

Tomoko M. Nakanishi
Keitaro Tanoi *Editors*

Agricultural Implications of Fukushima Nuclear Accident (IV)

After 10 Years



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Agricultural Implications Fukushima Nuclear Accident

**Keitaro Tanoi, Martin O`Brien, Tomoko
M Nakanishi**



Agricultural Implications Fukushima Nuclear Accident:

Agricultural Implications of the Fukushima Nuclear Accident Tomoko M. Nakanishi, Keitaro Tanoi, 2013-03-15

Following the Fukushima nuclear accident a large volume of monitoring data has been collected about the soil air dust and seawater along with data about an immense number of foods supplied to the market Little is known however about the effect of radioactive fallout on agriculture information about which is vital Although more than 80% of the damaged area is related to agriculture in situ information specifically for agriculture is scarce This book provides data about the actual movement and accumulation of radioactivity in the ecological system for example whether debris deposited on mountains can be a cause of secondary contamination under what conditions plants accumulate radioactive cesium in their edible parts and how radioactivity is transferred from hay to milk Because agriculture is so closely related to nature many specialists with different areas of expertise must be involved in answering these questions In the case of rice researchers in rice cultivation as well as in soil hydrology and radioactivity measurement are working together to reveal the paths or accumulation of radioactivity in the field For this purpose the Graduate School of Agricultural and Life Sciences of The University of Tokyo has diverse facilities available throughout Japan including farmlands forests and meadowlands Many academic staff members have formed groups to conduct on site research with more than 40 volunteers participating This book presents the data collected from the only project being systematically carried out across Japan after the Fukushima accident **Agricultural**

Implications of the Fukushima Nuclear Accident (III) Tomoko M. Nakanishi, Martin O'Brien, Keitaro Tanoi, 2019-01-30

This open access book presents the findings from on site research into radioactive cesium contamination in various agricultural systems affected by the Fukushima Daiichi Nuclear Power Plant accident in March 2011 This third volume in the series reports on studies undertaken at contaminated sites such as farmland forests and marine and freshwater environments with a particular focus on livestock wild plants and mushrooms crops and marine products in those environments It also provides additional data collected in the subsequent years to show how the radioactivity levels in agricultural products and their growing environments have changed with time and the route by which radioactive materials entered agricultural products as well as their movement between different components e g soil water and trees within an environmental system e g forests The book covers various topics including radioactivity testing of food products decontamination trials for rice and livestock production the state of contamination in trees mushrooms and timber the dynamics of radioactivity distribution in paddy fields and upland forests damage incurred by the forestry and fishery industries and the change in consumers attitudes Chapter 19 introduces a real time radioisotope imaging system a pioneering technique to visualize the movement of cesium in soil and in plants This is the only book to provide systematic data on the actual change of radioactivity and as such is of great value to all researchers who wish to understand the effect of radioactive fallout on agriculture In addition it helps the general public to better understand the issues of radio contamination in the environment The project is ongoing the

research groups from the Graduate School of Agricultural and Life Sciences of The University of Tokyo continue their work in the field to further evaluate the long term effects of the Fukushima accident

Agricultural Implications of Fukushima Nuclear Accident (IV) Tomoko M. Nakanishi, Keitaro Tanoi, 2023-08-31 This open access book presents the findings from on site research into radioactive cesium contamination in various agricultural systems affected by the Fukushima Daiichi Nuclear Power Plant accident in March 2011 This fourth volume in the series reports on studies undertaken at contaminated sites such as farmland and forests focusing on soil water mountain agricultural products and animals It also provides additional data collected in the subsequent years to show how the radioactivity levels in agricultural products and their growing environments have changed with time and the route by which radioactive materials entered agricultural products as well as their movement between different components e g soil water and trees within an environmental system e g forests The book covers various topics including radioactivity testing of food products decontamination trials for rice and livestock production the state of contamination in trees mushrooms and timber the dynamics of radioactivity distribution in paddy fields and upland forests damage incurred by the forestry and fishery industries and the change in consumers attitudes In the series of this book a real time radioisotope imaging system has been introduced a pioneering technique to visualize the movement of cesium in soil and in plants This is the only book to provide systematic data on the actual change of radioactivity which is of great value to all researchers who wish to understand the effect of radioactive fallout on agriculture In addition it helps the general public better understand radio contamination issues in the environment The project is ongoing the research groups from the Graduate School of Agricultural and Life Sciences of The University of Tokyo continue their work in the field further to evaluate the long term effects of the Fukushima accident

