

Investigating the role of probiotic lactic acid bacteria strains in improving the antioxidant properties of fermented white cabbage.

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INTRODUCTION & AIM

Administration of probiotic cultures would increase the functional attributes of plant-based matrices and consequently the competitiveness of production. Hence, the current study investigated the antioxidant properties of sauerkraut utilising natural fermentation or the commercial probiotic strains, *Lactiplantibacillus plantarum* 01 (LP01) and *Lacticaseibacillus rhamnosus* 04 (LR04) (Probiotical SpA, Novara, Italy), as single starter cultures.

METHOD

Lactic acid bacteria (LAB) production:

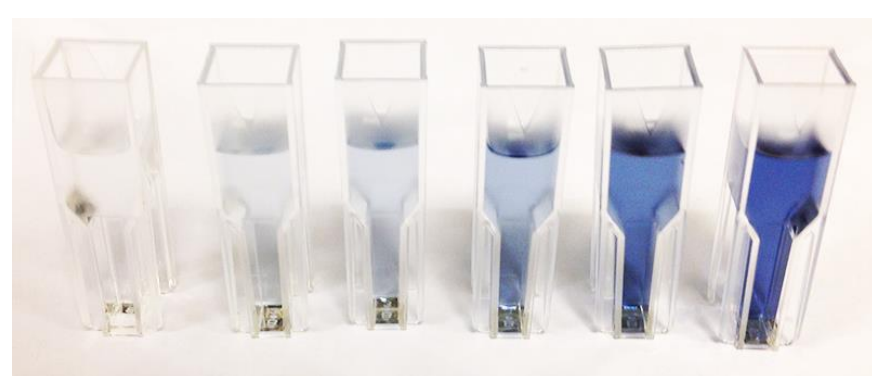


Fermentation trial:

White cabbages were shredded, mixed with sea salt (2.0% w/v), and packed into glass jars. The experimental samples were inoculated with spray-dried LP01 or LR04 (1×10^6 cfu/g of sauerkraut) and compared to a non-inoculated control group. Sauerkraut was fermented under anaerobic conditions at 20°C.



The Folin–Ciocalteu method was used for the determination of total phenolic content (TPC) (Singleton & Rossi, 1965) at 0, 21, and 28 days. The *in vitro* antioxidant capacity was assessed using ferric reducing antioxidant power (FRAP assay) and free radical scavenging activity (ABTS and DPPH assays) (Benzie & Strain, 1996; Brand-Williams et al., 1995; Re et al., 1999).



RESULTS & DISCUSSION

The highest TPC (202.38 mg GAE/100 g DW), FRAP (205.3 mg GAE/100 g DW), and DPPH (57.5 mg GAE/100 g DW) values were observed in LP01 samples at day 21, but the amount declined for LP01 and LR04 groups at the final fermentation stage ($p \leq 0.05$). Regarding the ABTS assay, control values at day 21 were similar to those obtained with LP01 and LR04 treatments ($p \geq 0.05$). However, at day 28, ABTS scavenging activity was higher for naturally fermented cabbages (542.4 mg GAE/100 g DW) ($p \leq 0.05$) (Figures 1 and 2).

Figure 1. Total polyphenol content (TPC) in sauerkraut during spontaneous and controlled fermentation. Values are means ($\pm$ SD) of three repetitions.

