

VARIABILITY OF HEMP SHIVES : STUDY THROUGH IBIS AND CHANVRISOL PROJECTS

Introduction

Development of biobased materials for thermal insulation of buildings is the final aim of IBIS and CHANVRISOL projects
Biomass resources can be used alone (hemp shives and wool, flax shives, rape straw) or with a binder (like earth or lime)



IBIS project



IBIS : Isolants BiosourcS pour le bâtiment
→ biosourced insulators for building sector



The **IBIS project** aims to design, on an industrial scale, a **biosourced insulation mortar** that has good vapour permeability performances, which could be applied in a continuous layer on the old masonry walls

IBIS partners



CHANVRISOL project



CHANVRISOL: développement de la filière CHANVRe en circuit court pour l'ISOLation des bâtiments normands → development of hemp production in short circuit for buildings insulation in Normandy

The **CHANVRISOL project** aims to evaluate the **performances of hemp shives and wools for thermal insulation**, taking into account the variability induced by different local production

CHANVRISOL main partners



Highlights of IBIS and CHANVRISOL projects

This present study is to characterize 12 hemp shives in order to measure the impact of their variability on the required performances for thermal insulation

Characteristics of 12 different hemp shives, coming from short circuit

- Different varieties
- Different seeding rates
- Different harvest years
- Method of harvesting : threshing or no threshing
- Transformation processes of straw : ensiling or crushing, always followed by sieving

Protocols of characterizations from RILEM TC-236 BBM

- **Bulk density** is measured in a dry state (particles are dried in oven at 60°C until constant mass), in a glass cylinder (20 cm in height and 12 cm in diameter), with 3 repeats.
- **Particle size distribution** is measured by mechanical sieving, which leads to width separation of particles.
- **Dust ratio** is measured by mechanical sieving. Dusts are particles with diameter lower than 0.25 mm.



hemp shive	Characteristics of hemp shives					Characterizations of hemp shives		
	variety	seeding rate (kg/ha)	harvest year	threshing operation	transformation process of straw	main granulometry	bulk density (kg.m ⁻³)	dust ratio
C3-1	santhica 27	50	2014	no	ensiling + sieving	> 4 mm	75 ± 2	0,16%
C3-2	santhica 27	50	2014	yes	ensiling + sieving	1 - 2 mm	146 ± 1	4,63%
C3-3	santhica 27	50	2014	yes	ensiling + sieving	2 - 4 mm	103 ± 4	0,62%
C3-4	santhica 27	50	2014	yes	ensiling + sieving	> 4 mm	75 ± 9	0,29%
C3-5	fedora 17	35	2014	yes	ensiling + sieving	> 4 mm	100 ± 4	0,40%
C3-6	fedora 17	35	2014	yes	ensiling + sieving	> 4 mm	74 ± 4	1,98%
C3-7	fedora	40	2013	yes	ensiling + sieving	> 4 mm	101 ± 4	0,25%
C3-8	futura	40	2013	yes	ensiling + sieving	2 - 4 mm	87 ± 1	0,40%
C3-9	fedora 17	50	2013	yes	crushing + sieving	1 - 2 mm	100 ± 1	1,36%
C3-10	fedora 17	50	2013	yes	crushing + sieving	> 4 mm	103 ± 4	0,15%
C3-11	fedora 17	50	2013	yes	crushing + sieving	> 4 mm	55 ± 1	0,30%
C3-12	mix of fedora 17 and felina32	46	2013	no	ensiling + sieving	2 - 4 mm	90 ± 2	0,25%

- ▶ Hemp shives with same characteristics and different granulometries (ex C3-2, C3-3 and C3-4) : granulometry ↗, bulk density ↘, dust ratio ↘
- ▶ Presence of fibres has been observed in some hemp shives : formation of fibres balls including shives on the first screen
- ▶ **Additional characterizations are undergoing** : fibre amount, hygrothermal performances, thermal insulation...