

## **Basic Natural Dyeing Instructions For 2020 Digital Download**

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## **Steps in Natural Dyeing**

With the dye materials:

1. Harvest / collect
2. Preserve, if saving
3. Determine ratio of weight of dyestuff to fiber
4. Extract
5. Strain
6. Use the dye bath

With the fiber:

1. Scour
2. Mordant, if needed
3. Rinse
4. Dye
5. Wash/Rinse/Condition/Dry

## Scouring

The first step for dyeing fiber is scouring. All the oils and dirt must be removed from your fiber so that it can receive the mordant and dye. Even if you have commercial yarn or fabric, you need to scour it because synthetic oils are used in the spinning process.

Caution: Protein (animal-based) fibers want to felt when they undergo changes in water temperature or agitation in water, so it's important to be gentle with the fiber during this step.

Steps for ~100g / ¼ lb of yarn or fabric:

1. Fill a wash basin with hot tap water. If your tap water is cooler than 120°F, you should add some boiling water from a kettle to get the water up to 120° – 140°F.
2. Add about two tablespoons of pH neutral, unscented dishwashing detergent and swish around. You may also use ½ tsp of Orvus Paste or a specialized product such as Unicorn Power Scour.
3. With clean hands, add your dry fiber to the tub and gently push it under the surface.
4. Let it soak undisturbed for a couple hours as the bath cools.
5. Gently lift the fiber out and set in another tub while you dump and refill the first one with clean water, the same temperature as what you dumped out.
6. Put the fiber in the rinse bath and let it sit for 5-10 minutes. Repeat the rinse process until there is no suds and the water stays clear.
7. Gently squeeze out the excess water and hang the fiber to dry. If you are going to mordant right away, there's no need to dry.

## Mordanting with Alum

A mordant is a material that bonds with both the fiber and the dye to enhance the color and ensure better light and wash fastness. Metal salts are the standard mordants for natural dyeing and the one that is the safest and most in use today is alum, or aluminum potassium sulfate.

Steps to mordant protein fibers:

1. Know the weight of your dry fiber. Grams are the easiest unit for measuring weight for dyeing.
2. Calculate 12% of the weight of the fiber (WOF)  
For example:  
 $100\text{g WOF} \times 0.12 = 12\text{g alum}$
3. Weigh out that much alum
4. Bring a small amount of water to boil in the bottom of the pot you will use for mordanting and turn off the heat.
5. Add the alum to the boiled water, cover and let dissolve for a few minutes. \*Caution: Avoid inhaling the steam from the pot at this stage.
6. Fill the pot with room temperature water and stir to mix the alum solution in.
7. Put the fiber in the pot and slowly heat the mordant bath up to 180°F — this should take at least 30 minutes to reach temperature.
8. Hold at 180°F for 45 min to an hour.
9. Turn off the heat, cover, and let the bath cool for at least an hour, preferably overnight.
10. Rinse the fiber in water of the same temperature.  
\*Caution: Alum is astringent, so wearing gloves in this step will keep your hands from drying out.
11. Keep damp until ready to dye, or let dry and re-wet before dyeing.

## Mordanting with Rhubarb Leaves

Rhubarb leaves contain large quantities of oxalic acid, which is toxic if ingested by people, but does act as a type of mordant with some natural dyes. Rhubarb leaf mordanted fiber is best dyed right away before it dries. Since it is acidic and also carries a muted beige, yellow or pink tone, rhubarb leaves will also alter the color of what is dyed on top of it, usually towards an earthier shade.

Caution: Do this whole process in a well ventilated space so you don't inhale the steam from the pot, which contains the oxalic acid.

### Steps:

1. Collect 10-12 large fresh rhubarb leaves, about what is left over after you've made a pie.
2. Cut up the leaves and cover with water in a large pot.
3. Bring to a simmer (180°) and let cook for an hour.
4. Cool and strain off the liquid to use as the mordant bath.
5. Put any amount of fiber into the room temperature liquid.
6. Slowly heat back up to 180° over 30 minutes to an hour, and hold at 180° for an hour.
7. Let the fiber cool in the bath
8. Gently squeeze the fiber and keep damp until ready to dye. No need to rinse.
9. The mordant bath can be reused several times until about 500g of fiber has been in it.

Try using rhubarb leaf mordant with dyes that change with acidity, such as *Tapinella atrotomentosa* or Lobster mushroom.

## **WOF (Weight of Fiber)**

The amounts of natural dye materials to use for any given dyeing project varies depending on the shade of color you want, the strength of the material as a dyer, whether it is fresh or dry, and the amount of fiber you have. The way to keep track of your experiments is by weighing both your fiber and your dye materials. WOF, simply means the weight of the fiber.

Terminologies differ a bit between resources. You can see something like “use this dye material at 200% WOF” which means use twice as much dye material as fiber, by weight. The same thing can be written as a ratio: “use this dye material at 2:1”.

