

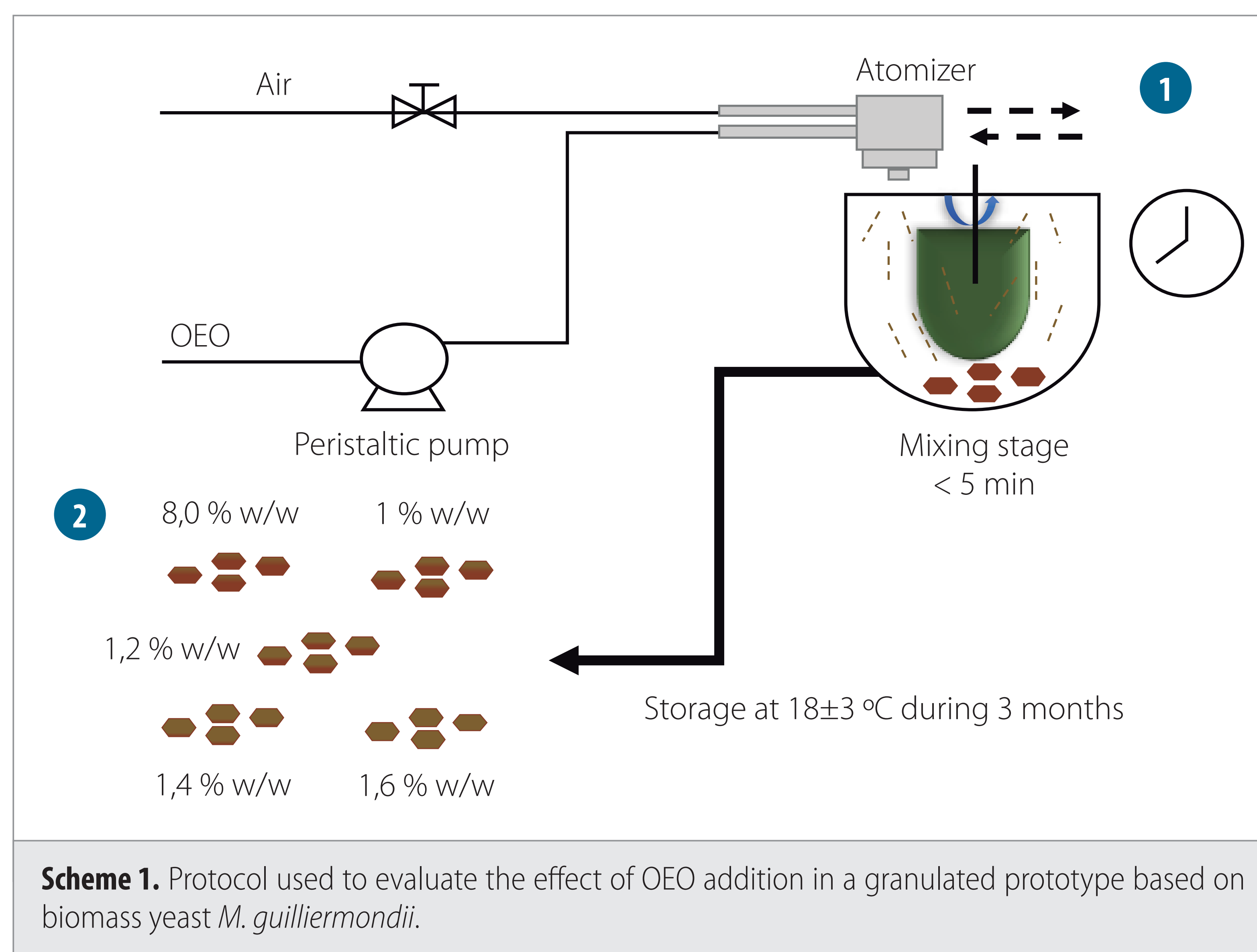
INTRODUCTION

New functional additives to the diets of ruminant are necessary in order to sustain the milk productivity in tropical countries as Colombia where climate change has become a drawback. In CORPOICA, a native Colombian yeast *Meyerozyma guilliermondii* strain Lv196 had been identified as a promising microorganism with a high probiotic potential on *in vitro* assays when it is mixed with oregano essential oil (OEO)[1]. Due to the anti-microbial property of OEO, a different alternative of prototypes has to be proposed in order to prevent loss of yeast cell viability during shelf time [2, 3]. Therefore, the objective of this study was to evaluate the stability of different prototypes composed by biomass of yeast Lv196 and OEO in order to select the one that guarantees the viability of yeast cells.

MATERIALS AND METHODS

Direct contact evaluation between formulated yeast biomass and AEO

