RCA News Letter

THE FIRST ISSUE | MARCH 2022

About the RCA Newsletter

The RCA Newsletter will be published on a quarterly basis and distributed to the target readers via email. The purpose of the RCA Newsletter is to deliver timely news of the RCA and facilitate information exchange among the RCA Government Parties and relevant stakeholders. It also aims to promote the RCA and its achievements to the potential partners and the public. The main sections and their contents of the RCA Newsletter are as follows: The RCA Newsletter will invite the GPs and experts to participate in the publication by providing articles on a range of topics. It is also open to all kinds of ideas that could improve the impact of the Newsletter. To subscribe or send messages to the RCA Newsletter, please contact rcaro@rcaro.org.

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Re-marks

Message of the Publisher

- Mr Pill Hwan Park | Director, RCA Regional Office

Dear Readers,

It is my privilege to announce the launch of the RCA Newsletter through this first edition. With a view to moving with the global trend of digitalization and enhancing the promotional effect, the RCA Regional Office (RCARO) planned to publish this newsletter, which was endorsed by the 43rd Meeting of the National RCA Representatives held in 2021. In response to the support, the RCA Newsletter Committee was established, comprising of the members of the RCARO Standing Advisory Committee (SAC) and RCA experts and the RCARO with the responsibility to manage the whole process of the publication and maintain the quality of the RCA Newsletter. The first edition was decided to be published in March 2022 in celebration of the 50th Anniversary of the RCA and the 20th Anniversary of the establishment of the RCARO.

The primary goal of the RCA Newsletter is to deliver news of the RCA in a timely and convenient manner to keep the RCA experts informed of the RCA activities and issues related to the RCA Programme and its policy. More importantly, it aims to facilitate information exchange of the Government Parties (GPs) by providing them with a vehicle where the experts can share their insights for improvement of the RCA as well as for the promotion of the peaceful uses of nuclear science and technology in the region. Diverse topics related to the RCA and nuclear technology, such as introduction of specific technologies or regional/national status and trends, will be covered in featured articles or dedicated sections based on the contribution of the GPs and RCA stakeholders.

For this reason, the GPs are highly encouraged to take part in the publication of this Newsletter by providing opinions and articles that would become valuable resources for understanding the region better and nourishing the RCA Programme. Another vital role of the RCA Newsletter is to increase the efficiency of RCA promotional activities by reaching out directly to the target audience and providing them with easy access to the RCA materials, using digital technology. Making the best use of the technology which lifts the time and space constraints, we plan to expand the audience to beyond the region, including international organizations and the public, for the purpose of increasing the RCA awareness and exploring potential partnership.

On the occasion of its 50th Anniversary, the RCA is taking a moment to look back on its past achievements and draw consented vision for the future. Intensive studies have been done by the IAEA on the performance of the RCA Programme, and the first RCA Ministerial Conference and the RCA Special Exhibition will be held during the IAEA General Conference in September 2022 to applaud the RCA's contribution and declare its future vision.

Also welcoming the 20th Anniversary of its establishment, the RCARO has been exploring various means that could contribute to increasing the impact of the RCA Programme and supporting the GPs more effectively in the new era of the RCA based on the strength and capacity of the RCARO. As part of the effort, we are delighted to publish the RCA Newsletter which is expected to enhance the information service and archive of the RCARO. I sincerely hope that the RCA Newsletter becomes what the readers look for when they are in need of information related to the RCA and the region.

Congratulatory Remarks I

- Ms Jane Gerardo-Abaya | Director, Division for Asia and the Pacific, Department of Technical Cooperation, IAEA

The 50th anniversary of the establishment of the Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (RCA) (1972-2022) marks an important milestone in the collaboration between the IAEA and the RCA. I heartily congratulate the RCA States Parties for their significant achievements that have generated tangible socio-economic impacts which are especially captured in the assessment reports on mutation breeding, on non-destructive testing and on radiotherapy. It is noteworthy that the RCA programme with the IAEA TC Programme contributed to increased food production, enhanced environmental protection, and strengthened regional capacity and sustainability from the production of over 7300 breeding lines with superior quality traits as well as the release of more than 250 certified mutant varieties of crops. Likewise, the workforce for diagnosis and treatment of cancer increased by 232%, including radiation oncologists, medical physicists, radiation technology therapists, and radiation oncology nurses. In non-destructive testing (NDT), more than 3,600 inspection centres and 190 firms have been established, offering training across the region and providing services to local industries as well as abroad. As a result, NDT technologies have been applied widely and effectively to assure safety, material quality, product integrity, better controlled manufacturing, and reduced production costs in multiple industrial sectors such as aero-

space, ship building, railways, power generation, oil and gas industry, nuclear industry, construction, and manufacturing.
The growth of the RCA from four founding members in 1972 to 22 States Parties 50 years after, attests to an effective regional cooperation for human resource capacity building. The 173 IAEA Technical Cooperation Projects with the RCA to date, have trained over 10,000 counterparts. The regional workshops and meetings supported a network for about 7,000 professionals, and the 4500 experts and lecturers have propagated to numerous beneficiaries their knowledge, experience and skills for the safe, effective and efficient use of nuclear technologies. These successes can be attributed to the people driving the RCA - the National RCA Representatives, the RCA Regional Office, the Working Groups, Programme Advisory Committee, Lead Country Coordinators, National Project Counterparts, the IAEA RCA Focal Persons and all involved through the IAEA TC Programme. Through the years, as a team, they have consistently pursued the ideals set by the founders and transformed those according to the evolving environment of the region. With its substantial intellectual, economic and technological strengths, the RCA has infinite opportunities to lead and further demonstrate innovative approaches like what it has done for the socio-economic impact assessments of the past 20 years of technical cooperation in agriculture, industry and health. The legacy it produced and its targets to support young generation through its Scholarship Programme in STEMs can mobilize and harness the resources in the region to materialise the RCA vision - "the RCA is recognized as an effective partner in providing nuclear technologies that enhance socio-economic well-being and contribute to sustainable development in the region". My most heartfelt congratulations to RCA for all its noble endeavours and with all wishes for continuing successes in the next 50 years!

