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Separation of Natural Fibres for Textiles and Composites

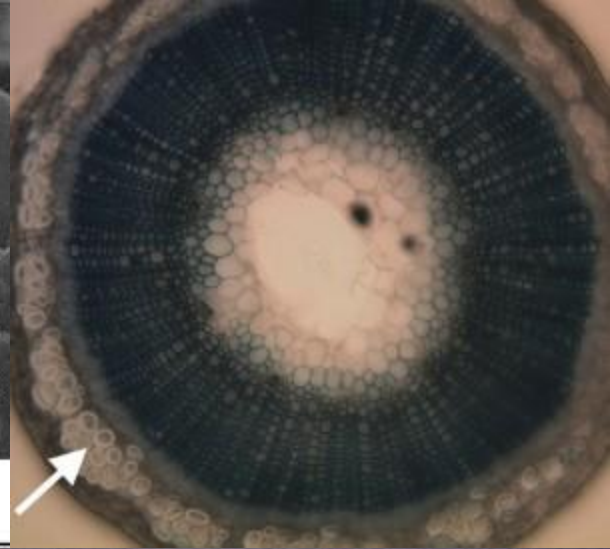
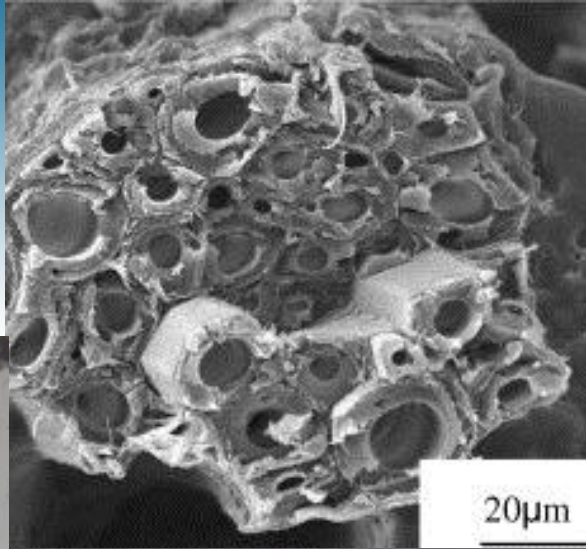
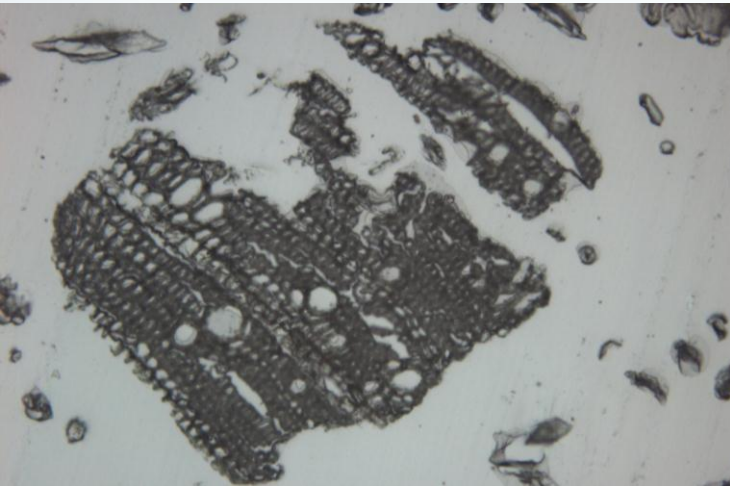
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Bast Fibre



Bast Fibres

Advantages

- Specialty fibre with good moisture adsorption, strength, durability and microbial attack resistance
- High production rates per land area
- Low or no pesticide use during growth
- Renewable resource

Disadvantages

- Fibre separation involves contamination of water system
- Inefficient fibre separation and production processes
- Legislation may restrict the growth of hemp



Hemp (*Cannabis Sativa* L.)

