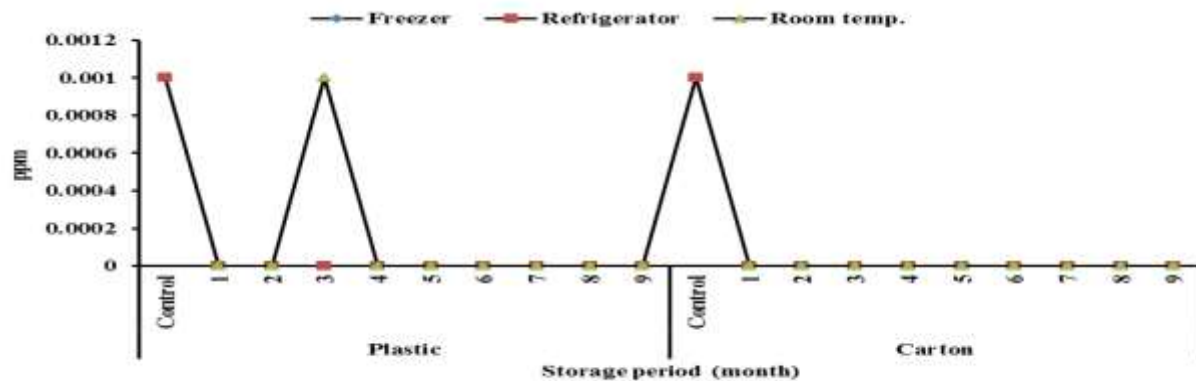


Fig. (4): Diazinon of Al-Khalas date

Bifenthrin/ppm in Al-Sukkary variety

As shown in Fig 5 Bifenthrin (ppm) was affected by packaging materials (plastic & carton), storage temperatures (freezer – refrigerator and room temperature) and by storage periods. The results showed that the Bifenthrin (ppm) of soft dates (*Al-Sukkary*) was found 0.0008 on control samples. The study showed that the results were affected by decreased at preservative temperatures with no significantly during storage temperature. Also showed had no significant difference ($P \geq 0.05$) between packaging materials during storage periods. In general, the results showed a small difference between the results of the samples at the beginning (control) of the analysis and the result after the storage. The results showed

that there were no significant difference ($P \geq 0.05$) between packaging materials, no significant difference ($P \geq 0.05$) between preservation temperatures and also storage periods affected on bifenthrin/ppm with no significantly difference ($P \geq 0.05$). The results showed the Bifenthrin/ppm was decreased during storage period and storage temperature and there was no significantly difference ($P \geq 0.05$) except two results on plastic packaged was increased during storage period explained to homogenized samples, apparatus and analysis condition, sensitivity and other reactions. But all the results on carton packaged were decreased to zero/ppm during storage period and storage temperatures.

