

(088)**Assessment of Microplastic Fibre Release from Common Synthetic Fabrics During the Washing Process Using Domestic Washing Machines in Sri Lanka****Amanda Wijayawardhana^{1,2}, Manura Weerasinghe², Meththika Vithanage^{2,3,4,5},
Chaamila Pathirana^{1*}**¹*Department of Forestry and Environmental Science, Faculty of Applied Sciences,
University of Sri Jayewardenepura, Nugegoda, Sri Lanka*²*Ecosphere Resilience Research Centre, Faculty of Applied Sciences,
University of Sri Jayewardenepura, Nugegoda, Sri Lanka*³*Department of Geochemistry, Geological Survey of Denmark and Greenland,
Copenhagen, Denmark*⁴*Sustainability Cluster, School of Engineering, University of Petroleum & Energy Studies,
Dehradun, Uttarakhand, India*⁵*Institute of Agriculture, University of Western Australia, Perth, Australia*
chaamila@sjp.ac.lk*Abstract**

Microplastic fibre (MPF) pollution from synthetic textiles is a growing environmental concern, particularly in regions such as Sri Lanka, where coastal ecosystems are ecologically sensitive and economically important. Limited research has been conducted on the release of MPF from domestic washing in Sri Lanka, making it difficult to assess potential local impacts. Therefore, this study aimed to assess the release of MPFs from two synthetic fabrics as 100% polyester and 100% nylon 6, under different washing parameters using fully automatic top-loading washing machines. Three standard programmes, strong, gentle, and speedy, differing in washing duration and agitation intensity, were tested with 4 replicates per treatment, resulting in 24 washing trials. MPFs were collected from the effluent and the lint filter bag, followed by vacuum filtration and analysis using digital microscopy and Fourier Transform Infrared Spectroscopy (FTIR). Polyester released a higher number of MPFs, with $133,989 \pm 24,521$ particles/kg fabric, compared to nylon, which released only $32,173 \pm 10,490$ particles/kg fabric. FTIR spectra showed no major structural changes before and after washing, indicating chemical stability of the polymers, while microscopy revealed surface abrasion across all washing programmes, suggesting mechanical stress during washing. Although nylon released fewer fibres overall, a larger percentage passed through the lint filter into the effluent compared to polyester, due to the lower length-to-width ratio of nylon fibres facilitated their passage through the lint bag. Washing duration influenced total fibre release, with the strong programme of 45 minutes releasing $99,609 \pm 63,572$ particles/kg fabric, the gentle programme of 28 minutes releasing $87,035 \pm 56,013$ particles/kg fabric, and the speedy programme of 23 minutes releasing $62,599 \pm 44,890$ particles/kg fabric. However, the gentle cycle resulted in the highest percentage of fibres entering the effluent, $81.77\% \pm 6.31$, likely due to reduced water flow through the lint filter during its agitation pattern. Future studies should assess fibre blends, aged fabrics, repeated wash cycles, and the use of different sieves and filter pore sizes to better guide policies and practices that reduce MPF pollution.

Keywords: *Microplastic fibre, Polyester, Nylon, Domestic washing, Aquatic pollution*