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Book reviews

Wilms, H. F.; Keijzer, C. J. (eds.): Plant Sperm Cells as Tools for Biotechnology. Wageningen: Pudoc 1988. 177 pp., 16 colour prints, 47 figs., 12 tabs. HFl. 90.00.

In this book, which seems to be the result of an unmentioned workshop, the editors quite fittingly emphasize that "the ability to control and manipulate the processes of gamete development, pollination, pollen-pistil interaction, fertilization and seed setting depends upon a detailed knowledge of reproductive biology and breeding systems". It is old news that pollen is one of the oldest tools available in plant improvement programmes. Two new aspects presented by various research groups in the present volume are stepping-stones in what is now fashionably called biotechnology. First, the isolation of sperm cells from pollen grains (*Zea mays, Brassica, Beta, Gerbera, Lilium*) is fast becoming routine, even when trinucleate pollen grains are used. The long-term perspective is sperm cell selection in vitro. The second aspect is what is called the dynamic structure of the male germ unit. The three-dimensional reconstruction presented in this book provides more detailed information on, and more fascinating pictures of the interaction between the vegetative nucleus and the sperm cells both in the mature pollen grains and in the pollen tubes during the progamic (not programic, p 58) phase. The computer-generated reconstruction pictures and the confocal scanning laser microscopical studies expand our knowledge of the association between generative cell and vegetative nucleus. The book contains 12 colour plates which demonstrate this progress. The next step in pollen biotechnology will be the transfer of plasmid DNA or entire plant chromosomes into the pollen tube protoplast by injection, a direct method of gene transfer with wide applications. H. F. Linskens, Nijmegen

Improvement of Grain Legume Production Using Induced Mutations. Proceedings of a Workshop on the Improvement of Grain Legume Production Organized by the Joint FAO/IAEA Division of Isotope and Radiation Applications of Atomic Energy for Food and Agricultural Development. Held in Pullman, Washington, 1–5 July, 1986. 1st edn. Vienna: International Atomic Energy Agency 1988. 524 pp. Soft bound Austrian sch. 1080.–.

This proceedings is a compilation of the papers presented at a workshop held at Pullman, Washington, USA from July 1 to 5, 1986. It is a valuable contribution and details work that has been done and the progress that has been made in using induced mutations for legume improvement. Legumes, the most ancient food of man, have been used both as a vegetable and as a supplement to food and have great nutritional value as their seeds contain high quantities of protein. In addition, they enrich the soil by fixing atmospheric nitrogen and show a wide diversity to environmental conditions. However, their grain production, yield stability, symbiotic efficiency, response to high input, and management practices are poor. They also exhibit a great susceptibility to diseases, pests, and stress conditions, and are unsuitable for a monocarpic culture. Many legumes have hard seeds and pose problems in sowing and cooking. Some contain poisonous alkaloids, glycosides, and anti-nutritional compounds. In short, they possess many genetic defects that need repairs. Mutation induction, in vivo and in vitro, is the only way to rectify genetic defects in the shortest period of time and to create the genetic variability unknown or lost in the genotypes. Results from studies on in vivo mutation induction and on the creation and utilization of genetic variability in *Arachis, Cajanus, Cicer, Glycine, Lathyrus, Lens, Phaseolus, Pisum, Psophocarpus, Vicia, Vigna,* and *Voandzeia* are comprehensively presented in the 35 papers of this volume. A review of these papers reveals that mutation induction and breeding has led to the isolation of number of genotypes exhibiting: (a) improved plant type and architecture, and, an improved resistance to disease and pests; (b) increased grain yield or seed protein content; (c) shortened maturation period or life cycle. In addition, an increase in the oil content of soybean mutants as well as a tolerance to heavy metal toxicity, alkaline or acidic soils, and problem soils and habitats have been successfully achieved in a few legume species. These research papers are supplemented by an excellent overview and review by Dr. Alexander Micke that details the high value of legumes, the role of induced mutations, breeding objectives, and mutation research in grain legumes. It also includes a comprehensive inventory of legume cultivars developed through induced mutations in various parts of the world and lists the major mutation breeding projects on legume improvement carried out in various countries of the world in collaboration with FAO/IAEA. This volume concludes with a list of the mutagens and mutagenic treatments adopted for inducing mutations and states major legume breeding objectives.

Perusal of this volume and other available literature indicates that little has been done in legumes with respect to in vitro mutagenesis, tissue culture selection, somaclonal variability, protoplast fusion, isolation, and the characterization of high protein genes and their subsequent transfer. This may be due to their incalcitrant nature, but methods have been devised for culturing cells, fusing protoplasts, and developing somatic embryos and plants in legumes. The attention of mutation geneticists should be drawn to these pragmatic aspects in order to accomplish legume improvement. Many papers in this volume lack precision and coherence, in others, too many details are given that are extraneous to the subject matter. In many more, the precise methods adopted and the precautions followed are unclear or inadequate. But even with these minor flaws, the volume represents an outstanding source of details on mutation research in legumes undertaken in various parts of the world, especially in the developing countries. Hence, the volume is a useful asset to every laboratory engaged in plant improvement and genetic research. M. L. H. Kaul, Bonn

Beach, D.; Basilico, C.; Newport, J. (eds.): Cell Cycle Control in Eucaryotes. CHS Series on Current Communications in Molecular Biology. Cold Spring Harbor: CHS Laboratory 1988. 211 pp.

This volume contains summaries of contributions made at a meeting on cell cycle control held at the Cold Spring Harbor Banbury Conference Center in March 1988. Its main topics are the genes and gene products that are supposed to play a role in the regulation of cell cycle events. F. Wanka, Nijmegen