

BOOK REVIEW

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INTRODUCTION

The progress registered in Genetics and Molecular Biology during the last decade brought a more optimistic future perspective in areas of great importance to mankind, such as: plant and animal melioration by means of genomic manipulation, new technologies for the production of useful compounds, energy generation, environmental protection, treatment of incurable or genetic diseases in human beings etc. Genomic sequencing of some microorganisms, animals, plants and humans gives us hope that one day we shall be able to deal with every theoretical and practical difficulty that will challenge humanity.

The DNA sequencing of *Arabidopsis* was the starting point for a “gene inventory” in the nucleus of a higher plant, the structural and functional study of those genes, the detection of genomic insertion loci for genetic mobile elements, the specific exploitation of biodiversity, the generation of valuable genotypes of some crops that are important for their components and resistance to biotic and abiotic factors, highlighting some new techniques for plant biodiversity preservation etc. Vegetal genomics is still at dawn and the perspectives given by the discoveries in this field are still hard to figure out.

BOOK CONTENT

This volume represents a collection of papers – the work of some well-known researchers from the Department of Plant Biology from the National Institute of Agronomical Researches from France, a synthesis of the latest discoveries in Vegetal Genomics. These syntheses are structured in 5 chapters: “*Structural Genomics*”, “*Functional Genomics*”, “*Pattern-plants in Vegetal Genomics*”, “*Genomics, genetic variability and plant amelioration*” and “*Reflexions on Genomics*”.

The chapter on Structural Genetics deals with intriguing, current issues regarding: physical structure of plant nuclear genome, genomic

sequencing in plants, the link between Genomics and Bioinformatics, banks and databases in Biology, gene prediction, strategies to detect certain functions of proteic sequences provided by researches in Genomics, systematic comparison of proteic sequences of different organisms. The chapter of Functional Genomics comprises detailed information on insertional mutagenesis and reverse Genetics, the importance of integrated multidisciplinary studies on vegetal transcriptome, proteome and metabolome to unravel gene functions in plants, the contributions of microscopy in the analysis of gene products etc.

A special chapter is dedicated to the description of pattern-plants in studies of vegetal genomics, starting with *Arabidopsis thaliana* and continued by rice, alfalfa and tomatoes.

The chapter “Genomics, genetic variability and plants amelioration” presents a series of papers on molecular markers, transposable elements and plant biodiversity analysis, characterisation of major importance genes and of those for quantitative traits loci (*QTL*), aspects of molecular evolution, plant patterns for Integrative Biology and their application in the process of selection.

The last chapter presents some considerations on genetic variability alteration of stress tolerance in vegetal systems, the necessity to understand and change the interactions between molecules and macromolecules *in vivo* and *in vitro*, the strategies for an international channel of scientific information and biological resources, to capitalize the researches on plant genomics and suitable biotechnologies in public service etc.

ABOUT THE BOOK

The book is definitely a successful synthesis that displays a wide range of methods and concepts, beginning with genome sequencing of some vegetal organisms, continued by the methods of gene expression analysis with the metabolic products and cell and tissue specificity and finalised by the contribution brought by the information in plant Genomics in the melioration of some crops. Actually

this is another approach on plant Biology, other than the one we were used to a while ago.

Plant Genomics developed tremendously during the last decade and a great contribution to the progress in this field is represented by the researches on genomic sequencing of some living organisms. This action started in 1978 and was extremely meticulous and intricate until the first automatic DNA sequencing machines were built. Since 1981 (when genomic sequencing of bacteriophage λ (50 kb) was notified, the number of species that were submitted to this process was continuously growing, implying a huge effort of the scientific international companies.

After 1990 the partial and total genomic sequencing for some bacteria (*Haemophilus influenzae*, in 1995), yeasts (*Saccharomyces cerevisiae*, in 1996), the first pluricellular eukariotic organism (*Caenorhabditis elegans*, in 1998). At the end of the year 2000 the complete sequencing of the human genome and also of a vegetal organism genome – *Arabidopsis thaliana* were carried out. The first successes in plants were notified by the Japanese researchers in 1986 and were linked to the chloroplastic genomes. The sequencing of 95 genomes was reported during the summer of 2002 while other 502 were being sequenced meanwhile. These accomplishments expanded to other species: rice, maize and *Medicago truncatula*. This outcome

will allow a gene “inventory” of the nuclear genome for some plant species and also the identification of their structure and functions.

The disclosure of some plant genomes will allow new approaches in the field of functional genetics and reverse genetics. The studies of plant genomics will offer new directions to enable the selection and melioration of some crops. They will also ensure the detection of molecular basis for genetic polymorphism and of quantitative traits for crops, the identification and characterisation of the genes involved in varied biological processes, the action of melioration will be more precise and better aimed so that a single genotype would comprise as many valuable traits as possible.

The book contains a multitude of information and scientific concepts elaborated in a professional manner using an accessible scientific language, intended for specialists in Biology and Agriculture, and also to master students and PhD students and I warmly recommend it to all those interested in deciphering the depths of a fascinating field, perpetually changing, with obvious (yet hard to define), practical contributions.

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