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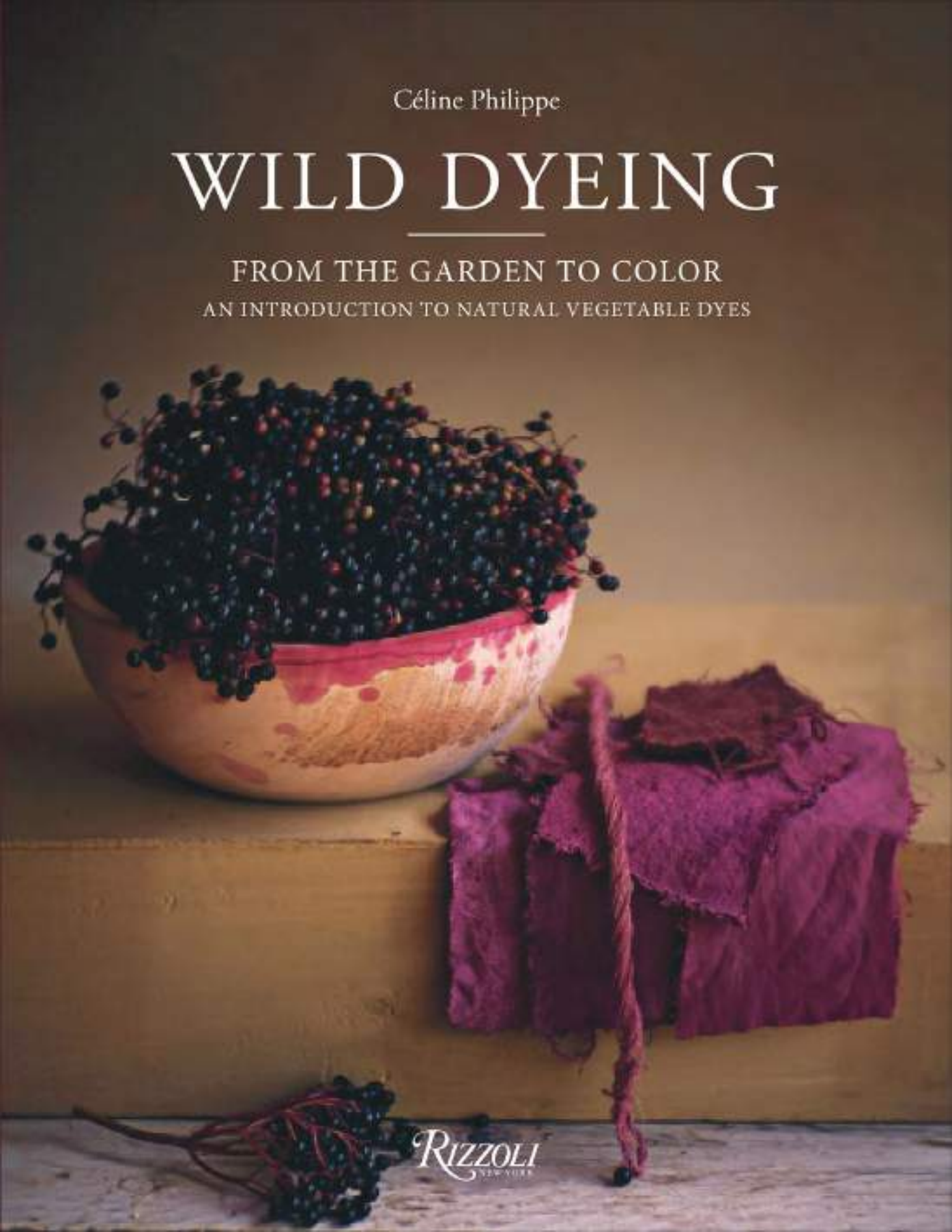
WILD DYEING

FROM THE GARDEN TO COLOR

AN INTRODUCTION TO NATURAL VEGETABLE DYES



RIZZOLI
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Fibers for dyeing

When you are interested in plant-based colors, you generally prefer natural materials. In this, the project of plant dyeing is consistent: both the materials and colors are derived from the living world.

All sorts of natural materials can be dyed with plants: wood, willow, paper, skins, and all textile fibers, whether of animal or plant origin. I will share my dyeing experience here with numerous textile fibers, in the form of skeins of yarn or fabric, woven or knitted.

