

Capsicums, Carotenoids and Blindness



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Eye Care...
Do You Really
Care??

Age-related Macular Degeneration (AMD)

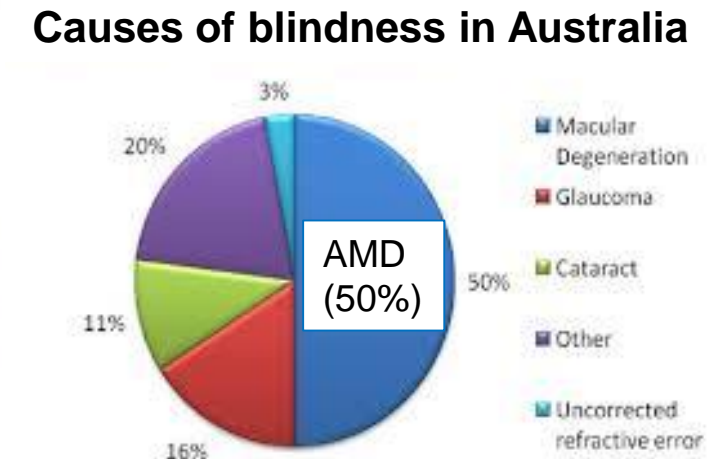
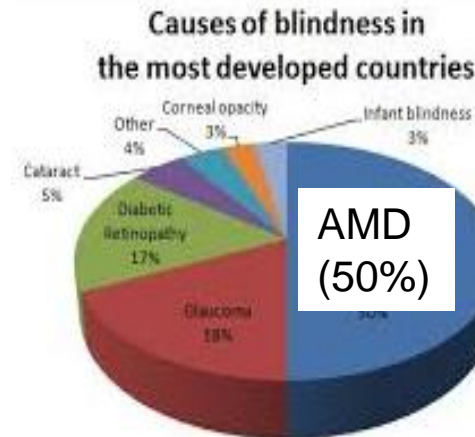
- Degeneration of macula leads to **central** blindness.
- Leading cause of visual impairment in the DEVELOPED WORLD.
- 1 in 7 people over age 50 are affected.
- Incidence of AMD increases with age.



NORMAL VISION
Objects are unobstructed and clear

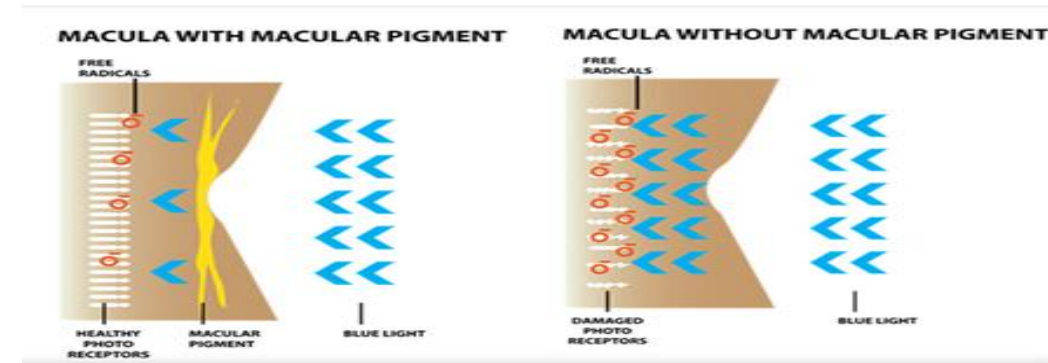
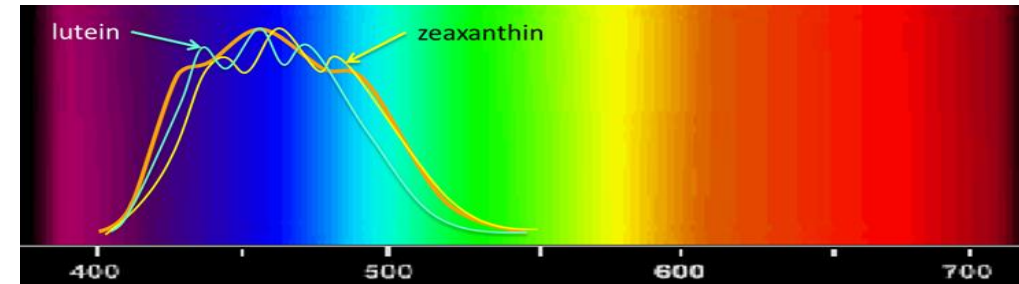


MACULAR DEGENERATION
Objects are obstructed and unclear



Lutein, Zeaxanthin and AMD

- Zeaxanthin & Lutein act like ‘sunglasses’ for oxidising **blue light**.
- Zeaxanthin and lutein are macular pigments, accumulated from the diet (and supplements).
- Evidence that high levels of zeaxanthin & lutein reduce the incidence & progression of AMD.

