

**best  
wool**

**ZQ**<sup>TM</sup>  
PREMIUM FIBRE



Biodegradation

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## INTRODUCTION

The growing social consciousness of both consumers and retailers has created demand for eco-friendly products. Consumers want to know where their products are sourced from, and their associated social and environmental impact. This demand has led Best Wool to provide more sustainable product options and to take into consideration the cradle-to-cradle philosophy and ability of textiles to be recycled, down-cycled or disposed of in an environmentally effective way.

Biodeterioration, or biodegradation, can be defined as 'any undesirable change in the properties of a material caused by the vital activities of organisms' (Hueck 1965, 1968). Natural protein and cellulosic materials such as wool, hair, cotton and flax will readily biodegrade.

This process is accelerated in aerobic conditions where both available oxygen and moisture are present, in combination with a favourable temperature and pH range. In comparison, synthetic materials do not readily biodegrade and, if buried in soil or land-filled, will remain intact for many years.

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## WHY BIODEGRADATION IS IMPORTANT

In today's 'throwaway' society, the ability of a product to be composted, and to meet the 'cradle-to-cradle' philosophy is far more environmentally friendly for us today and the future of our planet.

Best Wool choose to use ZQ Premium wool in their carpets - a high performance, naturally biodegradable fibre that meets consumers' demands for quality and environmental performance and true circularity.

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## THE RESEARCH

In an endeavour to understand and compare the biodegradation behaviour of a range of natural and synthetic textiles, a wool and synthetic carpet were individually buried in soil and excavated at regular intervals over a nine-month duration. More specifically, the objective of this research was to determine the effect that fabric mass has on the degradation time and behaviour of a natural compared to synthetic carpet.



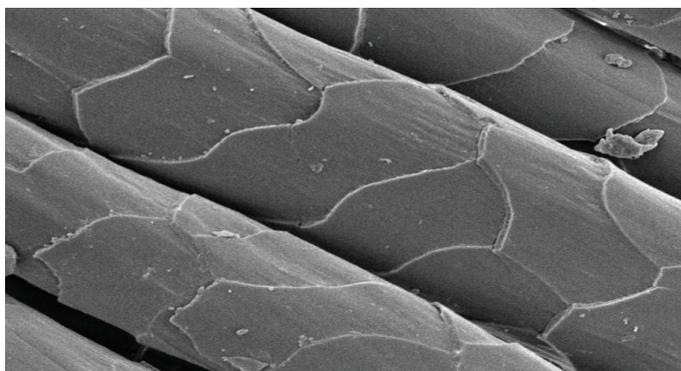
*Wool carpet at 9 months burial*



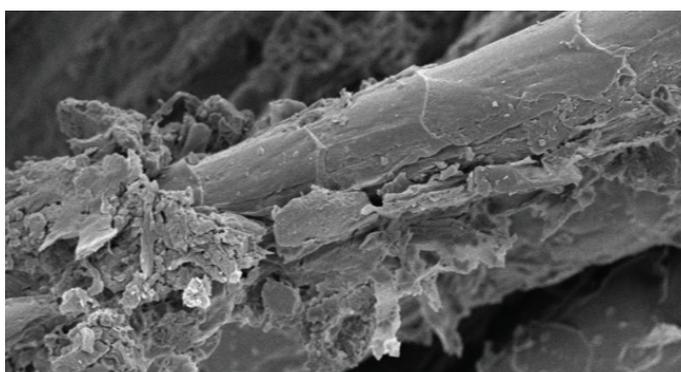
*Nylon carpet at 9 months burial*

The buried carpets cleared demonstrated a significant difference in their biodegradation behaviour. The wool carpet lost around 30% of its mass over the nine-month burial period in comparison to the synthetic nylon carpet which did not degrade at all (Hamilton and Causer 2011).

Scanning electron microscopy of control wool fibre and after only 4 months burial clearly shows the biodegradation process and the breaking down of the wool fibre structure.



*Control wool fibre*



*Wool fibre after 4 months burial*

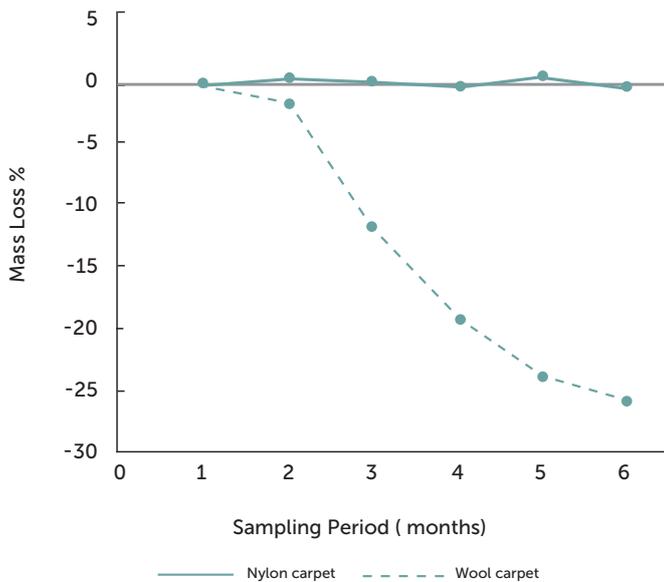


*Wool carpet control*



*Nylon carpet control*

## Mass Loss- Wool vs Nylon Carpets



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## SUMMARY

- *Wool is a robust textile fibre and is not susceptible to either bacterial or fungal attack under normal conditions of use.*
- *In contrast to synthetic fibres however, microbial decomposition can be induced in wool if so desired – affording a means of closed loop recycling.*
- *Under the right condition's wool will readily biodegrade when buried in soil.*
- *Synthetic materials will not readily biodegrade and can remain in the environment for many years.*

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## REFERENCES

Hamilton, M.A., Causer, S.M., September 2011, the effect of fabric weight and composition on rate of degradation of buried textiles, technical report prepared for the Wool research organisation of New Zealand

Hueck, H. J. (1968). The biodeterioration of materials – an appraisal in Biodeterioration of Materials. Eds. Walters, A.H. and Elphick, J.S. Elsevier, London, pp. 6–12.

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