Supplementary material:

Towards a starter culture for cocoa fermentation by selection of acetic acid bacteria

Lucie Farrera[ab*], Alexandre Colas de la Noue[b], Caroline Strub[b], Benjamin Guibert[a], Christelle Kouame [a], Joël Grabulos [a], Didier Montet[a] and Corinne Teyssier[b]

[a] UMR 95 QualiSud, Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), Université de Montpellier, Montpellier SupAgro, Université d'Avignon et des Pays de Vaucluse, Université de la Réunion, 34398 Montpellier Cedex 5, France,

[b] UMR 95 QualiSud, Université de Montpellier, CIRAD, Montpellier SupAgro, Université d'Avignon et des Pays de Vaucluse, Université de la Réunion, 34095 Montpellier Cedex 5, France,

Corresponding author: lucie.farrera@gmail.com*

Table S1 : Detailed list of *Acetobacter* strains used for genomic polymorphism and metabolic analysis

Sequence_ID	Pays	Country	Sampling date	Fermentation day	Lenght	Id %	cover %	Identification	Accession number Genbank
CI1	Ivory Coast	Wagana	dec_16	1	1366	99,8	99	*Acetobacter pasteurianus*	MN909060
CI2	Ivory Coast	Abidjan	may_18	1	1204	100	97	*Acetobacter pasteurianus*	MN909061
CI3	Ivory Coast	Abidjan	may_18	1	1345	99	100	*Acetobacter pasteurianus*	MN909062
CI4	Ivory Coast	Abidjan	may_18	1	1333	99	100	*Acetobacter pasteurianus*	MN909063
CI5	Ivory Coast	Abidjan	may_18	2	1346	100	100	*Acetobacter pasteurianus*	MN909064
CI6	Ivory Coast	Abidjan	may_18	3	1326	99,9	100	*Acetobacter pasteurianus*	MN909065
CI7	Ivory Coast	Wagana	dec_16	2	1401	99,7	98	*Acetobacter pasteurianus*	MN909066
CI8	Ivory Coast	Abidjan	may_18	3	1295	99,7	100	*Acetobacter pasteurianus*	MN909067
CI9	Ivory Coast	Abidjan	may_18	3	1260	100	100	*Acetobacter pasteurianus*	MN909068
CI10	Ivory Coast	Abidjan	may_18	4	1351	100	100	*Acetobacter pasteurianus*	MN909069
CI11	Ivory Coast	Abidjan	may_18	4	1308	100	100	*Acetobacter pasteurianus*	MN909070
CI12	Ivory Coast	Abidjan	may_18	4	1333	100	100	*Acetobacter pasteurianus*	MN909071
CI13	Ivory Coast	Abidjan	may_18	4	1284	99	100	*Acetobacter pasteurianus*	MN909072
CI14	Ivory Coast	Wagana	dec_16	5	1400	99	99	*Acetobacter pasteurianus*	MN909073

