Lipid production by oleaginous yeast using vegetable waste from sorting process

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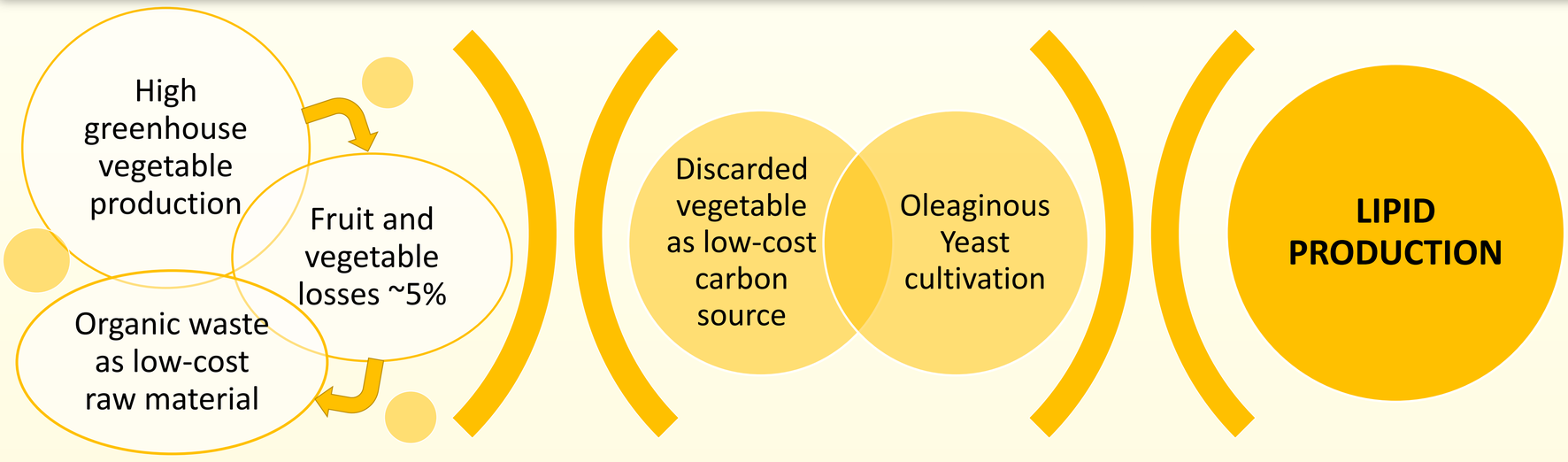
INTRODUCTION



OBJECTIVES

- **Obtain an adequate growth media from discarded vegetables**
- **Identify the optimum operating conditions in order to maximize lipid accumulation in yeast using discarded vegetables**
- **Analize the accumulated lipids quantitatively and qualitatively**

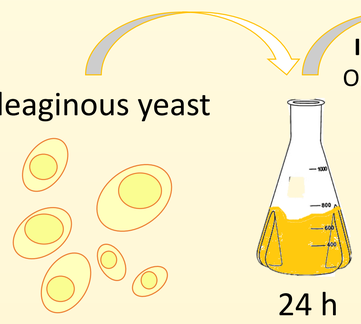
METHODOLOGY

Crushing and centrifugation

Soluble fractions as culture media

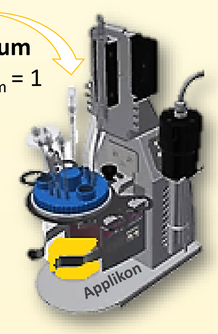
Discarded watermelon-, tomato- or pepper-derived media

Oleaginous yeast



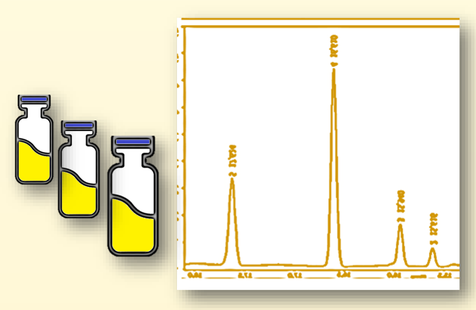
Cryptococcus curvatus CL6032

Propagation:
YPD medium
- T: 25°C
- pH: 6
- 180 rpm



Culture:
Media from discarded vegetable
- Glucose pulses (fed-batch strategy)
- T: 28°C
- pH: 6
- Aeration 1 vvm
- Stirring: variable (dO_2 >20% of air saturation)