Congratulatory Remarks II

- Ms Suchin Udomsomporn | National RCA Representative of Thailand, 2021 RCA Chair

This year, the Regional Cooperative Agreement for Research, Development, and Training Related to Nuclear Science and Technology for Asia and the Pacific or RCA marks 50 years of its endeavors. I am delighted to extend my congratulations to the RCA and all the parties involved in this achievement. The RCA has supported the development of technical and human resource capacities in 22 countries through more than 150 Technical Cooperation (TC) projects since 1972, the oldest regional cooperative agreement within the framework of the IAEA, and now has come to the celebration of its 50 years of anniversary. It's been 5 decades that the RCA has played the role as the formal inter-governmental agreement serving as a framework for the Asia-Pacific Member States to intensify their collaboration through programmes and projects focused on the specific shared needs of its members and to promote and coordinate cooperative research, development, and training projects in nuclear science and technology. The RCA aims to promote joint efforts to solve common problems and to stimulate technical cooperation among countries in the regions through the exchange of information and technical know-how, expanded networking, and partnerships across regions. With the unity of the Government Parties, the IAEA, and the RCARO, we have planned and implemented activities addressing regional development needs and priorities through the peaceful use of nuclear technology within Regional Cooperation Agreements.
This year as well offers the best opportunity for the RCA to launch its RCA Newsletter to support the Government Parties and relevant stakeholders in publishing the news of the RCA activities, featured articles on current issues and regional status, and diverse topics related to nuclear science and technology. This will benefit and facilitate the relevant experts, policymakers, and other RCA stakeholders in all levels of international/regional organizations as well as the public.
I would like to extend my thanks to the RCA Regional Office for its contribution to the arrangement of the RCA Newsletter. I wish the Newsletter success in delivering quality updates to our broad audience for a long time to come.

RCA NEWS

Overview of the RCA

The Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology for Asia and the Pacific (RCA) is the first intergovernmental agreement established under the auspices of the IAEA, comprising 22 Member States in the Asia and the Pacific region. Since its establishment in 1972, the RCA has served as an effective framework that reinforces collaboration among the Government Parties (GPs) to contribute to the dissemination of nuclear science and technology and bring socio-economic development to the region. Under the umbrella of the Agreement, the RCA Programme promotes and coordinates cooperative research, development and training projects in the areas of strategic priorities for betterment of the region. The GPs are committed to the development and implementation of these projects to address shared needs and make the best of the framework.

Based on the firm ownership of the GPs and strong support of the IAEA, the RCA has brought about unparalleled benefits to the region throughout last five decades. Demonstrable figures include: a total budget of USD 90 million spent; 173 RCA projects implemented; 9,950 professionals trained through 658 regional training courses; 562 meetings and workshops conducted with 6,923 participants; and 4,459 experts/lecturers recruited for provision of their expertise through diverse activities. These notable outputs contributed to the successful transfer of nuclear science and technology, especially in the fields of strategic priorities – Agriculture, Human Health, Environment and Industry – and enhanced socio-economic well-being of the GPs. Some of the success stories could be found in the Project section.

In 2022, the RCA is celebrating its 50th Anniversary. The Government Parties share the idea that it is an opportune time to look back on the past achievements and reaffirm their commitment to the RCA for the upcoming decades. For this purpose, the RCA is planning to hold its first Ministerial-level conference and an exhibition in conjunction with the IAEA Conference in September 2022. Promotional means, such as a dedicated website, video and publications, are to be released in due course. It is expected that these events and activities will motivate stronger ownership and confidence for future development among the RCA GPs as well as encourage potential partnership with other regional or international organizations.

RCA History

In celebration of the 50th Anniversary of the RCA, the IAEA, in cooperation with Dr Prinath Dias, Chair of RCA Programme Advisory Committee (PAC) and former RCA Focal Person, prepared a document on the 50-year history of the RCA. A summary of the document is provided herewith.

- **Dr Prinath Dias** | Chair, RCA Programme Advisory Committee

The 49th RCA General Conference Meeting, IAEA Headquarters

Introduction

A new era of regional cooperation among the Member States of the International Atomic Energy Agency (IAEA) in the Asia and the Pacific Region began in 1972, with the birth of the RCA (The Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology). The RCA is an inter-Governmental agreement established under the auspices of the IAEA, for regional cooperation in the peaceful use of nuclear science and technology for socio-economic development. From its modest beginning with just four Government Parties in 1972, over the past 50 years, the RCA has expanded to an entity with 22 members and has contributed to the well-being of the populations of Asia and the Pacific region (South Asia, East Asia, South-East Asia and the Pacific) through the use of nuclear techniques for socio-economic development.

The success of the RCA can be attributed to the high degree of ownership exhibited by the Government Parties to the Agreement (GPs), excellent strategies and clear procedures adopted by them, and the very strong technical and administrative support received from the IAEA. The following is a brief description of these strategies and the benefits gained by the RCA GPs during the past 50 years.

RCA Management

All policy decisions related to the RCA are taken by National RCA Representatives (NRs) appointed by the Governments of the parties to the Agreement, who meet twice a year. Among key strategic decisions made by the RCA NR's are the adoption of the RCA Medium Strategy and the identification of the RCA Strategic Priorities. These two documents which are regularly updated form the basis for development and implementation of the RCA Technical Cooperation projects. All RCA procedures to be used in the development, implementation and evaluation of RCA projects and the roles and responsibilities of RCA stakeholders are contained in the RCA Guidelines and Operating Rules, which are periodically updated.

The RCA NRs also took the initiative of establishing an RCA Regional Office in the Republic of Korea. This office, which is fully supported by the Government of the Republic of Korea, is responsible for improving the visibility and the viability of the RCA programme and for supporting the IAEA in the performance of its secretariat functions related to the RCA.

RCA Projects and Achievements

RCA GPs have benefitted from the RCA projects implemented mainly in the areas of Human Health (radiotherapy, nuclear medicine and medical physics), Industry (non-destructive testing, radiation processing and nuclear tracer applications), Agriculture (plant breeding, food irradiation, management of soil erosion, water resources development and food safety) Environmental Monitoring (air-pollution monitoring, marine pollution monitoring), Energy Planning and Radiation Protection. The following is a summary of some of the benefits gained by the RCA GPs through the Technical Cooperation Projects implemented over the past 50 years.

As a result of the RCA projects on Human Health, the RCA GPs have acquired the capability of applying advanced radiotherapy techniques such as stereotactic body radiation therapy (SBRT), 3D image-guided brachytherapy (IGBT), and intensity-modulated radiation therapy (IMRT), developed distance learning material for training of nuclear medicine technologists and developed and adopted guidelines for the establishment and clinical applications of PET facilities. It has also been possible to develop guidelines for clinical training of Medical Physicists in Radiation Oncology, Diagnostic Radiology, and Nuclear Medicine (IAEA Training Course Series 37, 47, and 50) which are being used by all IAEA Member States.

Through the RCA projects in the Industrial Sector, the RCA GPs have developed indigenous capabilities for training NDT technologists up to Level 3 and for providing professional NDT inspection services to the industry, establish new radiation processing facilities and develop about 50 advanced radiation grafted materials.

RCA Projects in the Agricultural Sector has made it possible to develop new varieties of soybean, groundnut, mung bean, wheat, sorghum, and sesame, which have been released to farmers, adopt regulations on food irradiation, establish irradiation plants, and process a significant amount of food products by irradiation.