Agricultural Implications of the Fukushima Nuclear Accident (III) Tomoko M. Nakanishi, Martin O'Brien, Keitaro Tanoi, 2019 This open access book presents the findings from on site research into radioactive cesium contamination in various agricultural systems affected by the Fukushima Daiichi Nuclear Power Plant accident in March 2011 This third volume in the series reports on studies undertaken at contaminated sites such as farmland forests and marine and freshwater environments with a particular focus on livestock wild plants and mushrooms crops and marine products in those environments It also provides additional data collected in the subsequent years to show how the radioactivity levels in agricultural products and their growing environments have changed with time and the route by which radioactive materials entered agricultural products as well as their movement between different components e g soil water and trees within an environmental system e g forests The book covers various topics including radioactivity testing of food products decontamination trials for rice and livestock production the state of contamination in trees mushrooms and timber the dynamics of radioactivity distribution in paddy fields and upland forests damage incurred by the forestry and fishery industries and the change in consumers attitudes Chapter 19 introduces a real time radioisotope imaging system a pioneering technique to visualize the movement of cesium in soil and in

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Impacts of the Fukushima Nuclear Accident on Fish and Fishing Grounds Kaoru Nakata,Hiroya Sugisaki,2015-07-10 This book presents the results from the Japanese Fisheries Research Agency s 3 year intensive monitoring of radionuclides in a variety of fish plankton benthos and their living environments after the Fukushima Daiichi Nuclear Power Plant FNPP accident in March 2011 The book reveals the dynamics of contamination processes in marine and freshwater fish mediated by the contamination of water sediments and food organisms it also clarifies the mechanisms by which large variations in the level of contamination occurs among individual fish Most importantly the book includes a large amount of original measurement

data collected in situ and for the first time assesses diffusion of radiocesium across the Pacific using both in situ data and a numerical simulation model Also introduced are several new approaches to evaluate the impact of the release of radionuclides including the measurement of radiation emission from an otolith section to identify the main period of contamination in fish The FNPP accident represents a rare instance where the environmental radioactivity level was elevated steeply through atmospheric fallout and direct discharge of radioactive water into the sea over a short period of time Replete with precise scientific data this book will serve as an important resource for research in fields such as fishery science oceanography ecology and environmentology and also as a solid basis for protecting fisheries from damage resulting from harmful rumors among the general public

Impacts of Fukushima Nuclear Accident on Freshwater Environments

Seiya Nagao,2021-11-16 This book examines the impacts of radionuclides released from the 2011 Fukushima Daiichi Nuclear Power Plant FDNPP accident on inland aquatic environments The focus is on the dynamics of radiocesium in inland aquatic environments The book comprises three parts migration behavior of radiocesium in river and lake environment accumulation of radiocesium into organisms in freshwater and integrated environmental analysis in a lake system and a forest freshwater system Many studies on the dynamics of radionuclides have been published after the FDNPP accident especially of radiocesium ^{134}Cs ^{137}Cs in land and marine environment The key features of this book are the new data of freshwater environment including transport of radionuclides in river and lake watershed and accumulation of radiocesium in freshwater fishes and insects Another feature of this book is that it summarizes the dataset of a model lake Lake Akagi Onuma from geochemical and biological approaches Readers will learn the actual dispersion behavior of radionuclides released from the Fukushima accident and their impacts on freshwater environments since the accident in 2011 The book presents valuable information for assessing the impacts of the FDNPP accident on ecosystem and human health which are also useful in developing countermeasures for similar accidents and environmental contaminations

