

Kombucha, the fermented-tea has attracted scientific attention because of its varied functional properties due to the presence of significant quantities of some functional polyphenols, organic acids and is a good source of water soluble vitamins. It is produced by the fermentation of tea and sugar by a symbiotic association of bacteria and yeast forming a tea fungus called as SCOBY (Symbiotic culture of Bacteria and Yeast). Traditionally, it is prepared by a non-sterile, home-scale, less controlled fermentation process in static conditions. Hence, the production process needs to be standardised to develop Kombucha as a health-drink and prevent any possible health hazards associated with the drink. This study aims to standardize the Kombucha production in the static conditions and explore the prospect of the fermentation process in agitated conditions.

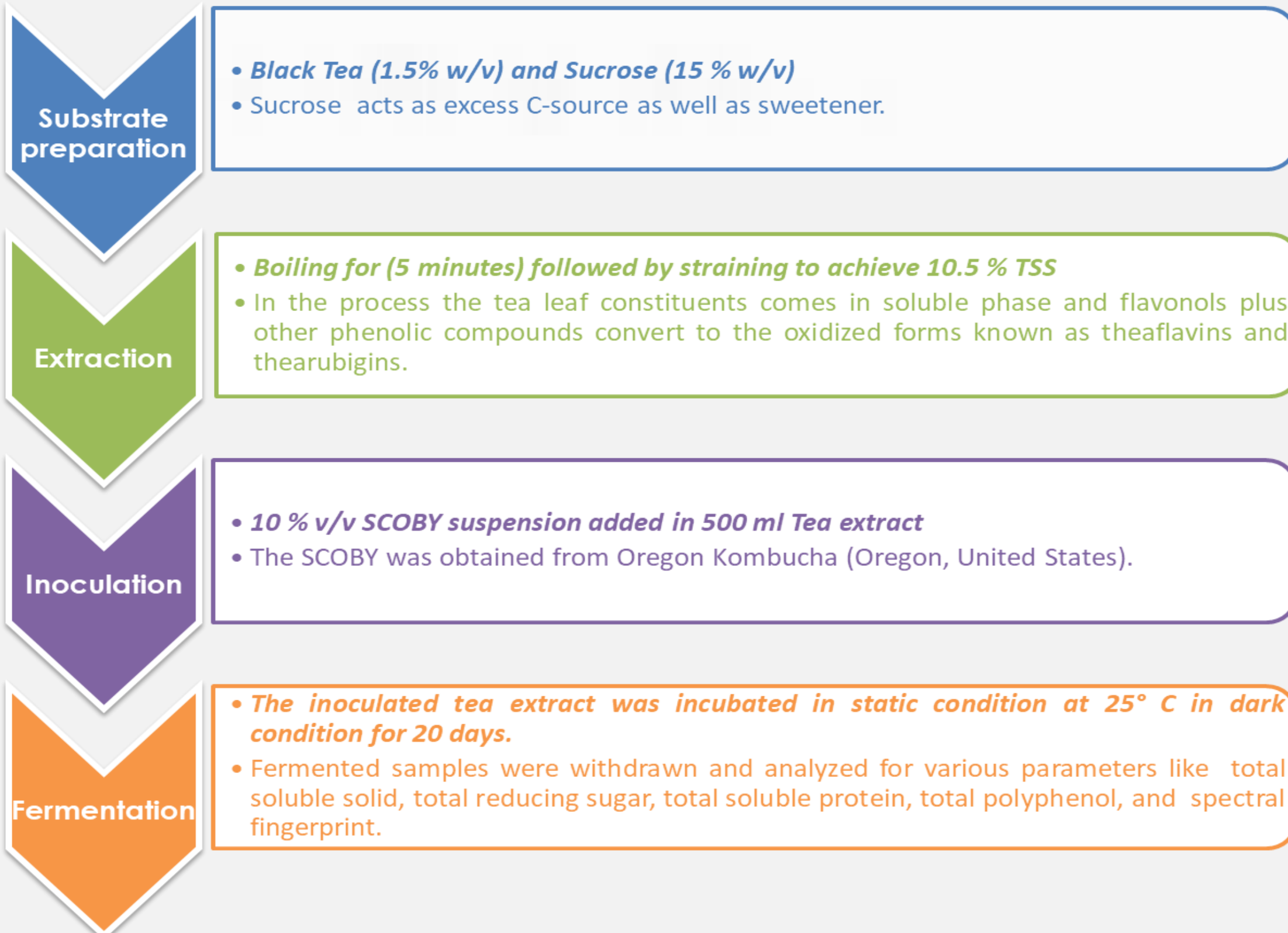
OBJECTIVES

- To understand and standardise the process of traditional Kombucha fermentation.
- To isolate the micro-organisms behind Kombucha fermentation.
- To study the effects of fermenting Kombucha in agitated condition and comparing it with the set standard.