The projects in the Environmental Sector enabled RCA GPs to develop the capability of collecting and analysing air-pollution data for source identification and apportionment, produce a database containing levels of particulate air pollution in the Asia and Pacific region and develop capabilities for the collection and preparation of marine sediments and the analysis of chemical and radioactive pollutants.

A more detailed history of the RCA can be found in the document titled "A Brief History of the RCA" (50 Years of Regional Cooperation in Nuclear Science and Technology), published by the IAEA.

What's New

The 44th Meeting of the National RCA Representatives and Its Preparatory Meetings being held on 18-21 April 2022

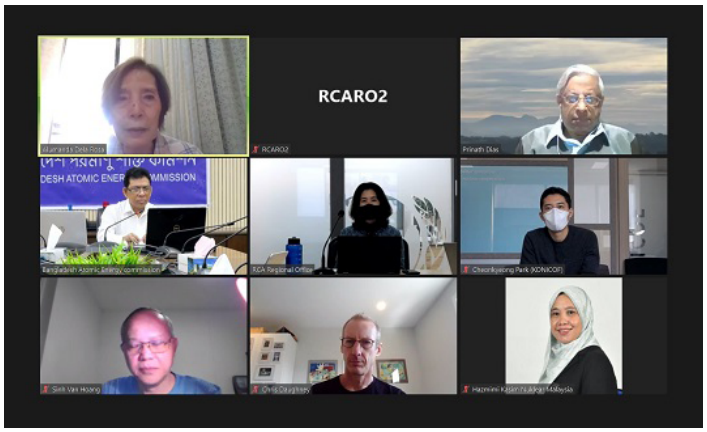
The 44th Meeting of the National RCA Representatives (NRM) is being held virtually on 19-21 April 2022. Its preparatory meetings, namely the Meeting of RCA Chars and the 34th Meeting of the RCARO Standing Advisory Committee are to be held on 18 April.

The 44th NRM will review the development of the RCA Programme for 2024-2025, preparation for the 50th Anniversary of the RCA including the Ministerial Level Meeting and discuss major policy matters. The background documents will be circulated and uploaded on the RCA website in due course.

The 10th Meeting of the WG on RCA MTS 2018-2023 Coordination held on 2-4 March 2022

The 10th Meeting of the Working Group (WG) on RCA Medium-Term Strategy (MTS) Coordination was held virtually on 2-4 March 2022. The Meeting was attended by the WG members and observers, comprising representatives from the Philippines, Bangladesh, Malaysia, New Zealand and Republic of Korea and the RCA Regional Office. The RCA Focal Person and the Chair of the RCA Programme Advisory Committee (PAC) also participated in the event.

The Meeting reviewed the result of the mid-term review of the MTS 2018-2023 and discussed the plan for the final review, including the timetable and responsible parties. It was emphasized that there should be close cooperation with the WG on Drafting the RCA MTS 2024-2029 to well reflect the performance of the current MTS and draw more effective strategies for the next term. The Meeting continued with discussions on financial matters, sustainability of the RCA Programme and ways to address the needs of the new GPs.



The 1st Meeting of the RCA Awards Committee held on 10 March 2022

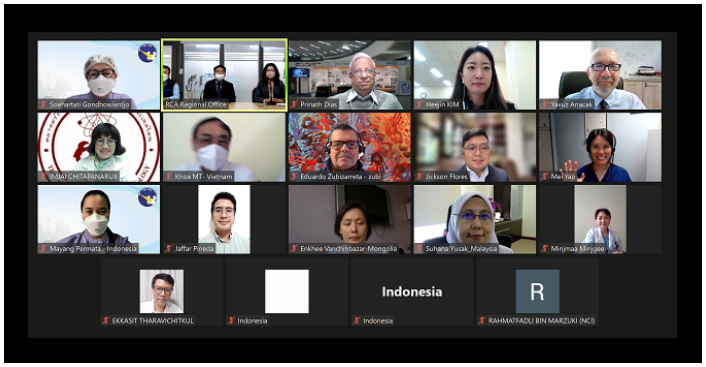
The 1st Meeting of the RCA Awards Committee was held virtually on 10 March 2022. The Meeting was attended by the members of the Committee, consisting of the representatives of Thailand, Viet Nam, and RCA Regional Office, the Chair of the RCA Programme Advisory Committee and delegates from the IAEA.

The Meeting reviewed the guide to selecting the awardees that includes the procedures categories and criteria of the RCA Awards. The Meeting also discussed and confirmed the work plan.

The Research Coordination Meeting for RCA Research Project in Radiotherapy held on 17-18 March 2022

The Research Coordination Meeting for the RCA Research Project on "Closing the Gap in Radiotherapy Access in RCA Government Parties" was held virtually on 17-18 March 2022. The Meeting was attended by a total of nineteen (19) participants comprising the Chief Scientific Investigators (CSIs) from eight (8) Government Parties - Australia, Korea, the Philippines, Indonesia, Malaysia, Mongolia, Thailand and Viet Nam - the Chair of the Research Review Committee, the Technical Officer of the project and representatives from the RCA Regional Office.

All the participating CSIs delivered a presentation on their national plan for the research project, including the overall programme and expected outputs of the research activities. It was emphasized during the meeting that close cooperation for research is important in implementing the planned activities and achieving the set objectives and targets. The participants also agreed to hold a regional training workshop on capacity building for research implementation.



The 5th Meeting of the STF for the 50th Anniversary of the RCA held on 30 March 2022

The 5th Meeting of the Special Task Force (STF) for the 50th Anniversary of the RCA was held virtually on 30 March. The Meeting was attended by the members of the STF, comprising representatives from Viet Nam, Thailand, Malaysia, Korea, China, Japan, the IAEA and the RCA Regional Office.

The Meeting reviewed the progress of preparation for the special events, including the first Ministerial Conference and the RCA exhibition, and other activities undertaken in celebration of the 50th Anniversary of the RCA. The Meeting also discussed the draft criteria for the RCA Awards prepared by the Committee in charge.

During the Meeting, it was highlighted that the endeavor of the STF members as well as strong support of the RCA GPs are the key to the success of the RCA 50th Anniversary events. In this regard, the Meeting requested active participation and firm support of the GPs for the STF activities and the ceremonial events.

PROJECTS

Agriculture / Human Health / Industry / Environment

The RCA Programme has contributed to the significant improvement of the socio-economic well-being and living environment of the residents in the Asia-Pacific region, especially in the fields of strategic priorities for the development of the region. In celebration of the 50th Anniversary of the RCA, the IAEA conducted social and economic impact assessments of the RCA Programme in the fields of Agriculture, Human Health and Industry, focusing on the representative nuclear technologies that brought notable achievements to the region over last 20 years. Below are the relevant Success Stories of the RCA Programme with extracts of the IAEA's reports of the social and economic impact assessment of the RCA Programme.