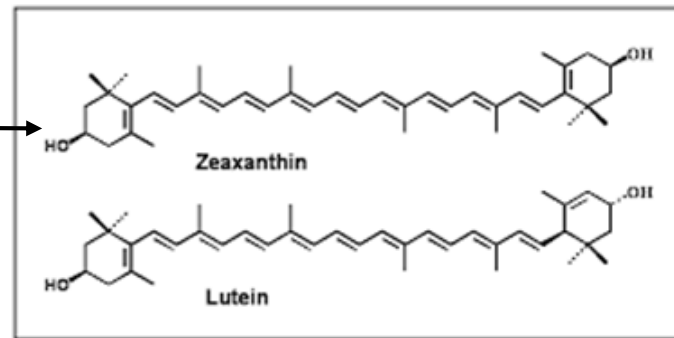


Lutein, Zeaxanthin and Capsicums

- Orange capsicums contains both:

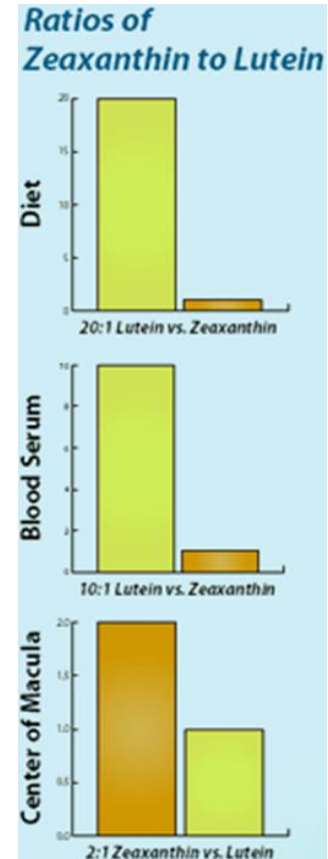
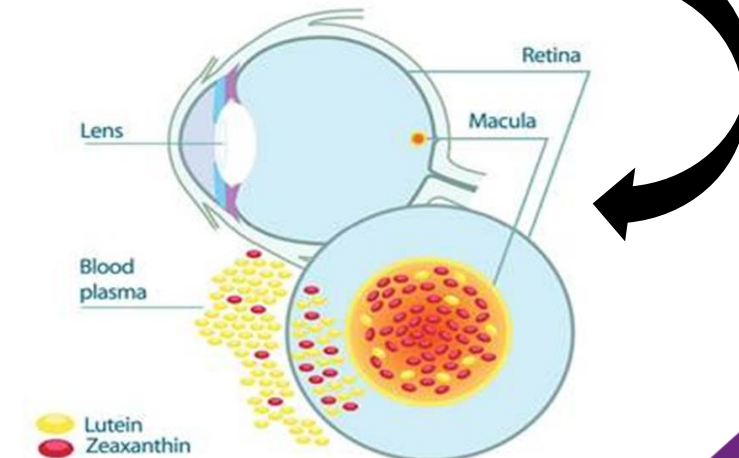
Zeaxanthin (orange)

Lutein (yellow)

