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FOOD IRRADIATION OF AGRICULTURAL PRODUCTS IN ALGERIA. PRESENT SITUATION AND FUTURE DEVELOPMENTS (a short communication)

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A b s t r a c t. In Algeria, commodities such as fruits (dates and oranges) and vegetables (potatoes, onions and garlic) have strategic role in the local and national markets. Long term storage is by combination of cold chain and traditional methods but losses are high. Ionising radiation proved to be effective at greatly reducing losses and the method is increasingly practised.

The banning of methyl bromide (or ethyl dibromide) and other desinfectants for the use in dates, and maleic hydrazide (MH), carbamate isopropyl N-phenyl (CIP) and CIP-chlore-(CIPC) for sprout inhibition in potatoes, onions and garlic suggest a high potential of the ionising radiation as a replacement treatment that could also complement temperature controlled storage.

K e y w o r d s: ionisation, agricultural products, food irradiation

INTRODUCTION

Ionising radiation as a method of preserving food has received more attention than any other, with considerable amounts of financial support being given to the major research centres world-wide to evaluate technical feasibility, cost effectiveness and effects on the safety and quality of food [2-12].

The major biological effects and functional benefits of irradiation are well known and this application causes three main types of effects (primary, secondary and tertiary) that are potentially useful in extending the shelf-life of fruits and vegetables; depending on the ranges of the following doses: very low doses (0.1-0.2 kGy), low doses (0.25-1.0 kGy) and moderate doses (10-2.5 kGy).

Storage is usually by combination of two or three existing technologies. Irradiation has the potential to complement or replace existing technologies or to provide new opportunities in storage.

The purpose of this paper was to present food irradiation technologies of some agricultural products (potatoes, onions, garlic and dates) used in Algeria.

PRIORITY PRODUCTS FOR IRRADIATION

Potatoes (*Solanum tuberosum* L.)

Potato has the highest production and consumption of all the vegetables in Algeria and is cultivated for early, normal and late markets. Annual production is 1.5 million t, most of which is stored for two or three months to regulate the market. Storage is usually by traditional methods, that is to say in closed, unventilated sheds and losses range from 15 to 20%, and, in hot weather, up to 40%. CIP (carbamate isopropyl. N-phenyl) or CIPC (carbamate chlore-isopropyl. N-phenyl) are often used to control losses. Part of the production is stored under refrigeration, but facilities are limited to the maximum of 20 000 t.

Onions (*Allium cepa* L)

Onion production in Algeria is second after potato. Annual production is 300 000 t, 50 000 - 80 000 t of which are green onions (spring onions) and 200 000 - 250 000 t dry onions (summer onions) intended for the long term storage (3 - 6 months). Farmers store their own production in traditional conditions, i.e., in closed and unventilated sheds where during hot spells, losses due to rotting and sprouting can reach 20 to 30% (and sometimes 50%). The quantities stored under refrigeration do not exceed 15 000 t. Chemicals are not used to limit or prevent losses in store.

Garlic (*Allium sativum* L.)

In Algeria, garlic has an annual production of 50 000 - 80 000 t. Most of the crop is stored by households as « hanged plaits » in batches of 2-5 kg; less than 20% of the crop is stored under refrigeration.

Dates (*Phoenix dactylifera* L.)

Date palms are the main activity in south Algeria with approximately 8 500 000 palm trees, 77% of them productive; annual production of dates is 280 000 t. Unlike other fruit, most of the crop is stored under refrigeration for the national market and export. Unfortunately, storage is accompanied by insect infestation particularly by *Ectomyelois ceratomiae* which causes losses of 10 - 20%.

Disinfestation by fumigation with bromide methyl (or dibromide ethyl) is by far the most efficient method of control but the use of either chemical is increasingly restricted by the importers.

FOOD IRRADIATION IN ALGERIA

Current status

The quantities of food treated by irradiation are small compared with the amount that is cold-stored traditionally. Laboratory and pilot scale experiments over several years have proved conclusive in the technical and economical aspects. However, the consumers response to food irradiation was not tested.

Future status

An industrial irradiation facility established in the Mascara region will soon be operational. The facility is a multipurpose automatic pallet type, and will have an initial ^{60}Co capacity of 300 kCi, and a maximum capacity of 3 MCi.

The quantity of irradiated food forms a small proportion of the total production (Table 1). With irradiation, however, the current losses in the potato and onion crops could be reduced by half, that is to less than 10% of the total production. Moreover, irradiation appears to be the safest and most practical alternative to the uses of fumigation in dates.

Table 1. Irradiation treatments of some agricultural products in Algeria [1]

Product	Production ($x10^3$ t)	Irradiated ($x10^3$ t)	%
Potatoes	1 500	60	4
Onions	200	20	10
Garlic	50-80	*	
Dates	280	*	
Non agricultural products ($x10^3$ M^3)		2.8-3	

*unavailable data.

The irradiation facility could be established in the production area of potatoes and onions, with the advantage of limiting the cost of treatment, which is often a limiting factor, to food irradiation. There would also be the potential to irradiate oranges produced in the surrounding areas. The irradiation facility could then operate 9 - 10 months per year and hence optimise irradiation source.

CONCLUSION

Irradiation of foods in Algeria must have wide technological applications to Aa range of raw agricultural products. However, in addition to technical, economical and commercial

considerations, there is a need to evaluate consumer response to irradiation as a treatment for food. Irradiation is likely to be only one process in modern storage, e.g., complementing controlled and modified atmosphere packaging (CAP, MAP).

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