

Methods to Maintain Soy By-Product (Okara) Quality for Use as a Food Ingredient Rather Than Food Waste

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1. Introduction

- Okara
 - Produced during tofu or soy milk production
 - At least 30 tonnes produced each day in Singapore
 - Nutritious: high in dietary fibre, protein, carbohydrates, calcium and potassium.
 - Spoils quickly
 - Usually thrown away as food waste
 - Local soy companies expressed their interest in utilising okara as a co-product, instead of disposing it as waste.

2. AIMS

To determine methods by which the shelf life of the okara could be improved.

Methods for stabilisation tested:

- Sealing okara in air-tight bags
- Adding commercially-available baker's yeast.

3. Methods

- Experimental conditions on sterilised and unprocessed okara:
 - Adding non-sterile distilled water and sealing in Ziploc bags;
 - Adding non-sterile distilled water and leaving in an open petri dish;
 - Adding diluted yeast solution diluted by a million times from instant yeast produced in Singapore;
- Additional experimental conditions on unprocessed okara:
 - Adding diluted yeast solution diluted by a million times from instant yeast produced in Belgium, France, Australia and Malaysia
- Incubation conditions: 35°C, in non-sterile plastic containers containing wet paper towels for 72 hours.

4. Results

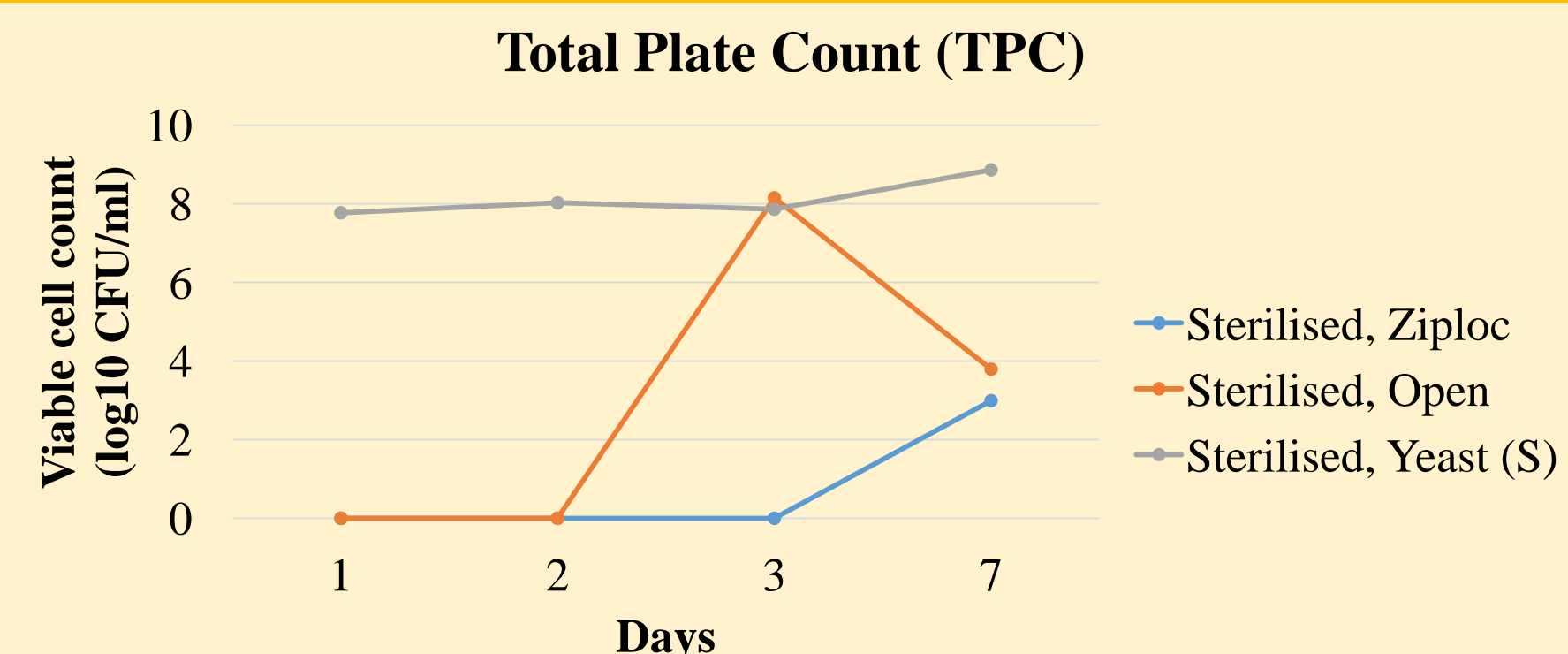


Figure 1. TPC Results of the Treated Sterilised Okara.