Cell harvesting and lipid extraction



Lipid quantification and fatty acid profile
Gas Chromatography (GC) method

RESULTS

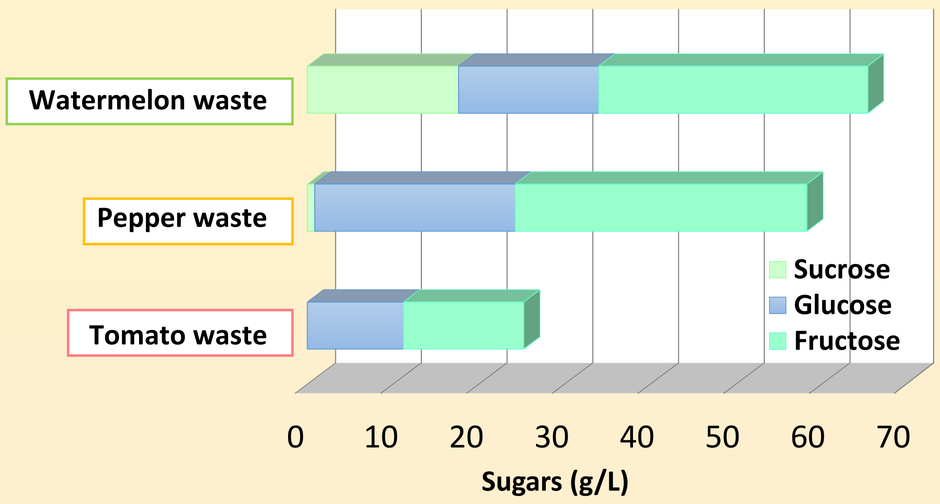
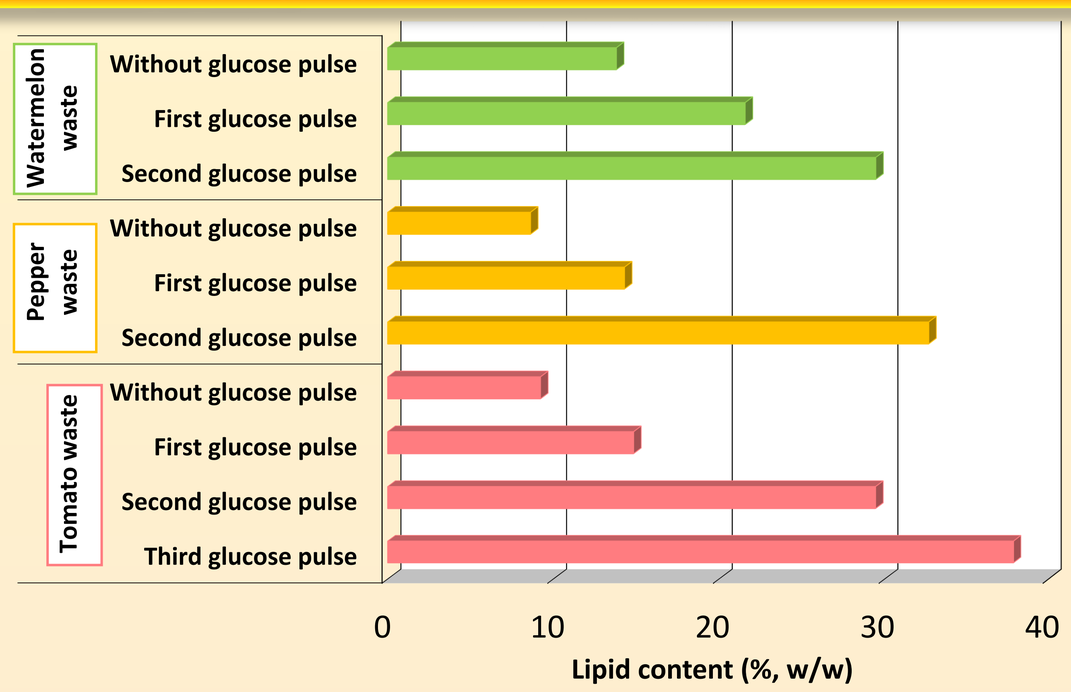


