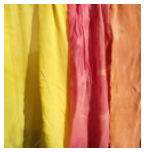

natural dyes

what are they?

They're dyes made from naturally-occurring materials - mainly from plants, but also from minerals, insects and even shellfish. Dyes are soluble and they change the colour of the material they come into contact with, whereas pigments are non-soluble, requiring a binder to hold the colour on the surface of a material. There are chemicals in nature that produce colours. In plants, those chemicals might be in the leaves (e.g. weld); roots (madder); bark (soaked birch bark); flowers (marigold, dyer's chamomile); or even stamens (saffron). Most dye plants grown in temperate regions produce gentle colours in the yellow-orange-pale-green-beige range, but tropical plants can give bright, deep reds, purples and blues. Indigo, a tropical shrub is a source of blue. It's difficult to grow in temperate regions, where blue has traditionally been from woad.

Dyes from rocks and minerals include ochre (oxide-containing clays) for yellow, brown or red; limestone or lime for white; manganese for black; cinnabar (mercury ore) for red; and malachite for green. Rust (iron oxide) can also be considered a mineral dye - which gives, not surprisingly, a yellow-orange-brown colour.

Then there are dyes from animals - brilliant red from insects such as kermes (Europe), cochineal (Americas) or lac (Asia); and royal purple from shellfish of the murex genus.

It's thought that dyes developed from the use of medicinal plants, when it was discovered that they produced colours ('tincture' and 'tint' have the same latin root). Bright colours were difficult to obtain before the industrial revolution, and the rarest dyes were status symbols. Woad was an important part of the economy - the city of Toulouse was built on the wealth from the woad industry - although its manufacture historically involved stale urine and wood ash, prompting Elizabeth I to ban woad dyers from working within 5 miles of her royal palaces. Royalty got their purple robes from the rare and expensive murex shellfish. Commoners were forbidden to wear purple on pain of death. Lady's bedstraw, a plant in the madder family, grows on sand dunes in Scotland. At one point, Scots were picking so much of it (for red dye) that the dunes were eroding. Picking it carried the death penalty.

Isatis tinctoria*, aka woad.*

Samples of plant-dyed colours.

Natural dyes need to be used with mordants (from the latin *mordere* - to bite), which allow the dye to 'bite' onto the fabric, making it set, and stopping it from washing out. Examples are aluminium sulphate (alum), copper sulphate (Bordeaux mixture, that organic gardeners use against blight), tannic acid (from oak bark & leaves) and oxalic acid (from rhubarb leaves). 'Substantive' dyes don't need mordants, because they're from plants that contain natural mordants, e.g. pomegranate skin, which contains tannic acid, and is used in India to produce yellows / browns.

what are the benefits?

Natural dyes can provide colour from local, natural, organic materials. The cheapest and most environmentally-friendly way is DIY (see below).

This may be subjective of course (how many opinions do you need before something becomes objective?), but natural dyes tend to produce more beautiful colours. Synthetic colours can look stark and, well, too synthetic. A traditional Persian carpet will always look more beautiful than a modern carpet (won't it?).

To evaluate the environmental benefits of natural over synthetic dyes is tricky. Certainly the synthetic dye industry is one of the world's most polluting. Most garment manufacture nowadays is in countries with weak or largely unenforceable environmental law, so waste water and sludge laced with toxic chemicals is routinely released

into watercourses. Over 50,000 tonnes of synthetic dyes containing heavy metals, formaldehyde and benzene, and 200,000 tonnes of salt are released into rivers globally each year by the dyeing industry. Natural dyes by definition can be re-absorbed by nature. However, natural dyes require more water and heat per area dyed than synthetic dyes, and if we switched to natural dyes tomorrow, to dye the same amount of material, we'd have to use all the agricultural land in the world. The human population is too large, and we want too many things, to be able to provide for ourselves from natural sources, and so we have to use environmentally-damaging procedures and materials. Maybe we'll realise soon that not everything needs to be dyed, we don't need new fashions every year, and we can't have growth in our population or economy forever. In the meantime we're not advocating large-scale industry, we're advocating, as with most of our topics, small-scale craft production, with plants from the wild and from gardens.

what can I do?

You can find suppliers online, but it's much cheaper to grow and make them yourself. You'll need scales, a stove, some big pots and a recipe book, unless you want to experiment and see what happens. Simmer with a mordant first, then in the dye pot until you have the colour you want. If the colour isn't strong enough, add more dye material. You're not just looking for strong, beautiful colours, but also colours that won't fade - e.g. beetroot will dye something quickly, but it will fade quickly too. Choose a species for fastness and the colour you want, and use a mordant bath to prepare the material before dyeing. Copper and chrome are toxic - so use alum, boil up rhubarb leaves for oxalic acid, or oak bark and leaves for tannic acid, then drain and keep in containers in a cool shed until you need it. Weigh out your alum precisely (home-made mordants will be more hit-and-miss), according to the weight of fleece. It's a different process with plant fabrics - the mordant is mixed with washing soda. You can find fleece recipes in books (see resources).

Here are some temperate dye plants for:

- yellow/orange: onion skins; coreopsis (flowers)
- lemon yellow: weld (leaves and flower stalks)
- greeny yellow: dyer's greenweed (leaves); tansy (leaves/flowers); foxglove (flower spikes)
- pinky yellows or reds: St. John's wort (flowers)
- reds: madder (roots); safflower (flowers)
- purply maroon: elderberries, but it fades fast - in fact all colours from berries fade fast
- blue: woad, a biennial plant, can give a beautiful, pale, translucent blue; harvest the first year's leaves after a few days' sunshine
- green: it's hard to get a good green from plant dyes - it's easier to dye something yellow, then blue; Lincoln green (think Robin Hood) was made using weld overdyed with woad

As well as growing your own, you can collect dyes from the wild. Birch bark can produce pink-brown colours, and walnut leaves give brown (the kind of brown depends on the mordant, but they can also dye without mordant). You can dye plant fabrics with rust. Leave in a rusty bath for 30 mins, then dip it into a bath of water mixed with a little caustic soda (wear gloves) or tannic acid to set it. You can make your own tannic acid bath by soaking oak bark, leaves or galls. With a tannic acid bath, you can achieve a deep brown-charcoal colour.

Dyeing with coreopsis.

resources

- see lowimpact.org/natural-dyes for more info, courses and books, including:
- Jenny Dean, *Wild Colour* - dyeing history
- Gill Dalby, *Natural Dyes: Fast & Fugitive* - fleece dyeing recipes
- Gill Dalby, *Natural Dyes for Vegetable Fibres* - plant fabric recipes
- oecotextiles.wordpress.com - looking into the toxicity of natural v synthetic dyes
- naturaldyes.org - Natural Dyes International, researching & promoting natural dyes
- wildcolours.co.uk - information on growing and using natural dyes