

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

By

ASMAA EZZ-ELDEEN AHMED EL-SAYED SALEM

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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This thesis has approved by:

Dr. Omayma Mahmoud Ismail

Prof. of Pomology, Horticultural Crops Technology, National
Research Centre

Dr. Hassan Fadel El-Wakil

Prof. of Pomology, Faculty of Agriculture, Ain Shams University

Dr. Nazmi Abdel Hamid Abdel-Ghany

Prof. of Pomology, Faculty of Agriculture, Ain Shams University

Dr. Ibrahim Mohamed Dosouky

Prof. Emeritus of Pomology, Faculty of Agriculture, Ain Shams
University

Date of examination: 21 / 7 / 2020

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Under the supervision of:

Dr. Ibrahim Mohamed Dosouky

Prof. Emeritus of Pomology, Department of Horticulture, Faculty of
Agriculture, Ain Shams University (Principal Supervisor)

Dr. Nazmi Abdel Hamid Abdel-Ghany

Prof. of Pomology, Department of Horticulture, Faculty of
Agriculture, Ain Shams University

Dr. Serag El Dein Ahmed Farag

Prof. Emeritus of Food Irradiation, Department of Food Irradiation,
National Centre for Radiation Research & Technology

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 Unpublished Ph.D. Thesis, Department of Horticulture, Faculty of Agriculture, Ain Shams University, 2020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 $0^{\circ}\text{C} \pm 2$ 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 $12^{\circ}\text{C} \pm 2$ 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 |
|---|-------------|
| LIST OF TABLES | VI |
| LIST OF FIGURES..... | IX |
| INTRODUCTION..... | 1 |
| 2. REVIEW OF LITERATURE..... | 4 |
| 2.1. The First experiment (effect of using some natural edible co- polymers coatings on Hyani date fruit behavior during marketing)..... | 6 |
| 2.1.1. Packaging and cold storage of fresh fruits..... | 6 |
| 2.1.1.2. Hazard of plastic packages..... | 7 |
| 2.1.1.3. The European Union restrictions for plastics use..... | 7 |
| 2.1.1.4. Biodegradable edible coatings and films for fruits..... | 8 |
| 2.1.2. Effect of gamma irradiation on polymer materials and co- polymer coatings and films..... | 11 |
| 2.1.3. Measurements on edible co-polymers coatings and films.. | 12 |
| 2.1.3.1. Mechanical properties..... | 12 |
| 2.1.3.2. Antimicrobial activity of chitosan based coatings..... | 12 |
| 2.1.4. Determinations on date fruits..... | 13 |
| 2.1.4.1. Fruit Decay (%)..... | 13 |
| 2.1.4.2. Moisture content (%)..... | 14 |
| 2.1.4.3. Shelf life span..... | 14 |
| 2.1.4.4. Weight loss (%)..... | 15 |
| 2.1.4.5. Microbiological analyses..... | 15 |
| 2.1.4.6. Sensory evaluation..... | 16 |
| 2.2. The second experiment (Using polyvinyl alcohol+ Silver nano-particles coatings for Preservation of Freshness Hyani Rutab Dates during storage and marketing)..... | 17 |
| 2.2.1. Nano silver coatings for fresh fruits..... | 17 |
| 2.2.2. Modification of coatings polymers and films..... | 19 |

| | Page |
|---|-------------|
| 2.2.3. Safety of Silver nanoparticles (Ag-NPs) for packaging food materials..... | 19 |
| 2.2.4. Characterization of Nano silver composites coatings and films..... | 20 |
| 2.2.4.1. Dynamic Light Scattering (DLS)..... | 20 |
| 2.2.4.2. X-ray Diffraction (XRD)..... | 20 |
| 2.2.4.3. Transmission Electronic Microscope (TEM) | 21 |
| 2.2.4.4. UV visible..... | 21 |
| 2.2.4.5. Inductively Coupled Plasma (ICP)..... | 21 |
| 2.2.5. Determinations on date fruits..... | 22 |
| 2.2.5.1. Fruit Decay (%) and Shelf life span..... | 22 |
| 2.2.5.2. Moisture content (%)..... | 23 |
| 2.2.5.3. Weight loss (%)..... | 24 |
| 2.2.5.4. Microbiological analyses..... | 25 |
| 2.2.5.5. Sensory evaluation..... | 26 |
| 2.3. The third experiment..... | 27 |
| 2.3.1. Dry dates..... | 27 |
| 2.3.1.1. Insect infestation and its effect on quality of dry dates. | 28 |
| 2.3.1.2. The most important Egyptian stored dry dates insects.. | 28 |
| 2.3.1.2.1. Saw-toothed beetle (<i>Oryzaephilus surinamensis</i>)... | 30 |
| 2.3.1.2.2. The almond moth (<i>Ephestia cautella</i>)..... | 31 |
| 2.3.2. Packaging of dry dates..... | 33 |
| 2.3.2.1. Mechanism of insects Entry into package..... | 34 |
| 2.3.3. Overall migration test..... | 35 |
| 2.3.3.1. Effect of irradiation on migration in plastic packages.. | 37 |
| 2.3.4. Traditional methods for controlling insect infestations in dates during storage..... | 38 |
| 2.3.4.1. Chemicals and Synthetic pesticides..... | 39 |
| 2.3.4.2. Ionizing radiations..... | 39 |
| 2.3.4.2.1. Ionizing radiations mode of action..... | 40 |
| 2.3.4.3. Vegetable oils and Essential oils..... | 43 |

