Citation index and impact factor in scientific publications

Sahni’s opinion and observations1 on the publication of the scientific results in refereed High Impact Factor International Journals (HIFIJ) and issues related to the universal nature and status of science call for a wider debate. It is certainly not important where the science has been done; the only merits are communicated results and their implications. But in that situation also it would become irrelevant where science is published, whether in HIFIJ or in low impact factor journals. It gains relevance only when one has to distinguish or select a few among a number of scientists. A number of times, this situation has to be faced by scientists and science managers. Citation indices and impact factors are good indices and come in handy for such an exercise to avoid subjectivity while assessing competence of a scientist.

The second aspect of Sahni’s opinion is avoiding compartmentalization of science in national boundaries while considering assessments, grants and fellowships. It would be useful to dismantle these boundaries but there is a small rider that whatever is performed and published by the scientist is expected to be mostly relevant to the needs and requirements of his country. The two aspects of opinion are dealt with here:

Results of scientific investigations must always be recorded/published in the form of scientific correspondence/research papers for wider dissemination of knowledge and to allow peers to test and verify the results. It was never a major aspect where it was published. But at present times where almost everything is quantified, science, too, has come to a stage where we have devised measuring published scientific results in terms of citation index and impact factor. It is good that quantification provides objectivity in assessing the results by peers and for common man to understand the importance of the work. But does it not hamper uninterrupted free flow of ideas and early reporting of results of scientific inquiry? Undoubtedly every serious scientific worker wishes to get his/her results published in leading and widely circulated scientific journals so that his/her accomplishments are noted and recognized by peers of his/her field. Communication is a skill and it is not necessary that every scientist masters the art. But it should not become a precondition and a hurdle in reporting scientific results. HIFIJs demand several parameters to be incorporated in the study before any work is accepted for publication. Many of the parameters are beyond the control of the individual scientist, particularly from a developing economy. It is a fact that in that situation such scientists lag behind while being considered for recognitions and grants. Here comes the role of the peer groups for providing a level playing field. Since we are talking about the Indian scenario this handicap becomes an advantage for some and disadvantages for others. A reasonable solution would be that those who in spite of all advantages or disadvantages get their work published on problems related to India or Indian materials should be given preference in such matters of recognition and fellowships.

In bygone decades scientific journals were brought out by scientific societies with the sole motive of communicating results of scientific investigation by their members or others working in specific areas to the scientific world. Such journals had in-built mechanisms of quality control (rigorous refereeing), which enhanced the value of the publication because all those involved in the publication of scientific journals were playing three-in-one role, namely that of author/editor/referee and doing sufficient justice to the act they were enacting at any given point of time. Involvement of business houses in printing and publication of scientific journals, started a race of upmanship resulting in roping in of professional marketing people for distribution that seriously affected the society’s journals. In this exercise, the two terms—citation index and impact factor—became common words among research workers. Willingly or unwillingly many journals have tried to satisfy all the conditions to figure in the list of journals having the two recently derived pristine criteria.

Most of the works by Indian scientists during the colonial period met international standards and generally got published in Indian journals, proving the merit and importance of the work over the medium of publication. However, now, since new and logical methods of citation index and impact factor have been devised, user agencies (academies, funding agencies of the government departments, UGC, etc.) can adopt them for gradation of institutions and scientists.


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The relevance of biofuels

Since the 1970s, the world’s attention has been focused on depleting oil reserves. As gasoline prices have reached record heights, demand for fuel continues to increase and crude oil price remains volatile. Our dependence on petroleum for fuelling the transportation sector threatens energy security, affects the environment and weakens our economy. Developing the technology to produce and use biofuels will create fuel options that can positively impact these issues and establish a safe, clean and sustainable alternative to petroleum. Gone are the days of growing edible crops just for food; now our crops can go from the field, to the family table, to the fuel tank.

Biofuels are renewable fuels generally derived from agricultural crops such as corn, soybeans and sugarcane, or from biomass resources1, such as agricultural, wood,
animal and municipal wastes. Much of the waste is lignocellulosic material that can be converted into biofuels. The two most common transport biofuels are ethanol and biodiesel. They are considered to be ecofriendly and can be used as substitutes for gasoline and diesel, or are blended with them in order to reduce greenhouse gas emission, thus helping communities improve air and water quality by reducing toxins. Development of recombinant strains to enhance the yield of ethanol in a short span has also received considerable attention. The fossil energy balance of biodiesel (3.2) indicates that for every unit of energy used for producing biodiesel, over three units are available to do useful work. In contrast, the consumption of one unit of fossil fuel energy produces just 0.83 units of useful energy from petroleum diesel.

India should focus on the conversion of biomass into fuel, which is an attractive alternative to face the emerging challenges. The Government of India has approved the controlled cultivation of Jatropha curcas, Pongamia pinnata, Calophyllum inophyllum, Euphorbia tirucalli and Boswellia ovalifoliolata for biodiesel production. J. curcas is the popular biodiesel-yielding source. It is estimated that about 3 million hectares of plantation is required to produce oil for 10% replacement of conventional diesel. Further, one acre of Jatropha plantation could produce oil sufficient to meet the energy requirement of a family of five. The residue oil cake, after extraction of oil, can be used as organic fertilizer. Moreover, Jatropha can be grown in any wasteland with less irrigation and hence can be an important feedstock under Indian conditions. In recent years, trials on automobiles using biodiesel have been conducted by institutes like IOC, ICAR, IIT-Delhi, which have confirmed that biodiesel can reduce wear and tear of engines and reduce oil pollution significantly.

The use of biofuels will preserve the environment, boost the economy and homeland security. Research should focus on improving technology for production of biofuels, which will decrease costs and increase the kind of biomass that can be converted into biofuel. Today’s farmers can be part of tomorrow’s solution and can grow the energy that will ‘fuel our future’.


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**Frequency of sister chromatid exchanges in diabetic patients**

Sheth et al. report increased frequencies of sister chromatid exchanges (SCEs) in patients with type II diabetes, results which are interesting. But from the way the results are presented it is difficult to judge whether their conclusions are valid. The figures presented show very high frequency of SCEs (21) in a lymphocyte from a diabetes case and 7 SCEs in a control case. The authors have pooled all the data of 20 diabetic cases together which do not give an idea about the extent of variability within the group of patients. It is important to know whether all the patients had high frequencies of SCEs or only a small proportion of them. It will be useful to present individual values in a histogram for the patients and controls which will reflect the extent of variations observed. For SCE studies in human populations it is recommended to score at least 40 or 80 cells per individual depending on the extent of difference observed between the controls and the patients and apply appropriate statistical analysis. The authors did not specify how many cells were scored for the presence of chromosomal aberrations. If they had confined this analysis to only 25 second division metaphases, then they would fail to observe any aberrations, because the frequencies of aberrations are usually very low (1–3/1000 lymphocytes) unless there was a history of exposure to radiation or chemotherapy. To detect spontaneously occurring chromosomal aberrations at least 100 cells per individual have to be scored. There are some discrepancies in the paper. Under table 2, the $P$ value given is <0.001, whereas $P$ values in the abstract and text should be <0.0001. In table 2, the fourth column should be no. of SCEs/meta-phase (not no. of metaphases). I guess the BrdU concentration used is 10 $\mu$g/ml and not 10 $\mu$l/ml.


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