

Annual Review of Phytopathology 1998. Robert K. Webster, Gregory Shaner and Neal K. Van Alfen (eds). Annual Reviews Inc., 4139 El Camino Way, Palo Alto, California 94303-0139, USA. Vol. 36. 537 pp. Price: Individuals US\$ 67; Institutions US\$ 134.

Global food security and the different options available to address the same are the major concerns of the world body. Today, the global population is 5.8 billion, of which over 800 million people do not have enough food and 1.3 billion people live on an income of less than \$1 per day. About 50% of the poor live in Asia, 25% in Africa, and 12% in Latin America. Most of the poor people reside in rural areas of developing countries where the ecosystem is fragile. Currently, 80% of the population lives in the developing world and the annual increase in population is 1.9%. Biotic stresses take a heavy toll of the 5 billion tonnes of food currently produced annually. Crop diseases, insect pests and weeds reduce global food production by at least one-third despite the fact that 32 billion dollar worth of pesticides are used on crops annually. Plant diseases alone reduce global food production by more than 10% and the potato disease that caused the Irish famine in 1845 is again becoming prevalent and resulting in significant food losses. In this context, the latest issue of *Annual Review of Phytopathology* addresses the important issues in plant pathology very effectively consolidating the recent progress and projecting future trends in reducing the crop loss.

The *Annual Reviews* have always focused on the growing areas of science and this volume too is no exception. There are 21 articles about current advances in basic and applied plant pathology. The preparatory article by J. Artie Browning analyses the need for reseeded the green revolution through the plant health programme that advocates molecular biology to increase yields close to the maximum for food production.

The article on Katherine Esau in the review is praiseworthy. Her work on plant anatomy is unparalleled in botany and work on healthy and infected plant tissues remains classical one. Her bio-

graphy serves as a model for present day botanists and plant pathologists.

This volume is also a textbook covering all aspects of plant pathology ranging from the diseases caused by different micro-organisms to probable futuristic technologies for overcoming plant diseases. While discussing the above, focus has been on the diversity in pathogen/isolates, host limitation in pathogen species determination and recent advances in the study of certain economically important diseases. Majority of the chapters describe resistant strategies for plant disease management with specific case studies on general application principles. On the understanding of the mechanisms and the important cascade of events leading to defense in plants, the primary focus is on the conserved nature of signal transduction pathways in broad spectrum and analysis of the defense response between plants and animals. Also, the possible use of new resistance genes of unrelated species for development of resistant transgenic plants is discussed.

An understanding of the mechanisms and important cascade of events leading to defence in plants is essential for plant disease management. Like other *Annual Reviews*, this issue has also been so vast that it covers all aspects of plant pathology ranging from the diseases caused by viruses, bacteria, fungi and nematodes to probable futuristic technologies to overcome plant diseases. The primary focus in this regard during the last several years has been on resistant signaling and this aspect has also been elaborately discussed by Hutchenson and Gilchrist in their articles. These articles have outlined the conserved nature of signal transduction pathway in broad families of plants and analysed the parallels in the defense response between plants and animals. Also the possible use of new resistance genes of unrelated species for development of resistant transgenic plants is suggested. Gilchrist has suggested that genes and the signal molecules of programmed cell death in plants helps in understanding the process of development of disease resistance.

New technologies and resources are needed for the development of sustainable crop protection systems by different control strategies against various

pests and pathogens that are the important components of the worldwide mission of the Integrated Pest Management Programme. This strategy for the crop production makes the environment less favourable for survival, growth and prolific reproduction of various pest species. This includes replacing susceptible crops from pest hot spots, cultivation to expose soil hidden pests, use of disease-free seeds and plantlets, crop schedules that synchronize with the most inactive period of pest proliferation, destruction of alternative hosts and voluntary hosts, thinning and developing to alter microclimate and nipping the budding pest by pruning to scavenge the field of the already-infested pests. In this context, the article by Barker and Koenning elaborates the historical outlines of the various strategies used for nematode management and their limitations. Recent strategies available for nematode management including the biocontrol, induced systemic resistance by rhizobacteria, nematode identification and assessment of population using the tools of rDNA technology, genetically engineered host resistance and application of ecology and soil biology-based cropping management systems are also covered. Though traditional plant breeding for disease resistance is in practice, a revolution in our understanding of the molecular basis of disease resistance has only occurred during the past 5 years as several genetically characterized disease resistance genes for the major classes of plant pathogens have now been cloned and dissected and this is emphasized in the review in a lucid way. The article by Johnson and Stockwell highlights the importance of fire blight in commercialization of pear and apple producers and stresses the importance of increasing population size of the pathogen. The article on 'Systemic resistance induced by rhizosphere bacteria' projects newer strategies for induction of resistance in plants with a potential for rhizobacteria to control plant diseases under field conditions. The description of plant health management through the application of mating type genes may help develop technologies for disease management.

