A STUDY OF INDIGENOUS DYE PRODUCING PLANTS AND THEIR DERIVATIVES IN TEXTILE DYEING

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"I certify that this thesis does not incorporate with acknowledgment any material previously submitted for a degree or diploma in any university and to the best of my knowledge and belief it does not contain any material previously published or orally communicated by another person expect where due reference is made in the text."

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ABSTRACT

With the discovery of synthetic dyes all colour industries, not only textile industry had turned to the more economical, reproducible, high colour fast and easy to use synthetic dyes and abandoned the natural dyeing tradition which had prevailed as the only colouring technology till then. But recently a revival in the natural dyeing technology has occurred as solutions to the environmental pollution arising out of the wet processing of textiles as well as to the growing trend of dye toxicity and allergies to the textile consumers. Natural dyes provide not only a good alternative to the environmental pollution arising from synthetic dyes but also provide low toxicity and allergic reactions while giving unique and fascinating colours which are not achievable from synthetic dyes.

A thorough review to the historic background of the origin and progression of natural dyeing techniques in the world with specific concern to Sri Lanka was carried out. During this review a search was also made into the reasons for the erosion of this valuable tradition of natural dyeing. Through a survey of the natural dye producing plants world over, a list of indigenous dye producing plants in Sri Lanka was prepared and investigated the possibility of using one of these plant sources to develop a new natural dye based on its extraction. In selection of this plant source the major concern was given to the fact that it should be abundant as a waste material in Sri Lanka.

Black tea, which is highly available as a waste (dust) from tea factories and domestic sources (brewed tea) were used to extract polyphenols, which are an abundant form of natural compounds in tea. These were used as the coupling component to produce azo compounds by coupling with different diazonium salts. Both polyphenols and azo compounds were separated and solidified and thus obtained azo compounds had variable colour shades depending on their respective diazonium salts. The possibility of applying these azo compounds as in-situ azo dyes on 100% cotton and ready-made insoluble disperse azo dyes using HTHP conditions on 100% polyester, 100% nylon and 100% wool were investigated. Different azo compounds produced different colour shades on different fabric types as well as on the same fabric type. Optimisation of dye bath conditions to improve the take up of polyphenols by cotton using the in-situ

application of azo dyes was also carried out. The colours produced on cotton were not very bright and showed moderate colour fastness to washing, good colour fastness to rubbing while the brilliant colours produced on polyester showed good to very good wash, rub and sublimation fastness, after reduction clearing. The colour depth and fastness on nylon and wool were better than those on polyester. The light fastness of all the azo dyed samples was poor and should be improved using suitable after treatments. The percentage yield of polyphenols for both used and unused black tea leaves and the percentage yield of different azo compounds obtained from unused black tea leaves were calculated.

The study was basically carried out with the aim of investigating the traditional dyeing techniques and indigenous dye producing plant sources in Sri Lanka and to assess the possibility of using polyphenols from one of the selected plant resources. Tea, which is abundantly available as tea waste (dust) from factories and brewed tea leaves from domestic sources was selected as the natural source of dye or dye intermediate for textile dyeing.

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