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Study the Effect of Different Packaging Films on Physiochemical Properties of Different Iranian Dates During Storage

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Abstract: This research was done in order to study the effect of different packaging films on the physiochemical properties of three Iranian date varieties (Kabkab. Piarome and Sayer) during storage. These dates were packed at coatings such as polyethylene, polypropylene and cellophane. These dates were stored for six month at three different temperatures (25, 5 and -18 degrees centigrade) and their chemical properties (moisture, pH, acidity, total sugars, reducing sugars, Brix, lightness value and redness to yellowness ratio) were analyzed each two month intervals. The results defined best packaging film, best temperature for storing and maximum time of storage for each of dates.

Key words: Date . storage . chemical properties . packaging film . temperature

INTRODUCTION

Date (*Phoenix dactylifera* L.) fruit is an important tropical fruit having heavy demands in world markets. The edible stages of ripening of date fruit could be divided into three main phases i.e. khalal, rotab and over ripened date. Fruit can be eaten during all these stages; however fruit in rotab stage is very delicious. Design of machines and process to harvest, handle and store agricultural materials and to convert these materials in to food and feed requires an understanding of their physical properties [1].

Date palm is the most successful and extremely important subsistence crop in the most of the hot arid regions [2]. The date belt stretches from the Indus Valley in the east to the Atlantic in the west. The world total number of date palm is about 100 million, distributed in 34 countries and producing between 2.5 and 6 million tons of fruit per year. The date fruit is marketed all over the world as a high value confectionery and fruit crop [3]. The production of dates has been increased many folds with modern biotechnological approaches. However the processing industries have not developed at that pace. There is enormous potential for fresh dates and date products with better quality attributes. Date processing industries are producing various date products like date-paste, date-syrup, date-dip, date-honey, date-jam, date-vinegar, etc [4].

Some important physio-chemical characteristics related to sugary foods are total soluble solids/total solids, sugar composition, water activity, color, rheology/texture, melting point, glass transition, temperature, etc. These parameters could successfully be utilized for product development, quality control, process equipment design,shelf life prediction, packaging and storage [5].

The economy and the trade significant of date which worthy of export is known to every one. According to "Tehran Times", of the overall 1.18 million dates produced within Iran country, 180.000 tons in consumed domestically and the remainder is exported. Iran enjoying 183.000 hectares of Land area under palm cultivation, accounts for 16.6 percent of the total palm groves world wide and has the second situation of production in the world [6]. aA good opportunity for trade and export of this commodity exists. Due to marketing process constraints and lack of access to global markets only about 12 percent of dates produced in Iran are exported during and large quantities were consumed domestically. Countries in Central Asia, Persian Gulf, Europe, East Asia and Northern America are among purchasers of Iranian dates. To support and reinforce its non-oil exporting position in global markets Iran should liberalize its economic programs to mitigate internal & external challenges of globalisation and take advantage of the global economic changes.

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Table 1: General specifications of films

Type of film	Water vapor transmission (1)	O_2 permeability (2)	N_2 permeability (3)	Co_2 permeability (4)	Water absorption
LDPE	1.3	550	180	2900	Low
PP	0.7	240	60	800	Low
Cellophane	0.3	1	1	13	High

gr/loss/24 hour /100 in^2, (2), (3), (4) cc/24 hour/100in^2

Unfortunately although high production potential, because of presenting dates without grading and not determined in large packaging as bulk, has not been able to obtain a suitable situation at international markets [7, 8].

MATERIALS AND METHODS

Three varieties of Iranian dates (kabkab, piarome and sayer) were collected at tamr stage from khozestan province of Iran. Dates were packed at three different coatings such as polyethylene (PE), Polypropylene (PP) and cellophane (CELLO).

The general specifications of these films is shown in Table 1.

These dates were stored at athree different atemperatures (25, 5 and a-18 degrees centigrade) for six months.