Agriculture

Ensuring food safety and security has long been the main priority of the Asia-Pacific region. Moreover, population growth and climate change have increased the demand for food and crops that can be adapted to the changing environmental conditions. As a means to enhance the productivity and traits of agricultural products, mutation breeding techniques were introduced and adopted in the region. Mutation breeding in crops involves exposing seeds, cutting or tissue-culture material to radiation, and then planting the seed or cultivating the irradiated material to grow seedlings. Individual plants are then multiplied and examined for new and useful traits. It does not involve gene modification but rather uses a plant's own genetic resources and mimics the natural process of spontaneous mutation. Through mutation breeding using radiation, plant breeders can enhance the genetic diversity necessary to develop new and improved varieties. RCA projects were implemented to enhance capacity of the Government Parties in mutation breeding technology that contributed to increasing food production and enhancing environmental protection.

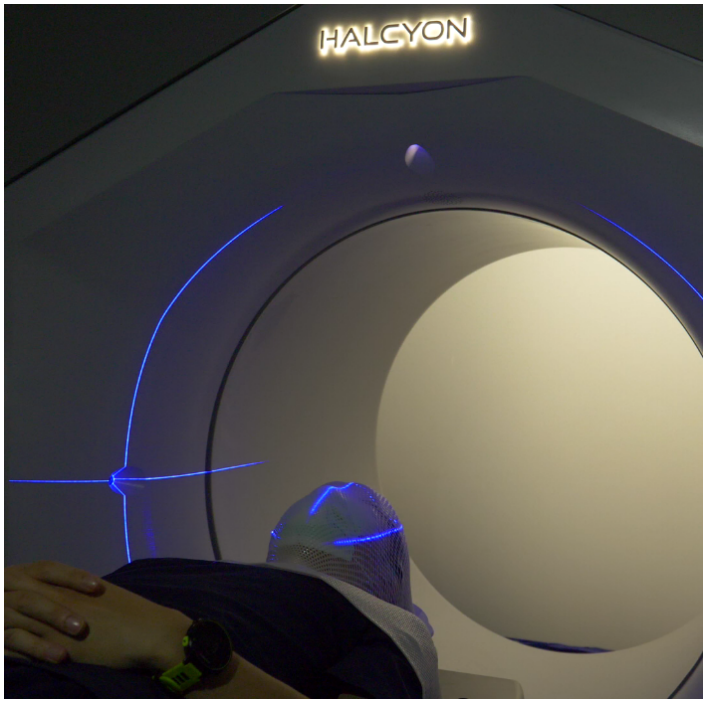
The RCA has supported a significant body of primary research and development of crop varieties. 7,316 mutant lines were developed during the past 20 years, among which 254 mutant varieties were certified and officially released. The new mutant varieties span 12 different crops, with rice, wheat and soybean having the highest number of new mutant varieties. These new mutant varieties produce greater crop yield, growing area and quality, contributing to increased food availability, diversity and accessibility as well as increased incomes for farmers. For example, Luyuan 502 is a wheat variety certified to have a grain yield 10.6 per cent higher than the national control variety and more tolerant to drought and diseases. For these reasons, Luyuan 502 became the second-most widely used wheat variety in China, increasing productivity by 4 million tons and generating an additional income of US$ 1.3 million to farmers. The new mutant varieties also contribute to environmental protection by reducing use of agricultural inputs such as pesticide, fertilizer and irrigation, and by increasing soil fertility.

Luyuan 502

Human Health

Non-communicable diseases, like cancer, have been by far the leading cause of death around the world and the cases are projected to increase as life expectancy improves whereas communicable diseases are better controlled. Radiotherapy is one of the most widely used therapies for cancer treatment, often used in conjunction with other treatments such as surgery, chemotherapy and immunotherapy. It uses radiation to kill cancer cells or slow down their growth by damaging their DNA. RCA projects were implemented to enhance capacity of the Government Parties in radiotherapy that contributed to training, education and certification of the radiation oncology workforce and establishment of professional networks. These impacts have led to the increases of use of the technology and patients' access to quality radiotherapy in the region.

The radiotherapy workforce was strengthened by enabling the Government Parties to establish radiooncology departments and societies, and offer educational training programmes. In result, the radiotherapy workforce in the region grew by 232% to 47,000 specialists between 2000 and 2020, of which three-quarters were certified. Patients' access to quality radiotherapy also improved based on the increase of operational radiotherapy equipment and technology. For instance, Indonesia attributed a 300% increase in radiotherapy equipment and establishment of a teleradiotherapy network to the relevant RCA projects. These improvements were especially effective to Indonesia, the largest archipelago country in the world, showing over 300% growth in cancer patients treated using domestic radiotherapy facilities. As a result of the strengthened radiotherapy workforce and increased access to quality radiotherapy, the life span and quality of life for cancer patients significantly increased in the region. It was estimated that approximately 47,000 health-adjusted life years was gained cumulatively by cancer patients during last 20 years.



The First 'O' Shape Linear Accelerator (LINAC) with high precision radiation techniques in Indonesia

Industry

Local NDT inspector performing inspection on industrial component in Malaysia

Non-destructive testing techniques are used in industry to evaluate the integrity and properties of material or components without causing damage to the tested object. It can identify cracks or flaws that might not otherwise be visible, which makes it a key tool for quality control, safety and reliability. Even though it is an effective technology that could ensure safety in the operation and maintenance of industrial components as well as increase competitiveness of industrial products, the Government Parties had to depend on the foreign expertise and bear great expenses due to lack of proper techniques and professionals. RCA projects were implemented to enhance capacity of the Government Parties in NDT techniques that contributed to establishing relevant infrastructure, producing certified workforce, and raising awareness of NDT benefits. These impacts have led to the improvement of productivity, quality and lower cost of industries as well as the enhancement of health and safety.

The RCA projects on NDT techniques primarily improved regional capacity and capability in non-destructive testing. They supported the Government Parties to establish infrastructure for producing certified personnel in both advanced and conventional NDT techniques. Between 2000 and 2020, an average of more than 2,800 personnel were certified annually by local NDT Accredited Training Centers. Participation of female personnel gradually increased and they currently take up 10.3% of the total workforce. The scope and scale of NDT demand and use also increased significantly. The projects contributed to increasing the awareness of NDT technology as an effective tool for quality assurance and quality control of industrial components. Currently, NDT has been applied in almost all Government Parties and assisted better controlled manufacturing, ensuring material quality, product integrity and production costs. Positive impacts have been achieved in multiple sectors, leading to wider adoption of NDT technology in fields of power generation, oil and gas, construction, railways and shipping, aerospace and so on. Malaysia is one of the countries that best benefitted from participation in the RCA NDT Programme. With the establishment of national infrastructure and creation of a pool of local professionals, Malaysia has transformed from being dependent on foreign expertise to being self-reliant

in NDT. The availability of high-quality NDT services with a competitive price lowered the overall costs of NDT inspections while increasing demand of NDT services improved the employment prospects of personnel with expertise in NDT.