***Nuclear Emergencies* Georg**

Steinhauser,Akio Koizumi,Katsumi Shozugawa,2019-08-20 This book discusses nuclear events that may become imminent threats to the fabric of our society and elucidates strategies for preventing these threats or mitigating their adverse effects It addresses multidisciplinary aspects of various nuclear emergencies including nuclear accidents terror attacks involving nuclear materials illicit trafficking of nuclear materials and problems related to nuclear forensics and strikes with nuclear weapons warheads Very often nuclear emergencies are only discussed within certain specific communities However this volume brings together experts from various fields to provide a more holistic approach to the problem Physical chemical environmental social and medical scientists together with representatives from the media and authorities present their views on and strategies for events that cause fear and anxiety among the public an aspect that can be even more threatening than the direct health effects The book offers a valuable guide for nuclear scientists such as radioecologists health physicists radioanalytical scientists and nuclear engineers as well as decision makers and national international authorities

Novel

Plant Imaging and Analysis Tomoko M. Nakanishi, 2021-06-04 This open access book is only an introduction to show that radiation and radioisotopes RI are premier tools to study living plant physiology which leads to new findings Who had ever imagined that we could see water in a plant Who had ever imagined that we could see ions moving toward roots in solution Who had ever imagined that we could see invisible gas CO₂ fixation and movement in a plant These studies demonstrated for the first time that water ions and gas can be visualized in living plants which could be hardly seen by anyone before This publication summarizes the results obtained by Nakanishi's lab in The Univ of Tokyo based on her original concept and her original tools or systems It is useful for professional scientists plant physiologist and those studying plant imaging The chapters demonstrate the innovative imaging work of the author using radioactive tracers and neutron beam to follow the absorption and transport manner of water as well as major minor and trace elements in plants Through these studies the author developed a real time macroscopic and microscopic imaging system able to apply commercially available gamma and beta ray emitters The real time movement of the elements is now possible by using ¹⁴C ¹⁸F ²²Na ²⁸Mg ³²P ³³P ³⁵S ⁴²K ⁴⁵Ca ⁴⁸V ⁵⁴Mn ⁵⁵Fe ⁵⁹Fe ⁶⁵Zn ⁸⁶Rb ¹⁰⁹Cd and ¹³⁷Cs The imaging methods were applied to study the effect of ¹³⁷Cs following 3 11 Fukushima Daiichi nuclear plant accident which has revealed the movements of radiocesium in the contaminated sites

Industrial and Medical Nuclear Accidents Jean-Claude Amiard, 2019-06-18 The peaceful use of atomic energy has given rise to a variety of nuclear accidents from the start This concerns all forms of use industrial and medical For each accident Industrial and Medical Nuclear Accidents details the contamination of the environment flora and fauna and quantifies the effects of ionizing radiation The book also examines the adverse effects on the health both physical and mental of the human populations concerned The monetary cost is also evaluated The research presented in this book is based on scientifically recognized publications and on the reports of national and international organizations competent in this field IAEA WHO UNSCEAR IRSN etc The book contains chapters devoted to the most recent accidents Chernobyl and Fukushima with a large body of institutional and academic literature

Radiological Issues for Fukushima's Revitalized Future Tomoyuki Takahashi, 2016-01-12 This book overviews environmental issues 4 years after the Fukushima nuclear accident covering a wide range of areas related to radiation and radioactivity The topics discussed are necessary to make clear the relationship between the results of research and Fukushima's revitalized future The chapters are divided into four parts Part 1 presents the identification of radionuclides in soil and migration of radionuclides in the terrestrial environment Part 2 describes the safety decontamination system and treatment of radioactive waste Part 3 explains the development of the system of measurement of environmental radiation and evaluation of external exposure and Part 4 discusses the identification of radionuclides in farm products control of root uptake identification of decreasing radionuclides by food processing and evaluation of internal exposure Since the accident at the Tokyo Electric Power Company's Fukushima Daiichi nuclear power station in 2011 gradual steps have been taken toward environmental recovery in the area However there are

still many issues that need to be tackled in order to achieve the full revitalization of Fukushima These issues encompass many different disciplines such as economics psychology and sociology In this kind of situation the role of science in relation to radiation and radioactivity is especially important This book aims to contribute to planning countermeasures against nuclear disasters in the future It will be of particular interest to governmental officials who are engaged with the Fukushima nuclear accident researchers including those in international sectors who are interested in radiological issues and those who need comprehensive and reliable information about the Fukushima accident

