



NEWS BULLETIN

Plants and Pollution

ENVIS RP-NBRI

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Vol. 02, February 2020

Recovery of Plant from Polluted Environment

CSIR-NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW

'Rule breaking' plants may be climate change survivors

Science Daily, 10 February 2020

Dr Annabel Smith, from UQ's School of Agriculture and Food Sciences, and Professor Yvonne Buckley, from UQ's School of Biological Sciences and Trinity College Dublin Ireland, studied the humble plantain (*Plantago lanceolata*) to see how it became one of the world's most successfully distributed plant species.

"The plantain, a small plant native to Europe, has spread wildly across the globe -- we needed to know why it's been so incredibly successful, even in hot, dry climates," Dr Smith said. The global team of 48 ecologists set up 53 monitoring sites in 21 countries, tagged thousands of individual plants, tracked plant deaths and new seedlings, counted flowers and seeds and looked at DNA to see how many individual plants have historically been introduced outside Europe.

What they discovered went against existing tenets of ecological science. "We were a bit shocked to find that some of the 'rules of ecology' simply didn't apply to this species," Dr Smith said.

"Ecologists use different theories to understand how nature works -- developed and tested over decades with field research -- these are the so-called 'rules'. "One of these theories describes how genetic diversity or variation in genes embedded in DNA are produced by changes in population size.

"Small populations tend to have little genetic diversity, while large populations with many offspring, such as those with lots of seeds, have more genetic diversity.....

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Forest soils recovering from effects of acid rain

Eurek Alert, 05 February 2020

Before the United States 1970 Clean Air Act, rainfall all over the country was acidic.

As precipitation would fall from the sky, it would mix with gases from industrial plants, emissions from cars, and especially coal and fossil fuel consumption. That caused the water to become acidic - also called "acid rain."

Besides the air pollution hurting plants and humans, this acid rain also hurt our soils.

Even dry deposits of these acidic emissions could be hurtful to humans, plants, soil and water. Acidic soil can bind nutrients so that plants can't get them.

It can hurt the microbes in soil, as well as plants. One odd "helpful" thing acid rain did, though, was to provide a few nutrients to the soil. The sulfur in the acid rain - in the form of sulfates - actually provided nutrition to plants. However, the benefit was negligible, and the overall effects of pollution required regulation. Occasionally, cities like Los Angeles will still experience "smog."

The incidents are even more common in China and India, where little regulation is in effect.

Jennifer Knoepp, with the US Forest Service, has been studying how the reduction of air pollution and acid rain is affecting forests in the southern Appalachian Mountains. Her interest is to see how soils are recovering as our air gets cleaner.....

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Conserve Plant to Save Environment

CSIR-NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW

8,500 trees to face axe in Bengaluru to ease traffic

Deccan Chronicle, 09 February 2020

The Karnataka Road Development Corporation Limited (KRDCL) will axe more than 8,500 trees in Bengaluru to decongest traffic in the tech corridor in the city much to the chagrin of environmentalists.

Campaigning organisation Jhatkaa.org has collected more than 2,500 signatures demanding an immediate stay on felling of trees, some of which are as old as 80 years.

Jhatkaa.org has also called for proper and accessible public consultation to be held for all projects. The existing two-lane and four-lane roads will be converted into four-lane and six-lane roads respectively along the stretch between Bannerghatta, Sarjapura, Mandur, Anekal and Whitefield.

Environmentalists point out that one of the reasons for the rise in air pollution in Bengaluru is the indiscriminate felling of trees across the city to make way for infrastructural projects.

"In just the past couple of years, air pollution has risen drastically in Bengaluru, with construction dust, garbage burning and the rise in private vehicles leading to more emissions.

In the midst of this, the city's old trees are a natural buffer and their loss for development projects will lead to worsening impact of climate change, not to mention the health effects of air pollution," the petition reads..... [Read More...](#)

Locals in Allahabad plant trees in 100 villages to create 'oxygen bank'

Times Now News, 11 February 2020

Locals in Allahabad's Pratapgarh are doing their bit in making the environment greener and better. In an attempt to make the earth a better place, people living in Pratapgarh have started planting trees in their area. The initiative has been started by an NGO named Paryavaran Sena.

Under the initiative, residents are planting trees in Allahabad, Kaushambi and Pratapgarh district of Uttar Pradesh.

The initiative intends on raising awareness about the environment and increasing level of pollution among the locals.

As many as 100 villages are a part of the initiative. Some of the villages are - Bojhi, Akaripur, Udideeh, Dhanipur, Kohla, Raipur Kala, Saherua, Kharwai, Malhupur.

The families are being sensitised towards climate change and increasing levels of pollution. The NGO is urging the families living in nearby areas to plant at least one peepal or banyan tree. Locals associated with the initiative are also trying to identify ancient trees that have been planted in their area.

BR Ahirwar, district forest officer (DFO), told The Times of India, "We will maintain a database of heritage trees, which were planted more than 100 years ago, and preserve them.

