

## Detection and quantification of *Vibrio parahaemolyticus* in vegetables and environmental samples at farm level

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### Abstract

The purpose of this study was to detect and quantify total and pathogenic *Vibrio parahaemolyticus* from vegetables and environmental samples at the farm level in Cameron Highlands, Pahang, Malaysia. Most Probable Number (MPN) – Polymerase Chain Reaction (PCR) method was used to detect *toxR*, *tdh* and *trh* genes and to quantify their concentration in samples. Samples obtained were cabbage (20), carrot (10), cucumber (10), lettuce (31), tomato (18), manure (10), soil (12), surface swab (21) and water (14), with a total of 146 samples. Sampling locations involved were three vegetable farms, two packing houses and one loading bay. Based on the results, overall, 13.7% of samples were present with *V. parahaemolyticus toxR* (maximum concentration 1100 MPN/g), with the highest detection in cabbage (6%). *Vibrio parahaemolyticus tdh* was detected in 1.4% samples (maximum concentration 7.3 MPN/g), and *V. parahaemolyticus trh* could not be detected in any samples. No *tdh* and *trh* genes could be detected from the recovered isolates. This finding highlighted that vegetables and environmental samples could potentially be contaminated with *V. parahaemolyticus* which poses risk to consumers. This study could be useful in future food safety risk communication and management programmes.

## 1. Introduction

Fruits and vegetables play a significant role in human nutrition by supplying nutrients such as vitamins, minerals and dietary fibre. The production and processing of fruits and vegetables involve a complex supply chain from the farm to the point of consumption (Pilizota, 2013). The number of produce-related outbreaks has increased in the past decade (Kalantar *et al.*, 2018). These products could be contaminated with biological hazards at any point throughout the supply chain. Consumers eating fresh fruits and vegetables are

at risk because this product may be grown on contaminated soil. These bacterial-tainted fruits and vegetables may have come from fields that used to contain animals. Their faeces, faeces-laced irrigation water, or raw manure may have been used as soil additives. Other contributing factors may include changes in agronomic and processing practices, increased international trade and distribution, and an increase in the number of immuno-compromised consumers. Contamination of produce is a concern in developing countries that lack sanitary basic conditions

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