

Vegetable dyes in biobulding and artistic handicraft

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A fourth-generation colour producer, in 1993 Mr. Mosca started a research programme whose final aim was to produce bioecological paints. In 1995 the first patent was achieved, for the industrial use of organic binders such as milk, eggs, beeswax and some of their derivatives.

Then the research was devoted to white or neutral colour bases, as well as to discovering long-forgotten traditional dyes. Beside inorganic pigments such as earth, clay, iron oxides and other light metals, the vegetable world soon began to be investigated. The first experiences were made with pigments from Iran: dyeing flowers or roots that are micronized in dry or wet conditions. The blues (various types of indigo) and the yellow-oranges (saffron) are exceptionally beautiful and appreciated in several building-sites, but their export was not permitted by Iranian laws in the desired quantities.

So the research and development were turned to vegetable pigments imported for cosmetic uses. Most vegetable pigments can be applied only in interior decoration and the main problem is the tone change after some months, which compels to exclude some extracts and to mix others with natural earths or with other pigments such as cochineal.

A new stucco with very good aesthetic properties was also made up, where chalk was added with dyeing flowers thanks to the tensio-active power of egg yolk stabilized by essential oils. The deriving colour palette was greatly appreciated and gave new life to the declining Venetian stucco.

In 1997 new precipitates of chlorophyll and of other vegetable extracts on inorganic bases such as natural earths were obtained by a chemist, by whose collaboration vegetable dyes were produced, that used a mix of caseine and albumine, stabilized with essential oils and vinegars. They were developed into wall paints such as lime paints, water and glaze colours.

In the same period, Spring Color collaborated with a farmer association and a regional extension service in the European project "Cilestre" aimed at rediscovering dyeing officinal plants, mostly suitable for textile uses. The most interesting yellows are safflower and mignonette, red is *Robbia*, blue is *Isatis tinctoria*, that is, woad. The latter is much more resistant than the commonly imported indigo and has been in use for centuries, before the advent of cobalt blue in the 18th century: it was known as "vitrum" by the ancient Romans, as the blue gold of middle-age textile traders, as the French "pastel" (whose extraction technique was rediscovered by Toulouse University in the '90s). In Italy its cold extraction has been successfully performed.

At present, Spring Color collaborates with a cooperative in Central Italy active in teaching/showing natural dyes in a museum, in field crop trials and in the extraction and production of water-colours for various artistic handicrafts (ceramics, thin pastelboard, decoupage).

My name is Roberto Mosca and I am the owner of a small artisan company that produces mortars, paints and varnishes since 1958 located in a central region of Italy. My family has dealt with paints and related products for 4 generations and I still possess a hand mill that was used by my great grandfather to grind mixtures of colouring earths and oil. As a consequence of the serious illnesses, due to toxic paints, that struck my father, my grandfather and other workers in the field that I was acquainted with, in 1993 I decided to begin researching into the possibility of producing non-toxic or ecological paints.

In 1995 I attained my first patent for the industrial use of organic binders made of milk, eggs, beeswax and their by-products. Once having obtained good white and neutral base paints, I continued to research into the traditional natural colourings forgotten over time. Apart from the inorganic pigments such as, earths, clays, iron oxides and other light metals, together with my collaborators, I began to explore the vegetable world.

My first experience in using vegetable dyes was with the pigments I managed to obtain from Iran. The same pigments that are used for the original Persian carpets. These pigments were flower or root dyes which are ground by dry or humid techniques. The blue dyes (various types of indigo) and

the yellow-orange dyes (saffron) are exceptionally beautiful and appreciated by many architects that have used the paints coloured with these dyes on building and restoration sites. Unfortunately, the use of these dyes is impeded by the fact that the Iranian export restrictions do not allow large quantities to be exported abroad hence favouring the local artisan. At that point in time, our research and development of vegetable pigments turned to the wholesalers who import pigments mainly for the cosmetic industry. We found that the majority of these pigments could be used in paints for internal walls only because the colour would alter after a few months. So many vegetable extracts were discarded while others were mixed with natural earths or pigments, such as cochineal. We also discovered a product that produced excellent aesthetic effects: a shiny stucco with a lime base in which the flower dyes are highlighted by the tensioactive reaction of the egg yolk which is stabilized by essential oils. Our latest colour chart has been highly appreciated and the use of a new colour effects has given new life to the venetian stuccos which have suffered an economic decline on the market in the last few years.

In 1997, Gianni Giovannini, a chemist from Modena, perfected several condensations of chlorophyll and other vegetable extracts on inorganic bases such as natural earths. The following year we began to collaborate with him and together we were able to produce vegetable colourings with a mixture of albumin and casein which were stabilized with essential oils and vinegars.

Thanks to these colourings, also sold to other producers, Spring Color has perfected new colour charts for wall paints, coloured lime washes, temperas and glazings.

The Agricultural Development Organisation of the Marche (ASSAM) together with the Confederation of Italian Agriculturists (CIPA-AT) and the European Union, are presently developing the project "Cilestre". The project's aim is to rediscover the officinal dyeing plants, especially for colouring textiles. Spring Color was also asked to participate in the project and so far the results have been very interesting. We have found pigments that are more resistant in both alkaline and acidic environments, and above all on external surfaces. The successful yellows are *cartamo* and *reseda*, *robbia* for red, and we have obtained blue from *isatis tinctoria*, or better known as *guado*. The blue *guado* is more resistant than the indigo blue usually imported to Italy, and it was used for centuries before cobalt blue was introduced in the 1700s. *Guado* blue was the *vitrum* of the Ancient Romans and the blue of the old Italian Masters. It was also known as the blue "gold" of the Renaissance merchants being an important part of the economy of central Italy. Piero della Francesca's father was one of these merchants who worked in the textile market. Recently, 60 ancient mills for grinding guado were found in the central Apennine area. And finally, the French in the 1990s at the University of Toulouse were the first to rediscover the ancient methods of extraction of the blue *guado*, calling it *pastel*.

The extraction of *guado* in Italy was first done by Massimo Butta who works with an agricultural cooperative called "La Campana" near Ascoli Piceno. Spring Color also collaborates with the cooperative "Oasi San Benedetto" of Borgo Pace near Urbino, which organizes educational activities; has a museum of vegetable colourings; has set up experimental cultivation; and extracts vegetable pigments to produce water colours, using Spring Color's natural binders, for various artistic craft works, such as ceramics and decoupage.