Figure 1. Sugar concentration of the different soluble fractions to be used as carbon source



Fed-batch strategy

Figure 2. Lipid content (%, w/w) obtained by *C. curvatus* in discarded pepper-, tomato- and watermelon-derived media with different pulsed carbon source additions

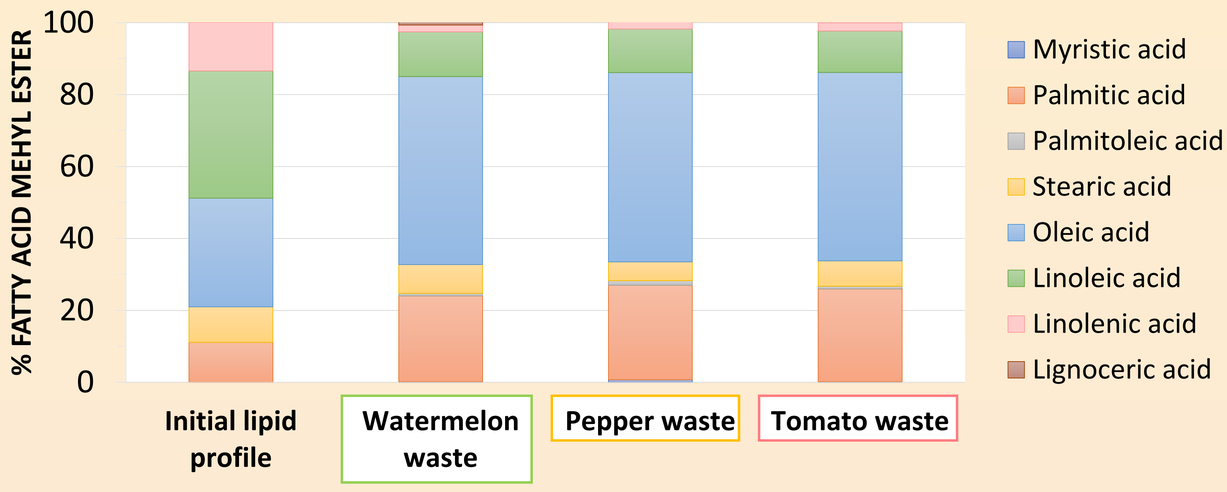


Figure 3. Fatty acid profile before lipid accumulation and fatty acid profile of *C. curvatus* after cultivation in discarded vegetable-derived media

Table 1. Dry biomass and lipid concentrations, lipid contents and lipid yields obtained after fermentations in discarded vegetable-derived media using *C. curvatus*

Discarded vegetable	DCW (g/L)	Lipid (g/L)	Lipid content (%, w/w)	Lipid yield* (g/g)
Watermelon	41.8	13.3	29.5	0.101
Pepper	47.3	16.8	32.7	0.106
Tomato	23.8	9.2	37.8	0.097

DCW (Dry Cell Weight)
*Lipid Yield (g lipid/g sugar consumed)

CONCLUSIONS

1. High sugars content in vegetables which can be easily extracted by mechanical methods
2. Lipid concentrations up to 16.8 g/L were obtained from the soluble fraction from discarded pepper and pulsed glucose addition in a fed-batch strategy cultivation
3. The highest lipid content was found when soluble sugars from discarded tomato were utilized as substrate and after three glucose pulses, but the lowest lipid yield was obtained
4. Oleic acid, palmitic acid and linoleic acid account for about 90% of the total fatty acids produced

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