

'Biosafety at the expense of food security is no solution'. In case of self-pollinated crops, the situation may not be very serious because in these crops cases of cross pollination are around 5%. So even if a farmer grows a variety with the terminator trait, atmost 5% of the seeds of the neighbouring field will be affected. Only plants in the border rows will be affected since the pollen dispersal in self-pollinated crops is not very long. To avoid this risk, the farmers may collect seeds from the middle of the field where chances of cross pollination are less. In case of cross-pollinated crop, this technology may cause significant loss to traditional varieties, particularly synthetic and composite ones. But hybrid seed industry is not going to be benefited from this technology because in case of hybrid varieties the farmers are forced to change the seed after every crop as the variety suffers severe inbreeding depression upon selfing. This lethal technology will also not find field in vegetatively-propagated crops like sugarcane, potato, etc. The potential threat of induced nonviability of seeds may not cause any havoc to our biodiversity also because the plant species produce

seeds in large quantities which may not be severely affected with such gene transfer. However, it is always better to be cautious.

Under a research agreement with USDA, Delta and Pine Land Company had exclusive right to license (or not) the technology to others. Soon after the patent was granted, on 11 May Monsanto Corporation took over Delta and Pine Land Corporation. So we must bear in mind that the technology was developed by a public sector (USDA) together with a private sector and at present Monsanto holds the patent. Since government and university research departments are undergoing an acute budget crunch, soon the public sector breeders will be forced to incorporate this technology in their breeding programme in order to have access to corporate funding in the name of privatization of research. The seed companies are investing billions of dollars in agricultural biotechnological research and patenting specific genes and traits. Thus in the near future the seed companies may insist that other breeders incorporate this lethal technology before licensing them to use their patented products. Slowly the breeding programme will go

solely in the hand of the seed companies which are in possession of this technology. In this situation the farmers will have no choice except either to pay for the Millennium Seed or to replant older varieties from the abandoned breeding programmes. With time the culture of seed sharing and exchange that is practised by farmers from ancient days will also be stopped. Therefore, if by the end of this century this technology launches in the international market, the way it is projected, the future of 1.4 billion poor people of the third world country will be jeopardized. It is now time to draw the tenuous line between genius and insanity. A global moratorium should be called on such technologies which are not aimed at the development of mankind but to terminate its progress.

1. Varkey, B. J., *Hindustan Times*, 26 July 1998.
2. RAFI Press Releases dated 13, 20 March and 14 May 1998.

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## Evaluation of a Ph D thesis

The article, 'Let us do justice to science' by Saad Tayyab (*Curr. Sci.*, 1998, 75, 78-79), poses a number of thought-provoking questions, one of which is 'What should be the standard of a Ph D degree?' The author answered only a few of them. I would like to comment on one of his unanswered questions—'What kind of evaluation should be adopted?'

I think the evaluation system of a Ph D thesis is the root cause of our abysmally low standard of scientific research. Unfortunately, many students who have no aptitude for research, are first admitted to a Ph D programme and worse still, acquire the degree dirt cheap because the theses are sent to their supervisor's friend/colleague/contemporary for evaluation. In most of the Uni-

versities, the supervisors themselves suggest the names of Ph D examiners! The supervisor always looks for *safe* examiners, and if he does not know any, he takes the help of his colleague(s) to procure the names of such safe examiners. Basically, the policy is, 'You scratch my back, I will scratch yours'. As a result of this (mal)practice, the supervisor has a casual approach and does not take much interest in scrutinizing the thesis of his student because he knows that *irrespective* of the quality of the Ph D thesis, the student will get the work approved as it is going to be evaluated by his friend. Some examiners even dare to evaluate the Ph D thesis, which is not at all related to their field of specialization. This disastrous approach is the main cause of our medio-

cre Ph D degrees as the supervisor is not bothered about the rejection of the thesis. One can find many such theses adorned by cobwebs in our libraries, which do not deserve to be there at all.