These following analysis carried out at an interval of two months:

- Moisture determination (with electrical oven)
- pH determination
- Acidity determination
- Total sugars and reducing sugars (lane and Eynon amethod)
- Total soluble solids (Brix with refractometer)
- Lightness value and redness to yellowness ratio (Hunter lab colorimeter) according to AOAC [9].

After six month results analyzed. A CRD with three replications and analysis of variance (ANOVA) were used.

MSTATC, EXCELL, SIGMA STAT and SLIDE WRITE were soft wares that used. Comparisons of means were carried out using LSD multiple comp arison test, with a probability level $p<0.05$.

RESULTS AND DISCUSSION

Figure 1 and 2 show the effects of packaging films on moisture content of dates at different temperatures and during storage respectively. Between packaging films used in this study, PP has the least effect on moisture variations at different temperatures that is because of higher thickness and lower permeability of this type of film. As it is shown at PE and cellophane films that have higher permeability to moisture a noticeable decrease in moisture is shown specifically at 25°C. Effect of time of storage shows that for all packaging, moisture decreases during storage, but the least variations is for PP.

Figure 3-6 show the effects of time, temperature and packaging films on pH and acidity of dates. These indicate that packaging type does not have a significant effect on pH and acidity solely.

Figure 7-10 show the effects of time, temperature and packaging films on Brix and total sugars.

Effect of temperature on °Brix and total sugars is meaningful.

At 25°C a ameaningful decrease has obtained in accordance with 5 and a a –18°C. Effect of packaging films on °Brix and total sugar content is meaningful too and more decrease was obtained for PE and PP, that is because of lower openings in these films that prepare anaerobic conditions for fermentation specially at 25°C. Thus cause a decrease in Brix and total sugars by sugar metabolization.

In all of packaging films a meaningful decrease was obtained during storage. Because of meaningful decrease in PE and PP in °BX and total sugars of dates, these packaging films are not useful for more than two month storage.

Figure 11 and 12 show effects of time, temperature, packaging films on reducing sugars of dates. For each packaging film effect of temperature and time of storage is meaningful at 5% level. As these figures indicate PE and PP do not have the ability for remaining reducing sugars like total sugars. Decrease of reducing sugars during time of storage was seen for all packaging films. Because of intense loss on reducing sugars after four months PE and PP are not proposed.

Figure 13 and 14 show effects of time, temperature, packaging films on L value of dates. The effects are not meaningful, but for all different temperatures lightness value at PP is higher in accordance with other packaging films and after six month storage decrease content is lower at this packaging film.

