

# WVG 4



**COST Action FA1204**

***VEGETABLE GRAFTING TO IMPROVE YIELD AND FRUIT QUALITY UNDER  
BIOTIC AND ABIOTIC STRESS CONDITIONS***



**WG 4**

# How herbaceous grafting influences vegetable quality

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consumers distrust of the products obtained by intensive cultivation

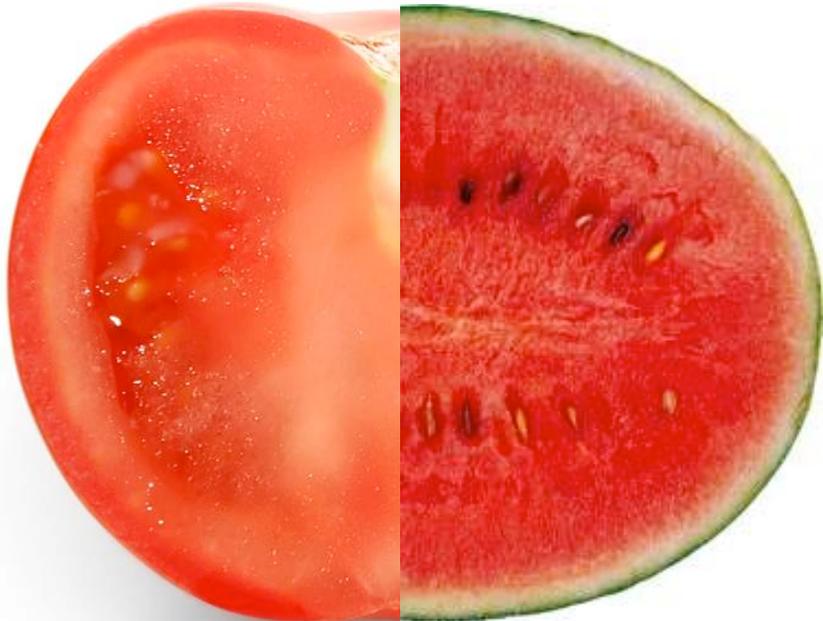
greater focus on what you eat



## Grafting quality complaints...



- Low Brix
- Insipid taste
- Increased number of yellowish bands in the red flesh
- Internal flesh breakdown



## WG 4

The WG had to develop **strategies and collaborations** with other Working Groups to gain new insights into the physiological, molecular and genetic mechanisms contributing to the **determinants of product quality** derived from rootstock.

Deliverables:



- D7** – Information on the rootstock effects on fruit quality;
- D9** - Creation of a database containing the main information about vegetable grafting;
- D10** - Providing opportunities to develop joint research programmes;
- D11** - Information sharing.

# What I should talk about .....

- a. What is quality?
- b. Rootstock effects on fruit quality
  - Appearance
  - Texture
  - Organoleptic compounds and relation to sensory properties
  - Health promoting substances
  - Contaminants
- c. Effects of grafting on ripening and postharvest behaviour
- d. Bio-physiological processes affecting fruit quality
- e. Conclusions and perspectives