Low-Dose Radiation Effects on Animals and Ecosystems Manabu Fukumoto, 2019-11-14 This open access book summarizes the latest scientific findings regarding the biological effects of the Fukushima Daiichi Nuclear Power Plant FNPP accident in 2011 Various cases of changes in animals and organisms have been reported since the FNPP accident However it is often unknown whether they are actually due to radiation since the dose or dose rate are not necessarily associated with the changes observed This book brings together the works of radiation biologists and ecologists to provide reliable radioecology data and gives insight into future radioprotection The book examines the environmental pollution and radiation exposure and contains valuable data from abandoned livestock in the ex evacuation zone and from wild animals including invertebrates and vertebrates aqueous and terrestrial animals and plants that are subjected to long term exposure in the area still affected by radiation It also analyzes dose evaluation and offers new perspectives gained from the accident as well as an overview for future studies to promote radioprotection of humans and the ecosystem Since the biological impact of radiation is influenced by various factors it is difficult to scientifically define the effects of low dose low dose rate radiation However the detailed research data presented can be combined with the latest scientific and technological advances such as artificial intelligence to provide new insights in the future This book is a unique and valuable resource for researchers professionals and anyone interested in the impact of exposure to radiation or contamination with radioactive materials

Radioactivity - Two-Volume Set Michael Wiescher, 2025-02-28 The first volume is presented in two parts covering radiation physics and natural radiation exposure It first explores the discovery and physics of the phenomenon of radioactivity covering the discovery of radioactive decay and the historical development of the physics and applications of radioactivity through to 1940 Chapters then present descriptive summaries of the physics of the atom and the atomic nucleus mass and energy conditions the nature of isotopes and the different decay patterns Chapter three discusses decay laws and introduces natural origins of radioactivity as well as methods for producing radioactive isotopes through nuclear reaction processes in reactor and accelerator The book then provides an introduction on dosimetry radiation chemistry and impact of radiation on biological systems The second half of the book details natural radioactivity and the role of radioactivity in the formation of the planetary system and our Earth The author describes how the inner radioactivity of our planet determines its dynamics and how it could have contributed to the origins of life The volume concludes with an exploration of the external and internal radioactivity to which humans are

exposed and their possible side effects The second volume is presented in two parts covering its development and modern applications It first explores the development and applications of technically enhanced natural radioactivity TENR and addresses nuclear energy sources the fission and fusion processes and the issues of radioactive fallout from nuclear weapon use and test programs Later chapters explore the cutting edge medical applications of radioactive materials in diagnostics and therapy exploring nuclear medicine technologies such as x ray tomography brachytherapy and positron emission tomography PET They also detail the broad range of applications of radioactive materials in industrial production processes in the sterilization of tools and materials in the medical and the food industries and in the analysis of art and archaeological material to analyse paintings and painting techniques to identify fakes and forgeries The book concludes with a discussion of the societal impact and understanding of radioactivity alongside detailing the underlying reasons for its negative preconceptions and the possible mitigation of these through better education and information practices These books will be of interest to non science undergraduates and nuclear astrophysics physics graduate students looking for an introduction to radioactivity in addition to interested laypeople Key Features Written in an accessible style to be understood by readers without a formal scientific education Highly illustrated throughout Authored by an expert in the field drawing from decades of experience in experimental nuclear physics

Radioactivity Michael Wiescher, 2025-01-16 This book provides an accessible introduction to radioactivity The second in a two volume set this volume is presented in two parts covering its development and modern applications It first explores the development and applications of technically enhanced natural radioactivity TENR and addresses nuclear energy sources the fission and fusion processes and the issues of radioactive fallout from nuclear weapon use and test programs Later chapters explore the cutting edge medical applications of radioactive materials in diagnostics and therapy exploring nuclear medicine technologies such as x ray tomography brachytherapy and positron emission tomography PET They also detail the broad range of applications of radioactive materials in industrial production processes in the sterilization of tools and materials in the medical and the food industries and in the analysis of art and archaeological material to analyse paintings and painting techniques to identify fakes and forgeries The book concludes with a discussion of the societal impact and understanding of radioactivity alongside detailing the underlying reasons for its negative preconceptions and the possible mitigation of these through better education and information practices This book will be of interest to non science undergraduate and physics graduate students alike as well as to interested lay people looking for an introduction to radioactivity Key Features Written in an accessible style to be understood by readers without a formal scientific education Highly illustrated throughout Authored by an expert in the field drawing from decades of experience in experimental nuclear physics

