

# Handling Procedures of Vegetable Crops

## **Abstract:**

The National Aeronautics and Space Administration (NASA) is working towards future long duration manned space flights beyond low earth orbit. The duration of these missions may be as long as 2.5 years and will likely include a stay on a lunar or planetary surface. The primary goal of the Advanced Food System in these long duration exploratory missions is to provide the crew with a palatable, nutritious, and safe food system while minimizing volume, mass, and waste.

Vegetable crops can provide the crew with added nutrition and variety. These crops do not require any cooking or food processing prior to consumption. The vegetable crops, unlike prepackaged foods, will provide bright colors, textures (crispy), and fresh aromas. Ten vegetable crops have been identified for possible use in long duration missions. They are lettuce, spinach, carrot, tomato, green onion, radish, bell pepper, strawberries, fresh herbs, and cabbage.

Whether these crops are grown on a transit vehicle (e.g., International Space Station) or on the lunar or planetary surface, it will be necessary to determine how to safely handle the vegetables while maintaining acceptability. Since hydrogen peroxide degrades into water and oxygen and is generally recognized as safe (GRAS), hydrogen peroxide has been recommended as the sanitizer.

The objective of this research is to determine the required effective concentration of hydrogen peroxide. In addition, it will be determined whether the use of hydrogen peroxide, although a viable sanitizer, adversely affects the quality of the vegetables. Vegetables will be dipped in 1% hydrogen peroxide, 3% hydrogen peroxide, or 5% hydrogen peroxide. Treated produce and controls will be stored in plastic bags at 5°C for up to 14 days. Sensory, color, texture, and total plate count will be measured.

The effect on several vegetables including lettuce, radish, tomato and strawberries has been completed. Although each vegetable reacts to hydrogen peroxide differently, the data suggest that 5% hydrogen peroxide reduces the shelf life of the vegetable. A dip of either 1% or 3% hydrogen peroxide helps reduce the microbial total count while not adversely affecting the quality of the vegetable.