

## Rose's Earthen Plasters Notes

### **A Natural Plaster needs..**

A *Binding* agent which becomes sticky when mixed with water, binds the ingredients together and sticks it to the wall. We are using Clay

A *structural material (Aggregate)* which makes up the bulk of the plaster, provides shrinkage control and strength. We are using Sand

A *Fibrous material* which provides tensile strength –particularly in the base coat, but optional in the top coat. We are using Hay

When working out a recipe with the ingredients you have found/chosen, there is not one right way.. it is a lot like baking.

Natural materials vary so you always need to experiment.

Begin by knowing the general properties of your ingredients, then

Test.. Test.. Test.

### Finding your ingredients..

When sourcing materials and deciding what to use, many factors play a part in arriving at the final decision..

Is there the quantity here for what I need?

How easy is it to get the amount I need?

How far does it have to travel?

How much processing does it need?

What are my available resources to achieve this.. energy, time, money?

(For example, a truck load of slightly less than perfect clay delivered to your door may be chosen over climbing down a cliff and carrying buckets of perfect creamy clay from down by the river.. or not!!)

**Clay** is found in the subsoil below the topsoil layer. For plasters, a pliable, sticky clay is best.

Some places to look are excavations for building sites, road or farm cuttings, around water-courses, or by digging a hole in your garden. You can also ask a quarry or local digger drivers.

Dry bagged clay can be bought from a pottery supplier.

It costs more so is usually used where smaller quantities or special colours are needed.

### Some field tests..

Clay is shiny when cut with a spade or knife.

Damp some clay and work it in your hands, feeling how sticky it is.

When it has become quite plastic, squeeze a clay ribbon over the edge of your hand and see how long it gets before it breaks.

Make a sausage/snake and bend it in a circle, notice how much it cracks.

A disc on the palm of your hand will stick when turned upside down.

**Silt** is a component of all clay in varying amounts, but if there is too much it causes dusting, doesn't bind or provide the structure that sand does in a plaster.

It is difficult to identify separate from clay, to determine how much silt is present.

Here is one way to get some idea..

Spread some wet well-worked clay on your arm and let it dry. Brush it off. Silt will dust off easily, clay will stick more and pull at the hairs on your arms.

If the clay is of a strong colour it is likely to be more silty. This means there is not as much clay binder in it.

Silty clays with not enough clay binder but good colours can still be used with added binders to make clay paints.

### Further clay tests

Use a piece of cut plastic downpipe (or anything) as a mould to create test disks.

Activate the clay before pressing it well into the wet mould. Remove mould and wait until dry.

Compare clay disc to the original mould to observe shrinkage. The clay disc also shows you levels of dusting, cracking etc.

Your first disk is your clay as found. Other tests can include the addition of potential shrinkage-reducing materials such as sand and fibre.

Clearly label your test disks 1:2, 1:3 etc (or mark them and write down what each mark is)

### **Sand**

Sand for clay plasters needs to be sharp and well graded.

Sharp sand feels and sounds gritty when rubbed between thumb and finger.

River sand or quarry sand is best.

Sharp sand can be bought from landscape supplies, usually in various grades.

The grains at microscopic level are angular.

Sea sand has round grains from being rolled in the surf. Particles are usually fine and evenly sized, not well graded. Sea sand has salts that are not wanted in a plaster.

Well graded means there is a good range of particle sizes –fine-medium-large.

The best proportions are some fine, most mediums and some large (shaped like a flattened bell when shown on a graph)

The grading means the angular sand particles knit together very strongly and there is more surface area for the binder to stick them together.

Particle size gets smaller in each coat going out from the wall/substrate.

The largest particles in any layer of plaster need to be less than half the depth of that layer, or the trowel will catch them so they tear the surface.

### **Fibre**

Plant fibres are most common (but animal hair can be used).

The best fibrous materials for plasters have shorter fibres, or they have long fibres that can be relatively easily processed into the shorter lengths needed.

Straw (or other dried fibrous grasses, hay, etc) is cut to 50-100mm for base coats, (or cut to under 10mm and sieved, for top coats).

There should be a range of shorter lengths in the cut fibre mix also, the same as is needed for the sand particle sizes.

Some ways to cut long fibre for plasters are.. a weedeater in a barrel, a lawnmower (ideally with a catcher), leaf shredder. (I have also been known to use a serrated bread knife and scissors on different occasions when mechanical means were unavailable.)

Fresh cow manure in an external top coat uses the enzymes in it as well as the fine fibre, for additional weather resistance.

Cow manure for plasters needs to be very fresh, still green with no dark tough skin (still warm is good!). If you gather it carefully and pick out bits of grass as you go, there is no need to sieve. Cow manure functions here as part binder, part fibre.

Some other fibres that can be used in plasters are horse manure, pine needles, dried grasses, Raupo heads, paper pulp made from soaked shredded paper.

*Plastic mesh* can be used where base coat needs to bridge any wood wider than 50mm. It is overlapped approx 100mm, attached to the wood with galvanised fencing staples, flat head nails (or similar), and worked into the base coat.

*Old carpet* can be used and attached in the same way, with the hessian backing-side out. (Only use old carpet that has a hessian backing) Rub hessian backed carpet with clay slurry before applying base coat.