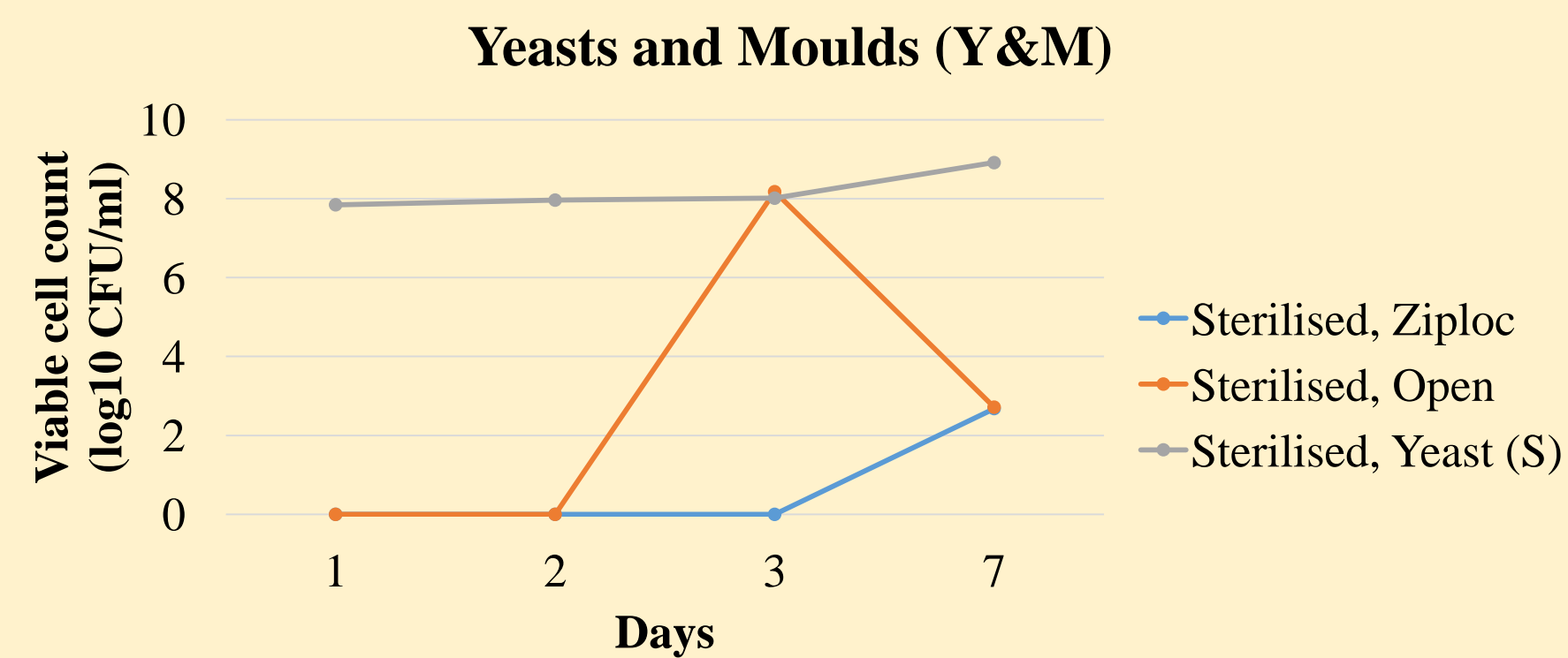


Figure 2. Y&M Results of the Treated Sterilised Okara.