Environment

Environment is another strategic priority area of the RCA. The importance of close cooperation of the Government Parties is essential in this field in that environmental impacts are normally not limited to a certain country but spread across borders, affecting wider areas regionally and globally. In particular, the RCA has put long-term cumulative efforts into fighting the major environmental problem of the region, air pollution. Following is the extract of the relevant RCA Success Story.

Air particulate matter is used to describe a mixture of solid particles and liquid droplets in the air. Besides some particles that are directly from natural sources such as deserts, oceans and fires, most of the particles are the result of chemical reactions emitted from industries, automobiles and so on. Air particulate matter is transported by the wind and becomes the major cause of air pollution which is the most lethal environmental threat that endangers public health and aggravates climate change. This threat is magnified in the Asia-Pacific region, where the rapid population growth and industrialization elevates the level of the pollution. To combat this problem, the RCA has implemented consecutive projects since 2002 to monitor and analyze the air particulate matter using Nuclear Analytical Techniques.
Nuclear Analytic Techniques, such as the ion beam analysis, X-ray fluorescence analysis and neutron activation analysis, provide information of elemental composition of air particulate matter with high sensitivity and speed. In order to get proper samples of airborne particles, the Government Parties were provided with necessary equipment such as the GENT Stacked Filter Unit, and related techniques through the projects. A series of campaigns were organized at the regional level to collect enough samples and data and the samples were analysed autonomously or with the support of the regional resource units. As a result, the Asia Pacific Aerosol Database (APAD) was established, containing the data of elemental concentrations for over 35,000 air particulate matter samples collected throughout the first 15 years. In addition, the Asia Pacific Source Fingerprint Database (ASFID) was established to provide receptor source fingerprints and source apportionment solutions based on the APAD dataset. Freely accessible through the ANSTO and the IAEA websites, these two world-class databases have worked as an effective means to identify the origin of both local and regional air pollutants, making it possible to track long range transport of the pollutants. Consequently, these datasets are being used by aerosol and health researchers as valuable resources for analyzing and understanding the atmospheric conditions.
These consecutive RCA projects on air pollution are the evidence of RCA's role in the region. Based on the consensus and technology transfer made through the projects, the Government Parties put in concerted efforts and established two comprehensive databases that could be used by relevant stakeholders for improving the air quality of the region.


GENT Stacked Filter Unit

References

· http://rcaro.org/sereports
· http://rcaro.org/success

FEATURED ARTICLES

The Korea Government's initiative to Lead Sustainable Mutual Growth and Innovation to the Global Society through the RCA

- Mr Seogon Ko | Deputy Minister, Office of R&D Policy, Ministry of Science and ICT, Republic of Korea

The Importance of Nuclear Science and Technology

Radioactive isotopes like uranium-235 and plutonium, when used as weapons such as bombs or missiles, have negative aspects of threatening mankind and ecosystem, bringing about major disaster. On the other side, nuclear technology plays a vital role in addressing the global climate crisis as the importance of reducing greenhouse gases was emphasized with the launch of the Post-2020 Climate Change Regime. In particular, Molybdenum-99 and Zirconium-89 contribute significantly to improving the human health and welfare.

Likewise, nuclear technology is like a double-edged sword that could be applied in controversial ways. In 1957, the United Nations established the International Atomic Energy Agency (IAEA) to promote the peaceful uses of nuclear energy and prevent military use and proliferation.

However, due to the environmental crisis represented by the global warming which has been caused by the greenhouse gases that were inevitably emitted in the process of industrialization and the COVID-19 pandemic that recently hit the global society and is threatening our lives, the importance of sustainable cooperation for mutual growth based on nuclear technology is being stressed more strongly than ever.

Appreciating the IAEA/RCA's Effort in Addressing Global Issues and Celebrating the 50th Anniversary of the RCA

In this reality, the IAEA has been operating Technical Cooperation Programme in four geographic regions, namely Asia and the Pacific, Africa, Europe, Latin America and the Caribbean, aiming to fulfill the IAEA's mandates stated in its Statute in the global society. Specifically, to strengthen nuclear science and technology cooperation in the Asia-Pacific region, it established the Regional Cooperative Agreement (RCA) 50 years ago in 1972, of which the membership has now been expanded to 22 Government Parties, including the Republic of Korea.

Since Dr Rafael Mariano Grossi was inaugurated as the Director General of the Agency in late 2019, the IAEA has put massive efforts in addressing diverse global issues with nuclear technology under his outstanding leadership. For instance, the IAEA provided test kits to more than 100 Member States two years ago when the countries were experiencing difficulties in response to the COVID-19 pandemic and it also initiated the ZODIAC[1] project last year to help countries with early detection and control of animal and zoonotic diseases. Moreover, it is currently undertaking the NUTEC Plastics[2] project to deal with the marine plastic pollution using radiation technology and protect the global ecosystem.

On behalf of the Korea Government, I would like to express my gratitude and welcome to the IAEA for these efforts. I would also like to sincerely congratulate the 50th Anniversary of the RCA.

Leading Sustainable Mutual Growth and Innovation through the RCA Regional Office

With the aim to go along with the IAEA's efforts and lead mutual growth and innovation to the Asia-Pacific region as a responsible member of the global society, the Korea Government hosted the RCA Regional Office (RCARO) in March, 2002. Currently, a total of 17 RCA projects are being implemented under the RCA Programme. The RCARO is carrying out diverse cooperative activities with the intent to complement the RCA Programme and expand the benefit for the GPs.

It is also making endeavors to achieve recognition and increase the awareness of the RCA to the relevant stakeholders.

However, considering that the demand for collaboration in the field of nuclear science and technology among the GPs constantly increased as our society developed and became more complexed, the IAEA TC Fund was seen to have limitations in addressing the needs of the GPs for technical cooperation projects and human resource development.

Therefore, as a member of the RCA and host of the RCARO, the Korea Government has contributed approximately USD 2,133 million throughout the last 20 years with the aim to fulfill the needs of the GPs and, furthermore, support the RCA to become the most exemplary modality for cooperation in the peaceful uses of nuclear technology beyond the Asia-Pacific region and accelerate its function of leading sustainable mutual growth and innovation to the global society.