Distinction of fibers according to their origin

1 · Fibers of animal origin: wool and silk

- **Wool** is made from the fleece of animals such as sheep, alpacas, mohair goats, angora rabbits, camels, and even yaks. There is currently a real movement in France and other parts of the world to revitalize the wool industry, which is part of an environmentally friendly approach that aims to perpetuate ancestral know-how. Feel free to explore various local events organized throughout the year around wool and knitting in order to find beautiful wool.

- **Silk** is made from the cocoons of the silkworm caterpillar. Originating from China, this moth has been bred and selected for silk production for millennia. Completely domesticated, *Bombyx mori* can no longer survive without human intervention. It no longer exists in the wild and is unable to feed itself or fly.

Since both of these fibers are made "on the backs" of animals, they should be chosen with care.

For wool, make sure its origin and shearing conditions are respectful of the animal, without the inhumane practice of mulesing.

For silk, opt for "Ahimsa (nonviolent) silk," which spares the lives of the pupa, unlike the ancestral practice of boiling the cocoons with the living insect inside.

2 · Fibers of plant origin: cotton, linen, hemp, and ramie

For plant-derived fibers, the mode of production and cultivation will guide your choices.

- Cultivated in the Global South, **cotton** is water- and treatment-intensive. Organic cotton cultivation is therefore preferable.

- On the other hand, **linen** has the immense advantage of being available locally. France is the world's leading producer of linen. Moreover, its cultivation requires no irrigation and uses few inputs.

- Like linen, **hemp** is not water-intensive and can be grown locally. It has other significant environmental advantages: it grows quickly and requires neither fertilizers nor pesticides. It also plays a major role in soil regeneration since, unlike linen, it has the ability to store CO_2 in the soil.

- **Ramie**, or China grass, grows mainly in countries with tropical climates. It requires warmth and humidity and does not tolerate droughts well. China is the largest producer of ramie and one of the few countries to master its complex production methods.

Whether the fibers come from animals or plants, I advise you to choose those that have undergone as few treatments as possible (such as the superwash treatment for wool or bleaching for cotton, linen, or hemp). And always try to be coherent in your creative approach: work with what nature offers us without spoiling it.

Distinction of fibers in plant-based dyeing

In natural dyeing, it is customary to distinguish between animal fibers and plant fibers because the method of treating them differs.

The protein nature of animal fibers, much like hair and nails, gives them a very good affinity with plant color. It is easy to achieve rich, bright colors. Their preparation for dyeing is relatively simple. However, some precautions are necessary during the dyeing process to avoid damaging the fiber.

- **Wool** is worked at high temperatures. The heat opens the scales of the fiber, allowing it to "grab" the color. Wool can tolerate temperatures up to boiling. However, it dislikes sudden temperature changes from hot to cold, which risks felting. This is a point of vigilance to keep in mind throughout the dyeing process. Always ensure, during any rinsing, that the water temperature is similar to that of the dye bath.

  Similarly, wool does not appreciate high alkaline baths. Here, too, there is a risk of felting with a pH above 9 or even less for some very delicate wools.

  In the interest of preserving the softness of the fiber, I do not iron wool, as it tends to make the fiber rough.

- **Silk**, on the other hand, is generally worked at cold or lukewarm temperatures to avoid damaging its luster.

Such precautions are not necessary for plant fibers. They are all-terrain fibers: they tolerate variations in temperature, significant pH differences, and are not affected by ironing. In this regard, plant fibers are easier to handle.

However, as a trade-off, their cellulose nature sometimes makes it difficult for the dye to adhere to them. The preparation and mordanting steps are therefore long and complex. Plant fibers require more preparation steps for the color to adhere to the fiber in a lasting manner. The resulting shades are also more matte and paler than those achievable with wool and silk.

Finally, no matter what kind of fiber you use, its quality and how it was manufactured will influence the color outcome.

Dyeing old household linens is often the first idea that comes to mind when venturing into plant color. These fabrics, which have already lived a long life, can offer us pleasant surprises. However, they retain the marks of their past use: plant dyeing will not make stains disappear; on the contrary, it can even reveal them.

What to do if you do not know whether a fabric or thread is natural or synthetic, animal or plant

How do you find out? The flame test will tell you. Gently bring the fiber close to the flame and observe:

- if it burns slowly, with a smell of burnt hair, goes out by itself, leaving behind a small pile of charred beads as ash, it is an animal fiber (wool or silk).

