RADIATION SENSITIVITY OF AN EXTRACT OF ROSELLE (*HIBISCUS SABDARIFFA* L.)

ANTONIO J. ALISTE AND NÉLIDA L. DEL MASTRO

Center of Radiation Technology, IPEN-CNEN/SP, Av. Prof. Lineu Prestes, 2242 Cidade Universitária, 05508-000 São Paulo, SP, Brazil
ajaliste@ipen.br, nlmastro@ipen.br

ABSTRACT

True roselle is *Hibiscus sabdariffa* L. (family Malvacea) which is cultivated for its jute-like fiber in India, the East Indies, Nigeria and to some extent in tropical America. More recently started a commercial production in Sao Paulo State, Brazil. An aqueous extract (1:4 w/v) of roselle was prepared and gamma-irradiated in a ^{60}Co Gammacell 220 with doses of 0.5, 1.0, 2.0, 5.0 and 10.0 kGy. The radiation effect on color stability was followed spectrophotometrically. Viscosity changes were registered. The viscosity of roselle preparation appears to be quite stable against radiation oxidative shock. Meanwhile, the absorbance at 500nm declined sharply with the increment of dose.

INTRODUCTION

In the West Indies and elsewhere in the Tropics the fleshy calyces of roselle (*Hibiscus sabdariffa* L.) are used fresh for making roselle wine, jelly, syrup, and cakes, and dried roselle is used for tea, jelly, marmalade, ice-cream, sauces, and other desserts. Tender leaves and stalks are eaten as salad. Reported to be antiseptic, cholagogue, digestive, diuretic, emollient, purgative, and tonic, roselle is a folk remedy for abscesses, bilious conditions, cancer, cough, debility, dyspepsia, fever, hangover, hypertension, neurosis and scurvy [1][2][3]. Per 100 g, the fruit contains 49 calories, 84.5% H_2O, 1.9 g protein, 0.1 g fat, 12.3 g total carbohydrate, 2.3 g fiber, 1.2 g ash, 1.72 mg Ca, 57 mg P, 2.9 mg Fe, 300 μg β-carotene equivalent, and 14 mg ascorbic acid. Karkade (dried-flowers minus-ovary) contains 13% of a mixture of citric and malic acid, two anthocyanins gossipetin (hydroxyflavone) and hibiscin, and 0.004–0.005% ascorbic acid. Ionizing radiation produces free radicals when interacts with matter

being its effects depending of the antioxidant capability of their components. The aim of this work was to assess the radiation-induced oxidative stress sensitivity of an herbal aqueous extract of roselle.

MATERIALS AND METHODS

An aqueous extract (1:4 w/v) of roselle (*Hibiscus sabdariffa* L.) was prepared by boiling fresh fleshy calyces without seeds for 10 minutes.

Irradiation was performed in a Co-60 Gammacell 220 (AECL), dose rate 4.24 kGy/h with doses from of 0 to 10.0 kGy, dose uniformity factor: 1.13. For the irradiation, the samples were contained in 50 ml-glass tubes.

Viscosimetry techniques developed previously at the laboratory were applied [4]. A Brookfield viscometer, model LV-DVIII, spindle SC4-18, with an adapter for small samples (8 ml) and a Neslab water bath, model RTE-210 precision $\pm$ 0,1°C was employed.

For the spectrophotometric measurements samples of the roselle extract prepared previously were diluted (1:2) and the absorbance registered using a spectrophotometer UV-Vis Shimatzu model PC1601.

RESULTS AND DISCUSSION

Figure 1 presented the spectra of different gamma-irradiated samples of roselle extract. A pronounced decline of the color at 500ηm was produced as a function of radiation dose. This is in agreement with other studies that described the decolourization produced by diverse kind of radiation [5]. Our laboratory had already studied the radiation response of diverse systems following spectrophometric changes [6} with quite different results depending of the media.

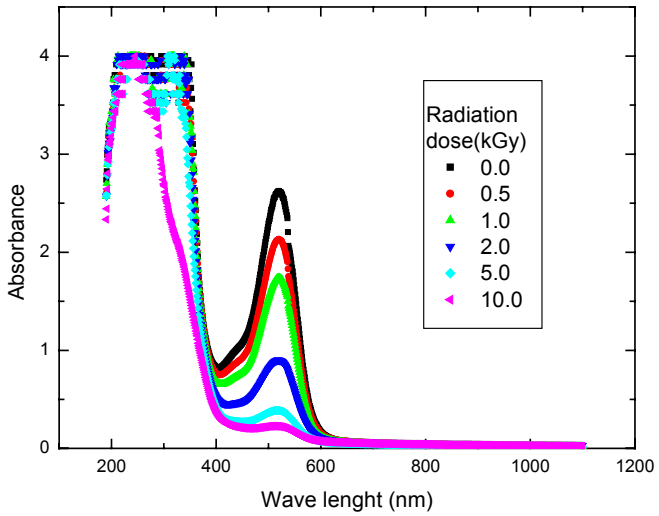

Fig. 1. Spectrometry of irradiated samples of roselle extract

In Table I the viscosity readings from the same set of unirradiated and irradiated samples are presented. There was a slight loss of viscosity with the increment of dose. From this results we can suppose that the main responsible for viscosity in this system was the protein content, known as quite radiation resistant.

Table I. Viscosimetry at 25°C of irradiated samples from roselle extract.

Radiation dose(kGy)	Aparent viscosity (cP)
0.0	2.11±0,07
0.5	2.15±0,01
1.0	1.98±0,02
2.0	1.94±0,00
5.0	1.75±0,01
10.0	1.58±0,01
25.0	1.86±0,01

CONCLUSIONS

Free radicals formed by ionizing radiation interaction were able to produce a bleaching of the intense roselle color. Nevertheless, small influence could be noted on the viscosity of the same samples. This fact signifies a different radiosensitivity of the diverse component of the complex roselle preparation.

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