CI15	Ivory Coast	Abidjan	may_18	5	1305	99,9	100	*Acetobacter pasteurianus*	MN909074
CI16	Ivory Coast	Abidjan	may_18	6	1331	100	100	*Acetobacter pasteurianus*	MN909075
CI17	Ivory Coast	Abidjan	may_18	6	1297	99,5	100	*Acetobacter pasteurianus*	MN909076
CI18	Ivory Coast	Abidjan	may_18	6	1346	100	100	*Acetobacter pasteurianus*	MN909077
CI19	Ivory Coast	Wagana	dec_16	5	1396	99,3	98	*Acetobacter pasteurianus*	MN909078
CI20	Ivory Coast	Wagana	dec_16	6	1360	100	100	*Acetobacter pasteurianus*	MN909079
CI21	Ivory Coast	Wagana	dec_16	0	1395	99	98	*Acetobacter pasteurianus*	MN909080
CI22	Ivory Coast	Wagana	dec_16	2	1363	100	100	*Acetobacter pasteurianus*	MN909081
CI23	Ivory Coast	Wagana	dec_16	5	1399	98	98	*Acetobacter pasteurianus*	MN909082
CI24	Ivory Coast	Wagana	dec_16	6	1401	98,8	99	*Acetobacter pasteurianus*	MN909083
CI25	Ivory Coast	Abidjan	may_18	3	1349	100	100	*Acetobacter fabarum*	MN909084
CI26	Ivory Coast	Wagana	dec_16	1	1398	98,3	98	*Acetobacter pasteurianus*	MN909085
CI27	Ivory Coast	Wagana	dec_16	1	1397	97,3	98	*Acetobacter pasteurianus*	MN909086
CI28	Ivory Coast	Wagana	dec_16	2	1399	99,3	98	*Acetobacter pasteurianus*	MN909087
CI29	Ivory Coast	Wagana	dec_16	4	1399	98,9	98	*Acetobacter pasteurianus*	MN909088
CI30	Ivory Coast	Wagana	dec_16	5	1400	99	99	*Acetobacter pasteurianus*	MN909089
CI31	Ivory Coast	Wagana	dec_16	1	1398	99,4	98	*Acetobacter pasteurianus*	MN909090

CI32	Ivory Coast	Wagana	dec_16	0	1401	99,7	98	*Acetobacter pasteurianus*	MN909091
CI33	Ivory Coast	Wagana	dec_16	3	1398	99,7	98	*Acetobacter pasteurianus*	MN909092
CI34	Ivory Coast	Wagana	dec_16	5	1395	98,9	99	*Acetobacter pasteurianus*	MN909093
CI35	Ivory Coast	Wagana	dec_16	6	1398	98,9	98	*Acetobacter pasteurianus*	MN909094
CI36	Ivory Coast	Wagana	dec_16	5	1398	99,3	98	*Acetobacter pasteurianus*	MN909095
CI37	Ivory Coast	Wagana	dec_16	6	1399	99,3	98	*Acetobacter pasteurianus*	MN909096
CI38	Ivory Coast	Wagana	dec_16	6	1398	99	98	*Acetobacter pasteurianus*	MN909097
CI39	Ivory Coast	Wagana	dec_16	1	1399	99,6	98	*Acetobacter pasteurianus*	MN909098
CI40	Ivory Coast	Wagana	dec_16	0	1398	99,5	98	*Acetobacter pasteurianus*	MN909099
GF41	French Guiana	Combi	dec_17	2	1306	100	100	*Acetobacter pasteurianus*	MN909100
GF42	French Guiana	Combi	dec_17	2	1346	99,9	100	*Acetobacter pasteurianus*	MN909101
GF43	French Guiana	Combi	dec_17	2	1295	99,9	100	*Acetobacter pasteurianus*	MN909102
GF44	French Guiana	Combi	dec_17	2	1310	100	100	*Acetobacter pasteurianus*	MN909103
GF45	French Guiana	Combi	dec_17	3	1334	100	100	*Acetobacter pasteurianus*	MN909104
GF46	French Guiana	Combi	dec_17	3	1346	99,9	100	*Acetobacter pasteurianus*	MN909105
GF47	French Guiana	Combi	dec_17	5	1346	100	100	*Acetobacter pasteurianus*	MN909106

