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**NATECO<sub>2</sub>**

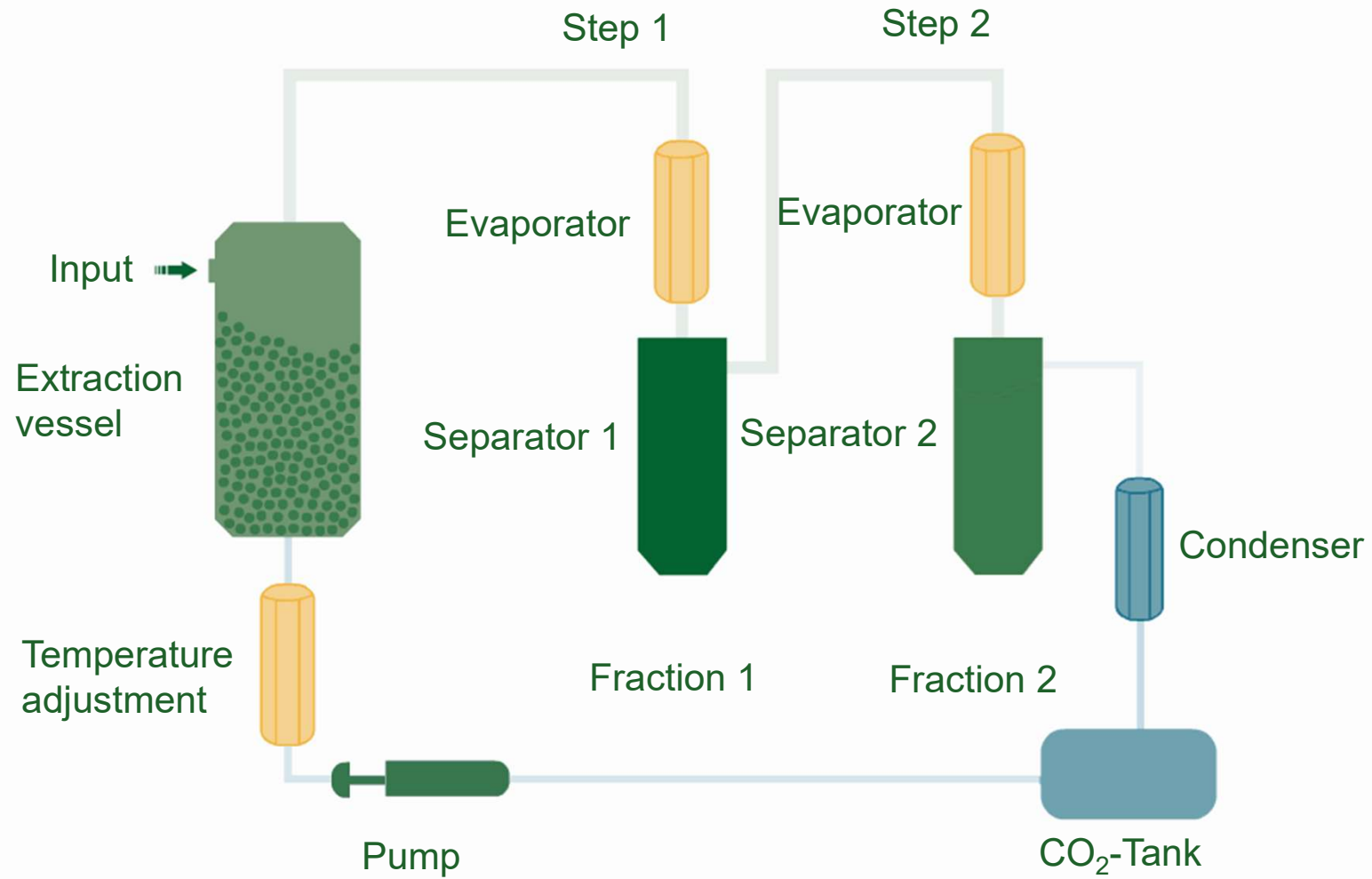
# **Hopfenveredlung St. Johann GmbH**

From lab scale to pilot and production scale  
Using scCO<sub>2</sub> at 1000 bar with special focus on  
*Haematococcus pluvialis*

