



Studies in preparation of banana wine (fruit wine)

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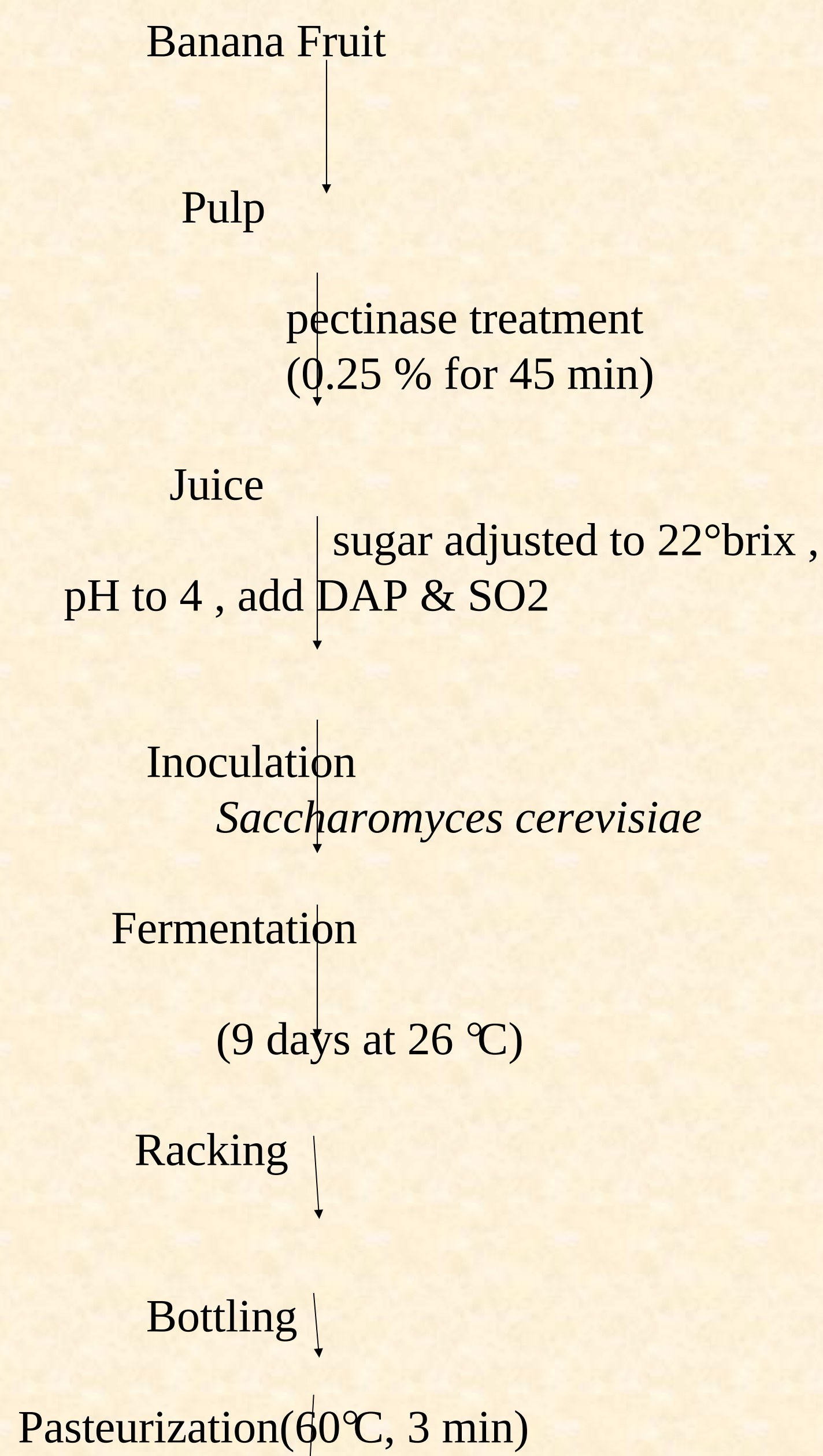
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Abstract