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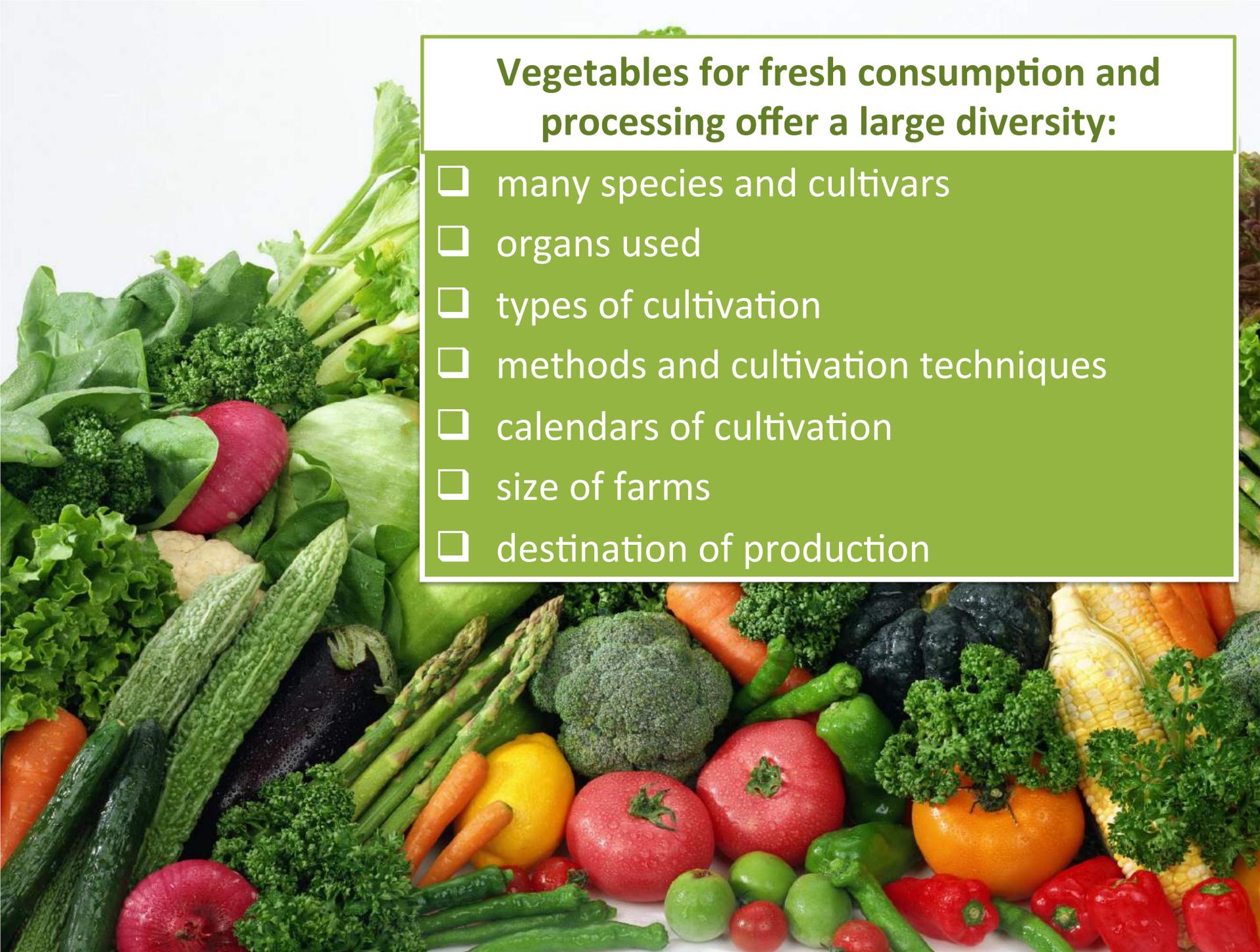
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- e. **Conclusions and perspectives**



# Main qualitative characteristics



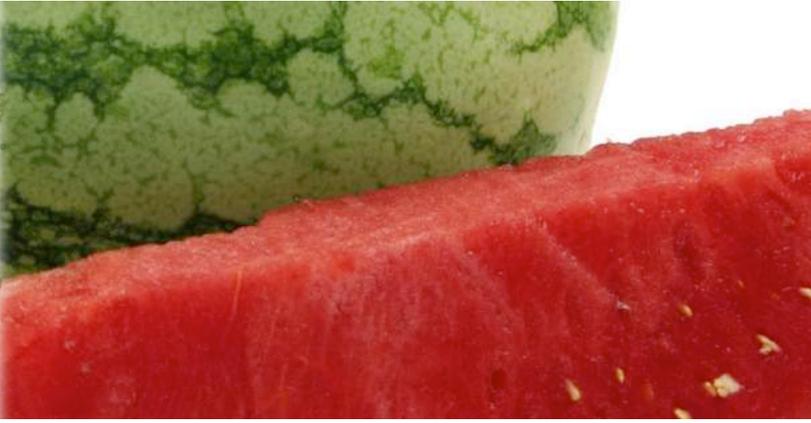
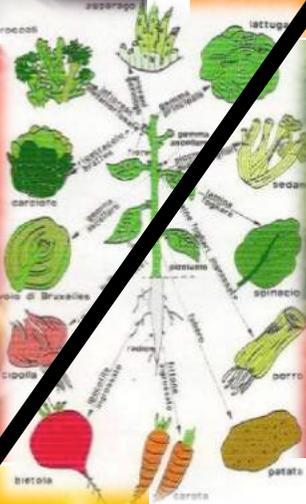
*“the set of characteristics of a product able to satisfy the needs of the consumer and to determine its value” ” (Peri, 2004)*



