

ABSTRACT

The present work was conducted on semi-dry date fruits (Siwi variety) to improve quality of stored fruits during long storage period (12 months) at room temperature (20-22°C, 70-75% RH).

The plan of work aimed to use different alternative of using methyl bromide (MB) as low doses of gamma irradiation (1.0, 2.0 and 3.0 kGy) separately or combined with thermal treatments at 50°C/24 hrs or 50°C/48 hrs, besides using thermal treatments separately. In addition, fumigation with sulphur dioxide (SO₂). The treated samples were packaged and stored even 12 months at room temperature.

Main factors affecting quality of dates were studied in details mainly physical, chemical, marketable, characters. IN addition, the histological studies were done on treated dates. Hazard Analysis Critical Control Point (HACCP), besides the carried out to get the applied treatment were the suitable economical studies.

The best results of physical characters which involved fruits weight loss (%) and total soluble solids proved suitability of the combination treatment which are the best one.

Also, chemical analysis as moisture content (%) showed that combination treatments keep the moisture (%) with low reduction comparing than other treatments. Whereas, same treatments caused slight increase in sugar content as proved by High Performance Liquid Chromatography (HPLC). In the same time, slight reduction caused by fumigation with MB or SO₂. Also, total sugars and, reducing sugars recorded high content in treated dates with thermal treatments than others. Browning values of dates increased as measured chemically or physically after one year of storage by Hunter apparatus in control, MB and irradiated with 1.0kGy. The best color resulted with sulfiting, some irradiation doses and low dose at gentle thermal treatments (50°C/24 hrs). Also, same trend observed with rest chemical analysis as pH values, crude protein, crude fat, ash content, fiber content (%), total sugar/acid ratio and element content.

The determination of MB or SO₂ residual after fumigation in dates proved that no residue resulted in dates which was less than maximum residue limits (MRL) as recommended by **FAO/WHO (2005)**.

Concerning the marketable characters as insect infestation (%) and microbial tests which studied in details proved that high percent of sound fruits (marketable %) resulted with thermal treatments separately or with irradiation treatments.

Same trend resulted with panelists test which give the preferability of combination treatment at first rank, thermal separately and the other treatments in respectively.

The histological studies showed that dates tissues contained exocarp, mezocarp and endocarp. Exocarp tissues have 3-layers of similar small cutinized parenchymatou cells which filled in some cells with tannins. Whereas, the edible part as mezocarp tissues which has

chloroplast tannins cells in groups and distributed in discontinuous band. High doses (3.0 kGy) or high temperature (50°C/48 hrs) injured cell walls as present in shrinkage or collapsed cells. The ideal dates as with less changes resulted by using thermal (50°C/24 hrs) without or with 1.0 kGy.

Also, the economical studies showed that the highest profit net can arranged as sulfiting, MB whereas the less one is radiation process at 3.0 kGy.

The abovementioned data proved the preferability of using thermal treatments at low level (50°C/24 hrs) separately especially in upper Egypt due to the solar energy availability of at this region.

HACCP results showed that using of thermal treatments are applicable techniques especially that no residual results.

Finally, according the obtained results, it could be recommended that using thermal treatments are the suitable alternative for using chemicals or radiation for improving quality of semi-dry date fruits.

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ARABIC SUMMARY.	

ABBREVIATIONS

CAC	Codex Alimentarius Commissions
CCFH	Codex Committee Food Hygiene
CCFIC	Codex Committee on food Import and Export Inspection And Certification Systems
CCP	Critical Control Point
CFSAN	Center for Food Safety and Applied Nutrition
FDA	Food Drug Administration
FSIS	Food Service and Inspection Service
GAP	Good agriculture Practices
GMP	Good Manufacturing Practices
GSP	Good Storage Practices
HACCP	Hazard Analysis Critical Control Points
MB	Methyl Bromide
MFSC	Microbiological and Food Safety Committee
NACMCF	National Advisory Committee of Microbiological Criteria Foods
NFPA	National Food Processors Association
QA	Quality Assurance
SASO	Saudi Arabian Standard Organization
SO₂	Sulfate dioxide
SPS	Sanitary And Phytosanitary Measures
TQM	Total Quality Management
USFDA	United States Food and Drug Administration
WHO	World Health Organization
WTO	World Trade Organization
HPLC	High Performance Liquid Chromatography