- if it burns quickly, without any particular smell, leaving little ash, it is a plant fiber (linen, cotton, hemp, etc.).

- if it burns quickly, leaving behind a hard black ball like burnt plastic, it is a synthetic fiber.

	Pros	Cons
Plant fibers	Resistant to: • changes in temperature • high pH bases • ironing	• Colors are less vivid and more matte • Lengthy preparation and mordanting
Animal fibers	• Faster preparation and mordanting • Bright, rich colors	Handling precautions: • must avoid sudden temperature changes • do not tolerate high pH levels or bases

Pots

1 · Pot materials

The materials chosen must be "inert." In other words, they must not interfere with the composition of the dye bath.

- **Stainless steel** is the best choice. It is the most versatile and resistant material. Stainless steel is essential for preparing plant decoctions to extract mordants or colors.

- If you are hunting for secondhand dyeing equipment, you can easily find large **aluminum** stockpots. Stored in the kitchen, they can generally be a great help when you need to dye large quantities. Of course, they are not inert: a few milligrams of aluminum may migrate into your dye bath. These infinitesimal doses in a five-gallon dye bath will enhance the color at best, without risking pollution.

- As for **iron** or **copper** pots, they interact directly with the color by darkening or greening it. If you use them, be sure to stir constantly to avoid staining.

2 · Pot sizes

It is a good idea to choose different sizes: smaller saucepans for plant decoctions and larger stockpots for the dye baths. The volume of the dye bath depends on the weight of the fibers to be dyed. In general, 5 gallons of water are needed to dye 2 pounds of fiber (approximately 20 liters per 1 kg).

The capacity of your stockpot should therefore be suitable for the amount of fiber you wish to dye.

If you are dyeing skeins of yarn, choose pots that are taller than they are wide. Conversely, for fabrics, choose pots that are wider than they are tall so that the fabrics can be spread out to their full width.

Ideally, you should have pots of different sizes and volumes on hand to suit your specific projects.

Other equipment and utensils

In addition to the pots, you will need the equipment you usually find in a kitchen:

- gas or electric stove
- scale
- thermometer
- wooden spoons
- measuring spoons
- strainers
- cheesecloth for straining
- glass or stainless steel bowls for reserving the dye liquids
- plastic bowls and buckets
- gloves and apron

You should be able to find all the equipment you need for a fraction of the cost at secondhand stores and garage sales.

Finally, as you will see, it is important to control the pH of your preparations and adjust the level if necessary. That is why it is useful to have pH paper on hand as a measuring tool. This can be found in pharmacies. Even better, but much more expensive, is a pH meter. To adjust the pH level, lemon juice and baking soda or washing soda are always useful.

THE NATURAL DYEING PROCESS

At first glance, the process may seem a little complicated and time-consuming. Complicated? Not really: the steps are simple and rather repetitive.

Time-consuming? Certainly! Natural dyeing takes time. Sometimes, it might take several days. Picking, cutting, steeping, simmering, curing, simmering again, drying, washing, drying again: one step follows another. Each one needs its own time, a certain amount of time.

Try not to leave out any of the steps. Above all, patience and observation are essential before you see the color appear on the fiber, the magical moment when the plant alchemy takes place.

Weighing

Dry weighing the fibers to be dyed is the first step, the first reflex, before any dyeing project.

Knowing the weight of the fibers to be dyed enables you to determine:

- **the quantity of plants** you will need, whether for mordanting or coloring. In dyer's jargon, the plants are quantified as a percentage of the weight of fiber (WOF) to be dyed.

- **the volume of water** for the baths in which you will be immersing your fibers. Knowing how much water required for each bath will enable you to choose the right pot.

So far, nothing too complicated.

Preparing the fibers

Fiber preparation is an important step. It enables the fibers to better adhere to the plant's active ingredients, whether for mordanting or coloring.

This involves removing any possible treatments and other residues left on the fibers from when they were manufactured.

1 · Washing, scouring, scouring

Wool

A simple wash in lukewarm water (85°F/30°C) with a few drops of eco-friendly detergent is generally sufficient for wool.

For greasy wool, such as raw wool fleece or raw spinning wool (still coated with oil to facilitate spinning), wash with a gentle natural soap. Rinse thoroughly, always with lukewarm water to avoid temperature shock (risk of felting), until all soap residue has been removed.

