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Mechanical properties of vegetal yarn: statistical approach

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Abstract

In recent years, many researchers have studied the exploitation of vegetable fibres as reinforcement in composite materials. The biodegradable nature of natural fibres makes them friendly to the environment which can lead to the preservation of nature and human wellbeing. With low cost and good performance, vegetable fibres are generating an economic interest for various industries. The objective of this work is the determination of the mechanical properties of the vegetable sisal yarns, with a twist angle equal to 13° and a linear density of 232 tex, subjected to tensile quasi-static loading. A test program consisting of 150 samples is performed. Due to the variability of natural yarns, more than 30 samples were tested for each gauge length (GL). Five different GLs are used: 50, 100, 150, 200 and 300 mm. The acquired results are then analysed by the statistical two and three parameter Weibull distribution for different probability index and estimation by Least Square (LS) and Maximum Likelihood Estimation (ML). Finally, all five groups for each tensile property are analysed by one-way (ANOVA).

Keywords:

A. Natural fibre, B. Mechanical properties, B. Strength, C. Statistical properties/methods.

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