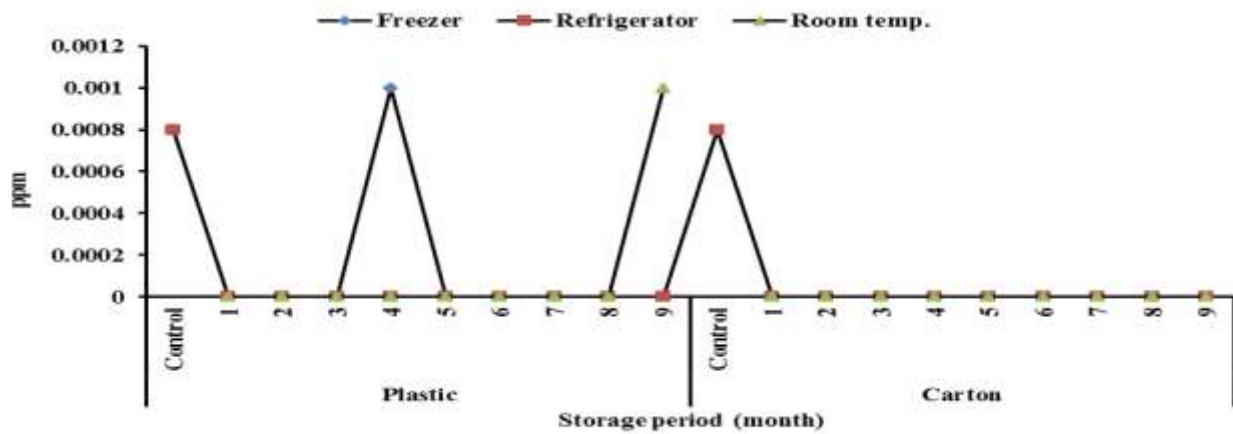


Fig. (5): Bifenthrin of Al-Sukkary date

Bifenthrin/ppm in Al-Khalas variety

The results in Fig 6 shown that the Bifenthrin in *Al-Khalas variety* was found 0.0/ppm as control samples, the results showed that the preservation (condition) temperatures and packaging materials not affected on Bifenthrin except on three results when to be packaged on carton and three results on plastic at room temperature and freezer during storage with no significant different ($P \geq 0.05$).The study showed that the results was constant on (0.0/ppm) except tow

results at room temperature and freezer when packaged to be on carton was increased with a significant different ($P \leq 0.05$).Some results were appeared may attribute to distribute of concentrate of Bifenthrin/ppm when used on trees before harvesting, samples homogenized, and quality of chemicals extraction.The variation of Bifenthrin/ppm content on *Al-Khalas variety* may attribute to the method of using the pesticide and its contact with fruit and the method of preparation of samples and other reactions.

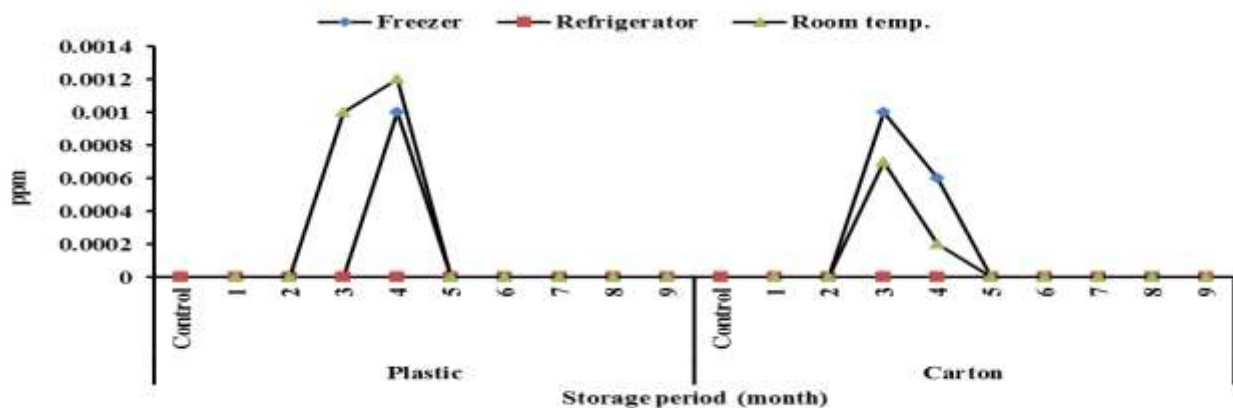


Fig. (6): Bifenthrin of Al-Khalas date

Ethion/ppm in *Al-Sukkary* variety

As shown in Fig 7 the results showed that the Ethion/ppm of soft dates (*Al-Sukkary* variety) was found to be 0.0004 as control samples. The results showed that the packaging materials (plastic & carton), storage temperature (freezer, refrigerator & room temperature) and storage periods effected on Ethion/ppm by decreased results and there was no significantly difference ($P \geq 0.05$) between packaging materials, except on carton packaged at refrigerator in 2th, 3th and 4th months of storage the results was

increased significantly ($P \leq 0.05$).The study showed there was no significant different ($P \geq 0.05$) between packaging materials, and no significant different ($P \geq 0.05$) between results during storage periods, but showed had a small significantly ($P \leq 0.05$) between preservation temperatures. Results were appeared high and concentrate of Ethion residue (ppm) in this study it may explained that the Ethion was a largest used on date fruits in Middle East special kingdom of Saudi Arabia.