Banana is a tropical fruit, which is grown abundantly in India. It is mainly composed of soluble sugars, starch and other polysaccharides. The juice was extracted from the normal ripe fruits with the help of pectinase enzyme. Optimization of pectinase treatment was done by RSM method. Wine was prepared by using two strains of *Saccharomyces cerevisiae* NCIM 3283 & NCIM 3046. The size of inoculum, effective pH, temperature, level of SO₂, level of DAP for both strains was optimized. It was found that NCIM 3046 gave better result compared to the other strain. Soluble solids (SS), pH and specific gravity decreased while titratable acidity (TA) increased with increasing length of fermentation of the juice. Sensory evaluation results showed that banana wine was acceptable in terms of flavor, taste, clarity and overall characteristics. The banana wine was generally accepted & could be popularized.

Introduction : Fruit wines are wine like beverages made from fruits other than grapes. Wines are specifically referred to by the name of the fruit of the juices from which they are fermented.

Flow chart of banana wine production



Banana Juice production (Banana Response Surface Method)

Independent variables	Dependent variable
•Enzyme concentration (0.05-0.3%)	Yield (%)
•Temperature (30-50°C)	Clarity
•Time (25-125 minute)	Turbidity
	Viscosity

Optimization : Optimum conditions for the extraction of banana juice with maximum yield & clarity, & minimum turbidity & viscosity. Based on the response surface & contour plots the optimum conditions are :