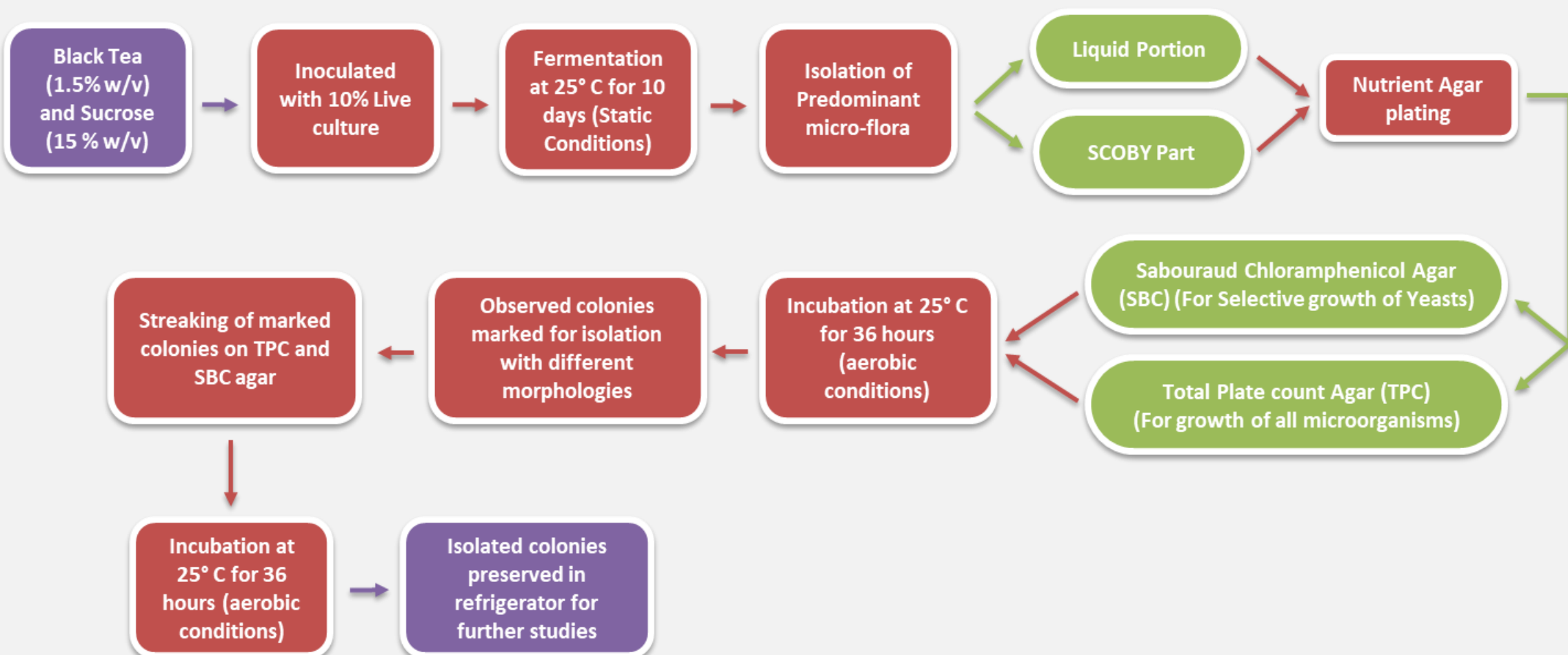


METHODOLOGY

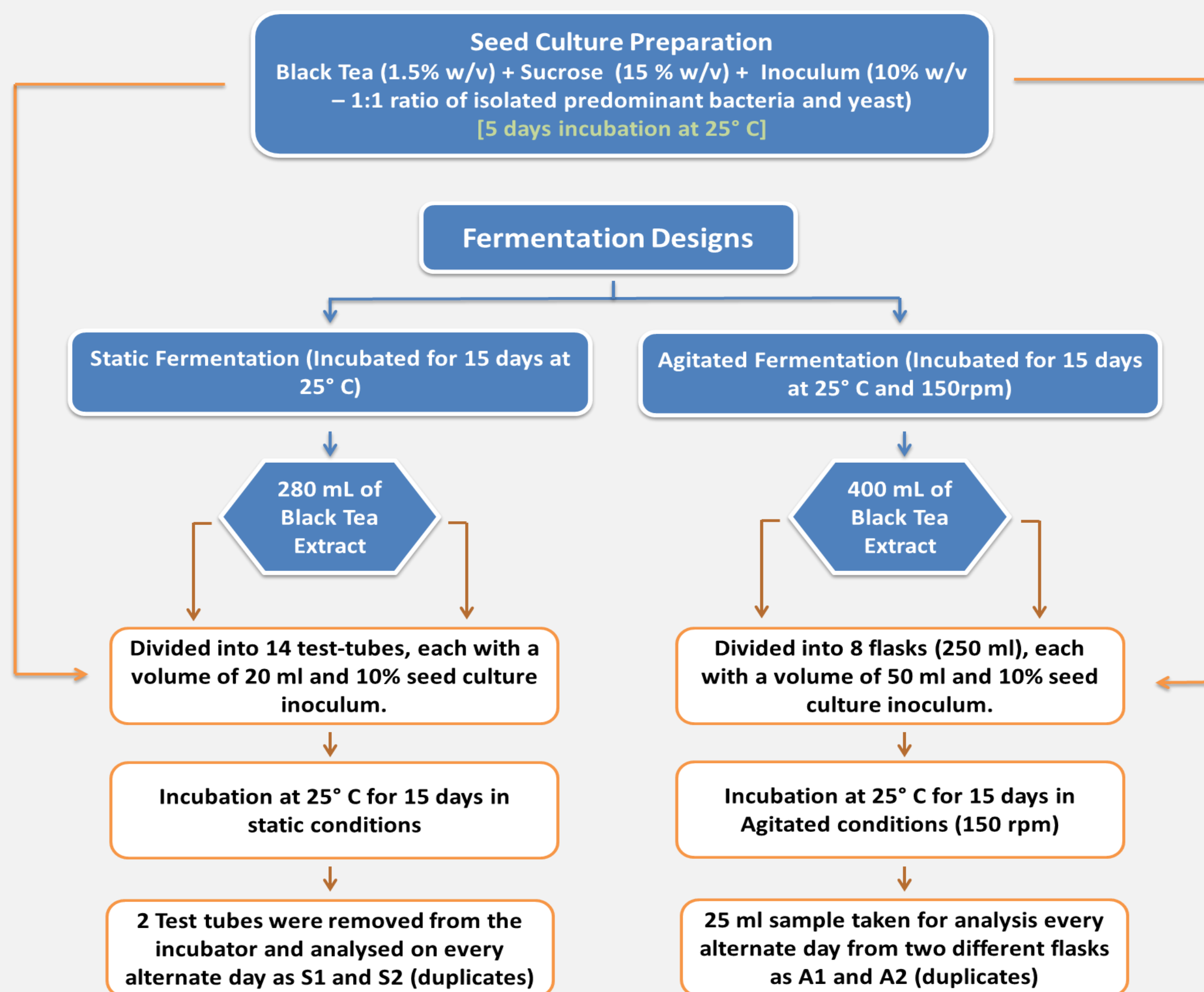
Process of Kombucha Fermentation



Isolation of predominant Microorganisms

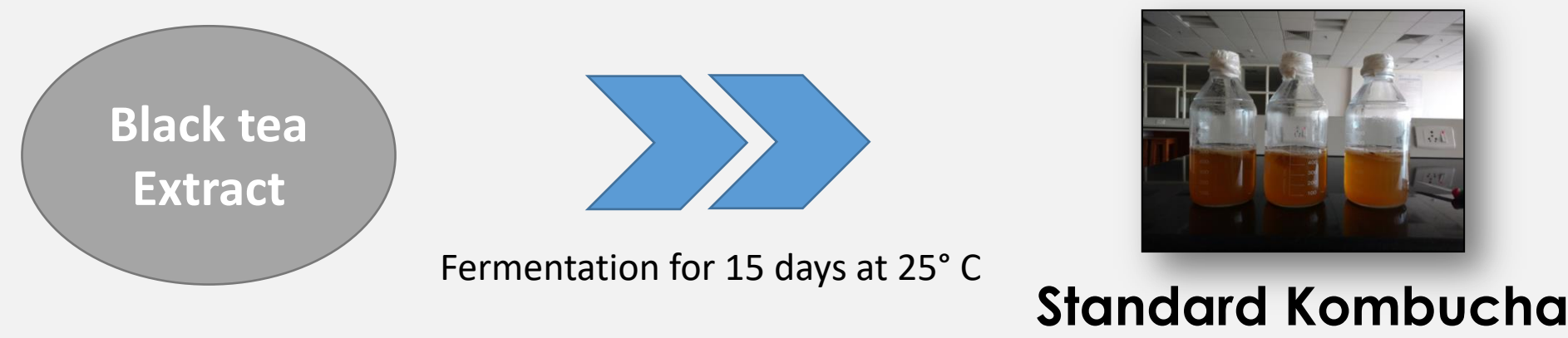


Static and Agitated fermentation designs



RESULTS

- Standard Kombucha was obtained after 20 days of fermentation at 25°C (Static conditions).
- On 15th day of fermentation, a thick layer of SCOBY was obtained.



- A total of 3 bacterial colonies and 2 yeast colonies were isolated in separate plates which showed similar results as that of the plates in which 10 days old SCOBY was kept.