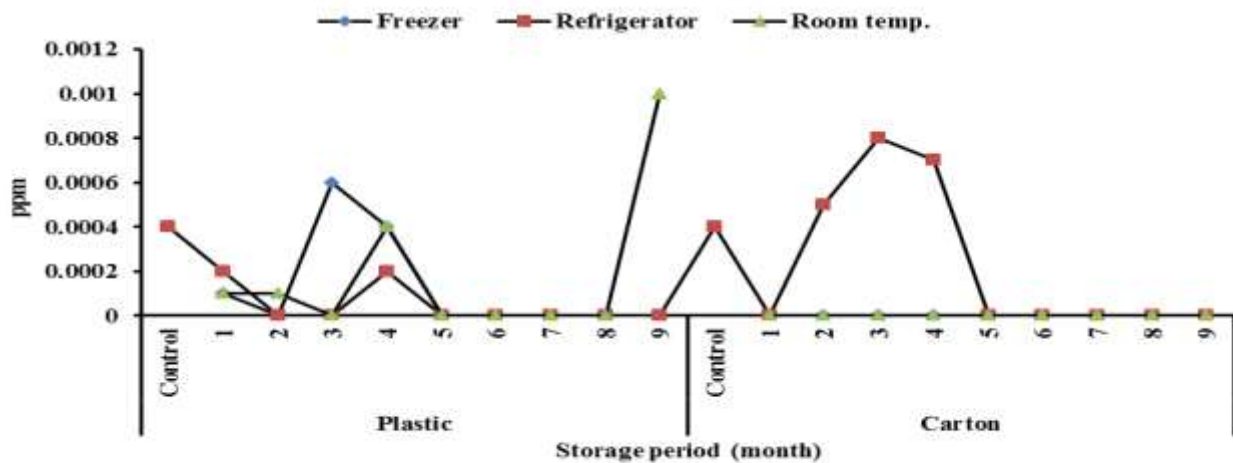


Fig. (7): Ethion of Al-Sukkary date

Ethion)/ppm in *Al-Khalas* variety

As shown in Fig 8 the results showed that the Ethion/ppm of soft dates (*Al-Khalas* variety) was found to be 0.0004 as control samples. The results showed that the packaging materials (plastic & carton), storage temperature (freezer, refrigerator & room temperature) and storage periods effected on Ethion/ppm by decreased results and there was no significantly difference ($P \geq 0.05$) between packaging materials. The results showed that the Ethion/ppm was decreased during storage period significantly ($p \leq 0.05$), also showed there was no significantly different ($P \geq 0.05$) between packaging materials and no significantly different

($P \geq 0.05$) between preservation temperatures. The study showed that there was no significant difference between date cultivars (*AL-Sukkary* and *Al-Khalas*) in the content of the ethion pesticide and affected by different packing materials and storage temperatures during the storage period. The Ethion (ppm) was decreased while packaged in carton and plastic materials it may attribute to snow, low temperature and high temperature in room condition, were being crushed the pesticide residues during storage period at different storage temperatures, and may attribute to type of pesticide and concentrate when was to be used. Also study showed that had no significant difference

($p \geq 0.05$) between two varieties of soft dates (*Al-Sukkary* & *Al-Khalas*) as control samples

and after packed and stored at different preservation temperatures.