| | Page |
|--|-------------|
| 3. MATERIAL AND METHODS | 48 |
| 3.1. Chemicals..... | 48 |
| 3.2. Food stimulants..... | 48 |
| 3.3. Natural fixed oils..... | 49 |
| 3.4. Date fruits..... | 49 |
| 3.5. Packaging materials..... | 49 |
| 3.6. Preparation of PVA/CS/TA Blends..... | 49 |
| 3.7. Preparation of (AgNPs /PVA) blend..... | 50 |
| 3.8. Gamma Irradiation process for prepared coating solutions..... | 50 |
| 3.9. Dates Irradiation process..... | 51 |
| 3.10. Treatment and Storage of dates..... | 51 |
| 3.11. Experimental design..... | 51 |
| 3.12. The first experiment..... | 51 |
| 3.12.1. Measurements on edible co-polymers coatings and films..... | 52 |
| 3.12.1.1. Fourier Transform Infrared (FTIR)..... | 52 |
| 3.12.1.2. X-ray Diffraction (XRD)..... | 52 |
| 3.12.1.3. Mechanical properties..... | 52 |
| 3.12.1.4. Scanning Electron Microscopy (SEM)..... | 52 |
| 3.12.1.5. Thermogravimetric Analysis (TGA)..... | 52 |
| 3.12.1.6. Antimicrobial activity of PVA/CS/TA Blends..... | 53 |
| 3.12.2. Determinations on date fruits..... | 53 |
| 3.12.2.1. Fruit Decay (%) and Shelf life span..... | 53 |
| 3.12.2.2. Moisture content (%)..... | 53 |
| 3.12.2.3. Weight loss (%)..... | 53 |
| 3.12.2.4. Microbiological analyses..... | 54 |
| 3.12.2.5. Sensory evaluation..... | 54 |
| 3.13. The second experiment..... | 54 |
| 3.13.1. Measurements on AgNPs /PVA coatings and films..... | 54 |
| 3.13.1.1. Dynamic Light Scattering (DLS)..... | 54 |
| 3.13.1.2. Fourier Transform Infrared (FTIR)..... | 54 |

| | Page |
|---|-------------|
| 3.13.1.3. X-ray Diffraction (XRD)..... | 55 |
| 3.13.1.4. High Resolution Transmission Electronic Microscope (HRTEM)..... | 55 |
| 3.13.1.5. UV visible | 55 |
| 3.13.2. Determinations on date fruits..... | 55 |
| 3.13.2.1. Fruit Decay (%) and Shelf life span..... | 55 |
| 3.13.2.2. Moisture content (%)..... | 55 |
| 3.13.2.3. Weight loss (%)..... | 55 |
| 3.13.2.4. Microbiological analyses..... | 55 |
| 3.13.2.5. Sensory evaluation..... | 56 |
| 3.13.2.5. Determination of AgNPs in coated dates..... | 56 |
| 3.15. The third experiment..... | 56 |
| 3.15.1. Insect infestation..... | 56 |
| 3.15.2. Weight loss..... | 57 |
| 3.15.3. Overall migration test..... | 57 |
| 3.15.4. Statistical analysis..... | 58 |
| RESULTS AND DISCUSSION..... | 59 |
| 4.1. First experiment..... | 59 |
| 4.1.1. Measurements on edible co-polymers coatings and films..... | 59 |
| 4.1.1.1. Fourier Transform Infrared (FTIR)..... | 59 |
| 4.1.1.2. X-ray Diffraction (XRD)..... | 60 |
| 4.1.1.3. Mechanical properties..... | 61 |
| 4.1.1.4. Scanning Electron Microscopy (SEM)..... | 63 |
| 4.1.1.5. Thermogravimetric Analysis (TGA)..... | 64 |
| 4.1.1.6. Antimicrobial activity of PVA/CS/TA Blends..... | 65 |
| 4.1.2. Determinations on Hyani dates..... | 67 |
| 4.1.2.1. Hayani decay percentage (%) | 67 |
| 4.1.2.2. Moisture content (%)..... | 68 |
| 4.1.2.3. Weight loss (%)..... | 70 |
| 4.1.2.4. Microbiological analysis..... | 71 |
| 4.1.2.4.1. Total bacterial count..... | 71 |