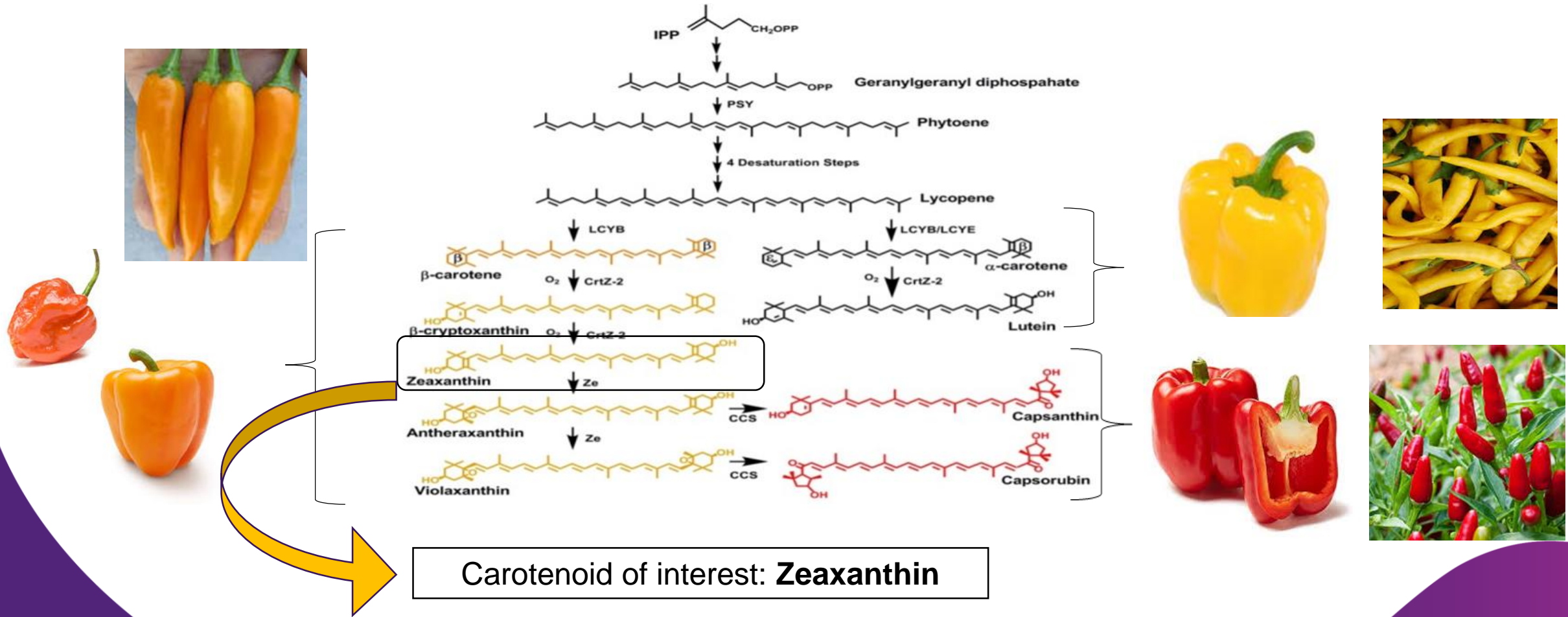


- These dietary pigments are accumulated in the macula & are essential for eye health.

Recommended Consensus Intake:
Zeaxanthin: 2 mg/person/day
Lutein: 10 mg/person/day