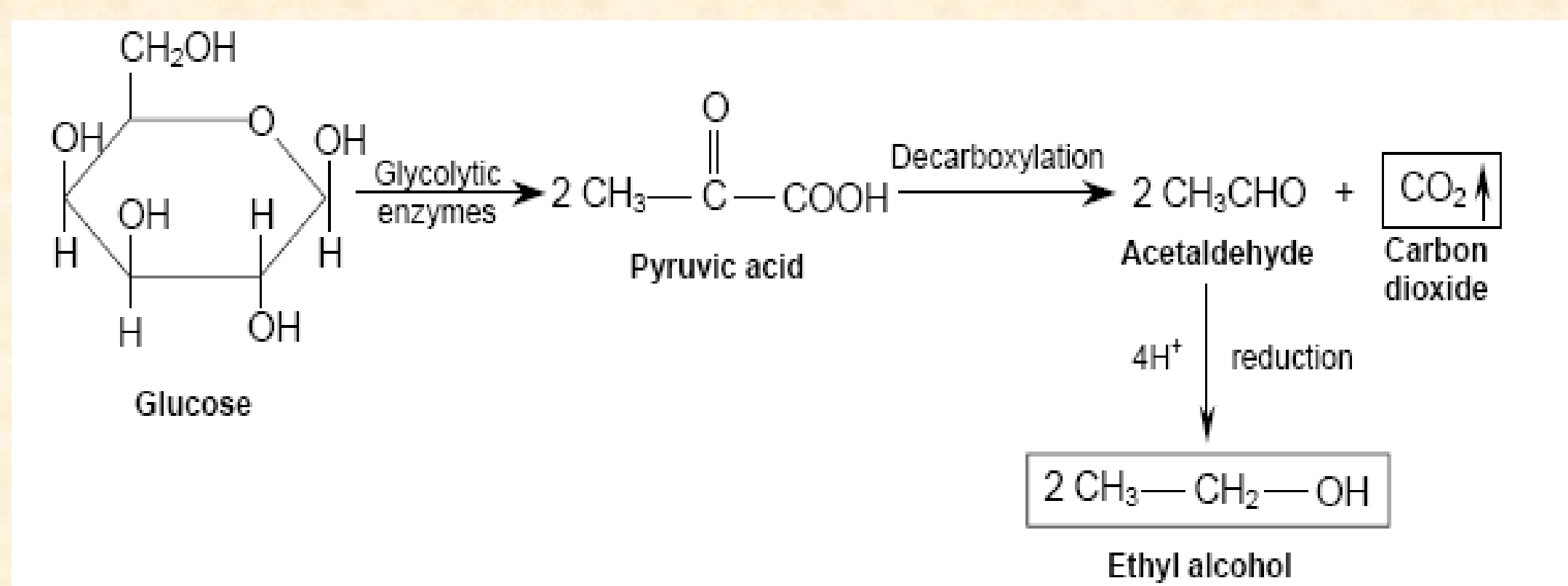
Enzyme concentration 0.094%

Incubation temperature 35.2°C

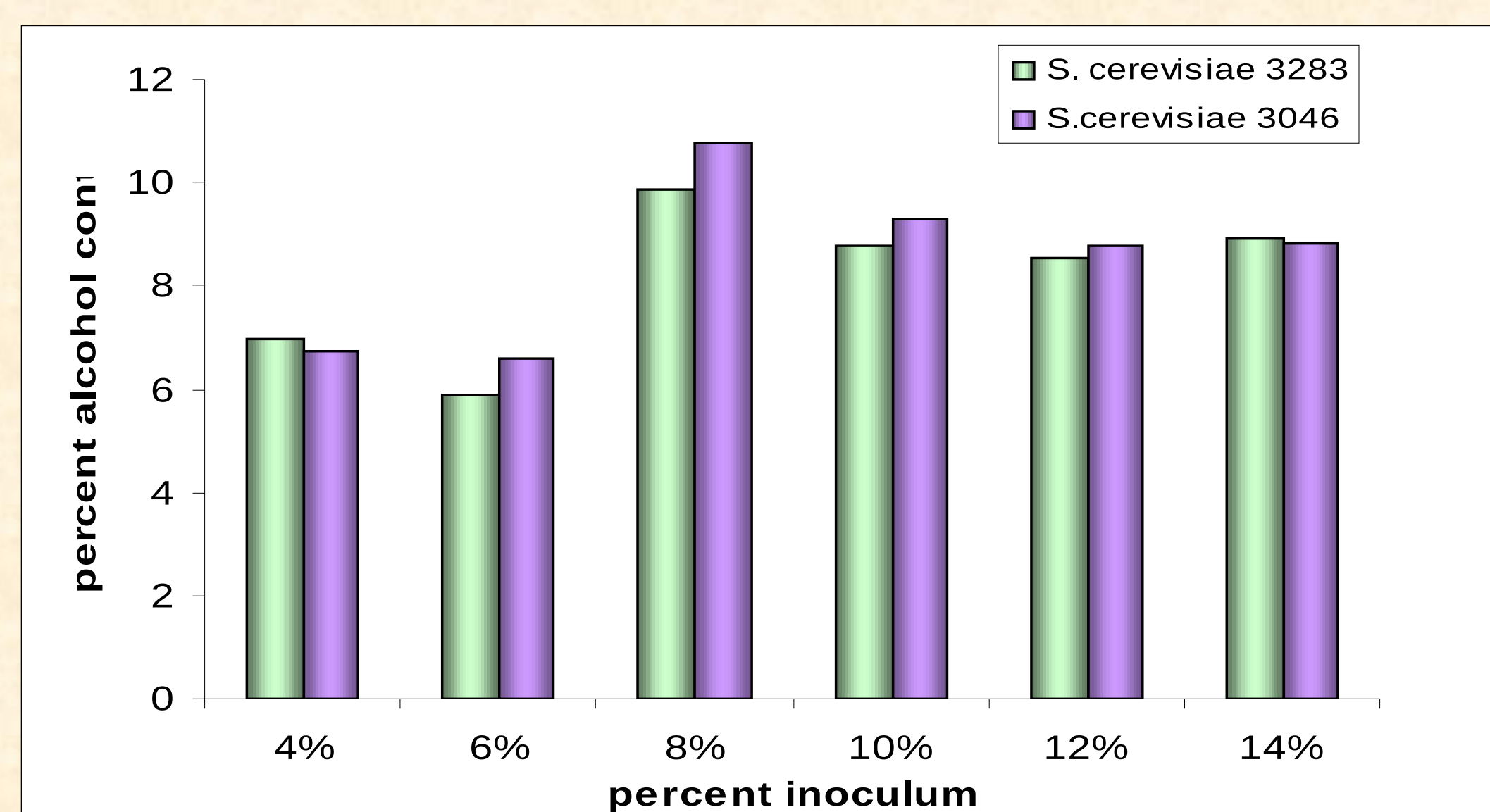
Time 80 minutes

Studies in wine fermentation :

