

# Overview and Progress of FNCA Activities in 2021

## Forum for Nuclear Cooperation in Asia

Australia  
Bangladesh  
China  
Indonesia  
Japan  
Kazakhstan



Korea  
Malaysia  
Mongolia  
Philippines  
Thailand  
Viet Nam

12 Member Countries

# Historical background of FNCA

**1990 1<sup>st</sup> ICNCA** (International Conference for Nuclear Cooperation in Asia)  
**held by Atomic Energy Commission of Japan**

to promote cooperation in the field of nuclear energy with neighboring Asian countries more efficiently.

- ✓ Exchange of frank views on how to proceed with regional cooperation by ministers in charge of development and utilization of nuclear energy
  - ✓ Practical cooperation on specified subjects
- ↓ 10<sup>th</sup> meeting in March 1999, Agreement toward a new framework

**2000 FNCA (Forum for Nuclear Cooperation in Asia)**

- ✓ Ministerial Level Meeting, Coordinator and Project Leader System
- ✓ Four Fields:
  1. Radiation Utilization Development  
(Industrial/Environmental Utilization and Healthcare Utilization)
  2. Research Reactor Utilization Development
  3. Nuclear Safety Strengthening
  4. Nuclear Infrastructure Strengthening



# FNCA Framework

## FNCA Meeting

Ministerial Level Meeting

✓ Decision about important policy matters of the FNCA

Senior Official Meeting

✓ Preliminary discussion on theme, specific topics for The Ministerial Level Meeting.

Direction

Reporting

Coordinators Meeting

Reporting

Reporting

Study Panel

One Coordinator in Each Country

Direction

Reporting

7 Projects in four fields

✓ Evaluation of ongoing and future projects

Discussion on

- ✓ Policy issues of nuclear power generation and radiation utilization
- ✓ Technical issues of introducing nuclear power generation

# Meetings and Workshops in FY2021

			4	5	6	7	8	9	10	11	12	1	2	3		
FNCA meetings					SOM & CDM 6/30	Senior Official Meeting & Coordinators Meeting					MLM 12/9	Ministerial Level Meeting				
Study Panel			To share progress of all projects among project leaders								Study Panel		SP 3/9			
Domestic Project Leaders Meeting						1st M 7/12	Meeting							2nd M 2/14		
Radiation Utilization	Industrial & Environmental	Mutation Breeding									DM 12/17	IW 1/18				
		Radiation Processing and Polymer Modification				Domestic meeting		DM 11/1	IW 11/29-30	International workshop						
		Research on Climate Change				Discussion with domestic experts and collaborators		DM 10/25	IW 11/11-12							
	Healthcare	Radiation Oncology						DM & IW 11/26								
Research Reactor Utilization		Research Reactor Utilization						DM 10/14	IW 11/24-25							
Nuclear Safety Strengthening		Radiation Safety and Radioactive Waste Management						DM 10/12	IW 11/9-10							
Nuclear Infrastructure Strengthening		Nuclear Security and Safeguards								DM 1/27	IW 2/19					



Web meeting  
Hybrid meeting



# 22nd FNCA Ministerial Level Meeting

[Outlines of major Joint Communiqués]

09 December 2021, Online meeting

- **The normalization of FNCA project activities and regular meetings**  
Maximize efforts continuously to normalize promptly FNCA project activities and the several regular meetings by requesting the coordinators to proceed with the best use of virtual means such as online meetings under the COVID-19 pandemic regulation,
- **Future cooperation between the FNCA and the IAEA in the area of human health**  
Anticipating that the IAEA will make necessary coordination with the relevant international organizations including the WHO and FAO without duplicating existing mandates in combating zoonotic diseases including COVID-19, explore possible collaboration between the FNCA and the IAEA on the ZODIAC project in the future,
- **Cooperate in addressing issues of environmental protection and countermeasures to climate change**  
In view of frequent occurrence of extreme weather worldwide in the recent years, encourage the member countries to reinforce their cooperation on the issues of environmental protection and the countermeasures to climate change, and proceed with the projects related to climate change continuously,
- **Enhance the practical use of research reactors and accelerators**  
Promote information exchange as well as the reciprocal usage of the facilities among the member countries in accordance with the Round Table Discussion of the 22nd FNCA Ministerial Level Meeting,
- **Spread of the R&D results**  
Encourage the member countries to utilize the outcomes of projects on mutation breeding, radiation processing, research reactor utilization, isotope production and neutron activation analysis with end-users, including the private sector, considering the possibility of their commercialization.



# FNCA on-going Projects in 2021

Project leaders in participant countries promote activities efficiently by sharing the progress of R&D in annual meetings.