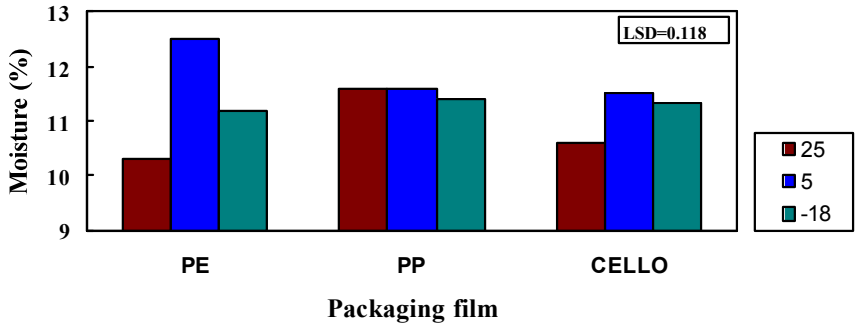

Fig. 1: Effect of packaging films and temperature on moisture content

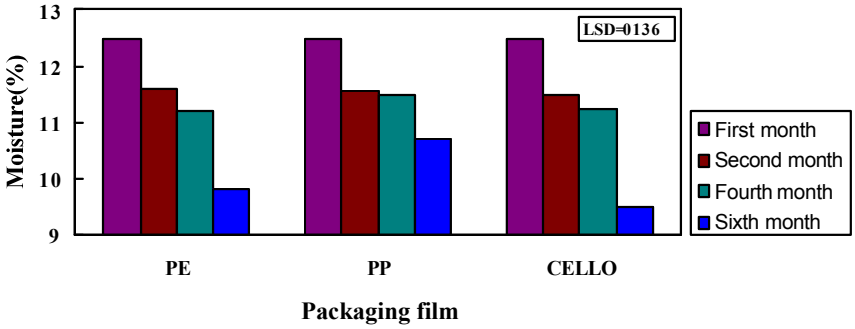

Fig. 2: Effect of packaging films on moisture content during storage

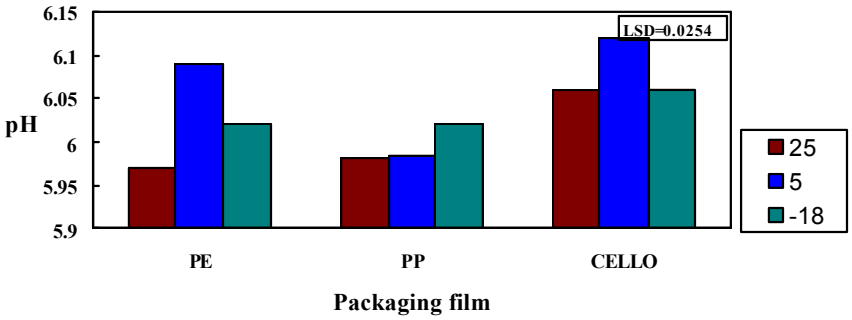

Fig. 3: Effect of packaging films and temperature on pH

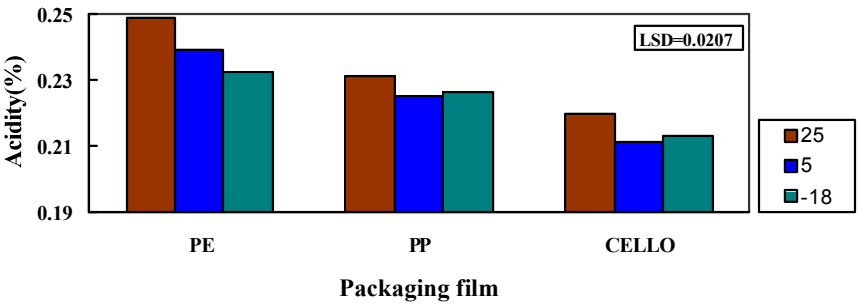

Fig. 4: Effect of packaging films and temperature on acidity

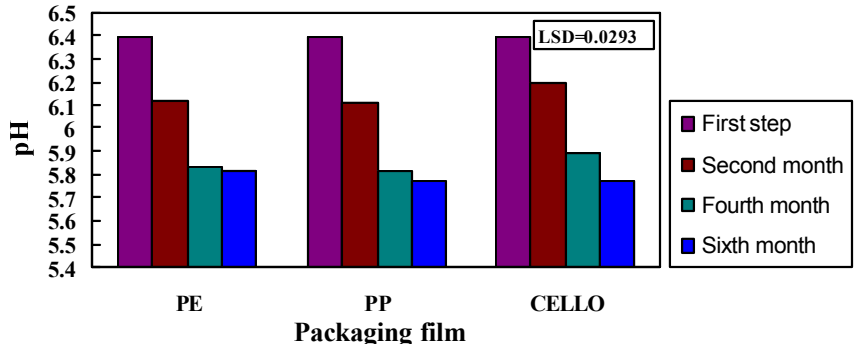

Fig. 5: Effect of packaging films on pH during storage

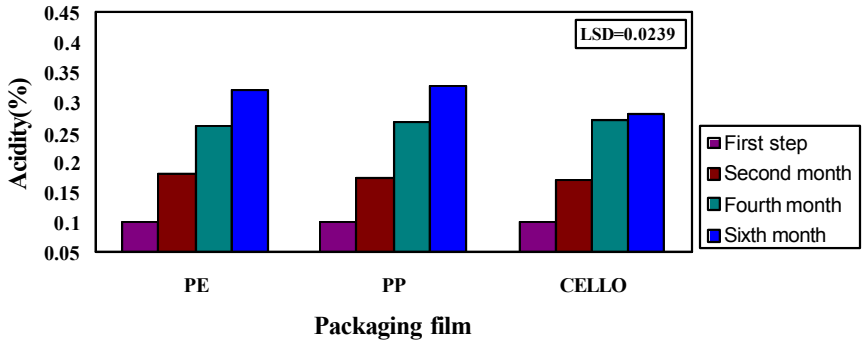

Fig. 6: Effect of packaging films on acidity during storage

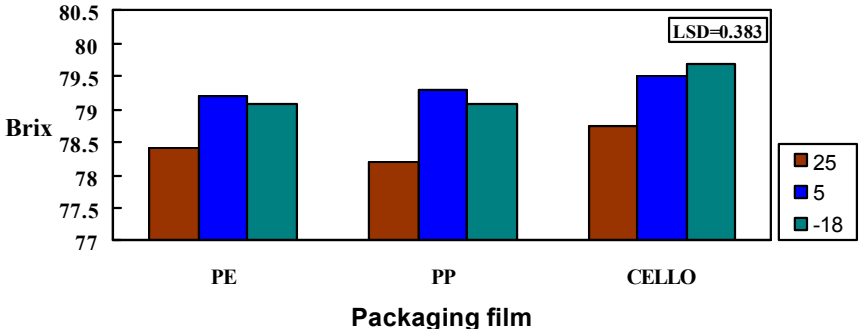

