Supplementary material

APPLICATION OF EXTRACTED COLORANT FROM BI-MIXTURE OF COCOA (*THEOBROMA CACAO L.)* AND CUTCH (*ACACIA CATECHU*) FOR COTTON DYEING

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Table S1 Central composite design for selection of dyeing variables through colour strength (K/S)

Sr. No	Powder amount (g/100mL)	Time (min)	Temperature (°C)	Salt (g/100mL)	Dyeing pH	(*K*/*S*)
1	4	35	60	2	11	0.5774
2	8	35	60	2	9	0.7273
3	4	55	60	2	9	0.5370
4	8	55	60	2	11	0.7091
5	4	35	80	2	9	0.4770
6	8	35	80	2	11	0.6928
7	4	55	80	2	11	0.6022
8	8	55	80	2	9	0.9629
9	4	35	60	4	9	0.4914
10	8	35	60	4	11	0.5368
11	4	55	60	4	11	0.6154
12	8	55	60	4	9	0.7444
13	4	35	80	4	11	0.5731
14	8	35	80	4	9	0.8148
15	4	55	80	4	9	0.4594
16	8	55	80	4	11	0.6838
17	2	45	70	3	10	0.6819
18	10	45	70	3	10	0.6364
19	6	25	70	3	10	0.3990
20	6	65	70	3	10	0.5228
21	6	45	50	3	10	0.4014
22	6	45	90	3	10	0.4658
23	6	45	70	1	10	0.4641
24	6	45	70	5	10	0.4501
25	6	45	70	3	8	0.4978
26	6	45	70	3	12	0.5730
27	6	45	70	3	10	0.6597
28	6	45	70	3	10	0.6768
29	6	45	70	3	10	0.6650
30	6	45	70	3	10	0.6732
31	6	45	70	3	10	0.6489

Table S2 Anti-oxidant activity of extract before and after radiation and fabric before and after dyeing and mordanting

Sr. No	Samples number	Anti-oxidant activity
1	Binary extract (without radiation)	54%
2	Binary extract (with radiation)	82%
3	Non dyed fabric (without radiation)	29%
4	Non dyed fabric (after radiation)	43%
5	Dyed fabric (without radiation)	38%
6	Dyed fabric (after radiation)	46%
7	Dyed fabric mordanted with Fe^{2+}	54%
8	Dyed fabric mordanted with myrobalan (MB)	49%

$Fe^{2+} = FeSO_4$

Table S3 Tonal values of optimum fabrics dyed before, after and during chemical and bio-mordanting

Mordant used	*Colour Strength (K/S)*	*L**	*a**	*b**	*C**	*h*
TA 1.5% before dyeing	4.108	56.05	11.08	17.74	20.92	58.02
Fe^{2+} 2.5% before dyeing	2.135	61.96	20.82	20.07	28.92	43.95
Al^{3+} 1.5% before dyeing	0.874	73.23	23.19	16.97	28.73	36.21
SU 2% after dyeing	1.048	71.53	23.06	17.56	28.98	37.29
MB 2% after dyeing	2.847	71.76	12.76	27.22	30.06	64.89

