Study of bioactivity and Chemical Composition of *Allium sativum* during the fermentation process

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Allium sativum L. is an annual herbaceous plant of the Amaryllidaceae family, originally discovered in Central Asia.
Since ancient times, garlic has been widely used as a spice and seasoning in cooking, but also as a traditional remedy for various diseases; its antimicrobial, neuroprotective, hepatoprotective and anti-inflammatory activities are well known [1,2].
The consumption of garlic in Europe and America is uncommon due to its pungent smell and taste, which is not very welcome. To overcome this problem, it is common practice, especially in Asia, to ferment garlic in high humidity and temperature for several days. Fermented garlic, made by heat-treating *Allium sativum* L. under controlled conditions, results in sweet-tasting cloves without a pungent odor often considered a functional food in Asia. Its production emphasizes minimizing strong taste and odor while preserving its benefits. The fermentation process modifies the chemical composition of matrix due to non-enzymatic and enzymatic browning reactions. In this context, this work aimed to evaluate the differences in the metabolic profile and bioactivities of garlic following the fermentation process. In particular, Aglio di Voghiera DOP, an Italian garlic variety widely used in the culinary industry, was selected for the studyVoghiera DOP garlic was fermented over 30 days, with samples collected at various stages of the process. The samples obtained were extracted using an ultrasound-assisted 50% hydroalcoholic solution and then fractionated in water/ butanol. All extracts were subjected to qualitative analysis using high-resolution mass spectrometry and evaluated through spectrophotometric assays to determine their antioxidant capacity (ORAC and ABTS) and hypoglycemic activity (α-amylase and α-glucosidase inhibition). Finally, the metabolomic profile of fresh garlic and different days of fermentation, together with the respective bioactivities observed, were compared by multivariate analysis (PCA and PLS) to identify the molecules responsible for the bioactivity.

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