

Bacterial Growth and Stem Water Relations in Cut Flowers

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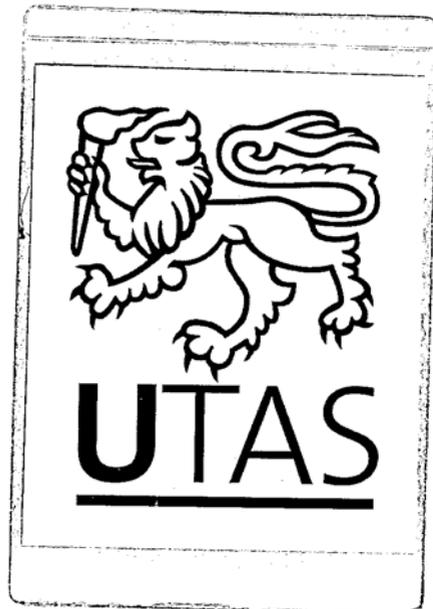
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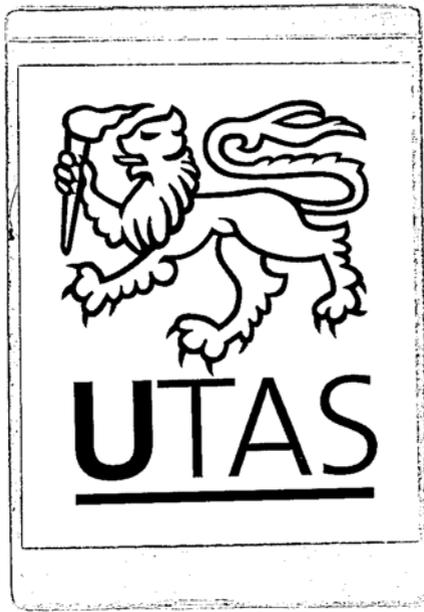
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I. ABSTRACT

I. Abstract

Longevity of vase life is a significant quality parameter in the cut flower industry. A number of factors have been postulated to influence longevity of vase life, and many of these involve disruption to water relations within the stem, particularly increased hydraulic resistance as a result of air embolisms, physical occlusions in the xylem vessels or bacterial interference. The purpose of this study was to investigate the role of bacteria in disrupting hydraulic resistance in the stems of three important cut flower species.

Xylem vessel length distributions of carnation, iris and chrysanthemum were determined, the maximum vessel length of each flower species being less than 4, 1 and 6 cm respectively. Stem sections longer than these vessel lengths were then used to determine the relationship between bacterial number and hydraulic resistance in various parts of the stem. Bacterial populations increased in all parts of the flower stem during the vase life period. The largest populations were found in the basal section of stems, particularly within 2 mm from the cut surface. The basal section was also the site of highest stem hydraulic resistance. However, only a very weak correlation existed between bacterial numbers in various parts of the stem and hydraulic resistance. Furthermore, bacterial cells were found to travel higher up the stem than the length of the longest vessels, indicating that the bacterial cells were unlikely to be the major cause of occlusions at intervessel pits. Xylem occlusion was more likely to be located at or close to the stem cut surface as removal of a 5 mm segment from the stem base resulted in significantly decreased hydraulic resistance.

Positive correlations were obtained between stem hydraulic resistance and concentrations of a bacterial exudate, bacterial exopolysaccharide (EPS), which was found to be present primarily at the base of the stem. Bacterial