PTV PLATAFORMA TECNOLÓGICA DEL VINO

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Técnicas innovadoras para producción de vinos de baja graduación alcohólica

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PTV PLATAFORMA TECNOLÓGICA DEL VINO

Interprofesional del VINO DE ESPAÑA

AgroBank

PTV PLATAFORMA TECNOLÓGICA DEL VINO

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Dr Rubén Martínez Moreno

RESPONSABLE DE INNOVACIÓN

28/10/2021

AZ3Oeno y el Instituto de Ciencias de la Vid y el Vino se alían con el objetivo de reducir el grado alcohólico en los vinos de forma controlada

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Llega La Primera Edición De Wine Next Generation

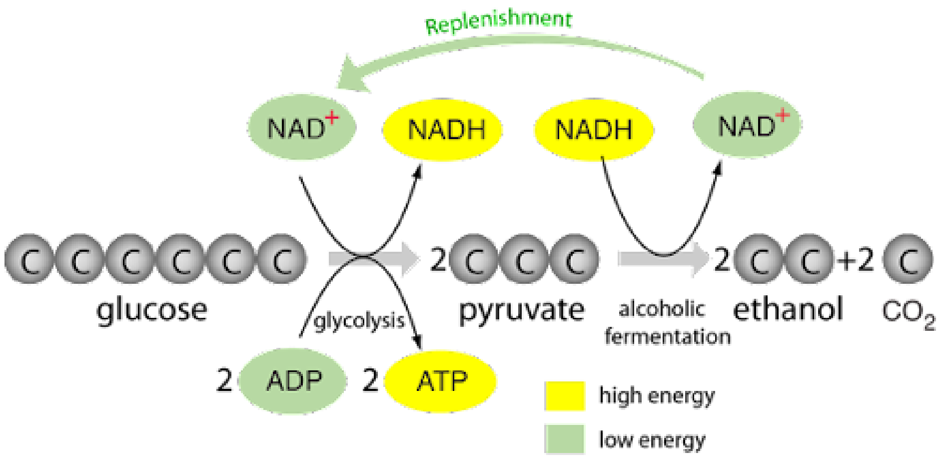
18 Octubre, 2021

Webinar "Técnicas Innovadoras Para Producción De Vinos De Baja Graduación Alcohólica"