The effect of five OEO concentrations (0.8, 1, 1.2, 1.4 and 1.6 %w/w) were evaluated on yeast viability previously formulated. See **Scheme 1**. OEO was added to 20 g of the yeast formulated prototype through spray system with a constant flow coupled to a mixer and each concentration was adjusted with respect to time. Prototypes were packed individually and yeast viability was computed monthly.



Alternative prototypes

Two alternative prototypes were evaluated in order to prevent a decrease of cell viability during storage at room temperature: a mixed prototype (MP) and a coated prototype (CP). MP consisted of the mix of two granulated products, both with the same proportions of coadjuvants, one with yeast biomass and another with OEO. On the other hand, CP consisted of a single granulated product with a double coated of natural wax and OEO. A completely randomized experimental design was applied and two OEO concentrations were evaluated, 0.8 and 1 %w/w. Prototypes were packed individually and yeast viability was computed monthly.

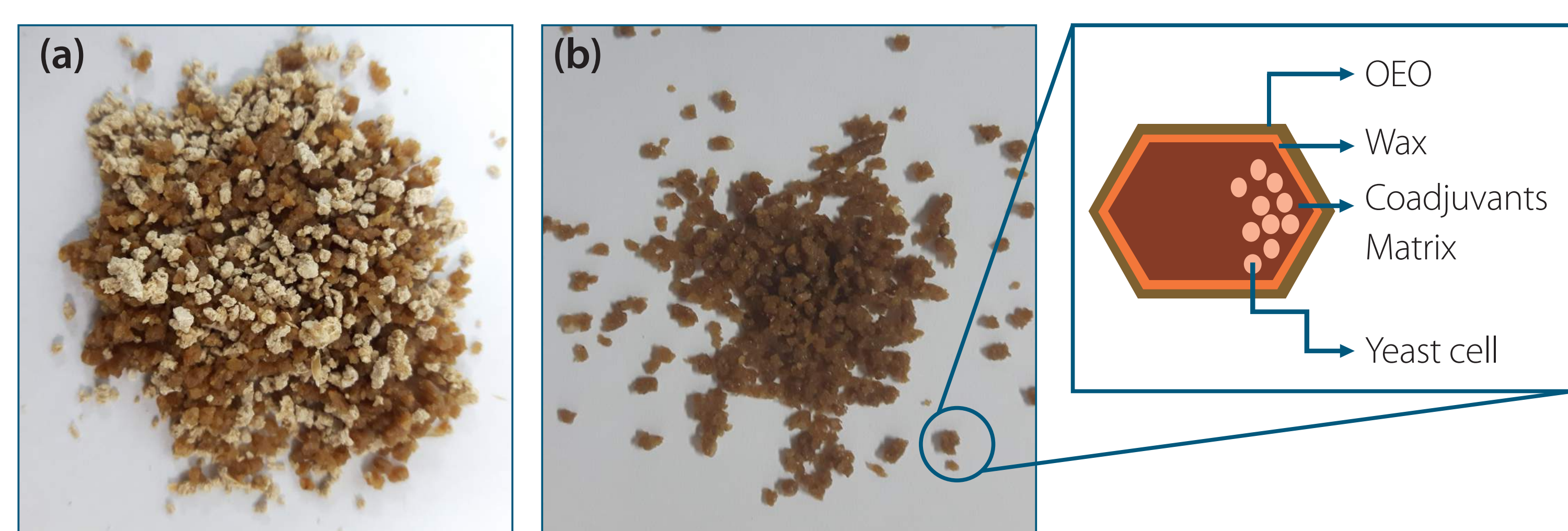


Figure 1. (a) Mixed and (b) coated formulation prototypes based on yeast biomass of *M. guilliermondii*.