Silk

If the silk is degummed, as is generally the case with manufactured silk, a simple wash with an eco-friendly detergent is all that is needed.

For raw silk, on the other hand, the preparation is more tedious. It is important to remove the sericin, the gum produced by the silkworm when it makes its cocoon, which is impervious to dyeing. To do this, the silk is soaked for an hour in a very hot bath (195–200°F/90–93°C) with a gentle natural soap. Add a tablespoon of washing soda to the rinse water. Here, too, rinse with care.

Plant fibers

All wax, pectin, and other treatments must be removed from the fibers. This is called "scouring."

Plant fibers should be washed at a high temperature (140–190°F/60–90°C) in water containing natural soap and washing soda. Use an amount of soap representing approximately 20 percent of the weight of the fiber to be washed and an amount of

washing soda equivalent to 6 percent. Rinse thoroughly until the water runs clear. For more convenience, this can be done in the washing machine.

Some dyers use wheat bran baths to effectively clean cellulose fiber fabrics. Thanks to its high phosphate content, it dissolves all chemical residues.

Bran bath recipe:

- infuse wheat bran (½ cup per gallon or 20 g per 1 liter of water) at 85–105°F (30–40°C) in a cheesecloth tied into a pouch;
- knead the bran to a milky consistency;
- plunge the fibers into this water and knead for around twenty minutes to ensure they are fully soaked;
- take out the fibers, rinse thoroughly, wring out, and dry.

In principle, this step is unnecessary for **fibers marketed as "ready-to-dye."**

As for **antique linens**, they generally take color very well because the trials and tribulations of their past life—dirt of all kinds and the many washes with our grandmothers' soap—have polished them, giving them better adhesion to natural dyes.

2 · Pretreatment of plant-based fibers: animalizing fibers

As explained above, natural dyes "bind" better to protein-rich materials. The cellulosic nature of plant fibers makes this more difficult.

With this in mind, dyers the world over have devised recipes to make cellulose fibers more adherent to color by "enriching" them with proteins. This is known as "animalizing" the fiber.

To achieve this, dyers use local resources. The Japanese soak cotton in soy milk, while Indians bathe fabrics in a hot bath of sulfonated castor oil. The protein-rich milk of certain herbivores, such as sheep and goats, can be used in the same way.

I experimented with several processes—some already tried and tested, others not at all. One that caught my attention—because it is economical and local—was eggs. More specifically egg whites, which are very rich in protein (82 percent).

Here's how I do it, for 3.5 ounces (100 g) of plant fiber to be dyed:

- in a large bowl, break two egg whites;
- add lukewarm water and stir;
- plunge the fibers into this mixture so that they are well immersed and mix thoroughly. Add more water if necessary;
- heat in a double boiler for 1 hour at 120°F (50°C);
- allow the bath to cool;
- take out the fibers, wring and dry them in the sun;
- let cure for one to two days.

The fibers are then ready for further dyeing.

For a color that respects nature and the living world, I suggest you choose organic eggs.

If you need to prepare a large quantity of fabric, you can buy organic egg white powder, which is easier to use. In this case, the proportion is 10 percent of the weight of the fiber to be dyed.

This step, designed to animalize cotton or linen, is not essential. It is not practiced by all dyers. You can skip this step by mordanting with a highly effective aluminum acetate.

However, if you choose to mordant only with plants, the result is less effective for strong colors. That is why it is best to leave no stone unturned in order to optimize the dyeing process.

Sulfur cosmos

Cosmos sulphureus

- **Part of plant:** fresh or dried flowers.
- **Harvesting period:** summer.
- **Recommended quantity:** 100–150% of the weight of fiber to be dyed for dried flowers. 200–400% for fresh flowers.
- **Color range:** red, orange.
- **Type of fibers to be dyed and mordant:** suitable for wool. When mordanted with symplocos and a good quantity of plants, cosmos can produce beautiful reds. For plant fibers, galling with colored tannins, such as catechu, chestnut, or onion peel, can produce stronger colors. In all cases, mordanting is necessary.