| | Page |
|--|-------------|
| 4.1.2.4.2. Total fungal count..... | 72 |
| 2.1.2.5. Shelf life (marketing span)..... | 75 |
| 4.1.2.6. Sensory evaluation..... | 78 |
| 4.2. The second experiment..... | 81 |
| 4.2.1. Measurements on AgNPs /PVA coatings and films..... | 81 |
| 4.2.1.1. UV visible Spectrum..... | 82 |
| 4.2.1.2. Dynamic Light Scattering (DLS)..... | 83 |
| 4.2.1.3. High Resolution Transmission Electronic Microscope (HRTEM)..... | 84 |
| 4.2.1.4. X-ray Diffraction (XRD)..... | 84 |
| 4.2.1.5. Fourier Transform Infrared (FT-IR)..... | 85 |
| 4.2.2. Determinations on Hyani dates..... | 87 |
| 4.2.2.1. Determination of AgNPs residues in Hyani dates tissues using Inductively Coupled Plasma (ICP)..... | 87 |
| 4.2.2.2. Hayani decay percentage (%) | 89 |
| 4.2.2.3. Shelf life span..... | 91 |
| 4.2.2.4. Moisture content (%)..... | 95 |
| 4.2.2.5 Weight loss (WT %)..... | 96 |
| 4.2.2.6. Microbiological analysis..... | 98 |
| 4.2.2.6.1. Total bacterial count (TBC)..... | 98 |
| 4.2.2.6.2. Total count of fungi..... | 100 |
| 4.2.2.7. Sensory evaluation..... | 102 |
| 4. 3. The third experiment..... | 106 |
| 4. 3. 1. Insect infestation (%)..... | 106 |
| 4. 3. 2. Weight loss (%)..... | 108 |
| 4. 3. 3. Overall migration test..... | 110 |
| SUMMARY AND CONCLUSION..... | 113 |
| REFERENCES | 119 |
| ARABIC SUMMARY | |

LIST OF TABLES

| Table No. | | Page |
|-----------|--|------|
| (1) | The world production of dates (tons) in 2016..... | 5 |
| (2) | The clearance doses for irradiation of stored products for pest disinfection..... | 41 |
| (3) | The effective doses for the stored products adult insects to prevent reproduction..... | 42 |
| (4) | Effect of polymer composition and radiation dose on tensile strength and elongation of PVA and blended films..... | 61 |
| (5) | Effect of total polymer concentration on the tensile strength and elongation of the Tribble blend with plasticizer..... | 62 |
| (6) | Antimicrobial activity of irradiated Tribble blind (Tb) copolymer | 66 |
| (7) | Effect of chitosan based edible coatings on fruit decay (%) of Hyani dates during storage at 0°C ±2 and 95- 98 % RH..... | 68 |
| (8) | Effect of chitosan based edible coatings on Moisture content (%) of Hyani dates during storage at 0°C ±2 and 95- 98 % RH..... | 69 |
| (9) | Effect of chitosan based edible coatings on weight loss (%) of Hyani dates during storage at 0°C ±2 and 95- 98 % RH..... | 70 |
| (10) | Total bacterial count (Log CFU) for coated and un-coated Hyani dates with chitosan based edible coatings at the beginning and end of storage period at 0°C ±2 and 95- 98 % RH..... | 72 |
| (11) | Total fungal count (Log CFU) for coated and un-coated Hyani dates with chitosan based edible coatings at the beginning and end of storage period at 0°C ±2 and 95- 98 % RH..... | 73 |