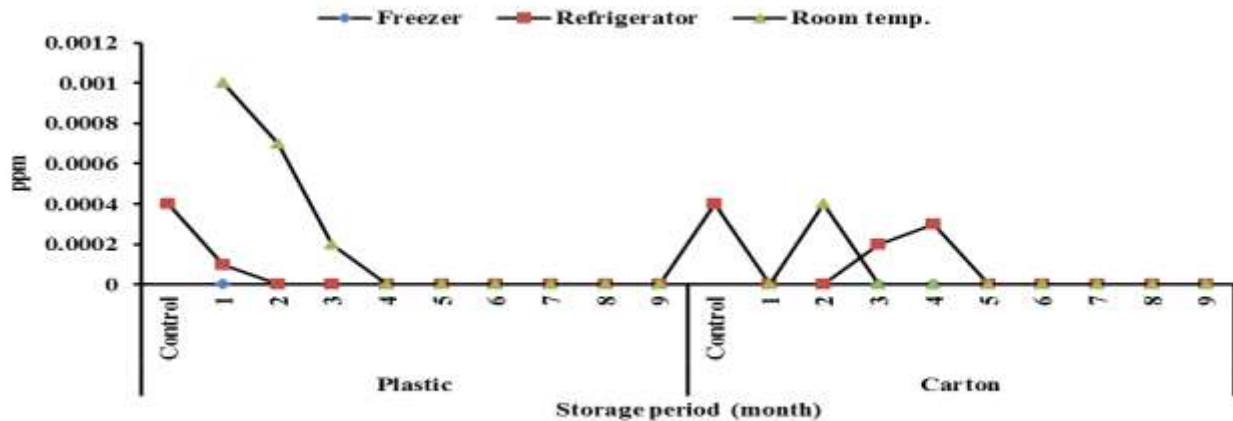


Fig. (8): Ethion of Al-Khalas date

Cypermethrin/ppm in Al-Sukkary variety
As shown in Fig the results showed that the Cypermethrin/ppm of soft date (*Al-Sukkary cultivar*) was found to be 0.00 ppm for as control samples. The results showed that the packaging materials (plastic & carton), storage temperatures (freezer, refrigerator & room temperature) and storage periods effected on Cypermethrin/ppm by constant results while some results were appeared by increased during storage period and storage temperature except at freezer and refrigerator condition on plastic packaged for all storage months was constant (0.0/ppm).The study

showed that there had a significant difference ($p \leq 0.05$) between types of packaging materials for effected on Cypermethrin during storage periods so that have some results was changed special when to be packaged on carton. The results showed there was no significant difference ($p \geq 0.05$) between preservation temperatures during storage except some results was increased as little significantly. Some results appeared during storage period it may attribute to analysis condition, device sensitivity about dust particles, quality extraction materials, samples contaminated and other reactions.

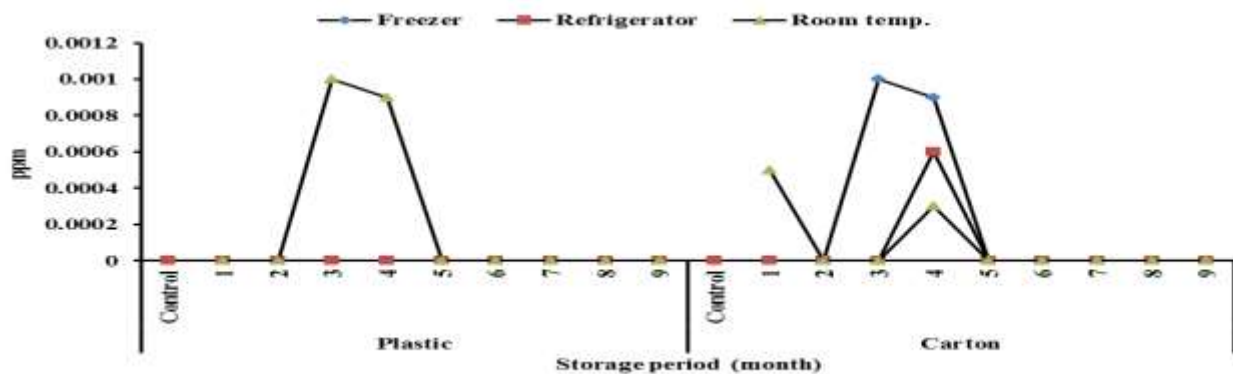


Fig. (9): Cypermethrin of Al-Sukkary date

Cypermethrin/ppm in *Al-Khalas* variety

As shown in Fig 10 the results showed that the Cypermethrin/ppm of soft date (*Al-Khalas cultivar*) was found to be 0.00 ppm for as control samples. The study showed that there had a significant difference ($p \leq 0.05$) between types of packaging materials for affected the proportion of Cypermethrin during storage periods so that have some results was changed special when to be packaged on carton. The results showed that the packaging materials (plastic & carton), storage temperatures (freezer, refrigerator & room temperature) and storage periods have affected the proportion of Cypermethrin/ppm by constant results while some results were appeared by increased during storage period and storage

