



# Plants under stress found to emit sounds characteristic to the stress

Researchers recording and analysing sounds emitted by plants under stress have found that they are emitted at a volume similar to human speech, but at high frequencies, beyond the hearing range of the human ear.

The scientists at Tel Aviv University, Israel, found that each type of stress was associated with a specific identifiable sound.

"While imperceptible to the human ear, the sounds emitted by plants can probably be heard by various animals, such as bats, mice, and insects," they said in a study published in the journal Cell.

"From previous studies we know that vibrometers attached to plants record vibrations. But do these vibrations also become airborne soundwaves - namely sounds that can be recorded from a distance?" said lead researcher Lilach Hadany.

The first stage of the study, focussing mainly on tomato and tobacco plants, involved the researchers placing plants in an acoustic box in a quiet, isolated basement with no background noise.

Ultrasonic microphones recording sounds at frequencies of 20-250 kilohertz (humans cannot hear beyond 16 kilohertz) were set up at a distance of about 10 centimetres from each plant.

"Before placing the plants in the acoustic box we subjected them to various treatments: some plants had not been watered for five days, in some the stem had been cut, and some were untouched.

"Our intention was to test whether the plants emit sounds, and whether these sounds are affected in any way by the plant's condition.

"Our recordings indicated that the plants in our experiment emitted

sounds at frequencies of 40-80 kilohertz. Unstressed plants emitted less than one sound per hour, on average, while the stressed plants both dehydrated and injured emitted dozens of sounds every hour," said Hadany.

The recordings collected were analysed using specially developed machine learning algorithms, a kind of artificial intelligence, which learned how to distinguish between different plants and different types of sounds. These algorithms were ultimately able to identify the plant and determine the type and level of stress from the recordings.

Further, the algorithms identified and classified plant sounds even when the plants were placed in a greenhouse with a great deal of background noise, where the plants had been subjected to dehydration over time.

Here, the researchers found that the quantity of sounds they emitted increased up to a certain peak, and then diminished.

"Our findings suggest that the world around us is full of plant sounds, and that these sounds contain information - for example about water scarcity or injury.

"We assume that in nature the sounds emitted by plants are detected by creatures nearby, such as bats, rodents, various insects, and possibly also other plants - that can hear the high frequencies and derive relevant information.

"We believe that humans can also utilize this information, given the right tools - such as sensors that tell growers when plants need watering. Apparently, an idyllic field of flowers can be a rather noisy place. It's just that we can't hear the sounds!" said Hadany.

SUNDAY, APRIL 9, 2023

# SUNDAY

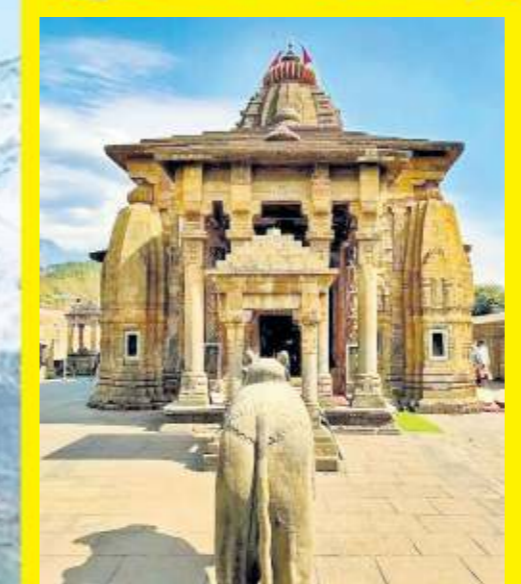
pioneer



p. 3&4  
GIPPUDU FILMS BOMBAAT ANNA!  
Celebrating the core of  
Telangana in Telugu flicks

# Accent on visible policing

p.8&9



Of peaks, streams and serenity

p.5



Malai murgh sheek kebab

p.11



Dil Se



# Of peaks, streams and serenity



*The Pioneer's* SHIKHA DUGGAL recently went on a trip to Dharamshala. In this travelogue, she takes you through the gamut of her experiences in Dharamshala and more.



