

Potential of cheese industry wastewater for the production of Phenyl Ethyl alcohol (PEA), an antimicrobial compound

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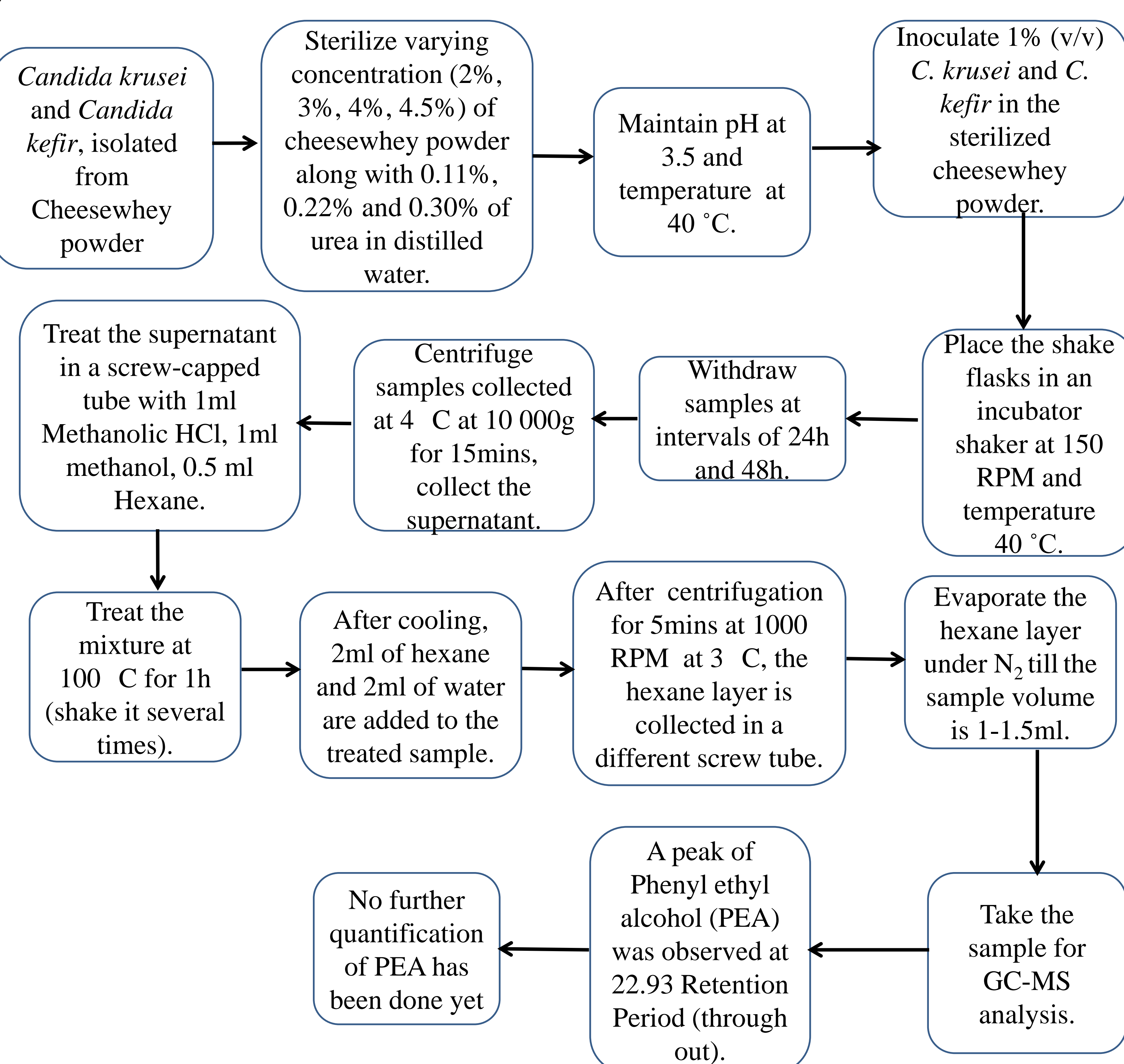
INTRODUCTION

- Cheese industry waste water (cheesewhey) is a major environmental problem.
