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Molecular cytogenetics in plant breeding

The human population is expected to increase to about 10 billion by 2050. Feeding that many people will be a great challenge. Plant genetic improvement will play a major role in meeting this demand, and the time to act is now. Producing new cultivars through plant breeding practices has reached aplateau that must be overcome. Developing new crops that are resistant to newly introduced pests and pathogens, improved in food value and tolerant to environmental stresses such as drought, salinity, and flooding would be one way to move forward. Land races and wild relatives of a crop species possess a vast reservoir of higher food value, resistance to pests and diseases, and tolerance to environmental stresses. These useful traits can be made available for developing new crops through breeding and genetic engineering that could hold promise for tackling future food shortages. Generally wide-crosses end up introducing unwanted traits along with the more desired ones. Smaller introgressed segments are better for the newly developed crop introducing the desired trait while maintaining the agronomic properties of the existing cultivar. Fluorescence in situ hybridization (FISH) and genomic in situ hybridization (GISH) are molecular cytogenetic techniques that can accurately assign molecular markers and/or gene sequences and introgressed segments to specific chromosomes. These cytogenetic tools have been utilized in wide crosses and transgene research for developing new cultivars. The introgressed segment, if quite large, can be further reduced to a smaller segment including the target gene through intercrossing the wide-cross progenies. Prior knowledge of cytological position of transgene insertion can make breeding more efficient and effective in developing new transgene cultivars. An overview of FISH and GISH in plant breeding will be discussed at the meeting.

Biography

Nurul Faridi has completed his PhD at the University of Cambridge, England, UK, 1988 and worked at the International Rice Research Institute and Intl. Maize and Wheat Research Institute, Mexico from 1989 to 1994, and then worked in the Department of Soil & Crop Sciences, Texas A&M University until 2003 before joining with the USDA Forest Service. He has been working in conventional and molecular plant cytogenetics for the last 25 years and published about 70 papers in reputed journals.

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