شبكة المعلومات الجامعية

بسم اللّه الرحمن الرحيم

HOSSAM MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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التوثيق الإلكتروني والميكروفيلم

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Preservation of Mango and Mango Pulp by Radiation

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DEDICATION
TO

My Father,
My Wife
and My Childrem
Aya and Ayman

Contents

Introduction

Introduction

The mango (*Mangifera indica* L., family Anarcadiaceae) is native to South and Southeast Asia. It is one of the most important tropical and subtropical fruits in terms of production, acreage and popularity. The mango largest producing country is India (sharing more than 70 percent of the world's production), where this crop has been cultivated for 4 to 6 thousand years. Other major mango producing countries are Mexico, Pakistan, China, Indonesia, Brazil, Philippines, Haiti, Dominican Republic, Malagasy Republic, Tanzania, Bangladesh, Zaire, Sudan, Venezuela, Cuba and Egypt **(FAO, 1988)**. It is also produced in the states of Hawaii and Florida in small quantities. The world production of this fruit in the last three years (1994, 1995 and 1996) was about 18.55, 19.00 and 19.22 million metric tons (FAO)*. The Egypt production** of this fruit in 1994, 1995 and 1996 was about 180, 232 and 240 thousand tons. In 1996 Africa produced approximately 9.85% of the world production Egypt produced approximately 1.25% of the world production representing approximately 12.68% of the Africa production. Asia produced approximately 80% of world mango supply, followed by Americas and Africa. The main importing countries of mangoes are the USA, EU, UK, Germany and France as reported by **(Loeillet, 1994)**.

Mango is considered one of the most important fruit with tremendous potential for the future and is expected to rise from exotic status to mainstream trading. The main advantages of mangoes are its year round availability, versatility and ability to meet the high taste expectations.

There are hundreds of mango cultivators grown all over the world. Many tolerate a wide spectrum of soil and climate conditions, as long as there is no frost problem. The most desirable soil for mango is medium texture, deep, welldrained, and has a pH range of 5.5-7.5 and a water table below 190 cm year-round **(Singh, 1978)**. The mango tree is ever green. It may grow to 10 m in the girth of the trunk and 2,200 m^2 in the crown spreads. The fruit is a fleshy drupe, more or less laterally compressed.

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* FAO Production Yearbook vol. **50** (1996).

** Central Agency for Public Mobilisation and Statistics, Egypt.

It varies considerably in size, shape, colour and flavour. The shape varies from rounded to ovate-oblong with the length varying from 2 to 30 cm in different cultivators and the weight from several grams to more than one kilogram. The exocarp or peel consists of three layers. The outermost layer is a very thin, waxy cuticle beneath which is a thin, tough, highly pigmented pellicle; beneath this is the innermost layer of fibrous, firm tissue. The mesocarp provides the edible juicy flesh. The endocarp develops into a thick, tough, woody covering of the large, flat, solidary seed and is termed the husk. Husk with the enclosed seed is called stone. Fibers extrude from the husk into the mesocarp.

An important advantage of gamma rays is their ability to penetrate deeply into the host tissues. Thus, in contrast to chemicals, gamma radiation enables not only the control of surface- or wound-infesting microorganisms but also pathogens implanted into the host as latent or active infections. Therefore, gamma radiation may also be considered as a therapeutic means for post-harvest diseases. With the increased tendency to reduce the use of chemical application on fruits and vegetables, the non-residual feature of ionizing radiation is an important advantage. On the other hand, the effective use of ionizing radiation as a fungicidal or fungistatic treatment is limited by the susceptibility of the host tissues, as expressed by radiation-induced peel damage and adverse changes in colour, texture, flavour, or aroma. Thus, the use of irradiation as a means for decay control will depend on the balance between pathogen sensitivity and host resistance to the treatment.

Following good management practices, irradiated food is virtually indistinguishable from its non-irradiated counterparts **(ICGFI, 1991)**. Sound, although non-empirical, evidence of this comes from countries in which commercially offered irradiated foods have been sold on a regular basis. For example, in France, Netherlands, South Africa, Thailand and even USA, commercial quantities of some irradiated food items are routinely sold in food stores, including strawberries, mangoes, bananas, shrimp, frog legs, spices and fermented pork sausages. The irradiated items, which are labeled to indicate the treatment and purpose, have been successfully selling alongside non-irradiated items.

Internationally, food irradiation processing has been considered a safe and effective technology by respected authorities such as the World Health Organization

(WHO), Food Agricultural Organization (FAO) and International Atomic Energy Agency (IAEA). To date, 38 countries have approved the irradiation of various foods. Commercial food irradiation is occurring in 30 pilot and commercial plants in 25 of these countries. Among foreign countries practicing food irradiation, Bangladesh, Belgium, France, the Netherlands, the People's Republic of China and South Africa are countries that have undertaken food irradiation programs of significance. While these countries have made recent progress, their annual tonnage of food irradiation is small **(Diehl and Josephson, 1994)**. In the USA, the Food and Drug Administration (FDA) has approved irradiation for a limited number of commodities, including wheat and wheat flour, white potatoes, spices and dehydrated vegetable seasonings, strawberries, pork and poultry. While frozen beefsteaks have recently been approved for sterilization in the space program, a petition for pasteurization levels of irradiation for commercial beef products is now pending with the Agency.

Therefore, This Work Was Done To Investigate The Following Points:

1- Effect of ionizing radiation alone or in combination with hot water dip treatment on the shelf-life extension, chemical, microbiological, rheological and organoleptic properties of mature green mango fruits stored at 12 ±1 °C.

2- Effect of gamma irradiation alone or with steam on the chemical, microbiological, rheological and organoleptic properties of mango pulp stored at 3 ±1 °C.

3- Isolation, purification and identification of moulds associated with mango fruits and yeasts associated with mango pulp as well as toxin production from some identified moulds.

List Of Abbreviations

Abs	= Absorbance
°Bx	= Brix degree
°C	= Degree of centigrade
cm	= Centimeter (10^{-2} meter)
Cp	= Centipoise
Dd	= Degree of discolouration
$E^{1.\%}_{1.cm}$	= Extinction coefficient
e.g.	= For example
etc.	= And others
g	= Gram
h	= hour
kGy	= kiloGray
K rad	= kilorad
mg	= Milligram (10^{-3} gram)
min	= Minute
ml	= Milliliter (10^{-3} liter)
mm	= Millimeter
NCRRT	= National Center for Radiation Research and Technology
ppm	= Part per million
RH	= Relative humidity
sec	= Second
SI	= System International
TSS	= Total soluble solids
μ gm	= Microgram (10^{-6} gram)
W	= Weight of sample