temperature except at freezer and refrigerator condition on plastic packaged for all storage months was constant (0.0/ppm). The results showed there was no significant difference ($p \geq 0.05$) between preservation temperatures during storage except some results was increased as little significantly. Also study showed that had no significant difference ($p \geq 0.05$) between two varieties of soft dates (*Al-Sukkary* & *Al-Khalas*) as control samples and after packed and stored at different preservation temperatures. Some results appeared during storage period it may attribute to analysis condition, device sensitivity about dust particles, quality extraction materials, samples contaminated and other reactions.

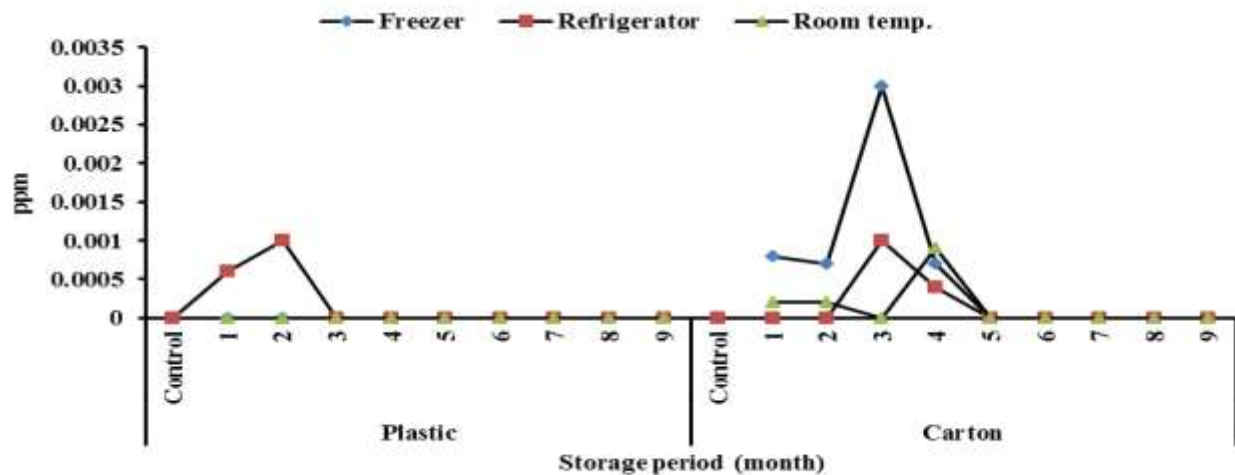


Fig. (10): Cypermethrin of Al-Khalas date

Bromopropylate/ppm in *Al-Sukkary* variety

As shown in Fig 11 the results showed that the proportion of Bromopropylate/ppm in soft date was found to be 0.011 of *Al-Sukkary*. The results showed that the packaging materials, storage periods and storage temperatures were affected on proportion of Bromopropylate/ppm by decreased a significantly ($P \leq 0.05$), except result on 5th month of storage period at room

temperature for all packages (plastic & carton) and refrigerator on carton packed was increased, in addition to the 1th month of storage in carton packaged at refrigerator and 7th month of storage on same packaged was increased and there was a significant different ($P \leq 0.05$) between packaging materials and storage period. The study showed that there had no significant different ($P \geq 0.05$) between preservation temperatures. Also, the study showed that the results were decreased significantly during storage

periods, and there was significant different ($P \leq 0.05$) between packaging materials. Some results were appeared increased it may attribute to

the samples extraction, apparatus sensitivity about dust particles and other reactions.

