



IAEA

International Atomic Energy Agency

Atoms for Peace

September 2008

Improving the common bean in Costa Rica

The challenge...

The common bean is one of the most important crops in Latin America and is the main source of protein, iron and fibre in the diet of Costa Ricans. It is grown on small and medium sized farms in Costa Rica and other parts of Central America and the Caribbean.

Web blight is the principal constraint to the production of beans in the rain zones. This disease is controlled by spraying fungicides. However, fungicide effectiveness is severely limited by the heavy rainfall and also has a negative environmental impact. In addition, there are no natural sources of resistance to this disease within the common bean germplasm available to bean breeders.

The project...

This project sought to develop web blight resistant common bean mutants that could be integrated into the bean improvement programme by inducing multiple mutations in bean plant tissues through irradiation. These mutants, which are superior in characteristics in terms of plant architecture, flowering period, disease and pest resistance, flavour and other quality traits, will be considered for official release.

The mass production of these induced mutants and the selection of those carrying the desirable traits (disease resistance), facilitated by the application of relevant biotechnologies such as in vitro techniques and molecular genetics, opens the way for successful breeding programmes. The resistant bean varieties and the molecular markers linked to this trait were analyzed for future introduction into the national bean improvement programmes.

Human and infrastructure resources were provided by The National Bean Programme of the Ministry of Agriculture and Livestock of Costa Rica and the Bean Research and Farming Technology Transfer Programme of Costa Rica. The IAEA provided expertise, training and some equipment.

The impact...

- The technical capabilities of the staff working in the field of plant breeding and genetics in Costa Rica were strengthened.
- Improved bean lines of the 'Brunca' and 'Bribri' varieties were successfully cultivated in vitro, regenerated and are now available for breeders.
- The Hojas desconectadas technique was used in the laboratory to test the resistance of the *Thanateporus cucumeris* fungus.
- The means to control bean web blight disease (Mustia hilachosa) in Costa Rica were improved.
- Interest in the coordinated use of biotechnology and nuclear energy was stimulated and a strategic plan for its future use was formulated.



COS/5/025: *Development of Induced Mutations and Biotechnology for Improved Productivity and Competitiveness*