

Enhancing the nutritional content of crops in South Africa

The challenge...

Cereals, maize and sorghum are important staples in Africa, however these crops are generally deficient in essential vitamins and minerals, and in many areas of the world the basic diet does not provide them in sufficient quantities. It is estimated that 60-80% of the global population is iron deficient and over 30% is zinc deficient. Most local communities in Africa cannot afford micronutrient supplements, and their food security is often at risk.

Biofortification – the enrichment of the nutritional properties of edible crops – can be achieved through a combination of agronomy and plant breeding. Among the tools available to plant breeders, induced mutation is highly efficient in altering the genetic constitution of plants, creating a wealth of genetic variability including desirable changes in crop quality, nutrient content and composition.

The project...

The project addressed deficiencies in essential amino acids, vitamins and minerals in maize and sorghum by training national staff in various aspects of induced crop mutation and by providing the necessary equipment and consumables for the implementation of the project.

The IAEA awarded three fellowships and two scientific visits, providing training in areas such as mutation induction efficiency enhancing techniques applicable to cereals; the handling and advancing of initial mutant generations; the evaluation and recording of effects in mutagens on initial mutant generations; and cereal breeding, including the use of mutation induction and efficiency enhancing bio-/molecular technologies in breeding for traits of interest.

The impact...

With IAEA assistance, the project counterpart, the Council for Scientific and Industrial Research (CSIR), developed six mutants of sorghum with improved grain quality traits. CSIR is now pursuing the rollout of further mutation breeding projects throughout South Africa's provinces in order to establish diverse small-medium crop-based enterprises. Due to the successful implementation of the project, six memorandums of inventions were submitted to the CSIR based on the new mutant cultivars of sorghum generated in this project. These will form the basis of an application for Plant Breeders Rights on the varieties. The success in creating outstanding nutritional sorghum mutants through this project have demonstrated that induced crop mutation is an environmentally friendly technology that can be simplified for practical implementation even at a community level.



The multiple sorghum-based dishes illustrates the ingenuity of aspiring entrepreneurs. Many agricultural raw materials can be transformed into high value food, feed and industrial products.