

Lack of motivation for quality research

With reference to recent letters in *Current Science*^{1,2}, I would like to emphasize that not only funds but lack of motivation for quality research is responsible for the present research scenario in the country. India is ranked 11th in terms of papers and 13th in terms of percentage of papers in the cited list among 13 countries². We know that most of the work is of repetitive nature. Gupta³ and Lakhotia⁴ are of the opinion that the number of students at PG and research levels should be reduced. Gupta³ also thinks that mushrooming colleges with poor laboratory facilities are responsible for degraded education/research standards in different universities.

During 1980–81 there were 40 students in M Sc and more than 50 research scholars in the botany department of the University of Allahabad. This number was quite sufficient considering the limited laboratory facilities. I completed my doctorate using a pressure cooker (a lone instrument used in place of an autoclave). Things changed later on, and the laboratories were full of equipments; but research scholars were missing. Now it is

claimed that the situation will improve since the university has got a Central University status. The question still unanswered is, where are the motivated research scholars?

I would like to remind all those young teachers who claim that they do not have enough time due to busy teaching schedule or have no funds to complete their research projects, that research is not a part-time job. One has to think a problem and to achieve its objective, he/she has to try several alternatives. This may be possible in a day, a month or it may take even a few years. Once a teacher is motivated, he/she will achieve the success and others will blame the situation for their failure. I would like to ask the authorities as to how many universities have central instrumentation facilities? Many departments have central instrumentation room, but instruments purchased by the Principal Investigators are locked in their personal cupboards. Why does the Head of a department not make a common pool of chemicals and glassware, to avoid duplication of purchase of chemicals in large quantities, when only

small quantities are needed by each researcher? Due to lack of repairing grants and greed for new ones, instruments worth millions of rupees are lying unused. Therefore, I recommend that all the universities should be given funds for new instrument as well as maintenance grants for old instrument. Society is looking towards the scientists for better future. We should never give up an idea, and work to achieve the desired objectives. This will certainly help to change the present scenario.

1. Srivastava, G. K., Singh, V., Shukla, S. K. and Shukla, P. K., *Curr. Sci.*, 2007, **93**, 749–750.
2. Basu, A., *Curr. Sci.*, 2007, **93**, 750–751.
3. Gupta, Y. K., *Curr. Sci.*, 2006, **90**, 276–277.
4. Lakhotia, S. C., *Curr. Sci.*, 2005, **88**, 1731–1735.

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Lack of statistical confidence

While on tour to the Himalayas, I came across a news item (*Amar Ujala*, 20 July 2007) which has prompted me to pen down this letter. P. S. Tejale, Director General (DG) of the Geological Survey of India (GSI), submitted a report on seismic vulnerability of Uttarakhand to Chief Secretary, Government of Uttarakhand at Dehradun, based on work undertaken for a period of three years. The report deals with the probability of occurrence of earthquakes in different districts (Table 1).

This must have been a good field and academic exercise. Why the probability was given in percentage is not clear and the timeframe for occurrence of earthquakes appears to be the near future.

However, the subsequent statement by the DG appears to be uncalled for. After giving details of the probability of occur-

rence of earthquakes in different districts, he has observed that earthquakes cannot be predicted. This is self-contradictory statement. The entire theory and philosophy of probability estimation is to predict the likelihood of occurrence/s. The projections are probabilistic and not deterministic. These projections show the possible or likely trend. The probabilistic approach has been used in trade, commerce, industry, social sciences, medical surveys, economic and financial fields, war strategies, meteorological forecasting, etc. Everybody knows the limitations of probabilistic projections. But after three years of study and arriving at probability values of occurrence of earthquakes of more than 0.98, to say that earthquakes cannot be predicted shows lack of confidence in the work or it could be disrespect to the theory of probability. This

statement takes the statistical findings to redundancy level.

Raghu Kanth and Iyengar¹, and Singh *et al.*² have done good work of seismic risk estimation for Mumbai and Delhi respectively. They have done probabilistic estimation of earthquakes and related parameters, extensively. But no author has

Table 1. Probability of occurrence of earthquakes in different districts of Uttarakhand

| District | Probability (%) |
|-------------|-----------------|
| Rudraprayag | 98.3 |
| Pithoragarh | 94.9 |
| Tehri | 96.8 |
| Pauri | 96.8 |
| Uttarkashi | 83.3 |
| Almora | 81.6 |

ever made any statement that earthquakes cannot be predicted. Contributions in the form of probabilistic estimations and projections in various fields of national development by P. C. Mahalanobis and the Indian Statistical Institute are quite well-known.

