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SOME OBSERVATIONS ON BREAKING EXTENSION PERCENTAGE AND TENACITY OF WHITE JUTE (CORCHORUS CAPSULARIS)

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White jute fibre has a very low breaking extension percentage which varies from 0.5% to 1.4%. The average value is around 0.9%.

For fibres with comparatively high values of breaking extension percentage (1% and above) it was observed that greater the value of breaking extension percentage of a fibre the greater is its breaking tenacity.

However, no definite relationship between breaking tenacity and the corresponding breaking extension percentage was observed for the fibres breaking at less than 1% extension.

The experiment was carried out with strain gauge testing machine 'Instron'. The rate of straining employed was 5% (of the test length) per minute. The test length used was 10 cm and the atmosphere for testing was $65 \pm 2\%$ R.H. at $74 \pm 2^\circ\text{F}$.

In obtaining a relationship between breaking extension percentage (for fibres having breaking extension 1% and above) and the corresponding breaking tenacity, correlation coefficient was calculated which yielded the value 0.41. This value was considered to be significant because in the present investigation the degree of freedom was 104 and the minimum value required for significance at 5% confidence level is 0.195.¹ The regression of the breaking tenacity on the breaking extension percentage is indicated by the full line in the scatter diagram.

Equation of the line was found to be $\hat{Y} = 7.03 + 26.45X$,

Where, X = Breaking extension percentage, and \hat{Y} = Prediction value of breaking tenacity.

The standard error of estimate for the regression line was found to be 6.55 g-wt/tex.

The above relationship may be usefully employed although to a limited extent (in our investigation the fibre specimens with breaking extension equal to and exceeding 1% was about 33% of the total) to obtain a fair estimate of the breaking tenacity from observation on breaking extension percentage Fig. 1. If the experimental technique used is adequate to prevent slippage of the fibre through the grips while being stretched, breaking extension percentage can be more readily

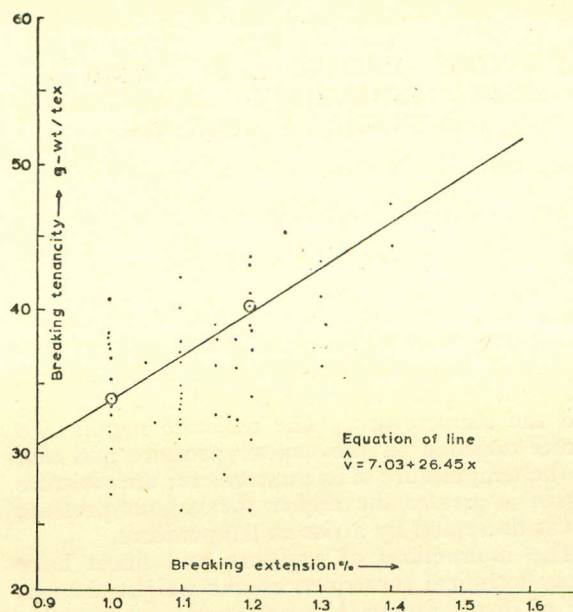


Fig. 1—Scatter diagram with regression line showing relationship between breaking tenacity and breaking extension percentage.

determined compared to determination of breaking tenacity which requires accurate weighing with a microbalance and somewhat rigid maintenance of specified relative humidity in the laboratory (to prevent variation of weight of the test specimens).

Mechanical properties of jute fibre depend, often to a considerable extent, on the region (zone) of the jute strand, that is bottom, middle or top part of the strand from which the fibres are taken. Because of these difficulties, definite relationships between various mechanical properties are difficult to obtain unless the fibres are taken from a definite region of the strand.

In obtaining the above relationship however test specimens were not limited to any such particular region. Out of about three hundred fibres taken at random without any restriction whatsoever regarding the region of the strand 106 fibres were found to have breaking extension percentage of 1% and above. The fibres also represented almost all the different qualities and varieties of white jute grown in Pakistan.

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Reference

1. Herbert Arkin Raymond R. Cotton, Tables for Statisticians, Barnes & Noble Inc. New York (Second Edition), pp. 155 as reproduced from George W. Snedecor. Statistical Methods (Ames, Iowa: Iowa State College press, 1946), pp. 351.