



UNIVERSITY OF NAIROBI  
HOUSING RESEARCH AND DEVELOPMENT UNIT

Lime Sludge Mortar

Preliminary Investigations

A short ~~Research~~ on the feasibility of  
the production of a lime sludge mortar from  
wastes of sugar mills, paper mills and rice mills.

Peter A. Erkelens  
Materials Engineer.

~~May~~  
April 1980.

HOUSING RESEARCH AND DEVELOPMENT UNIT HRDU  
~~UNIVERSITY OF NAIROBI~~ ~~P.O. BOX 30197.~~

DIRECTOR T. S. CHANA.

P.O. BOX 30197, Nairobi, Kenya Tel 27441

ERT 212

## O. Introduction

The Central Building Research Institute Roorkee (U.P.) India has developed a lime sludge mortar made from byproducts of sugar mills, paper mills and rice mills.

Basically this type of mortar is made from lime sludge (sugar - and paper mills) and rice husk (rice mills).

Because of its potential advantages also for Kenya the HRDU has ~~in~~ investigated the availability of the basic materials.

insert:

+11

### 1. The preparation of lime sludge mortar.

The two basic materials for the production of the mortar are rice husk and waste lime sludge (1).

Rice husk should be fine or in crushed state. Therefore husk obtained from small rice producers can be directly used. Rice husk coming from rice mills, producing rice in the full shell form, should be passed through a huller or grinding machine before use. ~~in the process~~

The other ingredient, lime sludge, should be in dry and powdery form. This lime sludge is a waste product of sugar industries and paper mills, dependent <sup>upon</sup> of the production process adopted in these industries.

Waste lime sludge and rice husk are dry mixed together roughly in equal amounts by weight. The required amount of water is added to the dry mix for making manually balls/cakes.

These balls/cakes are put out in the open for drying before burning. It should be noted that the balls/cakes possess sufficient strength and do not disintegrate ~~during handling~~ or firing.

The dried balls/cakes are next fired in the open on a grating base of a clamp or in a trench. Rice husk not only acts as integral fuel but also provides in situ silica for the lime produced during firing. ~~The fired material is a soft powder~~

The fired material obtained is ~~is a~~ soft powder. The finer the material is, the <sup>greater</sup> ~~more~~ increases its reactivity like other hydraulic binders.

The bulk density is  $700 \text{ kg/m}^3$  on grinding.

+11  
insert:

This <sup>preliminary</sup> investigation showed that ~~lime~~ <sup>lime</sup> sludge is not <sup>available</sup> as a waste material ~~available~~, while rice husk is ~~is~~ available in abundance in some locations.

## 2. Availability of production wastes in Kenya.

### Sugar mills

A number of sugar mills were informed about the above process but it turned out that there is no waste of lime sludge nor of sugar cane.

Limesludge is a by-product from the carbonatation process, which is not adopted in Kenya. ~~In~~ The Kenyan factories ~~have adopted~~ the 'sulphitation process'. The sludge from this process does yield a filter cake (equivalent of sludge) which has a high wax content. The filter cake is used as bulk manure in sugar cane plantations.

Sugarcane after processing is called bagasse and is burned in the boiler furnaces to generate steam. At times there is a surplus of bagasse but this quantity is small and irregular.

### Paper mills

The paper mills in Kenya have a lime reburning plant for recirculating lime. As such there is no residual lime sludge. Timber waste is used as fuel in the bark boilers and therefore not available for other purposes.

### Rice mills

According to the National Irrigation Board most of the rice is milled by Mwea Mills Ltd. at Mwea. Rice husk is not used for other purposes and is therefore ~~abundantly~~ <sup>in abundance</sup> available. Some individuals collect rice husk, free of charge, but the remaining quantities are still abundant.

## 3. Conclusions.

The small survey showed that lime sludge is not available from small scale industries. On a larger scale hydrate lime is produced at Koru by the Homa Lime Company Ltd. at a price of K. Shs. 523/55 per tonne ex factory. (Prices March 1980). For small scale production of lime ~~mortar~~ mortar this lime is too expensive. Lime sludge mortar can therefore not be produced on a small scale in Kenya. However because rice husk is ~~abundantly~~ <sup>in abundance</sup> available, further investigations have to be carried out whether this husk can be used for the production of cheap building materials. ✓

There are some limitations:

Presently there is little information available about other wastes from the agricultural industry or other industries in Kenya.

Experiences in other countries (ref. 2) have shown that <sup>some of</sup> these wastes ~~are~~ very good components for building materials of high quality.

Therefore it is ~~proposed~~ <sup>would be desirable</sup> to carry out a more in-depth survey, preferably all over Kenya into the availability of wastes.

Some of these wastes, together with other materials, can be very suitable for the production of building materials, either on a small scale or on <sup>a</sup> large scale.

References.

1. Central Building Research Institute, Roorkee; Cementitious Binder from waste lime, sludge and rice husk; Technical Note No. 75. India, 1978.
2. Mohan, Dinesh and Verma, Narendra; Construction materials and technology for building industry in rural India; Engineering World p. 21-24
3. Communications <sup>in</sup> 1980 with the following industries in Kenya:  
Pan-African Papermills (E.A.) Ltd., Webuye.  
Chemelil Sugar Company Ltd., Muhoroni.  
East African Sugar Industries Ltd., Muhoroni.  
Mumias Sugar Co. Ltd., Mumias.  
South Nyanza Sugar Company Ltd., Awendo.  
National Irrigation Board, Nairobi.

---