

Preliminary Studies on Pine-needle Light-weight Loam



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ABSTRACT

Lightweight loam is an improved mud-based material consisting of slip clay mixed with a large amount of natural aggregate that have good heat insulating properties. Amongst the ingredients commonly used are agricultural by-products such as straw, waste such as wood chips, and porous mineral aggregates such as expanded clay. This building material is therefore an appropriate choice when aiming for sustainable building materials and techniques: it is available locally, has low embodied energy, good insulation properties and provides an opportunity for self-built construction. Since organic by-products are now more widely used as a source of energy, causing their price to increase, research on new types of fiber for construction with lightweight loam should be initiated. Experiments using pine needles as the fibrous component in lightweight loam construction were conducted. Samples with different types of pine-needles and loam in different proportion were produced and dried in a controlled environment. The samples were tested for their thermal performance in weather condition, as well as for shrinkage, water resistance and humidity behavior. Results determined an appropriate mix of pine needles and wet loam. These experiments have demonstrated that the production of lightweight loam with pine needles is viable for non load-bearing structures and provide insulation. This paper presents results in hand and recommendations for developing further this building technique.

Keywords: Lightweight loam, thermal insulation, self-built construction, natural material.