been a setback since this programme was suspended for want of administrative support by the University during 1980–85. The reason was mainly that at that time there were not many employment opportunities for graduates studying the subject. During the past 10–15 years, several University colleges and leading institutions in India have been offering academic programmes and carrying out extensive research work to evolve ways and means of minimizing environmental pollution. For example, technology for microbial degradation of sugar factory and distillery effluents to produce biogas as fuel and biofertilizer has been developed and has come to use by the concerned industries. It is interesting to learn that the Supreme Court had taken up this issue as early as in 1991 and had issued instructions that all the States in the country should incorporate Environment as a general knowledge subject in schools and colleges in the country. A news item in the 23 September 2003 issue of *The Hindu* reports that the Supreme Court slapped a fine of Rs 15,000 each on 10 states which had not taken steps to implement an earlier order issued in this regard.

Regarding the methodology adopted for assessing the pesticide residues in the environment, especially in soil and water, there has been continuous upgradation of the technologies in the world. At the International Institute of Biotechnology and Toxicology, Padappai, Kancheepuram District, Tamil Nadu, the latest methods are followed. This Institute, being an NGO registered as a non-profit making Society, is recognized for assessing pesticide quality and quantities, including persistence in soil and water, residues in various agricultural produces, etc. not only by the Government of India but also by the German Federal Bureau for GLP Compliance, which is the most respected international agency in the world. Pesticide testing is done at this Institute for various countries, including Japan, UK, France, USA, etc. If called for, the Institute will carry out studies on soft drinks for pesticide residues, adopting the international standards on hand.

G. RANGASWAMI

Ravi Nivas,
17, Indira Gandhi Road,
Fairlands,
Salem 636 016, India
e-mail: drgr@eth.net

Plant biotechnology

The late sixties and seventies witnessed Indian plant breeders taking giant strides in enhancing wheat and rice productivity, transforming India from an importing nation to one exporting food grains. More recently rate of gain in productivity seems to have plateaued. There were times when breeders looked at the emerging fields of mutation breeding and tissue culture with awe and expectations. The illusion is over and we are witness to the real picture. These have occupied their place in the history of development of science and/or as an adjunct to the major field, the discipline nuclear to crop science research, i.e. plant breeding.

Indian plant biotechnology has come of age accomplishing research projects of national and international importance, e.g. rice genome sequencing project. Plant Biotechnology (PB) offers two major options to plant breeders. Marker-assisted selection (MAS) offers to make selection for desirable segregants precise and expression independent[1]. The question, however, which traits and who will do it, remains unattended. The molecular biologists who have so far been experimenting with it are alienated from those who will ultimately be practising MAS. The moment science of MAS for a trait of importance is perfect enough to become a technology, the same needs to be transferred to the end users, the plant breeders in this case. The interesting aspect of plant biotechnology outputs is that they need to pass through plant breeders before they reach the final consumers. Molecular biologists who tag a trait, need to be encouraged to convert it into a technology for use by breeders. Research managers can play a role to ensure that funds invested in these scientific endeavours lead to usable technology and the same is passed on to breeders to cut down the enormous costs involved in the elaborate plant breeding operations. The next logical question is to decide which traits to tag? The obvious answer is those which breeders find difficult to select for.

Transgenic technology is the other major important intervention that PB offers. This tool has immense potential and the same is evident from the fact that currently over 130 million acres are planted under transgenic crops the world over. The global market value of biotech crops, which stood at 3.8 billion US dollars in 1998, is slated to rise to five billion US dollars by 2005 (ref. 2). India has also benefited from this technology by adopting boll worm-resistant transgenic cotton. This is one field, which needs to be strengthened by investing human and financial resources in the form of groups dedicated to specific trait and crop. Development of technology needs to be regarded as an equally important contribution as publication. Only such an approach will encourage researchers to be focused and dedicated to the product development rather than just the publication, which in turn will make PB more relevant and responsive to the society's needs.

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RAJIV K. SHARMA*
NEELU JAIN

Division of Genetics,
Indian Agricultural Research Institute,
New Delhi 110 012, India
**For correspondence.*
e-mail: rajivksharma@rediffmail.com