Plants and their Pathogens

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How different irrigation treatments affect cell size in tomato fruit?

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In comparison with all other types of abiotic stress factors, water reduction has the biggest negative impact on plant productivity and final weight of tomato fruit [1]. The objective of the present study was to determine the effect of different irrigation practices on tomato plants during fruit development, on tomato pericarp cell size. Tomato plants, wild type and flacca mutant, were grown in a growth chamber under controlled conditions. Plants of both genotypes were subjected to following irrigation treatments: full irrigation (FI), partial root-zone drying (PRD) and deficit irrigation (DI). Fruit pericarp was sampled at different developmental days after anthesis (daa) and macerated with pectinase solution [2]. Pericarp cells were observed with a Leica DMLS stereomicroscope and images were acquired with a Leica DC300 digital camera. For each genotype and treatments a minimum of 1000 cells were measured by Image J software package. In flacca mutant under optimal water suply conditions, fruits are smaller compared to wild type, due to a reduction in cell size. In flacca pericarp, cell perimeter, maximal and minimal diameter were 20 do 24% smaller than in wild type (Fig. 1) and mean cell area in pericarp in flacca mutant was 42% smaller in comaparison to wild type. Under water deficit, fruit growth of both flacca and wild type was reduced. Cell perimeter, maximum and minimum diameter decreased during the earlier cell expansion phase, in DI 63% 10daa and in PRD 37% 12daa. In later growth phases, 20daa, impact of PRD and DI on reducing pericarp cell area in wild type was 47 and 59%, respectively. Similarly, in flacca reduction in cell size was observed in later phases of fruit development, after 20daa. Future investigations could compare results from different isolation methods for describing cell size parameters.

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2. N. Bertin, H. Gautier and C. Roche, Plant Growth Regulation 88 (2001), p. 1–8

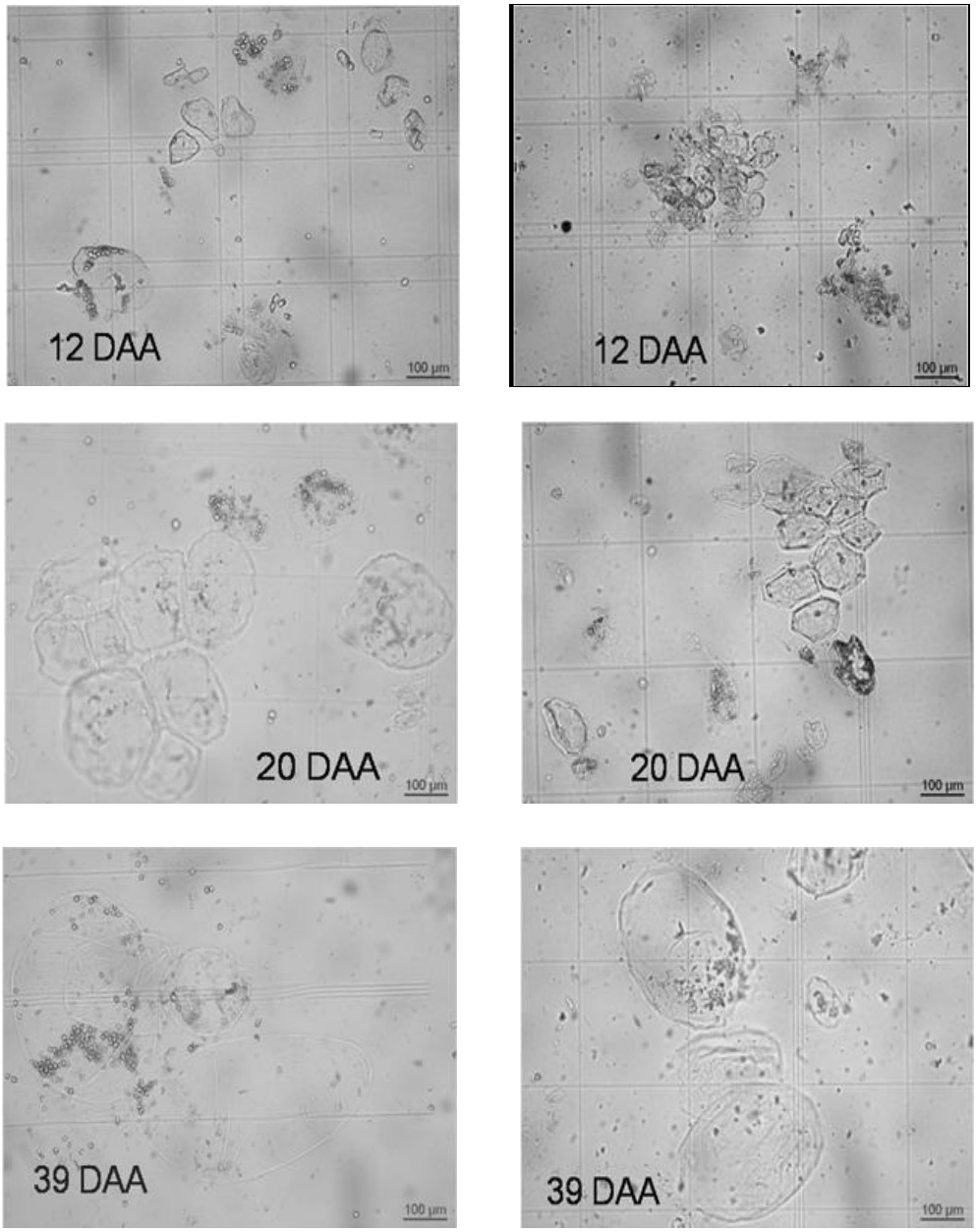

Figure 1. Pericarp cells during the process of fruit development wild type (left column) and flacca (right column) full irrigated tomato plants, photographed using 10 x magnifications. Bars represent 100 µm.