IONISING RADIATION APPLICATION IN FOOD AND AGRICULTURAL PRODUCTS

Villavicencio, A.L.; Sabato, S.F.; Moura, E.A.B.; Omi, N.M.; Rela, P.R.

Centro de Tecnologia das Radiações - IPEN/CNEN-SP

Keywords: radiation processing; food irradiation analysis; food irradiation detection.

Brazil started the use of radiation technology on food processing in the sixties with researches leaded to disinfestations and extension of shelf life of fruits. The regulation on food irradiation started in 1969 establishing dose limits for the products, a new version was updated in 2001 without limits and similar to the recent modification introduced by the Codex Alimentarius. Ionizing radiation may be used as a treatment for pest risk management. The adoption of irradiation treatments requires that the efficacy of the treatment be scientifically demonstrated. Application of the treatment is effective in particular facilities and with specific commodity configurations. The availability of methods for detection of irradiated food contribute to increase consumer's confidence.

Several studies have been carried out in our laboratories evolving fruits, honeys and ingredients. Papaya (Carica papaya L.) was studied in combined treatment between thermal and radiation processes evolving 600 fruits in the experiment. The use of chitosan as an antimicrobian coating was included in this study (FIG.1).



FIGURE 1 - Combined treatment between thermal and gamma radiation.

Rheological behaviors of honeys samples (FIG.2) were studied comparing irradiated samples with control. Other ingredients like whey protein, soy protein, and mixtures of ingredients were objects of analysis in order to verify the radiation effect on their physical and functional properties. Other important subject evolved biofilms made from animal and vegetal protein and submitted to ionizing radiation to increase their mechanical properties.



FIGURE 2 - Rheological behaviors of honeys.

Studies with Aspergillus flavus and the effects of gamma radiation was carried out. The results shown, that irradiation processing was effective in reducing the number colony forming units (cfu/g) of A. flavus in the maize samples. Also for grains decontamination, our laboratory use PCR-based methods for the detection and identification (FIG.3) of the fungal pathogen, Phakopsora pachyrhizi, which causes Asian soybean rust. Soft electron beam irradiation processing is applied as an alternative technology for soya desinfestation to attend the phytosanitary barriers and extend the shelf life. PCR to analyse microorganisms in foods are being done by our research group as well as radiation effects on Salmonella spp and E. coli in "açai (Euterpe oleracea) na tigela" contamined artificially.



FIGURE 3 - DNA extraction.

Effect of radiation processing of 60Co in production of volatiles compounds in nutritive and medicinal herbs were analyzed, a quick and simple screening test to indicate whether a food product has been irradiated or not. The DNA comet assay and germination test were applied in different kinds of foods and grains or seeds.