Motivated and committed teacher—dire need in our education system

I read the response 'Need for reforms in our education system'[1] to a previously published editorial 'Who are "people of genius" ' in *Current Science*[2].

Reforms need to come in the context of motivated and committed teachers, who would 'teach' (and not 'coach' for examinations) with enthusiasm and motivate learners with passion. The ultimate effect of simply improving the infrastructure in educational institutions is similar to flogging a dead horse. The driver in the classroom is the teacher, and if the teacher works with no motivation towards and passion in his/her job, the outcomes are a big zero. If we are presently talking of the need to change the education system in India, then the imperative is that something is intensely lacking. Teacher commitment is the principal driver in achieving an actively thinking and enabled human resource. In a majority of our institutions – from primary schools to the so-called major Indian universities – the disturbing feature is teachers with no motivation to teach. It is preposterous to think of high schools and colleges in rural India, because at least those in the cities get some exposure to technology via media. In how many universities and colleges, would the senior professors, who take pride in their titles and fellowships in learned academies, take classes to undergraduate students regularly? I am aware several would put up their hands and say yes to this challenge, but let us be frank and honest with ourselves; I would imagine that the true number will be in single digits. I would squarely blame the university and college system, which directly and indirectly promotes self-aggrandisement of teachers (priding themselves as professors), who, frankly speaking, feel shy to even to refer to themselves as teachers at the university or college level.

The most fundamental reform needed is to recruit committed and passionate teachers. At least Tamil Nadu, I can confidently say, suffers this problem intensely because of the state's lop-sided policies on teacher recruitment – from primary schools to colleges and universities, which could be true in other states of India as well.

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Popularization of 'Ashtvarga' plants for conservation and sustainable utilization

'Ashtvarga' is a composition of eight medicinal herbs [Riddhi (*Habenaria intermedia*), Vriddhi (*Habenaria edgeworthii*), Jeevak (*Malaxis acuminata*), Rishvak (*Malaxis muscifera*), Kakoli (*Roscoea procera*), Kshirakakoli (*Lilium polyphyllum*), Meda (*Polygonatum verticillatum*) and Mahameda (*Polygonatum cirrifolium*)], known to strengthen the vital force of the body, cell-regeneration capacity as well the immune system. All these plants are used in the preparation of 'Chyavanprash' (an herbal combination used in Indian medicine) since ancient times, which is largely been used for preventing degenerative diseases, maintaining youthfulness, vigour, vitality, etc. Studies on Chyavanprash suggest that it neutralizes the free radicals that cause cell decay and ageing[1,2]. These properties of the Chyavanprash might be due to the presence of Ashtvarga plants along with other components. This has increased the demands of these plants in pharmaceutical industry. As a result, the availability of these plants in nature is rapidly declining. Ashtvarga plants have been threatened since ancient times, and are difficult to obtain in the required quantity[3]. Considering the medicinal properties on one hand and their rare availability in natural habitat on the other, it is important to develop approaches for their conservation and sustainable utilization. It is to be mentioned that while undertaking conservation measures, it would be pertinent to evaluate the range of variability using various parameters to identify the elite populations/individuals based on ecological, genetic and phytochemical attributes. Such elite populations/individuals may act as the source material for attempting mass propagation. For instance, detailed study on two Ashtvarga plants, i.e. *H. edgeworthii* and *H. intermedia* was conducted[4]. Both are considered rare and critically endangered in the Himalayan region[5]. Genetic diversity of different Inter Simple Seduence Repeat (ISSR) primers on *H. edgeworthii* and *H. intermedia* was low. Tuber extract of both the species showed higher total phenolic content ranging from 3.78 to 8.57 mg gallic acid equivalent/g dry weight (*H. edgeworthii*) and 5.01 to 8.45 mg gallic acid equivalent/g dry weight (*H. intermedia*) among different populations. Antioxidant activity determined by 2,2′-azinobis (3-ethylbenzothiazoline-6-sulphonic acid) (ABTS) radical scavenging, 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging and ferric reducing antioxidant power (FRAP) exhibited considerably higher antioxidant capacity in both the species compared to the other components of Chyavanprash, i.e. *Piper longum*, *Tribulus terrestris*, *Boerhavia diffusa*, *Tinospora cordifolia* and *Oroxylum indicum*[6]. *In vitro* propagation protocol through asymbiotic *in vitro* seed germination was established in both the species[4,7,8] and tissue culture raised plant materials in *H. edgeworthii* showed higher phenolic content and antioxidant activity than the wild tuber[7,8].