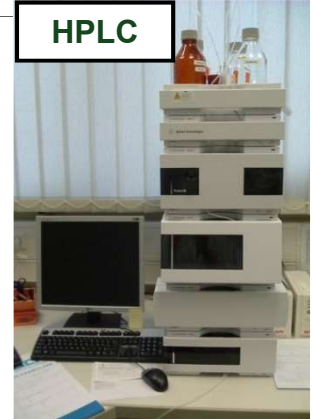
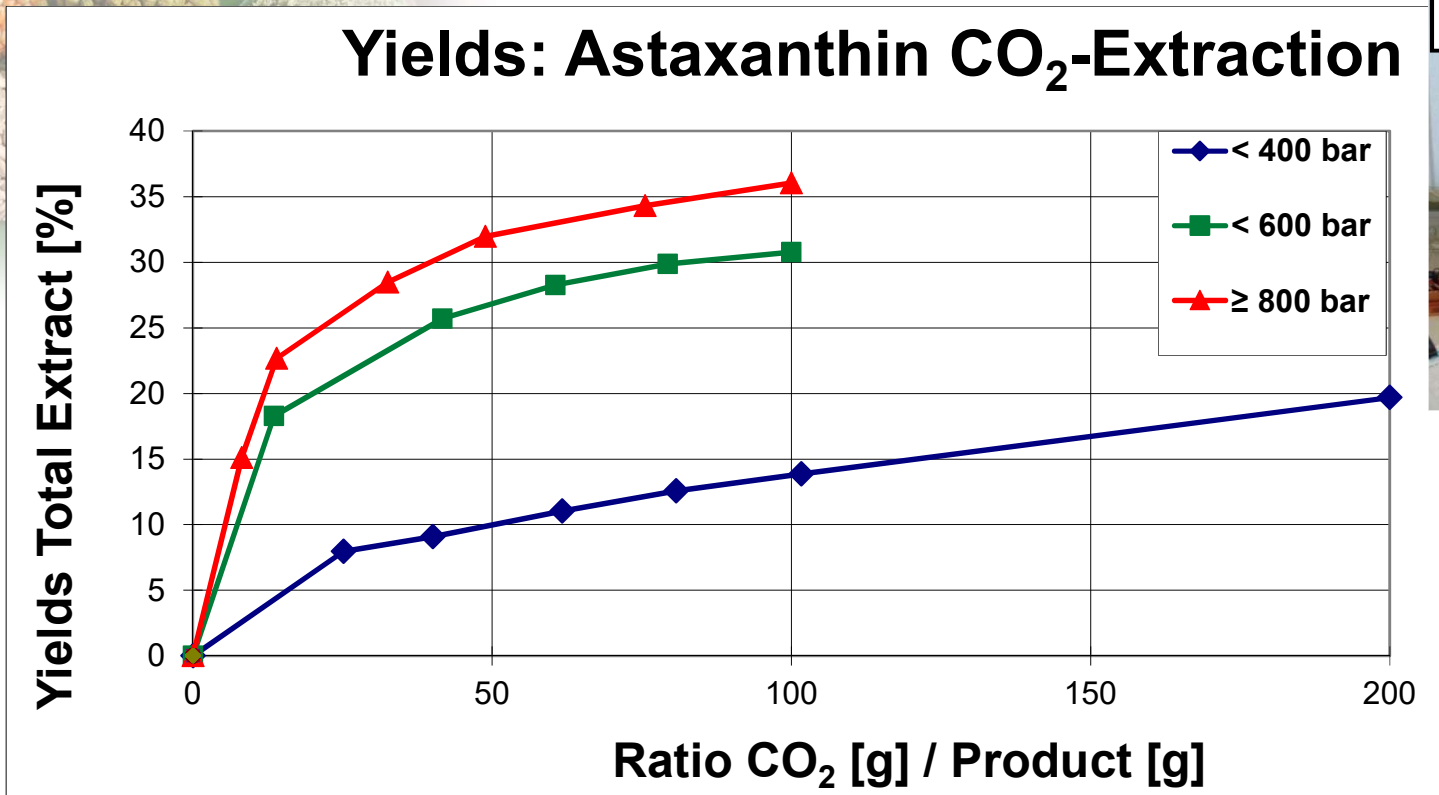
**17th European Meeting on Supercritical Fluids 2019**

