

RSM approach to study the influence of hard water on natural dyeing of cotton fabric by *Punica granatum* peels

I. Khalid¹, S. Ali¹, M. T. Hussain^{2*}, M. Atif¹, U. Habiba¹ and M. A. Iqbal¹

¹Department of Chemistry, University of Agriculture, Faisalabad, Pakistan

²Department of Applied Sciences, National Textile University, Faisalabad, Pakistan

*Email: mtahirhussain@gmail.com

Hardness in the ground water poses adverse effects on the dyeing quality of textile products. In wake of a growing trend to adopt natural dyeing at commercial scale, a study was conducted to evaluate influence of water hardness on the extraction yield of natural colorants from pomegranate (*Punica granatum*) peels and also on the dyeing quality of cotton fabric. Furthermore, efficiency of pre-mordanting and post-mordanting for the fixation of natural colorants was also investigated. The levels of water hardness at which they pose minimum influence on the dyeing quality of cotton fabric were explored with respect to time, temperature and mordanting type using RSM approach (Response Surface Methodological Approach). Results showed that the increase in water hardness adversely affected the color strength having significant degree of spots formation and unevenness on the dyed samples of fabric.

Keywords: Pomegranate peels, Pre-mordanting, Response surface methodology, Water hardness