GF48	French Guiana	Combi	dec_17	5	1352	99,8	100	*Acetobacter pasteurianus*	MN909107
GF49	French Guiana	Combi	dec_17	5	1358	100	100	*Acetobacter pasteurianus*	MN909108
GF50	French Guiana	Combi	dec_17	5	1305	99,9	100	*Acetobacter pasteurianus*	MN909109
GF51	French Guiana	Combi	dec_17	2	1336	99,9	100	*Gluconobacter oxydans*	MN909110
MX52	Mexico	Comalcalco	feb_18	5	1345	100	100	*Acetobacter pasteurianus*	MN909111
MX53	Mexico	Comalcalco	feb_18	5	1316	100	100	*Acetobacter pasteurianus*	MN909112
MX54	Mexico	Comalcalco	oct_18	1	1358	100	100	*Acetobacter pasteurianus*	MN909113
MX55	Mexico	Comalcalco	oct_18	1	1363	100	100	*Acetobacter pasteurianus*	MN909114
MX56	Mexico	Comalcalco	oct_18	1	1358	100	100	*Acetobacter pasteurianus*	MN909115
MX57	Mexico	Comalcalco	oct_18	1	1259	100	100	*Acetobacter pasteurianus*	MN909116
MX58	Mexico	Comalcalco	oct_18	2	1304	100	100	*Acetobacter pasteurianus*	MN909117
MX59	Mexico	Comalcalco	oct_18	2	1347	100	100	*Acetobacter pasteurianus*	MN909118
MX60	Mexico	Comalcalco	oct_18	2	1351	100	100	*Acetobacter pasteurianus*	MN909119
MX61	Mexico	Comalcalco	oct_18	2	1305	100	100	*Acetobacter pasteurianus*	MN909120
MX62	Mexico	Comalcalco	oct_18	3	1305	100	100	*Acetobacter pasteurianus*	MN909121
MX63	Mexico	Comalcalco	oct_18	3	1353	100	100	*Acetobacter pasteurianus*	MN909122

MX64	Mexico	Comalcalco	oct_18	3	1355	100	100	*Acetobacter pasteurianus*	MN909123
MX65	Mexico	Comalcalco	oct_18	3	1352	99,8	100	*Acetobacter pasteurianus*	MN909124
MX66	Mexico	Comalcalco	oct_18	3	1360	100	100	*Acetobacter pasteurianus*	MN909125
MX67	Mexico	Comalcalco	oct_18	3	1318	100	100	*Acetobacter pasteurianus*	MN909126
MX68	Mexico	Comalcalco	oct_18	4	1360	100	100	*Acetobacter pasteurianus*	MN909127
MX69	Mexico	Comalcalco	oct_18	4	1351	100	100	*Acetobacter pasteurianus*	MN909128
MX70	Mexico	Comalcalco	oct_18	4	1367	100	100	*Acetobacter pasteurianus*	MN909129
MX71	Mexico	Comalcalco	oct_18	4	1316	99,8	100	*Acetobacter pasteurianus*	MN909130
MX72	Mexico	Comalcalco	oct_18	1	1346	100	100	*Acetobacter pasteurianus*	MN909131
MX73	Mexico	Comalcalco	oct_18	2	1346	100	100	*Acetobacter pasteurianus*	MN909132
MX74	Mexico	Comalcalco	oct_18	2	1358	100	100	*Acetobacter pasteurianus*	MN909133
MX75	Mexico	Comalcalco	oct_18	2	1310	100	100	*Acetobacter pasteurianus*	MN909134
MX76	Mexico	Comalcalco	oct_18	2	1314	100	100	*Acetobacter pasteurianus*	MN909135
MX77	Mexico	Comalcalco	oct_18	3	1353	99,85	100	*Acetobacter pasteurianus*	MN909136
MX78	Mexico	Comalcalco	oct_18	3	1303	99,9	100	*Acetobacter pasteurianus*	MN909137
MX79	Mexico	Comalcalco	oct_18	3	1351	100	100	*Acetobacter pasteurianus*	MN909138