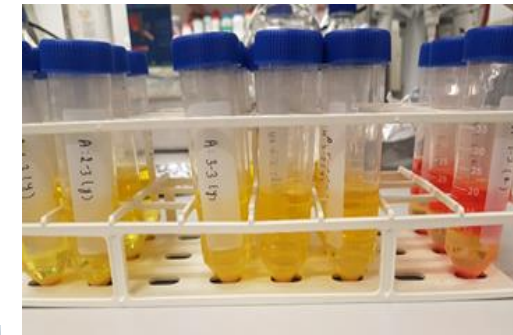
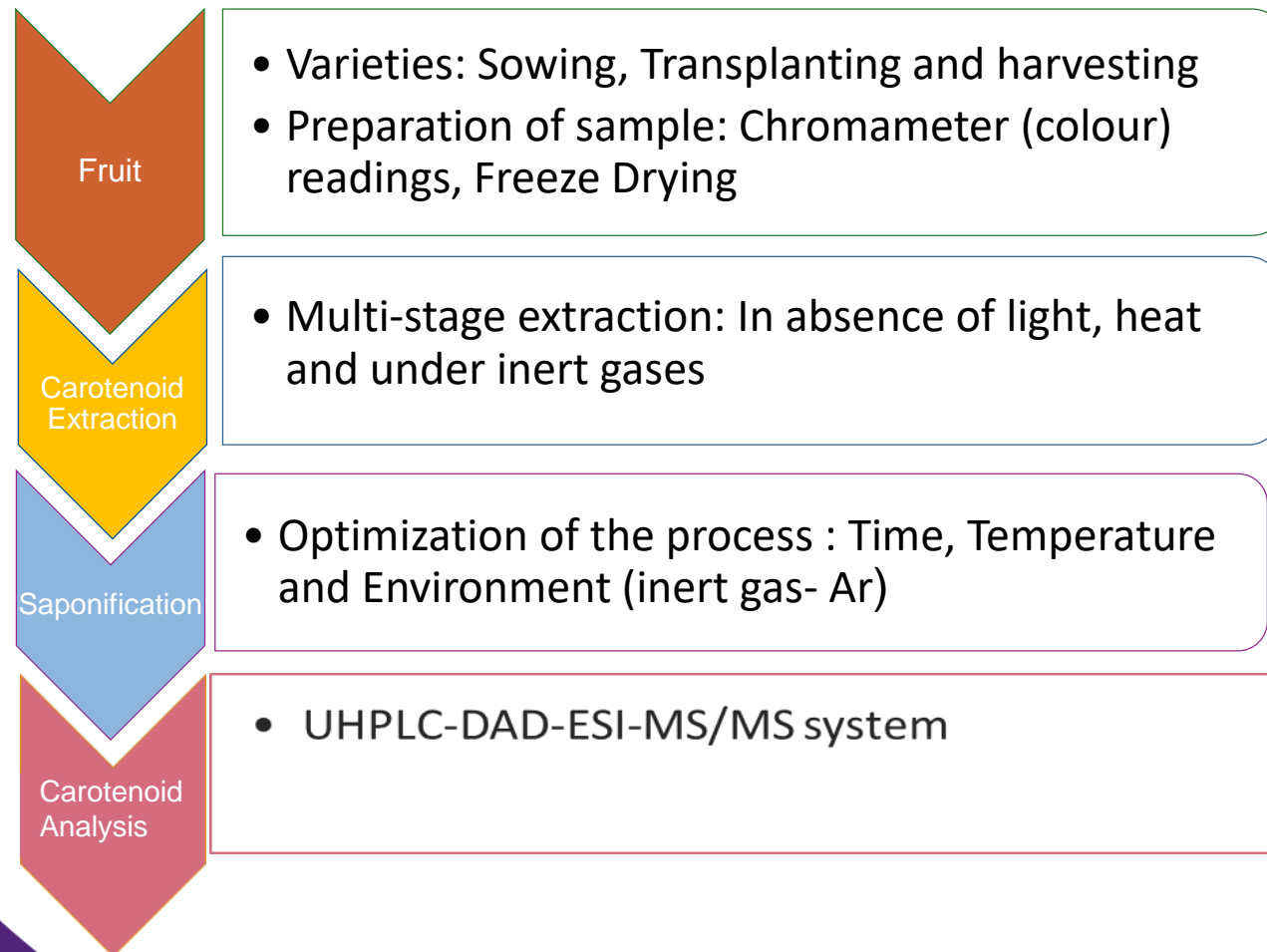
Carotenoid Pathway



