

### Abstract:

In cut flowers, hydraulic properties and dimensions of xylem vessels in the stem directly influence vase-life and thus post-harvest quality. Xylem hydraulic conductance as well as recovery from air embolisms at the start of vase life strongly depends on number, diameter and length of xylem vessels in the base of the cut flower stems. In this research we employed different water availability levels (high and low water content) in the growing medium of *Zinnia elegans* plants of three cultivars ('Envy', 'Purple Prince' and 'Scarlet Flame') to modify xylem anatomy and post-harvest xylem functioning and vase life of cut flowers from these plants. Vase-life was longer among fresh-cut *Zinnia* flowers in all three cultivars grown under low water content in the root medium. *Zinnia* flowers of all cultivars grown at high water content were not able to sufficiently restore water uptake at the start of their vase life. Shoot hydraulic conductivity was lower in water-stressed plants but it was not different among the three *Zinnia* cultivars within the same treatment. Anatomical analysis showed smaller xylem vessel diameters but no differences in xylem number and length, with the exception that in cultivar Purple Prince vessels were longer in well-watered plants. We conclude from these results that within these three *Zinnia elegans* cultivars water stress conditions in the root environment significantly affected xylem anatomy and functioning which correlates well with a longer vase life. Differences in xylem properties between the three cultivars due to pre-harvest watering treatments were limited.