The SMALTIS'tory – episode #3

A foretaste of Xmas chocolates!

Once upon a time there was a fabulous story about the taste of chocolate that awakens when it meets taste buds. A story that would not happen without microorganisms. Let's go on this journey of cocoa beans fermentation, an essential step in obtaining chocolate...

After opening the fruit, the cocoa beans are confronted with microbial populations from the environment, which invade the surrounding pulp. The latter, with its acidity and high sugar content, naturally selects certain species. Yeasts, enterobacteria, lactic and acetic bacteria naturally colonize the environment.

A perfectly orchestrated mechanism then comes into action, in which each microorganism will play a key role.

At first, the yeasts develop alcohol and secondary aromatic metabolites from sugar. The pectinolytic acid also produced alters the pulp, allowing oxygen to penetrate the fermentation medium. Meanwhile, lactic acid bacteria proliferate, transforming citric acid into lactic acid. This increases the pH, making the environment more favourable to acetic bacteria.

At this stage, the heat generated and the penetration of alcohol and acids into the beans break down the cell walls, leading to the interaction of substances between them. The implementation of the future aromas and flavours then begins and will continue as the beans dry in the sun. After roasting, beans will reveal all the final flavour of the cocoa.

Although this overall fermentation process is maintained for all cocoa beans, the unique taste of each variety depends on the local microbial diversity. A study published in 2019 on the noble varieties of Nicaraguan beans revealed the impact of geographical location on the microbial population, and therefore on the final flavour of cocoa. For example, *Saccharomyces cerevisiae* and *Pichia kudriavzevii* yeasts have a prolonged activity, leading to the production of more aromatic compounds. Enterobacteria, especially *Tatumella* species, also seem to be involved in the refined taste of these noble cocoas.

Thus, the natural microbiological selection of cocoa beans plays a key role in the richness of chocolate aromas, for the pleasure of young and old alike...

See you soon for a next episode of the SMALTIS'tory.