

## TECH OFFER

### Plasma Activated Water Device for Agricultural Produce Decontamination



#### KEY INFORMATION

TECHNOLOGY CATEGORY:

Environment, Clean Air & Water - Sanitisation

Foods - Quality & Safety

Sustainability - Food Security

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

COUNTRY: **THAILAND**

ID NUMBER: **TO175120**

#### OVERVIEW

Unsafe and contaminated food poses significant global health risks, affecting approximately one in ten people worldwide and leading to economic losses of around \$110 billion annually in low and middle-income countries due to reduced productivity and medical expenses. This issue also accounts for an annual burden of 33 million disability-adjusted life years and causes about 420,000 premature deaths. Additionally, the escalating use of pesticides in food production to meet the demands of a growing population contributes to approximately 200,000 deaths each year due to toxic exposure, posing severe threats to both human health and the environment.

This technology, Plasma Activated Water (PAW) provides an eco-friendly, chemical-free decontamination technique which eradicates residual chemicals, inhibiting microbial growth in agricultural produce. The technology is highly effective (95% reliability) in breaking down organic compounds, including pesticides, and destroying microbial pathogens on the surfaces of fruits and vegetables, resulting in an extended shelf-life.

PAW eliminates the need for potentially toxic chemicals for washing, minimizes chemical residues, reducing environmental impact and agricultural losses, thereby lowering costs. It effectively degrades pesticides, enhancing food safety while maintaining nutritional quality and sensory qualities.

The technology owner is seeking collaborations with agricultural companies or Institutes of Higher Learning to test-bed their technology.

## TECHNOLOGY FEATURES & SPECIFICATIONS

Plasma Activated Water (PAW) is an innovative technology that harnesses the reactive properties of plasma to enhance the characteristics of water. The process involves generating an electrical discharge in a gaseous environment, creating a plasma rich in reactive oxygen and nitrogen species (RONS). The use of pin-hole technology allows for precise and controlled plasma generation at the required intensity and location. This technique involves creating a small, focused plasma jet through a pin-hole or narrow aperture, which directs the plasma stream accurately to the target area. This precision ensures effective application, reducing the risk of unintended exposure and increasing treatment efficacy. The focused nature of the plasma jet also minimizes diffusion, resulting in more efficient energy use and lower operational costs.

The reactive species interact with the surface of agricultural produce, they effectively deactivate or destroy pathogens, bacteria, and pesticide residues. PAW technology significantly enhances food safety by **reducing contaminants in produce by over 50-80%, compared to just 30% with standard water washes.**

## POTENTIAL APPLICATIONS

This technology has the potential to transcend agricultural applications, harnessing its pathogen- and bacteria-destroying capabilities.

- **Healthcare and Medical Sector:** Can be used to irrigate wounds, leveraging its strong antimicrobial properties to clean and disinfect wound sites, promoting faster healing and preventing infections
- **Industrial Wastewater Treatment:** To treat industrial wastewater by breaking down pollutants and pathogens, ensuring that the treated water meets environmental regulations

## UNIQUE VALUE PROPOSITION

### Superior Decontamination Efficiency:

- **Highly Effective:** PAW technology significantly reduces contaminants, achieving over **50-80% reduction** in pathogens and pesticide residues compared to just 30% with standard water washes. Its decontamination efficiency stands at **95% reliability**
- **Broad-Spectrum Antimicrobial Action:** PAW effectively eliminates a wide range of microorganisms, including bacteria, viruses, and fungi, providing comprehensive protection

### Eco-Friendly and Chemical-Free:

- **Minimized Chemical Use:** Unlike traditional methods that rely heavily on chemical disinfectants, PAW uses plasma to activate water, significantly reducing the need for potentially harmful chemicals
- **Harmless Byproducts:** The reactive oxygen and nitrogen species (ROS and RNS) generated by PAW break down into

harmless byproducts, such as water and nitrogen, making it environmentally friendly