



Driving the nitrogen/carbon ratio of the culture medium determines *Propionibacterium freudenreichii* survival during spray-drying.

Floriane Gaucher, Houem Rabah, Koffigan Kponouglo, Sylvie Bonnassié,
Philippe Blanc, Romain Jeantet, Gwénaél Jan

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DRIVING THE NITROGEN/CARBONE RATIO OF THE CULTURE MEDIUM DETERMINES *PROPIONIBACTERIUM FREUDENREICHII* SURVIVAL DURING SPRAY-DRYING

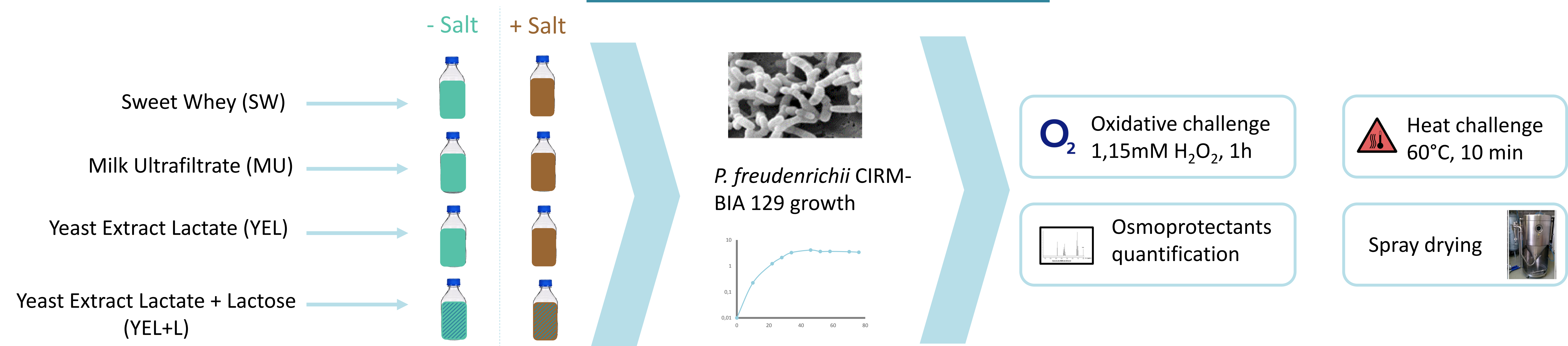
FLORIANE GAUCHER ^(1,2), HOUEM RABAH ^(1,3), KOFFIGAN KPONOU GLO ⁽¹⁾, SYLVIE BONNASSIE ^(1,4), PIERRE MARCHAND ⁽²⁾, PHILIPPE BLANC ⁽²⁾, ROMAIN JEANTET ⁽¹⁾, GWENAE L JAN ⁽¹⁾

1 STLO, INRA, Agrocampus Ouest, 35 000, Rennes, France
2 Bioprox, 6 rue Barbès, 92532, Levallois-Perret, France
3 Pôle Agronomique Ouest, Régions Bretagne et Pays de la Loire, F-35 042 Rennes, France
4 Science de la Vie et de la Terre, Université de Rennes I, Rennes, France.

