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EMERGING BIOTECHNOLOGIES AND THE CONSERVATION AND SUSTAINABLE USE OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

The chance discoveries of dometicable spontaneous plant mutants made the transition from hunting and gathering to agriculture possible. The methods for breeding ever higher yielding and more resilient and nutritious crop varieties to sustain a continually growing human population have been evolving rapidly. Cross-breeding; induced mutations (using physical and chemical agents); and biotechnologies –including genetic engineering, marker-aided selection and most recently, genome editing –are all aimed at increasing the efficiency of crop production by creating and utilizing useful heritable variations in plant genetic resources for food and agriculture. First described barely six years ago, the Clustered Regularly Interspaced Short Palindromic Repeats (or CRISPR) has become the genome editing method of choice, thus resulting in the development of crop varieties either formally released or in the pipeline. Its rapid adoption rate, the universal applicability and the low-cost involved mirrors the developments of the closely associated gene drive and digital sequence data and synthetic biology, for instance. The paces of the scientific and technological developments for these methods have far outstripped those of the requisite policy regimes. The ongoing debates include whether the products of genome editing, with or without gene drive, should be considered living modified organisms and, if so subject to the international framework, the Cartagena Protocol on Biosafety to the Convention on Biological Diversity. Another debate is whether digital sequence information should be subject to some free access and benefit sharing regime considering that with the powers of synthetic biology, products previously harnessed only from living organisms can now be produced in the laboratory once the DNA sequence is available. To avoid the crippling pitfalls of the past, a call is made for serious intergovernmental dialogues on the safeties, fairness and ethics of the use of these emerging biotechnologies as the stakes are extremely high.

Country or International Organization

Food and Agriculture Organization of the United Nations (FAO)

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