MX80	Mexico	Comalcalco	oct_18	3	1353	100	100	*Acetobacter pasteurianus*	MN909139
MX81	Mexico	Comalcalco	oct_18	4	1353	100	100	*Acetobacter pasteurianus*	MN909140
MX82	Mexico	Comalcalco	oct_18	4	1353	100	100	*Acetobacter pasteurianus*	MN909141
MX83	Mexico	Comalcalco	oct_18	2	1360	99,9	100	*Acetobacter pasteurianus*	MN909142
MX84	Mexico	Comalcalco	feb_18	4	1354	100	100	*Acetobacter pasteurianus*	MN909143
MX85	Mexico	Comalcalco	feb_18	4	1353	100	100	*Acetobacter pasteurianus*	MN909144
MX86	Mexico	Comalcalco	feb_18	6	1363	99,9	100	*Acetobacter pasteurianus*	MN909145
MX87	Mexico	Comalcalco	feb_18	6	1358	100	100	*Acetobacter pasteurianus*	MN909146
MX88	Mexico	Comalcalco	feb_18	6	1358	100	100	*Acetobacter pasteurianus*	MN909147
MX89	Mexico	Comalcalco	feb_18	4	1355	100	100	*Acetobacter pasteurianus*	MN909148
MX90	Mexico	Comalcalco	feb_18	4	1354	100	100	*Acetobacter pasteurianus*	MN909149
MX91	Mexico	Comalcalco	feb_18	4	1358	100	100	*Acetobacter pasteurianus*	MN909150
MX92	Mexico	Comalcalco	feb_18	2	1294	99,9	100	*Acetobacter tropicalis*	MN909151