With this support of the Korea Government, the RCARO has effectively performed various activities that could enhance or complement the RCA Programme. Some of its achievements include: supporting 38 students and experts for their study at the Korea Advanced Institute of Science and Technology (KAIST) through the Nuclear Engineering Master's Degree Programme; operating the RCA E-CAMPUS with more than 170 e-learning modules in the fields of nuclear medicine and radiation safety

1 Zoonotic Disease Integrated Action
2 Nuclear Technology for Controlling Plastic Pollution

and; training a total of 209 professionals in radiation application, in cooperation with Korean institutes such as the Korea Atomic Energy Research Institute (KAERI) so as to contribute to narrowing the gap in technology development among the GPs. Moreover, the RCARO has endeavored to extend partnerships with other international organizations, for instance, the UNOSSC[3], the ASEANTOM[4] and ARCCNM[5], to provide the GPs with opportunities to adopt and share advanced technology in the areas of agriculture, environment, advanced materials and emergency preparedness and response. It also recently established the integrated information service system which is expected to offer easier access to the RCA information and increase the awareness of the RCA as well.

Korea Government's Support for the RCARO in Commemoration of Its 20th Anniversary

Welcoming the 50th Anniversary of the RCA and the 20th Anniversary of the RCARO, the Korea Government is currently reviewing diverse measures for effective management of the RCARO. First, we plan to amend the related Korean legislation to solidify the basis for operation of the RCARO and its budget. We will also support the RCARO in enhancing its function of serving as the hub for the RCA information. The RCARO has been operating the RCA website to facilitate information exchange and serving as the archive for RCA information successfully. Whereas most of the RCARO's activities were focused on assisting the operation of the RCA and its Programme, the Korea Government expects that the RCARO would also perform as a think tank that contributes to identifying demands for cooperation and policy issues in the region and to widening the scope of its activities. Lastly, we will support the reinforcement of the RCARO workforce for more substantive implementation of its projects. Although there still needs to be further consultation with the relevant authorities, the Korea Government is looking forward to the RCARO becoming an effective think tank for the RCA and will devote the utmost effort to support the RCARO in strengthening its foothold for serving its roles.

Once again on behalf of the Korea Government, I would like to convey my heartfelt gratitude to the Director of the RCARO and its staff for their great work and efforts for assisting the RCA GPs and successfully carrying out various activities for the RCA. Last but not least, I warmly congratulate the 20th Anniversary of the RCARO.

Adaptive Strategy for Effective and Successful RCA Projects during Global Pandamic

- Ms Suchin Udomsomporn | NR of Thailand, 2021 RCA Chair

The Regional Cooperative Agreement for Research, Development, and Training Related to Nuclear Science and Technology for Asia and the Pacific (RCA) has been supporting the development of technical and human resource capacities in more than 20 countries through implementation of more than 150 Technical Cooperation (TC) projects, since 1972, and still continues to serve as important mechanisms for supporting International Atomic Energy Agency's (IAEA) Member States' efforts to address regional priorities through the application of Nuclear Science and Technology in various fields. The RCA will be celebrating its 50th anniversary and all the Government Parties are putting their efforts for this celebration through establishment of a multilateral Special Task Force (STF) for the 50th Anniversary of the RCA to work out the detailed work plan of activities for the celebration including budget implications. To mark the 50th anniversary of the RCA Agreement, two socio-economic impact assessments on radiotherapy and non-destructive testing (NDT) respectively, have been launched. As a way forward, the RCA Regional Programme Framework 2024-2029 has been formulated as a means to further enhance the effectiveness, efficiency, and impact of the RCA programme. A new RCA Scholarship Programme (SPS) is also planned to be launched next year to provide capacity building and accreditation opportunities for young professionals in the science, technology, engineering, and mathematics (STEM) disciplines especially in Nuclear Science and Technology (NST_.

The spread of COVID-19 has affected the health of humanity and hampered the normal operational procedures in all parts of the world due to the restrictions implemented to prevent the spread of the disease. This has forced a shift in strategies, mechanisms, operational procedures and actions in the "new normal" environment. Major events such as meetings and training activities under the RCA since the outbreak in early 2020 have had to be implemented in a virtual environment using a range of online technologies available today. These presented new challenges, both in terms of management and technical understanding to achieve the desired outcome, including adjustment of guidelines and action models. Limited travel has led to cost savings in terms of logistics and the budget earmarked for meeting and training activities have been wisely converted to the procurement of necessary equipment for Government Parties, enabling them to drive the projects. It is an example of a process which is pivoting to adapt to current circumstances and, as a result, the project can be driven in a more concrete way. Laboratory operations of Government Parties largely continue to run efficiently. This has led to the utilization of both basic information in the region and to bringing about the practical innovations of Government Parties according to the objectives of each project. Therefore, whether it is the epidemic of COVID-19 or any other challenges which may arise, the commitment, strong cooperation, acceptance and readiness to adjust and adapt by the Government Parties will result in the successful delivery of the projects under the RCA.

Amid the COVID-19 situation, the IAEA introduced COVID-19 and RCA programme initiatives related to air and the marine environment in the Asia and the Pacific region. The Agency also explored partnerships to address plastic pollution as well as shared information on the efforts of Member States in Asia and the Pacific to promote a circular economy and the

3 United Nations Office for South-South Cooperation
4 ASEAN Network of Regulatory Bodies on Atomic Energy
5 Asian Regional Cooperative Council for Nuclear Medicine

sustainable use of natural resources. In December 2020, the publication Social and Economic Impact Assessment of Mutation Breeding in Crops of the RCA Programme in Asia and the Pacific assessed the social and economic impact of plant mutation breeding projects under the RCA. It focused more on adding value rather than on the primary research undertaken by the individual countries in which it was launched.

Last year the RCA had to undergo a number of developments and changes both in terms of activities and management with the new guidelines and new approaches that helped to strengthen the cooperation of its 22 Government Parties. The RCA has continued to implement its regional programme successfully despite the challenges of the COVID-19 pandemic with a support plan for epidemic response that is appropriate and consistent in nature, while also flexible enough to operate under such circumstances.

The COVID-19 pandemic has resulted in both domestic and international restrictions which all GP's understand and adhere to. As a result, each GP has adjusted its strategy to achieve the project objectives according to their National Work Plan. Since in-person meetings and training sessions have not been possible in the past two years, the "online" or "virtual" method has become the main mechanism for driving the project. Although, initially,, many GPs faced difficulties with the techniques and equipment necessary to conduct online activities, they were able to quickly adapt. . Many GPs have provided tools and equipment to support online meetings and trainings, and have made it so smooth and familiar that it has become a normal part of the process. Technical operations in laboratories can be carried out depending on the internal rules and regulations of the Government Parties. Small consultations between experts and scientists, LCC with NR, NPT with NR, NPT with NPT are quicker, more economical and have brought them closer.

In summary, online systems are the main effective mechanism which are being used to drive the project to achieve the work plan. However, face-to-face meetings are still the most important effective way to build partnerships among GPs in the region and should be reverted to when the situation returns to normal.

Thailand as the Chair of the RCA in 2021, would like to assure its commitment to fully support the current and future success of the RCA Projects.

