



Experimental Study on Physical and Mechanical Properties of Date Palm Fronds Polymer Composites

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Abstract :Date Palm tree consists of trunk, frond, leaves and fruit bunch which have the variety of applications in the general engineering. Fronds of this tree have great potentiality for art, sport and domestic applications. In this research work, fronds of the date palms have been studied for its possibility of use in engineering application by studying physical and mechanical properties. Date palm frond mid rib was collected from five different regions of Sultanate of Oman from the seasonal pruning process. Samples were drawn as wood strips from the mid ribs as per the ASTM standards for testing mechanical properties such as tensile, bending and impact strength. Out of the five regions of the samples tested Nizwa region showed more strength of 28.61MPa whereas as Muscat region has the least strength of 13.16MPa. Fibers from Muscat region exhibited more flexural strength and the Nizwa based fibers are the least. Flexural strength of Muscatbased sample showed the higher value of 56.51MPa and Nizwa origin has the least value of 14.63MPa. Charpy impact strength of Al-Ameerat region exhibited highest impact strength of 5.8 J/mm and Ibra origin has the lowest of 3.2 J/mm. Composites prepared using polyester resin revealed that tensile strength of Nizwa was 20.14 MPa which was 57% higher than pure matrix strength. The lowest value of 11.81Mpa was seen in Ibra origin. The highest value of flexural strength of 46.56MPa was recorded in Nizwa region and the lowest of 20.66 MPa was from Ibra region. The highest impact strength of 11.76 J/mm was recorded in Al Suwaiq origin. All other samples showed a marginal value compared to pure matrix impact strength. Composites have recorded with the increase in the values compared to raw date palm fiber. Therefore, a study of frond mid ribs and their composites has great potential as the engineering material for various applications.

Keywords :Date Palm frond, Fibers, Polymer Composites, Physical and Mechanical Properties