




The balance between fumarate and malate plays an important role in plant development and postharvest quality in tomato fruit

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Tomato quality






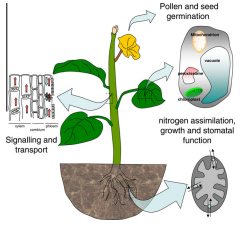


Acidity (Organic acids)

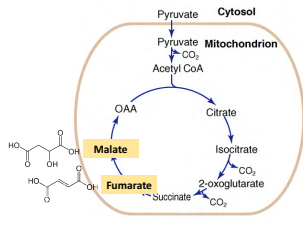
- Plays an important role in the organoleptic properties
- Imposes a strong influence on crop quality, and is an important factor in choosing the harvest date.
- In fruits, sourness is attributed to proton release from acids, while the anion forms contribute another taste.

Fumarate and Malate metabolisms

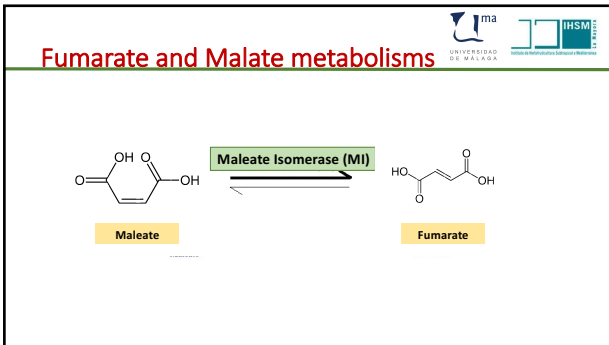



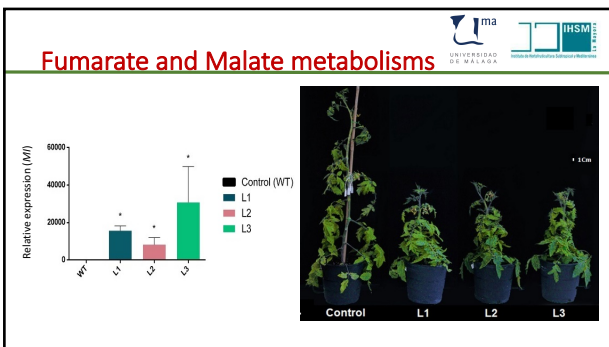


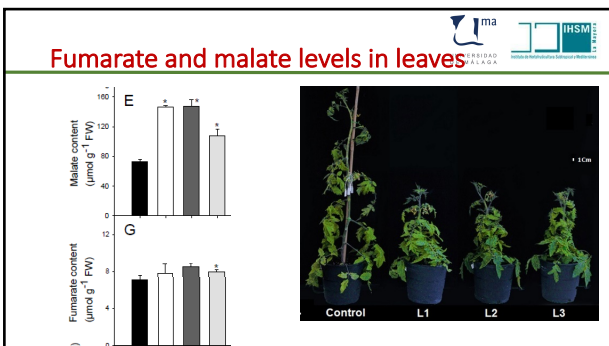
Aracajá et al., (2011)