Metal mesh is not compatible with clay because the clay 'breathes' in water vapour which rusts the metal over time.

### Substrates

Clay plasters can be used over other substrates as well as clay and straw-based materials.

Different surface preparation is needed depending on the substrate (another whole workshop!)

But with the right surface preparation and attention to detail, the benefits of clay plasters can be brought into existing buildings with great effect.

*Cement* in clay plaster is no good. Cement stops clay plaster from 'breathing' water vapour, which traps moisture inside the wall, causing hidden damage.

### **Plastering process..**

Clay is activated by moisture and movement.

The first coat is the *base coat or levelling coat*. It is fibrous and sandy, designed to fill hollows, be thicker (up to about 12mm) and thinner as required and makes the final shape of our walls. Do all the shaping at this stage.

The *top coat* is the final finish. It has a fine particle size and is designed to be an even thickness all over (3-4mm).

### **Mixing base coats**

Fill a measure bucket with raw clay. Cover just to the top with water. Soak overnight (or even an hour or two -or three- helps if you can't do overnight.)

If you don't have a lot of measuring-sized buckets to leave clay soaking in, make a bulk clay-soaking place. Put in just enough water to barely cover the clay, and soak overnight (or longer), then measure from there.

First put sand measure(s) into mixing tub, bath or contained tarp area.

Add measure(s) of soaked clay on top of sand.

Stomp to both mix and activate the clay at the same time.

This works fine mixing with bare feet because the sand is doing what the boots do. Take out any stones or sharp bits as you find them.

Add fibre gradually and mix in.

### **Mixing top coat**

Soak (ideally overnight) & stomp the clay (boots help here) to activate binding qualities till it is nice and creamy.

Sieve activated clay slurry (-stomped clay mixed with more water and worked to a creamy consistency-) for top coat through flyscreen/kitchen sieve.

Sieve sand(s) where needed. (Very fine plasterer's sand may be okay unsieved, but always test it first)

Cut straw/fibres & sieve out any long bits, small stones, sticks or knuckles.

Mix clay slurry and part of the sand until all grains are coated with clay. Add more sand and mix it in, until all is well mixed.

Add fibre gradually if using, mixing it in without any clumps.

Mix well.

Small amounts of extra water may be added if needed.

It is easy to add too much water so add it gradually and mix well in.

Plaster improves if left to amalgamate for a while but can be used at once too, if very well mixed.

**Plastering** is done when the substrate is completely dry.

Wet down the walls with a fine mist hose (outside), brush or spray bottle (inside/outside).

Spray again as you are working. Plaster does not stick properly if the wall is too dry.

NB Spray bottles clog really easily and become useless if even a grain of sand gets in the wrong place. Wash outside of sprayer thoroughly before opening and refilling with clean water.

Base coats can be lightly flicked onto the wall then pressed level with a trowel.

Or applied by hand (using the heel of the hand to press in and spread it), or trowelled on.

Leave an open surface on the base coat so the top coat sticks well. Work it just enough to be firm on the wall without bringing water/clay slurry to the surface, which weakens the plaster.

Get it on the wall first then come back over and firm it.

Make good clean edges and firm them well.

Makes strong edges and the rest of the plaster looks better too.

Wherever plaster touches wood, cut into it a few mm deep along the line where the base coat meets the wood and smooth over again.

Makes a clean line as the plaster dries and moves slightly away from the wood.

Top coats.. base coat is dry.

Mist wall, apply top coat over base coat with plastic tool or trowel.

Work an area, cut through to the base coat along wherever the top coat meets wood and smooth over it.

Makes a clean line as the plaster dries and moves slightly away from the wood.

Firm edges as above.

When plaster is partially dry –leather hard- sponge lightly in a circular motion with a clean, well squeezed out damp sponge to even out trowel marks and seal the surface.

Sponging polishes any fibre or other textural additions as well.

Some sand is brought to the surface.

When plaster is dry, use a soft brush to remove the loose sand.

Hessian.

Anywhere there is wood under the plaster, and around window frames or where there is more durability needed, use *hessian* soaked in clay slurry over the base coat and under the top coat.

No need to wet wall first.  
Can plaster over hessian/clay when it has lost its shine.

NB. Keep a separate bucket of 'liquid gold' sieved clay slurry for hessian dipping as the fibres make the slurry smell bad.

Drying (especially for top coats) needs to be even.  
Avoid having areas of bright hot sun and deep shadow as it will dry unevenly and may crack.  
Strong winds also dry plaster unevenly.  
Plaster with a lot of fibre in is more forgiving.  
If it is cold and drying is too slow, use heat and fans to dry it so you don't get mould.

Make biscuits of clay plasters left over and dry them.  
Label and store in a dry place.

Use for repairs by breaking up a biscuit and dampening with a little water from a spray bottle or similar. Doesn't need much water.  
Mix until it is plaster consistency.

To Repair.. Clean the area to be repaired of any dust, loose material etc, dampen surface and re-apply plaster as above.

### **Useful Books**

Earth Render by James Henderson –A good basic introduction.

Using Natural Finishes by Adam Weisman and Katy Bryce –Great in-depth resource.

Clay Culture by Carole Crews -Inspiration from both practical and artistic sides.

**Notes by Rose Tuffery**

<http://www.rosetuffery.com/>