

Hemp Shiv with Straw: Natural Additives for Water Repellency in Industrially Prepared Adobe, Scored after Eleven Months Outdoors



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ABSTRACT

Water is what limits adobe. Earth has been built with in central Anatolia since the Hittite period, and the works described here was making adobe a century ago, took up fired brick and roof tile in the decades that followed, and has never stopped. This paper asks which natural additives raise the water resistance of an adobe block prepared on an industrial clay line.

Earth for the blocks passes through the clay preparation unit of the tile works: screened free of stone to a defined fineness, micronised with water, and held in the mud pit for about a year, so that each block traces back to a known preparation. The base mix is 85% clay, 10% silt and 5% ash on dry mass; blocks are pressed at $300 \times 155 \times 100$ mm.

Two campaigns were run, in August and September 2025. The first compared 3% straw against 3% hemp shiv, each combined separately with pozzolan at 5, 10 and 15%, slaked lime cream at 2.5%, wood ash at 2.5%, salt at 2% and lime water at 10%, all on dry mass. Water repellency was scored by droplet absorption on a five-point scale against unadditised mud, set at 1; no standard test was applied. Second-campaign specimens stood outdoors, exposed to rain, frost and sun, and their scoring sheet is dated eleven months after moulding.

Lime cream scored highest in every matrix. Pozzolan worked against dose: 5% improved repellency, 10% and above returned to the reference. Salt produced no effect. Hemp shiv outperformed straw with every additive. The second campaign replaced part of the straw with hemp shiv, at 2.5% and 0.5%, and added calcined pozzolan; every specimen there scored 5 at the eleven-month assessment, the additive-free blend included. The fibre blend, not the additive, governed the result, and the scale saturates at that point.

This is a screening and not a quantified performance: a five-point ranking cannot say how much water a block repels, and one scoring sheet per campaign leaves the change across exposure unquantified. Compressive strength, water absorption and vapour permeability are the next stage. The block machine is installed; the formulation will be scaled once fixed with academic partners. The programme has been defined; its outcomes will be reported subsequently.

KEY WORDS: adobe; hemp shiv; water repellency; natural additives; earthen block production