## Radiation Utilization - Industrial & Environmental

1. Mutation Breeding
2. Radiation Processing and Polymer Modification for Agricultural, Environmental and medical Applications
3. Research on Climate Change using Nuclear and Isotopic Techniques

## Radiation Utilization - Healthcare

4. Radiation Oncology

## Research Reactor Utilization

5. Research Reactor Utilization  
-- Neutron Activation Analysis --

## Nuclear Safety Strengthening

6. Radiation Safety and Radioactive Waste Management

## Nuclear Infrastructure Strengthening

7. Nuclear Security and Safeguards

# Mutation Breeding Project

## Mutation Breeding of Major Crops for Low-input Sustainable Agriculture under Climate Change (2018 - 2023)

New crop varieties and promising mutant lines have been successfully obtained in line with the goal of the current sub-project.



Malaysia

- ✓ Drought tolerant
- ✓ Submergence tolerant
- ✓ Less lodging problem
- ✓ High yield



Indonesia

- ✓ Very early maturity (67 days)
- ✓ Moderately resistant to leaf rust and pod sucker



Technical Visit to Rice Field,  
2019 Workshop in Malaysia



Online Workshop 18 Jan. - 1 Feb. 2022



# Climate Change Science Research Project

Better understanding of mechanisms and processes of past and present climate change and variability by using isotopic-based experiments and analyses

Some Archives and **associated indicators** of climate change



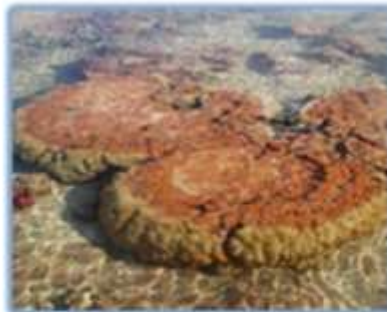
## **Lake sediments**

Proxies such as pollen, charcoal, diatoms, stable isotopes and geochemistry (elemental and grain size analysis) can indicate changes in vegetation, water quality and sedimentation



## **Tree - rings**

As a tree grows, annual climate signals are embedded within the composition and structure of the wood



## **Coral**

The skeletons of corals provide a record of the chemical and physical conditions that existed in the surrounding seawater at the time of its growth.






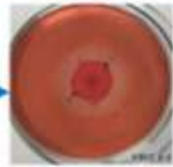
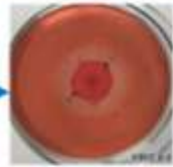


Online Workshop 11-12 Nov., 2021



# Radiation Processing and Polymer Modification for Agricultural, Environmental and Medical Applications

## Development and technology transfer of products using Radiation Processing technology

1. Degraded chitosan for animal.....>  Feed supplement for chicken to increase egg production (Indonesia)
2. Hydrogel for medical application .....>  Dressing hemostat hydrogel (Philippines)
3. Environmental remediation.....>  Waste water treatment and metal adsorbents (China)
4. Synergistic effect of plant growth promoters, super water absorbents and biofertilizer .....>   A new processing of super water absorbent beads with uniform spherical shape (Thailand)
5. Plant growth promoters and super water absorbents inclusive process development .....>  New Mutants with high cellulase production (Vietnam)
6. Mutation breeding of BF microbe .....>  New Mutants with high cellulase production (Vietnam)
7. Sterilization of BF carrier using gamma irradiation .....> No experiments due to COVID-19



Online Workshop 29-30 Nov., 2021

# Radiation Oncology Project

1. To establish optimal treatment protocols of radiotherapy and chemotherapy for predominant cancers in Asia.
2. To improve the quality of radiotherapy in FNCA MCs.
3. To improve treatment outcomes of predominant cancers in Asia.

➤ International multi-center clinical studies

- Cervical cancer (1996-)
- Nasopharyngeal cancer (2005-)
- Breast cancer (2013-)

➤ Physical QA/QC of radiotherapy

➤ ~~Open Lecture / Technical Visit / Hands-on training~~

## Radiation therapy during Covid-19 Crisis



- Physical distance
- Hand hygiene
- Patient screening
- Wearing mask & PPE(Personal protective equipment)



Online Workshop 26 Nov., 2021



# Research Reactor Utilization project

## Improvement of usage for research reactors in FNCA member countries

- Neutron activation analysis (NAA)
- Radioisotope production including new radioisotopes
- Neutron scattering
- Boron Neutron Capture Therapy (BNCT), Neutron Radiography (NR)
- Materials research
- New research reactor
- Human resource development, etc.

