# Damsons & Dyeing

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Excerpt from 'The Fruit Trade in the Area of Bewdley and the Wyre Forest' by Brian Stephens (Unpublished report for English Nature, March 2005)

Damson, *(Prunus domestica L.)* Wild Plum, characterised by its flattened stone, has been found in Britain from remains of late Iron-Age, (Maiden Castle, Dorset); Roman, Silchester, Hants); Late Anglo-Saxon (Hungate,York), and Norman, but is not native. A sub-species *P. insititia L.* the Bullace is also found, (less flattened seed). This occurs wild in Britain and parts of Europe. It is thought that the Damson derived from the Bullace, taking the name from Damascus where the fruit was grown before the Christian era and was originally known as the 'damas cene'.

From the Middle Ages to about 1860, the economy of the Wyre Forest area was of stock rearing. Fruit growing was largely the concern of the large estates. The Vale of Evesham was noted for corn growing. During the late 19th century and the changes consequent upon the Industrial Revolution, piecemeal enclosure of the scrub and woodland took place and the numerous small farms created the landscape we have today. Fruit was found to do well and could be grown along with livestock. Damsons were planted at intervals along hedges as well as in proper orchards.

One encounters rumours that damsons were used for dyeing yarns and the strong colour of the fruit juice and damson skin (epicarp) suggests a plausible idea. An interview with the Chairman of the Westmorland Damson Association, Mr. Peter Cartmell, in the Times of 6th April 2002, mentioned that "before the advent of artificial dyes, damsons were much in demand by the textile industry" giving various colours depending upon the mordant used, for example ammonia giving a green karki-like colour.

Correspondence with Peter Cartmell, (now President), reported work done by his Association. Anecdotes concerning the use of damsons for dyeing are numerous and from every damson growing area; Buckinghamshire, (uniforms and hats at Luton), Westmorland and Cheshire, (woollen textiles at Bradford and Leeds, cotton in Manchester), Shropshire and Worcestershire (military uniforms, textiles and carpets), even pottery, and a dye called Kendal Green is said to have used damsons. A search of 18th century dying manuals produced no evidence. Enquiries into the use of damson dye for uniforms is continuing.

Two references in print have been seen to date. T.W.Sanders, 'Fruit and its Cultivation', (Collingridge, 5th Ed 1942, p45), and C.D.Mel, 1933, in the Textile Colorist. Sanders writes; "The damson was formerly cultivated very largely in cottage gardens in Shropshire, Cheshire, Worcester and Hereford, and we have known individual trees to yield fruit to the value of £5 in one season. High prices were realised for the fruit in the last century, it being in great demand for yielding liquor for dyeing purposes. The latter having been superseded by chemicals". The reference to 'high prices' suggests that written evidence may well exist somewhere. (£5 about a weekly wage for a teacher).

Mel, (1933), in a brief article in 'Textile Colorist', also seems to confirm the use of damson dye, but gives no references. He mentions the dye from Blackthorn *(P. spinosa)* being discussed in a former article in the 'Textile Colorist' and considers Damson *(P. insititia)*. His information is not very specific. Without quoting sources, like Sanders, in effect substantiating the rumour. Damson...."was employed at one time or another for dyeing purposes both in England and continental Europe. The fruit of the sloe tree produces a reddish black dye, while that from the damson is inclined toward a purplish hue and is perhaps a slightly faster color, when the fabrics, (he does not say which.) are properly mordanted with alum. Both of these tinctorial materials were formerly preferred for coloring liquors and medicines, (presumably because they were safe to consume!), but they were used also, though less often, in household dyeing processes; their demand was never very extensive and yet in parts of France and Spain a rather large use was made of them when .... similar dyes from other sources were in insufficient quantities."

Mel's concluding paragraph is quoted in full as follows. "Dyes known and used among English dyers as plum colors and which may be described as being reddish purple are not obtained from the damson or related species, as the name might indicate. They are not unlike the dahlia shades of the printers, which are obtained from logwood, as a coloring matter, and tin as a mordant. These shades are prepared by mixing a decoction of logwood with a solution of tin called gum spirits. But the fruit of the damson affords a coloring substance almost similar to the dyes above referred to by simply preparing a decoction of the crushed-up fruit, which gives a purple color. This is prepared in a manner similar to the dye from blackberries. (Dye from blackberries mentioned in Cannon, 2002, Goodwin 1982.) Blackberries or damsons are crushed and put into cold water and brought to the boil and the mordanted wool put in. The wool must be mordanted with four ounces of alum, two ounces of cream of tartar and one ounce of common salt to one pound of wool. The inner bark of the Logwood tree is said to afford a dye similar to that of the fruit." As explained below, the damson pigments are denatured in alkaline solution. Acid conditions retain the purple colour and acidic potassium tartrate, found in nature, is slightly soluble. When wine is made, argol or lees of wine, is formed as a reddish, hard, crust of crystals on the sides of wine vessels. By purifying argol, a white crystalline compound, Cream of Tartar, is formed, from which tartaric acid is made.