- Sulfur cosmos is an annual plant in the Asteraceae family, native to Mexico. It can be found all over the United States and Brazil, where locally it is considered as invasive.
- In Indonesia and Thailand, young cosmos plants are eaten raw or cooked in salads.
- Its use as a dye plant goes back to ancient times. A source of oranges and reds, it was used by dyers in pre-Columbian civilizations to dye wool, which had first been mordanted in a decoction of local plants rich in organic aluminum.
- Today, sulfur cosmos is planted in our gardens, on roundabouts, and in urban planters. In addition to its “decorative” aspect, it is particularly popular with pollinators, and just as attractive to you for making beautiful red-oranges! All the more reason to sow it.
- Sow in late spring, in a nursery or in the ground, when frosts are no longer a threat. Sulfur cosmoses like sun and warmth. They are not overly demanding in terms of soil type, provided it has good drainage. In periods of drought, infrequent and abundant watering is necessary. Picking the flowers as you go encourages and prolongs flowering. This means you can pick flowers throughout the summer and dry them for a later dyeing project.
- If you dry them under a press, you can then use the printed flower to make floral designs. But that’s another subject.

RECIPE

First step: decoction

1 Put the flowers in a saucepan. Cover with water to immerse the plant and leave to macerate overnight.
2 Gradually raise the temperature to a simmer (185°F/85°C). Maintain this temperature for 30 to 60 minutes. The flowers will lose their color and the liquid will turn red. If the water is acidic, add a little washing soda for a pH of 7 or 8.
3 Turn off the heat. Allow to cool, then strain the decoction through cheesecloth.

Second step: dyeing

1 Pour the plant liquid into a stockpot large enough to allow the fibers to be dyed to spread out.
2 Add enough water to obtain a ratio of approximately 1:20 (see Water, p. 26).
3 Add the mordanted fibers (presoaked and wrung out). Make sure they are completely immersed in the bath.
4 Turn on the heat and gradually raise the temperature to 185°F (85°C). Maintain this temperature for 20 to 60 minutes. Stir regularly (about every 10 minutes) and gently. Turn off the heat and allow the dye bath to cool.

For silk, the dye bath can be made in cold or even lukewarm water, leaving the fibers to soak for twelve hours and stirring regularly.

5 Once the bath has cooled, remove the fibers and wring them out to dry. Dry out of direct sunlight. Finally, wash with the usual precautions (see Washing, p. 58).

Beet

Beta vulgaris

- **Part of plant:** lacto-fermented root juice.
- **Harvesting period:** early summer to autumn.
- **Recommended quantity:** at least 100% of the weight of fiber to be dyed.
- **Color range:** violet, burgundy red, orange-yellow.
- **Type of fibers to be dyed and mordant:** animal fibers only (wool and silk). Mordanting is not necessary; I found no difference in shade in a comparative test with and without mordant.

- This recipe was inspired by a friend of mine who is a lacto-fermentation cook. One day, she brought me some jars of lacto-fermented beet juice and asked me about the color: she had read on the Internet that lacto-fermented beet juice gave a long-lasting yellow color, but had no further details.
- Beet roots are very rich in betalains, which are very bright colorants. However, these dyes have a well-deserved reputation for being very fragile and not very long-lasting on textile fibers. So there was a mystery to be unraveled, which aroused my curiosity.
- Without delay, I set to work on my pots. To my astonishment, I found that lacto-fermented beet juice could be used to obtain shades of pink-purple, red, and yellow-orange, without the need for prior mordanting. I noticed that the different shades obtained depended on the concentration of betalains in the juice, as well as on the temperature and duration of cooking. The colors held up perfectly to washing. Some shades faded a little after several months of UV exposure behind a window.
- All this is empirical, and only for those who like to experiment and recycle. If you like beets and are a fan of lacto-fermentation, then know that you can make color instead of discarding your juice.
- This experiment illustrates that lacto-fermentation is more than just a preservation method: the plant is truly transformed. Thanks to the work of the bacteria, the color goes from fleeting to long-lasting.

RECIPE

Lacto-fermented beet juice

For a 4-cup (approx. 1-liter) jar: 2 lb (approx. 1 kg) beets, unchlorinated water, and unrefined salt.

1 Dice beets without peeling them.
2 Dissolve 2 teaspoons (10 g) of salt in 4 cups (1 liter) of water. This is the brine.
3 Fill the jar with the diced beets and pour the brine over it to within 1 inch (2 centimeters) of the rim. Make sure the beets are completely submerged.
4 Seal the jar tightly with a jar seal. Leave to mature in a cool place (60–65°F/16–18°C) at a constant temperature, for at least 6 months.

