From Agricultural By-Product to Construction Resource: Swiss Hemp in Hempcrete Production

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The demand for sustainable construction materials is driving interest in bio-based alternatives that cut environmental impacts while ensuring performance. Hempcrete, a mix of hemp shives, lime binder, and water, shows promise for insulation, carbon storage, and circular construction, but adoption is limited. This thesis investigates using Swiss-grown hemp shives for hempcrete and its integration into existing sand-lime brick production.

This thesis presents an opportunity study on the feasibility of using Swiss-grown hemp shives for the production of hempcrete bricks and examines the potential for integrating hempcrete manufacturing into existing sand-lime brick production infrastructure. The study combines material analysis, technical process assessment, market evaluation, and financial modelling to provide a comprehensive overview of the conditions required to introduce hempcrete as a sustainable construction material in Switzerland.

Experimental testing was conducted to evaluate the physical and mechanical properties of different hemp shive types, including two locally cultivated varieties. The results show that characteristics such as bulk density, fibre content, and particle size distribution influence compressive strength and thermal conductivity of the resulting hempcrete blocks. These findings informed production considerations, particularly in relation to compaction force and drying conditions.

The production analysis explored the adaptation of a sand-lime brick facility to accommodate hempcrete. Process adjustments related to material handling, pressing, and curing were identified as necessary but achievable within the existing operational framework. A parallel production approach was proposed to manage the differing technical requirements of the two materials.

A market study, based on a survey of architects and secondary data, revealed limited current use of hempcrete but growing awareness and interest in sustainable building solutions. Key barriers to adoption include a lack of technical knowledge, material availability, and cost concerns. The study also outlined a regional business model linking local hemp cultivation, processing, manufacturing, and distribution.

The financial analysis demonstrated that hempcrete production is economically viable under specific conditions, but sensitive to variable input costs and raw material supply. A multi-scenario evaluation was used to assess risks and identify the most influential factors affecting profitability.
The findings confirm that Swiss-grown hemp shives can be used for hempcrete production and that integration into existing facilities is feasible. However, successful implementation depends on coordinated efforts across production, supply chain, market development, and financial planning.

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