Annex 3. Session Summary

Session Summary of
FNCA 2015 Workshop on Mutation Breeding Project

Session 3 Extension of Successful Sub-project on Banana, Orchid, Sorghum and Soybean

Follow-up reports on the Sub-projects in Banana and Sorghum & Soybean were presented respectively. The summaries are as follows:

1. Sub-project on Drought Tolerance in Sorghum and Soybean
(Dr. Sobrizal, BATAN, Indonesia)

So far, 3 shorgum and 10 soybean varieties have been released by BATAN. Based on various examinations before released, some characters of varieties such as grain yield, grain quality and pest and disease resistances were beter than those of national leading varieties. All sorghum and soybean as well as rice varieties released by BATAN have been growing largely and given significant economy impacts to famers in Indonesia.

2. Sub-project on Disease Resistance in Banana
(Ms. Adelaida C. Barrida, PNRI, the Philippines)

Multi-Location Performance Evaluation of A New Banana Bunchy Top Virus (BBTV) – Resistant 'Lakatan' Cultivar

This project aims to make 'Lakatan' banana production more profitable to small farmers by reducing losses due to banana bunchy top virus infection by 20% through adoption of disease resistant cultivars. The total number of mutant lines tested from 2013-2015 by farmers/interested growers was about 25,284 from 13 provinces of the country. Continuous field monitoring of BBTV-resistant Lakatan was done in the different regions to determine the agronomic, yield and economic data for BBTV-resistant cultivar and also the occurrence of aphid vector in trial site. In addition mass propagation of mutant lines was also undertaken and registration of the mutants developed to NSIC, IAEA and PNRI will be considered.

Session 4 Country Report on Application of Mutation Breeding of Rice for Sustainable Agriculture

Nine member countries presented outcomes in the past years and activity plan in 2015-2016 for Project on Mutation Breeding of Rice for Sustainable Agriculture. The brief summaries are as follows:

Bangladesh (Dr. A.N.K. Mamun, BAEC)

Some display fields of BINA Dhan -14 were cultivated for farmer with the help of agriculture extension in the different area of Bangladesh. Daily newspapers published news about this rice. Finally one advance mutant line is selected from the mutant lines of BARRI dhan 29 and applied for new variety. Three land races of rice collected from the southern part (costal area) of Bangladesh called Lombur, B-11 and Hori dhan are irradiated by carbon ion beam from Japan.

China (Prof. Shu Qingyao, ZU)

Two dozens of rice maturity mutants (changed photoperiod/temperature sensitivity) were developed by gamma rays radiation and are being evaluated for their usefulness in inbred and hybrid rice production; the genomic variations induced by gamma rays are assessed by genome re-sequencing and bioinformatics analysis.

Indonesia (Dr. Sobrizal, BATAN)

Through 200 Gy irradiated SKI 64, SKI 88, SKI 153 and SKI 276 lines, 12 homogeneous early maturity M_7 mutant lines were selected. The results of yield trials on dray season 2013 and wet season of 2013/2014, growth duration of these 12 lines were ranging from 93.7 to 100.3 days from sowing to harvesting, significantly shorter than those of check varieties. The result of Multi-location yield trial in Musi Rawas showed that mutant lines of RSKI 88-3, 153-1, 276-1 were promising because their growth durations were less than 100 days and yields were more than 7 ton/ha, The yields of these mutant lines were not significantly different to the yield of national leading variety, Ciherang. Multi-location yield trials as well as other examinations such as pests, diseases and qualities are being continued as requirements of variety release.

Korea (Dr. Si-Yong Kang, KAERI)

During the 2013 to 2015, Korea research team has been succeeded to develop new mutant varieties and also conducted molecular biological researched using selected mutants. 'Tocomi-1', a new japonica rice cultivar derived from a 300 Gy gamma ray irradiation with high tocopherol content and red pericarp. 'Wonhae-2' was derived from an in vitro mutagenized population induced by 70 Gy gamma ray irradiation with elevated salt tolerance. Those two varieties have been evaluated to official registration by the National Seed and Plant Variety Service.

