Abstract:

Quality discrimination for spring onions using conventional methods of sensory appraisal and analytical tests is difficult, expensive and time-consuming. Discrimination of spring onion characteristics with electronic nose (E-nose) technology was investigated. Plants of cv. White Lisbon were grown in a glasshouse in pots containing clay (Alluvial gley) or sandy loam (Brown earth). Irrigation regimes were regular watering to near field capacity (-0.01 MPa soil water potential, SWP) or re-watering to near field capacity when available moisture level was depleted to either ≤ 50% (-0.80 MPa SWP) or ≤ 25% (-1.19 MPa SWP). The E-nose sensor response (%dR/R) was significantly ($P<0.01$) influenced by irrigation, with %dR/R decreasing in association with reducing soil water availability. Effects of soil type and irrigation regime x soil type interaction for %dR/R were not significant ($P>0.05$). Two-dimension Principal Component Analysis (PCA) plots showed significant ($D2>3.0$) differences among data set clusters. Increases in water-deficit level reduced separations between data set clusters for plants grown on both clay and on sandy loam. Regular irrigation increased pyruvic acid concentration by 43% on the clay as compared with 8% increase in mild water-deficit stressed plants on clay versus severely stressed plants. In contrast, pyruvic acid concentration was reduced by 8% in regularly watered plants grown on the sandy loam as compared with 8% increase in mild water-deficit stressed plants on sandy loam versus severely stressed plants. In conclusion, significant ($D2>3.0$) separations of data set clusters in association with water-deficit stress but not soil type were evident on the 2D PCA plots. However, while the E-nose has demonstrated potential for discrimination of spring onion quality, further detailed work is required to characterise the interactions of spring onion volatile components with conducting polymer sensors.