Something serious has to be done with the evaluation system if we really want to improve our standard. Firstly, the supervisor should not be involved at any stage, in selecting the panel of the examiners. This will make the supervisor work harder and take the Ph D thesis of his student more seriously. Secondly, there should be a centralized system of evaluation. The UGC can play a major role in this direction. It should build a data bank of all specialized serious and good workers in the country who can act as examiners of a Ph D thesis. The Universities should send the Ph D thesis to

the UGC, from where it will be mailed to at least two examiners by masking the names of student, supervisor *and their affiliations*. The evaluation should be strictly on merit. At times rejection of a PhD thesis would serve the purpose because either the supervisors will start taking things seriously or they will

stop guiding any PhD student. It is better to produce only a few good quality theses than to have a number of feeble theses. Thus, only a stringently merit-based PhD evaluation system can help us 'to do justice to science'. This will certainly not only improve post-doctoral research work, but will also

enhance the quality of research in general.

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## How to improve the quality of scientific research in India

The article 'Let us do justice to science' by Saad Tayyab (*Curr. Sci.*, 1998, 75, 78-79) was very interesting and throws light on the sorry state of affairs of science in majority of our universities, colleges and research institutions. What has been suggested by Tayyab for healthy and fruitful research is already being followed in some of our prestigious institutions and the results are well known. However, the scientific scenario in universities, colleges and institutions other than those listed is entirely different. Unfortunately, what is happening in the name of research leading to PhD throughout the country is appalling. The number of research papers cited in international indexes will stand testimony to this debacle. Let me cite some of the reasons for this tragedy. For instance, most of the teachers who are carrying out research sincerely are neither benefitted through promotions nor do they get recognition.

UGC and education departments of the State Governments insist on refresher courses rather than high-quality

research. No credit is given to the teachers for their outstanding research, publications, completion of projects and guiding PhD students. There is no relaxation in the teaching work-load for those teachers who carry out research despite their teaching responsibilities. Paradoxically, universities and colleges take the benefit of the work and obtain plan grants from UGC. But these teachers who carry out research, complete projects and guide PhD students are denied their basic academic benefits. For promotions and placement in senior scales, the only criterion is attendance in refresher courses.

I suggest that UGC which governs our universities and colleges must clearly define the benefit of research to college and university teachers and it must instruct the State agencies accordingly. Only quality research work must be encouraged in this regard. Publications of papers in peer-reviewed journals, successful completion of national and internationally-funded research projects, awards and other achievements must be

encouraged. At the same time there should be a uniform policy for research leading to PhD in all universities and colleges in the country. The same practice should be followed for the entry of students into research as is being done at reputed institutions like CCMB, IISc, TIFR, etc. This will allow real talent to enter and restrict fraud and duplication of research. The universities must be bound to have a very strict procedure for permitting PhD candidates and they must face entrance tests or show evidence of research accomplishment after M Sc, as a condition to registration.

Similarly, teachers who want to be guides and experts of the thesis must prove their merit either by independent publications in peer-reviewed journals or by getting a registration through an independent body of experts. Seniority must not be the sole criterion.

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## Dogs wagged by bureaucratic tails

I wish to write about a recent experience of mine which I suspect may strike chords of shared sufferance among your readers. Many research investigators have had occasion to be invited for meetings at the Government science departments, either as members of expert committees or for project presentations. Such meetings are most often held in New Delhi. Invitees are left to fend

for themselves with regard to arrangements for local transport and accommodation, and hospitality is a euphemism for the services offered by our national capital in either sphere.

We are also aware that Government regulations on allowances for its officials on tour are quite conservative. For example, the maximum provision for daily allowance is Rs 650 inclusive of

the cost of stay in a hotel. But would you imagine that the maximum for an expert invitee is pegged at Rs 100 per day (which represents just 80% of the entitlement of the least paid Group D employee in the Government)? Invitees who are members of committees considering grant proposals also necessarily have to carry large loads of official documents with them, but they are not