A former Head Dyer with Carpet Trades, Mr. George Cassidy at Kidderminster Carpet Museum had never heard of fruit being used. Mr. David Mills, Curator at Walsall Leather Museum, asked Mr Bill Rollinson, Colour Matcher and Dyer with 50 years experience of leather work, and he had no knowledge of fruit being used for dyeing leather. The Guild of Dyers and Colourists (The journals of which are in the Kidderminster Carpet Museum) has no records of damsons being used.

Nicholas Liddle at DEFRA's Scientific Laboratory at York has recently produced a brief internal report on this topic, (eight pages), in the context of their evaluation of new crops and search for alternative uses. This study, considering the feasibility, performance and environmental consequences of using damsons for dyeing, consulted Textile Research, Natural Dyers, archaeologists, historians, chemists, botanists, but still no evidence for the use of damsons. There seems no documentary evidence that damsons were used extensively or techniques developed.

Before synthetic dyes, techniques had changed little over 6000 years. There is a long list of plant parts producing dyes, but few from fruits or fruit trees. Apple bark, *Malus*, using alum, gives a yellow and damson bark as above. Blackthorn fruit or sloes, *Prunus spinosa L.*; berries from Elder, *Sambucus nigra*; Privet, *Ligustrum vulgare*; Blackberry, *Rubus fruiticosus*; Cranberry, *Vaccinium oxycoccos*; each with alum, gives a blue colour. Only Whortle berry, *Vaccinium myrtillus*, does not need a mordant. So if sloes can be used why not damsons?

Dyes need to be 'fast', i.e. durable with use, over time, withstanding washing, light and perspiration. Most natural dyes are soluble and require a mordant to make the pigment insoluble and attach to the fabric. The mordant forms a soluble compound between the dye and various metallic salts. The cloth is immersed in the solution of mordant, and the mordant is then hydrolysed by heating, to produce the insoluble hydroxide and the dye is bound to the fibres by a chemical link between cloth and dye-salt complex. Mordants are often metallic hydroxides, with Alum, (Aluminium potassium hydroxide), the most generally used. Others include iron, tin, copper, chromium or oxalic acid (Rhubarb).

An enormous number of compounds are known to chemists as heterocyclic rings, molecules of which are partly built up from carbon and hydrogen atoms and partly from atoms of nitrogen, sulphur or oxygen. Many important dyestuffs, haemoglobin, most plant pigments, including chlorophyll, and the alkaloids, are all heterocyclic in structure. The pigments which colour plants are of three types; Chlorophyll which gives green and yellow tints, the anthoxanthins which give pale yellows and the anthocyanins which give the red, mauve, violet and blue colours. Damsons contain anthocyanin, which is water soluble and easily extracted into a weakly acidic solution.

Because the pigments in damsons are anthocyanins and soluble, they do not attach well to natural fibres and thus need a mordant. However anthocyanins are unstable with the high alkalinity and the metallic ions of the mordant dyeing process, and no doubt these properties make damsons unsuitable for mordant dyeing on any scale. 'Natural' dyers use damsons successfully, (Goodwin), using vinegar or oxalic acid as mordant, i.e.acid dyes. Under acid conditions damsons yield a purplish dye. With ammonia and alum mordants, (alkaline), damsons give greenish colours. When dyeing was done on a small scale damsons could well have been used for either process.

Another class of natural dyes, exemplified by indigo, is insoluble. Most people have heard of woad. In Europe indigo dye was extracted from *Isatis tinctoria L.* (Brassicaceae), but this important dye has been known world-wide, since the most ancient time, in the tropics extracted from leaves of any of the 350 or so species of the Genus Indigofera L. (Fabaceae), (formerly Leguminosae) and also other genera, by a process of vat dyeing. For some years Professor Philip John at Reading University has been investigating the chemistry and microbiology of indigo dyeing. Present modern dyeing methods produce tonnes of sulphur waste in the production of Denim. Electrochemical methods are being investigated as an alternative with the possibility of using bacteria to enhance the process. In recent work, the medieval method has been re-discovered using documents and recipes as old as an 8th Cent. Irish law text. Fresh leaves were crushed and the paste kneaded in to woad balls about 10cm diameter, which were air dried. These could be stored indefinitely and transported all over Europe. Leaves do not contain indigo, conversion to indigo occurred in the woad balls. The leaves do contain several glucosides which, when hydrolysed by bacteria and an enzyme in the plant tissue give glucose and indoxyl. Two molecules of Indoxyl readily combine, when oxidised by atmospheric air, to form indigo. No indoxyl compounds were found after the balls had dried.

