In this issue

Sustaining sustainability
in campus environment

The notion of Sustainable Development and the associated international declarations led to the understanding that action is delimited by the level of commitment and awareness. The International Decade of Education for Sustainable Development moved the discourse to campuses. Now some campuses – MIT, for instance – even have designated office for sustainability and climate action.

The campuses in India have not woken up to the potential of making students and staff stakeholders in a campus development strategy that considers sustainability as a critical factor. The readiness of Indian campuses for a transition to informed action is presented in a general article on **page 2198** of this issue.

What are the perceptions of students at IIT Roorkee about issues related to environmental sustainability? Which department is more involved in sustainability issues? Do perceptions change as the students go up the ladder of academics? How ready are the students to contribute voluntarily to sustainability?

Asking such questions can generate ideas for strategic action and can help in the planning and management of campuses. It would be interesting to see a replication of the data collection to see whether the perceptions differ between IITs, IISERs, Central and State universities.

We should also note that the administration of such questionnaires can also invoke a Hawthorne Effect, where perceptions change due to the questions. The time invested by students to fill the questionnaire can in itself, increase commitment to sustainability issues.

Fixing carbon, growing food
Succulents in semi-arid agriculture

Plants have evolved a variety of metabolic pathways to use CO_2 from air and water from the soil, to ultimately produce carbohydrates. Chlorella, an alga, fixes one molecule of carbon dioxide into a three carbon atom intermediate. But some plants such as maize, take up two molecules of CO_2 to fix them into an intermediate that has four carbon atoms.

These two pathways differ in the way water is used up in the process. C4 plants like maize use much less water than C3 plants like Chlorella, to fix carbon. But as if to challenge the supremacy of fixing two carbon atoms in one go, some plants – mostly succulents – have evolved a system of carbon storage before using the C3 cycle to fix carbon. These plants take even less water than the C4 plants.

In semi arid and desert conditions, where water is the limiting factor, carbohydrate productivity can be increased using these plants. *Opuntia* is a typical succulent that survives well in low water conditions. And the fruits are edible. But commercial level plantations of *Opuntia* occur only in Mexico. Though India has large semi-arid regions where it could be cultivated, it is mostly seen as wild or planted as hedge.

As a first step in introducing the fruit into the Indian diet, scientists from CFTRI Mysuru take up the challenge of determining the nutritional value of the fruit of *Opuntia dillenii*, a common succulent found in the semi-arid regions of South India, in terms of the amount of minerals – both major and minor – in the fruit, at various stages of ripening. Their report on **page 2295** shows that the fruit has high potassium content. So, besides fortifying food security in semi-arid regions, it could be useful in the control of hyper blood pressure.

Microbes for energy
and for environmental engineering

In the first decade of the last century, it became apparent that microbes can spew out charges. That these charges can be a source for electricity generation became a possibility only towards the end of the century. Now, in the second decade of the 21st century, the role of microbes, not only for power generation, but also for hydrogen production and water treatment, is being actively investigated. Moreover, microbes (or parts of them) are used as biosensors and for denitrification.

A hundred years of evolution of the subject – biolelectrochemical systems – is difficult to review. But given that most of the developments in this area have taken place in the last 10 years or so, it is appropriate to attempt a bibliometric review. An examination of scientific databases can often tell us where active developments are taking place. A review article on **page 2204** shows that there is an explosion of scientific research in this area – from one article in 1991 to fifteen articles in 2003 to a whopping 680 in 2014!

Scientists from China climb giant shoulders in a manner that would have surprised Newton and present us with a bird's eye view of the lay of the land. Which are the hottest topics in research? Which journals publish more articles on the subject? Which countries, which institutes, publish more? How many are collaborative, across institutions and across countries? The filters available for database searches, and bibliometric tools that have evolved over the past few decades, come in handy for a quantitative analysis.

Microbiologists looking for applied areas and students of environmental engineering may now turn to page 2204. Ph D scholars in the beginning of their research career also have a lot to learn from the methods used in the review article.

Hundred Years of Research
Special section

A hundred years of research quite often transforms science in ways that could not have been predicted. In the last issue of *Current Science* you read about new developments in Quantum Theory. This issue, too, is special: it examines the advances in General Relativity Theory. It looks as if the time is ripe for yet another revolution in Physics. Read on for more in the special section.

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