In this issue

Hybrid crops using barnase–barstar system

Transgenic crops are estimated to occupy about 125 million acres of land the world over at the end of the year 2001. They are, therefore, going to play a major role in future crop-improvement programmes, despite the ongoing debate about biosafety/bioethics issues involved. Unfortunately, in our country no transgenic crops have been approved so far for commercial cultivation, although last year unauthorized *Bt*-cotton was grown in large areas in Gujarat and elsewhere. Resistance against biotic/abiotic stresses and several attributes important for the end-user have been incorporated in transgenic crops that have been or are being commercialized in several countries. The most important and the latest example is the golden rice produced by Ingo Potrykus (Switzerland) and Peter Beyer (Germany). However, an important area, where transgenic crops are yet to be exploited is the use of barnase–barstar system for hybrid seed production in crops, where naturally occurring and suitable cytoplasmic male sterility (CMS)-restorer systems are not available.

During 1990–92, C. Mariani and his group in Belgium discovered this system by isolating these sequences from *Bacillus amyloliquefaciens* and using them for developing transgenics in *Brassica napus*. Using an anther-specific promoter TA29, they produced transgenic male sterile and restorer lines in *B. napus* and demonstrated their utility for hybrid seed production.

In our country, Deepak Pental and his group at Delhi University South Campus have taken a lead in incorporating separately *barnase* and *barstar* genes in Indian oilseed mustard, *Brassica juncea*, for its intended use in hybrid seed production. Initially they reported the production of herbicide-resistant *B. juncea* (*Curr. Sci.*, 2000, **78**, 1358–1364) and later also reported the use of *barnase* gene for production of male sterile *B. juncea* plants (*Mol. Breed.*, 2001, **8**, 11–23), using the tapetum-specific promoters, TA29 and A9 for tissue-specific expression of barnase. However it was realized that the use of constitutive promoter for driving the marker gene deregulated the spatial and temporal expression of barnase due to tapetum-specific promoters, so that a spacer DNA had to be used to insulate tissue-specific expression of barnase.

On **page 52**, Arun Jagannath *et al.* report the successful use of *barstar* gene for production of fertility restorer lines in the same crop (*B. juncea*). They used both the wild type *barstar* gene and a modified *barstar* gene to produce transgenics restorer lines, although in 31 of the 32 combinations tested, restoration of fertility could not be obtained. These studies are a significant step forward in realizing the benefit of barnase–barstar system for hybrid seed production, although transfer of this technology for actual hybrid seed production by the seed companies and the plant breeders elsewhere may take time, for a variety of reasons.

P. K. Gupta

Tectonic activity and biological diversity

Geologists have known that tectonic activities control not only the evolution of continents and their landforms but also the drainage pattern, the emplacement of magmas, the eruption of lavas, the genesis of mineral deposits, the pattern and attributes of sedimentation, the metamorphic transformation of rocks and sediments, and other phenomena. Sagar Kathuria and K. N. Ganeshaiah demonstrate in their paper (**page 76**) that the tectonic activities are responsible for spatial distribution – particularly the patchiness in the tropical zone – of biological diversity on a global scale. This is quite understandable. The strong tectonism is responsible for formation of the mountain barriers that change atmospheric circulation and thus condition climate and attendant development of wet hill-slopes and rain-shadow zones, for the emplacement and mode of occurrence of rocks of varied composition that eventually give rise to the soils that support vegetation, and for the shaping of the landscape that influences habitats of living organisms, including plants. The stronger and the more repeated the tectonic activity, higher would be the mountain barrier and greater would be the impact on climate, sedimentation and physical and biotic environments. The history of the rise of the Himalaya as the northern mountain rampart of the Indian subcontinent bears testimony to this fact.

The tectonic activities have had profound influence on the palaeoclimate and palaeoecology all through the history of the evolution of our earth. It is but natural that their impacts should persist in our time. Kathuria and Ganeshaiah have marshalled a wealth of data derived from maps of biological hot spots characterized by high plant diversity, and through rigorous mathematical analysis have demonstrated that high biological diversity is attributable to high tectonic activity – manifest in faulting, their reactivation as indicated by occurrence of earthquakes and volcanic activities in the tropical belt, where the habitat variation is quite high. The deduction is geologically plausible and geographically quite apparent.

K. S. Valdiya