CONTEXT

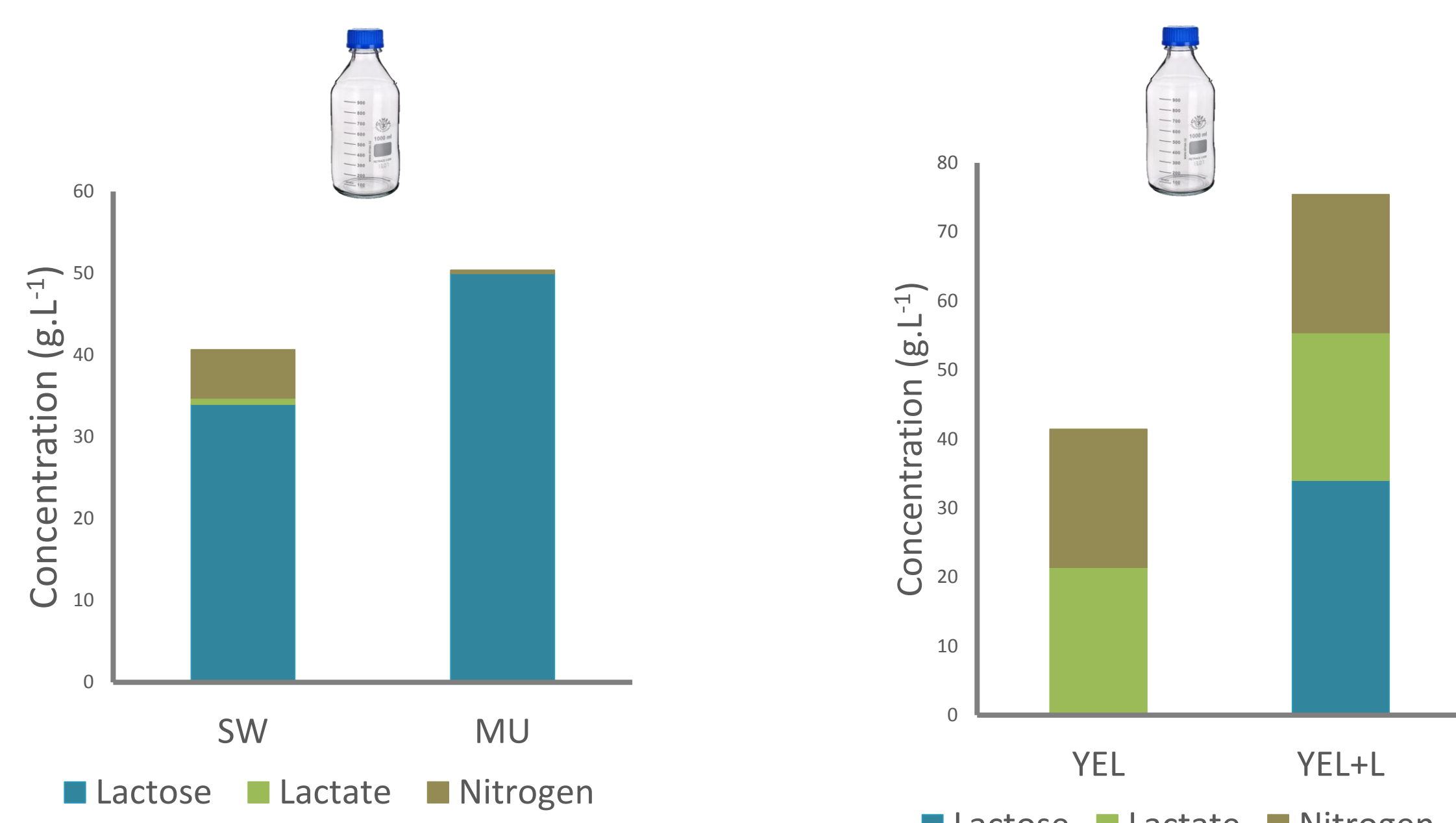
P. freudenreichii is used both as Swiss-type cheese starter and as probiotic. For these purposes, it should be converted into a powdered form to be stabilized, without significant loss of viability. Spray-drying is a stressful process, with simultaneous thermal, oxidative and osmotic stresses. To tolerate to these latter, bacteria should adapt. We investigate whether growth media could constitute a means to adapt bacteria in the aim to increase their survival during spray drying.