The longer the ripening time, the more concentrated your juice will be in betalains. After eating the beets, save the juice for dyeing.

Dye

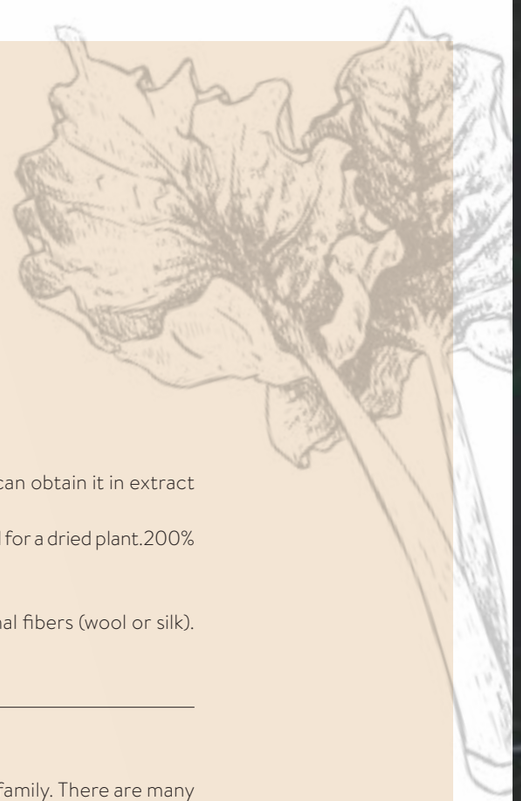
1 Pour the juice into a stockpot large enough to allow the fibers to be dyed to adequately spread out. Turn on the heat.
2 Add fresh water (preferably rainwater) to obtain a ratio of approximately 1:20 (see Water, p. 26).
3 Add presoaked, wrung-out fibers. Make sure they are completely immersed in the bath.
4 Gradually raise the temperature, stirring regularly. Below the simmering point (175°F/80°C), shades tend to be pinkish-purple. Above the simmering point, shades will turn red.

Stir regularly (approximately every 10 minutes) and gently.

5 Turn off heat when desired color appears. Let cool before removing fibers. A second bath will produce more yellow- orange colors.