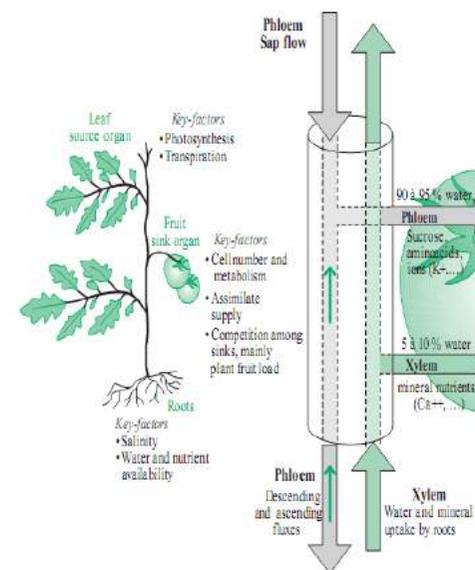
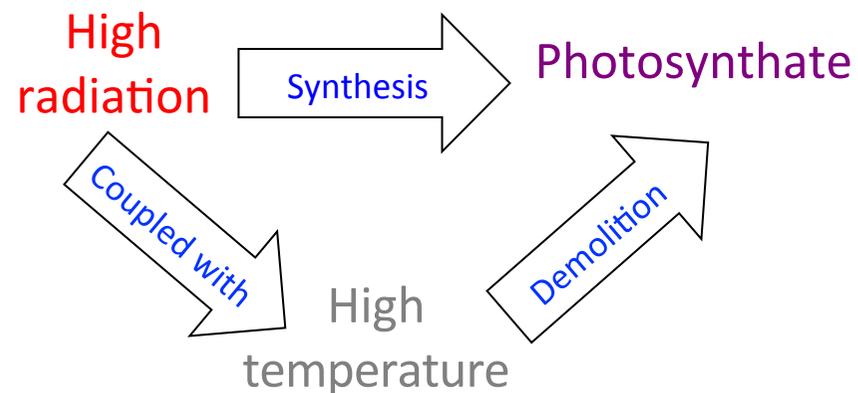
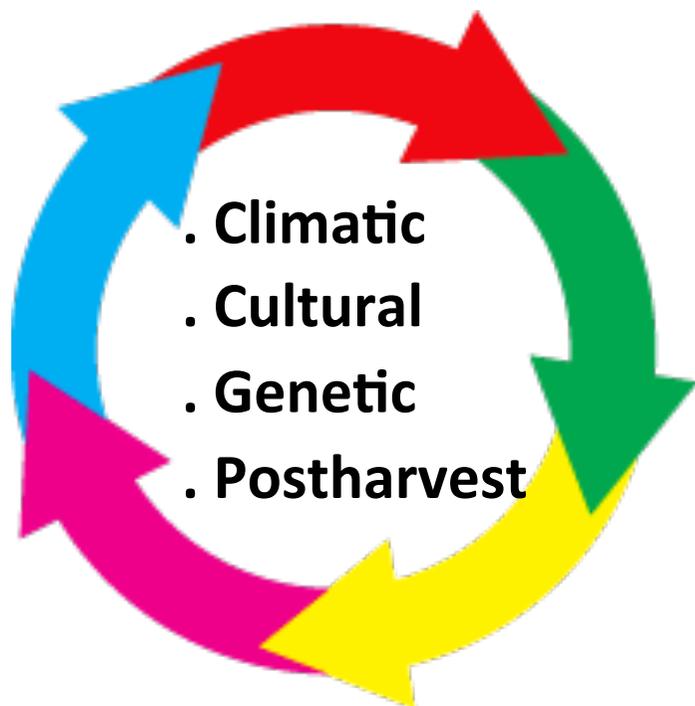
## Vegetables for fresh consumption and processing offer a large diversity:

- many species and cultivars
- organs used
- types of cultivation
- methods and cultivation techniques
- calendars of cultivation
- size of farms
- destination of production

# Solanaceae & Cucurbitaceae



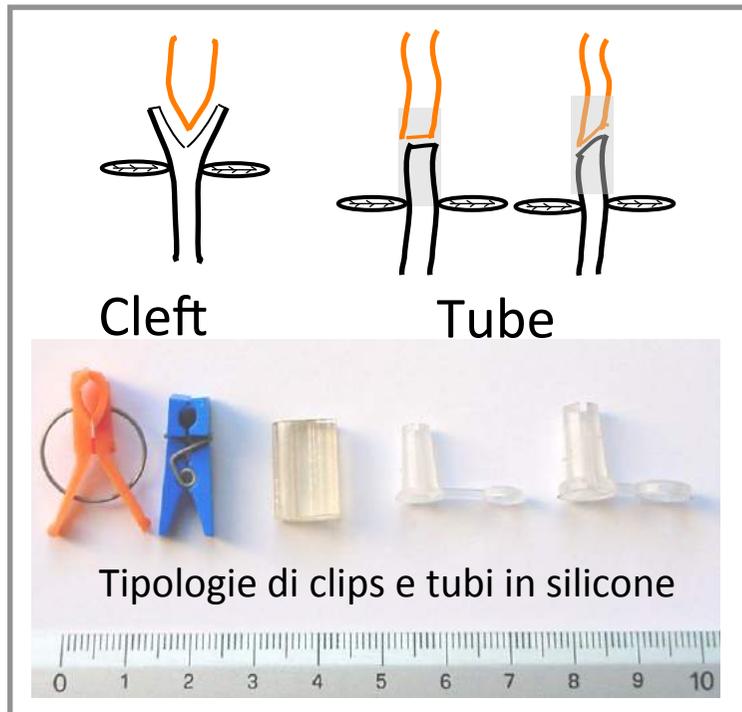
# Factors affecting fruit quality:



