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TITLE

Studies on the preservation of rice by gamma-radiation

FINAL REPORT FOR THE PERIOD

1 January 1968 - 15 December 1970

AUTHOR(S)

Hyong Soo Kim

INSTITUTE

Radiation Research Institute in Agriculture
Seoul, Korea

INTERNATIONAL ATOMIC ENERGY AGENCY

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Final Report

Date : Jan. 20th, 1971

1. Contract Number : 593/ R2/ RB

2. Title of Project: Studies on the preservation of rice by gamma-radiation

3. Institute where research is being carried out.

Division of Food Technology
Radiation Research Institute in Agriculture
Office of Atomic Energy, Seoul, Korea

4. Chief scientific investigator : Dr. Hyong Soo Kim

5. Time period covered.

From December 15, 1969 to December 14, 1970

Research Contract No. 593

Summary of final report

TITLE

Studies on the preservation of rice by gamma-radiation

RESEARCH INSTITUTION

Food Technology Division, Radiation Research Institute in Agriculture, Office of Atomic Energy, Seoul, Korea

PRINCIPAL SCIENTIFIC INVESTIGATOR

H. S. Kim

PERIOD OF CONTRACT

January 1st, 1968 - December 14th, 1970

SCIENTIFIC BACKGROUND AND SCOPE OF PROJECT

The research programmed aimed at the good preservation of rice by gamma-ray irradiation, free from the loss caused by insects and microorganisms during the storage.

The renowned varieties in Korea, namely, Paldal, Nongkwang and Nonglim #6 were sampled and exposed to the low dose irradiation(30-50 Krad) for the disinfestation and to the high dose one (500-1,000 Krad) for the disinfection by the Co-60 irradiator, respectively.

Since the straw sack was being used in Korea as a common rice container, the kraft paper bag was also examined as a container in search of the comparison and improvement.

It is well known that the problems detected in the irradiated rice lie in the changes of the rice components, therefore, the various chemical changes of the irradiated rice during the storage were investigated.

ESPERIMENTAL METHOD

The sampled, normal brown and polished rice were irradiated and stored at the room temperature. The occurrence of insects and the uric acid content were observed and determined at the low dose level, and the suppression of the moulds growth was observed under the high dose level. To know the changes of rice quality during the storage, the amylose contents, glucose contents, fat acidity, riboflavin contents of the rice, hydrolysis of the rice starch by amylase and free amino acids contents were determined periodically; the organoleptic test was then performed one year after the harvest.

On the other hand, the amylase activity, viscosity by Brahbender amylogram of the rice were determined together with the organoleptic test followed under the low temperature storage.

RESULTS OBTAINED AND CONCLUSION

As far as the case concerns the effective storage of the Korean rice by gamma-ray irradiation, it is advisable to be contended with the disinfestation by the low dose ranging 30--50 Krad. In this low dose lot, the changes of the chemical compositions had no difference with those of the control lot, except that the fat acidity marked a slightly higher rate of increase. No significant difference was also found in the organoleptic test as compared with the control lot, and the irradiated samples in the kraft paper bag were exempted from the infestation. When the samples in the kraft paper bag were treated by the higher dose of 500-1,000 Krad, although the growth of moulds during the storage was remarkably prohibited, both colors of brown and polished rice changed to yellow and the most chemical compositions of them diviated

wide from those of the control lot.

Even in the organoloptic test of boiled rice, the significant differences in color and odor were found comparing with the control lot.

If the samples were stored at the low temperature (10°C and 75% RH), the increasing rate of the fat acidity of the low and high dose lots lowered generally and also the irradiation odor was decreased.

PAPERS PUBLISHED ON WORK DONE UNDER THE CONTRACT

1) H.S. Kim and Y.R. Choi; Studies on the preservation of Korean rice by gamma-irradiation (I), J. Korea Assoc. Food Sci., 1(1), 61 - 71 (1969)

2) H.S. Kim, Y.R. Choi, S.K. Kim and I.J. Harn; Studies on the preservation of Korean rice by gamma-irradiation (II), On disinfestion of rice by gamma-ray irradiation, J. Korea Assoc. Food Sci., 2(1), 51 - 59 (1970)

3) H.S. Kim, Y.R. Choi, S.K. Kim and I.J. Harn; Studies on the preservation of Korean rice by gamma-irradiation (III), On disinfection of rice by gamma-ray irradiation, 2(1), 60 - 67 (1970)

4) H.S. Kim, S.K. Kim and I.J. Harn; Studies on the preservation of Korean rice by gamma-radiation (IV), On the free amino acids contents in gamma-irradiated rice, Korean J. Food Sci. Tech., 3(1), 1 - 4 (1971)

5) H.S. Kim and S.K. Kim; Studies on the preservation of Korean rice by gamma-radiation (V), Effects of low temperature storage of gamma-irradiated rice, Korean J. Food Sci. Tech., 3(1), 5 - 10 (1971)