To be used, the balls had to be couched to extract the indigo. They were crushed, wetted and aerobic microbial growth cultured carefully for two weeks then allowed to dry. The next stage was to render the indigo soluble. Transferred to a vat, kept at 50°C, and in anaerobic, alkaline conditions, a vigorous fermentation develops. Culturing bacteria on nutrient agar containing indigo, a new species of *Clostridium* was isolated, which reduced the indigo to a colourless form called leuco-indigo, and which the researchers called *C.isatidis*. This was confirmed when dyebath waste from 10th Cent. Anglo-Scandinavian remains, waterlogged, with no oxygen, yielded woad from the fibres of which *C. isatidis* was also isolated. The textile is 'dyed' with this solution of leuco-indigo, and the colouring matter, now in the fibre, is regenerated by oxidation in the air, a process called vat dyeing. Since about 1890, indigo has been made synthetically and is still important world-wide for dyeing. The medieval methods discontinued and the remarkable technology almost lost.

Before modern storage methods, questions of quantity, transport and supply for any prolonged commercial production would arise if damsons were to be used. Although John Rea of Kinlet writing in 1676 mentioned the "Pruine Damson, a good fruit to dry or preserve" and nowadays health and environmental concerns would apply to the use and disposal of mordant chemicals. With so much oral tradition it does seem possible that various techniques for dyeing were used, especially in the early stages of the Industrial Revolution, in the 18th century and before 1856, when cloth manufacture was still a cottage industry. With workers in keen competition, trade secrets might well have remained within a family to be passed on orally, and without record the knowledge lost.

Evidence is likely to be found incidentally, in documents such as wills, business transactions, letters, inventories, military and other archives. There is a strong local connection with dyeing through the Bewdley river trade and of course the textiles in Kidderminster from 1735. There is a photograph in Kidderminster Library showing a shop premises in the town as a 'Dyers' and the old dye house in Dixon Street still stands. On a small scale, in season, with a local supply, damsons may well have been used for dyeing. The present opinion is that industrially it did not happen, and fairly certainly not after 1856.

Samuel Skey (1726-1800) and family, of Bewdley, made sulphuric acid and sulphates until 1825, dealt in copperas and Logwood,



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all used for dyeing. ('Copperas' was a name formerly applied to copper sulphate, and other sulphates, now only to ferrous sulphate). 'Logwood' is the commercial name of a small tree, native in central America and the West Indies, *(Haematoxylon campechianum)*, (The wood is the source of Haematoxylin much used as a black dye for textiles. The heart-wood is red and the specific name refers to Campeche in southern Mexico). The tree was cultivated in the Caribbean region for ornament and as a hedge plant, but more important as a commercial source of honey. The dark, heavy heartwood is the source of a dye, mainly used for blues or black and ink. Logwood was first used in Britain at the time of Elizabeth I. Samuel Skey prospered. In 1775 he acquired land from Lord Foley and started work to develop his estate, Spring Grove, part of which we now know as the West Midland Safari Park. (Ironically, Spring Grove House, built by Samuel Skey between 1787 and 1790 was gutted by fire on Christmas Eve 2006.)

The first synthetic dyes were discovered by W H Perkin in 1856, a student of eighteen, at the Royal College of Chemistry, London. While attempting to prepare quinine by oxidising aniline sulphate, he obtained a black tar from which he laboriously isolated five percent as Mauveine. Since the aniline was obtained from coal-tar, mauveine became the first of the so-called 'coal-tar dye stuffs'. Many other coal-tar dyes were soon discovered such as magenta, Bismark brown, methyl violet, malachite green, with enormous economic and international impact. In Europe, great quantities of madder *Rubia tinctorum*, had been grown. The ruberythric acid obtained from the roots produced alizarin which, with various mordants, gave a range of dyes called 'lakes'. The madder industry was wiped out by the new dyes and in spite of them being a British discovery, and in spite of Mr. Perkin's enterprise, Germany soon controlled nearly ninety per cent of world production and captured the market to such an extent that during the First World War Britain had to import German dyes for uniforms, via USA and Portugal. From the 1860's the Perkin dyes became widely used by the Kidderminster carpet factories.

The Defra report concludes that more research of the kind cited above regarding wood, will be needed to overcome technical limitations of natural dyes as regards consistency and performance with modern alkaline washing powders and synthetic fibres. Apart from 'one-off' products, dyes would need to be produced to standard quality which would be difficult when the colour and tinctorial strength of the fruit varies with season and development The Welsh Border counties, the Vale of Evesham, north Worcestershire and the Lyth and Winster valleys between Kendal and Windermere, have the remaining concentrations of damson trees albeit a fraction of former times, (and incidentally are tourist areas), with some potential to support a small trade in a niche market for natural products.

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