All these findings in both the species suggest that conservation efforts are needed to save the species in their natural habitat, which can further be utilized for harnessing their antioxidant potential

in different pharmaceutical industries. Popularization of these species is also required to generate awareness for their cultivation and conservation as these species are among the important elements of the ecosystem. Besides, there is a need to generate baseline datasets as with *H. edgeworthii* and *H. intermedia* in other species too. The present study has projected a model that could be applied for undertaking research on other threatened Ashtvarga plants towards developing strategies for their conservation and sustainable utilization.

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Endosulfan: analyses sans logic

The alleged health problems in Kasaragod district, Kerala, where endosulfan was aerially sprayed for two decades, have gained national and international attention through campaigns organized by NGOs and activists. A slew of court cases, allegations and counter-allegations, large-scale financial aid and its misappropriation, a plethora of social problems and above all, the stealthy replacement of cheap generic pesticides with the costly new-generation proprietary ones in India and elsewhere are some of the outcomes of this well-organized campaign. However, the campaigners carefully avoid a comprehensive health survey of the so-called affected population from their charter of demands, besides making it clear that any proposal for such a study would be staunchly opposed, since the link between the alleged health problems in Kasaragod and the aerial spraying has already been established conclusively. The anti-endosulfan campaign, as is the case with most such movements, has been deriving its momentum from cherry-picked studies and anecdotal evidences. The popular media engaged in the high-voltage campaign using heart-rending images of 'endosulfan victims' has blacked out all voices of reason and dissent. No wonder that a few studies originating from the politically charged institutions of the state government especially in an atmosphere created by a protracted and emotionally charged campaign, also turned out to be biased, erroneous and misleading. Such studies cater to the needs of the campaigners rather than bringing the truth to light. The epidemiological study conducted by a team of researchers at the Calicut Medical College is an illustrious example[1]. The study by Harikumar *et al.*[2] too falls within this genre of research on the endosulfan issue. We would like to place on record the methodological lapses, inaccuracies in the results and the misleading conclusions communicated by Harikumar *et al.*

Methodological lapses

The laboratory at the Centre for Water Resources Development and Management (CWRDM), where Harikumar *et al.*[2] carried out analysis of the water, soil and sediment samples for endosulfan residues is not an accredited one for conducting analysis of pesticide residues. In the absence of accreditation by the National Accreditation Board for Testing and Calibration Laboratories (NABL), the quality of the data generated is questionable as there is no mechanism in place to ascertain the same. The authors have used gas chromatograpy with electron-capture detector (GC-ECD) technique to estimate endosulfan residues. But mass spectroscopy (MS) was not done to confirm the results. The Government of India has made it mandatory to confirm the results with MS under the All-India Coordinated Research Project on pesticide residues. The studies by the Centre for Science and Environment and the Calicut Medical College on endosulfan residues turned out to be grossly erroneous, as they did not confirm the results with MS. Weber *et al.*[3], who reviewed the fate of endosulfan in the environment, underscore the measurement challenges for endosulfan and state that GC-ECD significantly over-estimated actual concentrations. Vidal *et al.*[4] demonstrated the advantages of tandem mass spectroscopy over the ECD in the analysis of serum samples where matrix interferences can be confused with target pesticides.

Harikumar *et al*. have not compared the endosulfan residues in the sprayed areas with those in the unsprayed areas as done by the National Institute of Occupational Health (NIOH)[5]. This is essential as pesticide residues are often found in unsprayed areas too. Had this been done, biases and errors in the analysis would have been evident.

Implausible results and illogical conclusions

The two-decade-long aerial spraying of the pesticide was stopped following public outrage and the last round of aerial spraying was carried out on 26 December 2000 (ref. 5). No endosulfan has ever been applied during the past 13 years in Kasaragod due to the extreme vigil of the people. Harikumar *et al*.[2] have conveniently forgotten the fact that they are analysing residues of a pesticide applied 13 years ago while emphatically stating that 'the combined toxic residues of endosulfan in the sediment and soil samples of selected areas of Kasaragod were found to be persistent for a period of 1.5–2