Aim

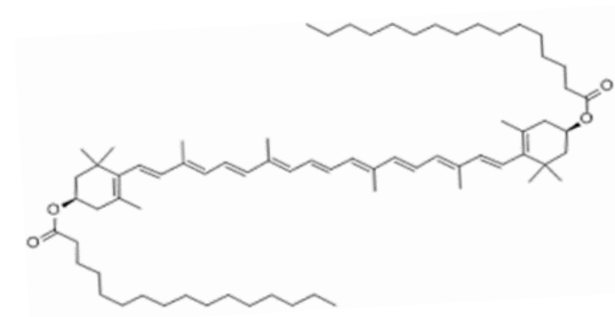
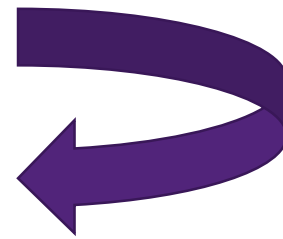
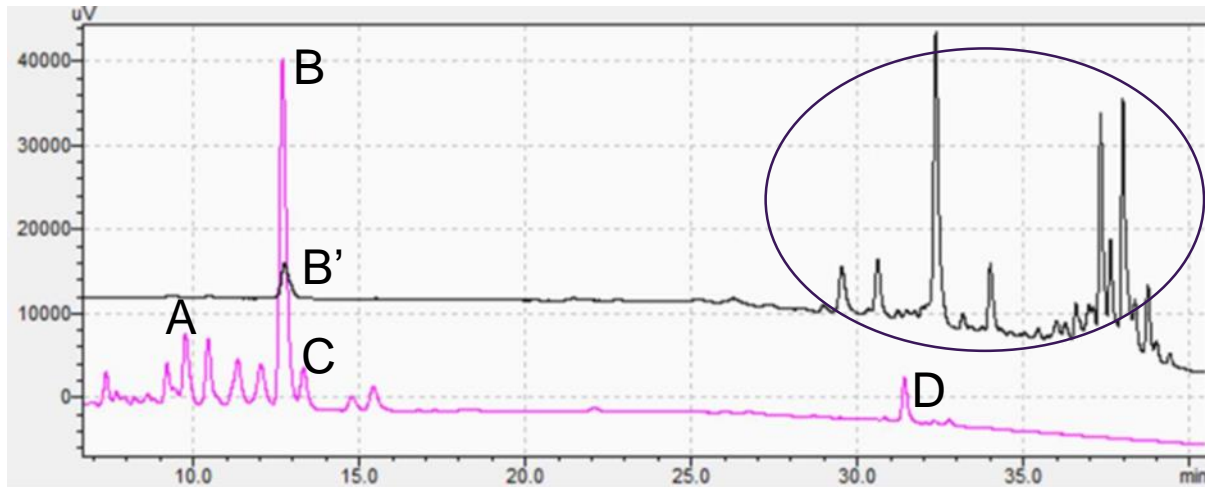
- Investigate the differences in the carotenoid profiles and zeaxanthin concentration between capsicums of similar appearance (Three red and eight orange capsicums).

Carotenoid Profiling Methodology



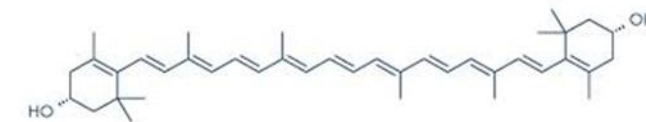
The need for preliminary 'de-esterification'

Why de-esterification???