Radioisotope production are the most preferred by participating countries.

However, the following sub-topics may need to be addressed along with the topic as per member's comments:

*Sub-topics can be included*

- a. Radiation safety
- b. Patient safety for medical use
- c. Purification of RIs
- d. QA and QC (quality assurance/quality control)



Online Workshop 24-25 Nov., 2021

# Radiation Safety and Radioactive Waste Management Project

- ✓ Enhancement of Radiation safety and radioactive waste management among participating FNCA countries by sharing information, knowledge and experience of existing technologies
- ✓ Supporting Member States by improving radiation safety and safety related to radioactive management in low-level radioactive waste repository site.
- Integrated report on low-level radioactive waste disposal site



- Issuance of RS & RWM newsletter



Online Workshop, 9-10 Nov., 2021



# Nuclear Security and Safeguards Project

- ◆ Share of experience, knowledge and information on implementing nuclear security and safeguards, including human resources development and R & D
- ◆ Exchange of views on policies, strategies and frameworks for nuclear security and safeguards



- Building an effective international mechanism for nuclear material security and safeguards in Asia
  - Nuclear identification
  - Cyber security
  - Radioactive material security
- Promotion of human resource development in nuclear security



- Discussion on future activities
- Virtual exercise on Complimentary Access for IAEA Safeguards
- Information sharing through country report

Online Workshop, 19 Feb., 2021

# Best Researcher of the Breakthrough Prize 2021

Until 2020, the FNCA Award was given to project teams that achieved outstanding results. However, in 2021, it was difficult to make a fair evaluation of their achievement since project activities in some countries have been **disturbed by COVID-19**. Therefore, instead of the FNCA Award, we have decided to **award the Breakthrough Prize to researchers** who have achieved the remarked results in the last five years.

## **Best Researcher of the FNCA Breakthrough Prize 2021**

✧ Dr. Phiriyatorn Suwanmala

**Thailand** Institute of Nuclear Technology

## **Excellent Researcher of the Breakthrough Prize 2021**

✧ Dr. Angel T. Bautista VII

**Philippine** Nuclear Research Institute

✧ Dr. Sobri Hussein

**Malaysian** Nuclear Agency

✧ Dr. MIZUNO Hideyuki

National Institutes for Quantum Science and Technology, **Japan**



# Best Researcher of the Breakthrough Prize 2021 Forum for Nuclear Cooperation in Asia

(Radiation Processing and Polymer Modification Project) Dr Phiriyatom Suwanmala, Thailand



Dr. Phiriyatom Suwanmala  
Thailand Institute of Nuclear Technology (TINT)  
Ministry of Higher Education, Science, Research  
and Innovation



polymers

MDPI

2020

Starch-Based Super Water Absorbent: A Promising and Sustainable Way to Increase Survival Rate of Trees Planted in Arid Areas

Palm Ganesan<sup>1</sup>, Thirumala Kaliraman<sup>2</sup>, Thirumala Kaliraman<sup>3</sup>, Subash Lakshmi<sup>4</sup>,  
Thirumala Kaliraman<sup>5</sup>, Ravi Prakash<sup>6</sup>, Prasad Kumar<sup>7</sup>, Phiriyatom Suwanmala<sup>8</sup>  
and Kavin Ramiah<sup>9</sup>



## Achievement:

1. Scaled-up production of Cassava starch-based Super water absorbent (SWA) ;
2. Field tests, showed increased survival rate of young rubber trees by up to 40%;
3. Baby corn production field showed a 43% increase in yield with SWA application;
4. A field-test for sugarcane, showed increased the yield of up to 52% with SWA application;
5. The research published in international journal;
6. Two international awards;
7. SWA using sugar cane bagasse as the starting material, use of a hitherto waste product;
8. Breakthrough collaboration with private sector.



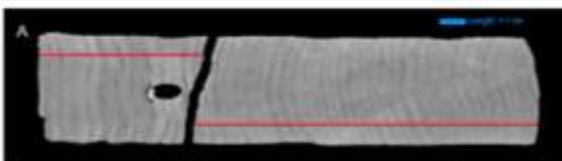
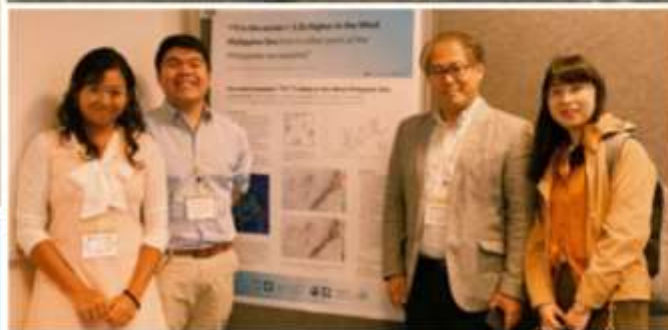
# Excellent Researcher of the Breakthrough Prize 2021

