ABSTRACT

Globally, the tradition of textile dyeing with bio-colorants suffered tremendously with the introduction of synthetic dyes in the mid 19th Century. Later studies reported that the use of synthetic dyes is not eco-safe and alleged to cause human health problems and to date this has shifted researchers'attentions on natural dyes as alternatives. In Uganda, many dye-yielding indeginous plants have been identified but information about the nature of these bio-colorants and methods for their extractions and applications is still limited. In this study, four dye-yielding plant species were selected namely; *A. coriaria, V. paradoxa, M. lucida* and *H. madagascariensis*. Phytoconstituents were determined through various techniques *viz*: phytochemical screening, chromatography, UV-Vis and FTIR spectroscopy. The extraction of dyes and their application on cotton and silk fabrics were optimized and adsorption-kinetic of fabrics mordant dyeings was studied. Dyestuffs from *A. coriaria* and *V. paradoxa* constitute of gallotannins and proanthocynidins respectively. Flavonoids were confirmed in dyes from *M. lucida* and *H. madagascariensis* and traces of anthraquinones were confirmed in the dyes. UV-Vis spectrometry method was modified and successfully used for quantification of dyes from plant samples. Good dye extraction yield (upto 10% w/w dry basis) and good filterability was achieved by use of dilute sodium bicarbonate solutions (0.65 to 0.8 % w/w) and by the optimized sample particle sizes (0.5 to 0.7 mm), M: L ratios (1:40 to 1:45), and extraction times (30 to 40 mins). Mordants used tremendously improved on fastness to between fairly good (3) and excellent (5) and mordanting method is unique to a plant species. Stronger and more brilliant shades in terms of *k/s* values were registered on silk. SM and PM dyeing using *M. lucida* dye extract followed PSO reaction model (chemisorption) and mordanting followed PFO reaction model (physisorption). Greater dye adsorption has been identified in PM method. Dyeing of fabrics followed Langmuir and Freundlich isotherm models which are homogenous forming monolayers. From kinetic models, dyeing speed can be improved by increasing the dye concentrations. Optimized extraction and dyeing variables are unique to a particular plant species and it is therefore important to study samples from each plant. More importantly, further studies should be conducted on the methods of preservation of the extracted dyes. Additionally, more investigation is needed to further the use of natural dyes from identified plants for cosmetics, food, leather and drugs.