	Min	Avg	Max
Unit weight (g)	15	21	28
Firmness (g/2mm)	522	745	975

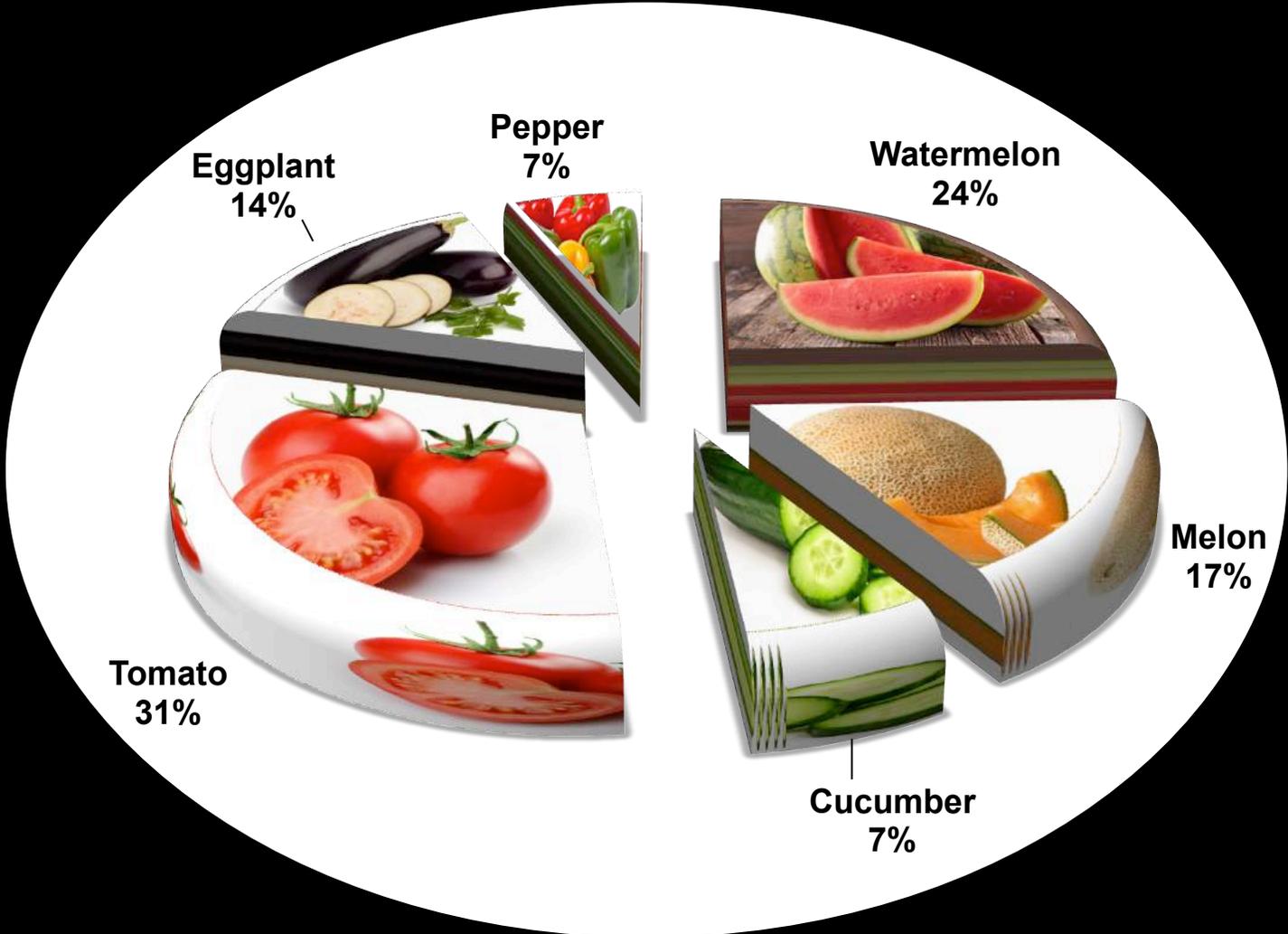


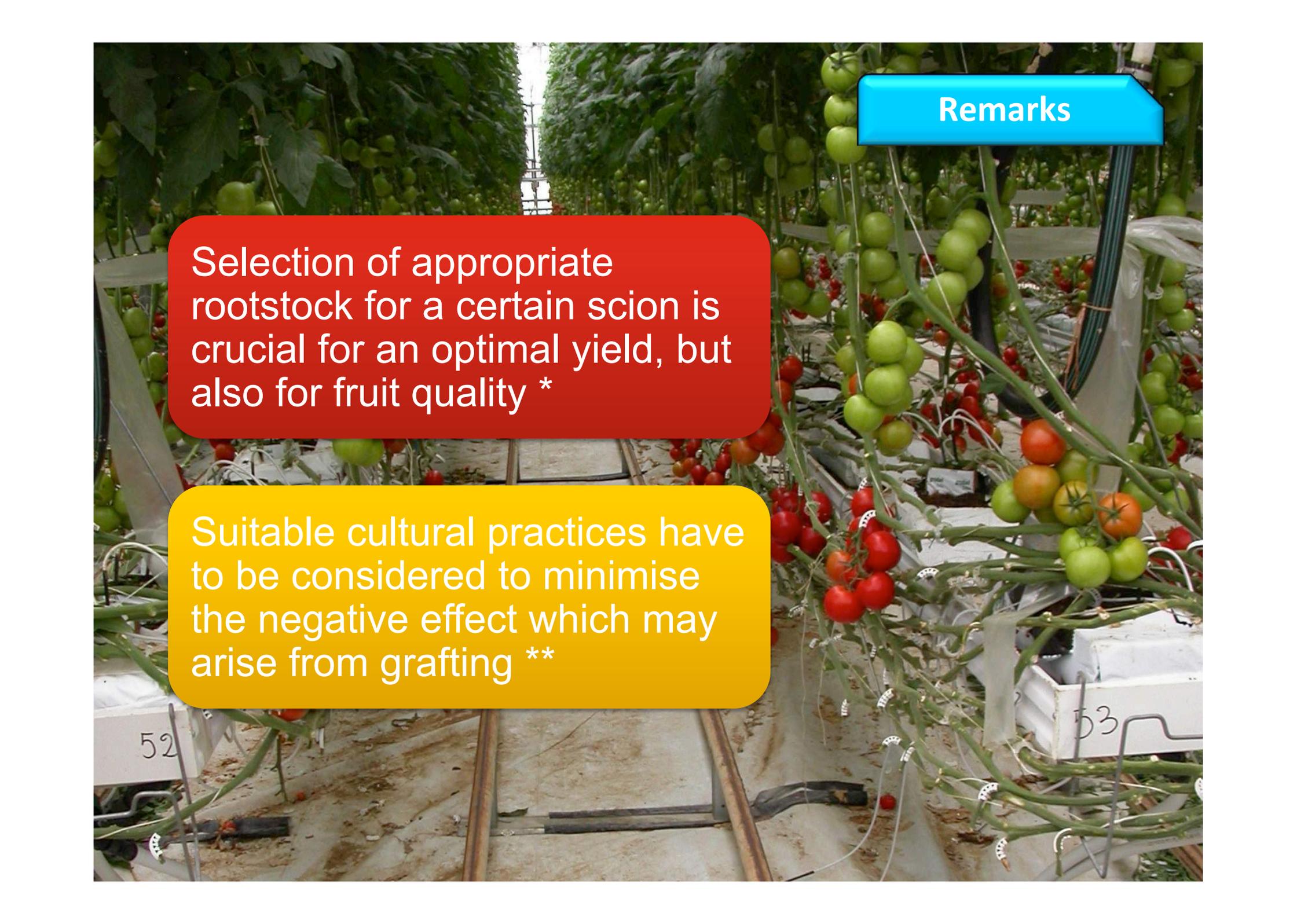
# Grafting!



