of the world's publications) in 1991 to 1527 (2.28%) in 2001 (Arunachalam *et al.*, to be published).

Such controversies – pertaining to growth and decline in publication counts – are not new. Years ago, when Margaret Thatcher was the Prime Minister, there was a debate on the decline of British science. The fixed journal set used by John Irvine, Ben Martin and colleagues[12] pointed to a decline, while the dynamic one (DIALOG-version which one would now call the CD-ROM version) used by Loet Leydesdorff[13] pointed to the UK's publication output remaining steady or even rising slightly. Anderson *et al.*[14] and Braun *et al.*[15], among others, joined the debate, which went on till *Scientometrics* published a special issue on measuring UK science in 1991. Leydersdorff's position (private commun. dated 28 January 2004) was eventually that the stability of UK science depended very much on the years one included in the time series!

Satyanarayana and Jain[1] refer to the European factor as an 'innovative alternative' to the *JCR* impact factor. Unfortunately, it is restricted to about 520 European biomedical journals ('to judge European journals under European conditions for European researchers', says the Vicer website, www.vicer.org/ VICER-EUROFACTOR.pdf) and is not widely used. As far as I know, the European factor has yet to gain wide acceptance among researchers – even in Europe.

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Cautious use of *Bt* genes in transgenic crops

Insecticidal proteins of *Bacillus thuringiensis* (*Bt*) have emerged as the proteins of choice to be expressed in transgenic crops towards an environment-friendly mode of insect pest management in agriculture[1]. Although *Bt* has been under extensive use as a biopesticide over the past five decades, its efficacy and potential have been realized only recently, because of its effective deployment in transgenic crops. Currently, two transgenic crops, viz. cotton and corn are being cultivated in more than a dozen countries[2]. These crops express different *Bt* toxins (Table 1).

Efforts are being made in many laboratories in India to develop insect pest-resistant transgenic crops[3]. However, consideration of many issues is warranted before introduction of insecticidal protein genes in various crop species. In this context, the experience/ knowledge gained in many aspects *vis-à-vis* *Bt*-cotton cultivation is valuable to evaluate different issues.

Transgenic cotton (Bollgard) expressing *Bt-crylAc* gene is under commercial cultivation since 2002 in India. Bt-Cry1Ac toxin confers protection to cotton which is heavily infested by four lepidopteran pests, viz. cotton bollworm (*Helicoverpa armigera*), pink bollworm (*Pectinophora gossypiella*), spotted bollworm (*Earias*

Table 1. Commercial *Bt* crops and genes expressed by them

Crop	Gene	Target pest
Commercial		
Cotton	*crylAc*	Bollworm
	cry2Ab	Bollworm
Corn	*cry1Ab*	European corn borer
	cry1Ac	European corn borer
	cry9C (discontinued)	European corn borer
	cry3Bb	Corn rootworm
	cry1F	European corn borer, southwestern corn borer, fall armyworm and black cutworm
Potato	*cry3Aa* (discontinued)	Colorado potato beetle
To become commercial soon		
Cotton	*cry1Ac + cry2Ab*	Bollworm
	cry1Ac + cry1F	Bollworm and fall armyworm
	Vip3A	Bollworm and fall armyworm
Corn	*cry34Ab/35Ab*	Corn rootworm

Source: http://www.isb.vt.edu/

vitella) and tobacco caterpillar (*Spodoptera litura*). Cry1Ac is highly toxic to *H. armigera* and *E. vitella*, moderately toxic to *P. gossypiella* and not toxic to *S. litura*[4–6].

There have been many concerns about the efficacy and durability of Cry1Ac toxin expression in *Bt*-cotton. The major one relates to the development of resistance in insects.

(i) The insecticidal activity of transgenic cotton declines significantly as the plants mature[7] and *H. armigera* and *P. gossypiella* are exposed to sub-lethal concentrations of Cry1Ac. This encourages some insects to complete their development late in the season. Their survival would eventually lead to the emergence of resistant insects. Promoters that are active during boll development and reproductive phase are needed to express insecticidal protein genes.
(ii) Cry1Ac is not an ideal toxin to manage pink bollworm. Long-term exposure to Cry1Ac may lead to *Bt*-resistant pink bollworm, which may also have cross-resistance to Cry1Aa and Cry1Ab toxins.
(iii) Deployment of refugia is an essential component of resistance management[8]. Non-compliance of refugia requirement is a problem in transgenic cultivation (http://www.colostate.edu/programs/lifesciences/TransgenicCrops/news.html#still breaking). Effective monitoring and supervision mechanisms are needed for strict compliance of the refugia guidelines.
(iv) Faster introduction of *Bt*-crops carrying multiple insecticidal protein genes, preferably with differing mode of action/receptor binding, is imperative[9]. Cotton expressing Cry1Ac, Cry2Aa, Cry1F and Vip3A toxins together will tolerate all the major pests in addition to containing a durable resistance management package.
(v) Avoidance of expressing the same gene (e.g. *crylAc*) in multiple crops (cotton, chickpea, pigeonpea, tomato, sorghum, sunflower, etc.) is necessary. An insect species such as *H. armigera*, with a high propensity for resistance development, should not be exposed to varying levels of Cry1Ac expression throughout the year, and spread over large tracts of cultivation.
(vi) It is advisable to avoid expressing toxins (e.g. Cry1Ab), which are moderately toxic to pests such as *H. armigera*. Exposure of *H. armigera* to such toxins will encourage resistance development and eventually cross-resistance to other Cry1A toxins.
(vii) Strict legal measures should be taken by the government to prevent illegal development and cultivation of *Bt*-crops (http://www.biotech-info.net/illegal_cotton_India.html). Failure to do so will lead to faster development of resistant insects and loss of a valuable biopesticide.

In working towards the development of insect pest-resistant transgenic crops, the following may be important.

(i) Critical evaluation of the target pest, its biology and susceptibility to a range of insecticidal proteins (*Bt* and non-*Bt* sources).
(ii) Selection of two or more effective toxins based on their efficacy, mechanism of action and receptor binding.
(iii) Evaluation of the biosafety of insecticidal proteins.
(iv) Optimization of gene expression as evidenced by studies in model systems like tobacco.
(v) Selection of suitable and effective promoters based on spatial and temporal aspects of insect infestation.
(vi) Expression of multiple insecticidal genes driven by different promoters in transgenic crop of interest (either via co-transformation or by plant breeding).
(vii) Selection of the transformed plants with single copy transgene insertion and high levels of toxin expression.

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Trachycarpus takil Becc. is not a 'rare' palm

During our botanical collection programme in July 2003, we noticed a population of palm trees in *Quercus*[1,2] forest at Kalamuni pass near the Kalamuni temple. This palm had been a subject of controversy from 1995 to 1996 with regard to its status and type locality.

Trachycarpus takil (Figure 1) was then understood to be a rare palm and was placed in the *Red Data Book of Indian plants*[3]. According to the information in this book, this palm grows on mount Takil (misspelled for Thakil) in Kumaon at 2000–2500 m. Rana *et al.*[1] stated that 'Thakil referred to all palm-like plants, and a part of the hill with an abundance of these palms at one time was named as Thalkedar Hills', which lies ca 15 km south of Pithoragarh. They concluded Thalkedar to be the type locality of this palm.

Kulkarni and Pawar[4] reported the type locality of *Trachycarpus takil* to be probably Takal, situated near Kalamuni pass between Kalamuni pass and Munsai (misspelled for Munsiyari) in Pithoragarh District of Kumaon Himalayas. They had seen abundant trees of this palm in this area