The use of wool in compost and other alternative applications

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As the wool market continues to decline, particularly for hill breeds with coarse wool, alternative uses need to be explored. The use of wool in compost or mulch is a fairly novel concept, with only a couple of commercial producers of wool and bracken compost. Nevertheless, wool (soiled wool in particular) provides an excellent slow-release source of nitrogen in addition to a variety of other trace elements as it biodegrades. Wool offers further benefits in terms of soil temperature regulation, moisture retention, soil structure and is an effective weed and pest control. Wool presents a sustainable, renewable and an all-round environmentally friendly alternative to peat, which is so often used in composts. Other applications for wool include in thermal and noise insulation, especially relevant in light of increased interest in sustainable and environmentally friendly eco-houses, constructed primarily from renewable and green materials.

Wool in compost

Whilst wool is fully biodegradable, this process takes a relatively long time – depending on the wool itself and the external environment this varies from 3 months to 2 years. This is a great advantage when composting, as this ensures a slow and steady release of nitrogen (N) into the surrounding soil – especially considering wool contains on average 10-11% nitrogen, more than some commercially available composts. Daggings are ideal as they contain dirt and faecal matter, which make for excellent compost material due to organic matter content. Wool offers a unique spectrum of trace elements too, studies have found comparatively high levels of potassium (K), sodium (Na), iron (Fe) and phosphorous (P). The very high concentration of K in sheep's wool is due to a certain type of wool grease – suint. Whilst levels are not as high as N and K, P is also present in sheep's wool, making up the full complement of essential, key nutrients found in fertilisers. Some studies have found that wool may not need to be composted – results from trials using container-grown plants suggest that raw wool may be used as a nutrient source and growth medium, with roots growing directly and preferentially on wool fibres.

Wool in mulches and mats

Wool may be used below plants to prevent water and nutrient runoff, a method dating back to the 1900s. The presence of lanolin and other waxy substances on the outer surface of the wool makes it water repellent. However, the interior cortex is more delicate and contains a matrix of sulphur-rich proteins that attract water and make wool highly absorbent – a feature that is particularly important for dyeing.
As a mulch, used to surround plants above ground, sheep's wool provides a porous shield that helps to reduce weed growth whilst regulating soil temperatures – keeping soil cool in the summer and warm in the winter. Numerous studies have shown the efficacy of wool mats used to quash weed growth with one noting that wool fabric nearly eliminated all weed growth, promoted daughter plant rooting and increased fruit yields in strawberries when compared to plants that were manually weeded and treated with a standard herbicide (chlorthal-dimethyl, DPCA). A similar study evaluating the use of wool mulch treatment in strawberries found that maximum temperatures were consistently lower and minimum temperatures consistently higher than those without wool. Overall, temperature variation was significantly lower for soil under the wool mulch. This study also agreed that wool mulch (single- and double-ply) is an effective barrier to weeds. Although not detailed in the scientific literature, there is anecdotal evidence to suggest that wool pellets might also deter slugs and snails, as some wool fibres have microscopic barbs which may act as a physical barrier.

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Wool may be composted with a large variety of different materials, or for some uses may not need to be composted at all. ... Studies investigating composting strategies suggest that on a large scale, 25% wool, 25% horse muck and 50% grass clippings may provide the best results. When compared to combinations with manure and woodchips and food waste and woodchips, the compost containing manure and grass clippings had the most appropriate moisture content, pH, temperature and composting time. Most studies recommend the separation of wool before composting as it is prone to clumping and can become compacted when left in bundles which can lead to a high percentage of solids. Future research may look to mechanically separate compacted waste wool bundles before large scale composting. Overall, there is little research detailing optimum composting strategies for wool, with most anecdotal guidelines stemming from social media and small, private gardens. There will likely be variations depending on the breed of sheep from which the wool is sourced as wool fibres are highly variable in diameter and length. This may affect wool composition (e.g. trace element levels) which would have a knock-on effect on both its behaviour in composting and value as a compost. Commercially available wool-based composts utilise wool from hill breeds of sheep, such as Herdwicks. The coarse wool from these breeds doesn't degrade as quickly as finer wool which gives a better structure and texture to the end product as well as ensuring a slow release of nutrients and maintained moisture retention. Hill wool is also often too coarse for use in textiles, so this also helps to support local farmers. ...

Wool in thermal & noise insulation

Wool has long been used as an effective insulator in terms of both sound and heat but is now experiencing renewed interest due to it's natural, sustainable and renewable nature. In light of increasing attention concerning climate change and the environment, these qualities are becoming more and more important to consumers. There is also increasing interest in "eco-houses", designing and building homes with minimal carbon footprints. To do so, houses must be well insulated to ensure good energy efficiency, so to this end, renewable and sustainable materials such as wool and indeed hemp and straw have been explored. Due to natural variation in wool, density can be inconsistent, meaning that a larger amount of wool is needed to produce comparable thermal effects to fibreglass, however, wool offers a myriad of advantages over fibreglass (*e.g.* sustainability and environmental impact, safety and toxicity, fire retardancy and better noise insulation). Studies have found that wool effectively isolates vibrations and can reduce noise by up to 6 decibels, outperforming mineral wool. A recent study has found that coarse, low-quality wool performs just as well in insulation, offering the potential for diversion of this waste stream of less marketable and valuable wool into green building material which may offer some benefit to sheep producers. When comparing wool with polyester fibres, a study found that a 50:50 mix of the two performed best, absorbing over 70% of noise, displaying good moisture resistance under high humidity and 65-70% biodegradation. The 50:50 mix outperformed both 100% polyester fibre and 100% wool, although it is worth bearing in mind that polyester is not biodegradable so 100% wool would likely be the more environmentally friendly option albeit not the most effective.