- The major sources of phenyl ethyl alcohol which is an anti microbial compound are from fermentation of tea leaves, cocco, essential oils and herbs.
- Synthetic ways of production of this anti-microbial compound are: a) Grignard Reaction between C_6H_5MgBr and C_2H_4O . b) Homologation of benzyl alcohol to β -phenyl ethyl alcohol in water at 100-165 °C. c) Catalytic oxidation of styrene oxide.

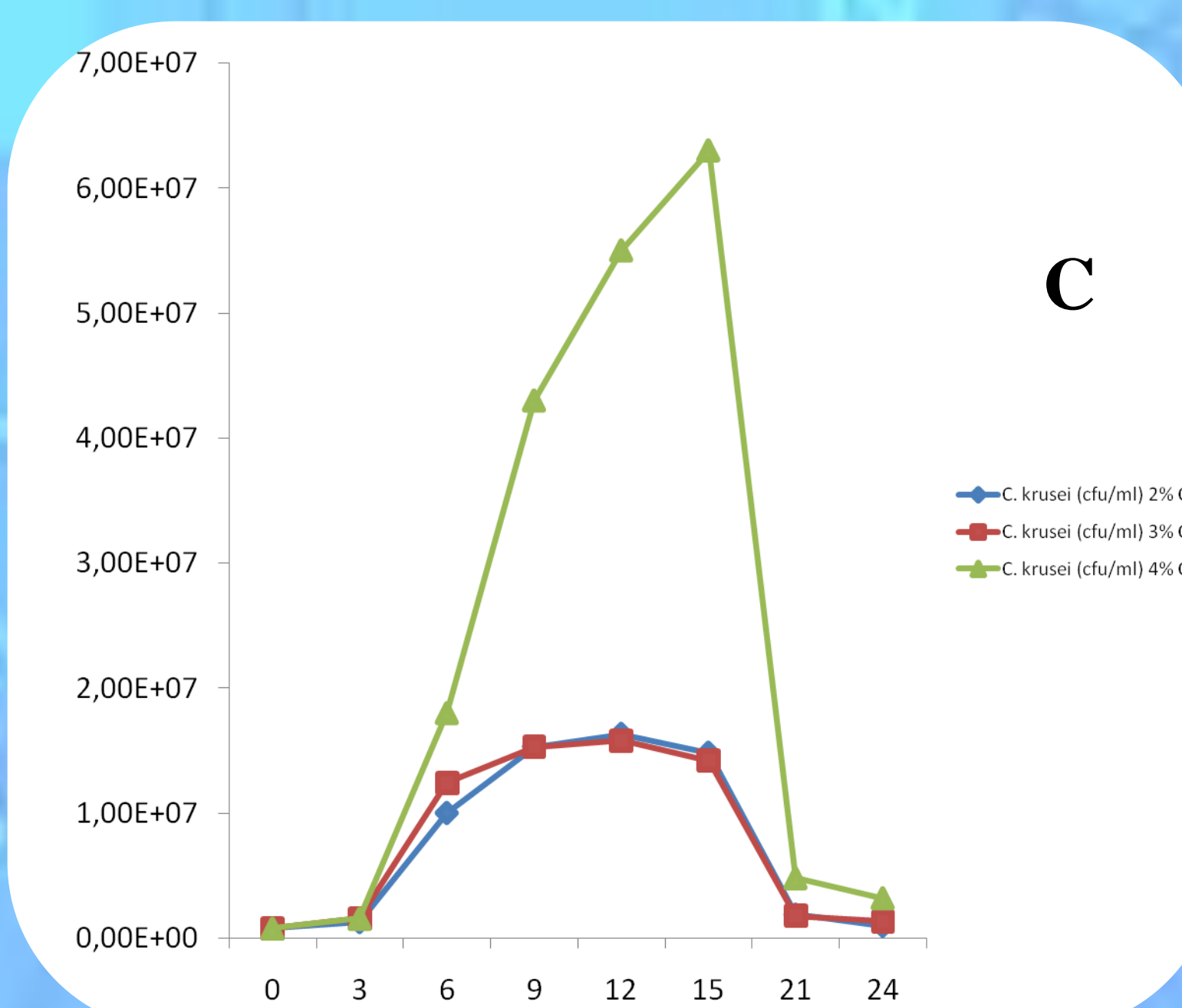
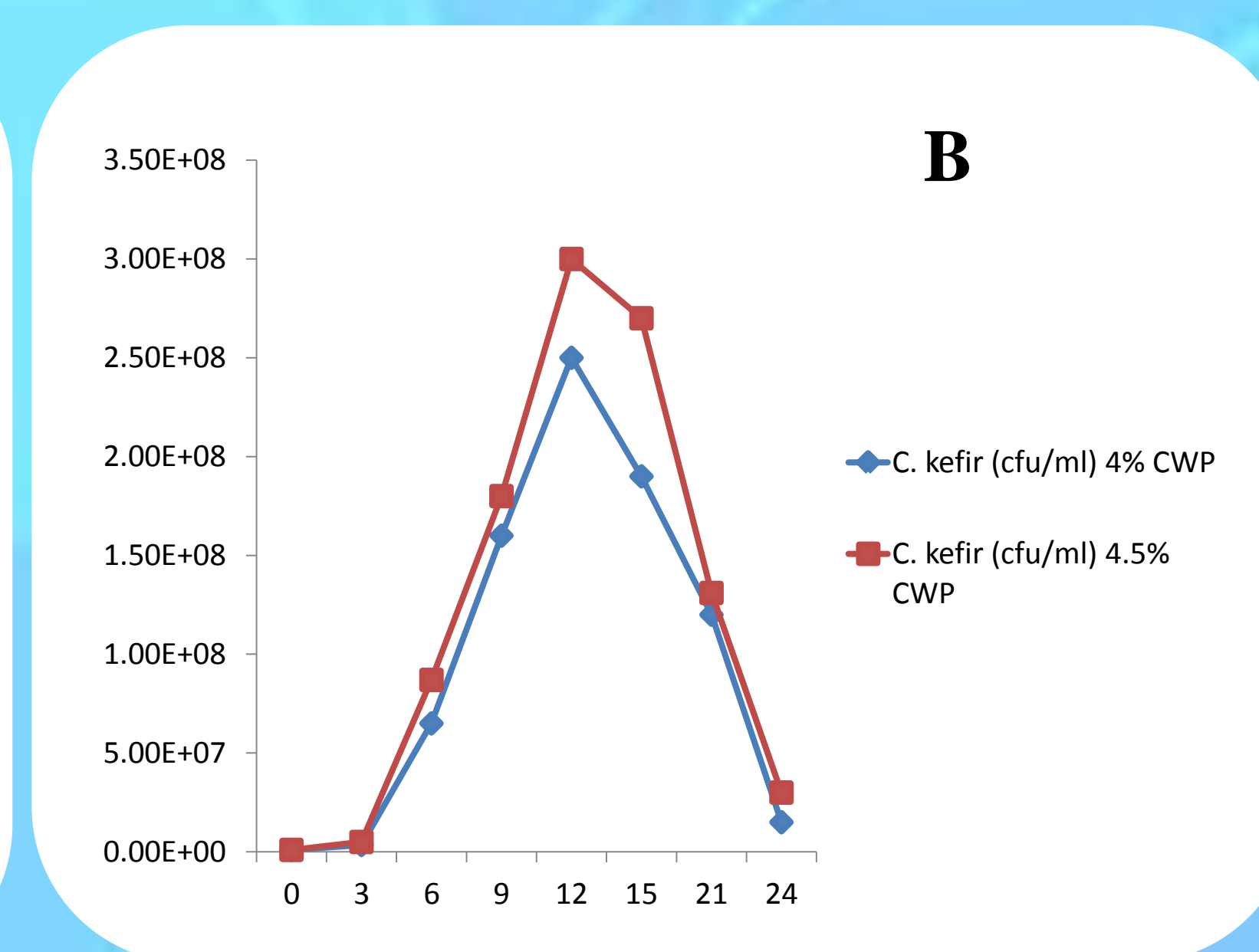
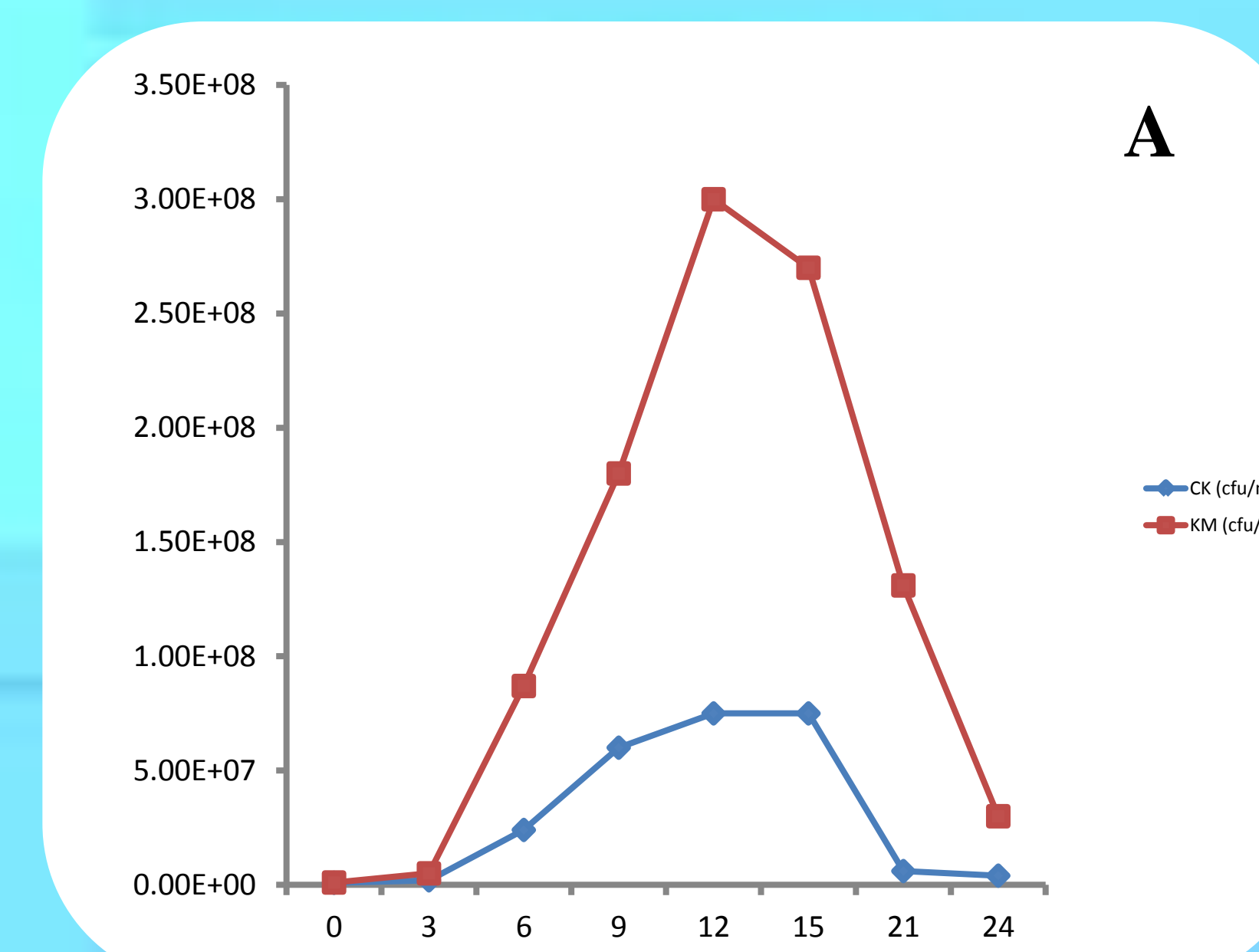