Fibre properties

Fineness: 18 μ m (14-35 μ m)

Length: 35mm (20 to 80mm)



Crop Details

Climate: Cool to hot

Growth period: Annual

Yields: 2.5-3.5ton/ha dry mass

Fibre yield: 25 to 35% original
straw weight

Separation techniques

Field retting

Limited to certain climates and limits use of land while retting occurs

Water retting

Provides high volumes of polluted, smelly water and takes two to three weeks to occur

Chemical retting

Energy, chemical and water intensive and provides moderate volumes of effluent

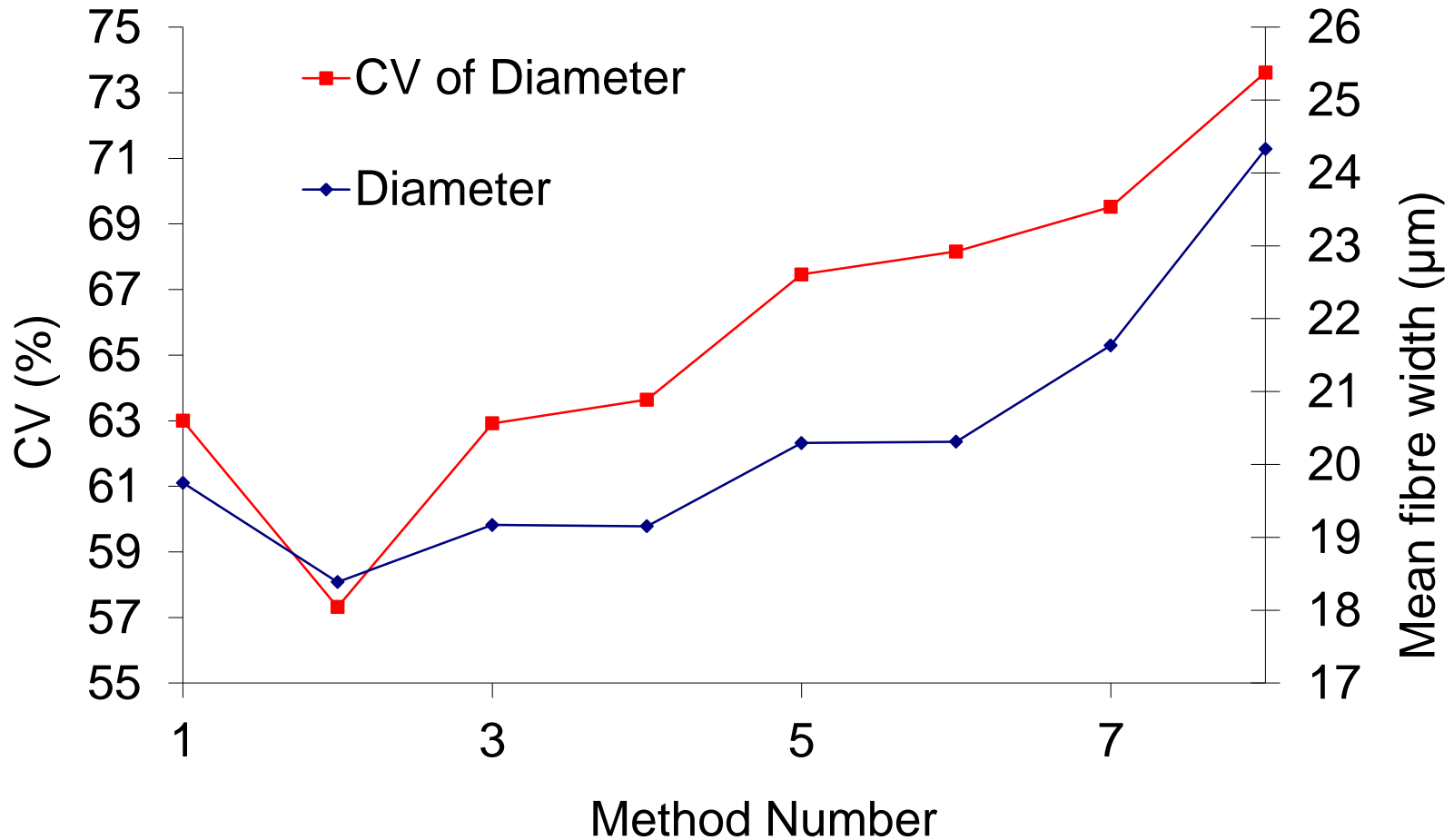
Ultrasonic retting

Requires high liquor ratios to allow ultrasonic penetration

Biological retting

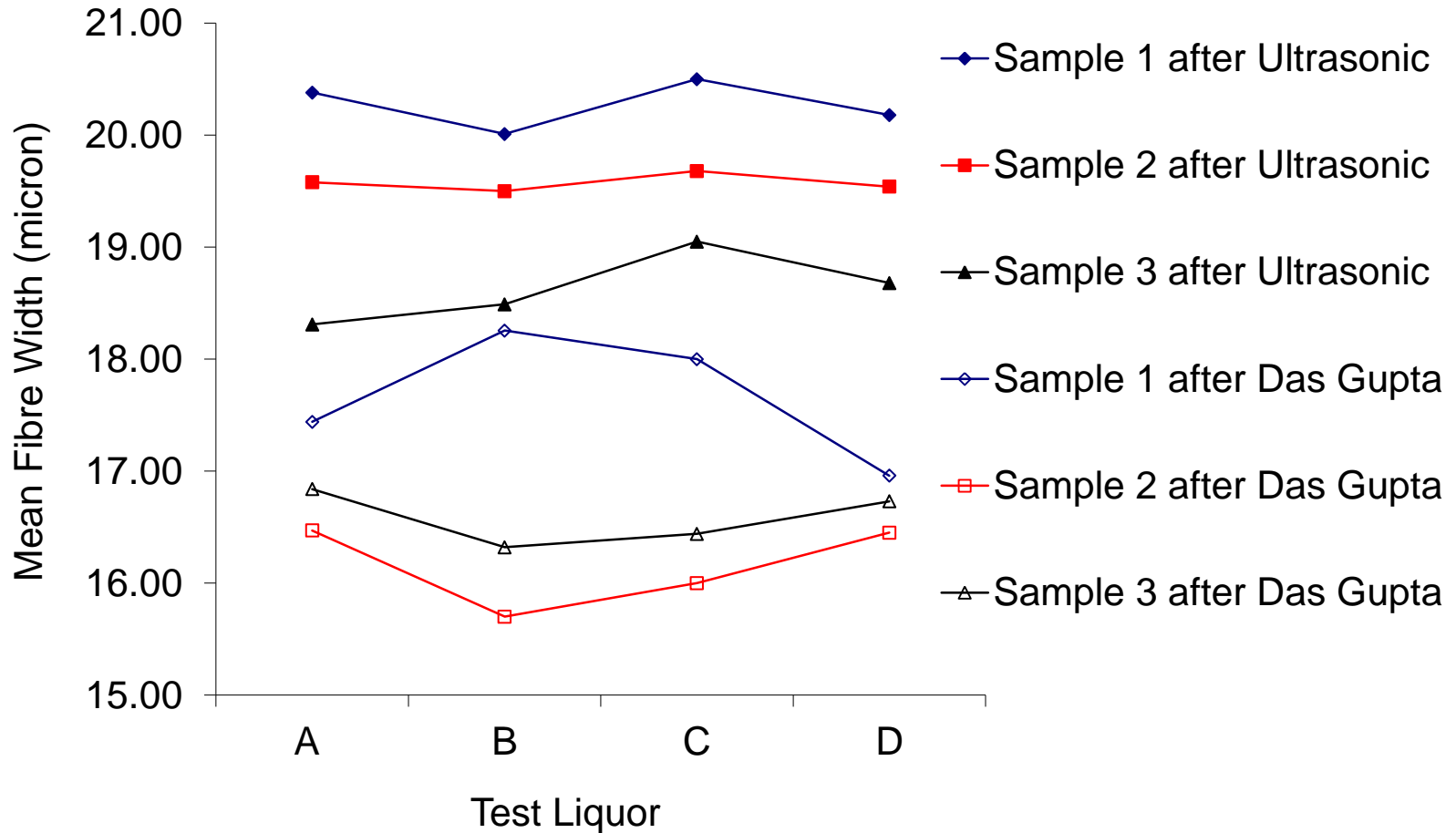
Enzyme is hard to acquire in large volumes

