

TECH OFFER

Sustainable Soil Moisture Control Using Nanogels



KEY INFORMATION

TECHNOLOGY CATEGORY:

Sustainability - Food Security

Life Sciences - Agriculture & Aquaculture

Materials - Bio Materials

TECHNOLOGY READINESS LEVEL (TRL): **TRL6**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO174971**

OVERVIEW

As climate change continues to cause rising temperatures and unpredictable droughts, the resulting environmental degradation and poor soil conditions have negative impacts on plant health and nutrition, ultimately affecting crop harvests and the global food chain. In Singapore, these changes threaten the very heart of the city's reputation as a garden city, including greenery, carbon sequestration, and aesthetically pleasing landscapes. To combat these issues and improve greening outcomes and land yield, enhancing soil conditions and plant resilience is crucial.

One significant issue that needs addressing is soil water repellence, which prevents water from penetrating the soil, leading to rapid evaporation and reduced plant growth. This problem becomes more severe on sloping terrains like mounds and hillsides, where water is more likely to run off causing additional issues like soil compaction and disease. Soil water repellency also affects the hydrological and geomorphological properties of soil, leading to reduced infiltration capacity, accelerated soil erosion, uneven wetting patterns, development of preferential flow, and the accelerated leaching of agrichemicals.

This technology refers to a specifically engineered nanogel formulation that controls water retention and release in dry soils. The nanogel formulation can uptake water-soluble nutrients and release them when needed. It has the potential to not only improve reclaimed land but also convert dry land into productive land that supports crop cultivation. The nanogel formulation can be tuned with varying retention capabilities based on underlying soil conditions and has been extensively tested in different plant species.

The technology provider is currently looking for test-bedding partners from the agricultural industry and interested environmental NGOs.

TECHNOLOGY FEATURES & SPECIFICATIONS

1. Scalable fabrication method using Generally Recognised as Safe (GRAS) materials
2. Nanogel formulation engineered for controlling water retention and release in dry soils.
3. The nanogel formulation can uptake water-soluble nutrients and release them when needed.
4. The formulation has the potential to convert dry land into productive land that supports crop cultivation, aside from improving reclaimed land.
5. Different nanogel formulations with varying retention capabilities based on underlying soil conditions have been developed and extensively tested for various horticulture plants.

POTENTIAL APPLICATIONS

1. Sustainable Landscaping
2. Horticulture plants
3. Reforestation
4. Ensuring food security

MARKET TRENDS & OPPORTUNITIES

The global soil conditioners market grew from \$5.6 billion in 2022 to \$5.93 billion in 2023 at a compound annual growth rate (CAGR) of 5.9%.

UNIQUE VALUE PROPOSITION

A tunable & eco-friendly nanogel formulation to help in the retention and release of moisture and/or nutrients in sandy soils for improving crop and flora survivability.

1. Reduced irrigation or water consumed by agriculture
2. Reduced labor cost & fertiliser consumption
3. Increased areas of land available for farming