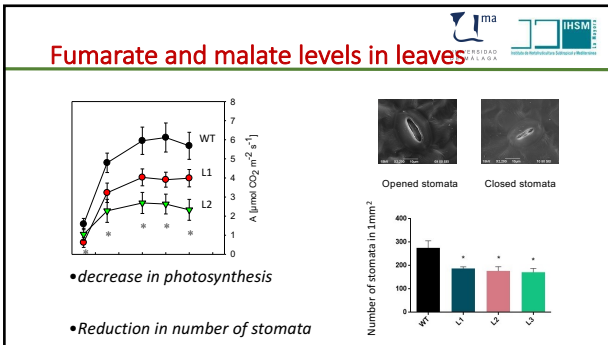


Malate is the predominant acid in tomato

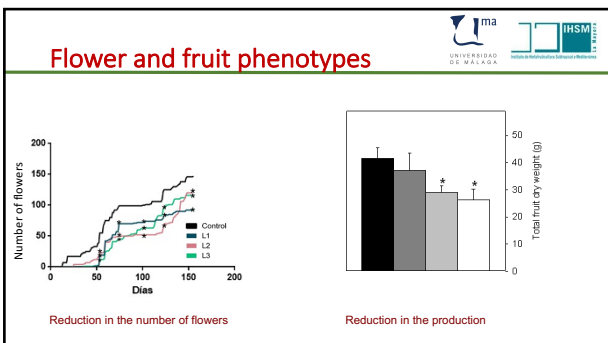


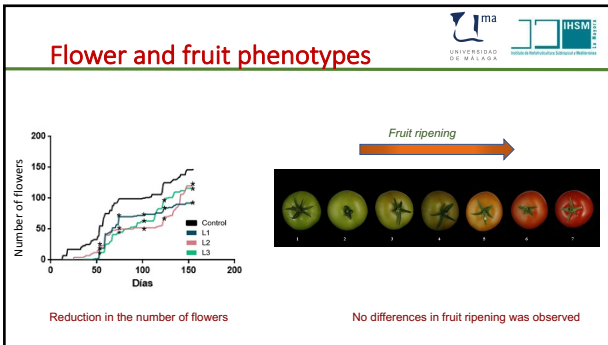


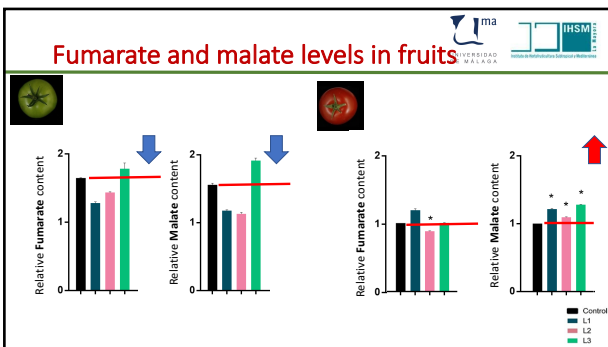


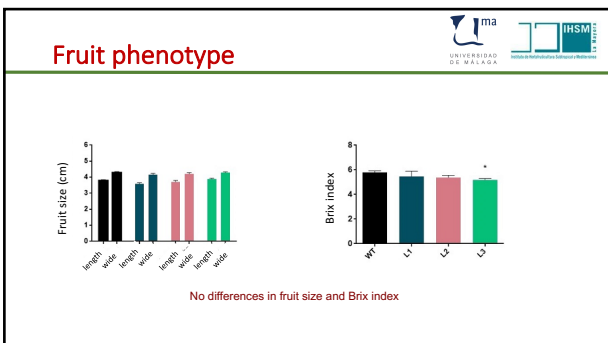


What happens in fruits?









Primary metabolism

GC-TOF-MS
~ 60 metabolites

- Amino acids
- Organic acids
- Sugars and Sugars alcohol
- Miscellaneous

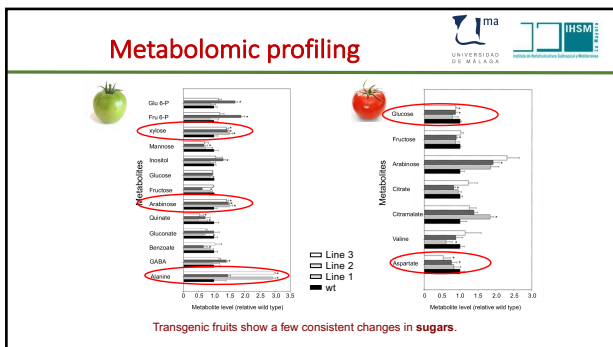
Metabolites

- Alanine, beta
- Asparagine
- Aspartate
- Cysteine, S-methyl-
- GABA
- Glutamine
- Glutamate
- Glycine
- Isoleucine
- lysine
- Methionine
- Oxothione
- Phenylalanine
- Proline
- Serine
- Serine, O-acetyl-
- Threonine
- Tryptophan
- Tyramine
- Tyrosine
- Valine