Legacies of Fukushima Kyle Cleveland, Scott Gabriel Knowles, Ryuma Shineha, 2021-04-02 This book is about the 2011 Fukushima disaster in Japan The disaster comprised a triple punch that began with an earthquake which caused a tsunami which triggered a meltdown at a nuclear plant

Safety

Protocols in the Food Industry and Emerging Concerns Giovanni Gurnari, 2015-03-27 This brief reports about safety protocols in the food producing industry Hygiene i e the prevention of contamination and microbial infections is of greatest importance in the industry as are disinfection techniques to prevent or to fight microbial contaminations and infections and practical emerging concerns are centered around these fundamental concerns The first part focuses on the attempts and possibilities to prevent microbial spreading Part II discusses disinfection techniques and their risks advantages and disadvantages Current industry trends such as the attempts to substitute chlorine in disinfection are critically reviewed In all this brief volume discusses decision procedures and strategies that are being applied to prevent reduce and fight microbial spreading In particular material that comes into contact with the foods has to fulfill strict requirements This aspect is explained in detail and how little details can have great effects The brief deals with the important question is disinfection more an ally or an enemy

Nuclear Power and Society Yoshiaki Oka, 2024-11-28 This book offers a comprehensive description of the issues at the boundary between the use of nuclear power and society Highlighting critical social topics such as economic liberalization risk communication radioactive waste accountability and non proliferation it provides an in depth exploration of the multifaceted relationship between nuclear technology and societal impacts The book covers a wide range of topics including the intersection of nuclear technology with economics engineering environmental studies and law Readers delve into the lessons learned from the TEPCO Fukushima accident understand the complexities of risk communication and explore the legal frameworks governing nuclear energy use The highlighted issues at the interface between nuclear power utilization and society are meticulously organized referring to historical information and insights from European and American government agencies and international organizations This book is an essential read for graduate students researchers professors engineers government officials and anyone interested in the social issues surrounding nuclear utilization Written by an experienced professional who served as chairman of the Japan Atomic Energy Commission it combines expert analysis with an engaging style to make complex topics accessible to a broad audience The translation was done with the help of artificial intelligence A subsequent human revision was done primarily in terms of content

Behavior of Radionuclides in the Environment III Kenji Nanba, Alexei Konoplev, Toshihiro Wada, 2022-03-14 This book the third in the series *Behavior of Radionuclides in the Environment* is dedicated to Fukushima Major findings from research since 2011 are reviewed concerning the behavior of radionuclides released into the environment due to the Fukushima Dai ichi Nuclear Power Plant accident including atmospheric transport and fallout of radionuclides their fate and transport in the soil water environment behavior in freshwater coastal and marine environment transfer in the terrestrial and agricultural environment Volume III discusses not only radionuclides dynamics in the environment in the short and mid term but also modeling and prediction of long term time changes Along with reviews the book contains original data and results not published previously It was spearheaded by the authors from the Institute of Environmental Radioactivity at Fukushima University established two years

after the Fukushima accident with their collaborators from Japan Russia and Ukraine The knowledge emerging from the studies of the environmental behavior of Fukushima derived radionuclides enables us to move forward in understanding mechanisms of environmental contamination and leads to better modeling and prediction of long term pollution effects in general

The Animal Microbiome in Health and Disease Timothy J. Johnson,Paul Plummer,2020-07-29

Whispering the Strategies of Language: An Psychological Quest through **Agricultural Implications Fukushima Nuclear Accident**

In a digitally-driven world wherever displays reign supreme and quick connection drowns out the subtleties of language, the profound strategies and emotional nuances hidden within phrases usually go unheard. However, situated within the pages of **Agricultural Implications Fukushima Nuclear Accident** a charming literary prize pulsating with raw thoughts, lies a fantastic quest waiting to be undertaken. Composed by a talented wordsmith, this charming opus encourages readers on an introspective trip, softly unraveling the veiled truths and profound influence resonating within ab muscles cloth of every word. Within the mental depths with this moving review, we shall embark upon a heartfelt exploration of the book is key styles, dissect their fascinating writing fashion, and succumb to the effective resonance it evokes serious within the recesses of readers hearts.

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