Thoughts of an RCA Stakeholder

- Dr Prinath Dias | Chair, RCA Programme Advisory Committee

I consider it a privilege to share some of my thoughts about the RCA, though succinctly, on account of its 50th anniversary. My first exposure to the RCA was in 1990, when I was nominated to represent Sri Lanka at a Progress Review Meeting of the RCA/UNDP Industrial Development Project, held in Malaysia. Subsequently, I had the opportunity to attend a few other RCA meetings. My involvement with the RCA increased when I was appointed as Chairman of the Atomic Energy Authority of Sri Lanka and the National RCA Representative of Sri Lanka in 1993. In 2003 I had the privilege of being appointed as the IAEA RCA Coordinator (designation changed later to RCA Focal person), and served in this capacity until December 2010. I am currently the Chair of the RCA Programme Advisory Committee.

If I am to say what impressed me most about RCA in two words, it would be what I would like to call the "RCA Spirit". It is the "RCA Spirit" which has motivated very senior personnel of the nuclear establishments of RCA Government Parties (GPs), with so many other responsibilities, to devote a considerable amount of their time an effort to introduce measures for the improvement of the RCA programme, without any consideration of financial or other kinds of gains for themselves. These include all those who served and continue to serve in numerous Working Groups of the RCA, those who served as National RCA Representatives and their support staff, RCA Chairs and those who provided their expertise to RCA in their individual capacity. The very high degree of willingness of RCA GPs to assist each other by sharing expertise and facilities is also a facet of the "RCA Spirit". It is the "RCA Spirit" that has led one RCA GP (Republic of Korea) to establish a Regional Office and to bear all its operating costs. RCA Regional Office has been providing excellent services to the RCA Programme since its establishment in 2003.

The main strength of the RCA is its relationship with the International Atomic Energy Agency. The IAEA has been providing administrative and technical support to the RCA Programme and financial support through its Technical Cooperation Programme since its inception in 1972. The excellent support of the IAEA to the RCA has been a key factor to the success of the RCA, along with the very high level of commitment of the RCA GPs.

Another main strength of RCA is the diversity among its GPs. Among RCA GPs are countries that are highly advanced in utilization of nuclear technology with well-established research centres and countries which are relatively new to the use of nuclear technologies. This has created many opportunities for technology transfer among RCA GPs, with a high degree of TCDC (Technical Cooperation among Developing Countries).

As a result of more than 150 RCA regional projects implemented in the thematic areas of Agriculture, Energy Planning, Environment, Human Health, Industry and Radiation Protection, it has been possible to establish strong networks of well-qualified scientists working towards common objectives.

The combined efforts of the RCA policy makers, scientific personnel of RCA GPs, and the technical, administrative and financial inputs of the IAEA, along with technical inputs and in-kind and financial contributions provided by the RCA GPs themselves, have made it possible for the RCA Programme to provide very significant socio-economic benefits to its Government Parties.

Despite the excellent progress made by the RCA there is still room for further improvements. One key area that requires attention is the over-dependence on the IAEA for financial resources. The RCA needs to expand its resource base through increased Extra-Budgetary contributions by its GPs and through partnerships with regional and international agencies. This is an area to focus on, as the RCA enters its sixth decade.

I thank the RCA Regional Office for giving me the opportunity to pen my thoughts on the RCA.

ARTICLES by GPs

Viet Nam / Malaysia

Viet Nam

Nuclear science and technology under the framework of RCA in Viet Nam

Since Viet Nam joined the RCA in 1981, more than 150 IAEA/ RCA projects have been carried out nationwide and gained significant achievements in almost areas of nuclear science and technology applications.

In the field of Agriculture, RCA activities made a positive contribution to enhancing national capacity in selecting mutant varieties for crop improvement. Through the technical cooperation projects with the IAEA and RCA, radiation induced mutation breeding technique has been used in Viet Nam for breeding improved varieties of most of the key crops like rice and soybean. Since 2000, collaboration under RCA has led to the release and registration of 30 mutant varieties of rice across a series of institutions including the Agricultural Genetics Institute (AGI), the Food Crop Research Institute (FCRI), and the Institute of Agriculture in the South (IAS). In efforts of enhancing food safety and security, the regional cooperation has also given a base support to develop guidelines for the accreditation and audit processes of food irradiation facilities in Viet Nam. Moreover, a number of RCA projects related to isotope techniques have helped the country to improve soil and water quality, reduce soil degradation and contribute to a regional database of isotope signatures of crop and soil compounds.

In the human health sector, RCA activities have contributed to improving the application of nuclear medicine in the treatment of non-communicable diseases (NCD) and increasing the quality of radiation therapy (RT) in cancer treatment in Viet Nam, helping to optimize the effective use of image-based radiotherapy and quality control. Technical procedures and protocols of many advanced technology related to radiation oncology have been applied for clinical studies and cancer treatment, i.e: Diagnostic Imaging, Endoscopy with soft endoscope/tube, laboratory, and molecular biology, etc. Besides, through information exchange and technology transfer, RCA projects have also contributed to developing a standardized graduate training programme in medical physics for universities nationwide. Viet Nam, with over 97 million people, has a total of 41 nuclear medicine centers, of which 36 are equipped with radionuclide imaging machines, including 45 SPECT and SPECT/CT, 14 PET/CT, 6 cyclotrons and 1 nuclear research reactor in Da Lat. In the complicated situation of the COVID-19 pandemic in 2020 with difficulties in importing radiopharmaceuticals, the Dalat research reactor operated for nearly 4300 hours in 2020 and produced over 1300 Ci of radiopharmaceuticals that increased by approximately 3 times and 48% compared with the five-year average of radiopharmaceuticals required for all nuclear medicine facilities in Viet Nam.

RAS6086 - National training course on enhancing the quality of radiotherapy in the treatment of common cancers, Bach Mai Hospital

Since many countries are facing serious economic and health problems due to the degradation of the terrestrial and marine environments, a number of RCA projects have been developed on water resource management and assessment of surface and ground water resources and water pollution. This has also contributed to ensuring the water security in Viet Nam, and enhancing the application of isotope hydrology in the study of water resources. The RCA projects on impact assessment on the marine and air environment have helped to enhance the national capacity for science-based assessment of the effects of radiation and other pollutants on marine resources, marine radioactivity monitoring, and using nuclear and isotope techniques to study the marine environment, improving expertise in the analysis of radionuclides. Since 2010, Viet Nam has provided approximately 1400 inputs of the activities of radioisotopes in the Vietnamese marine environment into Asia Pacific Marine Radioactivity Database (ASPAMARD) and participated in the establishment of a regional database on the main pollution levels in urban areas and industrial areas.

