EXPLAINER

What are safer fireworks alternatives?

How loud do fireworks at Thrissur Pooram get? What do India's noise rules permit? What risks do fireworks pose to hospitals? What is cold spark technology? Are they safer than traditional fireworks? Why are noiseless alternatives not widely used yet? What transition is being proposed for Thrissur Pooram?

Firefighters douse a blaze at a fireworks unit in Mundathikode, Thrissur, Kerala on April 21. - Photo: PTI

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THE GIST

- Noise levels at Thrissur Pooram peaked at 122.4 decibels — close to the legal cap — raising concerns over risks to animals, hospitals, and infant brain development.

- Experts call for a shift to noiseless alternatives like cold spark technology, which can deliver similar visual effects without high decibel levels, smoke, or burn injuries.

The story so far:

As hundreds gathered to experience the grand fireworks display at the Thrissur Pooram festival in Kerala last year, a heavily caparisoned and disoriented elephant, Uttoly Raman, suddenly ran amok, leaving 42 people injured. The previous day, another parading elephant, Chirakkara Sreeraman, had attacked its mahout. "Elephants, like other animals, get disoriented not just by decibel levels, but also by the structure and frequency of noise," said Manjari Jain, Associate Professor, Department of Biological Sciences, IISER Mohali. In response to an RTI request filed by *The Hindu*, the Kerala State Pollution Control Board stated that noise levels during the 2025 festival peaked at as much as 122.4 decibels in one area. This was just under the Central Pollution Control Board's 'Noise Standards for Firecrackers', which prohibit "the manufacture, sale or use of fire-crackers generating noise level exceeding 125 [decibels]... at 4 metres distance from the point of bursting."

What are the risks to hospitals?

As for permissible ambient noise levels, the National Ambient Noise Monitoring Network recommends 45-55 decibels in residential areas and 40-50 decibels in "silence zones" such as hospitals and educational institutions — far lower than the legal cap of 125 decibels for fireworks.

Eminent social scientist Rajan Gurukkal has raised concerns about the proximity of Thrissur's fireworks to hospitals, especially those with neonatal intensive care units, and their impact on infant brain development. "The way the festival is conducted in Thrissur violates ICU norms. Many facilities do not have soundproof windows, and the district hospital is minutes away from the fireworks," he told *The Hindu*. The World Health Organization notes that noise pollution is the third most hazardous environmental threat to human health, after air and water pollution.

What are the noiseless alternatives?

"It is time to go noiseless," said Professor Gurukkal, on April 21, when 13 people were killed and 40 injured in a blaze at a fireworks manufacturing unit in Mundathikode near Thrissur. "We do not need to reinvent the wheel, cold spark technology is available, but not yet scaled up."

This technology, unlike traditional fireworks, uses a chemical combustion reaction of very fine granulated metal alloy powders of titanium and zirconium, explained Samrat Ghosh, Assistant Professor at the Frugal Innovation Lab for Societal Benefit, Department of Chemical Sciences.

The ‘cold sparkular’, for instance, is a gun-like device equipped with a heater and a fan. The heater warms the fine alloy powder to increase its activation energy, while the fan blows the fine granulated metal alloy powders out. “When these fine powders eject out of the barrel of the hand-held gun, the heated fine powder reacts with the oxygen in the air and undergoes a rapid exothermic reaction that emits light with a sparkler-like effect as seen in traditional fireworks — but with no noise,” Dr. Ghosh explained.

They can prevent burn injuries. While traditional sparklers emit temperatures of around 1,200 °C, cold sparkulars and cold anars operate at 60-100°C, he added.

Though already available commercially online, these pyrotechnics remain expensive — a single ‘cold anar’ can cost around ₹400 — and are largely manufactured in China. “We have plenty of scope in India as the technology is well known and one can indigenously make these nano-powders,” Dr. Ghosh said.

Prof. Gurukkal emphasised that what is needed is “professionalism and management.” Contemporary stage technologies show that we can create in-house spark fountains and colourful spark-circles on the floor, he said, adding that televisions routinely employ cold spark systems that generate bright, upward jets of sparkling light without explosive combustion, heavy smoke and high-decibels “but giving the same, if not a superior, visual effect”.

“It is possible to deploy arrays of dozens or hundreds of spark units across open grounds, arranged linearly, radially, or in clusters, with sequential triggering of waves, expanding bursts, and cascading effects,” he said. These could even be mounted on temporary towers to extend the visual field, “creating the illusion of vertical expansion into the night sky”.

What is the way forward?

Delhi, which celebrated its loudest Diwali in three years, could also benefit from cold spark technology. As for Thrissur, Prof. Gurukkal said there should be an incremental transition strategy in Kerala, but that it would be ideal “to start with the Thrissur Pooram, the greatest among occasions that use parasols of intense air pollution with sound and smoke”.

Initial integration of large-scale cold spark-based displays should be tested in Thrissur, the district famed in the country for its high-quality air, he said. “It is the responsibility of the Thrissur Corporation to substitute the existing method.”