**How herbaceous  
grafting influences  
vegetable quality**

# Papers (% on different vegetables) dealing with the effect of grafting on quality





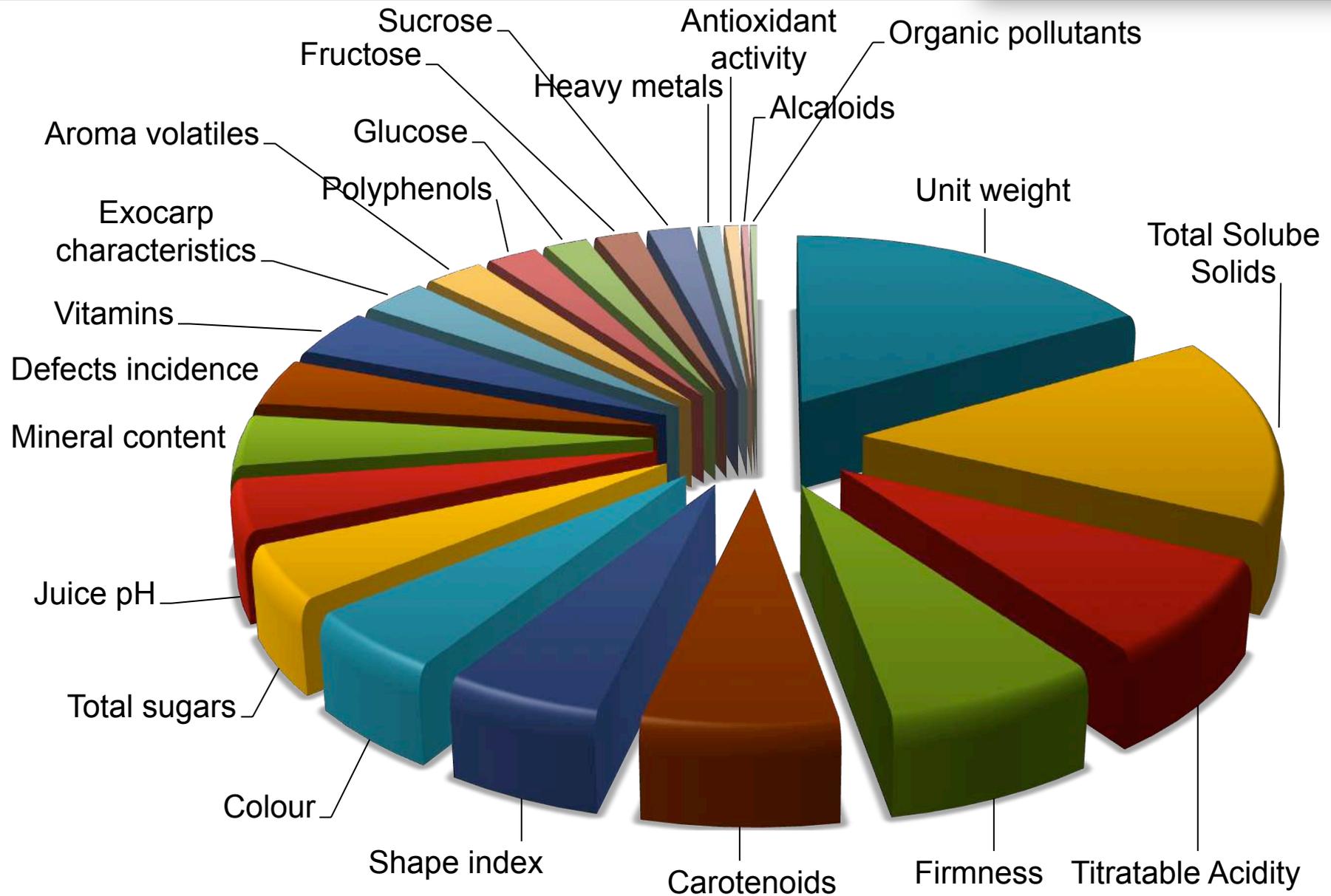
## Remarks

Selection of appropriate rootstock for a certain scion is crucial for an optimal yield, but also for fruit quality \*

Suitable cultural practices have to be considered to minimise the negative effect which may arise from grafting \*\*

# Characteristics considered in the studies on the effects of grafting on quality

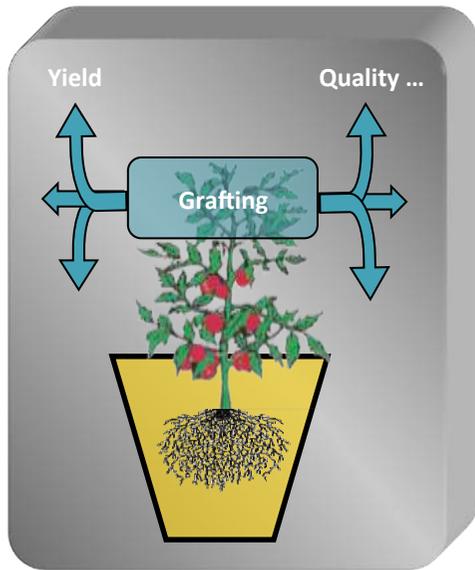
Remarks



# Effect of grafting on different qualitative parameters of different vegetables

Remarks

(+ increasing; - decreasing; = no significant effects) <sup>(1)</sup>



Product quality Parameter	Watermelon	Melon	Cucumber	Tomato	Eggplant	Pepper
<b>Unit weight</b>	+ =	+ - =	+	+ - =	+ =	+ <
<b>Shape index</b>	=	=	+	+ =	+ =	+
<b>Firmness</b>	+ = -	+ <	+ <	=	- =	=
<b>Total Soluble Solids</b>	- =	+ < =		+ - =	- =	=
<b>Titrateable Acidity</b>	+ =		+ -	+ =		+ =
<b>Carotenoids</b>	+ = -	+ - =		- + =		+ =

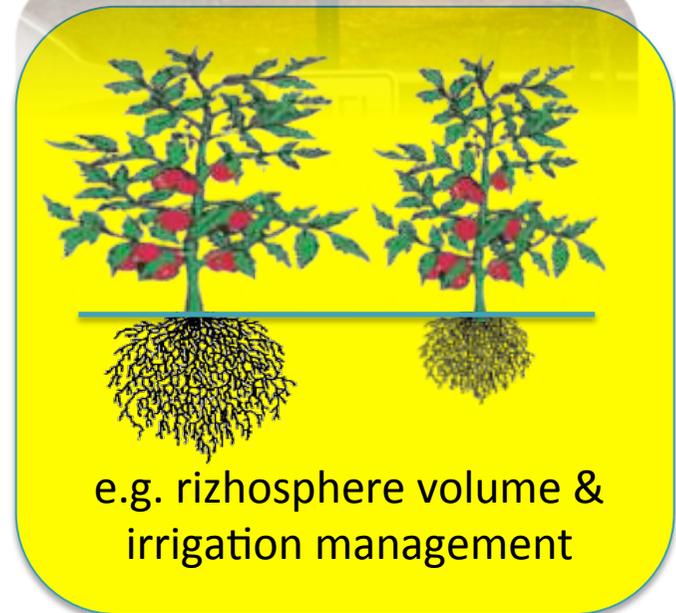
(1) More symbols are used if non univocal effects were observed in different papers; First symbol is general trend.