Malaysia (Dr. Sobri Bin Hussein, Nuclear Malaysia)

Results obtained from northern part of Malaysia indicate that mutant variety (MR 219-9) treated with the combination of Biofertilizer, Oligochitosan and liquid smoke produce higher yield (13 t/ hectare) as compared to the control. The data obtained also revealed that similar pattern was observed with mutant line MR 219-4 where by 15 t/hectare was produced. In another farmer's plot treatment with liquid biofertilizer was significantly increased the grain yield of mutant MR219-4 up to 55% as compared with other treatments over the control. Basically the yield obtained is higher than the national average yield (4.207t/ha).

Mongolia (Dr. Bayarsukh Noov and Dolgor Tsognamjil, IPAS)

In 2013-2015 treated 15 wheat varieties using by chemical and physical mutagens for developing high yielded, drought and heat tolerant wheat varieties.

During 3 years, the 5768 progenies of M1-M3 generations studied using individual and mass selection technique and about 610 mutant lines transferred to wheat breeding program as initial material.

The new mutant varieties Darkhan-172, Darkhan-173, Darkhan-106 and Darkhan-141 are used for hybridization with rust resistant varieties Anza, Kern, Yecoro rojo for the improvement of rust disease resistance in wheat.

In 2013, Darkhan-172 mutant variety transferred to the State Variety Test for preregistration test. Mutant variety Darkhan-172 is early matured and yield capacity is 2.5 t/ha under arid condition.
In 2013-2015 selected 2 varieties for mutagen treatment: Alag-Erdene /naked/, Burkhant-1 /multing/. Irridaited gamma, 60Co source was used at six different doses (0, 75, 150, 300, 450, and 600Gy) and determined optimal dose of naked barley variety Alag-Erdene was 200Gy, but in the malting variety Burkhant-1 was 250Gy.

The Philippines (Ms. Adelaida C. Barrida, PNRI)

Potential mutant lines selected with improved agronomic traits in the last generation planting were seeded for planting the M3 generation. The same methodologies were followed as in the last two generations. In this generation planting modification on the time of spraying of carrageanan was done. Carrageanan at the concentration of 100 ppm was sprayed two weeks after planting and followed after 35 days or during the tillering stage. The last spraying will be done during the flowering or booting stage. The plants are now at the tillering stage. Proper cultural management will be observed during the whole growing season. Continues selection of potential mutant lines responsive to organic farming will be done till harvest time. In the future testing of the mutants to abiotic stress like drought will be undertaken.

Thailand (Mr. Suniyom Taprab, RD)

Gamma ray irradiation with dosages of 200 and 300 greys are used to induce mutation in rice. High impact had been achieved from utilization of aromatic glutinous mutant and early matured aromatic non-glutinous mutant namely RD6 and RD15. They had been released since 1976 and presented 'Achievement Award' from IAEA. Good results also achieved during FNCA participation. Amylose content library was obtained in RD15-mutants containing various level of amylose content. Those isogenic mutant lines are very useful for genetic study and further breeding program. Present sub-project on mutation for flooding condition is proceeding to advanced generation of M4. M4 mutant lines are now transplanted in the field. Result is going to be obtained in December 2015.

Vietnam (Dr. Le Huy Ham, AGI)

From Gamma irradiation: 6 promising mutant lines with higher yield, at the same time retain resistance to bacterial blght, blast and salinity were selected. Especially, the promising mutant line, DT80 (carrying Saltol gene) was evaluated in salinity field of the Nam Dinh provine in spring season with high grain yield (6,8 ton/ha).
Ion beam treatment: Five mutant lines (two from CMBT, three from BLBT) with high potential yield and good agronomic traits were selected in M5 generation. From 1/2015 ion beam treatment: Big variations in M1 were observed. All M1 individuals were harvested and planted for in M2. From 6/2015 ion beam treatment: Evaluated for germination ability and currently grown in the field conditions for further evaluation.