The standard place to start is to use equal amounts of dye material and fiber, or 100% WOF, and adjust from there.

## **Extracting Natural Dyes in Simmering Water**

Most of the dyes are extracted in 180°F water. Simmering for an hour is enough for most, but longer, or multiple extractions can be experimented with.

Steps:

1. Chop up the natural dye material, if it isn't already, and cover with water in a pot.
2. Dry and woody materials can benefit from soaking for several hours in warm water to rehydrate before the temperature is raised.
3. Slowly bring the bath up to 180°F
4. For tooth fungi and some polypores, add a splash of ammonia to the extraction to raise the pH of the bath to 8-9.
5. Hold the temperature at 180° for about an hour. Cover, turn off the heat and let it cool.
6. Strain out the organic materials, squeezing to get all the dye liquid.

## Extracting C+ Lichens in Ammonia

Purples and magentas from C+ lichens are obtained by soaking the lichen in an ammonia and water solution for several weeks.

### Steps:

1. Tear apart the lichen into small pieces and loosely fill a glass jar about halfway with it.
2. Mix one part water to one part ammonia, enough to fill the jar about  $\frac{2}{3}$  of the way.
3. Pour the ammonia/water solution over the lichen, cover tightly and shake vigorously to incorporate oxygen.
4. Every day, open the lid and swirl the contents a bit, to replenish the oxygen in the jar. Then reclose and shake.
5. In larger jars, once or twice a week, open the jar and stir vigorously.
6. The dye concentrate is ready when the liquid has transformed to a deep magenta or purple. Finer structured lichen like *Punctelia rudecta* can be extracted in about 3 weeks. More leathery *Umbilicaria* takes several months.

### Dyeing steps:

1. Use about a  $\frac{1}{2}$  cup of the concentrate per 15 grams of fiber as a starting place.
2. Add the concentrated lichen dye to a pot with enough water to cover your fiber.
3. Add the fiber (no mordant needed!)
4. Slowly bring the dye bath up to 180°F and hold for an hour.
5. Cover, let cool, remove the fiber and rinse.



## The Dye Bath

When your fiber is prepped and your natural dyes extracted, you are ready to combine the two! The following instructions are the basics for most dye materials.

### Steps:

1. Make sure both the dye bath and the fiber are about room temperature. The fiber should be damp.
2. If the dye pot needs more liquid in it to cover the fiber, add some water.
3. Put the fiber in the dye pot!
4. Slowly raise the temperature to 180°F over the course of 30-60 minutes, stirring very gently once in a while.
5. Hold the temperature for about an hour, continuing to stir gently to ensure even uptake of the color.
6. Shut off the heat, cover the pot and let it cool. The fiber can stay in the dye pot overnight to get the deepest color and best colorfastness.
7. Lift the fiber out and gently squeeze the liquid out. You can try reusing the dye bath if you want. ("Exhaust bath" is the terminology for reusing a bath multiple times.)
8. Lower the fiber into a tub of similar temperature water and let the excess dye rinse off.
9. Move the fiber to a tub of warmer water that has a squirt of pH neutral dish soap in it. Let the fiber sit here for about 10 minutes.
10. Gently rinse in successive tubs of fresh water until the water runs clear. Usually 2-3 rinses.
11. Do a final rinse with a fiber conditioner before gently squeezing the fiber and hanging to dry.

## Modifying with an Iron (Fe) Post Dip

Iron is a great ingredient to use to darken color shades and also drastically change any tannin-containing dye. It can be used as a pre-mordant, like alum, but that can be harsh on protein fibers. There are two methods for using iron to modify a dye after the main dye bath.

### Method 1 Separate bath:

This is a good method if you want to keep using exhaust baths from the main dye pot. While your fiber is in its sustained soak at 180°, start a second pot:

1. Boil a couple cups of water and dissolve 1.5% WOF of Ferrous Sulfate crystals ( $\text{FeSO}_4$ )
2. Fill the pot with enough water to cover your fiber.
3. Raise the temperature to ~160°F and turn off the heat.
4. Have a rinse bath waiting of hot tap water
5. When the main dye pot has cooled to 160°, gently lift the fiber out and transfer it to the iron bath.
6. Gently stir the fiber and watch as it changes.
7. When the fiber has changed to the color you want, or after 15 minutes, lift it out and into the hot rinse water.
8. Follow the same rinsing steps from the dye bath sheet.

### Method 2 Same Bath:

1. Measure out 1.5% Ferrous Sulfate and dissolve it in a couple cups of boiling water.
2. When your fiber has completed its sustained soak and the bath has cooled slightly, lift out the fiber and set it in a dry tub.
3. Pour the dissolved iron liquid into the dye pot and stir it around.
4. Replace the fiber into the dye pot and follow from step 6 above.

