PRELIMINARY IN-VITRO REPORT

Preliminary In-Vitro Evaluation of Microplastic Adsorption by SEQUIVA Probiotic Product Strains

Evaluation of polyethylene (PE), polypropylene (PP), and polyethylene terephthalate (PET) fluorescent microparticles.

Product context	SEQUIVA probiotic product
Study type	In-vitro fluorescent microparticle adsorption assay
Scientific term	Adsorption

Introduction

Global annual plastic production has surpassed 400 million metric tons, with polyethylene (PE) and polypropylene (PP) collectively accounting for a substantial proportion of total output. PE, PP, polyamide (PA), and polyethylene terephthalate (PET) are among the most prevalent microplastics identified in environmental matrices.

Evidence of human exposure to microplastics has accumulated in recent years. Published studies cited in the source report describe detection of plastic particles in human blood and lung tissue, including PET, PE, PP, and other polymer types. Additional experimental literature has reported inflammatory responses associated with selected microplastics in cellular and animal models.

In this context, the SEQUIVA study employed fluorescent microparticles to evaluate whether selected probiotic strains associated with the SEQUIVA probiotic product possess the capacity to adsorb PP, PE, and PET particles under controlled in-vitro conditions.

Objective

The objective of this preliminary SEQUIVA report was to evaluate the in-vitro adsorption capacity of selected SEQUIVA probiotic product strains toward three common microplastic polymers: PE, PP, and PET.

Materials and Methods

A 30 microliter aliquot of bacterial culture at an optical density of 600 nm (OD600) = 1.2 was transferred into a 2 mL centrifuge tube containing 270 microliters of PE, PET, or PP fluorescent microparticle working solution (0.16 mg/mL; particle size, 0.1 micrometer). The tubes were incubated in the dark on a shaking incubator at 37 degrees C and 130 rpm for 4 hours.

Following incubation, the mixtures were centrifuged at 2000 rpm for 10 minutes. A 200 microliter aliquot of the supernatant was transferred into a 96-well black microplate, and fluorescence intensity was measured using a Thermo Fisher Scientific multimode microplate reader at an excitation wavelength of 485 nm and emission wavelength of 525 nm.

The adsorption ratio (AR) was calculated as: AR (%) = (A1 - A2) / A1 x 100%, where A1 represents the fluorescence intensity of the supernatant from the phosphate-buffered saline (PBS) control group and A2 represents the fluorescence intensity of the supernatant from the respective test strain group.

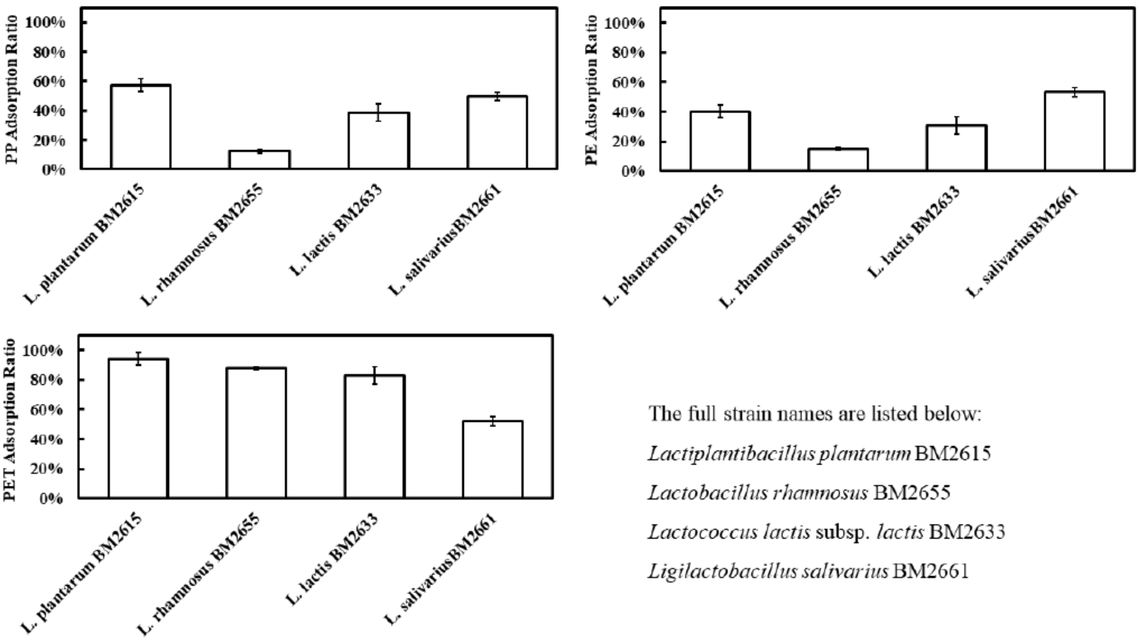
Results

The adsorption capacities of four selected SEQUIVA probiotic/lactic acid bacterial strains toward PP, PE, and PET were evaluated using the fluorescent microparticle adsorption assay. The results showed that adsorption ratios differed among bacterial strains and polymer types. All four strains exhibited higher adsorption efficiency for PET compared with PP and PE.

Polymer	Highest strain	Adsorption ratio	Result summary
PET	*L. plantarum BM2615*	**Approx. 93.9%**	Highest observed adsorption ratio in the SEQUIVA assay.
PP	*L. plantarum BM2615*	**Approx. 57.2%**	Highest PP adsorption among the tested strains.
PE	*L. salivarius BM2661*	**Approx. 53.3%**	Highest PE adsorption among the tested strains.

Taken together, L. plantarum BM2615 demonstrated superior adsorption capacity toward PET and PP, whereas L. salivarius BM2661 demonstrated relatively higher selective adsorption toward PE. L. rhamnosus BM2655 showed the lowest adsorption ratios for both PE and PP in the reported results.

Figure 1. Adsorption ratios of selected SEQUIVA probiotic product strains toward PP, PE, and PET fluorescent microparticles.



Product-Relevant Interpretation

These findings provide preliminary in-vitro evidence that selected strains associated with the SEQUIVA probiotic product can adsorb common microplastic particles under the tested assay conditions. The data are most appropriately described as strain- and polymer-specific adsorption results.

The scientifically supported terminology is adsorption, not absorption. The assay measures the reduction in fluorescent particles remaining in the supernatant after incubation and centrifugation; it does not establish plastic degradation or human microplastic removal.

Conclusion

This preliminary SEQUIVA report demonstrates measurable in-vitro adsorption of PE, PP, and PET fluorescent microparticles by selected SEQUIVA probiotic product strains. The strongest adsorption was observed for PET by L. plantarum BM2615 at approximately 93.9%, with additional polymer-specific activity observed for PP and PE.

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