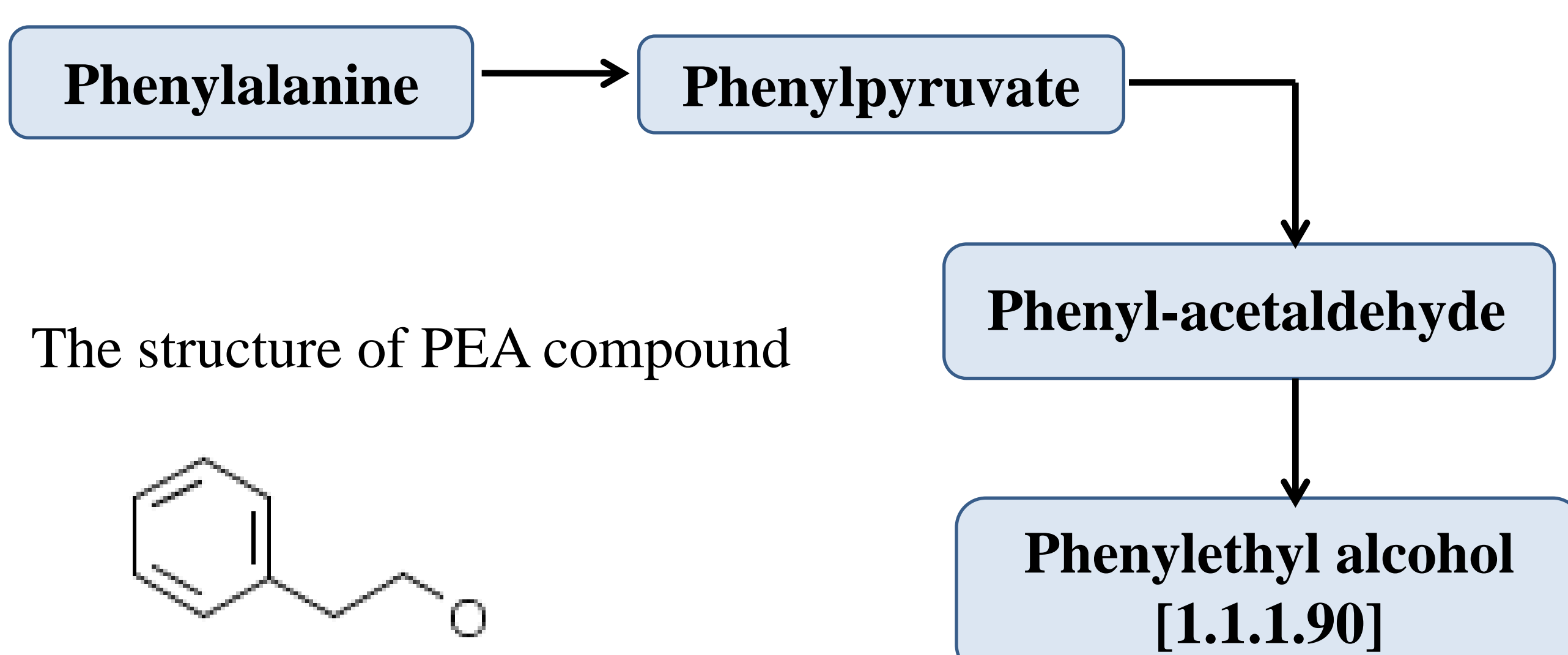
OBJECTIVE

Study the suitability of cheese whey as a substrate for phenyl ethyl production (PEA) by *Candida krusei* and *Candida kefir*.

