IAEA Technical Cooperation Programme

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Improving crop quality and stress tolerance in plants in Asia and the Pacific region

The challenge…

Low input farming uses minimal amounts of pesticides and chemical fertilizers. It is an approach that is frequently applied in developing countries, and it contributes to sustainable agricultural practices. However, countries that use this agricultural system may face environmental stresses that can have devastating effects on crop production. To alleviate losses in agricultural production and to support low input farming in developing countries, crop breeding programmes have been developed to improve crop quality and to strengthen the stress resilience of plants, maintaining crop yields without the help of fertilizers.

The project…

Through an IAEA technical cooperation project, Member States of the Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology for Asia and the Pacific (RCA) were able to improve quality and stress tolerance in a wide range of crops, using mutation techniques and biotechnology and applying marker assisted selection to accelerate the process. The project helped countries to develop and transfer methodologies and techniques for identifying the mutant genes that contribute to the quality characteristics and stress tolerance of important crops.

Participating countries developed capabilities in the use of mutation breeding and biotechnology to improve water use efficiency and tolerance to drought, salinity and other soil stresses. Training materials on the use of mutation techniques and biotechnology for routine application in identifying specific desirable plant characteristics and procedures, together with manuals, were developed and utilized in the regional training courses.

Water culture screening for salinity tolerance and susceptible mutant lines.

The impact…

The project has enhanced national and regional capacities in mutation techniques and biotechnology. All participating countries have used the training to develop new mutant varieties and important agronomic traits in a wide range of crops, leading to better crop quality and improved stress tolerance. The mutant varieties and advanced pre-breeding lines produced are expected to increase farmers' incomes and agricultural production, and to improve food security in the participating Member States.

Through the project, the Asian Association of Mutagenesis in Crop Plants was established as a mechanism to sustain and strengthen networking among the participating countries. The Association is managed by the Member States and provides a good platform to support and sustain the networking of professionals and researchers working in the area of plant breeding.

Technical cooperation project RAS/5/045: Improvement of Crop Quality and Stress Tolerance for Sustainable Crop Production Using Mutation Techniques and Biotechnology (RCA)