Docket #: S21-310

Tomato Brown Rugose Fruit Virus - a New Indicator of Fecal Strength and Contamination, and Control for Viral RNA Extraction from Stool

Stanford researchers have developed novel viral markers from tomato brown rugose fruit virus (ToBRFV). The marker is a good indicator of 1) environmental fecal contamination, 2) fecal load in wastewater, and 3) internal control for viral RNA extraction from stool.

Human exposure to fecal contamination in the environment can cause transmission of infectious diseases. Identification of fecal contamination in the environmental requires the use of fecal host-associated markers. Stanford researchers have identified, designed, tested and validated novel viral markers from genomes of tomato brown rugose fruit virus (ToBRFV). The markers are sensitive and specific to human stool, and highly abundant in human stool and wastewater samples. Using 15 wastewater and 236 stool samples, researchers found that the new invention targeting ToBRFV was more robust and yielded a greater signal compared to the current gold standard, PMMoV. In fact, this viral RNA based marker performed similar to the standard crAssphage based marker in detecting fecal contamination of storm water samples from the Bay Area in California. The marker can also be used as an indicator of fecal load in wastewater as well as an internal control for viral RNA extraction from stool.

Stage of Development
Proof of concept

Applications

- Detection of environmental fecal contamination
- Estimation of fecal load in wastewater
- Internal control for viral RNA extraction from stool

Advantages

- Sensitive and specific for human stool
- Highly abundant in human stool
- More robust than the current gold standard, PMMoV
- Compares with crAssphage based marker of fecal contamination
- Allows accurate detection of low levels of ToBRFV viral RNA

Publications

- Aravind Natarajan, Brayon Fremi, Marlene Wolfe, Ami Bhatt, Alexandria Boehm, et al. The Tomato Brown Rugose Fruit Virus Movement Protein Gene Is a Novel Microbial Source Tracking Marker. ASM Journals. Applied and Environmental Microbiology Vol. 89, No. 7 (5 July 2023).

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