

## ***Bt* brinjal: premature approval for cultivation**

Following the publication of the Expert Committee II (EC-II) report<sup>1</sup> and the Genetic Engineering Approval Committee (GEAC) decision, approving *Bt* brinjal for cultivation in India, there has been considerable discussion on the topic in public fora and the media. Surprisingly, there has been very little scientific debate or discussion on this topic in India<sup>2,3</sup>. Though I am not a biologist, this brief note summarizes some of my concerns as a scientist and a citizen.

(a) Relevance to reality: To preclude contamination, the apparently successful field trials involved maintaining an isolation distance of 300 m (p. 5)<sup>1</sup>, based presumably on some national or international standards. Standards are necessary to ensure that reported measurements can be duplicated scientifically and compared, and to evaluate the influence of other variables systematically. However, it is necessary to check the relevance of the standards to reality. Brinjal is grown primarily by small farmers in India<sup>1</sup>. Assuming a small one acre square farm, would be 63 m long, in which a small farmer would generally grow many different crops. It is essential that one considers realistic separation conditions of 1–2 m in India to ensure that there is no contamination of non-GM crops.

(b) Response to critical comments: While we may not agree with all critical comments made by independent referees, scientific manuscripts usually benefit from an open consideration of the comments, frequently with additional experiments and/or analysis. The 102-page EC-II report devotes 34 pages for responding to critical comments and the report finds essentially no value or basis for any of the comments! While apparently detailed, it also appears that it does not consider the comments seriously. Just as an example, there was a comment on the need for chronic (long-term) toxicity testing, which the report brushed aside. A recent statistical analysis of earlier data suggests strongly the need for chronic testing<sup>4</sup>.

(c) Conflict of interest: Independent studies, transparency and availability of all data, and independent evaluation are some of the hallmarks of good science. There is sufficient historical information available to warrant caution in accepting and relying solely on data provided by potential financial beneficiaries. Recently, independent analysis of data obtained by a GM company has led to serious doubts on the validity of the tests and conclusions reported earlier to regulatory agencies by the company<sup>4</sup>. Clearly, inde-

pendent studies and evaluations are necessary before approving *Bt* brinjal.

There are also other important broader societal concerns that need to be addressed, relating to biodiversity, choice and food security, apart from legal liability. Finally, while scientific debates and controversies are resolved over a period of time by further experiments or analysis using newer techniques, it is important to note that once released, it is not possible to put the *Bt* brinjal gen(i)e back into the bottle. The above discussion leads to the conclusion that it would be premature to release *Bt* brinjal for cultivation, until both the scientific and societal concerns are addressed adequately.

1. <http://moef.nic.in/downloads/public-information/Report%20on%20Bt%20brinjal.pdf>
2. Bhargava, P. M., *J. Biosci.*, 2009, **34**, 167–168.
3. Padmanaban, G., *Curr. Sci.*, 2009, **97**, 1715–1716.
4. Seralini, G. E. *et al.*, *Int. J. Biol. Sci.*, 2009, **5**, 438–443.

ATUL H. CHOKSHI

*Department of Materials Engineering,  
Indian Institute of Science,  
Bangalore 560 012, India  
e-mail: achokshi@materials.iisc.ernet.in*

## **The neglect of productivity indicators in measuring digital preparedness**

In an earlier article<sup>1</sup>, I dealt with the practice of adding input and output indicators in prevailing digital preparedness indexes. Methodologically, it seemed to me that for basic economic reasons one should instead or in addition divide the output indicators by the input indicators. Neglect of these productivity calculations could as I saw it lead to misleading estimates of digital preparedness. (It is easy to imagine a case for example where countries with relatively high productivity are ranked below countries with more inputs and lower productivity.) The purpose of this note is to identify some actual cases where the ranking of countries by existing preparedness indicators

would change if outputs were divided by, instead of added to, inputs.

Digital preparedness indexes have in common the goal of estimating the readiness for digital technology of different countries. Although there are at least 10 such indexes, the ones associated with the World Economic Forum (the e-readiness index) and the International Telecommunications Union (the development index) are probably the best known and most influential (they receive wide media coverage when the annual rankings are announced). Both cover large numbers of countries and share the practice of adding input and output indicators. For example, skills are added to

Internet use which in turn is added to the number of computers (per 100 persons). No productivity calculations are made in the annual reports or anywhere else for that matter and the question is whether the ranking produced without such calculations is the same as the ranking that would emerge from dividing outputs by inputs. My goal is to identify cases where there is a divergence between these indicators. The more the deviations and the greater their intensity, the more one would want to question the reliability of existing digital preparedness indexes. For then, one is likely to encounter perverse cases such as where a country with a low productivity (more