Structural identification of historical textile dyes gives important information on the time and style of manufacture of the textile residue. These dyes primarily contain carotenoids, hydroxyketones, anthraquinones, napthaquinones, flavones, flavonols, flavanones, indigoids and the like. Analysis of natural dyes shows that approximately half of the colour imparted to the textile product comes from the flavonoid compounds contained in the dye. The analysis of flavonoid dyes present in textile products can be performed using non-invasive techniques such as FTIR microscopy and SEM/EDS, extractive techniques coupled to HPLC/diode array detector, or pyrolytic GC/MS following derivatization with the aid of hexamethyldisilazane. Unfortunately, these sophisticated and costly techniques are not available to many routine laboratories. It is known that flavonoids are also antioxidant compounds. Therefore, the CUPRAC (cupric reducing antioxidant capacity) assay originally developed in our laboratories [1] has been modified to cheaply and rapidly estimate the total flavonoid content of natural dyes. As the reference method of comparison, the widely used AlCl₃/potassium acetate spectrophotometric method [2] was applied to total flavonoids assay of these dyes.

The results of the proposed and reference methods were expressed in the units of quercetin (QR) equivalent flavonoid concentrations (QREFC). The total flavonoid content of the natural dyes: *Rubia tinctorum* L. (dyer’s madder), *Curcuma longa* L. (turmeric, zingiberaceae), *Alkanna tinctoria* (dyer’s bugloss), *Matricaria chamomilla* (German chamomille), *Coccus ilicis* (kermes), as assayed by the CUPRAC method, were found to be 33.4, 55.5, 17.9, 65.2, and 136 μmol QR/g, respectively, and these values were compared to those found by the aluminum chloride reference spectrophotometric method. The method of standard additions was applied to the solutions of these dyes by adding standard increments of QR and measuring the resulting absorbances. The molar absorptivity of quercetin in the developed (CUPRAC) and reference (AlCl₃) spectrophotometric methods were 8.2x10⁴ Lmol⁻¹cm⁻¹ and 2.3x10⁴ Lmol⁻¹cm⁻¹, respectively.

References