

## In this issue

### Fertility status of soils

Apart from water shortage, soil infertility constraints crop productivity in the drylands of the semi-arid tropical (SAT) regions of India. To characterize the fertility status of SAT soils, soil samples collected from 3622 farmers' fields in watersheds spread in Andhra Pradesh (5 districts), Karnataka (5 districts), Tamil Nadu (5 districts), Madhya Pradesh (2 districts), Rajasthan (3 districts) and Gujarat (Junagadh district) States were analysed for soil fertility parameters. Results showed that almost all farmers' fields were low in organic carbon and low to moderate in available phosphorus, but generally adequate in available potassium. The deficiencies of sulphur, boron and zinc were most revealing; their deficiencies varied with nutrient, district and State. The results demonstrated that crops grown under rainfed agriculture in the SAT region of India not only face water shortages and deficiencies of nitrogen and phosphorus, but the widespread deficiencies of sulphur, boron and zinc also hold back productivity of rainfed systems. There is need to strengthen the soil testing programme at the local and regional levels for diagnosing the emerging nutrient disorders and for the efficient use of nutrient inputs and for enhancing rainwater use efficiency in rainfed systems. See **page 1428**.

### Barnase–barstar system for production of hybrid seeds

Heterosis has been successfully used for enhancing crop productivity. The availability of effective pollination control mechanisms consisting of male sterile and restorer lines facilitate the large-scale production of hybrid seeds using appropriate combiners. Transgenic technology has been successfully deployed to induce male sterility and its restoration in plants by the tissue specific (tapetum

expression of a ribonuclease gene (*barnase*) and its corresponding inhibitor (*barstar*) from the bacterium *Bacillus amyloliquefaciens*. In this mechanism, one of the combiners is made male sterile (*barnase* line), which acts as the female parent while the other combiner acts as the restorer (*barstar* line). The heterotic F1 hybrids obtained express both the *barnase* and *barstar* genes and thus set selfed seeds. The use of herbicide-based field selection marker is an important component in this hybrid seed technology. Male sterile lines are maintained by backcrossing with an isogenic line without the *barnase* gene. The progeny thus segregates for male sterility and fertility. In order to select for the male sterile lines in field, these lines are also made resistant to a herbicide by incorporating a gene conferring herbicide resistance in the *barnase* construct which acts as a field selection marker. Spraying of herbicide at an early stage ensures the elimination of the fertile segregants in the population. As the *barstar* lines are grown in the same plot as the *barnase* lines, they are also made resistant to the same herbicide. Thus, the commercial exploitation of this technology is dependent upon the availability and cost of the herbicide being used for field selections.

Krishna *et al.* (**page 1390**) report the successful deployment of this technology in Indian mustard (*Brassica juncea*), a crop cultivated in around six million hectares in the rainfed areas of Northern India. The present transgenics utilizes an imidazolinone-based low cost herbicide 'Pursuit' easily available in India.

### Protect wildlife sanctuaries and caecilians

In India, amphibians are mainly known by Anura which includes frogs and toads. The other two orders, namely, Urodela and Caecilia are very less known. The Urodela which

includes salamanders and newts is represented by a lone species, *Tylostotriton*. The caecilians which are fairly well documented in the forest transformed agricultural field in Western Ghats and Eastern Himalayas are always mistaken for the earthworms/snakes by the layman. The caecilians are the legless, secretive, nocturnal, burrowing amphibians. They live in moist, humus-rich soil with high organic contents.



The presence of distinct head with minute eyes and linear rings on the whole body would enable any one to distinguish these animals from that of snakes and earthworms. The caecilians are non-poisonous and do not bite humans although they possess numerous teeth in both the jaws. These legless amphibians are the bio-indicators of the healthy environment. Since amphibians live both in water and on land, they are the first to respond to any change in the environment. India is one of the richest countries in relation to caecilian diversity. Habitat destruction along with excessive use of inorganic fertilizers in the farmland is the major threat to the survival of caecilian population. The fact that the discovery of the present species *Gegeneophis mhadeiensis* from the surroundings of Mahadayi Wildlife Sanctuary (**page 1442**) as well as the other three species described earlier by the same team from the surroundings of Bondla Wildlife Sanctuary, Goa and Mookambika Wildlife Sanctuary, Karnataka clearly indicates how important it is to safeguard these treasures to conserve our biological wealth.