The mainstream mob is kind of knocking down the authenticity of the valley culture in Dharamshala, but fear not because a little snag down the former place — and you'll fall in the circuit of pine forests. Making the destination even more famous are Sunny Deol and Ameesha Patel, because the biggest summer movie, *GADAR 2*, was recently shot in Palampur. Kareena Kapoor Khan and Saif Ali Khan too visited the place recently. Adjoining the Dhauladhar peaks at the airport will also take your breath away. The mountains wouldn't end there — type any location on your GPS and continue to delight yourself with the snow-capped ranges. Our chauffeur didn't mind taking a short cut, and what an alternative route! For a moment, it felt like we were in the grasslands. You reach mid-way, and what do you see? Shocking detail: so-called religious leader Gurmeet Ram Rahim Singh's vacation home in the midst of prairie. Looking beyond it, the dominant vegetation continues. Farmers and animals grazing were all seen there. Be that as it may, the main attraction was almost there — a Norwegian-themed boutique resort waiting for us! Let us narrate to you a small anecdote about this homely hotel named Araiya that is truly a weekend retreat. Facade made of pebbled roads inside of it, typical Norwegian architecture, and located at one side of the evergreen KANGRA valley. For almost a day, we couldn't stop absorbing the stream flowing from the mountain and the snow all over the peaks! Yes, you can see all of this because the scenic view from your mezzanine will allow you to. No chomping on that regular chicken tikkas or basic curries — instead the executive chef was on his toes handing over a HIMACHALI DHAM to us. Asking oneself, What's it? Well, that lavish community feast with innumerable regional delicacies bedazzled us so much. "Sepu ki wadi", "missi roti", "siddu", and "spicy guava drink" had our hearts. So after an impressive community feast by Norwood that's actually inspired by KASHMIRI WAZWAN —

oh yes, it's the right time to mention Kashmiris now because, wallah wallah. It was difficult to believe the attachment of pahadis to Kashmiris. The simplicity, their honesty: the Kashmiris in the suburbs of Palampur were intricately weaving not just their clothing texture but cultural textures in the heart of Himachalis. The best way to know more about this is to indulge in it! We found a German immigrant, but a Kashmiri of ethnicity named Mr. Rafiq who was so educated that his culture was reflecting in the way he was speaking to us. The untouched simplicity couldn't touch the notions that hate is selling across the nation. He narrated stories of his fraternity, and what we observed by ourselves brought a feel-good factor to us too. Additionally, some of the Kashmiri peace lovers are going and finding everyday accounts of love with pahadis and foreigners. Or, count us in! Carrying over in this short staycation to the Norwood Heights resort, where Sunanda Shetty and Amrita Arora Ladakh like celebrities also observed the rapidly developing town. Other than that, there are fewer cultures blending all in the same valley — we were so pleased to see that. Honestly, it really does have some grand temples that even have awesome sights around them. If you visit the Chamunda Devi Temple, spiritual awakening is bound to come as you look at the scenic views around it. At the hilltop, with a river stream connecting it to another temple and donkeys grazing, with mythology, you will continue to see so much grandeur around. Or consider the BAIJNATH TEMPLE, which was built in the NAGARA style, for which we have a story to tell. Raining heavily, you're walking barefoot in running cold water, and when you see the entailing sight of Mahadev with dark clouds and precipitating rainfall, it's a sight to behold. This was about the temples; the Tibetan culture is more dominant. As soon as we reached a Tibetan Monastery — the way they have preserved their art was something to see. Their monks taught us self-sustenance; a tal-

ented master over there gave us their ancestral knowledge; and the craftspeople were making a community of their own. We couldn't hold ourselves back, ran straight into an exclusive Tibetan restaurant, and in a moment, started feasting on dumplings, spicy stew, laping, and Tibetan chowmein. Mouth-watering! Continuing our splendour of their art with the Dalai Lama as their trustee, we saw some Thangka paintings and gold statue making! Our fascination with Buddhism was increasing so much that the frescoes on the walls of temples were something else to see. This fascination will go on. Let's get back to our Norwegian architecture and a pleasant stay near the tea gardens. Absolute mocktails were waiting for us — the mixologist's twists on classics really made a splash! And, when you sidle up to their bar, you'll rediscover the health benefits of detox drinks by the infinity pool. What a view! And a vocalist and guitarist will sing your favourite tunes to you. Was enjoying a second wind! Say cheers, gazing up at the constellations in the clear skies of Palampur, where the moonlight was actually kissing the snow-capped peak over the valley slopes. When the chef curated a chocolate praline hazelnut especially in the room, he did the thing for us. Frankly, the proposal was to chance on wellness, and we finally did so. The yoga session made us feel joyful and even more enthusiastic in four degrees Celsius — can you imagine? The flute meditation session that was included for us in the retreat retracted so much concentration, calmness, and inner silence and relieved a tad bit of our stress. And then they offered us our choice of spa: the traditional Chinese healing massage, which worked on the reflex points on the feet. Excellent healing! Through pressure point techniques, the masseuse stimulated to help improve our immune system, which was so needed. Universally, it has emerged as our most favourite destination now, and there are many special touches around the town. The lush green valleys of Baner Khand will always be unforgettable.