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NST Quarterly

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MALAYSIAN INSTITUTE FOR NUCLEAR TECHNOLOGY RESEARCH

A newsmagazine on nuclear science & technology in Malaysia issued in January, APRIL, July and October.

REGIONAL MARINE ENVIRONMENTAL STUDIES

The level and type of contaminants in marine sediments can tell a story of what happens inland and offshore. The capacity to address regional problems and concerns relating to the transport, fate, and distribution of marine sediments has greatly been improved by the phase I of the Regional Asian Programme in Marine Contaminant and Sediment Transport. To enhance this capacity, MINT and other agencies in Malaysia join hands with institutes in the Republic of Korea and Thailand to compile unique and valuable data on radionuclides, metals, and organic contaminants in profiles of aged sediments through a number of national and bilateral scientific programmes.

More activities of the programme will be carried out following the agreement by IAEA earlier this year to a request for an extension of the project to the year 2000. The activities, agreed during the Regional National Co-ordinators meeting in Bangkok, on 4 - 9 January 1995, include: low level radioactivity measurements and sampling techniques intercomparison; dispersion modelling of radioactive materials and chemicals following dumping or similar events; comparative baseline studies on key anthropogenic and natural series radionuclides, and radiological assessment; studies on radionuclidic pathways, fates, and transfers; and emergency response planning.

OIL PALM AGROWASTES AS COMPOST

The oil palm empty fruit bunch (EFB) is a lignocellulosic by-product generated in large quantities by palm oil mills in Malaysia, where at least 2.3 million tonnes (based on dry matter) was produced in 1992. EFB is either incinerated to produce bunch ash which can be used as potash fertiliser, or, spread in the field as mulch. These practices however, are not without its problems. The burning of EFB in open areas or in poorly designed incinerators is a major source of air pollution. The spreading of mulch is a labour-intensive task. The labour shortage has posed a problem these days. Another difficulty is the transporting of the EFB to hilly areas in the estates. This gets worse in flood-prone areas come the rainy season.

Natural biodegradation, upon which nutrients are released, requires several months. The low nutrient content, which can be quite variable, indicates that EFB cannot be utilised as a fertiliser economically. Nevertheless, it is valuable for nutrient recycling for the oil palm crop to generate a higher yield. Composting of EFB is one way of getting a perfect nutrient balance. This is brought about by an efficient microbial activity which in turn reduces the volume of EFB.

A comparative study on the biodegradability of the EFB using five groups of composite micro-organisms i.e. Thomas, Organomine, Ohres C, Ohres II, and micro-organisms from POME (palm oil mill effluent) has been carried out. The aim is to produce compost in a shorter time of one month. These micro-organisms grow on a nutrient-balanced EFB media furnished with nitrogen additives. In utilising the carbon-rich cellulose, carbon dioxide is partly released, resulting in a 24% loss of dry matter. Despite the loss in nitrogen content with respect to the loss in dry matter, the proportion of nitrogen retained in the compost is relatively higher --- there is a net increase in the proportion of nitrogen in the compost. The compost produced using Thomas retains the highest total nitrogen content. It also has the minimal weight loss with the lowest C:N ratio (25:1 as compared to the initial 38:1). This lower C:N ratio indicates that it could be used directly by plants including cash crops. Prior to application, the compost is sterilised using gamma irradiation. This is to ensure that any pathogenic micro-organisms are eliminated and, hence, can be utilised safely for wider applications. A study using isotopically labelled ^{15}N in maize has shown that compared to ammonium sulphate compost provides a better nitrogen uptake.

RADIATION-CURABLE RESINS FROM PALM OIL

Acrylated resins are materials specifically made for use in radiation curing applications (electron beam or ultra-violet curing) such as surface coatings, laminations, pressure sensitive adhesives, and printing inks. Most of the radiation-curable resins available in the market are derived from petrochemicals. Stringent environmental legislation for the maximum allowable organic contents released to the atmosphere, the desire to preserve the earth's already dwindling natural resources, and the need to reduce wastes accumulation in the environment make the use of vegetable oil as raw materials for resin production attractive. To date, only a few resins are obtained from oleochemicals such as soybean, linseed and tung oils. None has been developed from palm oil products.