## Possible aspects involved in the contradictory effects of grafting on vegetable quality

- ✓ Degree of stressing conditions
- ✓ Different rootstocks and/or scion adopted
- ✓ Different combinations
- ✓ Various climatic conditions
- ✓ Nutrient and water availability
- ✓ Sampling size and method
- ✓ Recurrent harvests of experimental plots



### Remarks



Only a limited number of papers demonstrate or hypothesise the **biophysiological mechanisms involved**

Remarks



*not considered:*

- *the effect that may derive from a more or less evident degree of resistance.*
- *the aspects related to scion rootstock compatibility*

Several hypothesis from the results of the WG1, WG2, WG3,

## In tomato grafting ....

- increases in fruit water content or the vigorous rootstocks .....
- enhances the uptake of nutrients, such as potassium ...
- affects the carotenoid-derived volatiles (e.g.: geranylacetone,  $\beta$ -cyclocitral, etc.) due to the carotenoid variation

## The case of watermelon



+



= bigger fruits



+



= more fruits

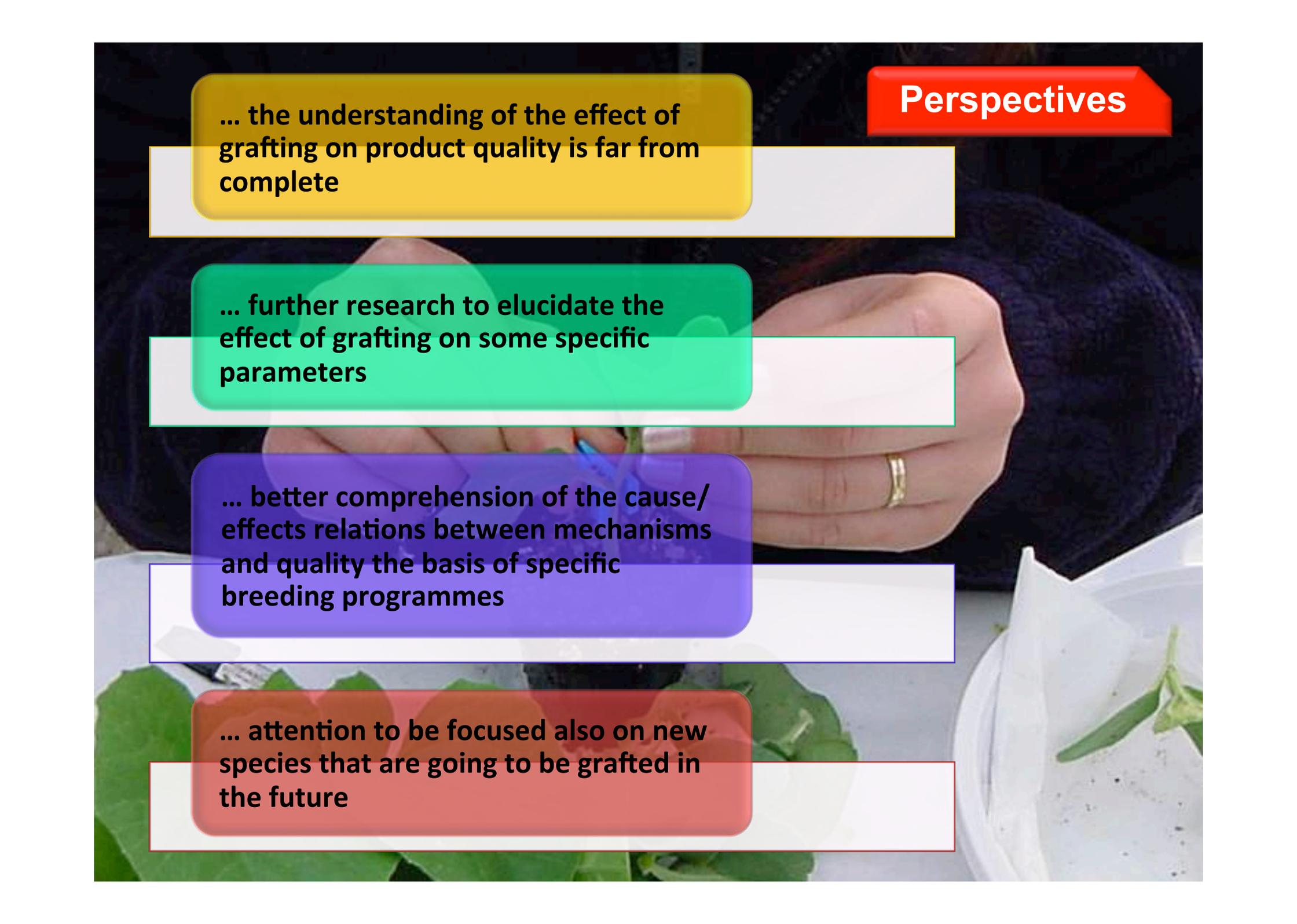
## Remarks

### The case of TSS ...

- grafting >>
- scion vigour >>
- timing of flowering >>
- fruit load >>
- yield >>
- fruit ripening >>