De-esterified carotenoids

Zeaxanthin Dipalmitate



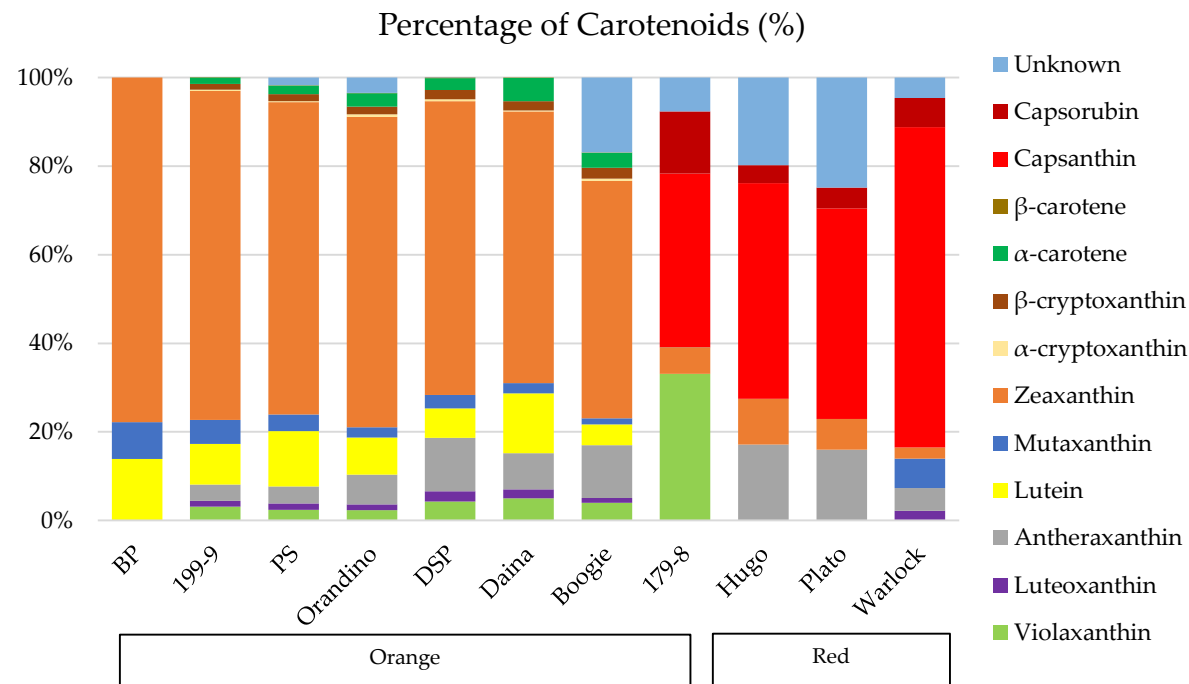
Zeaxanthin

1. At least 4 different carotenoids after saponification could be identified:

A- **Capsorubin**; B-**Capsanthin**; C-**Zeaxanthin**; D-**Beta-carotene**

2. Prevents under-estimation of carotenoids.

1. Carotenoid profiles of the varieties



- 7 of 8 orange varieties had zeaxanthin (50-75%) as their principal carotenoid.
- 179-8 (darker orange hue variety) had violaxanthin (33%) and capsanthin (39%) as its principal carotenoids.
- All three red varieties had capsanthin (50-70%) as their principal carotenoid.

Figure 1: Percentage of carotenoids (after de-esterification) in different orange and red capsicums

Findings!

ORANGE

Due to orange pigments:

1. Beta-carotene
2. **Zeaxanthin (Mainly)**
3. Beta-cryptoxanthin

1. Bell Pepper
2. 199-9
3. PS
4. Orandino
5. DSP
6. Daina
7. Boogie

Other reasons:

1. Mix of red and yellow pigments

1. 179-8

2. Zeaxanthin concentration and daily dietary intake of varieties-

Variety	Colour	Total Carotenoid conc. (mg/100g FW)	Zeaxanthin conc. (mg/100g FW)	Zeaxanthin Percentage
Orandino	Orange	40.0 ± 12.3	28.0 ± 8.5	70.1 %
Boogie	Orange	50.3 ± 22.5	27.0 ± 9.4	53.6 %
PS	Orange	29.1 ± 13.7	20.5 ± 10.3	70.5 %
Daina	Orange	22.0 ± 14.1	13.5 ± 8.4	61.5 %
199-9	Orange	10.4 ± 3.2	8.0 ± 2.7	77.1 %
DSP	Orange	9.3 ± 1.5	6.2 ± 1.0	66.3 %
BP	Orange	2.4 ± 0.1	1.9 ± 0.1	79.7 %
179-8	Dark -orange	3.7 ± 1.2	0.2 ± 0.1	5.9 %
Hugo	Red	7.5 ± 1.3	0.8 ± 0.2	10.3 %
Plato	Red	9.5 ± 2.0	0.7 ± 0.3	6.9 %
Warlock	Red	17.8 ± 7.6	0.5 ± 0.4	2.5 %

- Zeaxanthin concentration is dependent on both total carotenoid production, and the percentage of this made up by zeaxanthin.

Variety	Amount needed to be consumed (g)
Orandino	7 g
Boogie	7 g
PS	10 g
Daina	15 g
199-9	25 g
DSP	30 g
BP	100 g
179-8	910 g
Hugo	260 g
Plato	300 g
Warlock	440 g

- High zeaxanthin orange capsicums:** (Orandino & Boogie) : 7g tissue*
- Other orange varieties:** 10-100g tissue*
- Red varieties:** 260-440g tissue* (Half to one big capsicum per day).
- Darker hue orange:** 910 g tissue* (nearly 2 big sized capsicums per day).

*Tissue needed to meet the daily recommended zeaxanthin value- 2mg/person/day

What would you like for dinner?!!!



Eye Care
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Capsules



Conclusion

1. Orange capsicums are generally a much a better source of zeaxanthin as compared to red capsicums. However, not all orange capsicums are a rich source of zeaxanthin. Orange colour may be due to a mixture of red and yellow carotenoids.
2. Zeaxanthin concentration is also dependent on total carotenoid production, and the percentage of this made up by zeaxanthin.
3. The orange capsicums 'Orandino' and 'Boogie' were identified as a very good source of dietary zeaxanthin, with only 7 g of orange flesh supplying the 2 mg zeaxanthin.

Thank You!

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