It will be useful to know some points about the theory and development of probability. Systematic analysis of non-demonstrative arguments is an important task of logical theory. Non-demonstrative reasoning received some attention from thinkers in the ancient and medieval periods. Following Pascal and Fermat, a series of distinguished investigators, including Jakob and Daniel Bernoulli, Abraham de Moivre, Jean d'Alembert, Thomas Bayes and Joseph Louise Lagrange, esta-

lished fundamental theorems of probability and showed how, on the basis of apparently simple assumption, the probability of such complex events as that of obtaining two sixes at least once in 24 throws with two dices can be found. These achievements were extended and unified by Pierre de Laplace in his work, 'Theorie analytique des probabilités'. Contributions of contemporary thinkers during the last few decades to various fields all over the world are quite well-known.

According to the philosophy of probability theory, the findings should be justifiable, self-evident, sound and rational. It is felt that the DG should have remembered these fundamental guiding principles of probability. His statement has totally nullified the good work of finding

the probability of occurrence of earthquakes in Uttarakhand. Instead, he could have observed, '...we have identified seismically vulnerable areas with high probability of occurrence, but we cannot predict the exact time of occurrence of earthquakes...'.

1. Raghu Kanth, S. T. G. and Iyengar, R. N., *Curr. Sci.*, 2006, **91**, 1486.
 2. Singh, S. K. *et al.*, *Bull. Seismol. Soc. Am.*, 2002, **92**, 555.
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Reviving quality in plant science education

The quality of postgraduate teaching in plant sciences is declining in India. Many of the botany departments in Indian universities have shifted from traditional M Sc courses in botany or plant sciences to courses like biotechnology or genetic engineering. Even the teachers of botany are not confident about the relevance of their subject, the same being reflected in the mindset of the students. The postgraduate syllabus of botany courses in most of the Indian universities is on par with the international standards. Unfortunately some of the new topics mentioned in the syllabus are not taught in the class due to lack of knowledge of the teachers. The UGC is spending lakhs of rupees to conduct refresher courses in order to equip teachers regarding the recent advances in science. But only a few of them benefit from these refresher courses. Majority of the teachers attend these programmes only to get promotions.

If we analyse the quality of knowledge acquired by the students now and compare it with the students of the early 70s or 80s, there is a tremendous decline in the acquisition of knowledge. Even though we speak of interdisciplinary approach nowadays, it is not new to plant sciences as such. If we analyse any of the books written in the early 60s or 70s, we can see that most of the science books in

physiology or even anatomy have successfully explained biological problems using various physical, chemical and mathematical terms. Unfortunately books published nowadays lack this approach, reflecting the quality of the authors.

There are various factors that affect the declining standards in plant science education. Some of them are listed as: (1) More importance given by teachers to certain courses like biotechnology, without understanding their meaning. (2) Importance given to record-drawing, making many wonder if botany is an art. (3) Negligence of basic subjects like taxonomy, anatomy, histochemistry, cytogenetics, etc. (4) Importance given to molecular biology tools and techniques. (5) Over dependence of substandard guide-like textbooks. (6) Lack of multidisciplinary approach in the teaching process. (7) Inability of teachers to convey the application of the subjects taught in class at the industrial level. (8) Poor practical training in the laboratory. (9) Lack of industrial academic training.

If we analyse the attitude of our students, they may be able to explain concepts in molecular biology, but cannot correlate them to classical genetics. Likewise, they are trained in various molecular biology tools like electrophoresis, but are unaware about its physical process.

Faculty capable of doing micrometry or histochemistry are also becoming rare.

Plant science is the gem among various science subjects. It has to be nurtured for the well-being of the human and scientific community. The varied metabolic pathways of plants may provide answers to many of the problems faced by the human community, especially in the development of new drugs and 'designer products'. Phytodrugs will be a major business in the international market. Some private colleges in India have already started courses like phytomedical sciences and technology, keeping in mind the prospects of the subject.

Being a country rich in biodiversity, it will be a big loss for us if we do not have well-trained plant scientists in the future. DST along with UGC should initiate steps like providing scholarships and free and compulsory training at various research institutes as part of their academic programme to students who pursue postgraduate education in plant science.

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