## Notes on pH, color and fiber care

pH is a factor in several aspects of natural dyeing. Raising or lowering the pH can work as a color modifier with some materials, especially with mushrooms and lichen. Some dye baths are by nature or necessity acidic or alkaline. Organic indigo vats are highly alkaline. The ammonia extract for lichens makes those baths alkaline. Sumac, walnut and rhubarb dye baths are acidic. Alum mordanting is slightly acidic.

Protein fiber “likes” to be slightly acidic in order to remain soft. Fiber that has been in alkaline dye baths should, then, be neutralized with a rinse in water to which some white vinegar has been added. A ½ cup to a couple gallons of water is good for indigo. Use less with lichen purples because the acid will modify the color towards pink.

The pH of the water you use can be a factor in the colors you get. If you are curious to see the difference, try doing a few tests using tap water versus creek water versus rain water.

## Indigo from Plant to Vat

### Cultivation

There are several plants worldwide that contain indican, the precursor to indigo pigment. In Vermont, we can grow Woad or Japanese Indigo, the latter producing much greater quantities of the pigment. Japanese Indigo is an annual here. Seeds are started indoors in March, planted outside in May and harvested from July-September when the stalks are 2-3ft tall and the plant begins to bloom. Your plants need very little care, just plant them outside in a mostly sunny spot and keep them watered if there's a dry spell.

### Things you'll need to make an organic indigo vat:

- Scale
- Thermometer
- Pot for the vat - sized as small as possible for the amount of leaves you have
- Hydrated lime (you can find this at a farm/garden store)
- Fructose sugar (probably need to order from Amazon)
- Something you want to dye blue!

### Steps to making the vat | Total time ~8-24 hours

1. Cut the stalks of Japanese Indigo and strip the leaves off to use. (The plant will continue to grow, and you may get a second harvest 4-6 weeks later)
2. Weigh the leaves and then pour enough 130° F water over them to cover and let steep for 4 hours.
3. Strain out the leaves and discard. Keep the water that is now a rich brown/green and glows a bit like antifreeze.
4. For every 8 oz of original leaves, stir in 0.4 oz of hydrated lime

5. Aerate the liquid by pouring back and forth or vigorously stirring for 10-15 minutes, until it turns opaque blue green indicating that the indigo pigment has formed. There should be a blue froth on top.
6. For every 8 oz of leaves, gently stir in 0.6 oz of fructose sugar and let sit 6-24 hours until the liquid turns a clear amber color and the sediment settles to the bottom. There should be a coppery scum on the surface. Now the indigo is in its reduced state where it can adhere to fiber.

### **Dyeing**

Indigo will adhere to any natural fiber without a mordant. 8 oz of leaves should dye 2-4 oz of fiber to a medium shade.

1. Scour your fiber by soaking in hot water and a neutral dish soap (don't agitate it). Let the bath cool, rinse gently several times and leave damp.
2. Heat the dye vat to ~115° (warm to the touch)
3. Using a steamer basket or colander to keep the fiber out of the sediment at the bottom, slowly dip the fiber into the vat making as few bubbles as possible
4. Leave the fiber in the vat for 15-45 minutes, slowly stirring it a few times
5. Lift the basket and fiber out of the vat and over to a drip catching tub
6. Watch the fiber turn blue as it comes in contact with the oxygen in the air!
7. Rinse in lukewarm water to complete the oxidation and let hang in the air for another 30 minutes before dipping again or washing
8. Repeat as many times as needed to build up the desired shade of blue

## **Washing**

1. Fill a tub with lukewarm water and 1/4 c. white vinegar. Soak the fiber here for 10-15 minutes to neutralize the pH
2. Gently squeeze out the fiber and refill the tub with warmer water and a couple squirts of dish soap
3. Let the fiber soak in the soapy water for 10 minutes without agitating it
4. Gently lift out the fiber and dump the water — you will have lost a bit of the blue into the water at this point
5. Rinse by soaking several times in fresh tubs of warm water until no more suds or blue pigment comes out
6. Hang dry

For more information on different kinds of organic indigo vats, this Maiwa instruction sheet is an excellent resource: <http://box19.ca/maiwa/pdf/OrganicVat.pdf>

## Suppliers of Natural Dyes and Mordants

**Pro Chem:** <https://prochemicalanddye.net>

Mostly chemical dyes, but I buy alum here (Potassium Aluminum Sulfate)

**Botanical Colors:** <https://botanicalcolors.com>

West coast supplier with lots of instructions on their site

**Maiwa:** <https://maiwa.com> --

They are in Vancouver, BC, so shipping isn't economical, but they also have lots of good, free, information on their site and host lots of workshops.

**Dharma Trading:** <https://www.dharmatrading.com>

Their website is a hot mess, but they have LOTS of dye stuff.

**Long Ridge Farm:** <https://longridgefarm.com>

Nancy Zeller in Westmoreland, NH is a local supplier of natural dye stuff.