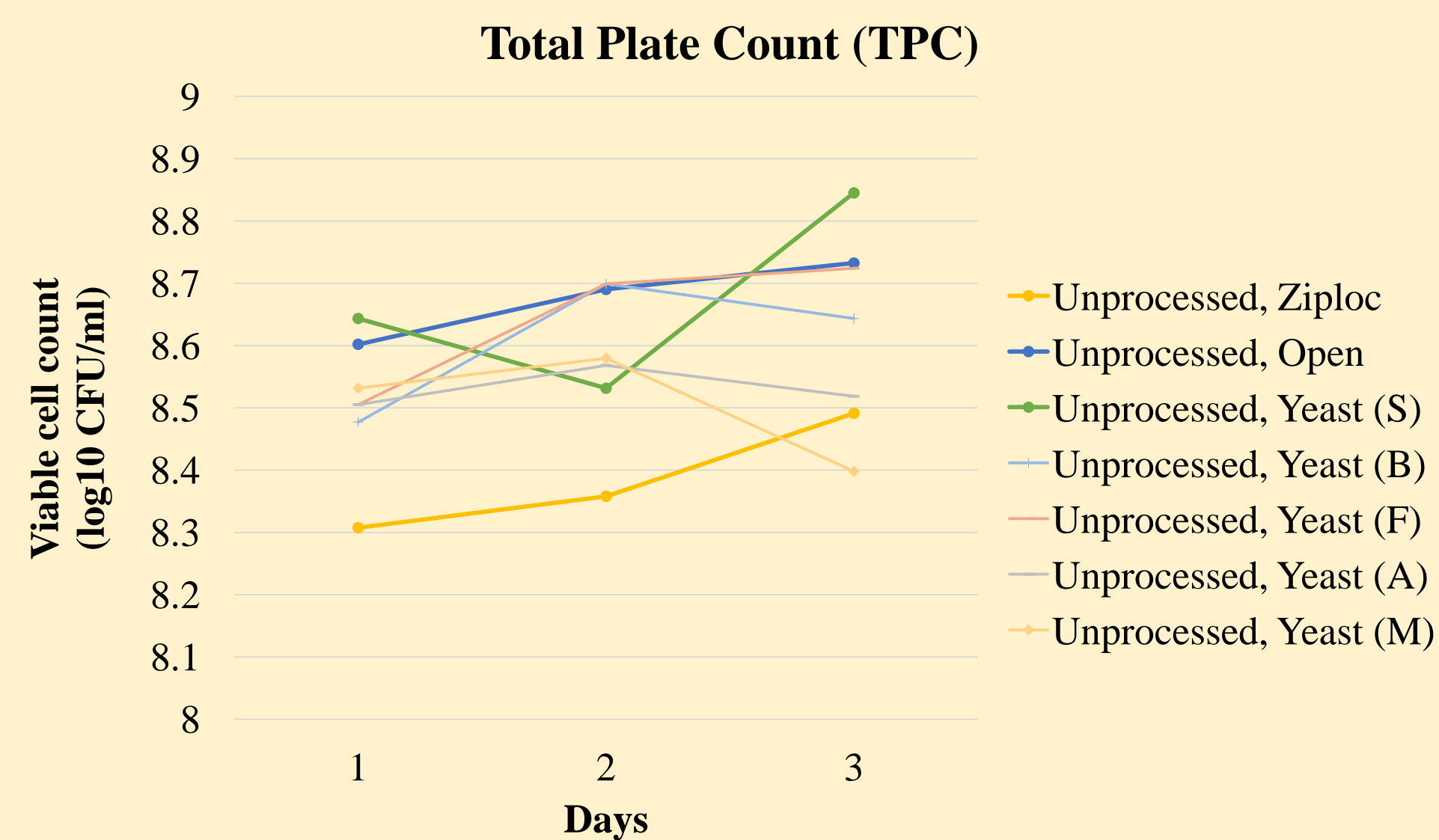


Figure 3. TPC Results of the Treated Unprocessed Okara.