- Ascorbic acid
- Citric acid
- Dehydroascorbic acid
- Galactonic acid-1,4 lactone
- Fumaric acid
- Galacturonic acid/Glucuronic acid
- Glyceric acid
- Malic acid
- Quinic acid
- Pyroglutamic acid
- Saccharic acid
- Succinic acid

- Inositol, myo-
- Inositol-1-P, myo-
- Phosphoric acid
- Putrescine

- Erythritol
- Fructose
- Fructose-6P
- Fucose
- Galactinol
- Glucose
- Glucose-6P
- Iscumaltose
- Maltotriose
- Maltose
- Raffinose
- Rhamnose
- Sucrose
- Trehalose
- Xylose

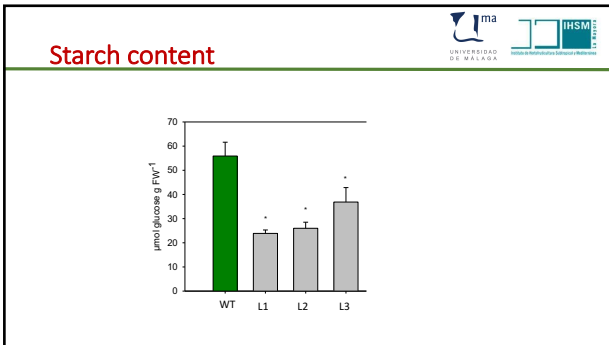


Metabolic profiling - Green fruits (35 DAF)

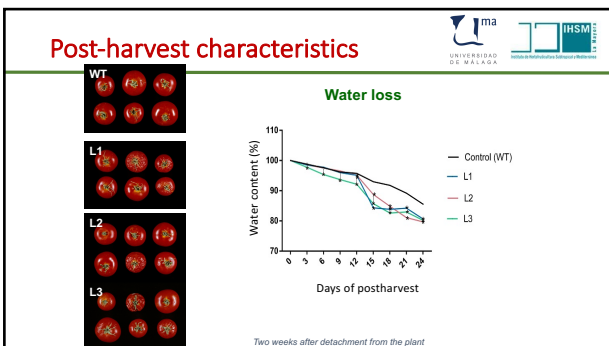
	WT	L1			L2			L3		
		$\mu\text{mol g}^{-1} \text{FW}$								
Glucose	109.63 ± 5.89	98.91 ± 0.94	93	4.25	107.38 ± 5.67					
Fructose	104.4 ± 2.96	91.3 ± 1.76	82.43	4.88	100.98 ± 3.65					
ATP	22.51 ± 1.5	12.86 ± 0.66	15.53	1.05	22 ± 0.78					
ADP	4.27 ± 0.32	1.12 ± 0.04	1.54	0.09	3.41 ± 0.43					

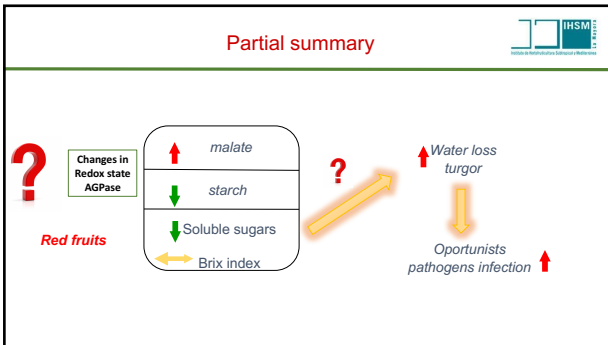
↓ Glucose and Fructose


↓ ADP



AGPase → Starch → malate/fumarate







Many Thanks...☺

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...and you for your attention!!!!