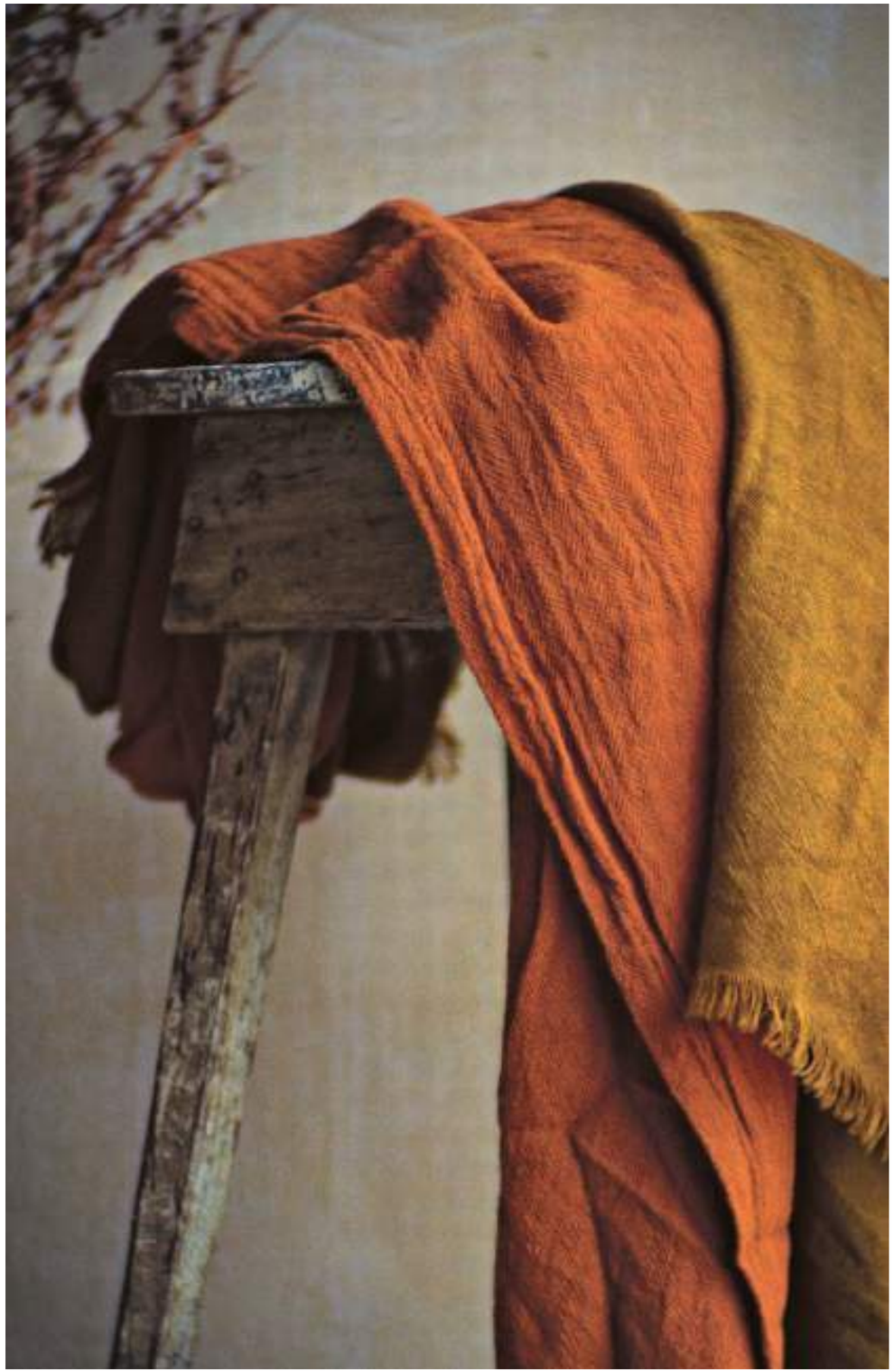
Rhubarb

Rheum species



- **Part of plant:** fresh or dried roots ground into powder.
- **Harvesting period:** summer. If you do not grow rhubarb, you can obtain it in extract form from a herbalist or stores specializing in plant dyes.
- **Recommended quantity:** 100% of the weight of fibers to be dyed for a dried plant.200% for a fresh plant.
- **Color range:** shades of yellow, yellow orange.
- **Type of fibers to be dyed and mordant:** best affinity with animal fibers (wool or silk). All types of mordant.

- Rhubarb is a perennial herbaceous plant in the Polygonaceae family. There are many varieties, such as Chinese rhubarb, Indian rhubarb, and rhapontic rhubarb.
- Native to northwestern China and Tibet, where it grows wild, rhubarb can grow up to six feet tall, with large, well-lobed leaves.
- Hybrid varieties of rhubarb that are adapted to temperate climates can be grown in the garden for the pleasure of cooking it in the form of pie or jam. However, with climate change and increasingly long periods of drought, garden rhubarb is finding it hard to flourish in summer. It thrives in sunny, deep, fertile, well-drained soil that stays cool in summer.
- A medicinal plant in traditional Chinese medicine, it is mainly known for its tonic and purgative properties.
- Its use as a dye plant goes back a long way. Like weld for eighteenth-century Europeans, rhubarb is the Tibetans' main source of yellow and orange, as evidenced by their magnificent carpets.
- I'm particularly fond of using rhubarb in dyeing, for its shades of golden yellow to mustard yellow, or orange when mordanted with beet leaves.
- It is a multipurpose plant for the dyer: its oxalic acid–rich leaves (see Plants rich in oxalic acid, p. 37) can be used as a mordant, and its roots as a coloring agent.
- The concentration of anthraquinone derivatives, responsible for the yellow color, varies from one rhubarb variety to another. This explains the differences in hue between plants, as well as between seasons.



RECIPE

First step: decoction

1 Place the powdered or finely chopped roots in a saucepan. Cover with water to ensure immersion.
2 Turn on the heat and gradually raise the temperature to a simmer (185°F/85°C). Stir regularly. Maintain this temperature for 30 to 60 minutes, depending on the quantity of plant material used. Add water if evaporation occurs in order to keep the plant submerged.
3 Turn off the heat. Cool and strain the decoction through cheesecloth. Reserve the dye liquid after adding lemon juice for a pH between 4 and 6.

For a higher concentration of colorant, you can repeat this step and make a second decoction with the plant material recovered from the cheesecloth. Add the second dye liquid to the first.