Bast fibre retting systems



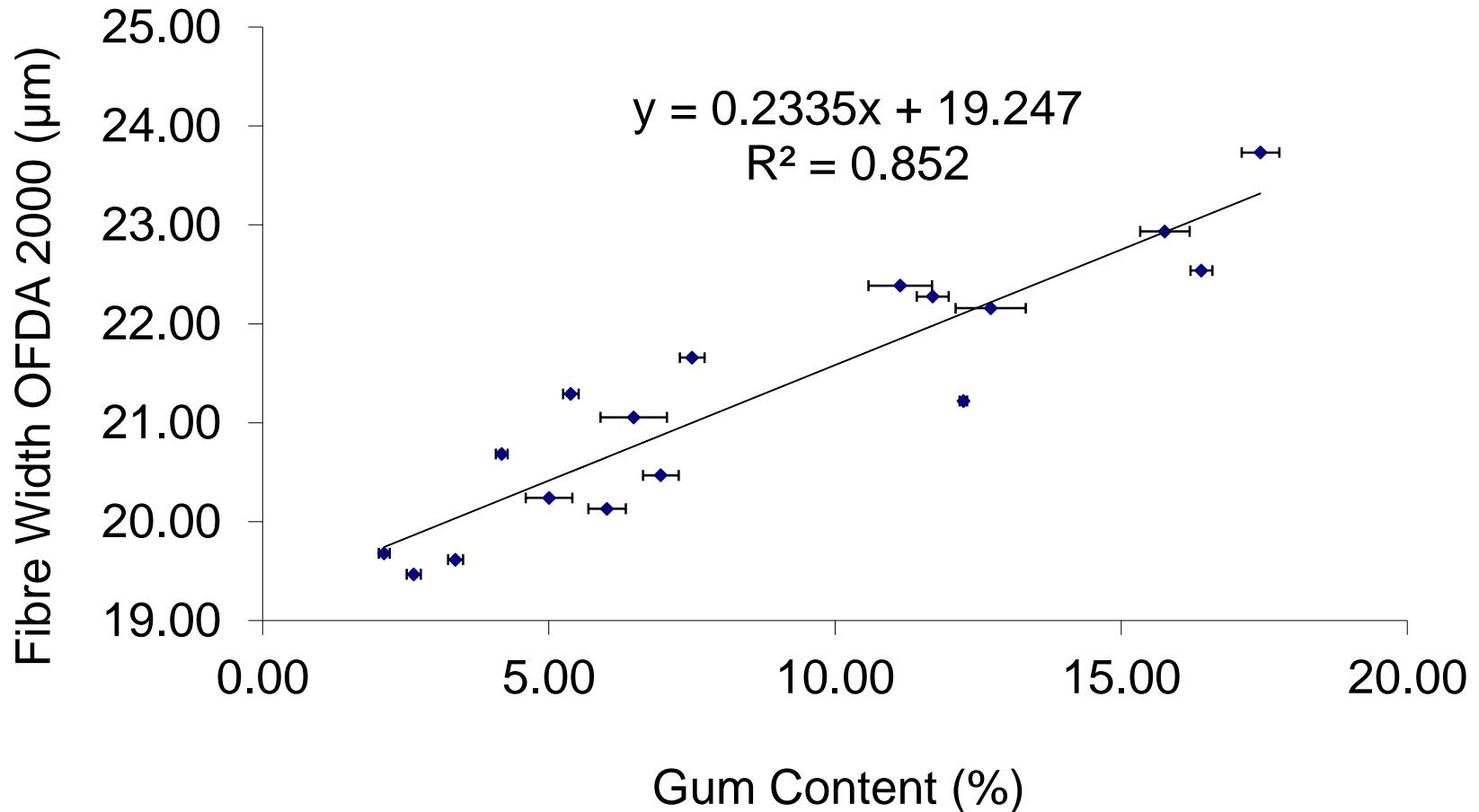
Hurren C, Wang X, Denis H, Clark A, Evaluation of Bast Fibre Retting Systems on Hemp. Proceedings of the 82nd Textile Institute World Conference, Cairo (2002).

Fibre ultimate fineness



Hurren C, Lecomte S, Wang X, Determining Residual Gum Content of Bast Fibres. Proceedings of the 83rd Textile Institute World Conference, Shanghai (2004).

Quality analysis



Beltran R, Hurren C, Kaynak A, Wang X, Correlating The Fineness And Residual Gum Content Of Degummed Hemp Fibres. *Fibres and Polymers*, vol 3, No 4, 129-133 (2002)

Other Publications in this area

- Kafi, A., Hurren, C. and Fox, B. (2008) Influence of Helium Atmospheric Plasma Treatment on Surface and Fracture-mechanical Behaviour of Quickstep™ Cured Bio-composites, *Proceedings of the 4th International Conference on Advanced Engineered Wood & Hybrid Composites*, p. 1, The University of Maine, USA
- Kafi, A. A., Hurren, C. J. and Fox, B. (2008) Influence of helium atmospheric plasma treatment on surface and fracture-mechanical behaviour of quickstep cured bio-composites, *AEWC 2008 : Proceedings of the 4th International Conference on Advanced Engineered Wood and Hybrid Composites 2008*, AEWG, Bar Harbor, Me.
- Hurren C, Everaert B, Corbett T and Fox B, An Analysis of Natural Fibre Composite Processing Conditions. 2003, Proceedings of the International Symposium of Kenaf Development and Product Show Aug 19-21, Beijing.

Conclusions

Deakin can help provide solutions into bast fibre separation techniques from a decorticated product

Deakin has the laboratory facilities to conduct fibre related research in the natural fibre area

Thank you

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