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DESIGNING A BIOSENSOR TO DETECT VOLATILE ORGANIC COMPOUNDS(VOCS) RELEASED
BY INFECTED PLANTS IN SPACE

Abstract

Long term space missions require a continuous supply of food and nutrition with less dependency on acquiring them from Earth. Plants could be the major source of food and nutrition during long term spaceflight and growing them fresh in a sustainable manner thereby becomes a necessity. Considering the various effects of the space environment, there is a very high chance that the plants can get infected by pathogenic microbes present in the surroundings. These microbes could in fact be super-microbes which may have superior traits compared to their earth counterparts. Taking into account the limited vegetation and its time-bound production, diagnostics to determine the infection is of utmost importance to prevent its spread and to curb the effect of the infection. Diagnostics based on techniques such as polymerase chain reaction, enzyme immunoassay, and immunochromatography are extremely sensitive but are also time-consuming, invasive, and labor intensive and hence not very ideal for space based settings. Hence, early and rapid diagnostics are acutely necessary. Pathogenic infection of plants could release certain Volatile Organic Compounds(VOCs), and these VOCs are highly indicative of the type of stress that the plants are under. A study of these VOCs detected by biosensors can help in the determination of the cause of plant infection which could further help determine the type of treatment needed.

The aim of this study is to design and develop a biosensor which can detect the VOCs released by infected plants/plant products and aid in determining the cause and nature of the infection with respect to the profile of VOCs released.