

Microwave hydrodiffusion and gravity: An emergent technology for green extraction of non-volatile compounds

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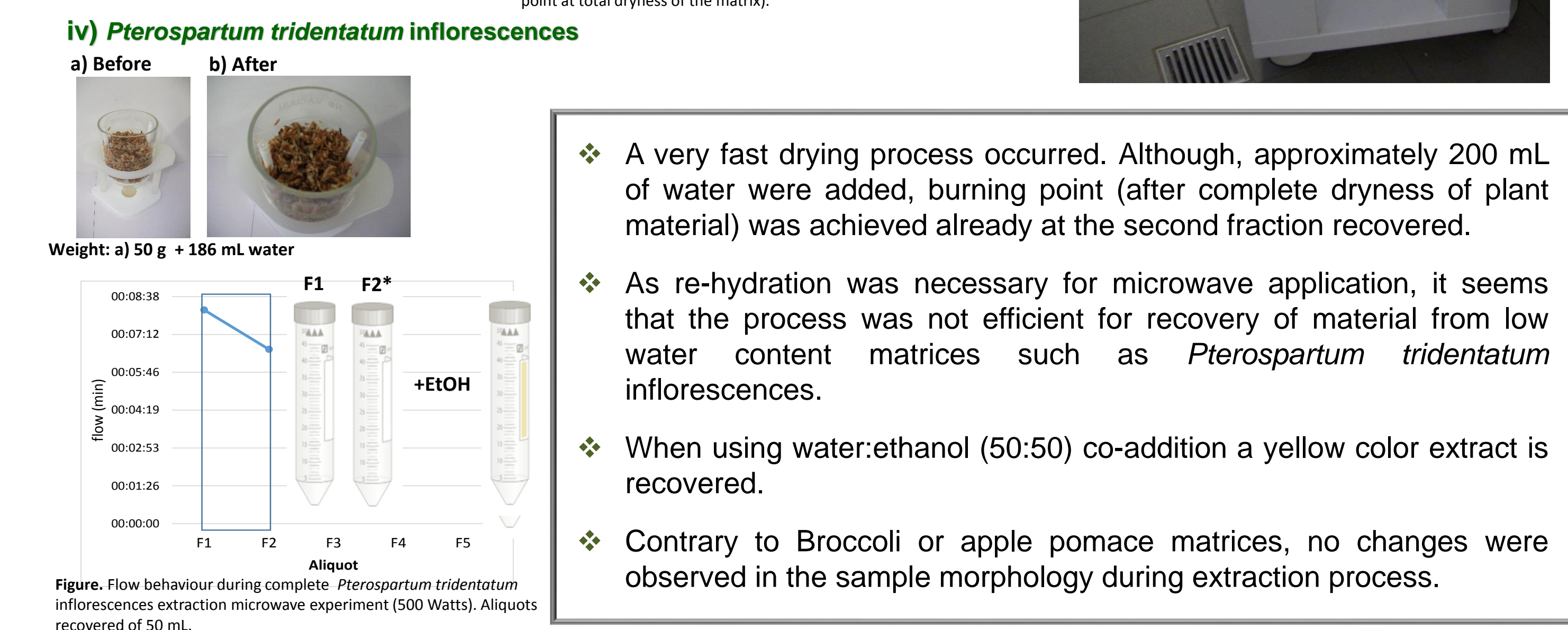
