

Greening deserts the solar way

Lack of water need not be a hurdle to grow trees in the arid regions of the world if planners adopt a novel technology developed by a group of researchers in India. The technology employs the most abundant natural resource available - solar energy.

Scientists at the [Nimbkar Agricultural Research Institute \(NARI\) at Phaltan](#) in Maharashtra have successfully tested a simple method of raising plants using water extracted from soil using solar energy.

"We find this method far more practical than strategies like aerial seeding, hand-watering, and sowing seedlings during rainy season," says NARI director [Anil Rajvanshi](#).

Six years ago India launched an ambitious afforestation scheme for raising trees on five million hectares but it failed largely because water could not be provided at the seedling stage.

All soils contain some moisture and plant roots tap this water by osmotic pressure difference. But in arid and semi-arid regions, the water is so tightly bound to the soil; it is not easily available to the seedlings because of their shallow root system and inadequate osmotic potential.

"We decided to use the heat of solar radiation to free the water that is bound to the soil, and use this

The still is required only until the seedling gets established on the ground. After that it can be removed and used over another pit.

The NARI team that started testing this system in July 1988 says it has been working very well. **A single pit, on the average, produces 300 ml (milliliter) of water per day - enough to sustain four seedlings.**

"That this little amount of water is capable of helping the seedlings to survive came as a surprise to us," says Rajvanshi adding, "it is possible that it is acting like a drip irrigation system."

Tests also showed that the seedlings grew better when they received their share of water - however small - every morning than when they were given a big dose once a week.

The solar still costs less than Rs. 500 (\$12) to build and Rajvanshi and his team built five of them for their experiments. By reusing these stills on different pits the team covered 900 square meters of an experimental plot in Phaltan, a semi-arid region in Maharashtra. Today, about 130 plants are growing in this plot that include **P. juliflora, A. indica and L. leucocephala.**

Presently NARI scientists are trying to raise bamboo, a species

water to irrigate the seedlings," Rajvanshi states.

The NARI technology for harvesting soil-bound water is extremely simple and cheap. First a box shaped pit about 1 m deep is dug. Then, solar water evaporation still with reflecting sides and a sloping glass roof is installed over the pit. The heat generated by solar radiation releases the moisture in the soil and the water vapor condenses into droplets on the glass roof.

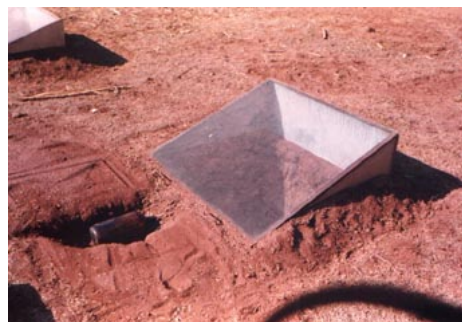
The water thus produced automatically collects in a bottle attached to the sloping roof and is used to nourish the seedlings planted immediately around the pit.

that is relatively more susceptible to water stress. According to Rajvanshi, seedlings raised with water from solar stills had 100 per cent survival rate! In contrast, the survival rate of rain-fed seedlings was 70 to 80 per cent.

NARI scientists first presented their work at the [Solar World Congress held in Denver, United States, in August 1991](#). "Since then we have received numerous inquiries," says Rajvanshi, who believes that the simple technique could play a major role in greening arid zones in other parts of the world.

Besides Maharashtra, Madhya Pradesh has shown interest in the novel technology. The state's land use and wasteland development board is planning to spread this method in low rainfall areas where afforestation programs have failed due to lack of water.

Dr. Rajvanshi said, "we would like to extend this scheme on a larger scale. We would welcome funding to do that".



Single still showing the water collection bottle



Large scale experiment

Courtesy **Indian Express** ;

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