Industrial application is another important area being benefited from the use of nuclear techniques and has been developed in Viet Nam since 2000. RCA activities have helped Viet Nam to improve its capacity in process optimization by using innovative radiotracers and sealed source techniques, gamma tomography research, radiolabeling technology, combined with simulation technology to optimize manufacturing process and enhance product quality. The Centre for Applications of Nuclear Technique in Industry (CANTI), Vietnam Atomic Energy Institute (VINATOM) has successfully designed and manufactured the 3rd generation imaging equipment; CT/SPECT equipment, CT GORBIT and photo editing software; deploying marking techniques on oil fields. The applications of advanced digital radiography and volume imaging techniques for non-destructive testing (NDT) to check the quality of construction foundations, roads, bridges, and equipment have been carried out by NDE Center with about 300 NDT services per year... contributing to building training units and national non-destructive testing cer-

tification bodies according to international standards (ISO). In 2018, the NDE Center of VINATOM has implemented a protocol mission with Lao PDR to support the neighboring country to build a NDE center.

Radiotracer for Leak detection in gas treatment plant

Malaysia

Enhancing the Quality and Yield of Rice Production in Malaysia through RCA Programme

Malaysia is striving for self-sufficiency in rice and paddy production, which is the country's primary staple food and food crop. This will help to alleviate the dependence of such strategic commodity on foreign imports and thus strengthen the country's economy. On the other hand, the impacts of climate change have had a profound effect and have worsened the country's food security and farmers' livelihoods. Hence the use of nuclear and radiation technology in improving rice varieties offers a cost-effective way to adapt to changing weather conditions while increasing yields to feed the growing population in Malaysia thus offering an economic benefit and reduced dependency on foreign imports.

Under the IAEA Technical Cooperation Programme, the RCA projects have helped Malaysia in developing technical and human resource capacities to produce higher quality rice varieties leading to higher yields of rice production within the same land area. As an RCA Government Party since 1975, Malaysia has actively participated in 18 RCA projects that have been focusing on plant mutation breeding, soil and water management, and crop nutrition. The projects have successfully developed national capacities and infrastructures in producing high-quality products and improving rice varieties that are more tolerant to climate change and producing higher yields per hectare of land. However, the technology will only provide impacts to the people of it is adopted by the industries and used in a commercial way or on a large scale.

Thus, one of the most significant impacts of RCA projects in Malaysia is the commercialization of new mutant rice varieties developed by the Malaysian Nuclear Agency. Two of the rice mutants, NMR 152 and NMR 151 were successfully granted with Certificate of Registration of New Plant Variety and Grant of Breeder's Right by the Department of Agriculture Malaysia in February 2020. In addition, NMR152 mutant was also certified as an official national rice variety by the Ministry of Agriculture and Food Industries (MAFI). These rice mutants have consistently recorded a yield of between 7-11 tonne/ hectare depending on planting area and field management, a value that is higher than the national average yield of only 4.2 tonne/ hectare. With this recognition, the rice variety could then be officially planted on a large scale for commercial productions anywhere in the country.

In 2019, a Memorandum of Understanding (MoU) was signed between the Malaysian Nuclear Agency and private authorized seed producers, HMN (M) Sdn. Bhd and Bayer Co. (MALAYSIA) Sdn. Bhd. This collaboration has added more value to rice mutant seeds and other advance mutant lines, that ultimately resulted in the development and production of more competitive seeds as compared to other rice varieties available in the market. The NMR 152 mutant (or its commercial name IS21) was officially launched by The Honorable Prime Minister of Malaysia on 20th November 2021. Due to the consistency in producing high yield, in 2021, the planting of NMR152 was also expanded to various regions in Malaysia, which covered approximately 24,600 hectares of paddy fields, benefiting around 15,000 farmers in Peninsular Malaysia. The commercialization of these new rice varieties as such will hopefully bring significant socio economics impacts to the country.

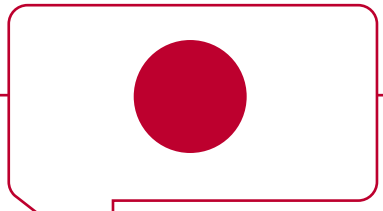
Launching of new rice mutant variety IS21 (NMR152) by Prime Minister of Malaysia

What's More

Dear RCA Newsletter

Mr Md. Azizul Haque
NR of Bangladesh

"Publication of RCA Newsletter is extremely pleasing to us. Bangladesh strongly believes RCA Newsletter will play significant role for the research and development of nuclear science and technology and strengthen the bond among the RCA government parties. The country also believes this platform will inspire young scientists of the region to exchange their views and bridge the gap of communication among them. On this commemorative occasion, Bangladesh wishes RCA Newsletter a great success in all of its future endeavors."



Mr Takashi Nakano
NR of Japan

"I would like to extend my congratulations on the publication of the RCA newsletter. I hope many people from Government Parties and experts from the nuclear field read the newsletter and discuss various topics related nuclear science and technology so that collaborations among RCA's Government Parties can promote peaceful uses of nuclear energy to bring socio-economic benefits to people in the Asia-Pacific region. I am convinced that this activity will deepen the exchange of information among local stakeholders and strengthen the human network more strongly and accelerate cooperation among Government Parties for attaining the sake of our same purposes."

Mr Sunil Ganju
NR of India

"It is indeed heartening to know about the publication of the RCA Newsletter on a quarterly basis starting March 2022. This is a welcome step in disseminating knowledge and providing a platform for information exchange between the RCA Government Parties. We are sure that this newsletter will help in identifying the regional needs and the member countries will have access to the current issues besides reading through diverse topics related to non-power applications of nuclear science and technology.
On behalf of the Govt. of India, I extend my good wishes to the editors of the newsletter and look forward to receiving the newsletters on a regular basis. On our part, we will put in our best efforts in circulating this newsletter across the widest possible spectrum of researchers and specialists in the related fields."

Mr Tran Chi Thanh
NR of Viet Nam

"Upon the launch of the RCA Newsletter, we in Vietnam would like to extend our heartfelt congratulations to the publication on the milestone of 50th RCA anniversary. Among the diverse topics and news stories covered in the RCA Newsletters, we are more particularly interested in the two following domains, which we expect would benefit our purposes of information exchange and future research and development: (1) The status of the development and implementation of the RCA program and activities in the region. (2) Guidelines for policy making and updates on outstanding applications of nuclear science and technology that significantly contribute to socio-development in GPs (I.e., energy, medicine, environment, food and agriculture, and civil industry)."

Mr Chan Sodavath
NR of Cambodia

"As a government party, Cambodia gains a crucial benefits from the technical cooperation activities of the IAEA/RCA. The community of people finally is the beneficiaries of this RCA initiatives projects. Hence, we wish to encourage RCA to be aggressive furtherly in nuclear or radioactive technology transfer, experiences and as well as information sharing. We strongly request IAEA/RCA to focus on human health improvements, fighting climate changes to meet the UN/SDG."