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Introduction

Pink-coloured tomatoes are reputed as good flavoured and are quite popular in local markets. **Pink tomatoes** show a transparent, colourless fruit cuticle in contrast to the naringenin-chalcone flavonoid-rich, orange-yellow cuticle of **red tomatoes**. It is widely known that the *y* recessive mutation in *MYB12* gene located in chromosome 1 underlies the colourless epidermis of pink-type fruits (Fig. 1). *MYB12* is a transcription factor which regulates the biosynthesis pathways responsible of the accumulation of phenolics in the skin but *MYB12* regulation of the ones contributing to the amount of total soluble solids or organic acids which determine tomato taste has not been described. To investigate the role of *y* recessive mutation at *MYB12* in fruit taste, two red x pink crosses between pairs of tomato near-isogenic lines were obtained (Fig. 2).



Fig. 1. Isolated cuticles from 'Ailsa Craig' *y/y* and 'Ailsa Craig' *wt/wt* at the red ripe (RR) stage.

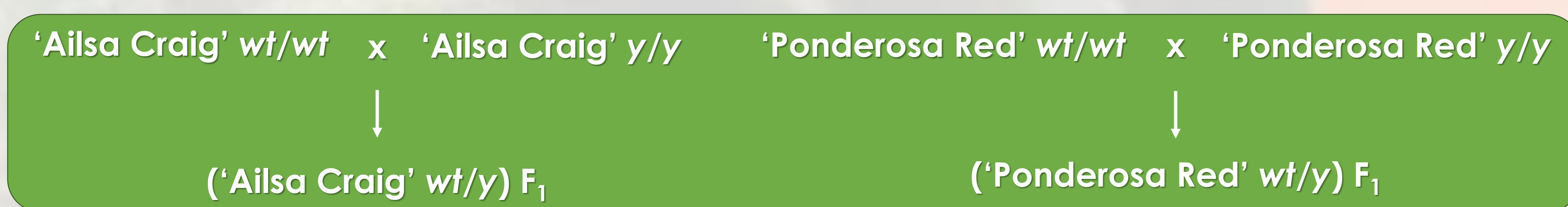


Fig. 2. Schematic representation of the crosses red x pink that were carried out. Both the parental lines and the F₁ crosses were cultivated in a greenhouse. 'Ponderosa Red' *y/y* is a pink tomato line in which the *y* allele was introgressed into a 'Ponderosa Red' genetic background from its closely related 'Ponderosa Pink' cultivar.

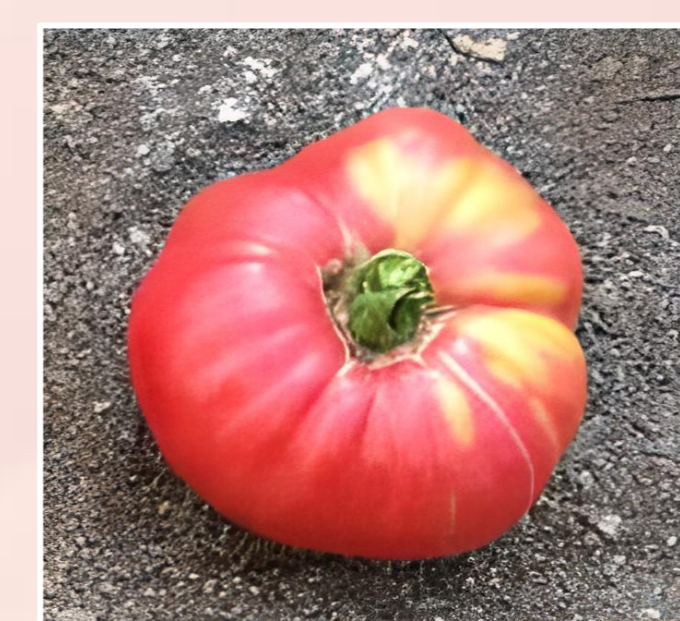


Fig. 3. Fruit of 'Ponderosa Red' *y/y* parental line at red ripe stage.

Results

Total soluble solids (°Brix) and titratable acidity (TA) were measured in red ripe fruits of the parental lines and their hybrids (Table 1). While no differences for °Brix were observed between the parents of each cross, significantly higher °Brix was measured in the two red x pink F₁'s compared to their corresponding parental lines. For TA both parents showed differences, and the same was observed for the F₁'s.

The experiment was repeated but including also the pink x red reciprocal F₁ crosses. The overdominance for °Brix was confirmed in the red x pink F₁ hybrids while the pink x red F₁ hybrids produced °Brix values similar to those of their parents (Fig. 4.a). Although the previous measurements also showed overdominance for TA, this was not confirmed in both F₁ crosses (Fig. 4.b).