14 Octubre, 2021

La PTV Visita Fruit Attraction Con Motivo Del Proyecto SISVITIMAD

11 Octubre, 2021



Alcoholic fermentation

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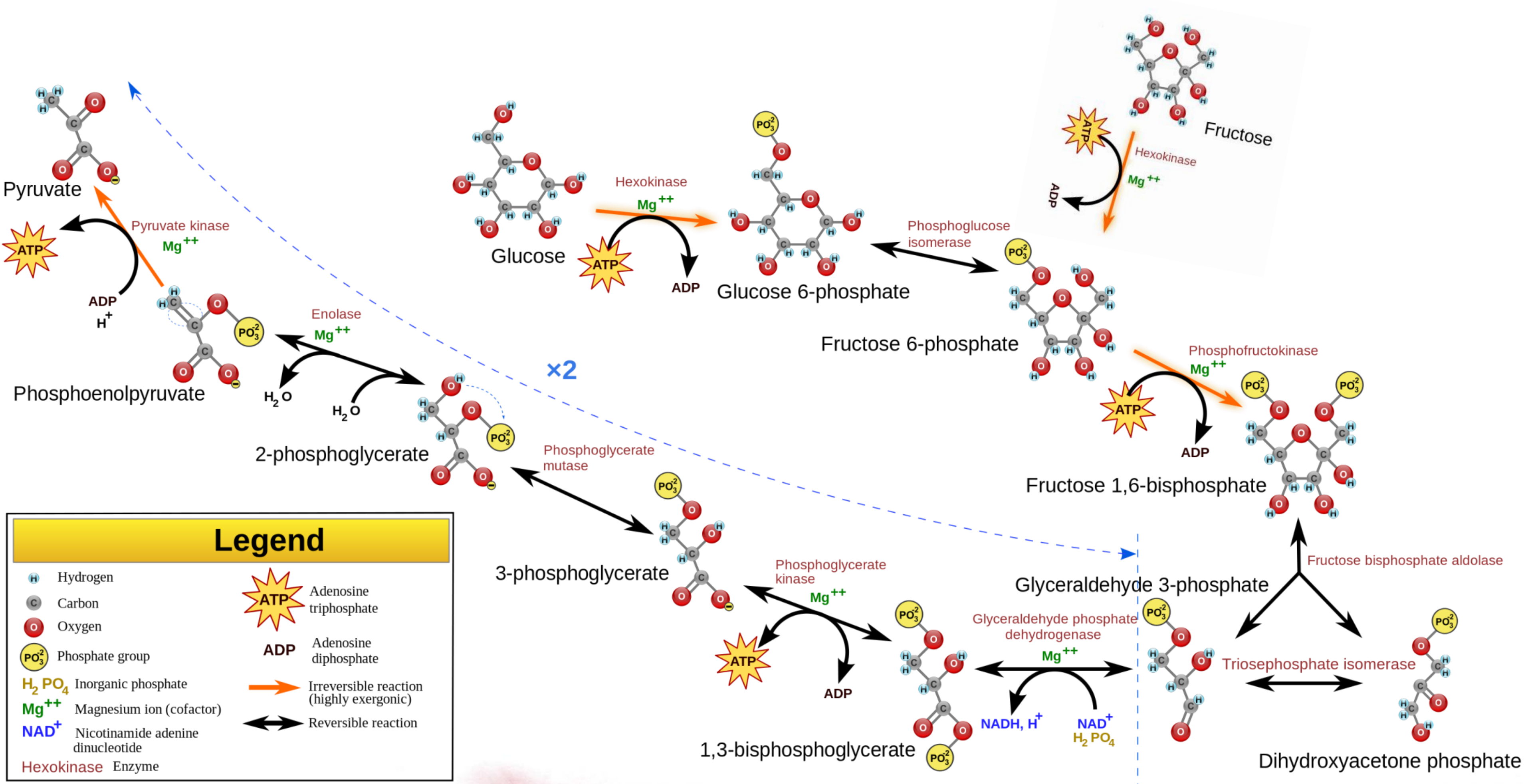
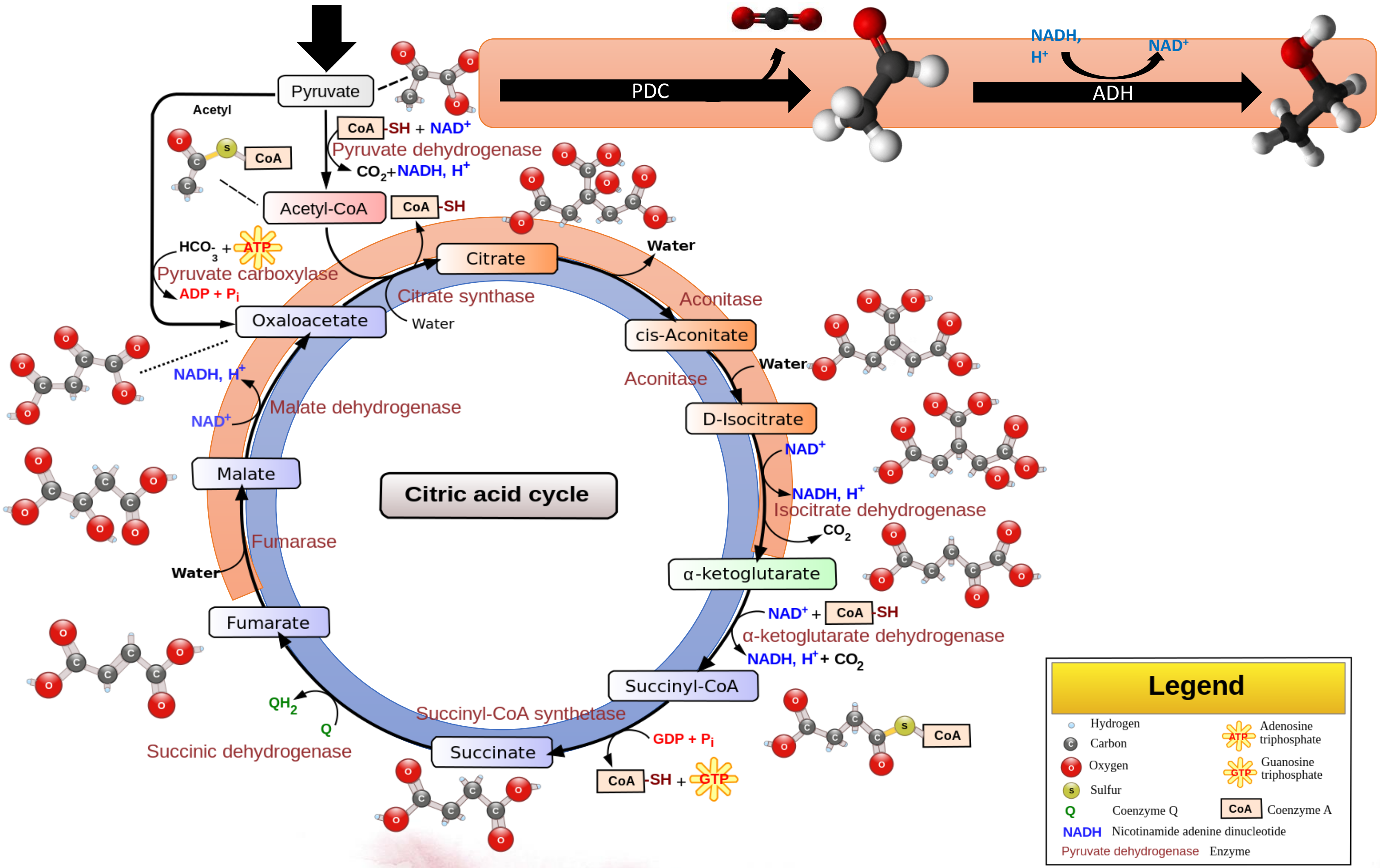



