

## Terminator technology – A weapon of biological warfare

The letters of C. R. Bhatia and K. P. Gopinathan, and the article by P. K. Gupta (*Curr. Sci.*, 25 Dec. 1998) are all very welcome contributions to the ongoing controversy on the terminator technology in this country. *Current Science* deserves to be commended for providing useful scientific information and reasoned viewpoints about a debate which otherwise seems to be crossing all limits of sanity and decency. In this context, I was particularly disturbed by the unacceptably foul language of a letter on the internet (attributed to one Nanjundaswamy) which openly proposes terrorist acts outside India. I suggest that all Indian scientists who have read this letter should strongly condemn it. Unfortunately, I cannot suggest that a responsible journal like *Current Science* should reproduce the (unprintable) language of this letter.

Having said that I must hasten to add that after reading P. K. Gupta's article I think the terminator (and verminator) technologies should be viewed as weapons of biological warfare invented by some greedy MNCs to deny the immense potential benefits of transgenic plants to poor farmers. According to Gupta's article

China, India and Pakistan are three major targetted countries. To me democratic India seems to be the most vulnerable. If we remember that under the proposed new patent laws we may not be permitted even to develop indigenous non-terminator transgenics, things do appear rather bleak. We may have Champarans with no Mahatma Gandhi on the horizon.

The responsibility of defending Indian farmers against these attacks may have to be borne by Indian biologists. I cannot persuade myself to agree with Bhatia that the legal freedom of a farmer not to buy the seeds from a specific MNC is adequate defence in itself. The social-economic realities are much too complex for that. Rich farmers may have the capital to buy the expensive seeds but the poor ones may end up losing even their land. We may need to develop technologies which may make the terminator/verminator constructs ineffective. One way would be to knock out the terminator or the *cre* recombinase gene. The latter is easily available from the bacteriophage  $\phi$ I. Inactivating it *in vitro* should be no problem at all. A more, but not insurmountably, difficult step would be the replace-

ment of the wild type gene in the plant cells by its mutant allele by homologous recombination. The rapidly accumulating information on homologous recombination genes of plants should permit devising strategies for enhancing homologous recombination in somatic plant cells. Other possible anti-terminator technologies may rely on antisense RNA or introducing a large number of copies of the *lox* target sites into the plant cell to titrate out the *cre* recombinase. With some luck it should be possible to develop efficient technologies to pierce the terminator shield much before 2004 when the commercialization of this technology is projected. I hope that in the national interest we shall not accept any patent laws which would bar Indian scientists from developing these methodologies.

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## Increasing *Current Science* circulation

I read with interest the editorial 'Scientific publishing in the Third World' (*Curr. Sci.*, 1999, 76, 117–118). I agree that there is a pressing need to increase the circulation of *Current Science* among the scientific community in our country. How to carry this out? The following incident in my life may suggest a simple answer to this query.

In February 1943 I, as a young research student of V. V. Narlikar, wrote a small note (of course under the guidance of my Professor) entitled 'Gravitational Field of a Radiating Star'. It was communicated to *Current Science*. It was published in

the issue of June 1943. Within a month of its publication, I received a personal letter from C. V. Raman congratulating me on my research work and wishing that I would keep up this research enthusiasm. He also suggested that reading *Current Science* regularly would go a long way in keeping up this enthusiasm.

On receiving this letter I, a young man of 25, was overwhelmed with joy mixed with gratitude. I have been a subscriber of *Current Science* since 1943. And except for a few years in nineteen eighties, I have continued the subscription till today.

If a few enthusiastic young research professors make a point to read *Current Science* and commend younger generation to its reading, I am sure this peculiar 'Raman Effect' will generate many fold increase in circulation of *Current Science*.

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