



Improving of Mungbean Production Using Nuclear Techniques and Package of Technology with Mutation Induction and Tissue Culture

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Opinion

Mungbean (*Vigna radiata* L.) is an important short duration pulse legume crop considering major source of protein in staple diets and may compensate the lack of expensive animal protein. Furthermore, Mung beans fix their own nitrogen, so they normally don't need nitrogen fertilizer. Planting of this crop encounters many constraints relating to the lack of successful breeding program, climatic environment and soil and water conditions such as drought and salinity. Local cultivar characteristics with low yield potential, limited genetic base and less tolerant to drought, salinity and diseases. However, mutation breeding program to this crop may be implemented to break the yield potential barriers, enhancing tolerant to environmental stresses and increasing the efficiency of biological nitrogen fixation which is mainly affected by many factors such as soil and water stresses and genetics of the strains fixing nitrogen. Broadening of the genetic base of the crop can be introduced as an exotic germplasm and inducing mutations for the target objectives to enhance an efficient and high out-yielding cultivar. Enhancing and developing soil management practices under irrigated and rain-fed area must be considered in such program for increasing drought and salinity tolerance of Mung bean. Applying new technologies and nuclear techniques in this aspect will contribute in sustaining of cropping and production systems.

Nuclear Techniques are the essential tool to adopt and broadening the genetic variability, induced useful mutants and applying applicable practices under specific agro-ecological conditions of Iraq. Incorporating stable isotopes such as ¹⁵N will be most impressive issue to evaluate enhancing of biological nitrogen fixation (BNF) which will contribute in increasing biomass, production and subsequent the amount of the protein. Tissue culture under controlled environmental conditions will sure implemented to induce variations in cells and subsequently the plants regenerated from them (Somaclonal variation). Also,

Application of ionizing radiation with tissue culture will increase the mutation frequency and provide a wide range of variability for selection. Moreover, application of molecular marker technique for the selection of improved plants can reduce the time of the breeding program.

The Objectives of this Project and its Analyses are:

- a. Develop and deduce new Mungbean cultivars characterized with high yield potential and desired characteristics of short stature, determinate growth, earliness in flowering and enhance uniformity in pod maturity with favorable level of drought and salt tolerance.
- b. Increasing efficiency of the biological nitrogen fixation.
- c. Evaluation of the soil stresses on BNF efficiency
- d. Maximum exploitation for affected soils with drought and negligible inputs.
- e. Enhancing plant and soil system horizontally and vertically
- f. Application of ionizing radiation with tissue culture to increase the mutation frequency and provide a wide range of variability for selection
- g. Improve the production via the application of mutation and molecular marker assisted selection technique.
- h. Improving the socioeconomic approaches throughout rehabilitation of farmer's livings and establishment.
- i. The analyses of these objectives reflects.
- j. Exploitation of the current crop genetic adaptability.
- k. Utilization of the methods recombination among all available breeding trends and germplasm exchange.
- l. Utilization of the available expert philosophy in IAEA.

- m. The ability to apply the program in multi-locations of the targeted area.
- n. Measurement and estimates all reflected outputs on farmers and land establishment.
- o. The capacity building for scientists, researchers, technicians and farmers.

IAEA Role

IAEA will be expected to contribute in the following activities

- a. Mutagenic treatments, especially the neutron fast, gamma rays, and ion beam.
- b. Training of both scientists and technicians in the applications of nuclear techniques in the topic of this project (Meetings, Scientific visits fellowships and training courses).

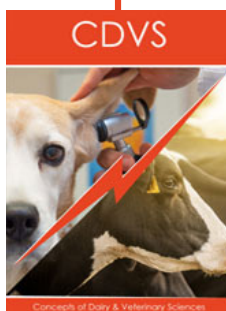
- c. Other assistance includes the technical assistance in nuclear techniques and detecting the useful mutagen sources, doses and rates, detecting the useful mutagen sources, doses and rates, and equipment's concerning to mutation breeding and methodology application and measurements.
- d. Stable isotopes.
- e. Analysis of plant, soils, and other components relating to nuclear techniques and advanced technology.
- f. Data analysis
- g. The implementation of expert missions is an additional essential part of IAEA's role.



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