	'AC' <i>wt/wt</i> RR	'AC' <i>y/y</i> RR	('AC' <i>wt/wt</i> x 'AC' <i>y/y</i>) F ₁ RR
°Brix	4.10 ± 0.09	4.33 ± 0.20	5.51 ± 0.09
Titratable acidity	3.18 ± 0.21	4.07 ± 0.08	6.02 ± 0.12
	'PR' <i>wt/wt</i> RR	'PR' <i>y/y</i> RR	('PR' <i>wt/wt</i> x 'PR' <i>y/y</i>) F ₁ RR
°Brix	4.08 ± 0.18	4.19 ± 0.17	4.94 ± 0.21
Titratable acidity	4.22 ± 0.20	3.19 ± 0.12	5.93 ± 0.30

Table 1. °Brix and titratable acidity (TA) mean values ± SE of the parental lines and the two red x pink F₁ crosses. The F₁ showed higher values for both parameters. °Brix were measured using an ATAGO PR-100 refractometer which measures the total reflection of a light beam that is in contact with a sample, being the refractive index value displayed on the instrument and converted into °Brix. TA are showed as meq NaOH/100 ml tomato juice and were measured using a SCHOTT TitroLine easy mV and pH meter. 'AC' = 'Ailsa Craig', 'PR' = 'Ponderosa Red', RR = red ripe.

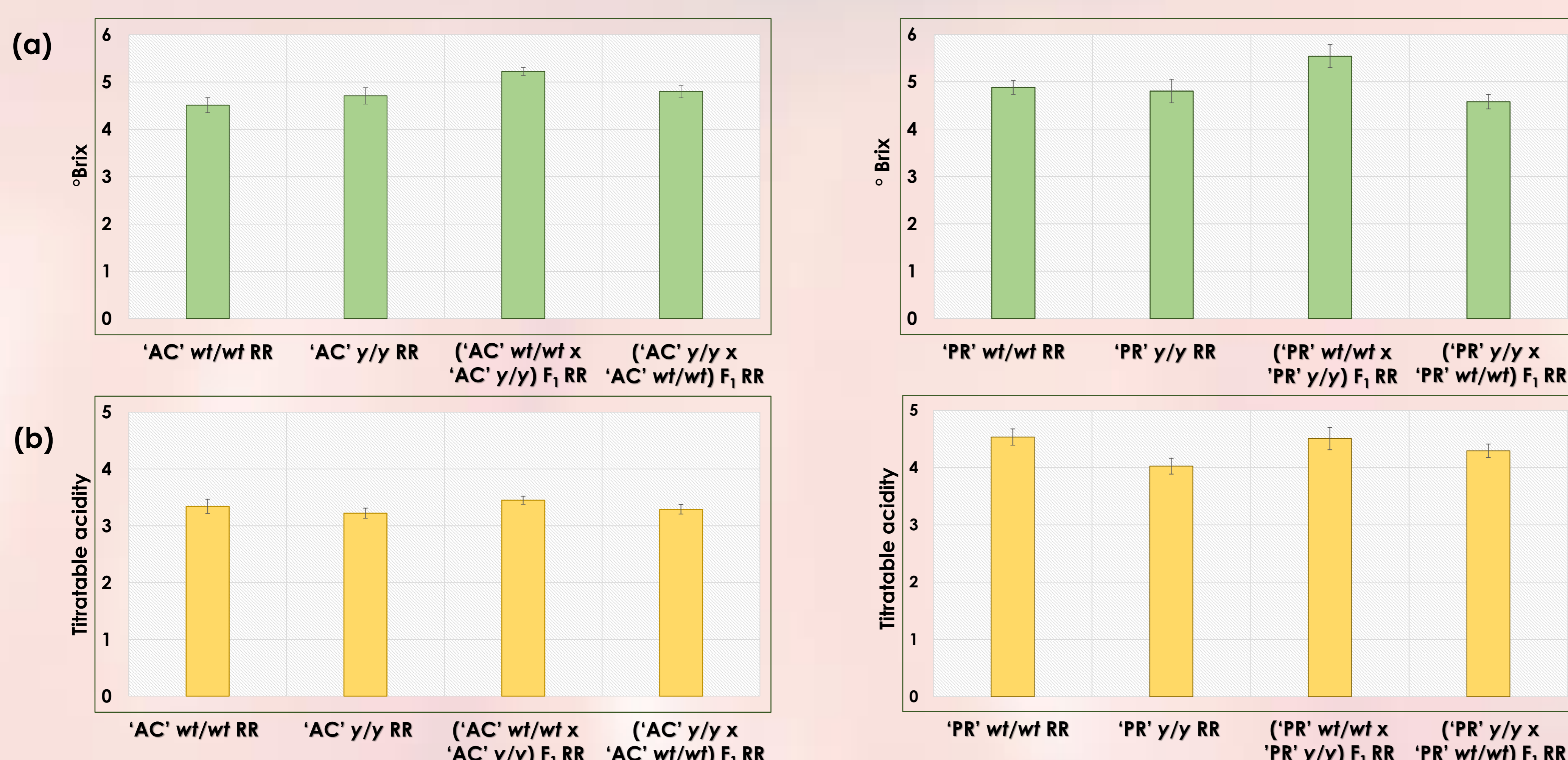


Fig. 4. °Brix (a) and TA (b) mean values ± SE for fruits of the parental lines, red x pink F₁ hybrids and pink x red F₁ hybrids. 'AC' = 'Ailsa Craig', 'PR' = 'Ponderosa Red', RR = red ripe.

Conclusions

Heterotic effect for total soluble solid content of the fruit was observed in red x pink F₁ hybrids but not in the pink x red F₁'s. Metabolomic and transcriptomic analyses are on the way to understand the observed heterotic effect which might be relevant for tomato breeding.

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