Pyruvate
PDC
ADH
NADH, H+
NAD+
Acetyl
CoA-SH + NAD+
Pyruvate dehydrogenase
CO2 + NADH, H+
CoA
Acetyl-CoA
CoA-SH
HCO3- + ATP
Pyruvate carboxylase
ADP + Pi
Citrate
Water
Aconitase
Citrate synthase
Water
Oxaloacetate
cis-Aconitate
Water
Aconitase
NADH, H+
NAD+
Malate dehydrogenase
D-Isocitrate
NAD+
NADH, H+
Isocitrate dehydrogenase
CO2
Malate
Citric acid cycle
Fumarase
Water
α-ketoglutarate
NAD+ + CoA-SH
α-ketoglutarate dehydrogenase
NADH, H+ + CO2
Fumarate
Succinyl-CoA
QH2
Q
Succinyl-CoA synthetase
Succinic dehydrogenase
Succinate
GDP + Pi
CoA-SH + GTP
CoA
Legend
Hydrogen
Carbon
Oxygen
Sulfur
Q Coenzyme Q
Adenosine triphosphate
Guanosine triphosphate
CoA Coenzyme A
NADH Nicotinamide adenine dinucleotide
Pyruvate dehydrogenase Enzyme

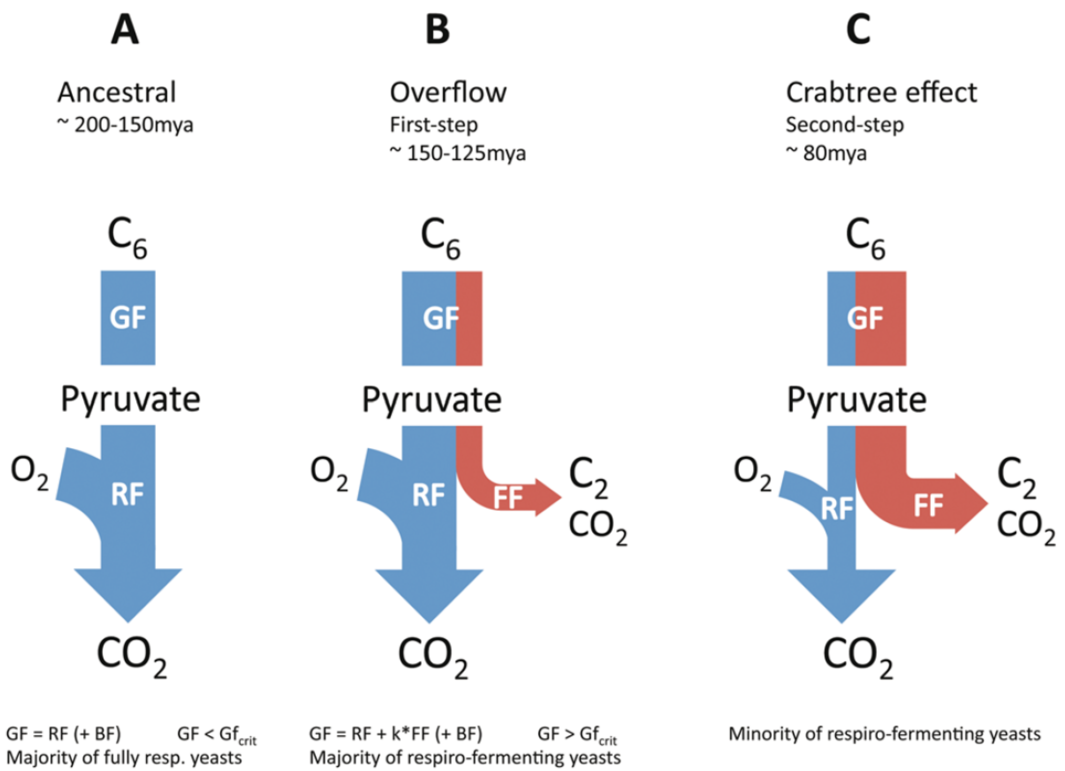
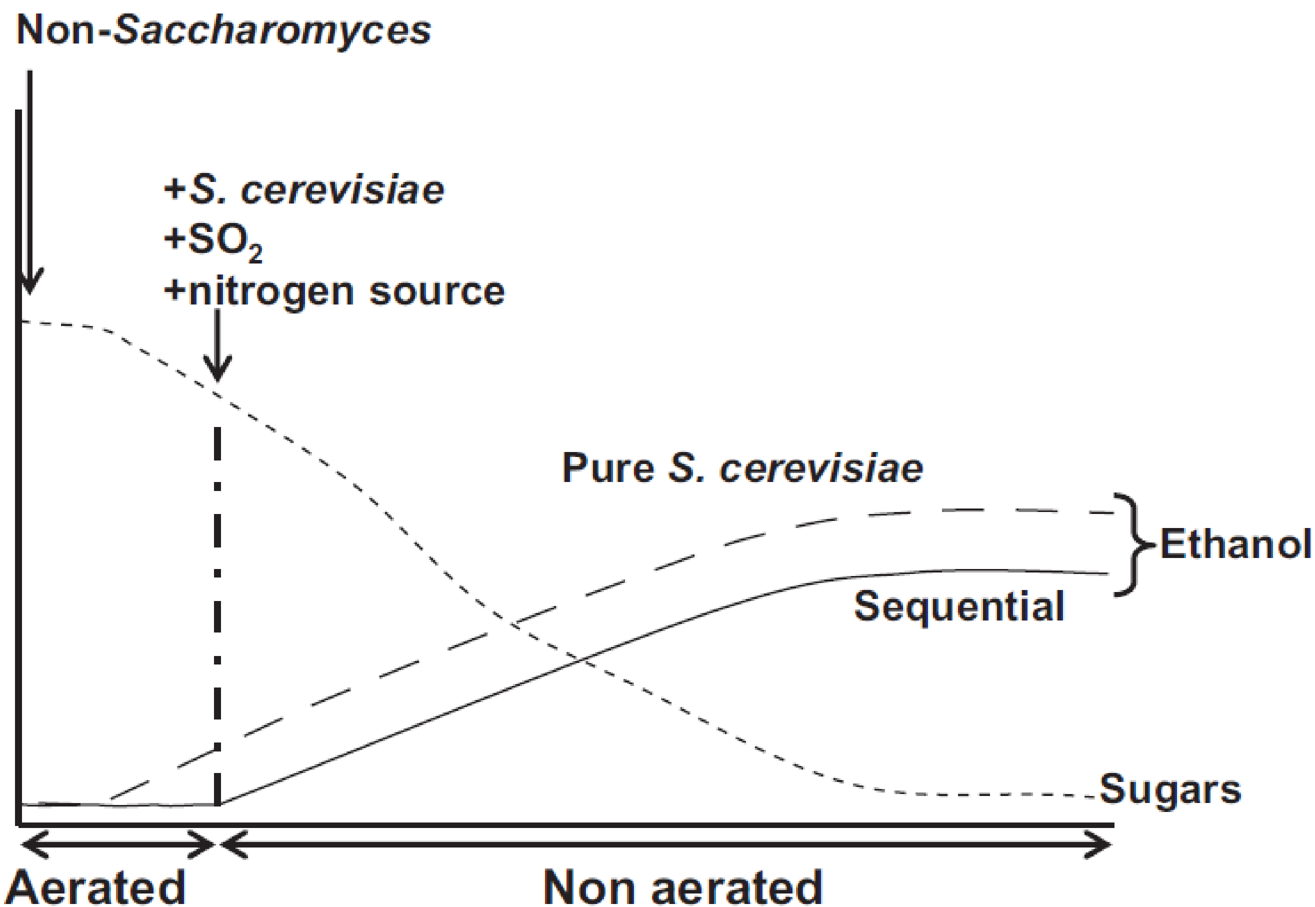


Fig 10. Evolutionary scenario for the origin of Crabtree effect in *Saccharomycetales* yeast. This figure illustrates the capacity of central carbon metabolic pathways for the metabolic groups of yeast (as designated in Table 1), when grown on C_6-sugars such as glucose. Biomass formation rates have been left out, since no significant differences amongst groups could be observed (S2 Table). **(A)** Purely respiring yeasts, including *Pichia*, *Debaromyces, Eremothecium* and a majority of *Kluyveromyces* exhibited low glycolytic flux (GF), without any overflow metabolism (see also S10B Fig.). **(B)** Yeast that separated from the *Eremothecium* lineage, including some *Kluyveromyces*, and all *Lachancea, Torulaspora, Zygotorulaspora* and the majority of WGD yeasts possessed a greater glycolytic flux than respiratory flux (RF) capacity, what results in overflow metabolism. The upregulation of the anaerobic glycolysis has provided this group of yeast with a greater energy producing apparatus that can consume glucose more rapidly under aerobic conditions (see also S10C Fig.). **(C)** Our results can be interpreted as that traits such as overconsumption of glucose, and excess of energy producing capacity has enabled the development of a third metabolic group (including a majority of *Kazachstania* and *Saccharomyces*) that exhibit a trade-off between ethanol and energy production efficiency (see also S10D Fig.).