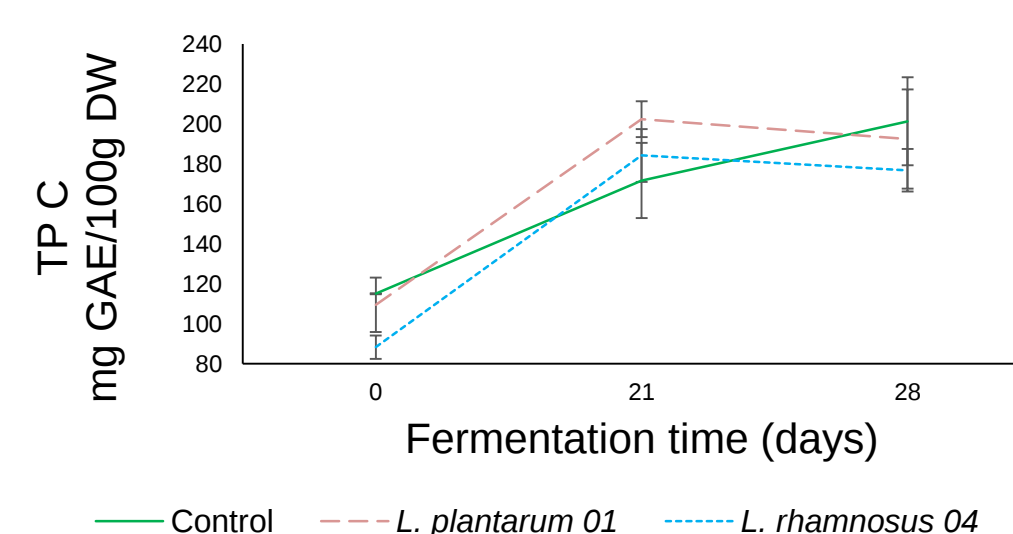
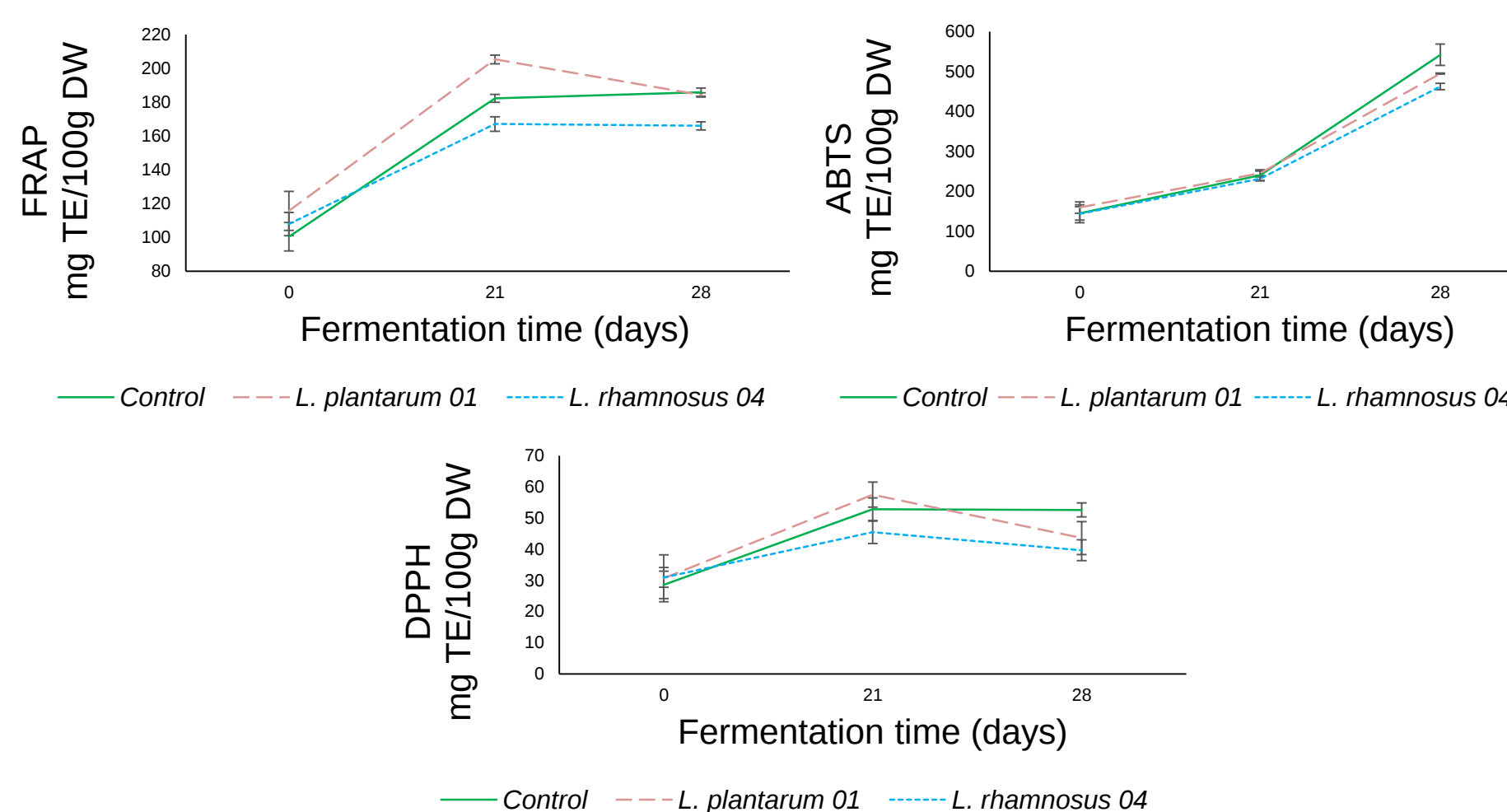


Figure 2. Antioxidant capacity (FRAP, ABTS and DPPH assays) in sauerkraut during spontaneous and controlled fermentation. Values are means ($\pm$ SD) of three repetitions.



CONCLUSION

Cabbage fermentation with LP01 for 21 days presents an opportunity to create a probiotic-rich sauerkraut that increases TPC and antioxidant capacity estimated by FRAP and DPPH methods.

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