IEA Bioenergy
Technology Collaboration Programme

Innovative bio-based pile cover for biomass chip storage

Summary Series

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Investigation of the performance of a bio-based storage-pile cover compared to commonly used alternatives

Fossil-based plastic tarps are still commonly used as cover material for forest chip storage piles, which can cause waste or require special waste treatment. This work aimed to investigate the performance of an innovative bio-based forest chip pile cover compared to commonly used alternatives (plastic cover or uncovered) under the storage conditions in East Finland. The trials investigated the drying process during the storage of two different types of raw materials, stemwood chips (see Prinz et al. 2022), and logging residue chips (presented only in this report as an addition to the mentioned publication). The study included the developments of key performance parameters of six stemwood piles and two logging residue piles.

The stemwood piles with an approximate storage pile volume of around 200 m^3, sampling was done using sub-samples and balance bags, which is a common method that involves net bags filled with wood chips and placed within the storage piles (see Prinz et al. 2022). In each pile, 16 balance bags were placed at two height levels, approximately 0.9 m and about 2 m from the ground (Prinz et al. 2022). For the logging residues with a pile volume of approximately 3,000 m^3 for each pile, 32 chip samples were taken from each pile at the beginning and at the end of the experiment at two height levels (approximately 1.5 m and 3 m). The sampling procedure and preparation of samples followed the standard methods as they were valid at the time of the trials (see Prinz et al. 2022).

As a result, the forest stemwood chips covered with the bio-pile cover dried by 11%, and the piles covered with plastic tarps dried by 22%, dry-matter losses were 4.3% when covered with the bio-pile cover, and 2.9% when using the plastic tarps (Prinz et al. 2022). The moisture content in the logging residue pile with the bio-pile cover increased during the experiment by 18.9% to 48.6% while the average moisture content of the logging residue chip pile with plastic cover decreased by 6% to 31.4% at the end of the experiment.

BIO-BASED FOREST CHIP STORAGE PILE COVER

Livetech Suoja® is an innovative pile covering method that was developed to protect biofuel piles from rain and meltwaters; and without the use of plastic. The product consists of a mixture of water, pulp fibre, and a binding agent. The method includes the spraying of the product over a pile from a specially designed tank truck to form a 0.5–2.0-centimetre layer.

Established experiment with two logging residue chip piles in an unpaved terminal area. (A) The experiment included one pile covered with plastic (beginning of the experiment) and (B) one pile covered with Livetech Suoja® material (end of the experiment). Source: (A) Luke/Robert Prinz, (B) Luke/Johanna Routa.

Bio-pile cover performance and future R&D work

The trials´ results reveal that the bio-pile cover performed as a forest chip pile cover, as planned, however, the performance of plastic tarps used as cover for forest chips outperformed the innovative bio-pile cover under the given trial conditions (Prinz et al. 2022). Differences in the key drying performance parameters of tested alternatives were found.

From a scientific perspective it needs to be concluded that the bio-based cover in the studied experimental conditions does not render better storage conditions than those in currently commonly used practices, although fossil-substitutional benefits by using the bio-based covers may be achieved (Prinz et al. 2022), which shows the need for further R&D work in this matter.

Source: this report provides a summary of the experiments conducted within the "Innovative ecological pile cover for biomass chip storage" project that led also to the following cited publication:

Prinz, R.; Routa, J.; Anerud, E.; Bergström, D.; Sikanen, L. Performance of an Innovative Bio-Based Wood Chip Storage Pile Cover—Can It Replace Plastic Tarps? Energies 2022, 15, 1680. https://doi.org/10.3390/en15051680

The actual covering of the experimental stemwood piles with the innovative bio-based cover material happens with a specially designed truck. Source: Luke/Robert Prinz