EXPERIEMENTS DESIGN

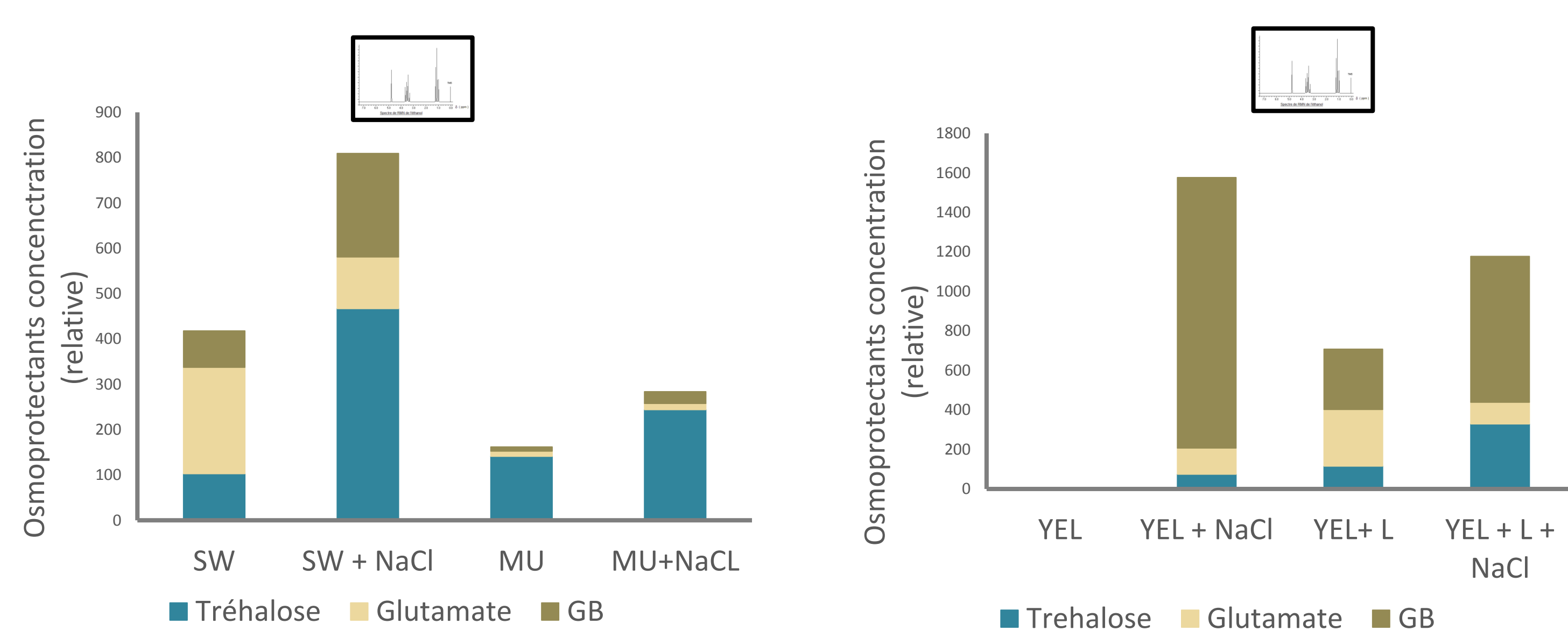


RESULTS

1 Carbon/nitrogen composition of the culture medium

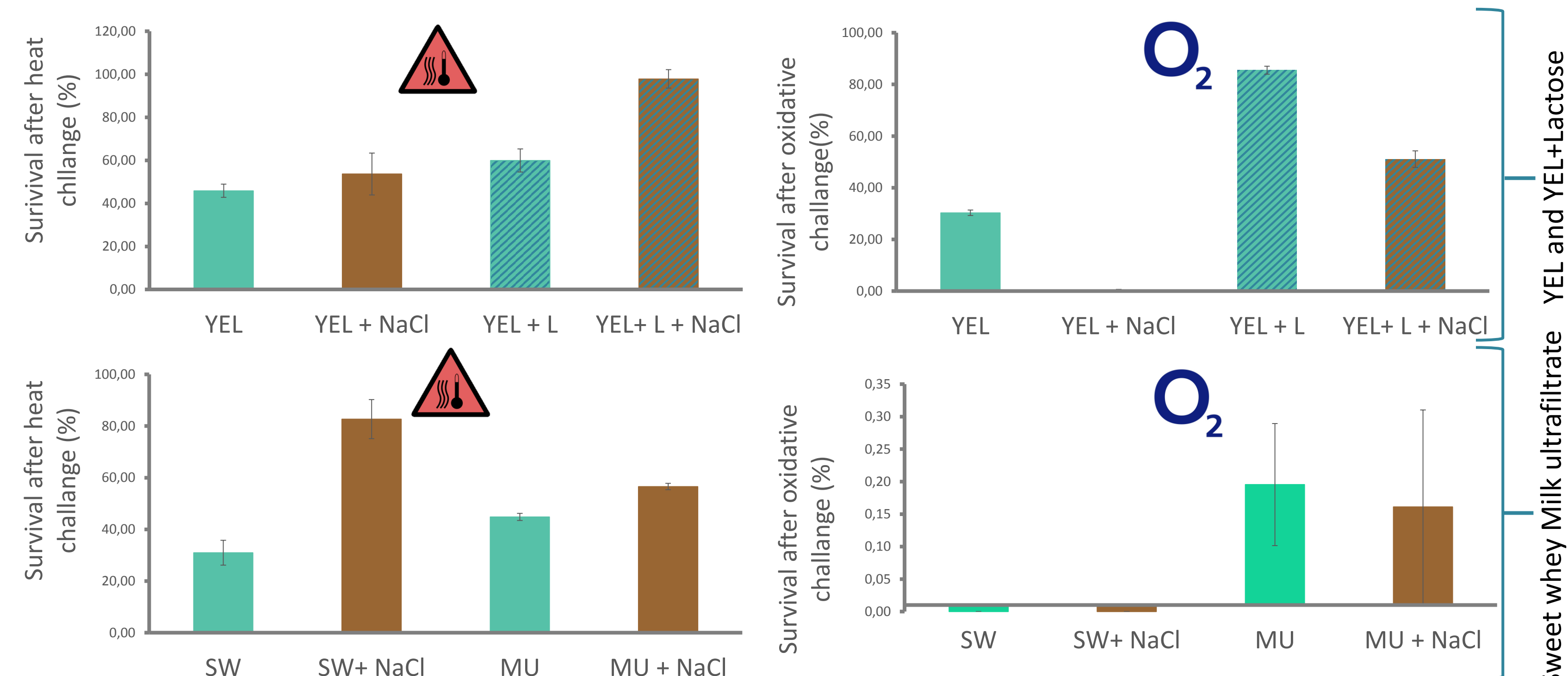


2 Osmoprotectants accumulations is determined by the medium composition