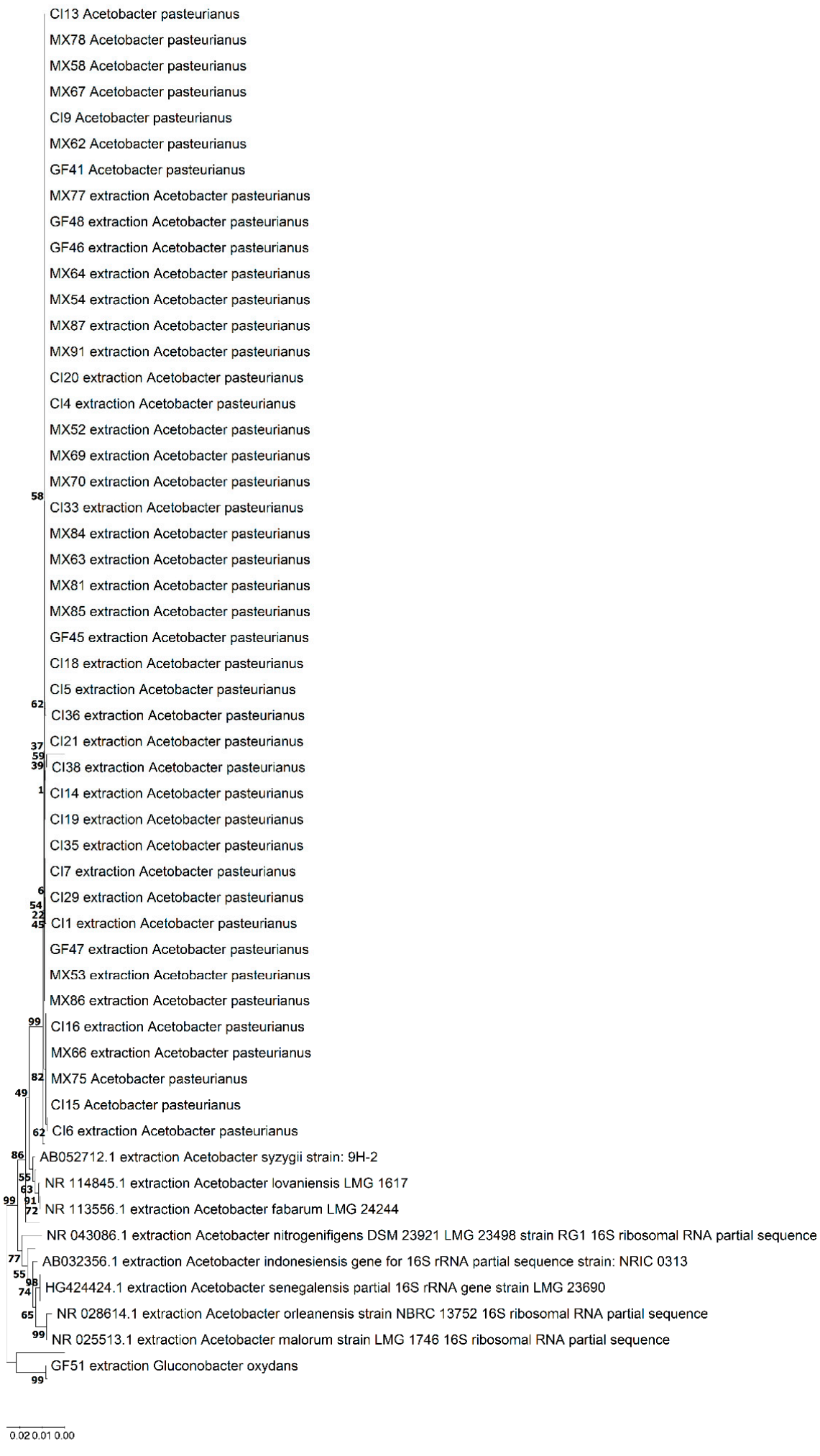
CI13 Acetobacter pasteurianus
MX78 Acetobacter pasteurianus
MX58 Acetobacter pasteurianus
MX67 Acetobacter pasteurianus
CI9 Acetobacter pasteurianus
MX62 Acetobacter pasteurianus
GF41 Acetobacter pasteurianus
MX77 extraction Acetobacter pasteurianus
GF48 extraction Acetobacter pasteurianus
GF46 extraction Acetobacter pasteurianus
MX64 extraction Acetobacter pasteurianus
MX54 extraction Acetobacter pasteurianus
MX87 extraction Acetobacter pasteurianus
MX91 extraction Acetobacter pasteurianus
CI20 extraction Acetobacter pasteurianus
CI4 extraction Acetobacter pasteurianus
MX52 extraction Acetobacter pasteurianus
MX69 extraction Acetobacter pasteurianus
MX70 extraction Acetobacter pasteurianus
58
CI33 extraction Acetobacter pasteurianus
MX84 extraction Acetobacter pasteurianus
MX63 extraction Acetobacter pasteurianus
MX81 extraction Acetobacter pasteurianus
MX85 extraction Acetobacter pasteurianus
GF45 extraction Acetobacter pasteurianus
CI18 extraction Acetobacter pasteurianus
CI5 extraction Acetobacter pasteurianus
62
CI36 extraction Acetobacter pasteurianus
37
CI21 extraction Acetobacter pasteurianus
59
39
CI38 extraction Acetobacter pasteurianus
1
CI14 extraction Acetobacter pasteurianus
CI19 extraction Acetobacter pasteurianus
CI35 extraction Acetobacter pasteurianus
CI7 extraction Acetobacter pasteurianus
6
CI29 extraction Acetobacter pasteurianus
54
22
45
CI1 extraction Acetobacter pasteurianus
GF47 extraction Acetobacter pasteurianus
MX53 extraction Acetobacter pasteurianus
MX86 extraction Acetobacter pasteurianus
99
CI16 extraction Acetobacter pasteurianus
MX66 extraction Acetobacter pasteurianus
82
MX75 Acetobacter pasteurianus
49
CI15 Acetobacter pasteurianus
62
CI6 extraction Acetobacter pasteurianus
86
AB052712.1 extraction Acetobacter syzygii strain: 9H-2
55
63
NR 114845.1 extraction Acetobacter lovaniensis LMG 1617
99
91
72
NR 113556.1 extraction Acetobacter fabarum LMG 24244
NR 043086.1 extraction Acetobacter nitrogenifigens DSM 23921 LMG 23498 strain RG1 16S ribosomal RNA partial sequence
77
AB032356.1 extraction Acetobacter indonesiensis gene for 16S rRNA partial sequence strain: NRIC 0313
55
98
74
HG424424.1 extraction Acetobacter senegalensis partial 16S rRNA gene strain LMG 23690
65
NR 028614.1 extraction Acetobacter orleanensis strain NBRC 13752 16S ribosomal RNA partial sequence
99
NR 025513.1 extraction Acetobacter malorum strain LMG 1746 16S ribosomal RNA partial sequence
GF51 extraction Gluconobacter oxydans
99
0.02 0.01 0.00

Figure S1: Neighbor-joining tree based on nearly complete 16S rRNA gene sequences of AAB type strain and AAB isolated in this study. The robustness of the branching is indicated by bootstrap percentages calculated for 1000 subsets.

