Annex 3. Summary of Open Seminar

FNCA JFY2013 Workshop on Mutation Breeding Project
Open Seminar
"Strengthening Mutation Breeding Approach for Mitigating Climate Change"

Hosted by : Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT)
National Nuclear Energy Agency of Indonesia (BATAN)
Date : 4th March, 2014
Venue : Jakarta, Indonesia
Total Participants : 150 People

Outline of FNCA Mutation Breeding Project and Purpose of the Workshop

(Dr. Hirokazu Nakai, FNCA Mutation Breeding Project Leader of Japan)

Goal of FNCA Mutation Breeding Project is to contribute to welfare and peace in Asia through the increase of food production and improvement of food quality by promoting the mutation breeding using gamma and ion beam irradiation. Target plant is rice, bananas, orchids, soy beans, sorghum, wheat, etc. At this workshop, plan for new project on Mutation Breeding of rice for sustainable agriculture, and follow-up of results of the terminated sub-project; soybean, sorghum, orchid, banana and rice will be discussed.

The Impacts of Climate Change on Sustainable Agricultural Development in Indonesia

(Dr. Ir. Astu Unadi M. Eng., on behalf of Dr. Haryono, Indonesian Agency for Agricultural Research and Development)

The agricultural sector is highly affected by the dynamics of climate change, especially in relation to food supply and livelihoods, most farmers are still poor with a range of problems, the impact of climate change which can result in production losses, its contribution to emissions greenhouse gases. Thus, efforts should be made mitigation and adaptation in the face of climate change. In order to achieve of goal of adaptation and mitigation of climate change, IAARD have synergized the technology owned by the Ministry of Agriculture with advances isotope technology used in agriculture. Technological advances isotopes in agriculture in Indonesia need to be developed from the laboratory scale to field scale that is useful for farmers who need food healthy and safe.

Application of ion Beam Irradiation in Mutation Breeding and Possible Use by FNCA Member Countries

(Dr. Atsushi Tanaka, Japan Atomic Energy Agency)

The characteristics of ion beams for the mutation induction are to induce mutants with high frequency, to show broad mutation spectrum, and therefore, to produce novel mutants. Many ion beam breeding projects have been carried out in Japan and achieved success in producing new varieties which are useful for food resources, environmental conservation, and industrial innovation.

Development of Rice Varieties Using Mutation Breeding in Indonesia

(Dr. Untung Susanto, on behalf of Dr. Made Jane Mejaya, Indonesian Center for Rice Research)

Development of rice varieties using mutation breeding in Indonesia had established and resulted at least 20 rice varieties, firstly release in 1982. Further breeding efforts for various targeted traits such as shorter growth duration, higher yield, resistance/tolerance to biotic/abiotic stresses, and quality is continuously conducted collaboratively among BATAN, IAARD, and other institutes such as universities and local governments. Some of the materials are in the pipeline going to be released. Rice mutant variety adoption by farmers gradually increases and the impact is more significant.

Workable Male Sterility Systems for Hybrid Rice

(Prof. Dr. Qingyao Shu, Zhejiang University)

The male sterility systems deployed in hybrid rice production in China is reviewed. There are two different types of male sterility systems, i.e. cytoplasmic male sterility (CMS) and environment-conditioned genic male sterility (EGMS). Three main types of CMS (WA-CMS, BT-CMS, HL-CMS) and two of EGMs (Temperature- and photoperiod-sensitive –TGMS and PGMS) have been applied in production. The genetics of CMS and its restorer of fertility, and of is EGMS are reviewed, the biochemical basis and feature of sporophytic male sterility - abnormal tapetal PCD is described, and the evolution of male sterility systems in hybrid rice production in China is analyzed.

Significance of Rice mutant Varieties for Vietnam Rice Production and Export

(Dr. Le Huy Ham, Institute of Agricultural Genetics of Vietnam)

Rice contributes to 90% of food security in Vietnam. In recent year rice production has been improved very much in the team of productivity and production volume. These improvements have turned Vietnam from a food importer to an exporter. In these achievements, mutation breeding has contributed significantly by releasing a number of new, high productive, disease resistant varieties of rice, soy bean and other crops. Economic benefit of mutation varieties in Vietnam accounted for more than 100 million USD/year. However, to sustain food security in

future a lot of challenges have to be overcame, like control the rate of population growth, environmental pollution and to adapt climate change. Multi-tolerant, climate resilient crop varieties should be developed to meet requirements of for climate change adaptation. In this context, should be good combination of mutation and biotechnology to make mutation more precise and well directed.

Significance of Sorghum Mutant Varieties to Increase Land Productivity of Drought Prone Areas in Indonesia

(Prof. Dr. Soeranto Human, National Nuclear Energy Agency)

Climate change effects may make adverse conditions such as become more severe in the future agricultural development. For Indonesia, limited factors in developing dryland farming agriculture in Indonesia are mostly related to drought problems in the east and soil acidity in the west part of the country. In order to mitigate climate change, development of dryland farming agriculture should be directed to crops that require less agricultural inputs, have good adaptability and with high economic values such as sorghum. Sorghum has been recognized as sources of Food, Feed, Fuel and Fiber (4Fs). In Indonesia, sorghum is still regarded as a minor crop and its cultivation is limited, mostly grown by local farmers in a specific region. Sorghum is not Indonesian origin so that the available plant genetic variability is low. Attempts to increase sorghum genetic variation was achieved through introducing plant materials from ICRISAT and China. These materials were used in breeding programs by conventional, mutational and biotechnological approaches to improve productivity and quality. Through mutation breeding programs at BATAN, a number of sorghum mutant lines were identified to have highly tolerance to drought and soil acidity with improved grain yield and quality. Some promising mutant lines had been investigated under intensive multi-location trials. Three sorghum mutant varieties had recently been released with given the name of “Pahat”, “Samurai-1” and “Samurai-2”, respectively. Meanwhile, some other sorghum mutant lines showed improved agronomic and quality traits such as lodging resistance, early maturity, higher sugar brix content (for sweet sorghum) and biomass production (for forage sorghum) in later generations. These promising mutant lines were kept at sorghum germplasm collections at BATAN for further breeding program. Sorghum cultivation will subsequently be expected to increase land productivity, promote sustainable agriculture development and ensure food and energy security in the country. Sorghum mutation breeding had been included in the FNCA project for the period of FY2002 - FY2006.