Figure 1: Isolated species of predominant bacteria and yeast

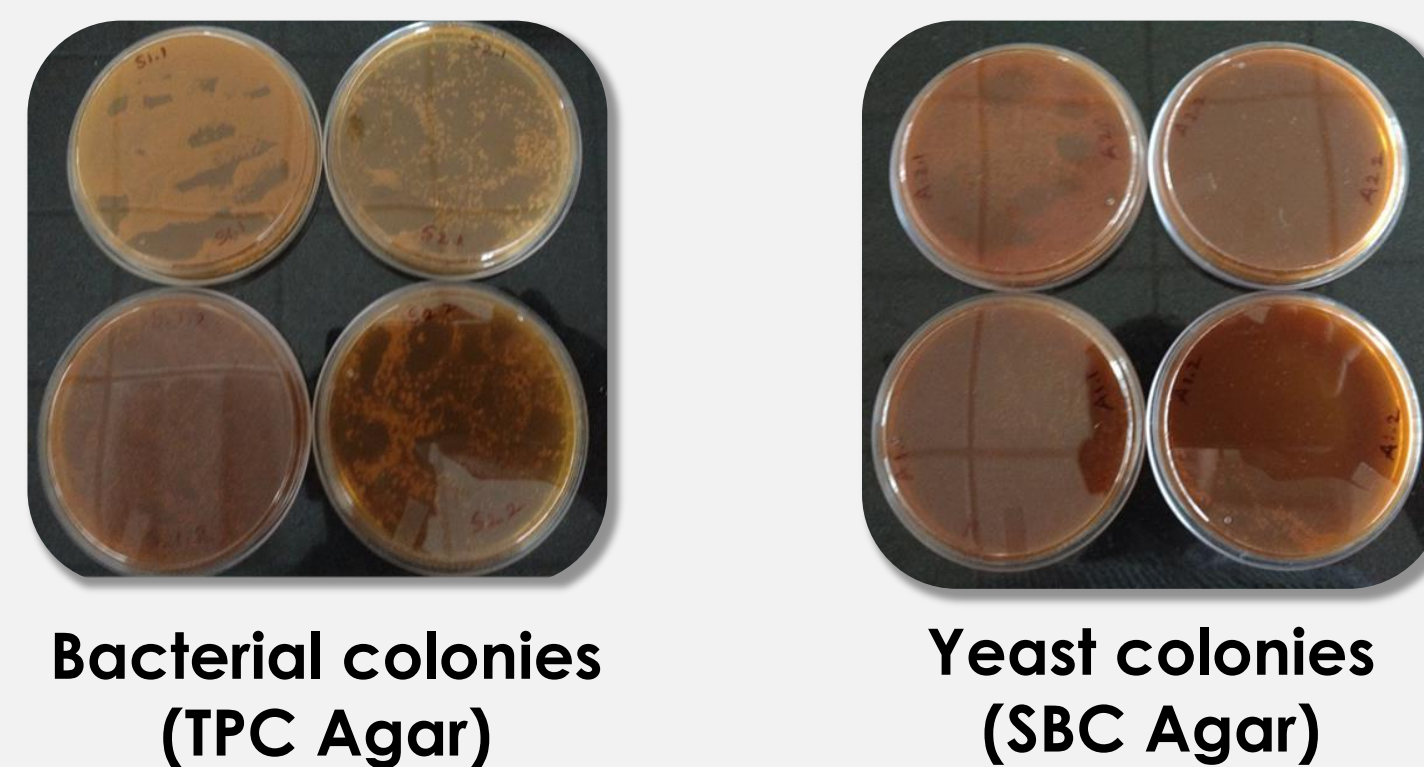


Figure 2: Kombucha fermentation (Comparison)

