

## The World Food Supply of Tomorrow

From successfully removing once inoperable brain tumors to inventing the printing press, competent individuals have continuously strived to achieve the extraordinary. Billions of dollars are invested in research and development facilities to provide human posterity with the best available resources and opportunities. A large amount of research grants is dedicated to public health missions. Public health is the science behind promoting and prolonging life status through cooperative efforts between the federal, state, and local government (American Public Health Association). One of the main goals is to provide every human being with equal and abundant access to nutritional food. The use of nuclear technology and radioisotopes has proven to be monumental to the world's food supply because it provides the increasing population with techniques that maximize food reserves while offering the best nutritional content.

For centuries, people have become accustomed to preserving their food with heat, refrigeration, and chemical treatment; however, irradiation technology provides similar, if not equivalent results. The World Nuclear Association describes food irradiation as the process of using gamma rays or other ionization techniques to kill harmful bacteria within meats, fruits, and vegetables and to increase the amount of time a good is still in acceptable quality of consumption. The radiation directly attacks the microorganisms that are likely to produce food-borne diseases which protects what we put inside our bodies. Traditional preservation methods may have been useful for hundreds of years, but what these methods lack is the ability to maintain the quality of the foodstuffs itself. Yes, perishable foods see an increase in their shelf-life, but the nutritional value is compromised. Irradiation hardly alters the taste,

appearance, and nutritional value of food, which makes it desirable for consumption because human beings want to enjoy their favorite foods in the same way prior to treatment.

Radiation carries a negative connotation because it is usually discussed in relation to cancer treatments and chemical contamination; however, when used for preservative measures, the safety of the people is the number one priority. The dosage of radiation is too low for any contamination to occur throughout the process, and there is no direct contact between the radioactive material and the food (Australian Nuclear Science Technology Organisation). Additionally, this process is used everyday for commercial and household purposes because foods are repeatedly exposed to infrared and microwave radiation from the sun.

Nuclear technologies not only have impact on preservation, but also on the agricultural yields of several crops. Like radiation, mutations also have the negative perception of being destructive or detrimental because we equate much of these occurrences to cancer or genetic malformations, but DNA can be purposefully restructured in hopes of passing it along to future generations of a species for long-term benefits. The World Nuclear Association defines plant mutation breeding as the process of introducing the seeds or roots of a selected plant to gamma rays that create mutations. These altered plants are then cultivated to create plantlets for selective breeding, and the radiation quickens the process of spontaneous genetic mutation. Since the implementation of this method, three thousand two hundred crops including new species of sorghum, garlic, bananas, and cereals have been developed (World Nuclear Association). These species have advantages over their non-genetically modified counterparts because they are more resistant to pests and able to withstand harsher climate conditions. In parts of South America, the International Atomic Energy Agency is investigating ways to incorporate plant mutation

breeding to fight fungal diseases that coffee plants acquire. Namibia has created new varieties of sorghum and cowpea that are more resistant to the extreme drought conditions that they face in the desert area. The hot, humid climates in several countries are more manageable now that we can create crops that can acclimate to these stressful growing environments.

Plant mutations can also lead to more productive species and with this increased agricultural output, more individuals in several lower-developed countries have access to a variety of foods. Parts of India and Bangladesh have tripled their output with these modified crops which is highly beneficial since Asia has the highest population growth rate (World Nuclear Association). Namibia has also seen an increase by ten to twenty percent of output for its most important crops: cowpea, sorghum, and pearl millet. Much of the success stories of these nuclear radiation techniques have occurred in South America, Africa, and parts of Asia which happen to have the highest rates of malnourished and impoverished citizens in the world. The increase in food supply benefits their standard of living as more people have access to nutritional food and are able to overcome their disadvantageous situations.

The use of radioisotopes on food also goes a step further than just increasing and preserving the world's food supply; it aids in alleviating food insecurity across impoverished nations. The University Department of Agriculture defines food insecurity as the state of having unreliable means of attaining a variety of nutritious foods. With nuclear technology, scientists are able to retain the nutritional quality and maximize agricultural output, feeding an increasing number of people. One in every nine people suffer from chronic malnourishment according to the United Nations Food and Agriculture Organization. This means that nearly seven hundred

and ninety-five million individuals are food insecure, and radioisotopes and nuclear technology have been monumental in reducing these numbers.

The improvement of nuclear technology is highly stigmatized especially in light of the current political climate, but the benefits that this science has is pivotal for human posterity. Irradiation techniques have the ability to achieve the same results as traditional preservation methods and retain nutritional quality of foods. This safe method also prevents harmful bacteria from entering the human body. In addition, plant mutation breeding is a revolutionary method that can benefit millions of people from lower-developed countries who are facing food insecurity. With its ability to maximize agricultural output and create genetically superior species, mutation breeding can alter the way human beings receive their food supply. Not only will innovations in nuclear technology and radioisotopes provide invaluable improvements to public health but it will also add onto mankind's extraordinary achievements for years to come.

### Works Cited:

- American Public Health Association. "What Is Public Health?" AMERICAN PUBLIC HEALTH ASSOCIATION, American Public Health Association, [www.apha.org/what-is-public-health](http://www.apha.org/what-is-public-health).
- Australian Nuclear Science Technology Organisation. "Food and Agriculture." ANSTO, Australian Nuclear Science and Technology Organisation, 11 July 2017, [www.ansto.gov.au/NuclearFacts/BenefitsofNuclearScience/FoodandAgriculture/](http://www.ansto.gov.au/NuclearFacts/BenefitsofNuclearScience/FoodandAgriculture/).
- United States Department of Agriculture. "Definitions of Food Security." USDA ERS - Definitions of Food Security, United States Department of Agriculture, 4 Oct. 2017, [www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security/](http://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security/).
- World Nuclear Association. "Radioisotopes in Food & Agriculture." Radioisotope Uses for Food and Agriculture - World Nuclear Association, May 2017, [www.world-nuclear.org/information-library/non-power-nuclear-applications/radioisotopes-research/radioisotopes-in-food-agriculture.aspx](http://www.world-nuclear.org/information-library/non-power-nuclear-applications/radioisotopes-research/radioisotopes-in-food-agriculture.aspx).