

WoolPell Sheep-Wool Pellets as a Soil Amendment

Kaycee Larios^{1,2} & Galina Brychkova^{1,2}

¹University of Galway, School of Biological and Chemical Sciences

²Ryan Institute Agriculture, Food Systems and Bioeconomy Research Centre

Overview and Background

Wool pellets are an emerging organic soil amendment produced from processed sheep's wool. One of their most interesting physical properties is their capacity to absorb and retain water.

When wetted, wool fibres swell and hold moisture, which can subsequently be released into the surrounding soil. This has generated increasing interest in wool pellets as a potential means of helping soils buffer short-term changes in water availability. This property may be particularly relevant in agriculture, horticulture and landscaping systems exposed to irregular rainfall, drought periods or restricted irrigation. If wool pellets increase the quantity of water retained within soil between watering events, they may have potential to reduce short-term fluctuations in soil moisture and improve water management. Despite growing interest in wool-derived soil amendments, systematic experimental evidence remains limited, particularly for pelletised wool used with cereal and forage crops under contrasting watering regimes.

The present study therefore independently evaluated the effect of WoolPell sheep-wool pellets on soil moisture retention under controlled watering conditions.

Project Aims

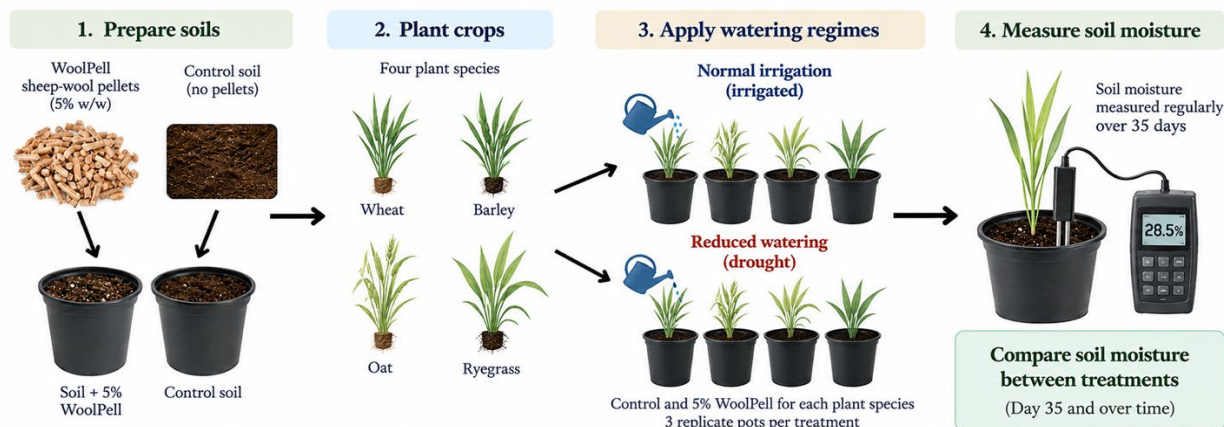
The principal aim was to determine whether incorporating WoolPell sheep-wool pellets into soil could improve soil moisture retention under normal and reduced watering conditions.

The study included four agriculturally important species: wheat; barley; oat; and ryegrass.

Control soil was compared with soil containing 5% sheep-wool pellets by weight under both normal irrigation and a reduced-watering regime.

WoolPell sheep-wool pellets – soil moisture experiment

Experimental design to assess the effect of sheep-wool pellets on soil moisture in plant crops



Key Research Finding

WoolPell-treated soil maintained higher soil moisture

The clearest result of the study was that soil containing WoolPell maintained higher moisture levels than untreated control soil.

Once the reduced-watering treatment commenced, soil-moisture levels increasingly separated between the WoolPell-treated and untreated soils. Under normal irrigation, WoolPell-treated soil contained approximately 12 percentage points more soil moisture than the untreated control at Day 35. Under reduced watering, WoolPell-treated soil contained approximately 6 percentage points more soil moisture than the untreated control. Statistical analysis showed that soil treatment significantly affected soil moisture, alongside significant effects of watering regime and crop species.

The soil-moisture data were analysed using a Scheirer–Ray–Hare test, with significant main effects of soil treatment, watering regime and crop species ($p < 0.001$). The main experiment contained three replicate pots for every crop $\times$ soil treatment $\times$ irrigation combination, giving $n = 48$ pots overall.