- Marlene Tippelt -





# Haematococcus pluvialis extraction

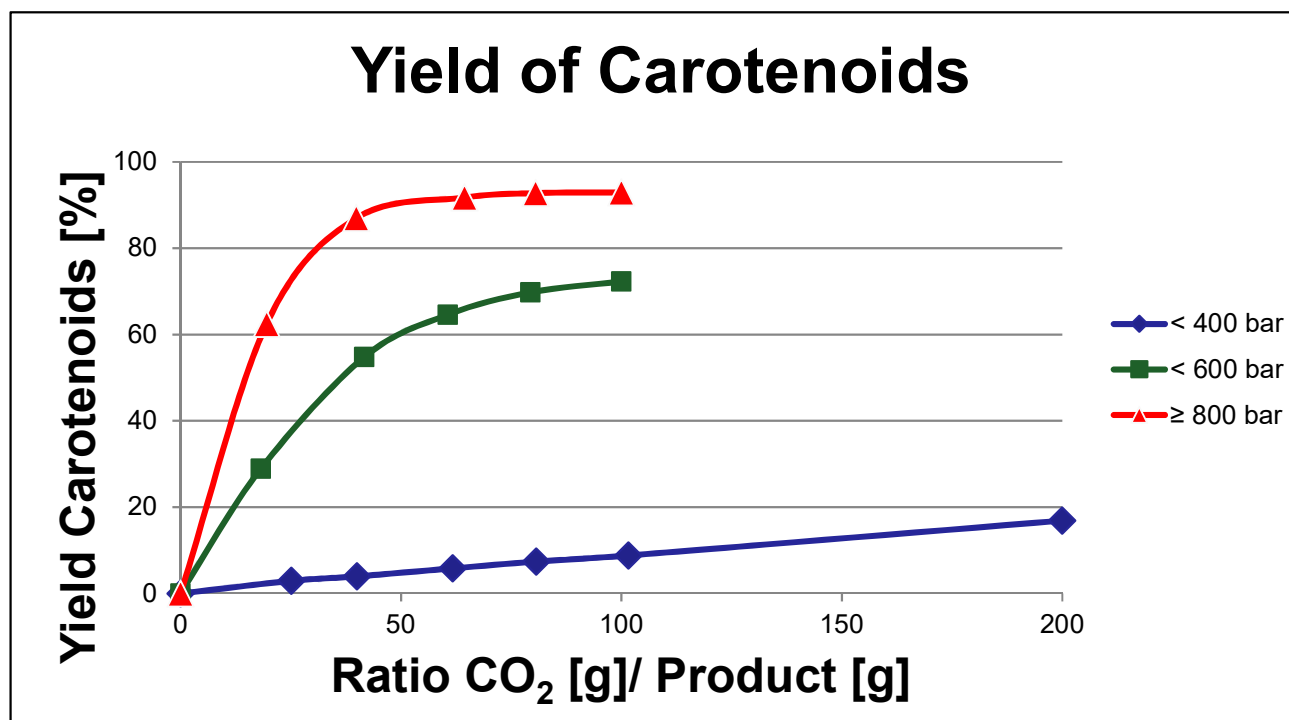
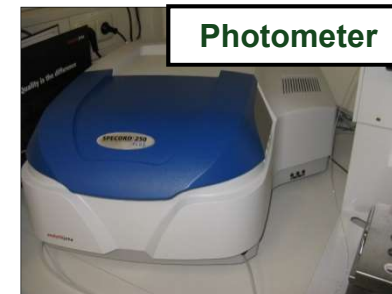


Pressure [bar]	Temperature [° C]	Recovery rates of Carotenoids in the extract [%]
< 400	60 - 80	~ 20
< 600	60 - 80	~ 70
≥ 800	60 - 80	> 90

# Haematococcus pluvialis extraction

## Extraction of *Haematococcus pluvialis*

Starting Biomass:	4,7 % Carotenoids
Spent Biomass < 400 bar:	4,1 % Carotenoids
Spent Biomass < 600 bar:	1,5 % Carotenoids
Spent Biomass $\geq$ 800 bar:	0,1 % Carotenoids