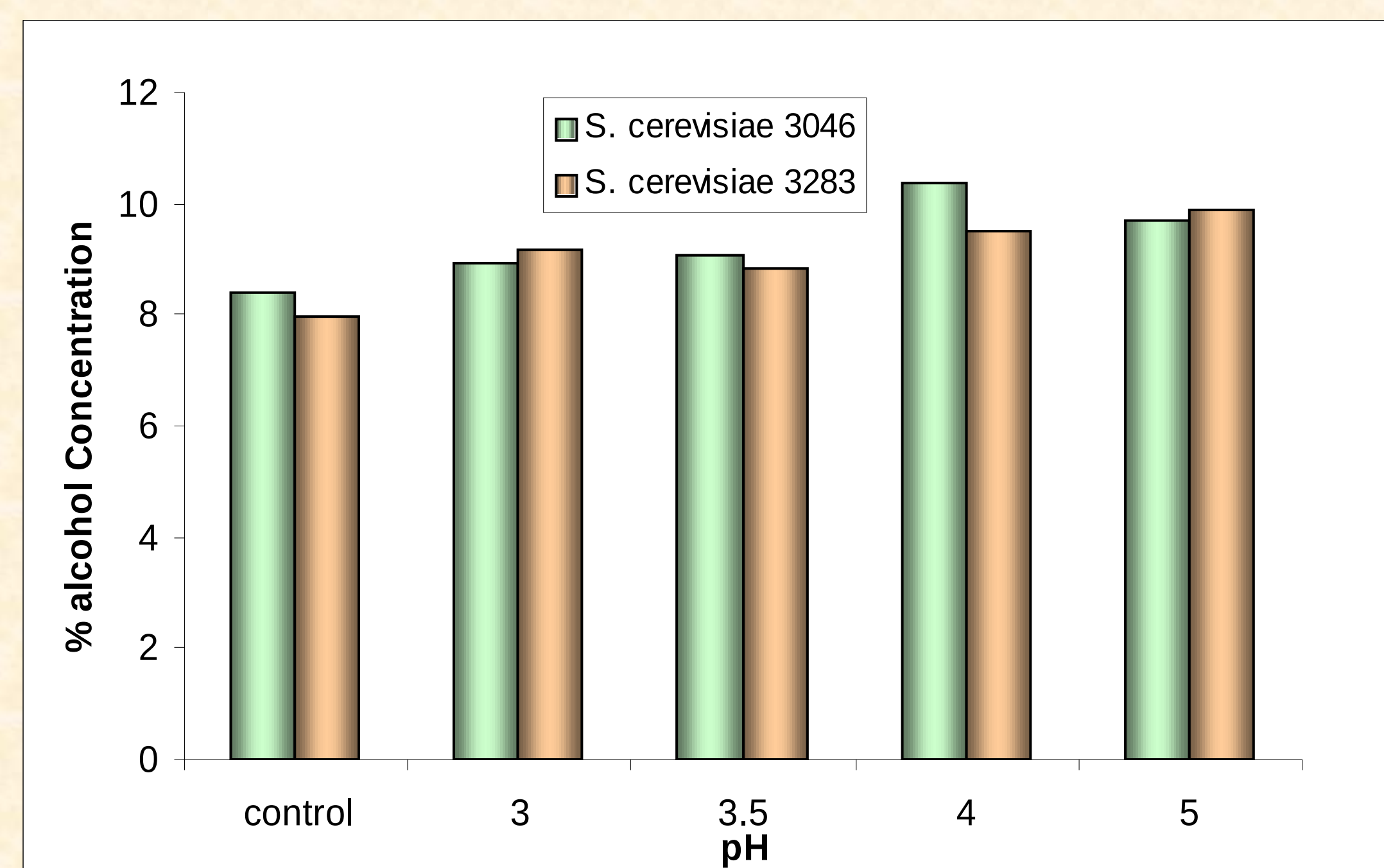
The main biochemical conversion reaction is