The performance of vegetable oil-based radiation-curable resin is based on the unsaturation level of fatty acids in the oil. The more unsaturated it is, the better is the performance. Since the unsaturation level of palm oil and its products are no more than a half that of soybean, they were not generally considered suitable for resin production. Palm oil and its products are,

however, abundant and renewable. These considerations motivated joint efforts between MINT and PORIM to investigate to what extent palm oil can be used as the raw material for resin production.

The first acrylated palm oil was synthesised from epoxidised palm oil (RBD palm olein) products, EPOP, in early 1989 at MINT's laboratory. The acrylated products, epoxidised palm olein acrylate or EPOLA, with a molecular weight of around 2000 was found to be curable when subjected to UV or EB irradiation. The EPOLA-based formulated resins have been satisfactorily used as radiation-curable coating materials on various substrates such as wood, bamboo, glass, ceramic, and metal. At a reasonably fast cure rate and at a dose of 10 kiloGray the coatings show no major defects. However, at 20-30% pendulum hardness of the cured film, EPOLA is considered rather soft for commercial coating purposes. Preliminary investigations indicate that it has potential as radiation-curable pressure sensitive adhesives (using 60-80% EPOLA), and printing inks (using 20-40% EPOLA).
Current work is focussed on this area.

RADIATION STERILIZATION/PASTEURIZATION OF COSMETICS AND PHARMACEUTICALS - THE INDONESIAN SUCCESS STORY

They've done it! The steadily growing market for Indonesia's traditional and herbal cosmetics and *jamu* in Malaysia, Europe and the Middle-Eastern countries is testimony of their manufacturers' awareness and wisdom in exploiting the benefits of Radiation Processing Technology to improve and upgrade the quality of their products.

Two MINT delegates attended the seminar on *Alternative Method for Sterilization of Cosmetics and Pharmaceuticals Using Gamma/Beta Irradiation* in Jakarta on 24-25 January 1995. The seminar, at which there were over 100 private manufacturers from the cosmetics and pharmaceuticals industries, was highly successful.

Post-seminar visits to Mustika Ratu, Sari Ayu, Ristra Indolabs, and Indogamma showed evidence of the high acceptance of the radiation processing method amongst Indonesian healthcare industries, a point to be seriously considered by our local manufacturers!

CE-MARKETING AND ITS IMPLICATIONS ON MALAYSIAN MEDICAL DEVICE INDUSTRIES

There has been some concern within the local medical device industry regarding the implications of the European Medical Devices Directive 93/94 which comes into effect on 1 January 1995. The Directive requires all medical devices marketed in EEA countries to display the CE-Marking following this date. It is applicable to instruments, apparatus, appliances or materials, used alone or in combination on human beings for the purpose of:

- diagnosis, prevention, monitoring, treatment or alleviation of disease or handicap;
- investigation, replacement or modification of the anatomy or of a physiological process;
- the control of conception.

Manufacturers must follow the prescribed **Conformity Assessment** routes and provide proof of such conformity via third party assessment of their product and production processes by an EU-notified body.

SINAGAMA has obtained confirmation from the association of International Industrial Irradiation (AIII) in Paris that it is a requirement for all medical device manufacturers and industrial irradiators to request certification from any one of the EU-notified bodies. Enquiries to SIRIM have also been made with regards to the SIRIM-issued ISO 9000 and product certificates. SIRIM has given the assurance that its certificates are recognized within the EU and it has, in fact, signed MOC's with several EU-notified bodies with the aim for mutual recognition. A recent ISO press release has indicated that an ISO 9000 worldwide recognition system will be launched by late 1995.

