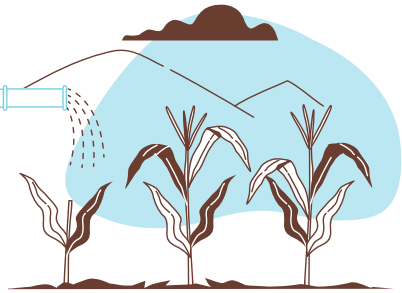
THE/NUDGE Prize

DCM SHRIRAM FOUNDATION

Upgrading Soil with Biotechnology to *Save Water*



When we think of India's water crisis, we automatically think of aquifers being drained by borewells. However, solving the problem requires us to shift our focus from below the ground, to the soil beneath our feet, which is where India's water crisis starts and ends.

India now has surplus food production, but the dark side of this food security is the severe degradation of our soil, primarily due to the use of fertilisers, pesticides, and other chemical inputs aimed at increasing yield. The more we used them, the more we needed them, leading to a vicious cycle that trapped smallholder farmers without enough income to sustain themselves, and simultaneously depleted freshwater reserves for everyone. This situation is largely due to a complex ecosystem involving MSPs (Minimum Support Prices) and market forces. These factors incentivise farmers to cultivate water-intensive crops, while a subsidised yet erratic power supply leads them to water their crops based on electricity availability rather than the crops' actual water needs. Efforts to change this system inevitably lead to pushback, because smallholder farmers simply cannot sustain themselves while we make such long-term fixes.

A solution therefore needs us to work with them to improve the soil they farm in, so that they can get better yield from crops, but use less water to do so. To address this need, innovative startups like EF Polymer and Virenxia are employing cutting-edge biotechnological strategies. They are among 16 competitors in the DCM Shriram AgWater Challenge, launched in June 2023. This challenge aims to discover and enable a range of approaches to address India's water crisis. It evaluates startups based on specific parameters including water use efficiency, scalability, affordability and profitability for small-holder farmers. These startups must demonstrate their solutions in a verifiable pool of 5,000 farmers or across 5,000 hectares of land by the end of the challenge.

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EF Polymer, hailing from Rajasthan, developed Fasal Amrit through extensive research in India, Japan, and the U.S. This product represents a significant breakthrough in water conservation. Fasal Amrit is a super absorbent hydrogel, made with organic polymers from orange peels. It can absorb up to 100 times its weight in water and can be mixed up with soil and spread across the field. Just 5 kg of Fasal Amrit is enough for an acre of land and can be mixed with seeds and fertilisers, or just mixed with dry soil and distributed while ploughing. Once the field is watered, the polymer holds on to water and keeps the soil moist even after 15 days, and starts degrading into it after 180 days, becoming an organic fertiliser.

This affordable but effective solution is able to increase agricultural yield by up to 30% while reducing water requirement by 30-40%, and fertiliser requirement by 10-20%. The company has won numerous awards including from the Bill & Melinda Gates Foundation, and achieved a global presence in countries from Mexico to China and beyond.

Virenxia adopts a unique approach, not only enhancing soil's water capacity but also aiding farmers' transition to non-chemical farming. Despite initial challenges, this shift promises long-term benefits in water efficiency and crop yields. However, small farmers struggle to make the transition, which leads to a temporary drop in yield as soil takes time to recover. The company's Anivara micronized soil rejuvenator solves the problem by fast-tracking the soil regeneration process and helping farmers match or improve yield right from the first year of switching from chemical to regenerative farming. With only one application needed per year for 3 years, it also reduces input costs and improves their earnings with better quality crops.

Innovative biotech solutions lay the foundation for irrigation and automation.

Virenxia has already demonstrated success in trials involving rice, wheat and cotton, and is currently in the middle of a trial for sugarcane, in partnership with Coca-Cola.

While many other problems need to be addressed to solve India's water crisis, these innovative biotech solutions are quite literally laying the foundation for further efforts, from irrigation to automation solutions, which will all benefit from soil that can better absorb and retain water.

Improving soil health also has various other benefits for the environment, and even for recharging groundwater, especially near the surface. As we continue to explore such innovative solutions, perhaps we can hope to one day, dig wells for water again, instead of going ever deeper and deeper with borewells.