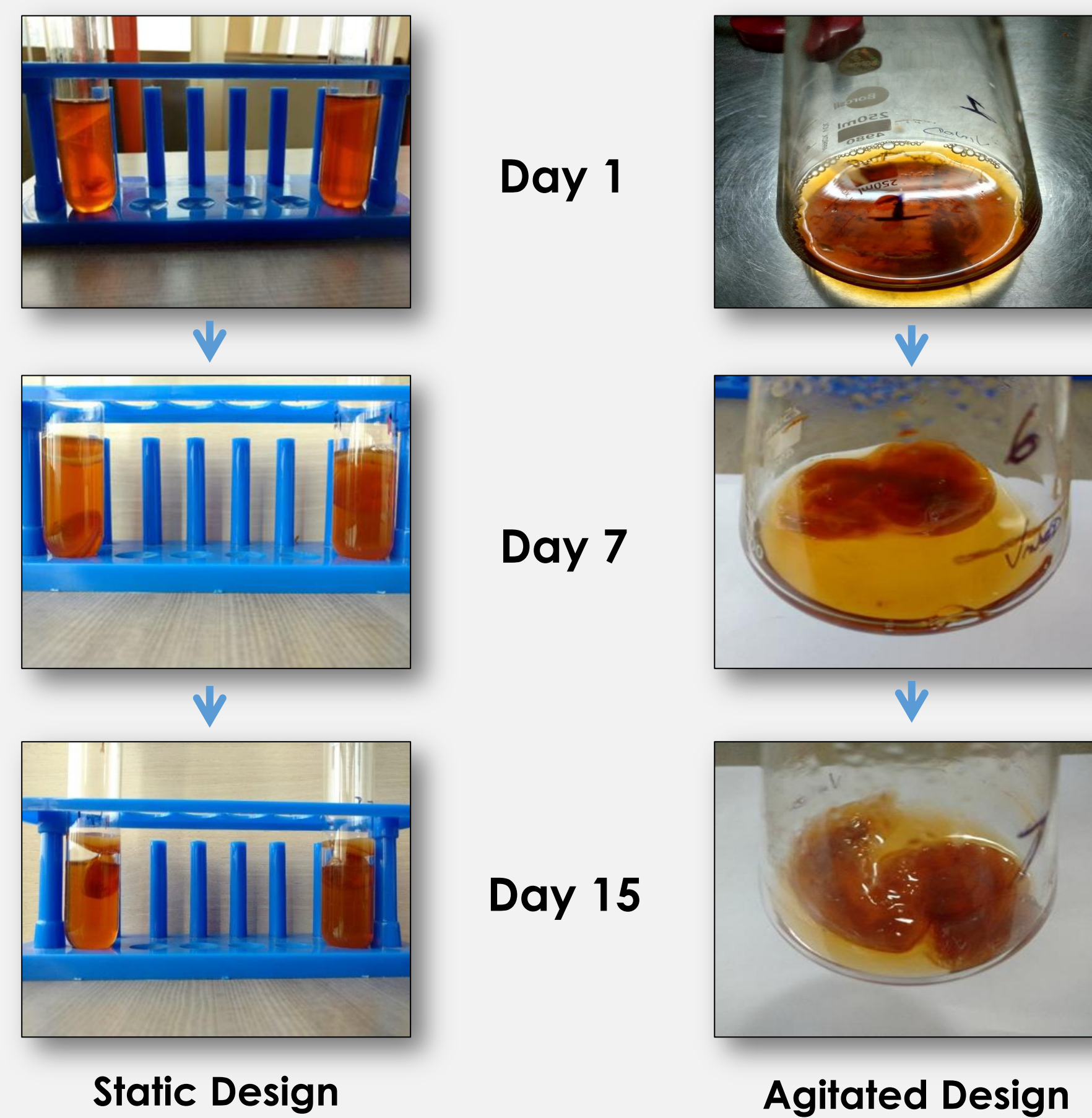


Figure 3: Variations in Total Soluble Solids (Day-wise)

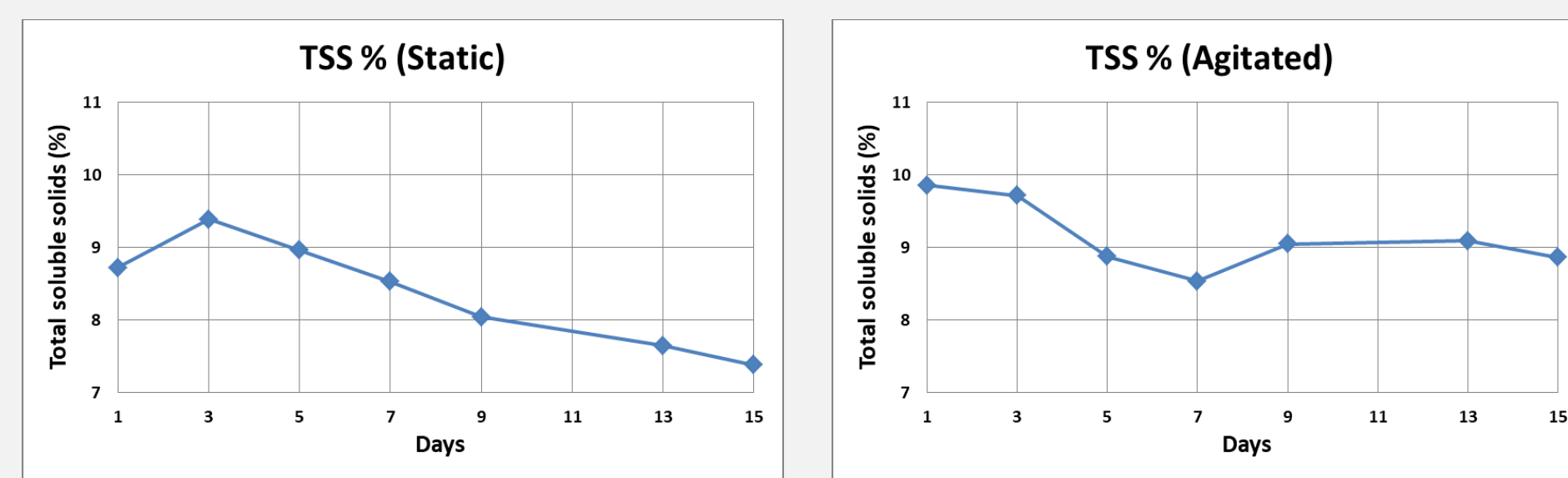


Figure 4: Variations in Sugar content (Day-wise)