Fig. 7: Effect of packaging films and temperature on brix

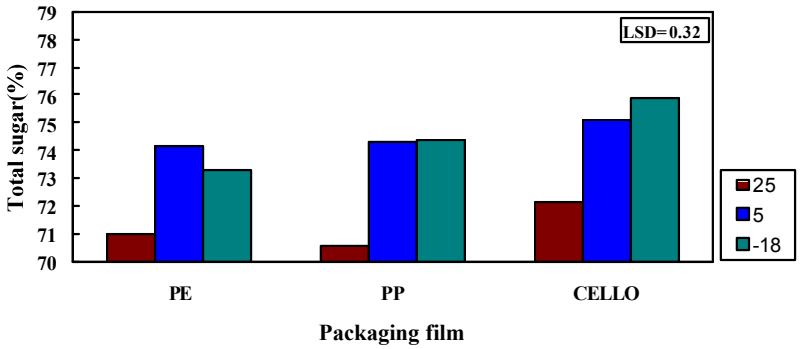

Fig. 8: Effect of packaging films and temperature on total sugar

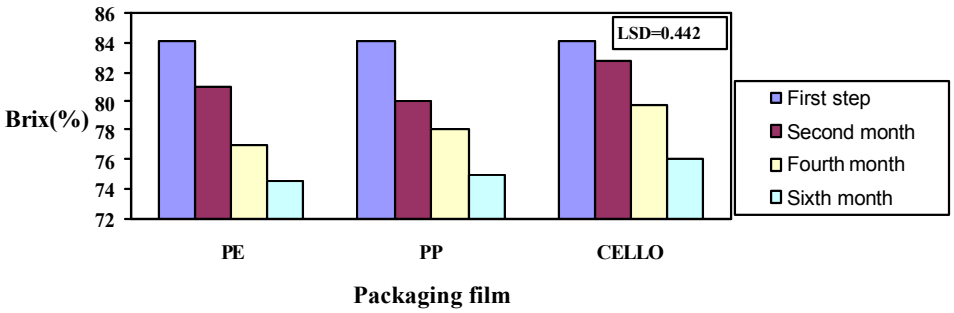

Fig. 9: Effect of packaging films on Brix during storage

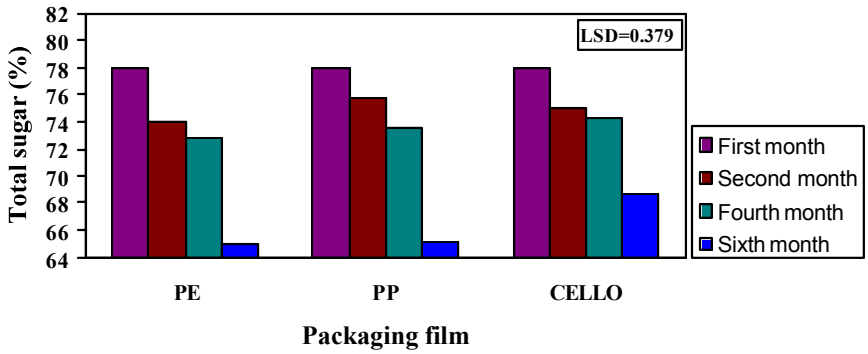

Fig. 10: Effect of packaging films on total sugar during storage

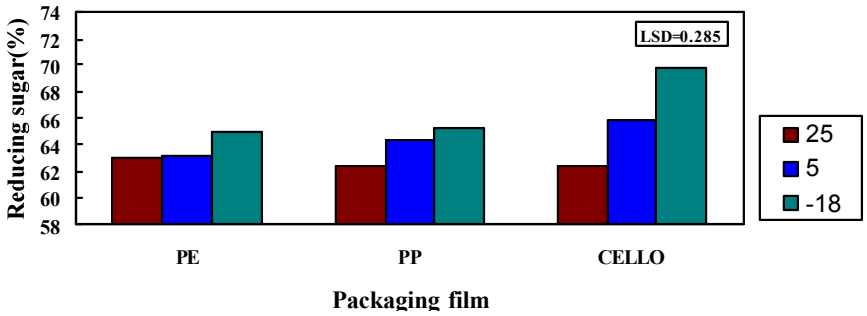

Fig. 11: Effect of packaging films and temperature on reducing sugar

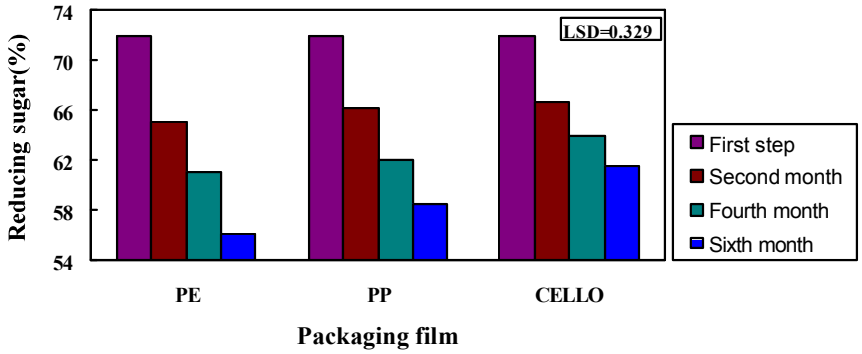

Fig. 12: Effect of packaging films on reducing sugar during storage

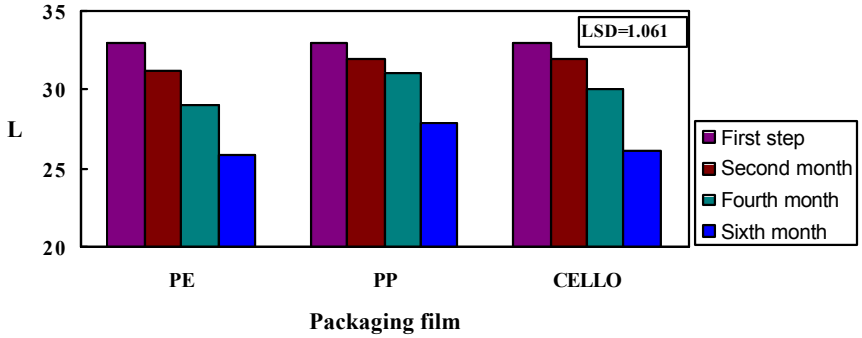