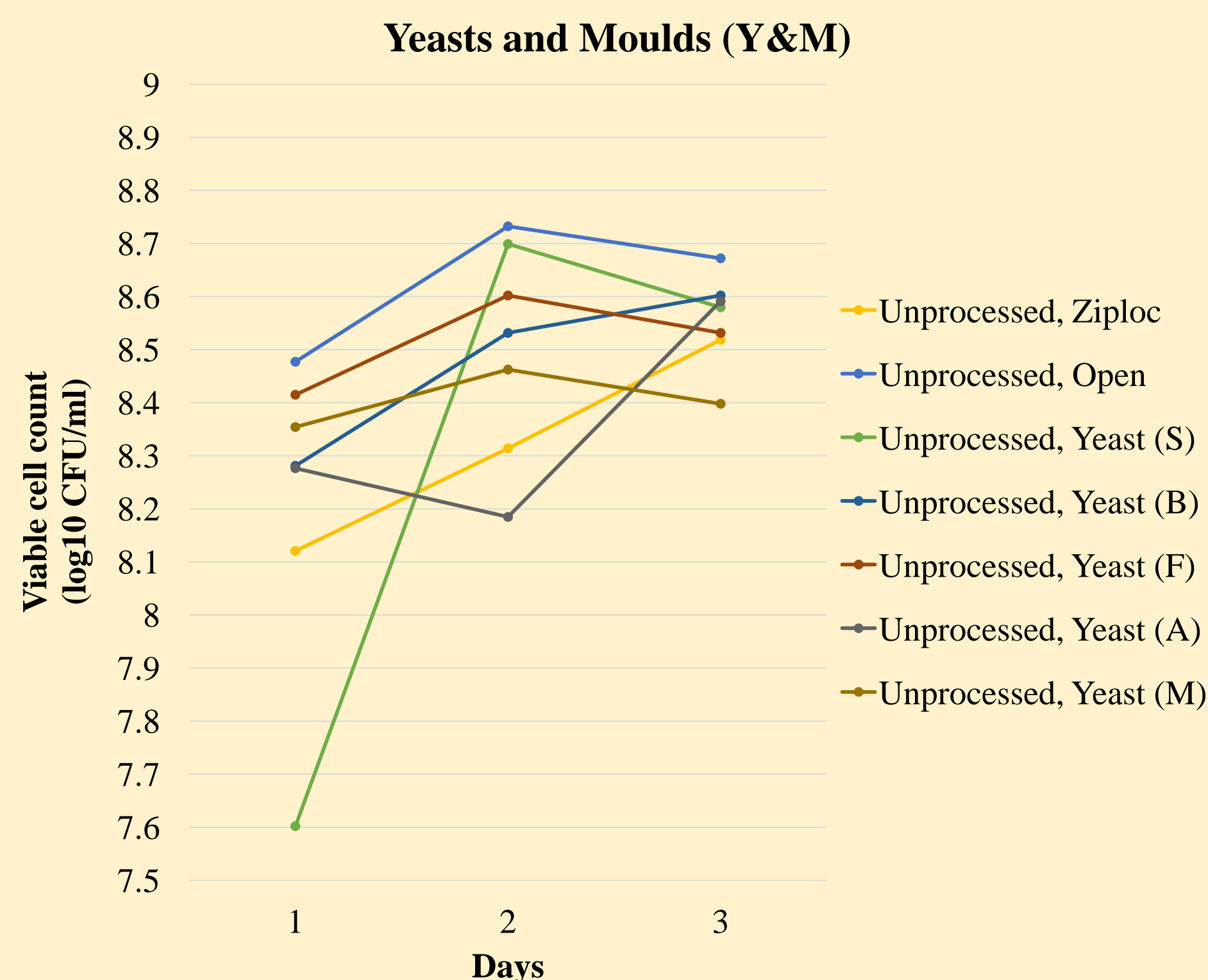


Figure 4. Y&M Results of the Treated Unprocessed Okara.

5. Discussion

- Okara left in the Ziploc bags fared better than most of the ones with yeasts added (figures 1 to 4).
- Okara samples have lower CFU/ml counts when they are left in Ziploc bags compared to being left in the open (figures 1 to 4).
- Number of CFU/ml for the sterilised okara samples that contained yeast are higher than the number of CFU/ml for the unprocessed okara samples (figures 1 to 4).
 - Addition of yeast may have caused an increased rate of spoilage
 - However, as the unprocessed okara samples already contained much microorganisms, the yeast cells may not be able to populate as quickly as they could in the unprocessed samples.
- Yeast solutions prepared from instant yeasts produced in different countries have different effects on the numbers of microorganisms in the okara samples.
 - In this experiment, yeasts from Australia and Malaysia seemed to have a better “preservation” effect on okara samples compared to others.
 - Future studies could be conducted to find out differences between yeasts from different countries of origin,
 - And whether there is any particular yeast from a certain country of origin which would be suitable for related researches.
- However, as there is only 1 sample tested for each experiment due to the time constraint, these results might not be accurate.

6. CONCLUSION

- Quality of okara samples better maintained when left in Ziploc bags compared to the other treatments, other than a few exceptions.
 - Soy companies could consider sealing the okara produced to reduce the rate of spoilage.
- Further up-scaled researches to be done.
 - This project could be shared with the soy companies to get funding.

Acknowledgements

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