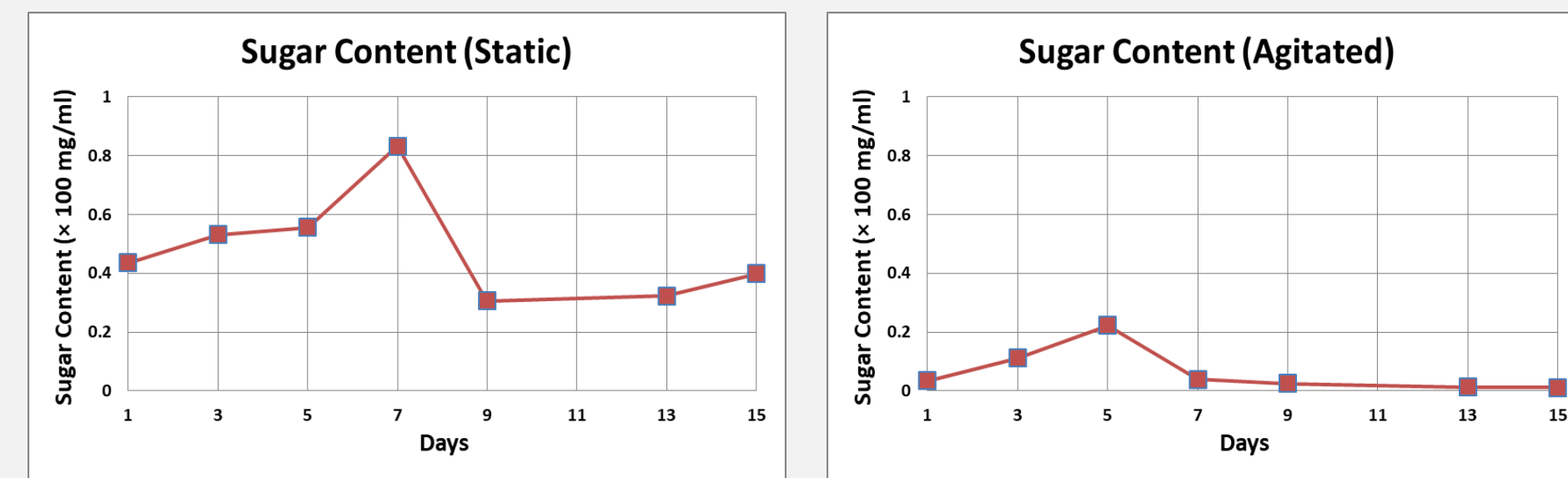


Figure 5: Variations in total phenolic content (Day-wise)

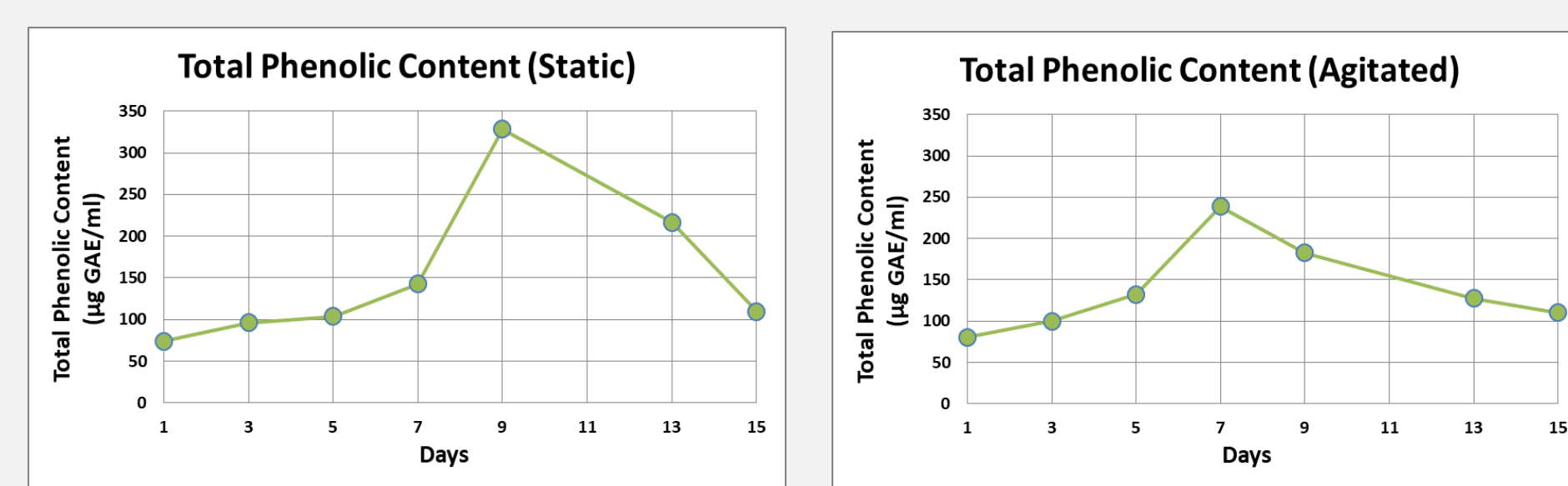


Figure 5: Variations in protein content – liquid part (Day-wise)