RESULTS AND DISCUSSION

Tolerance of formulated yeast biomass to AEO

As is seen in **Fig. 2**, from the first month of storage, all OEO concentration evaluated had a negative effect on cell viability of yeast *M. guilliermondii*. After 3 months of storage, the treatments with 1, 1.2, 1.4 and 1.6 %w/w OEO presented a loss of viability higher than 5 %. Prototype with 0.8 %w/w, had the unique acceptable loss of viability value of 4.4 ± 0.13 %. Those results suggested the necessity of a modification in terms of the prototypes design in order to reduce the stability of yeast during storage.

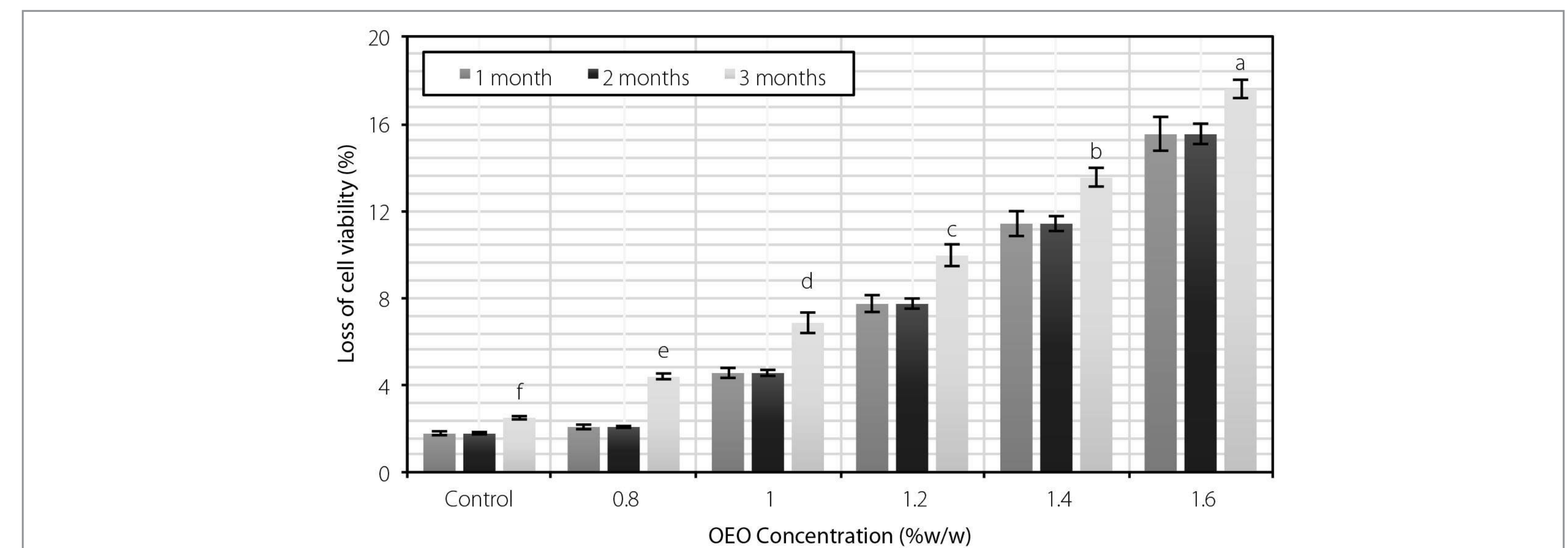


Figure 2. Loss of cell viability of regular granulated prototype based on yeast strain Lv196 at different OEO concentration. Different letters indicate significant differences ($p < 0.05$).