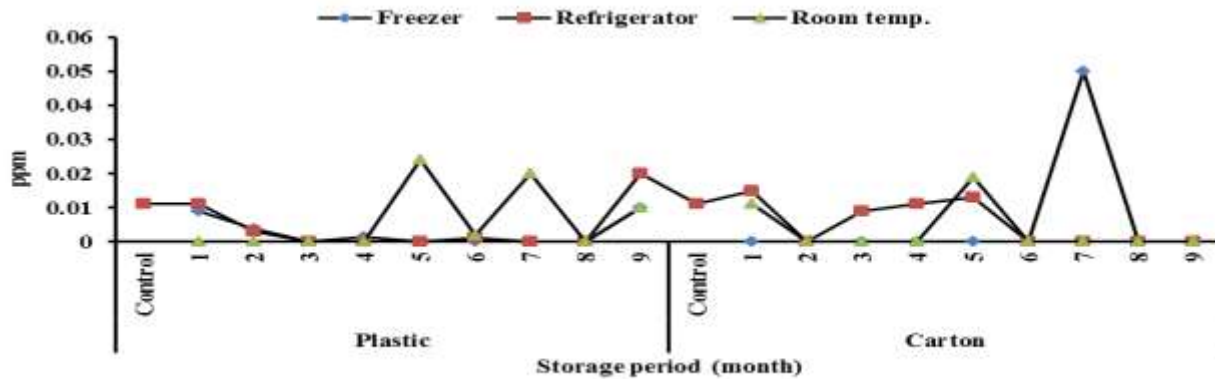


Fig. (11): Bromopropylate of Al-Sukkary date

Bromopropylate/ppm in Al-Khalas variety

As shown in Fig 12 the results showed that the proportion of Bromopropylate/ppm in soft date was found to be 0.0065 of *Al-Khalas cultivar*. The results showed that the samples when stored in freezer for all packaged materials (plastic & carton) was affected on proportion of Bromopropylate/ppm by decreased and there was significant different ($P \leq 0.05$) between storage period and result on control, but another preservation temperatures (refrigerator and room temperature) a few results were appeared increased and more results than it was decreased significantly. In this study results showed there had no significant different ($P \geq 0.05$) between packaging materials during storage periods. And there was a significant different

($P \leq 0.05$) between preservation conditions (temperatures). Also, the study showed that there had a variation between two soft dates (*Al-Sukkary and Al-Khalas cultivars*) for contaminated by Bromopropylate residue and this may be due to the use of the pesticide and the dosage used. The Bromopropylate /ppm was decreased on (*Al-Sukkary & Al-Khalas cultivar*) while packaged in carton and plastic materials it may attribute to snow, low temperature and high temperature in room condition, were being crushed the pesticide residues during storage period at different storage temperatures, and may attribute to type of pesticide and concentrate when was to be used. And other results were increased it may attribute to samples extraction, apparatus sensitivity about dust particles and other reactions