Hagman A, Piškur J (2015) PLoS ONE 10(1): e0116942.



R. Gonzalez et al. / Trends in Food Science & Technology 29 (2013) 55-61

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Table 2
Yields on substrate, consumption of sugars, and RQ values obtained for selected yeast strains. Results are expressed as the average ± standard deviation of two biological replicates.

Strain	YE/S (g/g)	YG/S (g/g)	YSUC/S (mg/g)	YACE/S (mg/g)	YBM/S (g/g)	Consumed sugar (%)	RQ
S. cerevisiae EC1118	0.25 ± 0.01	0.05 ± 0.01	5.95 ± 0.29	3.85 ± 0.45	0.05 ± 0.01	48.06	1.94 ± 0.50
S. cerevisiae UCD 522	0.30 ± 0.01	0.03 ± 0.00	6.08 ± 0.61	6.63 ± 0.56	0.03 ± 0.00	69.54	1.99 ± 0.00
C. sake CBS1939	0.11 ± 0.01	0.02 ± 0.00	11.56 ± 0.31	0.48 ± 0.18	0.22 ± 0.01	13.35	1.66 ± 0.02
C. sake CBS5093	0.18 ± 0.00	0.04 ± 0.00	12.34 ± 0.22	0.96 ± 0.42	0.07 ± 0.01	44.69	2.31 ± 0.24
D. fabryi PR66	0.01 ± 0.00	0.11 ± 0.00	2.90 ± 0.01	0.00 ± 0.00	0.61 ± 0.02	10.85	0.97 ± 0.03
D. hansenii IFI866	0.01 ± 0.00	0.1 ± 0.01	2.92 ± 0.19	0.00 ± 0.00	0.43 ± 0.01	11.74	0.89 ± 0.12
K. exigua DBPVG6354	0.39 ± 0.00	0.09 ± 0.01	4.08 ± 0.3	6.88 ± 1.8	0.05 ± 0.01	35.23	1.41 ± 0.10
K. lactis AQ2166	0.27 ± 0.00	0.05 ± 0.00	9.67 ± 0.09	0.37 ± 0.05	0.12 ± 0.01	32.79	0.8 ± 0.04
K. lactis/marxianus AQ1101	0.16 ± 0.03	0.06 ± 0.01	4.57 ± 0.49	0.42 ± 0.10	0.20 ± 0.00	23.34	1.25 ± 0.17
M. pulcherrima IFI1459	0.25 ± 0.07	0.05 ± 0.01	8.44 ± 3.07	0.54 ± 0.07	0.15 ± 0.02	29.78	1.04 ± 0.13
M. pulcherrima IFI1240	0.24 ± 0.03	0.02 ± 0.00	10.09 ± 1.13	2.02 ± 0.13	0.07 ± 0.00	49.21	1.21 ± 0.07
M. pulcherrima IFI1244	0.26 ± 0.00	0.03 ± 0.00	11.33 ± 0.18	1.71 ± 0.23	0.10 ± 0.00	43.19	1.26 ± 0.14
P. membranifaciens AQ166	0.00 ± 0.00	0.08 ± 0.00	11.44 ± 0.27	0.18 ± 0.25	0.72 ± 0.06	4.65	0.97 ± 0.13
P. membranifaciens AQ169	0.00 ± 0.00	0.28 ± 0.00	1.10 ± 0.11	1.86 ± 0.16	0.42 ± 0.11	13.86	0.93 ± 0.11
S. stipitis CBS 5776	0.11 ± 0.01	0.00 ± 0.00	7.55 ± 6.51	0.00 ± 0.00	0.69 ± 0.04	6.85	1.05 ± 0.00
T. delbrueckii AQ216	0.35 ± 0.01	0.03 ± 0.00	7.53 ± 1.02	1.71 ± 0.08	0.04 ± 0.00	69.75	1.39 ± 0.16
T. delbrueckii AQ249	0.3 ± 0.02	0.03 ± 0.01	5.01 ± 1.37	4.18 ± 0.29	0.04 ± 0.00	69.75	1.42 ± 0.06
S. bombicola CBS8451	N/A	N/A	N/A	N/A	N/A	N/A	1.34 ± 0.05
S. bombicola CBS9711	N/A	N/A	N/A	N/A	N/A	N/A	1.84 ± 0.03

YE/S, ethanol yield on glucose; YG/S, glycerol yield on glucose; YSUC/S, succinic acid yield on glucose; YACE/S, acetic acid yield on glucose; YBM/S, biomass yield on glucose. N/A, not available (*S. bombicola* strains did not grow in the medium used to calculate these yields). RQ values were obtained under different experimental conditions than the other parameters (see Materials and methods).

