In this issue

Spread and Style of Research

Comparing countries

The way research is organised varies from country to country. In some, research is primarily in the government sector or institutions for higher education and, in some others, it may have contributions from the private and other sectors. Which is the best way of organising research, the most productive?

Gangan Prathap chose the Scimago Institutions Rankings as the basis for his study. SIR, as it is respectfully called, has a more comprehensive coverage of research-focused institutions than other institutional rankings. All institutions with records of more than 100 publications per year in Scopus are included in the Scimago. Besides data from Scopus, it also takes into account patents and the visibility of research findings on the Net, as measures of innovation and social impact.

The Scimago listed 5632 institutions in 2018. Gangan Prathap selected 20 leading countries from the Scimago and compared the spread of research contributions of different sectors. Using statistical methods he shows that the leading countries have their unique styles of sharing and spreading their research efforts across sectors. Read the General Article on **page 530** in this issue to know more.

Lakes within Glaciers

Threat of flash floods

When Himalayan glaciers start retreating, moraine-dammed lakes are often formed. Sudden release of this water can lead to flash floods downstream. We need to learn from the history of such flash floods and seek ways to predict them and to reduce their impact on human lives.

Scientists from the Divecha Centre for Climate Change in collaboration with the Sikkim State Council of Science and Technology examined the potential perils that may be lurking in ten such glaciers. The terrain is not friendly. So they took satellite images from 2001 and 2002. Ten glaciers in the Tista Basin covered an area of 136 square kilometres. Four had moraine-dammed lakes.

Remote sensing cannot estimate the depth of these lakes. Estimating the volume of water based on the area can lead to large variations in results. So the scientists chose to use a method based on velocity, slope and laminar flow equations. The model has been validated by comparing the predictions to the actual boundary seen in 2015.

They estimate the total volume of the ten glaciers in Tista Basin to be about ten cubic kilometres. The total volume of lakes was about 150 million cubic meters and expanded with the formation of new lakes in 2015 to nearly 250 million cubic meters. The team also identified three new sites where lakes may form in future. Read the Research Article on **page 620** in this issue for more.

Monitoring glaciers in other regions of the Himalayas can help us prepare for flash floods. History need not be repeated.

Pesticides and Soil Health

Scientists have been pointing out that the use of chemical pesticides to protect crops, to improve agricultural production and to provide food to the ever increasing population may impact environment, ecology and human health. Now researchers from three ICAR institutions have come together to provide evidence that using pesticides may even bring down agricultural productivity.

The researchers collected soil samples from 20 locations in the paddy growing belt of the Sitapur district, Uttar Pradesh. There are four pesticides used commonly in the paddy fields of Sitapur: chloropyriphos, 2,4-D, carbendazim and carbofuron. The scientists examined soil microflora, soil microbial biomass C and enzymatic activities to quantify the impact of pesticide use.

In the first 10 cm of the paddy soils, which half the soil microbes inhabit, they found more than 130 different bacterial species. Colony-forming units per gram of soils, from farmers using pesticides, reduced from more than 600 thousand to less than 20 thousand. When safer pesticides were used, bacterial load in soil increased from less than 55 thousand units to 410 thousand units.

2,4-D application resulted in maximum harm to the soil microbiota of paddy fields compared to chlorophyriphos, carbofuron and carbendazim applications, report the researchers in a Research Communication on **page 643** in this issue.

Since soil microorganisms have a role in increasing agricultural productivity, the use of chemical pesticides for immediate gains may lead to long-term losses. Though consumption of chemical pesticides in India has been reducing in the last two decades, to meet the demands of growing populations, perhaps we may need to rethink ways to deal with agricultural pests.

Testing Time for Rice Varieties

Bringing out a new rice variety is like bringing a new drug into the market. Drugs tested in labs save lives; rice varieties tested in fields stabilise yields to feed populations.

It is, however, difficult to estimate the role of genetic gain in the improvement of yield because other factors such as water, fertiliser, sunlight, farm management, etc. also influence yield. Performance may vary in different ecosystems.

Scientists from the ICAR-Indian Institute of Rice Research reported the progress from 1974 to 1994 in volume 71, pages 438–448 of this journal in 1996. Now, in this issue, they come back to report a Research Account of the period 1995 to 2013.

Evaluating the productivity of 9880 breeding lines, including checks under different field conditions, to releasing 573 varieties for commercial cultivation, the processes adopted are quite different from those involved in bringing a new drug into the market. Read on from **page 544**.

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