EFFECT OF MODIFIED PACKAGES ON FRUIT QUALITY OF IRRADIATED DATES DURING STORAGE

By

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B.Sc. Agric. Sc. (Horticulture), Fac. Agric. Ain Shams University, 2006
M.Sc. Agric. Sc. (Horticulture), Fac. Agric. Ain Shams University, 2012

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ABSTRACT

Asmaa Ezz-Eldeen Ahmed El- Said: Effect of Modified Packages on Fruit Quality of Irradiated Dates during Storage. Unpublished Ph.D. Thesis, Department of Horticulture, Faculty of Agriculture, Ain Shams University, 2020

This study was conducted as an attempt to solve some of the problems that limit the export of Egyptian date fruits. Two varieties of Egyptian dates were chosen, Hayani (rutabe) as a fresh dates one and Sakouti as a dry dates. Different biodegradable coating films was prepared from polyvinyl alcohol, chitosan, tannic acid and the irradiated mixture of them using γ- irradiation with different doses to prolong the shelf life of Rutabe dates (Hayani cv.) during marketing and maintaining the highest quality during cold storage. Another group of coating films was prepared from polyvinyl alcohol doped with silver nano particles at concentrations of 0, 25, 50 and 100 ppm. The coating films were applied on Hayani dates and the fruits were stored at 0°C ±2 and 95-98 % RH. Different measurements were taken on edible co-polymers coating films as Fourier Transform Infrared (FTIR), X-ray Diffraction (XRD), Mechanical properties, Scanning Electron Microscopy (SEM), Thermogravimetric Analysis (TGA), Antimicrobial activity of PVA/CS/TA Blends. And Dynamic Light Scattering (DLS), UV visible and High Resolution Transmission Electronic Microscope (HRTEM) for polyvinyl alcohol + silver nano particles coating films.

Some different determinations on Hayani dates were taken i.e. fruit decay (%), shelf life days, moisture content (%), weight loss (%), microbiological analyses, sensory evaluation and the residue of silver nano particles before and after washing the coated Hayani fruits using Inductively Coupled Plasma (ICP). The results showed that the antimicrobial effect, physical and chemical properties of coating films (polyvinyl alcohol + chitosan + tannic acid) improved by irradiation with 10 kGy gamma rays. Hyani dates coated with the irradiated mixture of

polyvinyl alcohol + chitosan + tannic acid or 50 and 100 ppm AgNPs + PVA had the best quality during the storage and marketing period. The shelf life period of coated fruits extended to 28-30 days at 12°C ± 2 and 95-98 % RH, while the uncoated fruits (control) were completely damaged after about one week.

Irradiated Sakouti cv. (dry dates variety) were packaged in different types of bags as high-density, low-density transparent polyethylene and cellophane, in addition to the traditional packaging of burlap treated with some fixed natural oils that have a repellent or lethal effect on the insects, such as cotton seeds oil and soybean oil, to prevent the insects re-infestation after irradiation during storage at room temperature. Insect infestation (%), Weight loss (%) and the overall migration test were determined. The results showed that the low-density polyethylene was resistant for penetration by insects during the storage period, while insects succeeded in penetrating high-density polyethylene and cellophane. But it was found that the overall migration in low-density polyethylene exceeded the limits allowed by the WHO. The application of cotton seeds oil and soybean oil on burlap delayed the insect infestation for two months only, but the fruits were completely infested in the end of storage period.

Key Words: Hayani dates, Sakouti dates, γ-irradiation, Migration, biodegradable, silver nano particles, cotton seeds, soay bean oil.

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CONTENT

Page

Page

LIST OF TABLES

LIST OF FIGURES