M. Quirós et al. / International Journal of Food Microbiology 181 (2014) 85–91

Table 2 Concentration and yields of the main fermentation metabolites by the end (262–265 g/L sugar consumed) of fermentations sparged with air or nitrogen in the conditions described in the text

		S. cerevisiae[a]	*M. pulcherrima*+10 % *S. cerevisiae*[a]	*M. pulcherrima*+1 % *S. cerevisiae*[a]
Glycerol (%*w*/*v*)	Air[b]	0.83±0.02*A	1.86±0.18*B	1.79±0.06B
	Nitrogen[b]	1.20±0.04*A	1.46±0.06*B	1.65±0.06C
Ethanol (%*v*/*v*)	Air[b]	12.9±0.2*B	11.0±0.3*A	11.1±0.2*A
	Nitrogen[b]	14.7±0.2*	13.9±0.6*	13.9±0.4*
Acetic acid (mg/L)	Air[b]	2158±329*B	676±63*A	682±123*A
	Nitrogen	185±47*B	63±3*A	62±2*A
$Y_{E/S}$ (g/g)	Air[b]	0.384±0.007*B	0.329±0.010*A	0.330±0.006*A
	Nitrogen[b]	0.441±0.006*	0.417±0.014*	0.416±0.010*
$Y_{A/S}$ (mg/g)	Air[b]	8.159±1.241*B	2.553±0.237*A	2.579±0.461*A
	Nitrogen	0.703±0.178*B	0.238±0.010*A	0.236±0.007*A
$Y_{G/S}$ (g/g)	Air[b]	0.031±0.001*A	0.070±0.007*B	0.067±0.002B
	Nitrogen[b]	0.045±0.001*A	0.055±0.002*B	0.063±0.002C

Values are shown as mean±standard deviation of three biological replicates

$Y_{E/S}$ ethanol yield on sugar, $Y_{A/S}$ acetic acid yield on sugar, $Y_{G/S}$ glycerol yield on sugar

[a] Statistically significant differences (ANOVA) between cultures sparged with air or nitrogen for the same parameter and inoculum are indicated by *

[b] Different capital letters indicate statistically significant differences (ANOVA) for values in the same row

P. Morales et al. / Appl Microbiol Biotechnol (2015) 99:3993–4003

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Environmental factors influencing the efficacy of different yeast strains for alcohol level reduction in wine by respiration

Alda J. Rodrigues, Typhaine Raimbourg, Ramon Gonzalez*, Pilar Morales

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RESEARCH Open Access

Identification of target genes to control acetate yield during aerobic fermentation with *Saccharomyces cerevisiae*

José Antonio Curiel[1†], Zoel Salvadó[1†], Jordi Tronchoni[1], Pilar Morales[1], Alda Joao Rodrigues[1], Manuel Quirós[1,2] and Ramón Gonzalez[1*]

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Exploring the suitability of *Saccharomyces cerevisiae* strains for winemaking under aerobic conditions

Jordi Tronchoni[a,b], Ramon Gonzalez[a], Andrea M. Guindal[a], Elena Calleja[a], Pilar Morales[a,*]