## Technical Equipment

Designation	Products/Usage [exemplary]	Pressure [max. bar]	Vessels	Volume [L]
HDL 3	R&D	1,000	1	3
HDL 4	R&D	1,000	1	5
HD 99	Pilot Unit	1,000	1	50
HD 15	Algae	1,000	1	800
HD 94	Saw Palmetto	300	3	500
HD 03	Cocoa	300	1	1,000
HD 85	Hemp	300	4	2,000
HD 88	Hops	300	4	4,000
HD 91	Hops	300	4	4,000

Currently under construction:

HD 17 (2x 1,000L - 300 bar)

HD 19 (8x 4,000L - 500 bar)



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## Lab plant – *Haematococcus pluvialis*

First trials in 2004

In Lab plant units with a maximum pressure of 1,000 bar and extraction volume of 3l and 5l



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# Pilot plant – *Haematococcus pluvialis*

Pilot plant in 2005  
maximum pressure of 1,000 bar  
and extraction volume of 50l

**Biomass**  
2 - 5 % Astaxanthin



**Oleoresin**  
> 10 % Astaxanthin

**Spent Material**  
< 0,1 % Astaxanthin



Sep. 1

Sep. 2



**Oil**  
~2 % Astaxanthin



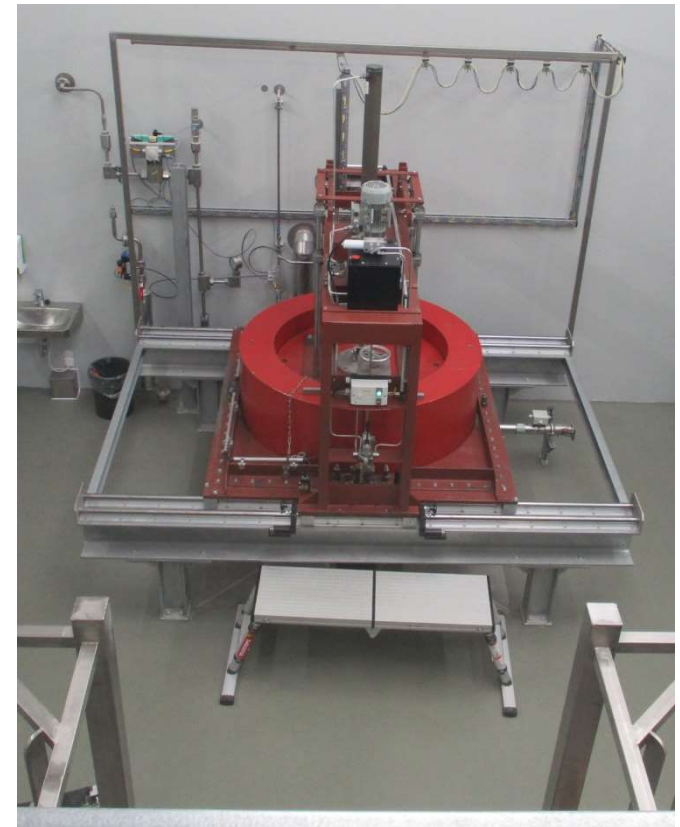
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# production plant – *Haematococcus pluvialis*

First runs in 2011  
with a maximum pressure of 1,000 bar  
and extraction volume of 800 l



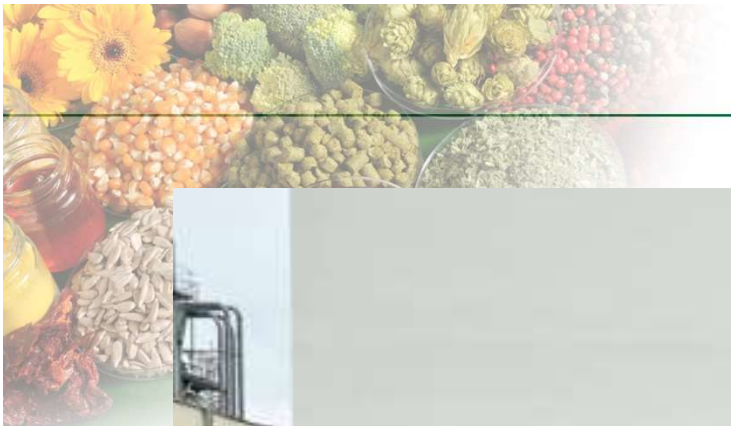
2004 – today

Baskets of 3, 5, 50 and 800 l extraction volume



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**THANK YOU** for your attention!

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