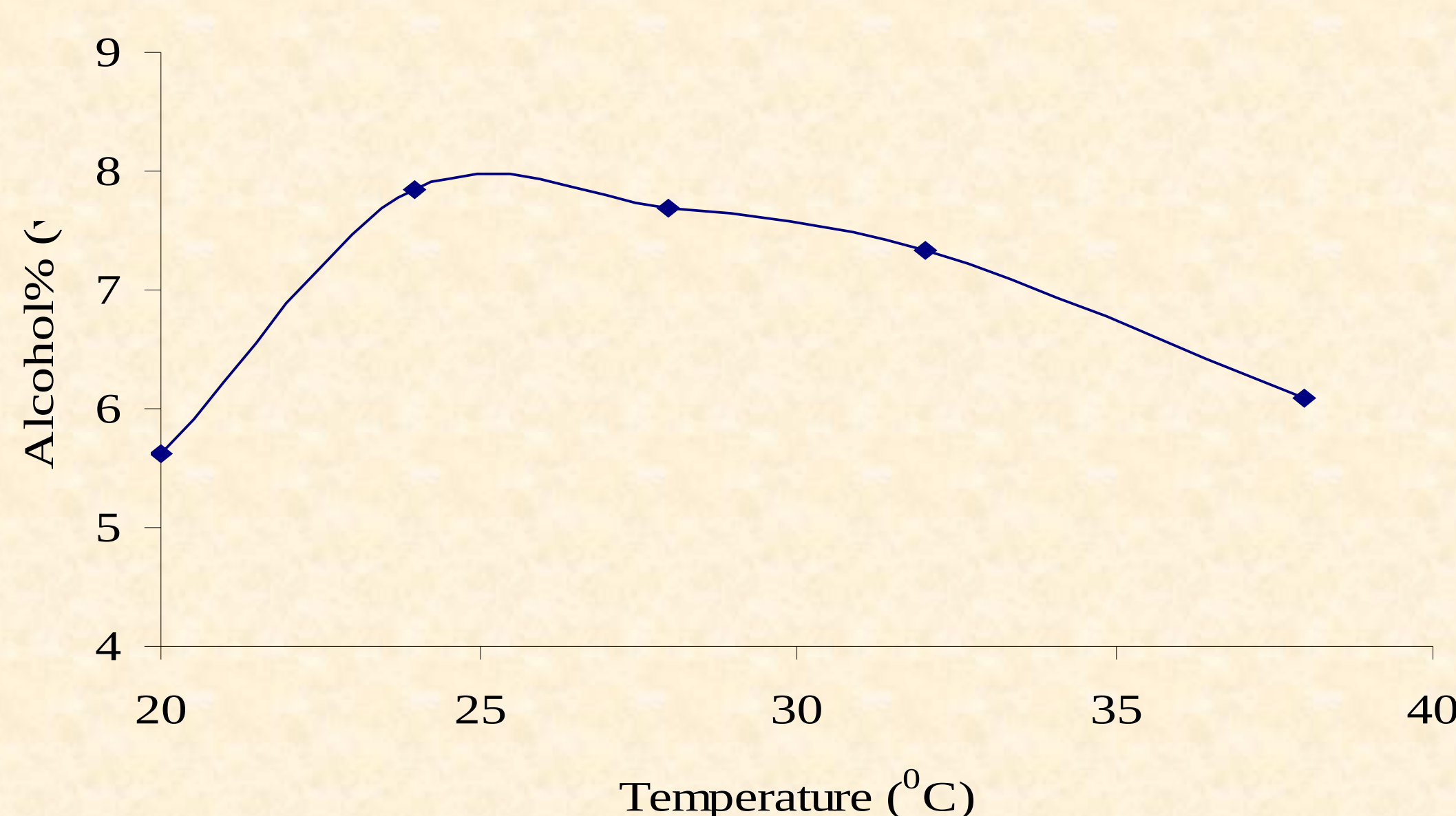
(i) Inoculum optimization



(ii) pH optimization

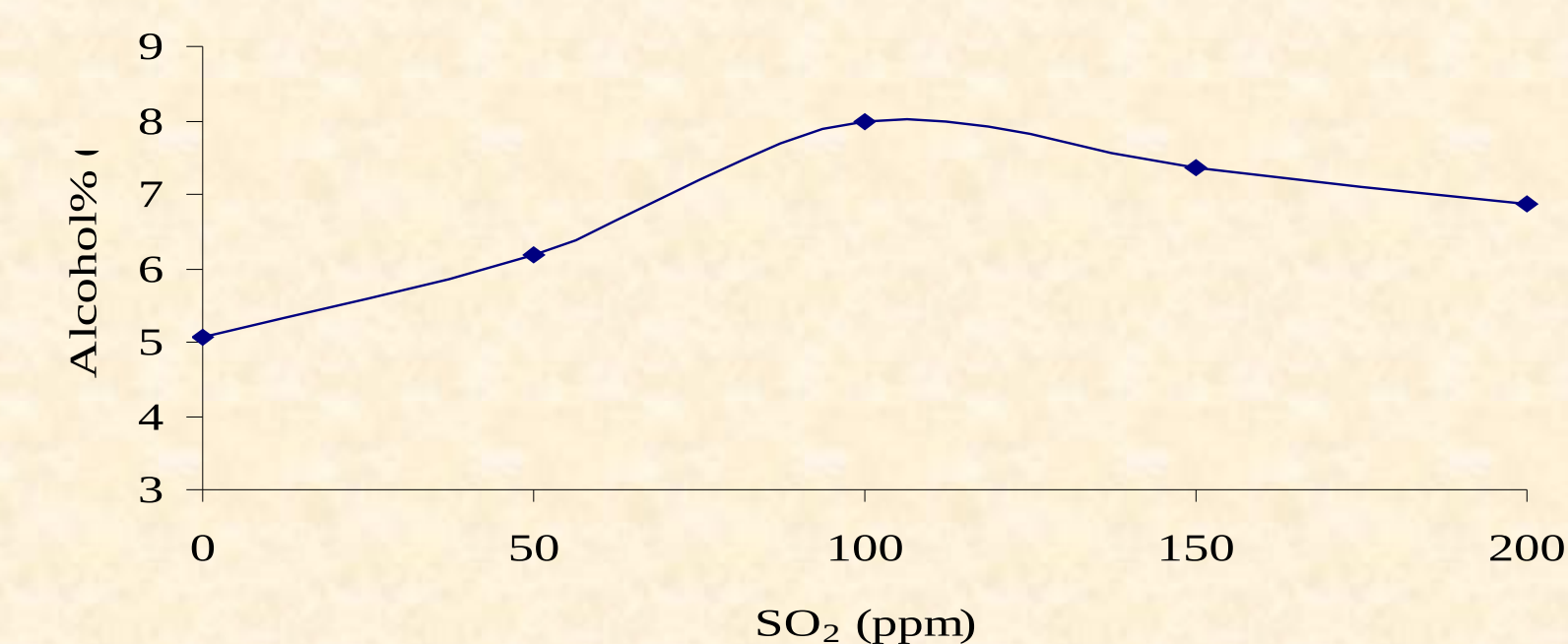


(iii) Temperature optimization



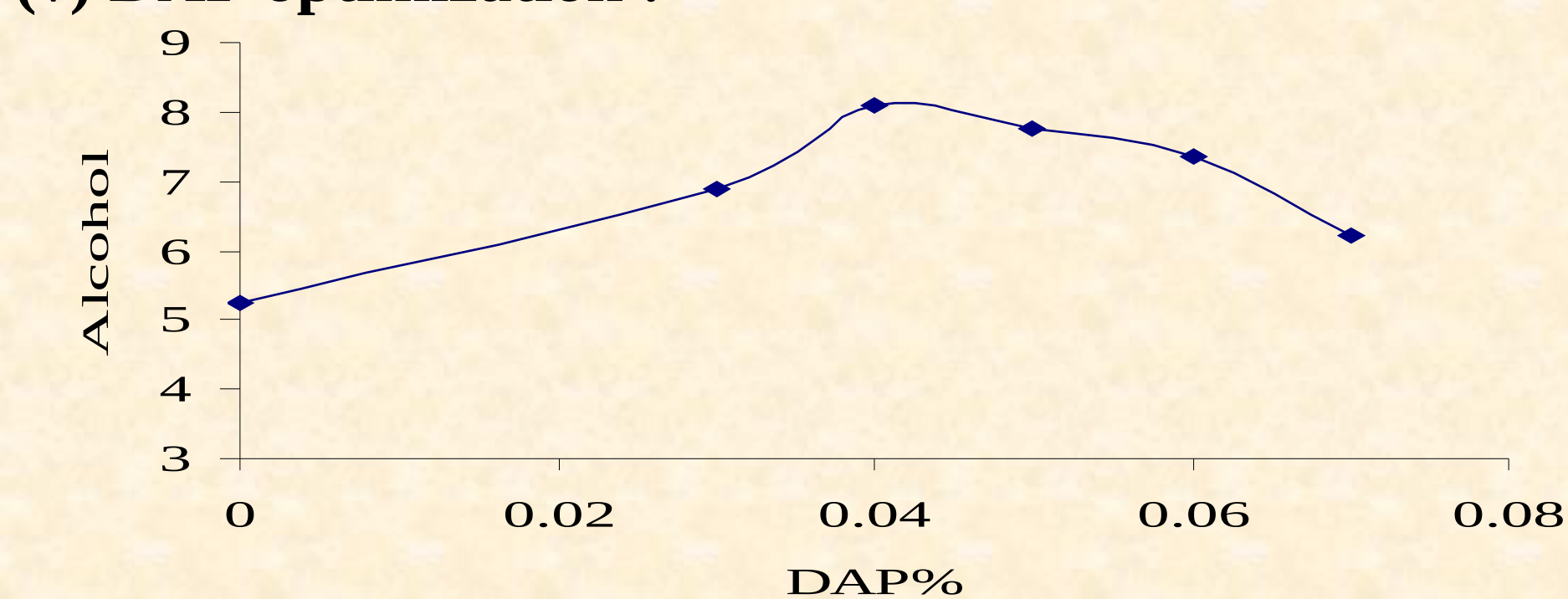
Variation in alcohol production during Banana wine fermentation at different temperatures using *Saccharomyces cerevisiae* 3046

(iv) SO₂ optimization:



Variation in alcohol production by *Saccharomyces cerevisiae* 3046 during Banana wine fermentation with different levels of SO₂.

(v) DAP optimization :



Variation in alcohol production by *Saccharomyces cerevisiae* 3046 during banana wine fermentation at different % of DAP

Physicochemical properties of banana wine

pH	3.30 ± 0.01
Titratable acidity (% tartaric acid)	0.85 ± 0.04