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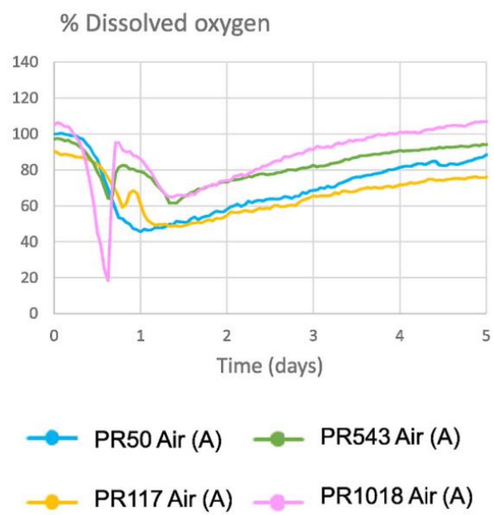
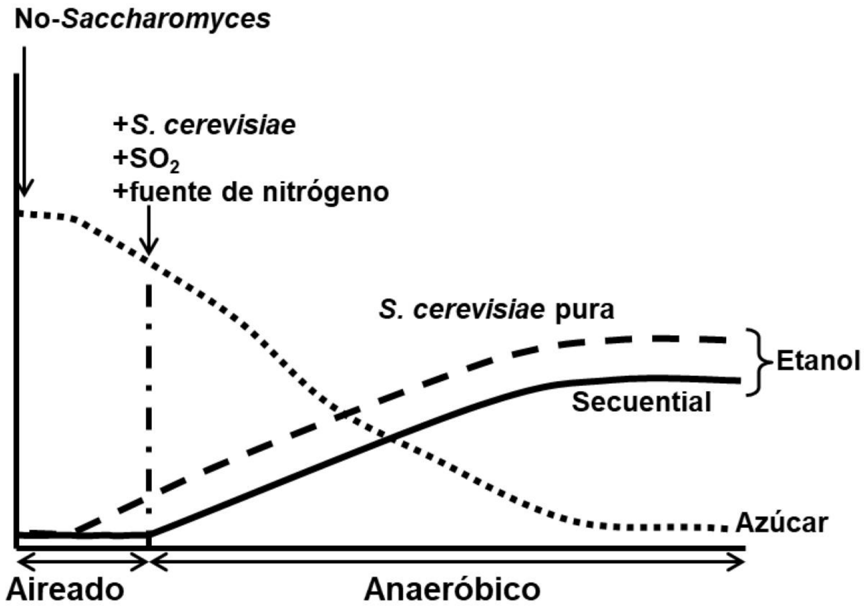
[b] Universidad Internacional de Valencia – VIU, C/ Pintor Sorolla 21, 46002, Valencia, Spain

Table 1

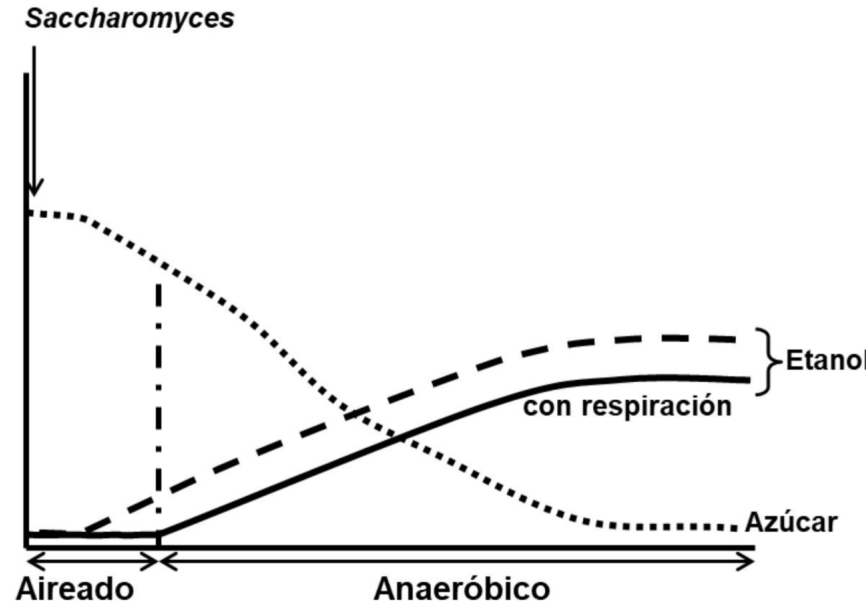
Consumed sugars and yields of main fermentation metabolites on consumed sugars on day 5 after inoculation, in sterilised natural must in anaerobic (10 VVH N2) and in aerobic (10 VVH air) conditions of strains grown in bioreactors. Capital letters in the same row indicate statistical differences ($p \leq 0.05$).

		PR50			PR117			PR543			PR1018		
		mean	±	std dev	mean	±	std dev	mean	±	std dev	mean	±	std dev
% Consumed Sugars	N_2	83.34	±	0.95 B	43.84	±	2.63 A	96.49	±	1.64 C	81.93	±	0.72 B
	Air	77.70	±	1.23 B	69.20	±	1.03 A	77.37	±	1.44 B	90.40	±	0.63 C
Glycerol Yield (mg/g)	N_2	52.09	±	2.01 A	79.54	±	4.08 C	55.62	±	2.59 A	65.47	±	2.63 B
	Air	32.39	±	1.08 A	50.96	±	0.50 D	40.75	±	1.98 C	37.64	±	0.39 B
Acetic Acid Yield (mg/g)	N_2	0.22	±	0.02 A	0.24	±	0.01 A	0.58	±	0.05 B	0.41	±	0.17 AB
	Air	5.34	±	0.65 B	0.47	±	0.02 A	6.70	±	1.47 B	0.23	±	0.01 A
Ethanol Yield (g/g)	N_2	0.39	±	0.00 AB	0.40	±	0.00 AB	0.40	±	0.00 B	0.38	±	0.01 A
	Air	0.27	±	0.01 A	0.28	±	0.00 AB	0.29	±	0.00 B	0.30	±	0.01 C