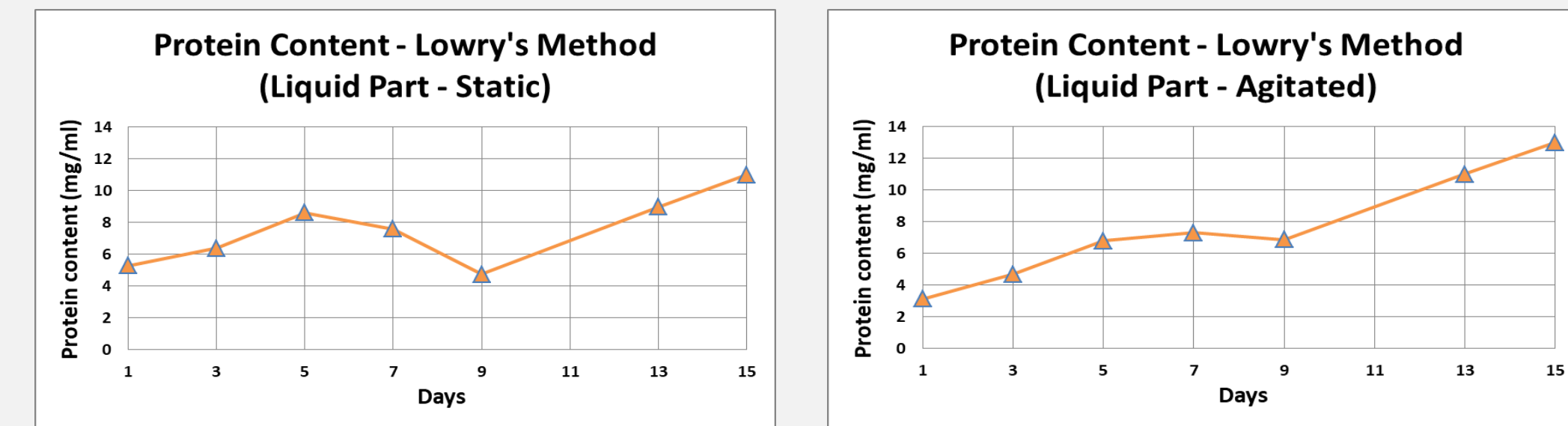


Figure 6: Fingerprint Spectra

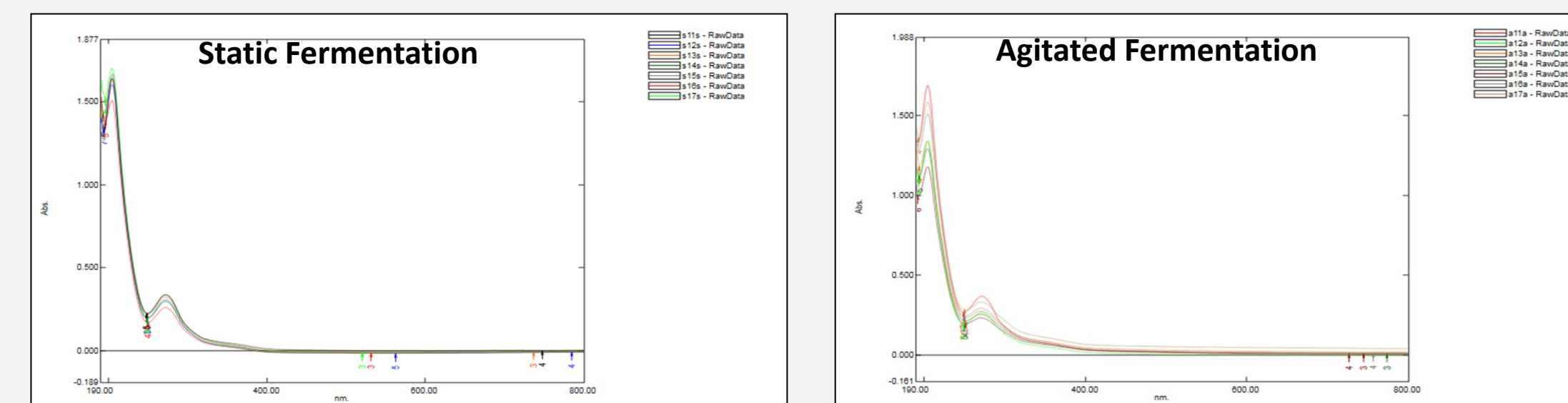


Figure 7: Proximate analysis (Standard Kombucha SCOBY)

Proximate analysis (SCOBY)	% (wet basis)
Moisture content	89.73
Protein content	2.08
Fat content	0.05
Ash content	1.18

Figure 8: SCOBY Dry weight variations (Day-wise)