TSS

biophysiological  
mechanisms involved



## Perspectives

... the understanding of the effect of grafting on product quality is far from complete

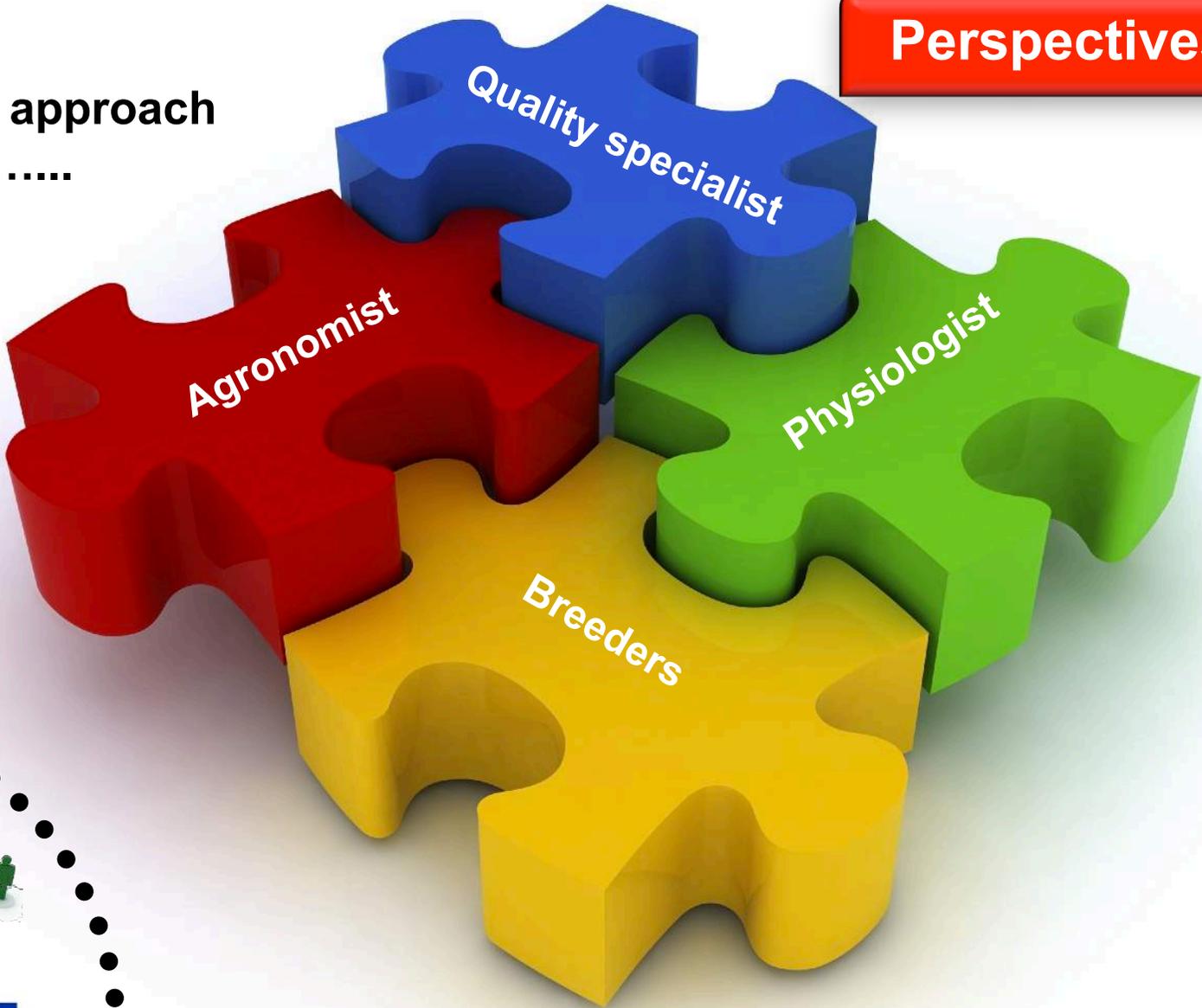
... further research to elucidate the effect of grafting on some specific parameters

... better comprehension of the cause/ effects relations between mechanisms and quality the basis of specific breeding programmes

... attention to be focused also on new species that are going to be grafted in the future

Integrated approach involving .....

Perspectives



Interreg 

HORIZON 2020 

.... Thank you



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