METHODOLOGY

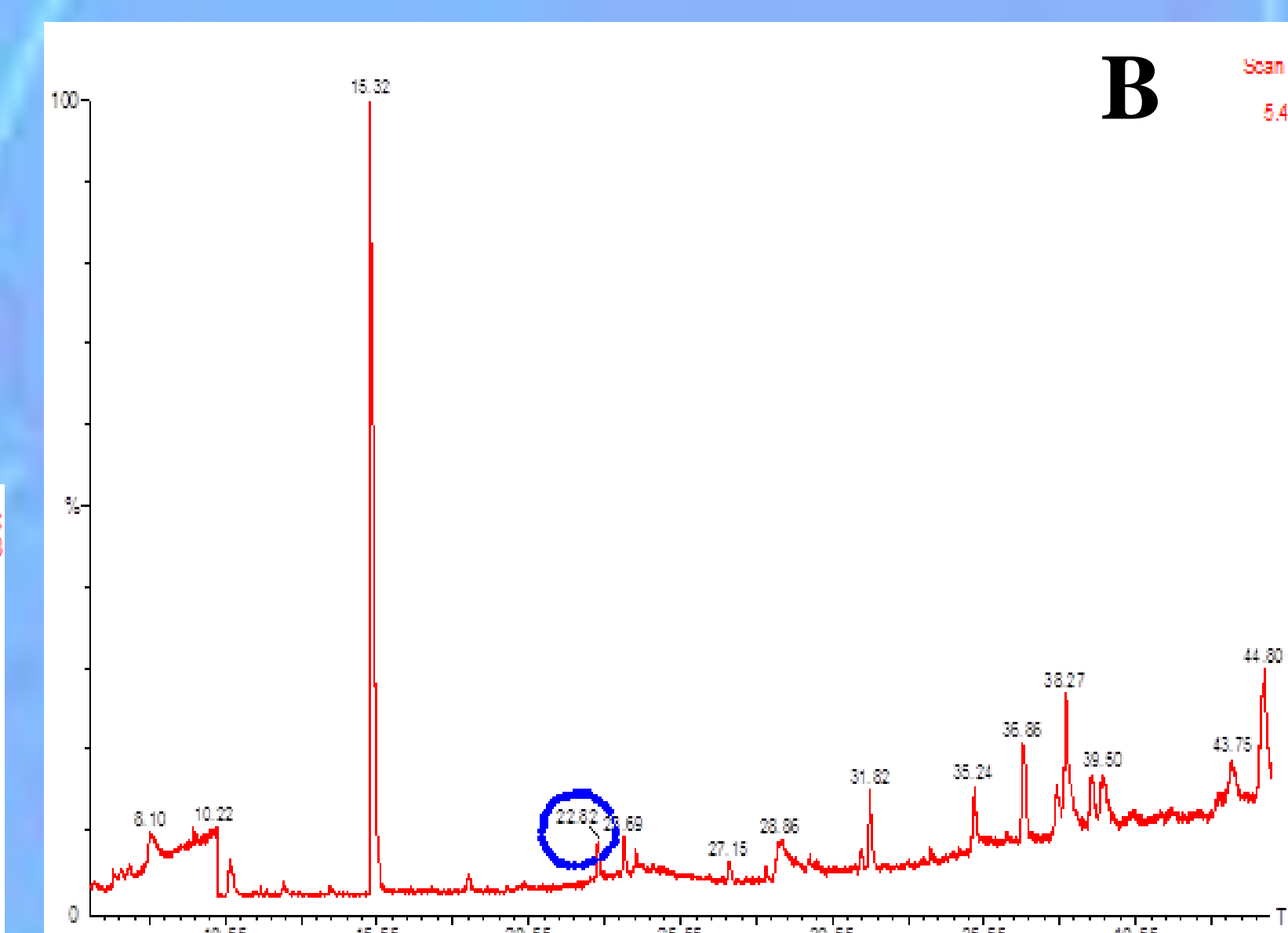
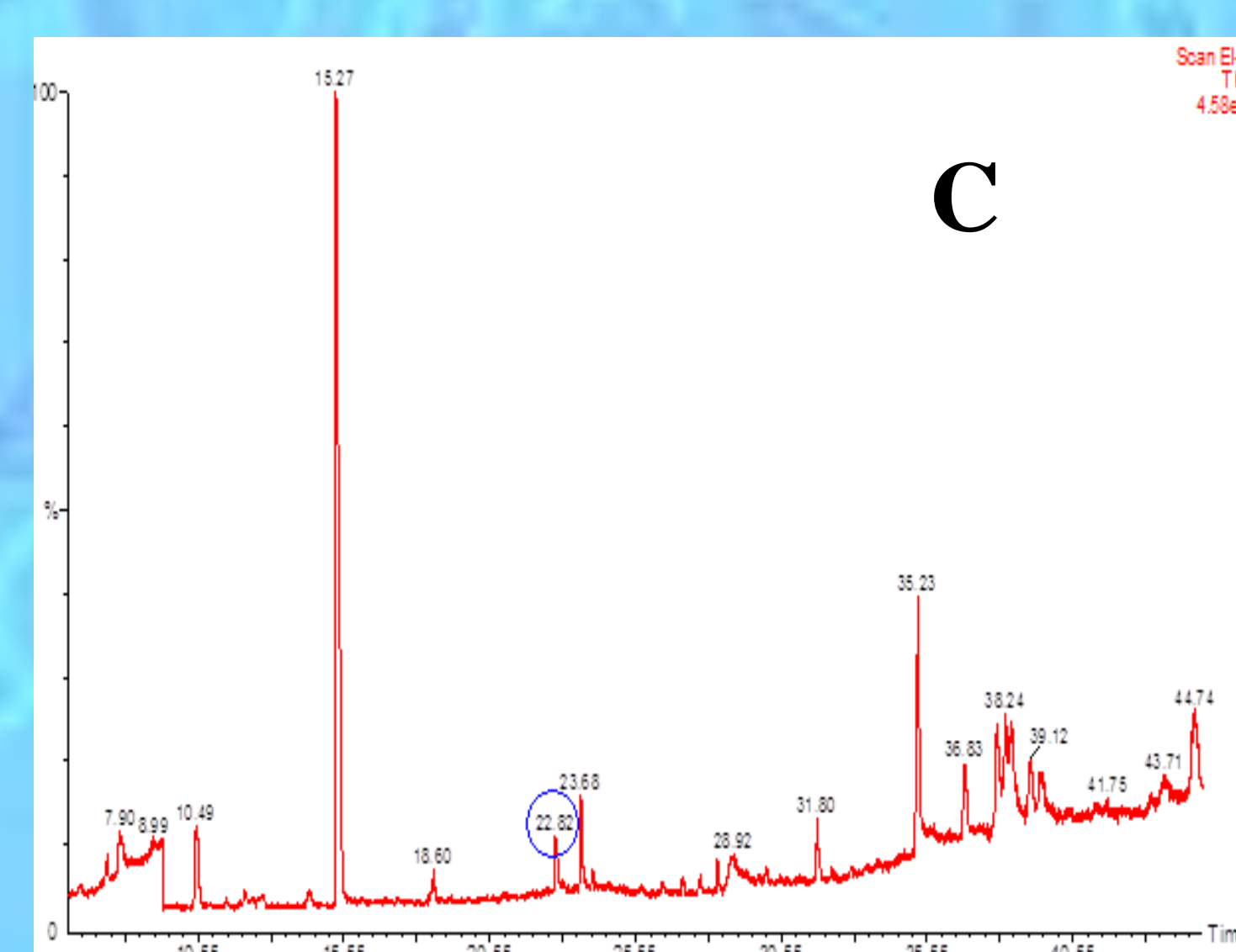
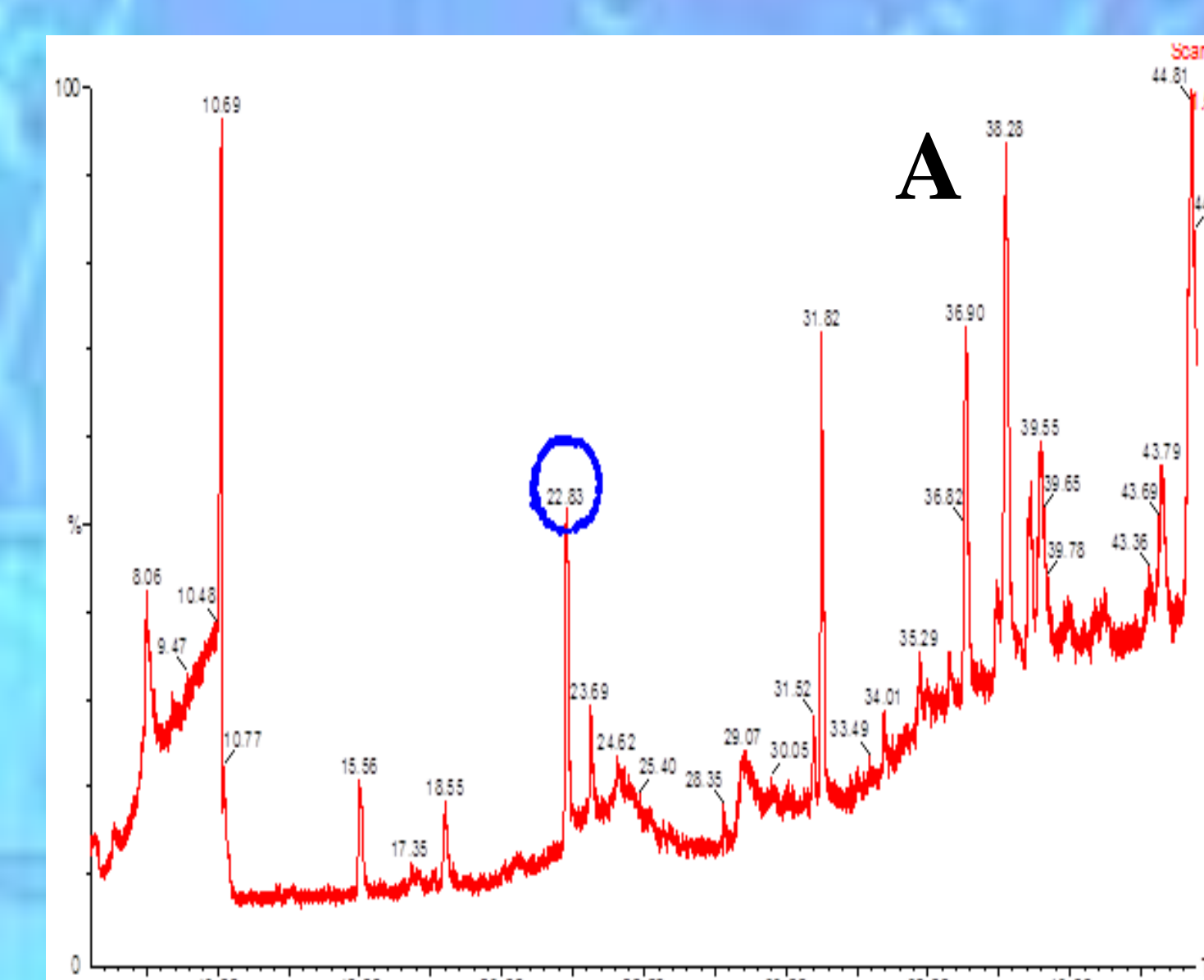


The predicted pathway for the production of PEA by *C. krusei* and *C. kefir*



Growth of *Candida spp.* under different fermentation conditions. A: *C. krusei* and *C. kefir* are grown together at pH 3.5, temperature 40 °C in 4.5% (w/v) cheesewhey powder (CWP) and 0.22% (w/v) urea. B: (w/v) cheesewhey powder and 0.22% *C. Kefir* grown at pH 3.5, 40 °C in 4% (w/v) of urea. C: *C. krusei* grown at pH 3.5 and temperature 40 °C in different concentration of cheesewhey powder.

Concentrations	