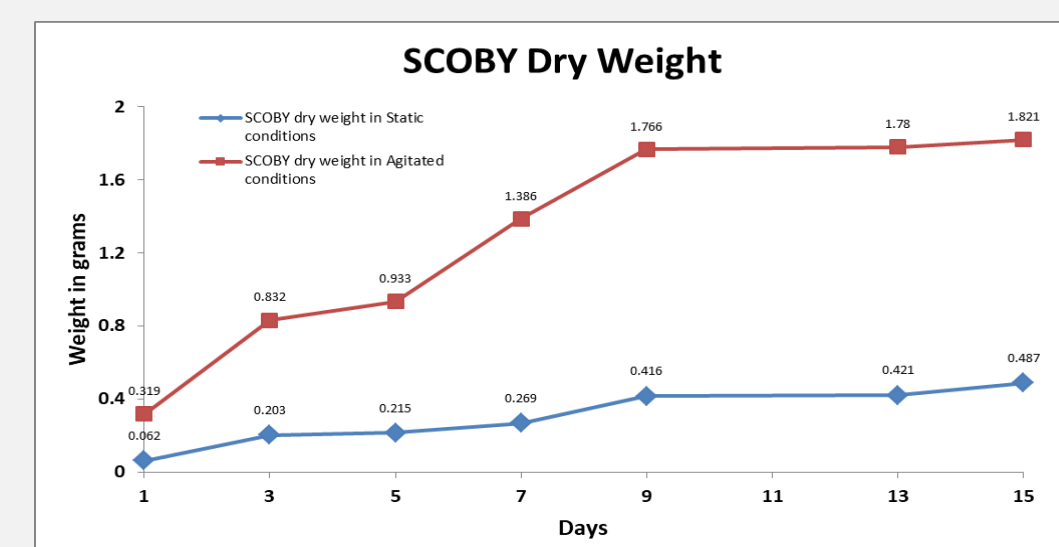
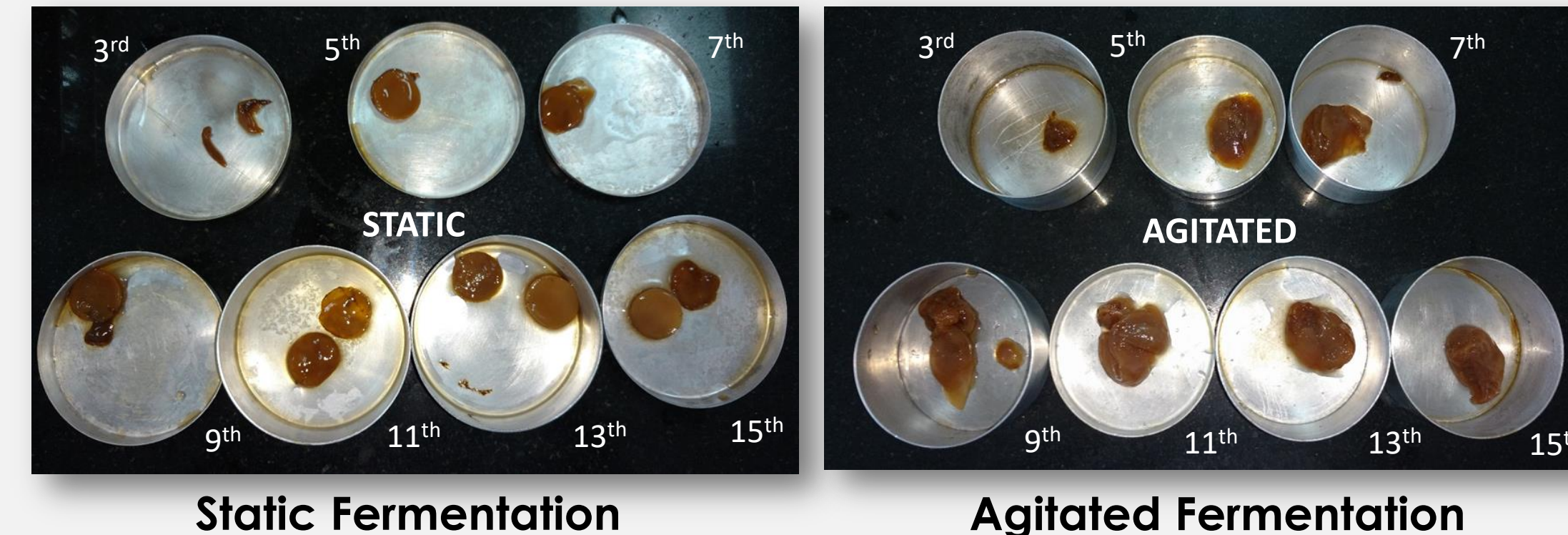


Figure 9: Kombucha SCOBY comparison



DISCUSSION

- In the standard Kombucha fermentation (non-aseptic), the desired sourness and aroma was obtained after 15th day of fermentation later a typical off flavour developed. So further studies were restricted to 15 days.
- This study was a proof of concept that Kombucha can be produced in agitated condition. From the comparison between static and agitated process, biomass growth (in terms of dry weight) achieved was more as expected and from preliminary analysis it was noted that the condition of the Kombucha broth was similar to the standard kombucha within 7 days in terms of taste and flavour. This is supported by higher reducing sugar metabolism and increased phenolic content in the agitated culture.
- Different growth rates of bacteria and yeast could be a reason for the difference of fingerprint (UV-visible) spectra and reducing sugar appearance (from sucrose hydrolysis) and disappearance (consumption by both the microorganism).
- However, optimization of the agitation condition is to be done to use agitated culture system for production of functionally active Kombucha.

CONCLUSIONS

- Time of fermentation for Kombucha can be reduced by a considerable amount using agitated culture system.
- The use of a combination of predominant bacteria plus yeast in 1:1 gave desirable results with respect to Kombucha production, but apart from that various other combination of the isolated micro-organisms could be further worked upon.
- The SCOBY formed in agitated system had very distinct morphological characteristics. Hence, it requires further investigation to evaluate its functional properties.

Acknowledgement:

Author acknowledges the support and all the necessary means provided by NIFTEM-MOFPI for the completion of this study.

CONTACT

ABHINAV JAIN, ALISHA KAR
NIFTEM - MOFPI
199625alisha@gmail.com
+91-8607728432; +91-8059727548
jainabhinav1997.000webhostapp.com

Future Plans

- Identification and characterisation of the isolated organisms.
- Characterisation of the SCOBY and the fermented broth obtained from static and agitated fermentation with controlled (Aseptic) fermentation.
- Optimisation of the Kombucha.