Local manufacturers who are exporting medical devices to the EU countries and who have received quality system and/or product certification from SIRIM **need not** undergo multiple audits and registration programmes. You are, however, advised to write to SIRIM, so that appropriate steps are undertaken to get the SIRIM assessment endorsed by the counterpart EU-notified body.

"BLOOMING PROFIT THROUGH IRRADIATION"

MINT's continuing effort in exploring and pioneering new areas in the application of nuclear science and technology in the country, has produced numerous successes. In agriculture, for example, MINT has successfully produced a new mutant rice and a banana variety popularly known as *Tongkat Ali* and *NOVARIA* respectively. This proves the benefits of nuclear technology in applications specifically in crop improvement, and the potential of the technology in enhancing national economic development. Despite this achievement, the innovative minds of MINT are still forging ahead to open new frontiers in agricultural research in the country. This time MINT has found a willing partner in RMJ Management Sdn. Bhd. to work together to realise common interests and objectives in ornamental plants research. As a manifestation of this commitment MINT and RMJ Management Sdn.Bhd. signed an MOU on 14 March at the Hilton International, Kuala Lumpur. The signing ceremony was witnessed by Datuk Law Hieng Ding, the Minister of Science, Technology and the Environment.

The MOU covers the *In vitro Mutagenesis of Ornamental Plants* programme which consists of genetic improvement of selected ornamentals through mutagenesis, and the develop-

ment of mass propagation technology for selected ornamentals. The aims of the project are to improve:

* economically important characters such as growth rate, morphology, leaf shape, and colour of the selected ornamental plants
* propagation techniques of the selected ornamen tal plants to be more economical and efficient on a large scale production

MINT and RMJ will play important and synergistic roles in implenting the MOU.

MINT as a nuclear technology institute will
develop in vitro mutagenesis and other related tech nology for ornamental plants improvement,
generate new varieties, and
efficiently mass propagate selected ornamental plants.

RMJ as a private company will
act as a vital link with the customers to ensure effective response,
gauge market demands and preferences
determine effective marketing strategies for the products.

Both parties will make available the infrastructure, equipment, facilities, and manpower needed to ensure the continuity and success of the project at the laboratory scale and the nursery level.

The theme *Blooming Profit Through Irradiation* will , hopefully, encourage the two partners to execute the MOU to a profitable and successful venture. It is envisaged that the success of this link-up will generate more interest with other private sectors to invest in R&D, especially in the nuclear and related technology.

MALAYSIA PLAYED HOST TO RCA WGM

Malaysia hosted the 17th Working Group Meeting of the Regional Cooperative Agreement for the Asia Pacific Region (RCA) on 27-30 March. RCA is a regional technical cooperation programme under the auspices of the IAEA and is participated by 17 member countries: Australia, Bangladesh, China, India, Indonesia, Japan, South Korea, Malaysia, Mongolia, Myanmar, New Zealand, Pakistan, the Philippines, Singapore, Sri Lanka and Vietnam.

Malaysia was represented by MINT as the agency to coordinate and implement. The meeting was officiated by Datuk Law Hieng Ding, the Minister of Science, Technology and the Environment who reiterated Malaysia's support of the RCA programme. He also urged participants of the meeting to consider the application of nuclear technology in the environment.

COURSES, SEMINAR AND WORKSHOPS
THIRD QUARTERS OF 1995

CODE	TITLE	DATE	FEES
CRPO	Radiation Protection Course For Officers	11/7-20/7 19/9-28/9	RM900.00(K) RM1300.00(S)
CRT01	Industrial Radiography Training Course-Basic Grade	19/6-5/7 4/9-19/9	RM1200.00(K) RM1670.00(S)
CRT02	Industrial Radiography Course Intermediate Grade	5/6-22/6 7/8-25/8	RM1300.00(K) RM1900.00(S)
CSM01	Course on Surface Method Basic Grade	17/7-31/7	RM1000.00(K) RM1500.00(S)
CMNDT	Course on Basic Metallurgy For NDT	24/7-29/7	RM600.00(K) RM800.00(S)

*(K) Government
*(S) Private

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