



Valorization of sediments in bio-based materials

Application to fluvial sediments with incorporation of natural fibers

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 Fundings: HEC Pakistan Government, UniLasalle Rouen, ANR-Conacyt VAL USES

Objectives

- Characterization of dredged sediments from Usumacinta River, Mexico.
- Dredged sediments reuse in fired bricks and tropical fibers based-earth bricks.
- Local dredged sediments and fibers waste reuse in crude bricks.

Work Planning

Determining geotechnical, physical, chemical, mineralogical and hydro-mechanical properties of Usumacinta River sediments.

Manufacturing fired bricks with industrial approaches such as Gippini, Winkler and Augustinik charts and innovative mineralogical and statistical approaches.

Earth bricks implementation, manufacturing and strength optimization with palm oil and tropical fibers.

Fibers characterization and study of fibers distribution and orientation, fibers anchoring in earth bricks.

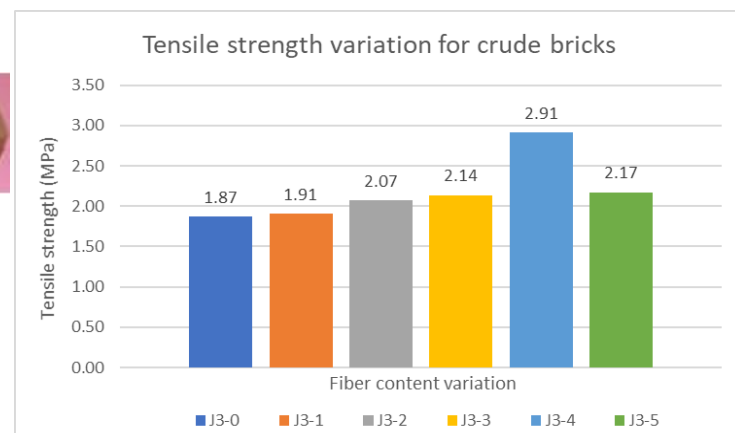
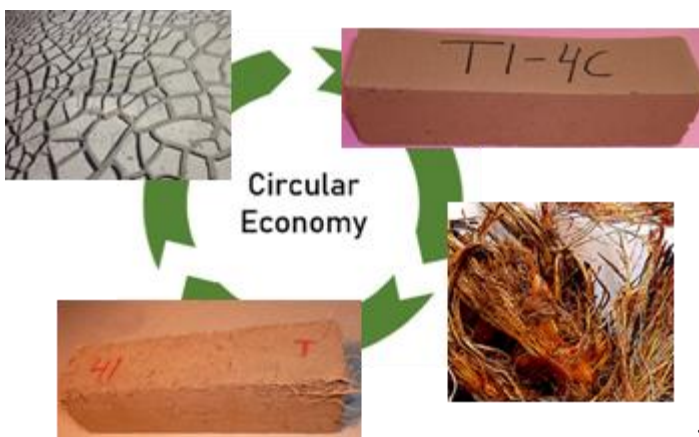
Application to local waste fibers in reinforced sediment-earth bricks.

Sediment reference	T1-4C	T2-5C	T5-10C	T6-14C	T6-18C	J3-9C	J3-10C	J4-13C
LL _{fall cone} (%)	30.40	26.0	33.92	27.28	28.96	33.82	35.01	48.27
CaCO ₃ (%)	8.21	7.19	1.9	8.73	8.32	7.84	8.55	8.49
OM (%)	3.77	3.5	3.46	4.9	3.96	4.48	4.98	5.72
pH value	8	8	7.5	7.5	7.5	7.5	7	7
n (-)	0.7	0.62	0.57	0.61	0.65	0.55	0.61	0.5
MBV (mg/g)	2.53	2	5.9	1.93	2.87	2.73	4.5	> 8
ρ_s (g/cm ³)	2.7	2.71	2.61	2.68	2.67	2.63	2.7	2.53
Clay content (%)	6.9	8.97	8.75	6.09	6.55	5.9	4.66	13.4
d ₅₀ (μ m)	53.28	24.57	35.75	53.66	58.24	51.85	60.98	14.12

Characteristics of Usumacinta River sediments

Applications

- Beneficial uses using soft techniques and eco-valorization of sediments dredged from Usumacinta River (from Tenosique and Jonuta, Tabasco, Mexico) and tropical fibers waste.
- Local scale application in case of fired bricks and earth bricks.
- Transfer of this eco-friendly valorisation techniques to sediments and waste fibres in Normandy.



J3 is sampling site - while 0, 1, 2, 3, 4 and 5 show fiber content used
 Flexural strength of earth bricks