Fig. 13: Effect of packaging films on L value during storage

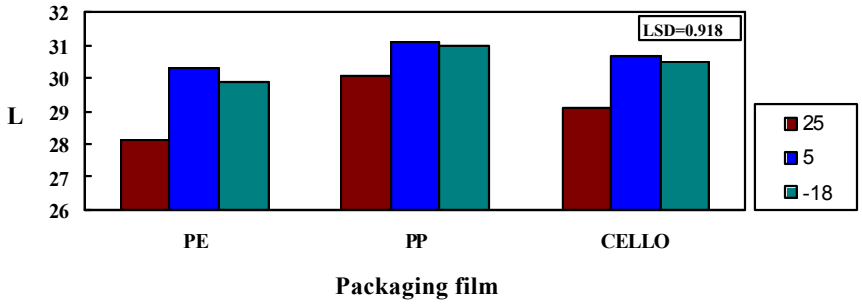

Fig. 14: Effect of packaging films and temperature on L value

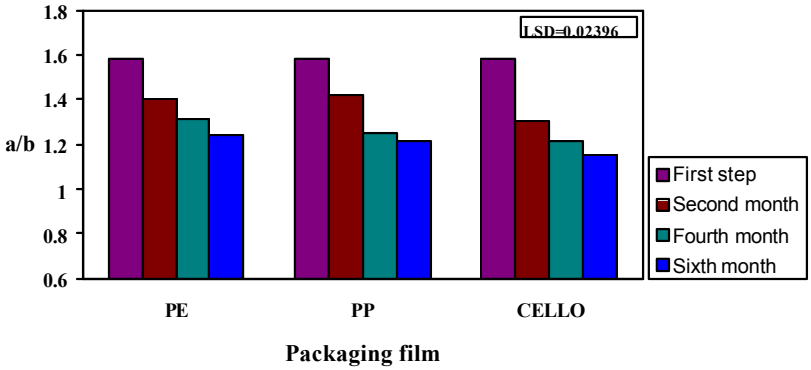

Fig. 15: Effect of packaging films on a/b ratio during storage

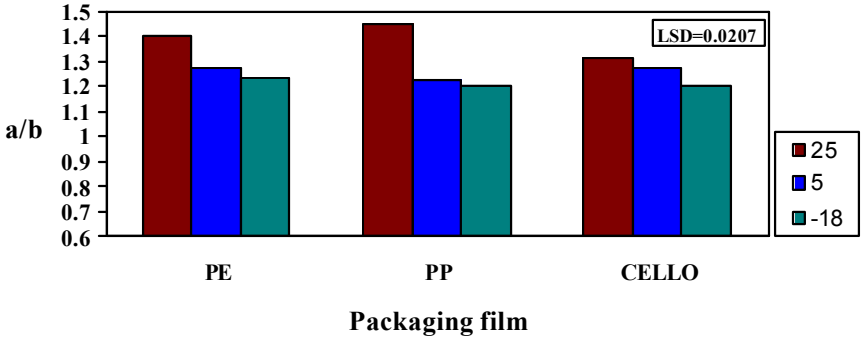

Fig. 16: Effect of packaging films and temperature on a/b ratio

Figure 15 and 16 show effects of time, temperature, packaging films on redness (a/b ratio) of dates. For all packaging films this ratio decreases during storage but a meaningful difference was not shown at 5% level. Totally we can say because of insignificant effect of packaging film on redness ratio a specific type of film can not be proposed.

CONCLUSION

There is a meaning full difference on physiochemical properties of different date varieties (8). Time and temperature and type of packaging film have noticeable effects on date quality. At 25°C date spoil very soon. In all packaging films at 5°C least variations on quality of dates observed until two month storage. For storing more than two month PE and PP causes a decrease in °Brix, total and reducing sugars.

Totally depend on the processing and the type of produced product and consumption we can select the best packaging film.

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