Novel Ficus retusa L. aerial root fiber: a sustainable alternative for synthetic fibres in polymer composites reinforcement	
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Abstract: Awareness about the global sustainability among consumers had turned industries in producing eco-friendly, lightweight, and affordable materials. In line up, natural fibre–reinforced composites (NFRC) have experienced tremendous expansion in recent years. The researchers were working in finding a novel natural fibre with an enhanced properties which compete the synthetic fibers in its application. This investigation focused to characterize the novel aerial root of Ficus retusa L. (FRL) fiber, including analyses of their physical properties, chemical composition, thermal stability, crystalline properties, surface properties, mechanical properties, and morphology. Physical study has shown the FRL's aerial root fiber dimensions to be 495 µm in diameter and 1376 kg/m3 in density. Its higher cellulose percentage (64.12%) and small wax percentage (0.33%) gave superior specific strength and improved bonding characteristics. Nuclear magnetic resonance (NMR) spectroscopy examination and FTIR was also conducted out to support the chemical groups existing in this fibre. The X-ray diffraction (XRD) examination of FRL's aerial root fiber shows a higher crystallinity index (CI) value 55.96% and lower crystallite size (CS) of 4.13 nm. The average strain to failure of the raw fiber was 7.5–11.4%, the Young's modulus was 3.33–5.81 GPa, and the tensile strength was 331.22–465.45 MPa for the fiber gauge length 10 to 50 mm. The angle value of the microfibrils in the aerial root fiber of FRL is 7.2°. TG and DTG thermal study confirmed the fiber's maximum degradation temperature (527 °C) and thermal stability (342 °C). Surface roughness measurements made with a SEM and an AFM both pointed to the least amount of roughness in FRL's aerial root fiber. The foregoing results established that novel FRL's aerial root fiber was an excellent reinforcement for making fibre reinforced composites.