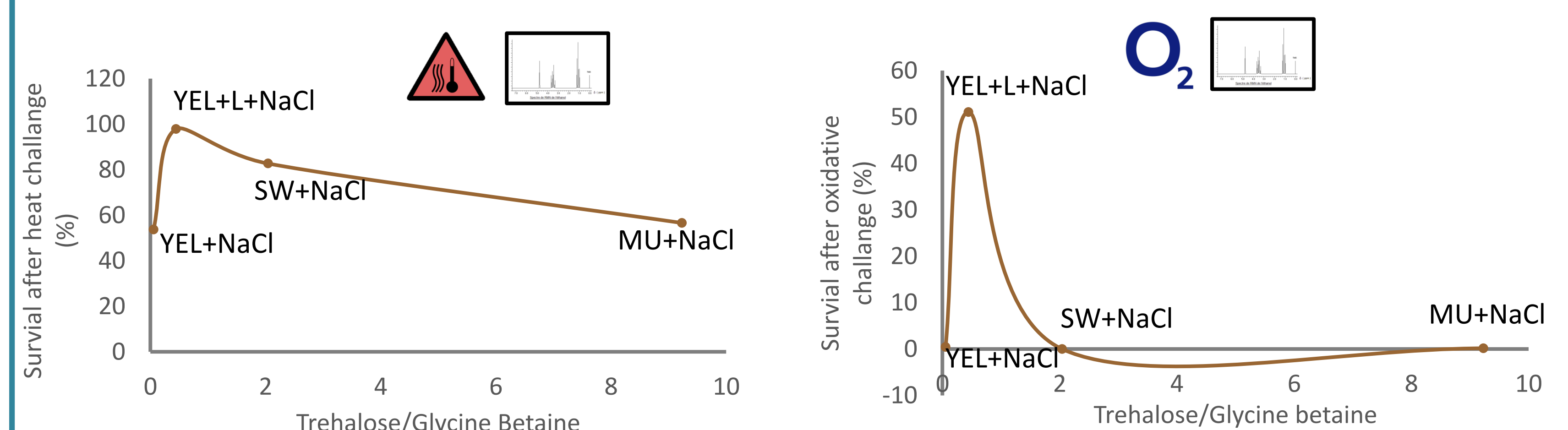
P. freundeichii was cultivated in the different growth media and collected during exponential phase. Cytoplasmic molecules were extracted and the osmoprotectants were identified and quantified by C and H NMR

