Title Macro-vision and grey level granulometry for quantification of tomato pericarp structure

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Abstract

Histological assessment of plant material can be tedious by conventional microscopy. One reason is that plant parenchyma cells can be very large, and only a few cells are visible per field. Two macro-vision devices are proposed to visualise about 1 cm^2 of sample from whole organ halves and 100–500 μm thick microtome sections, respectively. In images, the structure observed can be described in terms of image texture. Morphological grey level granulometries using erosion, dilation and closing are proposed to extract size information from these textures. Methods were applied to characterise tomato (*Lycopersicon esculentum*) fruit pericarp tissue. In images acquired from tomato halves, various amounts of cell walls and translucent areas were visible depending on regions in the pericarp. Erosion–dilation curves were assessed and compared using multidimensional data analysis. Pericarp texture was found to depend on fruit varieties, although a huge variability within varieties was observed.

In images acquired from 200 μm thick microtome sections, cells were clearly visible. Cell elongation in the direction perpendicular to the epidermis was quantified by assessing closing curves using vertical linear structuring elements. Two parental tomato varieties and two of their lines were compared. Average cell lengths ranged from 100 to 600 μm, the longest cells being as large as 1000 μm. For the two lines issued from the parental varieties, cell elongation was reduced. Cell length heterogeneity was found to depend on parental genetic background. Macro-vision and grey level granulometries were found useful to compare large areas of tomato pericarps. The two methods bring complementary information and are faster than usual microscopic techniques making the statistical characterisation of histological variability possible.