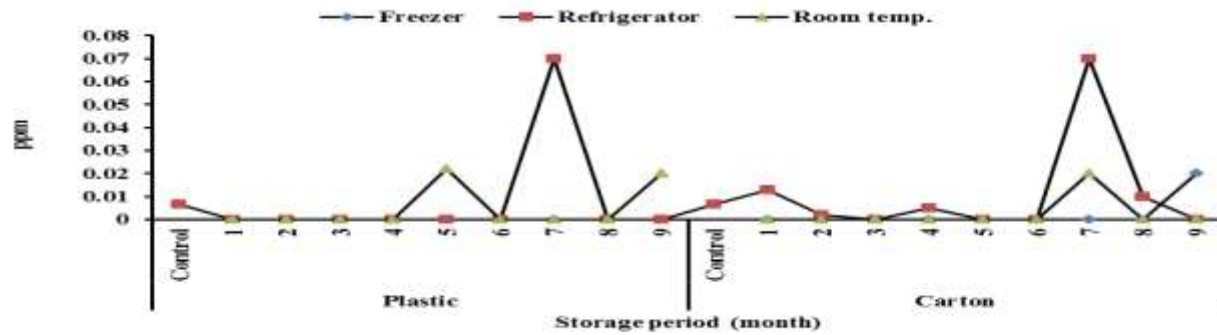


Fig. (12): Bromopropylate of Al-Khalas date

Discussion: (compeer with anther references) agree or not

The Pirimophos-methyle (ppm) in soft dates (AL-Sukkary and Al_Khalas cultivars) was decreased while packaged in carton and plastic materials it may attribute to snow, low temperature and high temperature in freezer, refrigerator and room condition respectively, were being crushed the pesticide residues during storage period at different storage temperatures, and may attribute to type of pesticide and concentrate was used.

The Diazinon/(ppm) was decreased on *Al-Khalas variety* while packaged in carton and plastic materials it may attribute to snow, low temperature and high temperature in room condition were crushed the pesticide residues during storage period at different storage temperatures, and may attribute to type of pesticide and concentrate was used. And increased during first months of storage on *Al-Sukkary variety* may attribute to samples contaminated, extraction condition and other reactions

The results showed the Bifenthrin/ppm was decreased during storage period and storage temperature and there was no significantly difference ($P \geq 0.05$) except two results on plastic packaged was increased during storage period explained to homogenized samples, apparatus and analysis condition, sensitivity and other reactions. But all the results on carton packaged were decreased

to zero/ppm during storage period and storage temperatures

The Ethion (ppm) was decreased while packaged in carton and plastic materials it may attribute to snow, low temperature and high temperature in room condition, were being crushed the pesticide residues during storage period at different storage temperatures, and may attribute to type of pesticide and concentrate when was to be used. Some results appeared during storage period it may attribute to analysis condition, device sensitivity about dust particles, quality extraction materials, samples contaminated and other reactions.

Conclusion

The ruggedness test results showed that there was no significant different ($P \geq 0.05$) of the type of pesticide (Pirimophos-methyle, Diazinon, Bifenthrin and Ethion/ppm) for all varieties of Dates during the storage period. There was a significant difference ($P \leq 0.05$) between two types of pesticides (Cypermethrin and Bromopropylate/ppm) during storage periods. Additionally, a higher value was recorded in a variety of sukkary (0.000056 parts per million) and less in the Al -Khalas (0.000016 ppm). Monitoring pesticide residues in date samples helps to assessing the potential risk of these products to consumers health and gives information on the pesticide treatments that have been used

during the processes of harvesting, preservation, and distribution

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تأثير مواد تعبئه مختلفه ودرجات حرارلا الحفظ على متبقى المبيدات خلال فترات التخزين في التمور الرطبه
صنفي السكري والخلاص

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المستخلص

أجريت هذه الدراسه بغرض دراسة تأثير متبقيات المبيدات على جودة وسلامة صنفيين من التمور الرطبة (السكري والخلاص). باستخدام مواد تعبئه مختلفه (الكرتون والبلاستيك) تحت تأثير درجات حراره مختلفه (التجميد, التبريد وحرارة الغرفة) وفترة تخزين تسعه اشهر تم اخذ العينات من مزرعه بمنطقه القصيم في المملكه العربيه السعوديه تم تقدير متبقيات المبيدات (ppm) في المعاملات المختلفه أظهرت النتائج أنه ليس هنالك فرق معنوي في حدود الثقة 0.05 باختلاف الصنفيين لكل من المبيدات (بريموفوس ميثايل، داي أزينون، بيفنثرين و ايتيون/ جزء في المليون) ولكن يوجد فرق معنوي لمتبقيات المبيدات سايبيرمثرين و بروموبروبيليت / جزء في المليون حيث سجل الاول أعلى متوسط معنوي له لصنف السكري (ppm0.000056) وأقل متوسط معنوي له لصنف الخلاص (ppm0.00442) بينما سجل الاخر أعلى متوسط معنوي له لصنف الخلاص (ppm0.000016) وأقل متوسط معنوي له لصنف السكري (ppm0.00424).