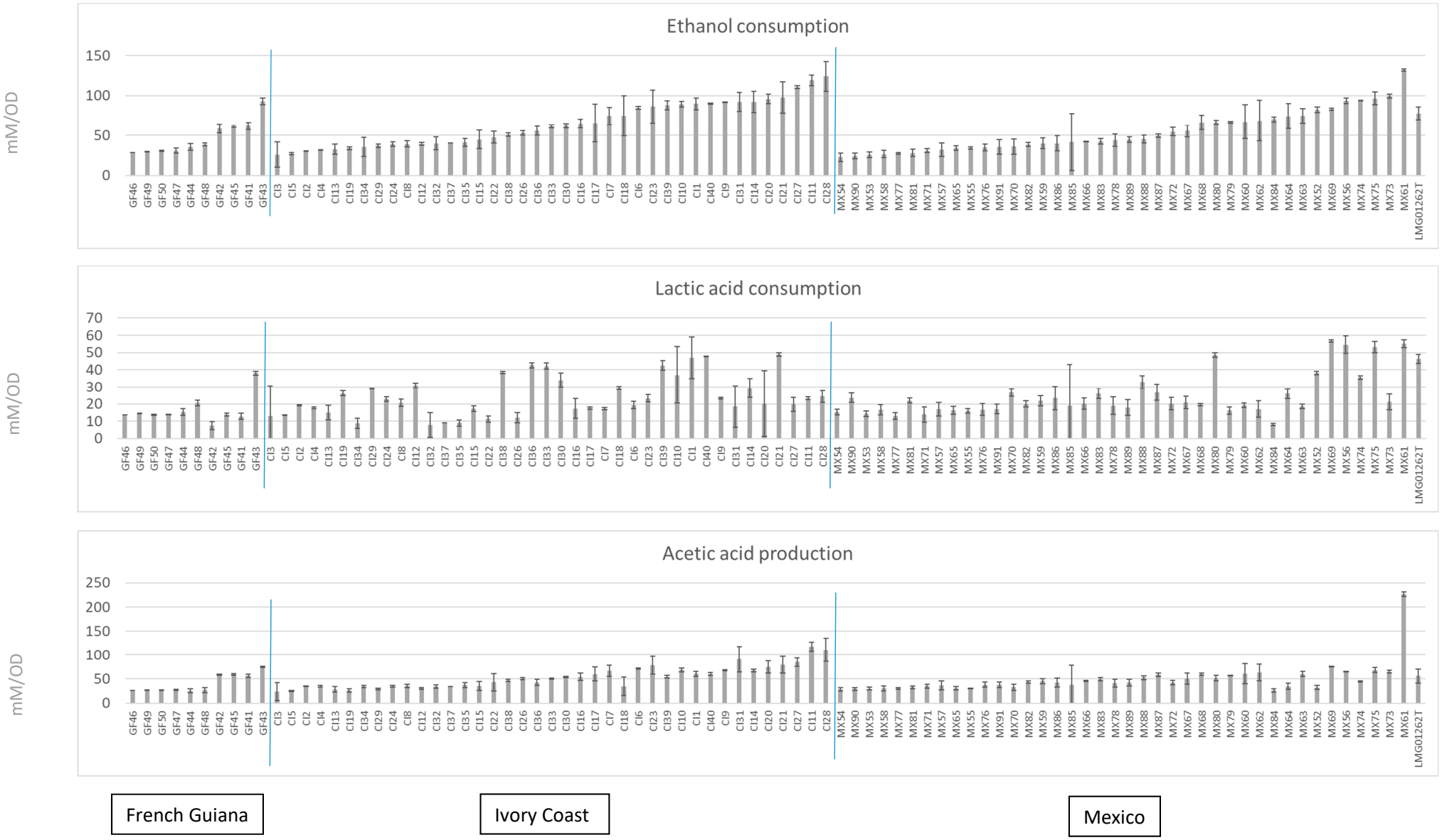
Ethanol consumption
mM/OD
150
100
50
0
Lactic acid consumption
mM/OD
70
60
50
40
30
20
10
0
Acetic acid production
mM/OD
250
200
150
100
50
0
GF46 GF49 GF50 GF47 GF44 GF48 GF42 GF45 GF41 GF43 CI3 CI5 CI2 CI4 CI13 CI19 CI34 CI29 CI24 CI8 CI12 CI32 CI37 CI35 CI15 CI22 CI38 CI26 CI36 CI33 CI30 CI16 CI17 CI7 CI18 CI6 CI23 CI39 CI10 CI1 CI40 CI9 CI31 CI14 CI20 CI21 CI27 CI11 CI28 MX54 MX90 MX53 MX58 MX77 MX81 MX71 MX57 MX65 MX55 MX76 MX91 MX70 MX82 MX59 MX86 MX85 MX66 MX83 MX78 MX89 MX88 MX87 MX72 MX67 MX68 MX80 MX79 MX60 MX62 MX84 MX64 MX63 MX52 MX69 MX56 MX74 MX75 MX73 MX61 LMG01262T
French Guiana
Ivory Coast
Mexico

