Bio-Waste Materials as Eco-Friendly Mordant in Fabric Dye Process

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Due to the increasing awareness of conserving environment through reducing pollutants, the aim of finding natural colorants and mordants to substitute synthetic dyes and chemical mordants is crucial. This project aims to investigate the possibility of using bio-waste as eco-friendly mordants in dyeing cotton fabrics with Allium Cepa extract. Cotton fabrics were treated with extracts from rambutan rinds, pineapple waste, tea waste, mangosteen skin, fish scales and alum by premordant, metamordant and postmordant methods before dyeing with Allium Cepa extract. Colour fastness, effects of temperature, concentration and soaking duration are studied. The colour of dyed fabrics were picked using a colour picker for RGB values then converted to L*a*b values. The total colour difference, dE between fabrics were calculated. From the results, premordant with bio-waste show higher dE than alum and shows a significant difference of $P<0.01$ with unmordanted fabric. Light fastness show non-significant in colour change while wash fastness show a significant decrease ($P<0.01$) but the dE shown is still higher than unmordanted fabric. 50% concentration mangosteen extract yields the highest dE compared to 12.5% and 25%. Mangosteen extract shows satisfactory dE at room temperature, non-significant in light fastness but significant decrease in wash fastness. For temperature and soaking time, as the variables increase, dE increases. 2 hours soaking with mangosteen extract is able to yield higher dE than alum. Therefore, I conclude that bio-wastes can be used as natural mordants as they not only reduce and reuse the bio-waste but also reduces the usage of chemical mordants.

Awards Won:

Intel ISEF Best of Category Award of $5,000

First Award of $5,000