— C. krusei (cfu/ml) 2% CWP	Urea 0.11% (w/v)
— C. krusei (cfu/ml) 3% CWP	Urea 0.22% (w/v)
— C. krusei (cfu/ml) 4% CWP	Urea 0.22% (w/v)
CWP - Cheesewhey Powder	



Production of PEA with *Candida spp.* under different fermentation conditions. A: *C. krusei* and *C. kefir* at 4.5% (w/v) cheesewhey powder and 0.22% (w/v) urea at pH 3.5 and temperature 40 °C; B: *C. krusei* alone when grown at (2%, 3% (w/v)) of cheesewhey powder and (0.11%, 0.22% (w/v)) urea at pH 3.5 and temperature 40 °C; C: *C. Kefir* grown alone at pH 3.5 and temperature 40 °C in 4% (w/v) concentration of cheesewhey powder and 0.22% (w/v) of urea.

CONCLUSION

- Cheesewhey contains the necessary pre-cursor for the production of PEA which is L-phenylalanine and for the growth of the *candida spp.*
- *C. krusei* and *C. kefir* produces efficient amount of PEA when cheesewhey powder is 4% (w/v) and urea concentration is 0.22% (w/v).
- Optimum fermentation conditions found to be at pH 3.5 and temperature 40 °C.
- An effective utilization of cheese industry waste water could be considered for the production of an anti-microbial compound PEA as low cost fermentation media.
- However no attempts has been made for the recovery of the anti-microbial compound from cheesewhey powder, but it can be rendered through ultra-filtration techniques.