Soluble solids (°Brix)	4.8 ± 0.03
Specific gravity	0.9928 ± 0.01
Fixed acidity	0.63 ± 0.00
Volatile acidity (% acetic)	0.220 ± 0.02
Ash (%)	0.2 ± 0.09
Moisture (%)	92.6 ± 0.01
Residual sugars (%)	4.00 ± 0.02
Alcohol (% V/V)	5.0 ± 0.001
Ascorbic acid (mg/100 ml)	1.4 ± 0.09

Conclusion

•The enzymatic extraction of banana fruit juices was carried out successfully with the help of response surface methodology.

•*Saccharomyces cerevisiae* NCIM 3046 was found to be better strain for the production of banana wine.

•Fermentation of banana juice to obtain alcohol with higher yield

•Fermentation temperature(25 °C), pH(4), diammonium phosphate (0.04%) and Sulphur dioxide (100ppm) gave better good quality of alcohol.

•Fermentation of banana juice up to ninth day produced a good quality wine.

References

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- Romano, P. et al., Function of yeast species and strains in wine flavour, *International Journal of Food Microbiology* 86 (2003) 169– 180.
- Roustan, J.L., & Sablayrolles, J.M., Impact of the addition of electron acceptors on the by-products of alcoholic fermentation, *Enzyme and Microbial Technology* 31 (2002) 142–152.

	Variables			Physical parameters			
	Enzyme Conc. (%)	Temp (°C)	Time (min)	% yield	Clarity (abs)	Turbidity (abs)	Viscosity (cps)
Before Optimization	0	RT	60	15-20	Viscous juice	Viscous juice	11.4-14.9
RSM Predicted	0.094	35.2	80	60.37	2.235	1.796	7.91
RSM Experimental	0.094	35.2	80	59.1	2.10	1.93	8.01