Figure S2: Comparison of physiological traits of *Acetobacter pasteurianus* strains from different origins and the type strain LMG 01262^{T}, ethanol consumption, lactic acid consumption, acetic acid production in mM/OD. All values were normalized by biomass (OD600). For each strain, standard deviation was given.

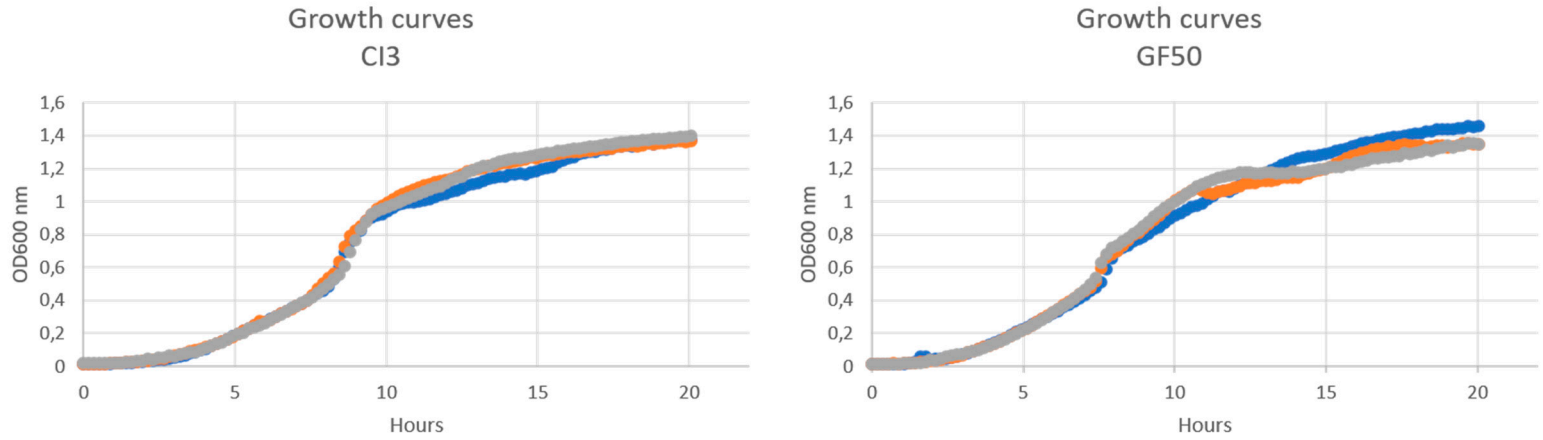

Figure S3: Example of growth curve obtained after the kinetic follow-up with the spectrophotometer.

Made in triplicate (blue, orange and grey) after subtraction of the blank (growth medium).

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