Mixed and coated prototypes

As is shown in **Fig. 3**, the mixed prototype was not effective in protecting the yeast because of the possible volatilization of toxic compounds as monoterpenoid phenols from OEO. For instance, MP with an OEO concentration of 0.8 %w/w had a loss of cell viability of 8.27 ± 0.23 % after 3 months. This was also observed with coated prototype using NW2. In contrast, the coated prototype with NW1 and a similar OEO concentration presented the lowest loss of cell viability with a value of 2.46 ± 0.55 % at the same time of storage at room temperature.

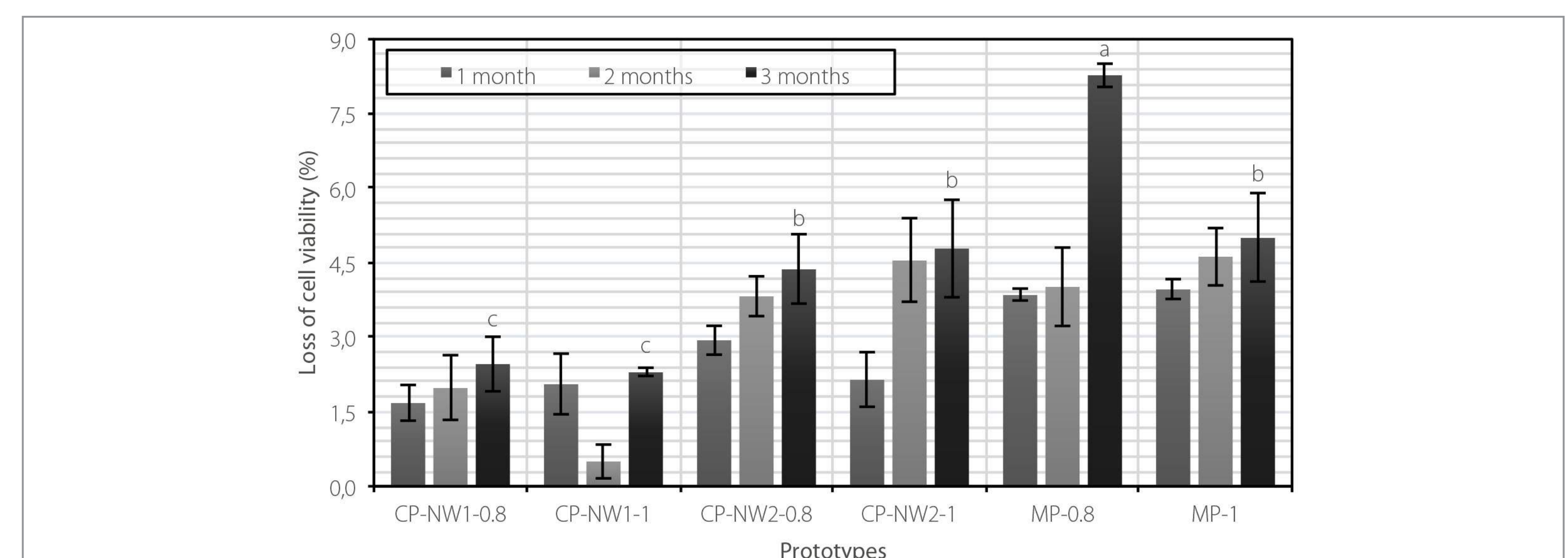


Figure 3. Loss of cell viability of the different prototypes, coated (CP) and mixed (MP), based on yeast strain Lv196 at different storage time. Different letters indicate significant differences ($p < 0.05$).

CONCLUSION

A coated prototype with NW1 (CP-MW1-0.8) could be selected as an effective option to design granulated bioproducts based on yeast biomass and oregano essential oils in order to guarantee its stability at shelf time. After 3 months of storage, the loss of cell viability of *M. guilliermondii* on the prototype mentioned before was 2.46 ± 0.55 %.

REFERENCES

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