Besides, we will focus on planting more peepal and banyan trees in villages, blocks and cities. "..... [Read More...](#)



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Microbes for Remediation

CSIR-NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW

Engineered yeast can remove heavy metals from wastewater

[Chemistry World, 18 February 2020](#)

As the world's demand for electronic goods and other chemicals grows continuously, environmental heavy metal contamination grows too. Traditional chemical approaches to dealing with the problem can be ineffective and difficult, especially in the developing world where contamination is often most severe.

Researchers at the Massachusetts Institute of Technology, US, have genetically engineered yeast to precipitate heavy metals from solutions of contaminated water. They demonstrated their organism's effectiveness by cleaning up samples from notoriously polluted oil sands in Canada, and claim the yeast could easily be shipped to pollution hotspots elsewhere.

The most effective way to precipitate heavy metal contaminants is by forming sulfide minerals. However, as hydrogen sulfide gas is toxic and safe storage is therefore expensive, inferior reagents such as lime are normally used instead. One solution is bioremediation: sulfate-reducing micro-organisms can generate H₂S in situ. Unfortunately, says biological engineer Angela Belcher, these bacteria 'grow slowly, and require very precise handling and culture conditions.'

Instead, Belcher has studied yeast, which grows faster and can also produce H₂S. The molecular pathway involved is highly convoluted but, conveniently, had already been elucidated by the wine industry. Even in tiny amounts, H₂S can produce a rotten egg smell in wine, so strains of yeast have been engineered..... [Read More...](#)

Newly found bacteria fights climate change, soil pollutants

[Phys.org, 21 February 2020](#)

Cornell researchers have found a new species of soil bacteria—which they named in memory of the Cornell professor who first discovered it—that is particularly adept at breaking down organic matter, including the cancer-causing chemicals that are released when coal, gas, oil and refuse are burned. "Microbes have been here since life began, almost 4 billion years. They created the system that we live in, and they sustain it," said Dan Buckley, professor of microbial ecology in the Section of Soil and Crop Sciences in the School of Integrative Plant Science. "We may not see them, but they're running the show."

Buckley and five other Cornell researchers, along with colleagues from Lycoming College, described the new bacterium in a paper, "Paraburkholderia madseniana sp. nov., a phenolic acid-degrading bacterium isolated from acidic forest soil," published Feb. 6 in the *International Journal of Systematic and Evolutionary Microbiology*. The new bacteria, madseniana, is named to honor the late Gene Madsen, the microbiology professor who started the research. He died in 2017, before he could confirm the discovery. All plants and animals, including humans, host a collection of friendly bacteria that help us digest food and fight infection. The bacteria living in soils not only help plants grow, cope with stress and fight off pests, they're also essential to understanding climate change..... [Read More...](#)



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Effect of Climate Change on Seeds

CSIR-NATIONAL BOTANICAL RESEARCH INSTITUTE, LUCKNOW

Seeds in Tibet face impacts from climate change

Science Daily, 25 February 2020

A new study published in the Ecological Society of America's journal Ecological Applications examines how warming and increased precipitation (rain and snow) harms the seeds in the ground of the Tibetan Plateau and elsewhere. "Soil seed banks are essentially the last resort of natural resilience in ecosystems," says Scott Collins, professor at New Mexico University and an author on the paper. "Too often we focus on what we see above ground and base management decisions just on the appearance of the plant community."

The Tibetan Plateau, a place that has been grazed for thousands of years, is an ideal place to study direct and indirect climate effects on vegetation in a fragile environment. The study states that as the highest plateau in the world, averaging over 12,000 feet (4000 meters) in elevation, it is regarded as the third pole of the Earth. The warming rate here is nearly 1.5 times that of global warming due to climate change and annual rainfall has increased in most areas of the plateau.

Because the growing season is relatively short on the plateau, the soil samples and the plant surveys were all collected in one year. Researchers from Lanzhou University in China visited 57 sample collection sites at different elevations and ecosystem types in the northeastern part of the plateau. They gathered 1026 soil samples and surveyed the above-ground plant community, which are composed of the grown plants that reflect the types of seeds dropped into the ground over time. Next, the researchers germinated the..... [Read More...](#)

Climate warming disrupts tree seed production

Science Daily, 12 February 2020

Masting, the process by which trees vary the amount of seeds they produce year by year, is a characteristic of many forest tree species, including oaks, beeches, pines and spruces. It is beneficial because during 'famine years', seed-eating animals (such as moths) are starved so their numbers decrease, while in the 'bumper years',

seed production is so high that it satiates insects and seed predators, so that some seeds can survive to establish the next generation of trees. However, a study of beech tree seed production published in the journal Nature Plants, found that increased seed production due to warmer temperatures was accompanied by a reduction in the degree of year-to-year variability in seed production, and specifically a reduction in the frequency of the 'famine years'. Thus the main beneficiaries of climate-driven increases in seed production are seed predators, and not the plants themselves.

Co-author of the paper, Dr Andrew Hackett-Pain, from the University of Liverpool's School of Environmental Sciences, said: "This study is important for understanding how beech trees are responding to changes in the climate:

Climate change is leading to an increase in the seed production of beech trees -- but we show that any benefit the trees might gain from this increased reproductive effort has been almost entirely offset by higher seed consumption by the moth larvae..... [Read More...](#)