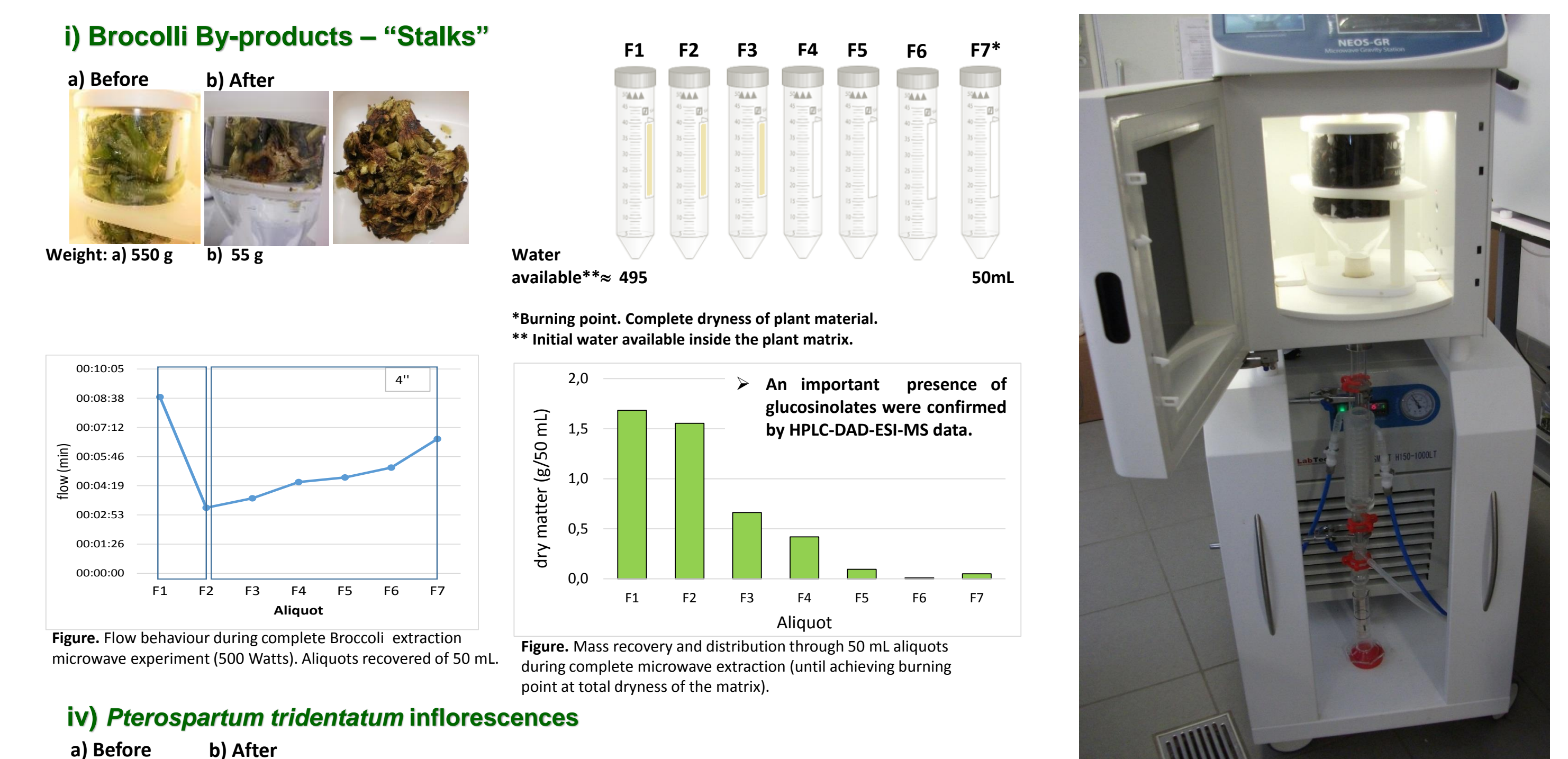
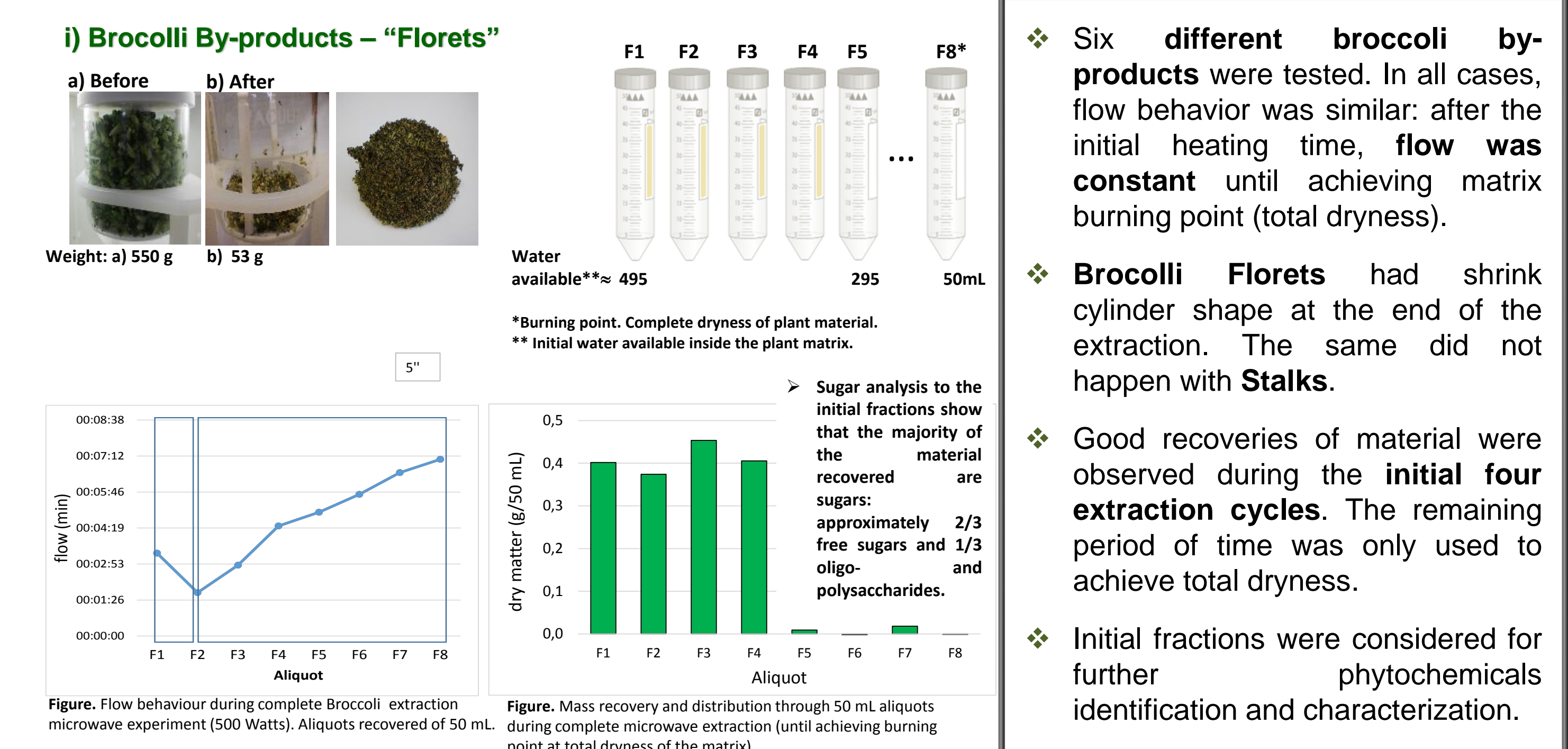
1. Introduction

