In this issue

Emptying Ship Ballast Water

Microbes in sea ports

When ships are not carrying adequate weight, they become unstable when the sea gets rough. So ships use water as ballast. The ballast water can be emptied when cargo is loaded. But if this is done in the ports, the microorganisms in the ballast water are introduced into a new environment. Ballast water can thus act as vector for marine bio-invasion, posing threats to environment and health.

What happens when ballast water from ports with different salinities is emptied, much later, into fresh, low or high saline water elsewhere, wondered Lidita Khandeparker from the CSIR-National Institute of Oceanography. She and her research scholar, Nishanth Kuchi, collected water from Kolkata Port (fresh water), Paradip Port (saline water) and Kandla Port (highly saline), and kept samples under dark for 30 days to simulate ballast water conditions, after examining bacterial diversity. They examined the changes in the bacterial diversity of the aged water. Then they mixed the aged water samples with water from the river, Zuari. To represent different levels of salinity, the samples were taken from upstream and mid stream sections of the river as well as from the mouth of the estuary. And they examined the changes in bacterial diversity again.

Now we have clues to understand what happens when the estimated 10 billion tonnes of ballast water is translocated in the sea every year. Besides bacteriologists and ecologists, port authorities and people from the shipping industry need to read the Research Article on **page 507** in this issue.

Optimising Irrigation Scheduling

Root water uptake model

A major portion of groundwater extracted is used up in irrigation. While over-irrigation is a waste of a precious and not-so-easily renewable resource, under-irrigation reduces crop yield. To optimise irrigation, there is a need to understand the patterns of water uptake by the roots of crops. Research has already shown that water uptake by crops is not linear. It increases and decreases with plant growth. Soil parameters, agroclimatic factors and the developmental stages of the crop under consideration introduce nonlinearities in water uptake even under adequate water availability. So, nonlinear models for the phenomenon have been developed.

Researchers from Himachal Pradesh and Uttarakhand assessed the most successful model, for its applicability to three different crops in three different agro-climatic conditions. They measured the required parameters for maize, wheat and Indian mustard, grown in Roorkee, Solan and Hamirpur and compared the field measured values with the values predicted by the model. By selecting appropriate values for the non-linear factor for each crop, they found that the values predicted by the model are in close agreement with the values from field crop experiments.

The challenge for agri-entrepreneurs now is to translate this model into technology that can be used by farmers to optimise water use for different crops. Read the Research Article on **page 485** for details.

Influenza and Pneumonia

Protection from COVID-19?

Examining death rates due to COVID-19, Gangan Prathap and Ajit Haridas from Thiruvananthapuram found an unexpected phenomenon – countries with high death rates due to influenza and pneumonia had low death rates due to COVID. There was an earlier report on the cross reactivity of sera from patients suffering from dengue fever with the Zika virus. So they decided to dig deeper.

Which influenza virus strain is providing cross immunity to CoV-SARS-2, they wondered? To find out, they searched for data on the types of influenza virus co-circulating 28 weeks before COVID-19 emerged as pandemic. Though the data is not complete or comprehensive, they could tentatively identify infection by the H1N1 of Influenza A virus as the dominant strain responsible for the phenomenon of inverse correlation between death rates due to influenza and COVID.

The influenza virus and the corona virus belong to two distinct families. But both are negative sense RNA viruses. And there are similarities in the pathology they produce. While researchers search for the mechanism of cross immunity for months to come, policy makers can leverage on this information to orient health delivery for COVID-19 to regions that were not impacted by H1N1 earlier. Read on from **page 535** in this issue.

COVID Comforts

Respiratory respite

The 25th March to 3rd May lockdown due to COVID-19 helped delay the spread of SARS-CoV2 and helped prepare for the epidemic's peak. There was also fallout which was not anticipated, but clearly visible: the air quality improved in most cities of India. And researchers from the Indian Institute of Remote Sensing took this opportunity to examine the baseline data of reduced anthropogenic pollution due to lock down, using satellite data.

Besides the lack of transport of Saharan dust into India this year, reduced vehicular traffic, forest fires and stubble burning also helped reduce air pollution.

An estimated 1.2 million premature deaths in India is attributed to air pollution. But the lockdown helped people prone to respiratory illnesses breathe. Read more on the comforts that COVID brought us, in a Research Communication on **page 539** in this issue.

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