(Climate Change Science Project) Researcher Name: Angel T. Bautista VII

Forum for Nuclear Cooperation in Asia



Angel T. Bautista VII, Sophia Jobien M. Limlingan, Mary Margareth T. Bauyon, Remjohn Aron H. Magtaas, Jeff Darren G. Valdez



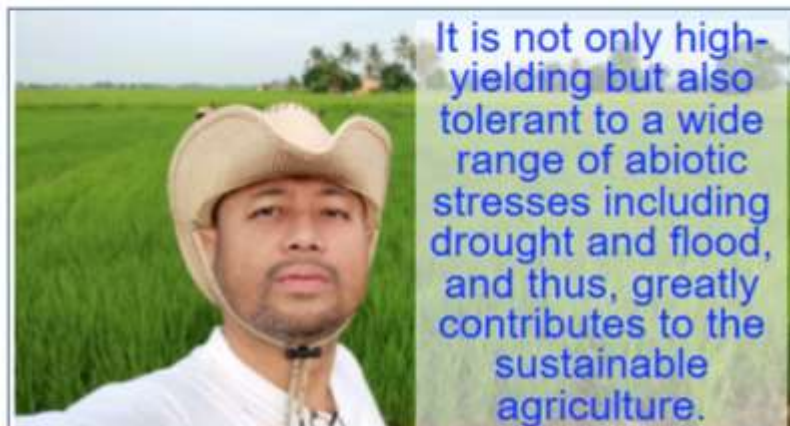
## Achievements:

- 1) Collected several coral core samples from various locations in the Philippines for the reconstruction of natural and anthropogenic environmental changes.
- 2) Developed a novel method using 3D X-ray Computed Tomography of coral cores to reconstruct sea surface temperature.
- 3) Determined impacts of past nuclear weapons testing and nuclear accidents in the Philippines using iodine-129 in coral cores.



# Excellent Researcher of the Breakthrough Prize 2021

(Radiation Utilization Development Project) Researcher Name: Dr Sobri Hussein Forum for Nuclear Cooperation in Asia



## Achievement:

1) Ministry of Agriculture and Food Industries, Malaysia (MAFI) certifies NMR152 as national new rice variety after NMR152 undergone the technical defense with the technical committee (BKKIPB BIL.2/2020) on 10 August 2020. Approved on 1 Jan 2021.

2) Two rice mutants were successfully granted with Certificate of Registration of New Plant Variety and Grant of Breeder's Right by Department of Agriculture Malaysia in Feb 2020 with registration number, PBR0156 (for NMR152) and PBR 0159 (for NMR151).

3) Government of Malaysia through MOSTI has awarded RM 2,021,200.00 Million research grant to further develop rice mutation breeding project (Project code RD0120A1407)

4) The product has been used by the local farmers and around 20,000 farmer has benefited from this rice mutant.

5) This new rice variety has been launched by the Prime Minister of Malaysia in Nov 2021

Dr Sobri Hussein, Dr Abdul Rahim Harun, Mr Faiz Ahmad, Mr James Mackester Simoli, Mr. Muhammad Ruzaini Abdul Wahab & Prof Madya Dr Anna Ling Pick Kiong



# Excellent Researcher of the Breakthrough Prize 2021

(Radiation Oncology Project) Researcher Name: Hideyuki Mizuno

Forum for Nuclear Cooperation in Asia



Hideyuki Mizuno, Shigekazu Fukuda,  
Taku Nakaji, Akifumi Fukumura,  
Yuzuru-Kutsutani Nakamura, Shingo Kato



Journal of Radiation Research 118, No. 5, 2017, pp. 475-477  
doi:10.1093/jrr/rrw008  
Advance Access Publication 10 November 2016

Journal of  
Radiation  
Research

## Multicentre dose audit for clinical trials of radiation therapy in Asia

Hideyuki Mizuno<sup>1\*</sup>, Shigekazu Fukuda<sup>2</sup>, Akifumi Fukumura<sup>3</sup>,  
Yuzuru-Kutsutani Nakamura<sup>4</sup>, Cao Junping<sup>5</sup>, Chai Kuo-Chi<sup>6</sup>,  
Nana Supriana<sup>7</sup>, To Anh Dung<sup>8</sup>, Miriam Joy Caliguan<sup>9</sup>, C.R. Berta Devi<sup>9</sup>,  
Yaswala Chamila<sup>10</sup>, Parys Akhtar Bano<sup>11</sup>, Manonima Bhat<sup>12</sup>,  
Surya Eswarappa<sup>13</sup>, Shingo Kato<sup>14</sup>, Kamiko Kawanaka<sup>15</sup> and Hirohiko Tsuji<sup>1</sup>