No-*Saccharomyces*
+*S. cerevisiae*
+SO_2
+fuente de nitrógeno
S. cerevisiae pura
Etanol
Secuential
Azúcar
Aireado
Anaeróbico



Saccharomyces
Etanol
con respiración
Azúcar
Aireado
Anaeróbico

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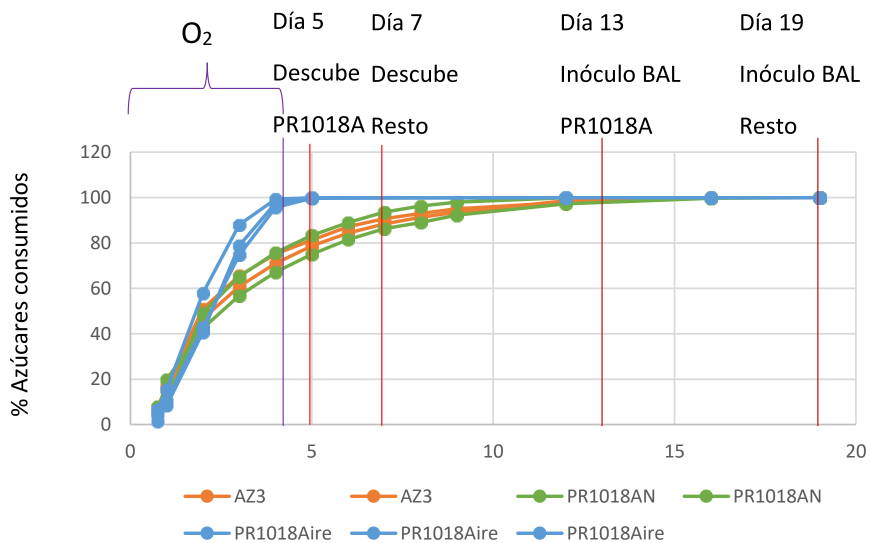
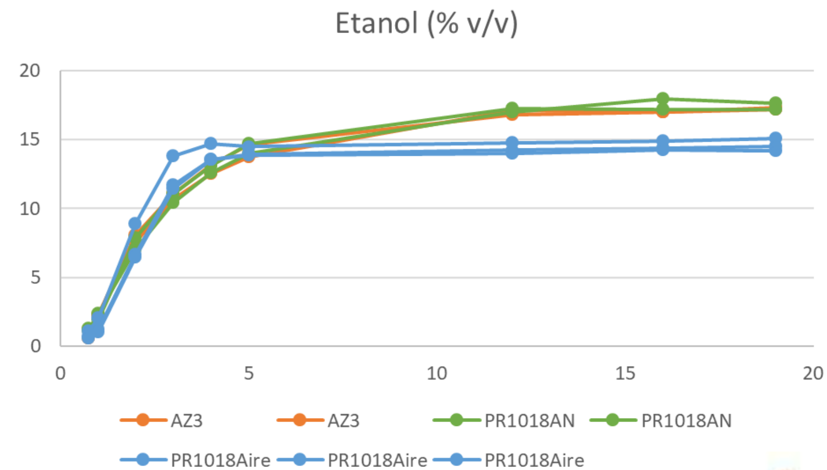

O2
Día 5
Descube
PR1018A
Día 7
Descube
Resto
Día 13
Inóculo BAL
PR1018A
Día 19
Inóculo BAL
Resto
% Azúcares consumidos
120
100
80
60
40
20
0
0
5
10
15
20
AZ3
AZ3
PR1018AN
PR1018AN
PR1018Aire
PR1018Aire
PR1018Aire


Etanol (% v/v)
20
15
10
5
0
0
5
10
15
20
AZ3
AZ3
PR1018AN
PR1018AN
PR1018Aire
PR1018Aire
PR1018Aire

Tiempo	Glicerol	Acético	Etanol	Azúcar consumido
(días)	%p/v	mg/l	%V/V	% p/v
0	0,07	66,155	0,155	0
0,7	0,08	79,21	0,18	0
1,7	0,16	167,905	0,84	0,9
2,7	0,63	72,22	5,245	9,105
3,7	1,04	328,995	11,845	22,685
4	1,04	368,355	12,55	24,695
8	1,005	403,81	**12,295**	**25,525**
			14,59-15,47	**GAP**

Dr Rubén Martínez Moreno

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