Microwave technologies are more and more present in food applications due to their performance in shortening the time of treatments such as drying, pasteurization, defrosting, or post-harvesting [1]. While solvent-free microwave extraction has been extensively used as a green procedure for essential oil and volatile compounds from aromatic herbs [2], its applications have been extended to enhance extraction of phytochemicals simultaneously with drying. In microwave drying, operational cost is lower because energy is not consumed in heating the walls of the apparatus or the environment [3].

2. Objective

Evaluation of different plant material drying process using a microwave hydrodiffusion and gravity laboratory microwave oven (NEOS-GR, Milestone, Italy) while evaluating the possible co-extraction of non-volatile compounds such as: free sugars, fibers, colour and phenolic compounds.

4. Results



5. Conclusions

NEOS-GR, a microwave hydrodiffusion and gravity oven, has been presented as a potential equipment to completely dry matrices with high humidity (therefore highly perishable), while under the scope of green extraction technologies, also recovering hydrophilic (non-volatile) compounds from these wet matrices using its own water.

Good recoveries were observed when using high water content matrices, such as apple pomace and broccoli. However, when using re-hydrated matrices, such as brown algae, *Pterospartum tridentatum* inflorescences, and spent coffee grounds it was observed that the amount of material extracted is very low.

The initial low recoveries, when using re-hydrated matrices, can be overcome by the co-addition of ethanol, allowing to obtain fractions rich in phenolic compounds, as well as brown compounds and caffeine in the case of spent coffee grounds.

3. Material and Methods

I. Plant Material

i) Broccoli By-products (90% humidity):



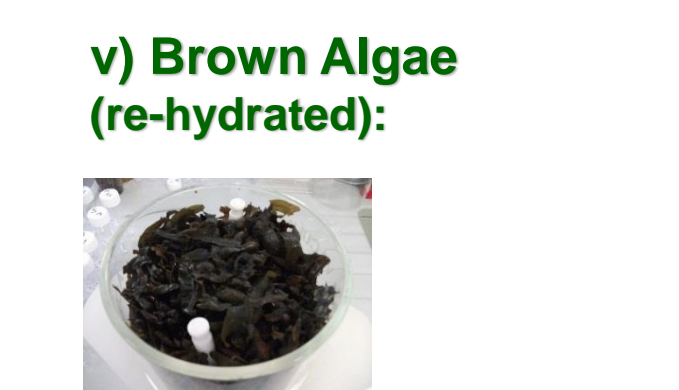
ii) Apple pomace (86% humidity):



iii) Spent Coffee Grounds (65% humidity):



iv) *Pterospartum tridentatum* inflorescences (re-hydrated):



v) Brown Algae (re-hydrated):



