Annex 1

Summary of FNCA Open Seminar

" Application of Radiation Processing for Sustainable Development and Agriculture"

9th February, 2015

Yogyakarta, Indonesia

Presentation 1: World trends of application of radiation for sustainable development and agriculture

(Dr Sueo Machi, FNCA Coordinator of Japan)

Nuclear and radiation/isotopes applications were improving industry and agricultural production, better health care and protecting the environment. There are some achievement in the industry and application area such as NDT (Non Destructive Test), radiation cross-linking of wire insulation, radiation cross-linking of tire and heat shrinkable tubes and sheet, radiation grafting of battery separator membrane, hydrogel wound dressing, curing coating and printing and coloring gem stone. In the application for better health care are radiation therapy of cancer (uterine cervix cancer), advance technology for cancer therapy by using heavy ion beam facility in NIRS, Japan, lung cancer treatment by Carbon-12 ion and early diagnosis by nuclear medicine (PET, cyclotron), sterilization of medical products by electron accelerator to avoid infectious disease, sterilization of plastic bottle. The challenges this fields are the shortage of high cost medical equipment due to lack of funds and government policy for funding. The achievement of radiation technology in the fields of nuclear for food and agriculture are reducing hunger by improving agriculture production using mutation breeding, sterile insect technique, biofertilizer of Rhizobium, food irradiation for sprout inhibition, radiation processing of natural polymer for plant growth promoter and super water absorbent. The challenges of nuclear technology for food and agricultural sector are promotion of sustainable agriculture, reduction of post-harvest loss and spreading the better knowledge of nuclear technology to the agricultural sector.

Presentation 2: Application of radiation technology for industry and agriculture in Indonesia

(Dr Anhar Riza Antariksawan, Deputy Chairman, National Nuclear Energy Agency (BATAN), Indonesia)

The milestone of nuclear technology in Indonesia has been begun in 1958 by creation of Atomic Energy Institute. By time of 1964 BATAN has been established under UU No. 34 year 1964. The fields of non-energy of nuclear application in Indonesia are industry and agriculture. There are 6 gamma irradiators and 7 electron accelerators including one irradiator and five

accelerators which belong to private sector respectively in Indonesia. Moreover, there are also three nuclear research reactors in Indonesia. Among the application of radiation in industry in Indonesia, biodegradable plastic wares have developed with collaboration BATAN with P.T. Tirta Marta and P.T. Mulia Cooliman Int'l**.** In field of agriculture, the application of oligochitosan and super water absorbent (SWA) are still ongoing research. BATAN also has introduced various new variety of mutant plant including rice, soybean, mungbean, shorgum and cotton. Last but not less, BATAN had outstanding achievement award in mutation breeding from IAEA on 50 years of joint collaboration of IAEA/FAO Division celebration in September 2014.

Presentation3: Research and Development of Radiation Processing in Japan for Industry and Environment

(Dr Masao Tamada, Director General of Takasaki Advanced Radiation Research Institute, Japan Atomic Energy Agency (JAEA), Japan)

The milestone of nuclear technology in Takasaki Japan has begun in 1963. One of the advantages of radiation processing is to develop new functional materials. The available reactions in radiation processing are cross-linking, graft polymerization and degradation. These reaction can modify polymers be satisfy the need of end users. The application of EB crosslinking in industry are coating of car component to improve thermal stability of car, heat shrinkable tubes, crosslinking of tire to reach high quality and cost saving tires (95% radial tire is processed by EB), heat resistance of poly(lactic acid) for application of optical lens, cabinet of electrical appliances, crosslinking of cellulose derivatives for preparation of biodegradable hydrogel, modification of traditional "washi" of Japan for mechanical strength improvement and application to gel dosimeter. Furthermore, the grafting reaction could give the desired function into existing materials. The materials which have developed by grafting reactions are separator membrane for battery, NH_3 removal filter for LSI (Large Scale Integrate Circuit) facility, swift adsorption of metal ions, graft adsorbent for collection of metals (uranium, scandium), synthesis of cesium adsorbent for drinking water. The dissemination of radiation processing are through regional cooperation, school, university and technology transfer.

Presentation4: Success Stories of Radiation Processing Application in Vietnam in Industry and Agriculture

(Dr Nguyen Quoc Hien, Head of R & D Department, Vietnam Atomic Energy Institute (VINATOM))

Radiation facilities (gamma Co and e-beam (EB)) for food irradiation and medical devices sterilization are listed. Results on radiation degradation of natural polysaccharides for

production of oligosaccharides used as elicitor, growth promoter for plants and immune stimulant for fishes are presented. Typical results on radiation synthesis of metal nano particles, nano composites, and test production of products are briefly introduced. Radiation technology is useful tool for development of new and value added products.

Presentation5: Assesment of BATAN'S Super Water Absorbent (SWA) and Oligochitosan for Shallot in the Sandy Soil at Bantul, Yogyakarta by BPTP

(Dr. Tri Martini, Assesment Institute for Agricultural Technology, Yogyakarta)

The missions of Assesment Institute for Agricultural Technology, Indonesia is to increase the dissemination acceleration of location specific agricultural innovation; to increase the collaboration networking with governmental or private research institutes whether international and national levels; to develop the capacity building of institute for achieving the ultimate services to users. As a horticultural, vegetables are commodities which play an important role in the agricultural sector. In the national economy, the regulation relating to the vegetables commodity always be improved because some horticultural centers should manage some commodities vegetables, including shallots for export. The determination of shallots crop development in Yogyakarta was held in Kulon Progo and Bantul Regency. The shallots crop which is planted and developed in Bantul is local variety which could survive on sandy land and wetland irrigation. The last data mentioned that harvested area of shallots along the south coast of Bantul showed high productivity. The main problem of the increase in shallots production is the high price of pesticides and pest attacks constraints (OPT). For the successful cultivation of shallots, we should use good varieties, which meet with basic requirements of growing and also improve the cultivation techniques as well. The aim of this activity is to introduce BATAN'S SWA(Super Water Absorbent) on shallots crop on sandy soil, in coastal of southern Yogyakarta. It was expected that increased production will occur by additionally foliar spayed of oligochitosan ("Fitosan") produced by BATAN. Research was done on August to October 2014 in Sanden Vilage, Bantul district, Yogyakarta with display area of 800 m^2. Materials used are: SWA, fitosan, pesticides, shallots seeds, organic fertilizers, chemical fertilizers, and others. The data obtained were analysed by analysis of variance (ANOVA) followed by Duncan's test significant difference (DMRT). As the conclusion of the research, it recommends that the use of SWA on shallot crop in sandy land is one of the supporting technology to improve soil moisture and soil amelioration in marginal sand (nutrient-poor) and relatively easy to dryness (very porous soil structure). Moreover, as expected the combination of SWA and fitosan treatment with 2 times a week watering throughout the shallot crop cultivation gives the best performance.