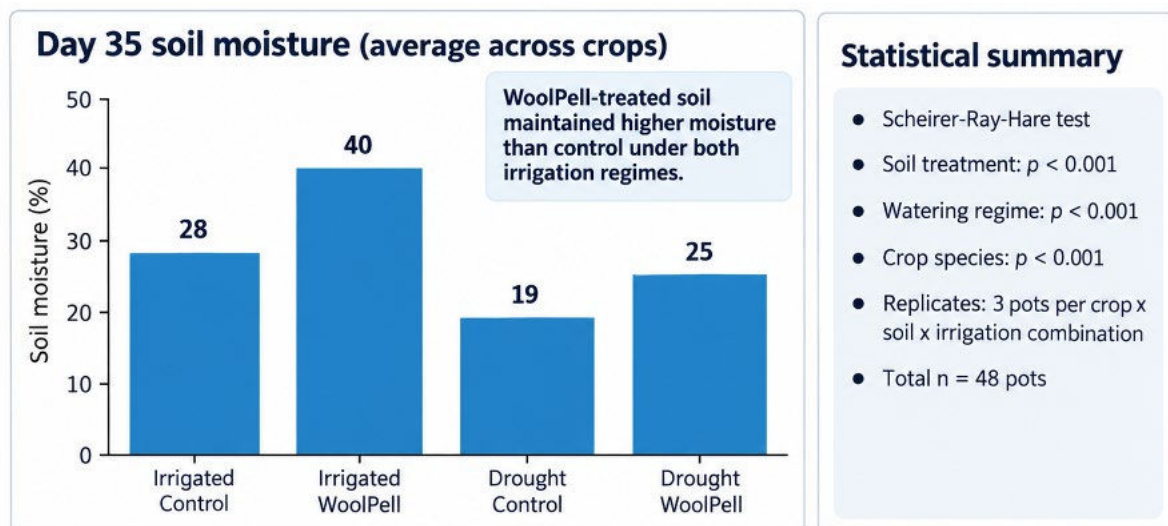


Figure 1. Summary of key experimental results for WoolPell sheep-wool pellets as a soil amendment. (A) At Day 35, WoolPell-treated soils maintained higher moisture than controls under both irrigation regimes; soil treatment, watering regime and crop species significantly affected moisture (Scheirer–Ray–Hare, $p < 0.001$).

The study therefore provides experimental evidence that soil amended with WoolPell sheep-wool pellets maintained higher soil-moisture levels than untreated control soil under the conditions tested. The effect was particularly evident once watering frequency was reduced, indicating that sheep-wool pellets may have practical potential as a soil amendment for maintaining moisture during periods of reduced water availability.

Water availability is an increasingly important consideration in agriculture, horticulture, landscaping and other growing systems. An amendment capable of helping soil retain moisture between irrigation events could potentially contribute to:

- improved water management;
- greater resilience during periods of reduced watering;
- reduced dependence on frequent irrigation in suitable applications; and
- improved management of growing systems in water-stressed environments.



The present study demonstrates a soil-moisture retention effect. It does not yet establish a specific reduction in irrigation requirement. Longer-duration and larger-scale trials are required before a defined percentage reduction in water use can be claimed.

Conclusion

In an independent University of Galway controlled study, soil amended with WoolPell sheep-wool pellets maintained significantly higher soil-moisture levels than untreated control soil under the experimental watering conditions.

Study Limitations and Further Research

The experiment was conducted for 35 days under controlled conditions, rather than over a complete growing season or under field conditions.

The key limitations relevant to the moisture finding were:

- relatively short experimental duration;
- three replicate pots per treatment combination;
- controlled-environment rather than field conditions;
- no complete crop-cycle assessment; and
- no direct measurement of how much irrigation could be reduced while maintaining equivalent plant performance.

These limitations do not negate the observed moisture-retention effect. Instead, they define the next questions required to translate the result into practical irrigation recommendations.

The most commercially important question for the next research phase is:

Can WoolPell maintain equivalent plant performance while reducing the amount or frequency of irrigation?

Answering this experimentally would allow the moisture-retention effect identified in the present study to be converted into evidence-based recommendations for growers, horticulture, landscaping and water-stressed markets.

Research Acknowledgement

The authors acknowledge WoolPell Organic Pellets International Limited for this research supported by Enterprise Ireland Innovation Voucher “Fertawool Organic Sheep Wool Fertilizer” IV20250379]. The experimental design, data collection, analysis and interpretation were undertaken independently by the University of Galway research team: MSc student Kaycee Larios, supervised by Dr Galina Brychkova, as part of the MSc in AgriFood Sustainability & Technology. The sheep-wool pellets used in the experimental work were WoolPell pellets supplied by WoolPell Organic Pellets International Limited.