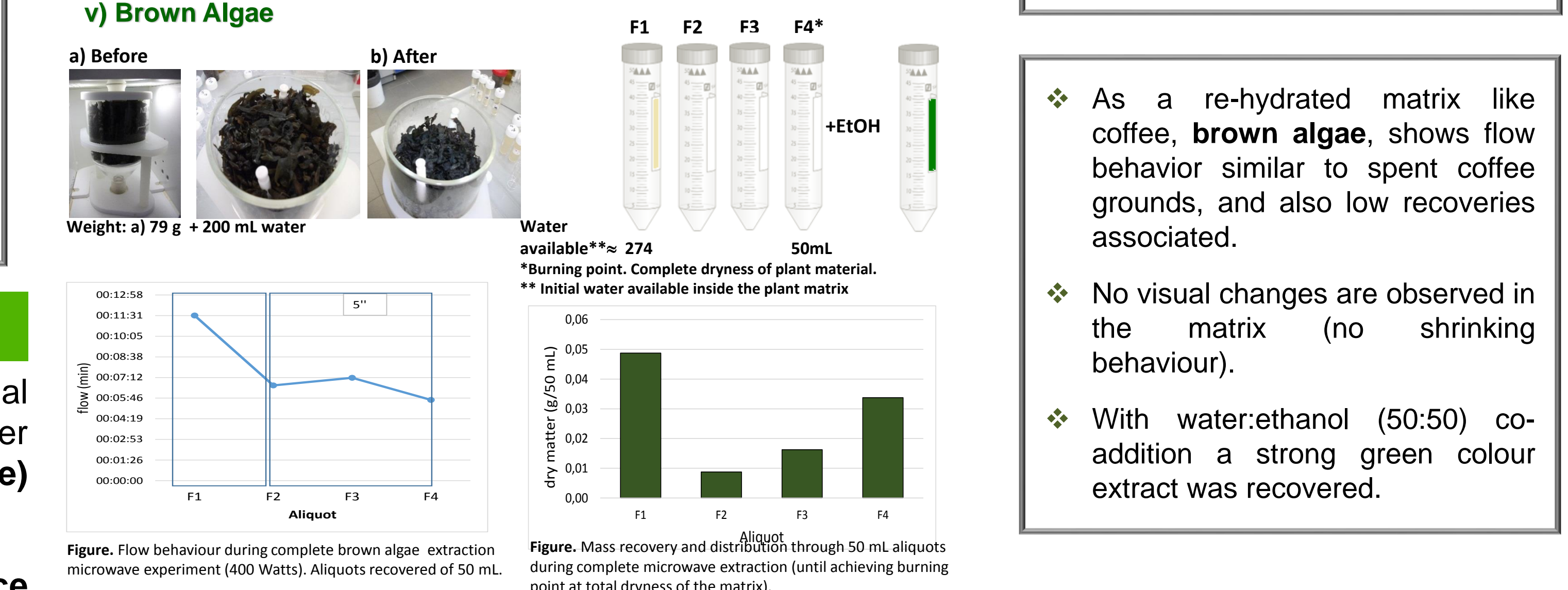
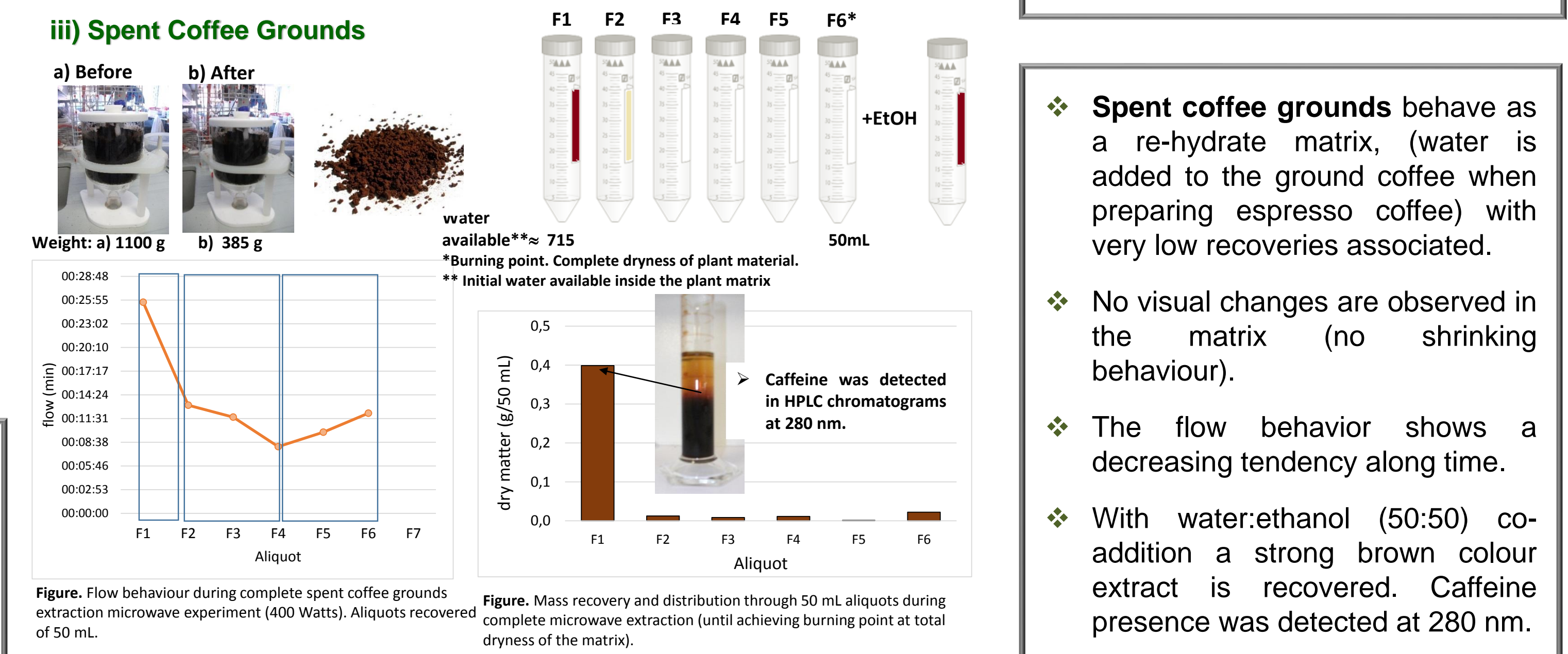
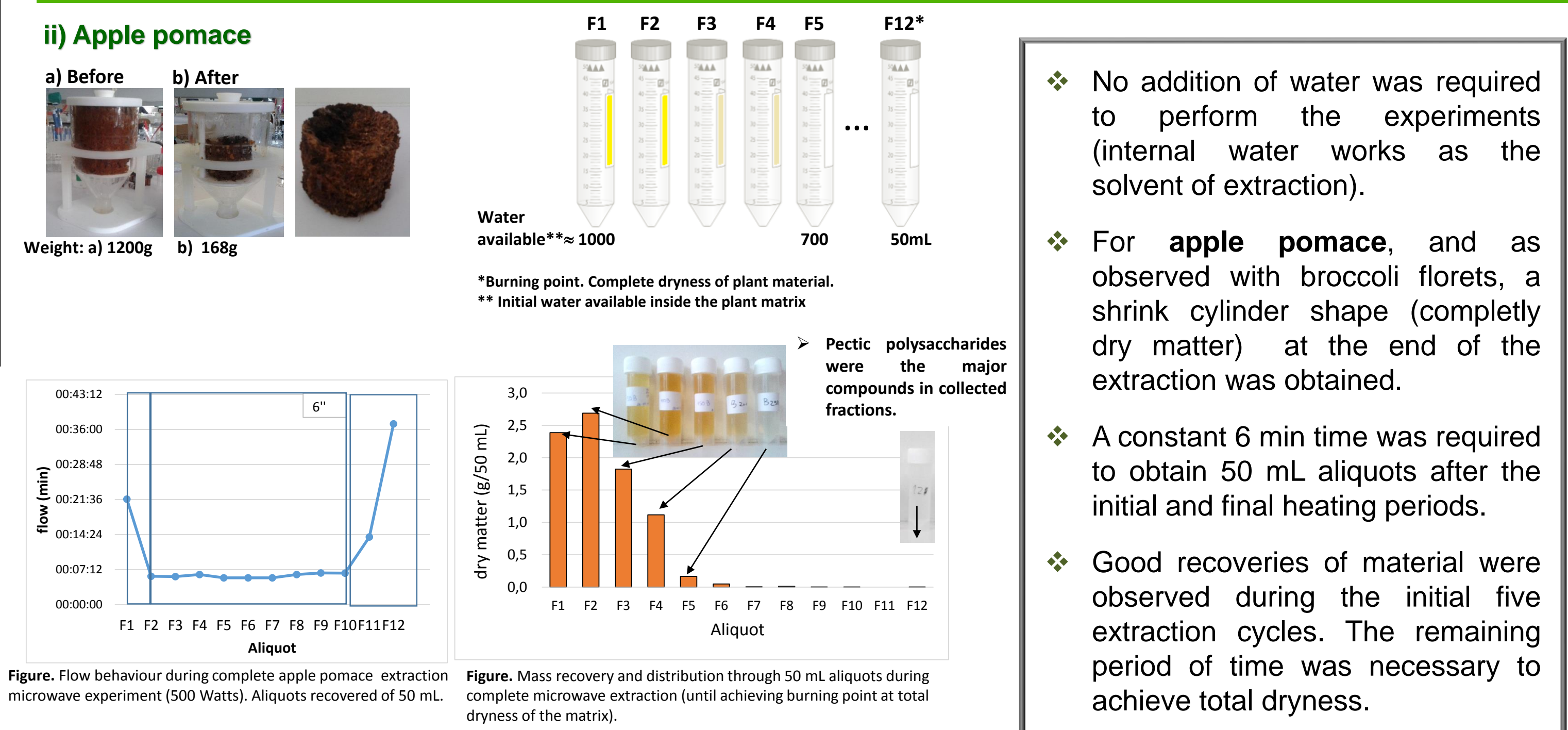
II. NEOS-GR experiments



III. Analyses

- Mass yield
- Absorbance
- Sugars
- Phenolics
- Caffeine

V = 50 mL



References

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