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Dirty water can be sterilised and made drinkable after filtering it with cotton sari and then heating it with solar energy for less than an hour, reports kv venkatasubramanian

A discarded or worn-out ubiquitous cotton sari can be used to sterilise dirty water and make it safe for drinking, a scientist couple from Maharashtra has demonstrated. The scientists folded an old cotton sari into four layers, poured dirty canal water over it and heated the filtered water to 55-60 degrees Celcius for less than an hour. Sari-filtration removed particulate matter and significantly reduced the coliform bacteria count from raw water, and further heating to sub-boiling temperatures (55-60°C) for less than an hour completely eliminated coliform bacteria population, their experimental data showed.

“Hence there is no need to boil water (to 100 degrees C). Since solar water heaters can easily reach 50-60 degrees C, our work has great ramifications for using solar energy to sterilise water easily and hopefully economically,” Nandini Nimbkar and Anil Rajvanshi of Nimbkar Agricultural Research Institute (NARI), a non-profit institution, told this correspondent who visited their research lab at Phaltan, 110 km from Pune.

The technique is particularly suited to villages, where there is no electricity and where people fetch water from ponds, streams and open and draw wells. Cloth filtration is already a common practice in rural areas, especially when water becomes turbid during the rainy season, and when bacteriological quality of water is poor. “The use of cloth filtration and low-temperature solar sterilisation can be an effective, feasible and environmentally sustainable technique of disinfection to obtain clean drinking water,” recommends Rajvanshi. Waterborne infectious diseases are transmitted primarily through contamination of water sources. Since water treatment technologies currently available are fairly costly and not sustainable, solar energy can be used effectively to purify drinking water. The duo heated the sari-filtered water to varying temperatures and found that the water had become free of bacteria, and was safe for drinking. “These heating conditions for water can be achieved even on a partially cloudy day in a not-so-efficient solar boiler.” However, during mostly cloudy days the temperatures required may not be reached. Hence, a combination of traditional cotton sari filtration and heating of water to simulate a solar boiler was evaluated as a water sterilisation treatment, they said. Water may be disinfected by using chemicals, direct application of heat and filtration techniques. However, chlorination and ozonation have side

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effects. Boiling of water is not necessary for disinfection and only low-temperature sterilisation is sufficient. Rajvanshi said chlorinated water alters its taste and boiling requires fuel or electricity. "In fact, boiling requires about twice the energy as heating to 65°C (sterilisation temperature), plus the extra time of monitoring, and the time and expense of obtaining fuel. Sterilisation via solar energy can play an important role in improving water quality, particularly in those regions and rural areas that enjoy hot, sunny climate."

The scientists said the whole idea of the water sterilisation project was to heat the water using solar energy. On a clear day, the stagnation temperatures of solar collectors (when water is not flowing in them) can reach 100-150 degrees C. "Even during cloudy days and rainy season, around one-fourth radiation (diffused solar radiation) is collected by solar collectors and we feel that modern high efficiency collectors like tubular ones can easily reach 50-60 degrees C. This is sufficient to effect water sterilisation," Rajvanshi said.

In their experiment, the researchers used water heated in an old solar collector they had fabricated in 1984. It has double glazing (two sheets of glass) over blackened stainless steel tank. "The real challenge now is to create a very efficient solar water heater below Rs 1000, which will heat the water to 50-60 degrees C on cloudy days." The scientists have reported their work in the latest issue of the journal Current Science.

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