3 Osmoprotection protects *P. freudenreichii* during lethal challenges



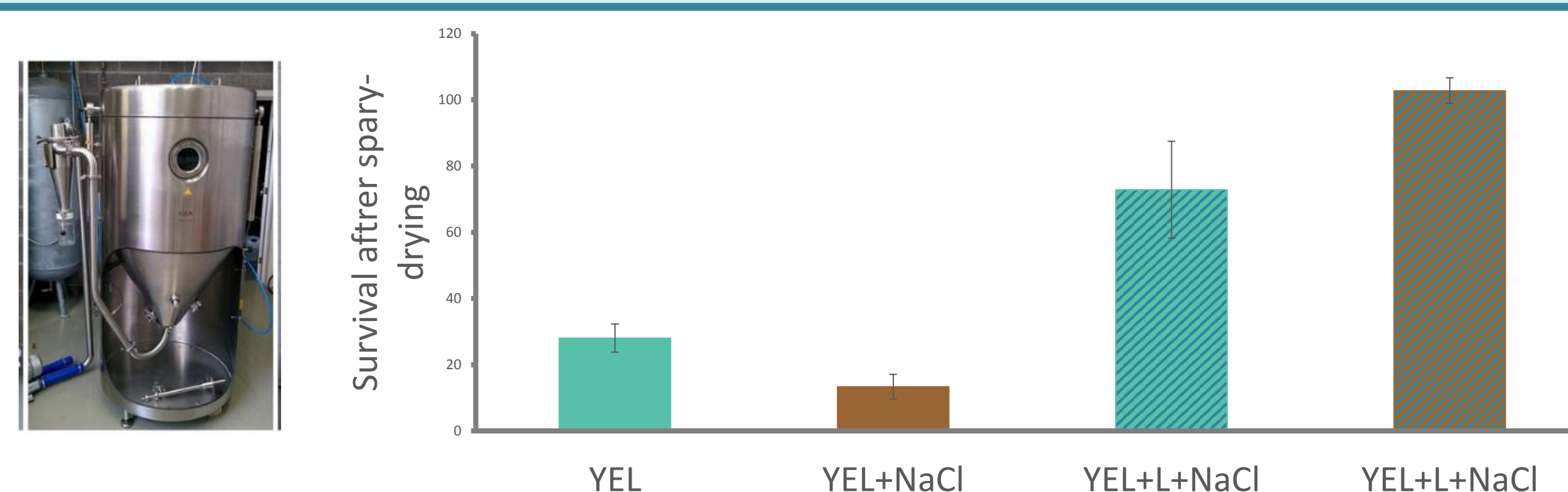
P. freundeichii was cultivated in the different growth medium. Both lethal challenges were applied at the beginning of the stationary phase. *P. freudenreichii* quantification was made by CFU numeration before and after challenges

4 The trehalose/glycine betaine ratio is linked to *P. freudenreichii* survival during lethal challenges



The relation between the trehalose/glycine betaine ratio and *P. freudenreichii* survival with the experiments 2 and 3

5 The nitrogen/carbon ratio of the growth medium influence *P. freudenreichii* viability during spray drying



P. freundeichii was cultivated in the different growth media, and spray-dried at the beginning of the stationary phase. *P. freudenreichii* quantification was made by numeration before and after spray-drying

CONCLUSION

We demonstrate here that driving the nitrogen/carbon ratio of the culture medium modulates the trehalose/glycine betaine ratio which, in turn, determines *P. freudenreichii* survival during spray-drying. Spray-drying needs less energy than freeze-drying. This work thus opens new perspectives for sustainable drying of beneficial bacteria