Second step: dyeing

1 Pour the dye liquid into a stockpot large enough to allow the fibers to be dyed to spread out.
2 Add water to obtain a ratio of approximately 1:20 (see Water, p. 26). Check the bath pH (it should be between 4 and 6). Add lemon juice if necessary.
3 Add the mordanted fibers (presoaked and wrung out). Make sure they are completely immersed in the dye bath.
4 Turn on the heat and gradually raise the temperature to a simmer (185–195°F/85–90°C). Simmer for 30 to 60 minutes, adding hot water to keep the fibers submerged.

Stir regularly (approximately every 10 minutes) and gently. Turn off the heat and allow the dye bath to cool.

For silk, you can make the dye bath cold, leaving the fibers to soak for 12 hours and stirring regularly.
5 Once the bath has cooled, remove the fibers and wring out to dry. Dry out of direct sunlight. Finally, wash with the usual precautions (see Washing, p. 58).

Rhubarb yellow is lightfast and washable. In slightly acidic water, it will retain its brilliance.

Beautiful greens can be obtained on wool dyed with indigo, and luminous oranges on wool mordanted with beetroot.

Calluna

Heather

Calluna vulgaris

- **Part of plant:** flowering branches.
- **Harvesting period:** late summer, early autumn.
- **Recommended quantity:** 100–200% of the weight of fiber to be dyed for dried plants. 200–400% for fresh plants.
- **Color range:** yellow, orange-yellow, pink, pinkish-brown.
- **Type of fibers to be dyed and mordant:** shades differ considerably according to the nature of the fibers: yellow and orange for animal fibers, pink and brown for plant fibers. Mordanting is necessary. Shades will vary according to the plant to be mordanted and the pH. For yellows on wool or silk, symplocos is recommended.

- Callune heather is not botanically a heather, but actually a callune, a twisted, perennial, evergreen subshrub in the Ericaceae family. Its Latin name, *calluna*, comes from the Greek meaning “to beautify, to make beautiful,” a name in memory of the ancient use of heather to make brooms.
- Heather characteristically grows in poor, acidic soils.
- It can be found widely in Europe, in moors, open woods, and at the edges of forests. Very common in France’s Massif Central, it colors bare summits a beautiful purplish-pink. Calluna can be confused with the closely related ashy heather, found more in the western half of France.
- It is an extremely hardy plant. Resistant to cold and drought, it has incredible longevity, living up to forty years! It develops an extensive root system that shelters soil fungi. This association enables it to better absorb mineral elements, which are particularly useful in the poor, acidic environments in which it grows.
- Its small, bell-shaped pink flowers attract foraging insects. In herbal medicine, heather is recommended for the prevention and treatment of urinary tract infections.
- At the end of summer, you can pick up a few armfuls of flowering sprigs, observing the rules to avoid harming biodiversity. Calluna can be used fresh or dried.

RECIPE

First step: decoction

1 Place the finely cut flowering sprigs in a saucepan. Cover with water to immerse the plant. Leave to stand overnight.
2 Bring to a low simmer (185–195°F/85–90°C). Maintain this temperature for 45 to 60 minutes, depending on the quantity of plant material. Add water if evaporation occurs in order to keep the plant submerged.
3 Turn off the heat. Cool and strain the decoction through cheesecloth. Reserve the dye liquid.

Second step: dyeing

1 Pour the dye liquid into a stockpot large enough to allow the fibers to be dyed to spread out.
2 Add water to obtain a ratio of approximately 1:20 (see Water, p. 26).

Check bath pH. On wool, with a pH of around 6, you'll get more orangey-yellow shades. If that is not your desired shade, add a little lemon juice. On the other hand, with a pH of 8 and above, shades will be more pink, especially on plant fibers. In that case, add washing soda dissolved in hot water if that is not your desired shade.

3 Submerge the mordanted fibers (presoaked and wrung out) into the bath. Make sure they are completely immersed.
4 Turn on the heat and gradually raise the temperature to a boil (185–195°F/85–90°C). Boil for 30 to 60 minutes, adding hot water to keep the fibers submerged. Stir regularly (approximately every 10 minutes) and gently. Turn off the heat and allow the dye bath to cool.

For silk, you can make the dye bath cold, leaving the fibers to soak for 12 hours and stirring regularly.

5 Once the bath has cooled, remove the fibers and wring them out to dry. Dry out of direct sunlight. Finally, wash with the usual precautions (see Washing, p. 58).