



PERGAMON

Radiation Physics and Chemistry 00 (1998) 1-7

**Radiation Physics
and
Chemistry**

Irradiation of dates: insect disinfestation, microbial and chemical assessments, and use of thermoluminescence technique

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Received 27 May 1997; received in revised form 27 October 1997; accepted 15 November 1997

Abstract

Irradiation of dates (Khalas variety) at 0.9 kGy was sufficient to eliminate single insect infestation (*Oryzaephilus surinamensis*) and mixed infestation (*O. surinamensis* and *Tribolium castaneum*), whereas 0.3 kGy was effective only in controlling single infestation. Sensory properties were not affected but irradiation contributed to some reduction in microbial counts immediately after irradiation and counts remained low till the end of 6 months storage period. All sugars were significantly reduced immediately after irradiation but they increased gradually with increasing storage time. Thermoluminescence (TL) technique was useful in discriminating between irradiated and unirradiated dates during the entire storage period but was less sensitive as far as the dose estimation is concerned. © 1998 Elsevier Science Ltd. All rights reserved.

Keywords: Irradiation; Dates (Khalas); Insect disinfestation; Microbial count; Sensory properties; Sugars; Thermoluminescence

1. Introduction

The Kingdom of Saudi Arabia is one of the major dates producing countries in the world. The date palms (*Phoenix dactylifera* L.) are widely distributed in Saudi Arabia, and number of trees in the Kingdom is estimated to be over 13 million (Ministry of Agriculture, 1994). Although most of the dates produced in the Kingdom are used directly for human consumption with little or no further processing, the quantities of properly processed dates are growing rapidly due to governmental support and subsidies to date production and processing. The annual pro-

duction of dates in Saudi Arabia was 563 000 tons in 1994 (Ministry of Agriculture, 1996).

Dry dates are attacked by moth and beetle (Hussain, 1974). Methylbromide, which is used in Saudi Arabia, is very effective for controlling stored products insects (Cherif et al., 1985). However, the use of such gas will be banned in the year 2001 due to its suspected carcinogenic effect (Council on Radiation Application, 1985). Therefore, irradiation is the possible alternative to control insects in dates.

Studies on use of irradiation to control insects in dates are enormous (Farkas et al., 1974; Zaklandnoi and Ratanova, 1978; El-Sayed and Baeshin, 1983; Grecz et al., 1986). However, only few studies were conducted on either the effect of irradiation on nutrients of dates (Farkas et al., 1974; Auda et al., 1977; Auda and Al-Wandawi, 1980; El-Sayed and Baeshin,

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