In this issue

Evergreen Revolution

Cereals in India

The green revolution, initiated in the late 1960s, made remarkable improvements in food production in India. Critics of the Green Revolution often claim that it was short-lived and that productivity reached a plateau by the late 1970s. Researchers from the ICAR-Central Arid Zone Research Institute, Jodhpur, the Punjab Agricultural University, Ludhiana and the Indian Council of Agricultural Research, New Delhi now refute this claim.

They examined trends in cereal productivity since 1950. Dividing 68 years of data into four phases of 17 years each, they examined the productivity of wheat, rice, maize, pearl millet and sorghum to show that the productivity of cereals in India has grown consistently even after the Green Revolution.

This evergreen revolution in cereal production is a result of research in crop improvement and management practices, says the General Article on **page 1805** in this issue.

Tapping the Market

Coconut inflorescence sap

The sap that is tapped from coconut inflorescence is a nutrient-rich health drink, containing sugar, amino acids, vitamins and minerals. Many coconut-producing countries have started packaging and marketing the sap, *neera*. Coconut farmers in India, however, have not taken economic advantage of the inflorescence sap.

In a Review Article in this issue, scientists from the ICAR-Central Plantation Crops Research Institute, Kasaragod explore the method of tapping and sap yield variations. The yield depends on coconut variety, tree age and season as well as biotic and abiotic stresses. They examine the biochemical parameters of the sap and provide insights for tapping the inflorescence without reducing the yield of other products from the coconut trees.

Read more in the Review Article on **page 1809**.

Salabat Khan Tomb

When you travel from Aurangabad, Maharashtra, about 13 kilometres on Highway 61, stands the Salabat Khan Tomb, a 16th century Mughal monument. It has withstood the vagaries of weather for more than four centuries. But the passage of time made the beautiful tomb look ugly.

Researchers from the National Museum Institute, New Delhi examined the problem. They found that the lime used in the construction has not yet carbonated and leaches through the basaltic stone joints when rain water seeps into the structure. Calcifying bacteria then act on the calcium hydroxide streaks converting them to a hard pure white layer of calcium carbonate. Calcium carbonate from the lime mortar has changed its form to layers of calcite, they found.

Now, that can happen because of alkaline pH. And, often, the alkaline pH is contributed to by the urease activity of some microorganisms.

So they took samples and cultured the samples. They also sequenced the 16S ribosomal RNA genes to identify the microorganisms. They found *Bacillus*, *Arthobacter* and *Aquamicrobium* species, as well as *Agromyces indicus* species in the stratified deposits.

A Research Article in this issue argues that the same organisms that made the Salabat Khan Tomb ugly can be used to make buildings look more beautiful. A spray of these organisms along with calcium carbonate can make the exterior strong by creating a calcite layer, preserving it for posterity. Read on from **page 1840**.

Although the calcifying bacteria were responsible for reducing the aesthetic appeal of the Salabat Khan Tomb, they can be used to clean marble monuments such as the Taj Mahal and the limestone sculptures of Amravati and Nagarjunkonda. Bacterial biomineralization can be initiated by spraying the bacteria on the surface. This will give the surface of marble stones a stain free whitish coat and protect the underlying stone by making it scratch free.

Groundwater Recharge

Improved by ventilation

When rain water seeps through sand, often, the wetting front comes across a layer of air that resists further impregnation. So the water accumulates on the surface and runs off to join streams that join rivers that, in turn, join oceans.

If the air could come out, then water can go further down and join groundwater reserves, reasoned V. K. Haritha and L. Elango of Anna University. So they rigged up a square column in acrylic material and filled the first few centimetres with fine gravel and rest with sieved river sand of fine size. They covered the surface with a plastic mesh so that the surface remains flat during the experiments.

They poured water into the column and measured the time taken for the water to reach the bottom. Then they experimented with inserting various numbers of tubes of various sizes into the sand column. And measured the time for the water to reach the bottom.

As the number of vents increased, the time for water to percolate reduced. As the diameter of the tubes increased, again the time for percolation decreased. Pipes of any diameter inserted within the unsaturated zone beneath recharge structures such as check dams and percolation ponds will lead to rapid increase in the infiltration rate, say the researchers. Turn to **page 1914** in this issue and read the Research Communication to see the details.

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