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Sensory Acceptability Evaluation of  
Irradiated Rice, Oryza sativa indica

Srisan Loaharanu, Manon Sutantawong, and Ampai Ungsunantawiwat  
Biological Science Division  
Office of the Atomic Energy for Peace

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Abstract

The non-glutinous and glutinous types of polished rice, Oryza sativa indica were subjected to gamma rays at ambient temperature and stored at  $27 \pm 1^\circ\text{C}$  for one week. The irradiated rice was cooked and tasted by members of trained panel. Using Hedonic scale and Triangle test, the acceptability of irradiated rice was justified. Gamma irradiation up to 100 Krads did not significantly cause off-color, off-odor and off flavor in irradiated non-glutino rice. Glutinous rice irradiated at 60 Krads could not be significantly differentiated from non-irradiated sample.

## Introduction

In relation to insect disinfestation by irradiation, the effect of gamma rays on rice has been concerned. Okanue, et al. (1965) concluded that for the preservation of rice, it was preferable to irradiate at a dose of  $10 \times 10^4$  rads (100 Krads) on unhulled stage. Tape and Ferguson (1966) also reported quality evaluation of irradiated rice. They stated that some indication of harmful effect on flavor was observed in rice irradiated with 60 Krads. This report concerns the acceptability of irradiated rice by panel judging.

## Objectives

1. To study the color, odor and flavor of non-glutinous rice irradiated at different doses.
2. To differentiate irradiated and non-irradiated glutinous rice samples.

## Materials and Methods

The slender, somewhat flat grain rice, Oryza sativa indica (Chang, 1964) was obtained from market. The following experiments were carried out:

1. Polished rice, Oryza sativa indica, non-glutinous type was subjected to gamma rays at 0, 60, 80 and 100 Krads at ambient temperature and stored at  $27 \pm 1^\circ \text{C}$  for one week. The irradiated rice (rice : water = 1:2 by weight) was steamed to produce well cooked samples. A trained panel of 10 persons was selected from our laboratory staffs to score the color, odor and flavor of rice irradiated at different doses. Four repeated experiments were conducted. The panel members used the following numerical and verbal designations:

6, 7, 8, 9 = increasing respectively  
according to degree of likeness

5 = neither like nor dislike  
4 = dislike slightly  
3 = dislike moderately  
2 = dislike very much  
1 = dislike extremely

This method was adopted from the principles of sensory evaluation of food (Amerine, et al. 1965).

2. The glutinous rice, Oryza sativa indica was also irradiated at 0, 60 80 and 100 Krads at ambient temperature and stored under the same conditions as non-glutinous rice. This irradiated glutinous rice was cooked to make a typical Thai dessert, the Kao-neo-piak. This dessert was made from rice, sugar and water at a ratio of 5:3:40 by weight. In cooking, water was heated to boil and rice was added next. A stirrer was used to stir the rice until it was viscous and well cooked. Sugar was added last. The whole cooking process took 15 minutes. Using the Triangle method (Amerine, et al. 1965), a panel of 10 persons was asked to pick up the odd sample. From the justification of the panel, the degree of difference between irradiated and non-irradiated samples could be obtained. Observation was also conducted on the glutiness of the irradiated samples. This experiment was repeated 4 times.

### Results and Discussions

1. Results of acceptability of irradiated non-glutinous steamed rice were shown in Table 1. The scores for color, odor and flavor of rice irradiated up to 100 Krads were not significantly different (at 5 % level) from those of non-irradiated. All the scores for irradiated samples were over 6. This indicated that all panel members liked the irradiated rice as well as non-irradiated one.

2. Results of differentiation between irradiated and non-irradiated glutinous rice dessert were shown in Table 2.

According to the Table in Triangle test when  $P = \frac{1}{3}$  (Amerine, et al. 1965), 7 correct identifications are required from a total of 10 trials at 5 % level of significance, At the 1 % level of significances 8 correct identifications are required from a total of 10 trials.

From the results of studies in Table 2., it could be concluded that glutinous rice irradiated at 60 Krads could not be significantly differentiated from non-irradiated one. Rice subjected to 80 and 100 Krads of gamma rays was significantly different (at 5 % and 1 % level respectively) from non-irradiated sample.

Glutinous rice irradiated at 80 and 100 Krads also exhibited some decrease in glutiness when compared with non-irradiated sample.

3. In contrast to previous work on irradiated Pakistani rice using Multiple comparison (Tape and Ferguson, 1966), our results of studies appeared that dosage up to 100 Krads did not significantly cause off-color, off-oder and off-flavor in irradiated rice of non-glutinous type. In the case of glutinous rice, however, when irradiated at 80 and 100 Krads, some decrease in glutiness was observed. This might be due to "depolymerization" of the starch molecules as previously discussed (Tape and Ferguson, 1966). More detailed

studies on the acceptability of irradiated rice would be carried out.

Summary

1. Irradiation up to 100 Krads did not significantly cause off-color, off-odor and off-flavor in irradiated non-glutinous rice.
2. Glutinous rice irradiated at 60 Krads of gamma rays could not be significantly differentiated from non-irradiated sample.

Table 1. Sensory acceptability of irradiated non-glutinous rice

Rice irradiated at different doses (Krad)	Panel's scores (average)		
	Color	Odor	Flavor
0	(a <sub>1</sub> ) 7.6 ± 0.56	(b <sub>1</sub> ) 7.72 ± 0.45	(c <sub>1</sub> ) 7.13 ± 0.48
60	(a <sub>2</sub> ) 7.27 ± 0.26	(b <sub>2</sub> ) 7.07 ± 0.23	(c <sub>2</sub> ) 6.93 ± 0.16
80	(a <sub>3</sub> ) 7.03 ± 0.25	(b <sub>3</sub> ) 7.17 ± 0.32	(c <sub>3</sub> ) 6.87 ± 0.21
100	(a <sub>4</sub> ) 7.33 ± 0.63	(b <sub>4</sub> ) 7.07 ± 0.83	(c <sub>4</sub> ) 6.63 ± 0.83

(a<sub>1</sub>) to (a<sub>4</sub>) for color, (b<sub>1</sub>) to (b<sub>4</sub>) for odor, and (c<sub>1</sub>) to (c<sub>4</sub>) for flavor were not significantly different at 5 % level according to analysis of variance.

Table 2 Differentiation between irradiated and non-irradiated glutinous rice dessert

Rice irradiated at different doses (Krad)	No. of correct identification (average)
60	6.3
80	7.3
100	9.0

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