The collection of articles in this volume, with a focus on emerging areas, detailed analysis of host-pathogen in-

teraction in plant diseases, role of rhizosphere organisms in plant health and appreciation of plant defence strategies is a relevant publication serving to integrate information available in different fields. Hence, it is a very important reference source to researchers in plant pathology.

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Gene Therapy – Principles and Applications. Thomas Blankenstein (ed.). Birkhauser Verlag AG, P.O. Box 133, CH-4010, Basel, Switzerland. 1999. 392 pp. Price: DM 198/SFr 168.

The hype about gene therapy stems from the fact that for the first time in medical history, hope is held out that there could be a cure for genetic disorders. The pressure from the population that is afflicted directly or indirectly to share the burden of a suffering closest kith and kin, has given a tremendous purpose to pursue this field. The scope of gene therapy has been broadened to treat cancers and HIV and in fact the major emphasis in recent years has shifted to studying cancer therapy using this approach. The growing clinical trials have indicated that the major problems with the approach are in terms of getting an ideal vector to introduce the gene followed by optimal and durable expression of the gene product in the recipient, besides consideration of safety. While a dramatic success of a cure is yet to be reported, the information made available on the subject is exploding. Therefore, any book that gives a comprehensive account of the field is welcome and the present title fits the bill.

The book is organized into four major sections – Gene transfer methods, gene therapy of single gene defects, gene marking and gene therapy of cancer. Each section has several articles written by different authors working in the field.

The section on gene transfer methods encompasses six articles, three on biological gene transfer and three on physical approaches to gene targeting. Retroviral, adeno and recombinant adeno associated viral (γ AAV) vectors have been described in detail. Despite the limitation of retroviruses to infect only dividing cells, these constitute the most widely used system for *ex vivo* gene therapy. A few examples of *in vitro* delivery of 'suicide genes' are also available. Adenovirus can express the transgene in the nucleus of both replicating and non-replicating cells. Replication-deficient recombinant adenovirus carrying the transgene of choice has been studied for use in cystic fibrosis, the Ad2 and Ad5 subtypes having tropism for the lung. More recently, γ AAV is being seriously considered as a future gene therapy vector. Attempts to obtain a high titre (3×10^{11} particles/ml) seem to be successful and the vector has unique potential for targeted integration into the chromosome. Three other articles deal with liposome and receptor-mediated gene delivery as well as particle bombardment as another tool. While these physical methods would be ideal from safety point of view, in general their efficiency of gene transfer is low.

The section on gene therapy of single gene defects has four articles covering information on severe combined immuno deficiency (SCID), lysosomal storage disorders, familial hypercholesterolemia and cystic fibrosis. Adenosine deaminase deficient SCID is the first genetic disorder to be treated with retroviral-mediated gene transfer and the studies have demonstrated the feasibility of introducing functional genes into peripheral blood lymphocytes and hematopoietic stem cells to restore normal immune function in this disease. The article on lysosomal storage disorders highlights the point that natural animal models provide a powerful investigative tool, when the animal phenotype closely matches the symptoms in the human, as is the case with mucopolysaccharidosis Type VII in mouse. However, gene-targeted mouse models of certain other lysosomal disorders, do not mimic the human condition, but manifest changes rendering certain facets of disease pathology not manifest in humans. Cystic fibrosis has been the

disease of choice to study the efficacy of various vector systems and routes of administration to the airway epithelium. The results reported in early clinical trials are equivocal and with several strategies available for improvement, the development of therapy protocols is likely to be incremental. Familial hypercholesterolemia is due to a defect in LDL receptor and the first clinical trial has demonstrated the general feasibility using retroviral-mediated *ex vivo* gene transfer.

The section on gene marking consists of three articles dealing with gene marking in bone marrow cells, peripheral blood cells and T lymphocytes used in transplantation as well as MDR gene transfer to hematopoietic cells. Gene marking studies provide crucial information on feasibility, safety and efficacy of genetically modified cells, a prerequisite for gene therapy trials. The marker with retroviral vectors as such does not modify the cells, but allows them to be detected. The results suggest that autologous transplanted cells contribute to long-term hematopoiesis. The marking studies also establish the contribution of unpurged autologous bone marrow to disease relapse following bone marrow transplantation. The lymphocytic target cells for gene marking include tumour infiltrating lymphocytes (TILS), virus specific cytotoxic T cells and donor derived lymphocytes. *MDR1* gene transfer studies have shown that the expression of P-glycoprotein in hematopoietic tissues can protect progenitor cells from cytotoxicity of anticancer drugs. Transformed cells have a selective advantage over non-transformed cells in terms of protecting bone marrow cells from myelosuppression following chemotherapy. The approach permits to introduce and over-express otherwise non-selectable genes that can correct genetic disorders.

The section on gene therapy of cancer has eight articles. The first one elaborates on antisense oligonucleotide therapy using *c-myc* proto-oncogene as the target. The article on thymidine kinases discusses the prospects of tk-mediated 'suicide' gene therapy. Tumour cells transduced with HSVtk become sensitive to Gancyclovir and the approach has attracted attention in view of the 'Bystander' effect. The characterization of tumour associated antigens, the