VII

| | | |
|------|--|-----|
| (12) | Effect of chitosan based edible coatings on decay (%) of Hyani dates during shelf life span at (12 °C \pm 2, RH= 95-98 %). | 76 |
| (13) | Effect of chitosan based edible coatings only (Regardless of time factor) on some physiochemical parameters of Hyani dates. | 78 |
| (14) | Sensory evaluation for coated and un-coated Hyani dates with chitosan based edible coatings at the beginning of the marketing span (Average of eight months of storage at 0°C \pm 2 and 95- 98 % RH.). | 79 |
| (15) | Sensory evaluation for coated and un-coated Hyani dates with chitosan based edible coatings after 21days at 12 °C \pm 2/ 95-98% RH (Average of eight months of storage at 0°C \pm 2 and 95- 98 % RH.). | 79 |
| (16) | The residual content of AgNPs at different parts of treated rutab hyani dates with 100 (ppm) before and after washing with tap water. | 88 |
| (17) | Effect of PVA and PVA+ AgNPs coatings on Hayani decay percentage (%) during storage at 0°C \pm 2 and 95- 98 % RH. | 90 |
| (18) | Effect of PVA and PVA+ AgNPs coatings on Hyani dates Moisture content (%) during storage at 0°C \pm 2 and 95- 98 % RH. | 95 |
| (19) | Effect of PVA and PVA+ AgNPs coatings on Hyani dates weight loss (%)during storage at 0°C \pm 2 and 95- 98 % RH. | 97 |
| (20) | Effect of PVA and PVA+ AgNPs coating only (Regardless of time factor) on some physiochemical parameters of Hyani dates. | 98 |
| (21) | Total bacterial count (Log CFU) for coated and un-coated Hyani dates with PVA and PVA+ AgNPs at the beginning and end of storage period at 0°C \pm 2 | 100 |

VIII

| | | |
|------|--|-----|
| | and 95- 98 % RH..... | |
| (22) | Total fungal count (Log CFU) for coated and un-coated Hyani dates with PVA and PVA+ AgNPs at the beginning and end of storage period at 0 ⁰ C ±2 and 95- 98 % RH..... | 101 |
| (23) | Sensory evaluation for coated and un-coated Hyani dates with PVA and PVA+ AgNPs at zero time of shelf life (Average of eight months of storage at 0 ⁰ C ±2 and 95- 98 % RH)..... | 103 |
| (24) | Sensory evaluation for coated and un-coated Hyani dates with PVA and PVA+ AgNPs after 30 days at 12 °C ±2/ 95-98% RH (Average of eight months of storage at 0 ⁰ C ±2 and 95- 98 % RH.)..... | 104 |
| (25) | Effect of different types of packages on insect infestation (%) of Sakouti dates during storage at room temperature..... | 107 |
| (26) | Effect of different types of packages on weight loss (%) of Sakouti dates during storage at room temperature..... | 109 |

LIST OF FIGURES

| Fig. No. | Page |
|---|------|
| Fig. (1) Distribution of dates (<i>Phoenix dactylifera</i>) around the world (2000–2016)..... | 4 |
| Fig. (2) Evolution of world production and area harvested of dates (<i>Phoenix dactylifera</i>) between 2000 and 2016. | 5 |
| Fig. (3) Different approaches to make 'bio-packaging' from agricultural raw materials..... | 11 |
| Fig. (4) Life cycle of moths..... | 29 |
| Fig. (5) Life cycle of beetles..... | 29 |
| Fig. (6) Different phases of Saw-toothed beetle (<i>Oryzaephilus surinamensis</i>),..... | 31 |
| Fig. (7) Infested date fruit by almond moth <i>Ephestia cautella</i> larva..... | 32 |
| Fig. (8) Almond moth, life stages (size in mm)..... | 33 |
| Fig. (9) Direction of insect penetration into food packaging. | 35 |
| Fig. (10) Interactions between food and packaging material... | 36 |
| Fig. (11) FTIR spectra of (a) Chitosan (b) PVA / Cs and (C) Tb films..... | 60 |
| Fig. (12) XRD patterns of (a) PVA, (b) Chitosan, (c) PVA/Cs and Tb irradiated films (d)..... | 61 |
| Fig. (13) Scanning electron micrographs of (a) PVA, (b) Cs, (c) PVA/Cs, (d) un-irradiated Tb and (e) irradiated Tb..... | 64 |
| Fig. (14) Thermo gravimetric diagram of (a) PVA, (b) PVA/Cs, (c) Tb and (d) Tb +G irradiated films..... | 65 |
| Fig. (15) Anti-microbial effect (inhibition zone) of irradiated combined with Tb..... | 66 |
| Fig. (16) Effect of chitosan based edible coatings on fruit decay (%) of Hyani dates during storage at 0°C ±2 and 95- 98 % RH..... | 68 |