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<sup>15</sup>Department of Radiation Therapy, National Cancer Center, 1-1-1 Hongo, Bunkyo-ku, Tokyo 113-8601, Japan

## Achievement:

1) Developed the dosimetric audit tools and system for radiation therapy for both external radiotherapy and brachytherapy.

2) By means of these techniques, the quality dosimetry audit has been conducted among FNCA countries for radiotherapy.

3) Despite the variety of modality and different levels of staff quality, the audit in all member countries was completed successfully.

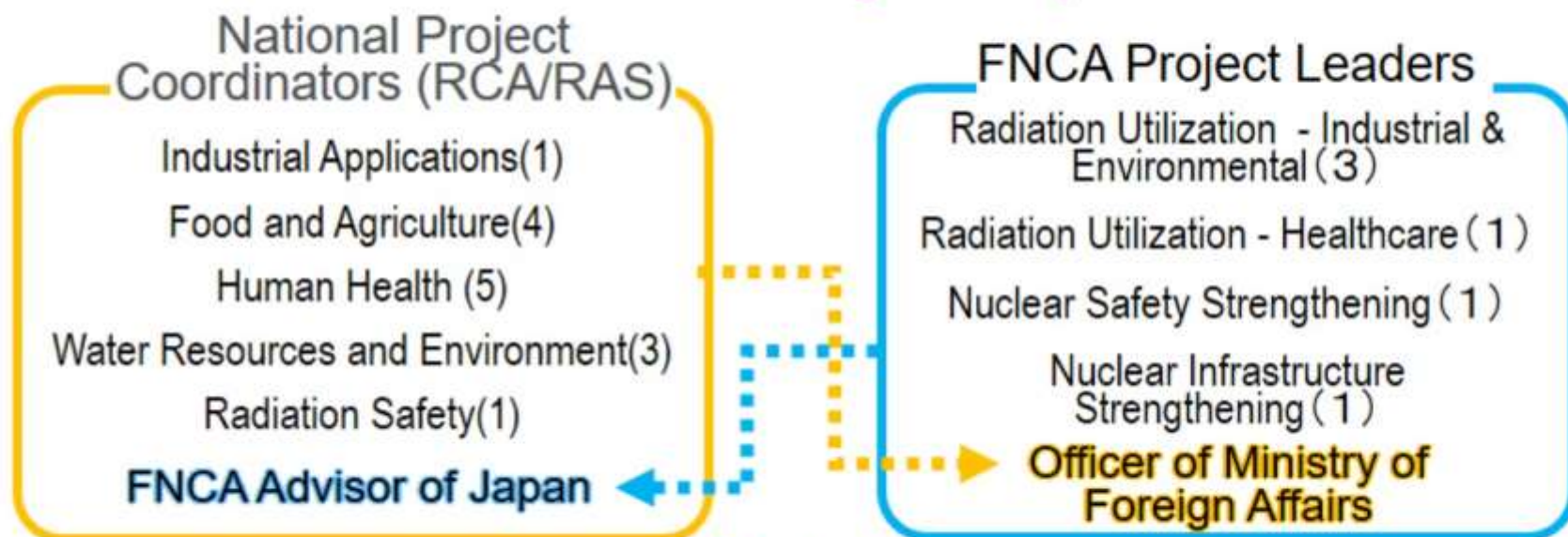
4) Some centers improved their treatment quality in response to the result of the audit.

5) A paper on the results from this audit was published in an international journal in 2016.



# Information shearing between RCA and FNCA

## Domestic meetings in Japan



## Projects

<b>RAS5088</b> Enhancing Crop Productivity and Quality through Mutation by Speed Breeding 2020-2023	Agriculture	Mutation Breeding Project
<b>RAS6098</b> Standardizing Radiotherapy in Palliative Care 2022-2025	Human Health	Radiation Oncology Project

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<https://www.fnca.mext.go.jp/english/index.html>

March 2022



[https://www.fnca.mext.go.jp/english/newsletter/e\\_fnca\\_news.html](https://www.fnca.mext.go.jp/english/newsletter/e_fnca_news.html)

*Thank you for your kind attention!*

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*FNCA Advisor of Japan*



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