TA= tannic acid, Fe^{2+}= $FeSO_4$, Al^{3+}= Alum

Figure. S1

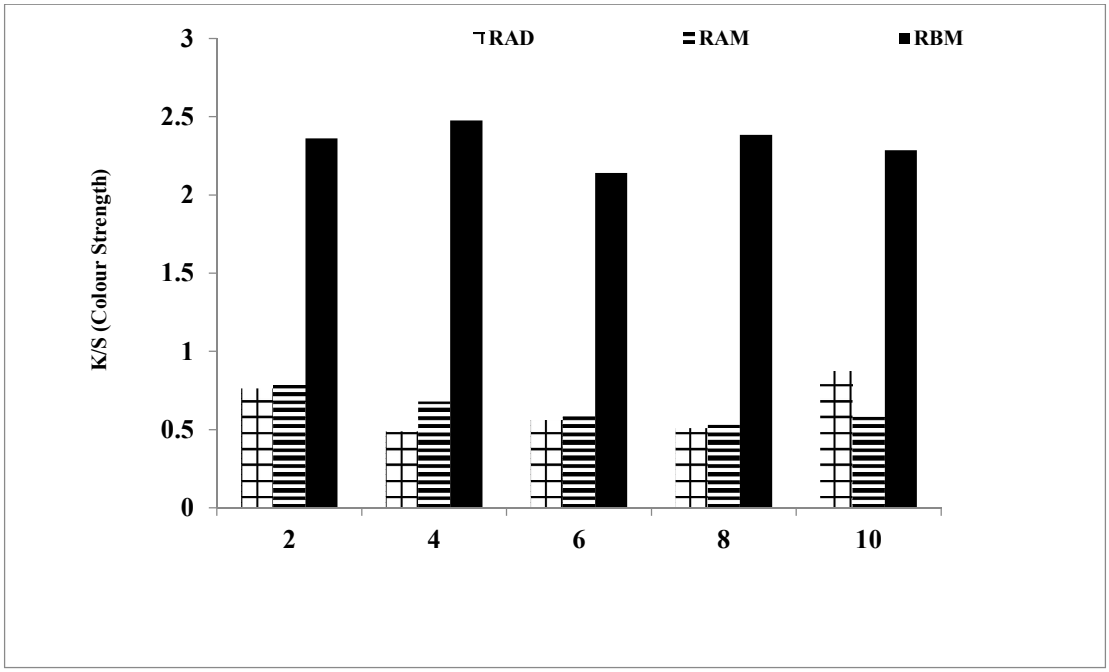

Figure S1. Impact of MW treatment after dyeing (RAD), after mixing (RAM), and before mixing (RBM) for cotton with binary extract of cocoa and cutch

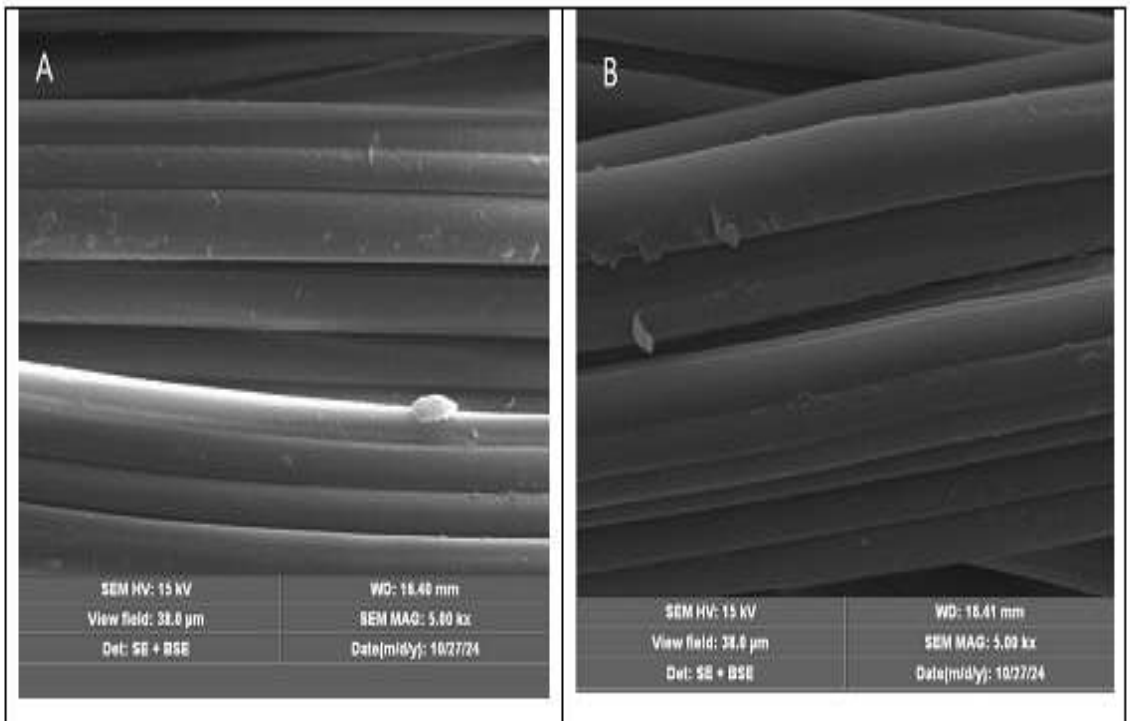

Figure S2. Scanned images of cotton before (A) and after MW treatment (B)

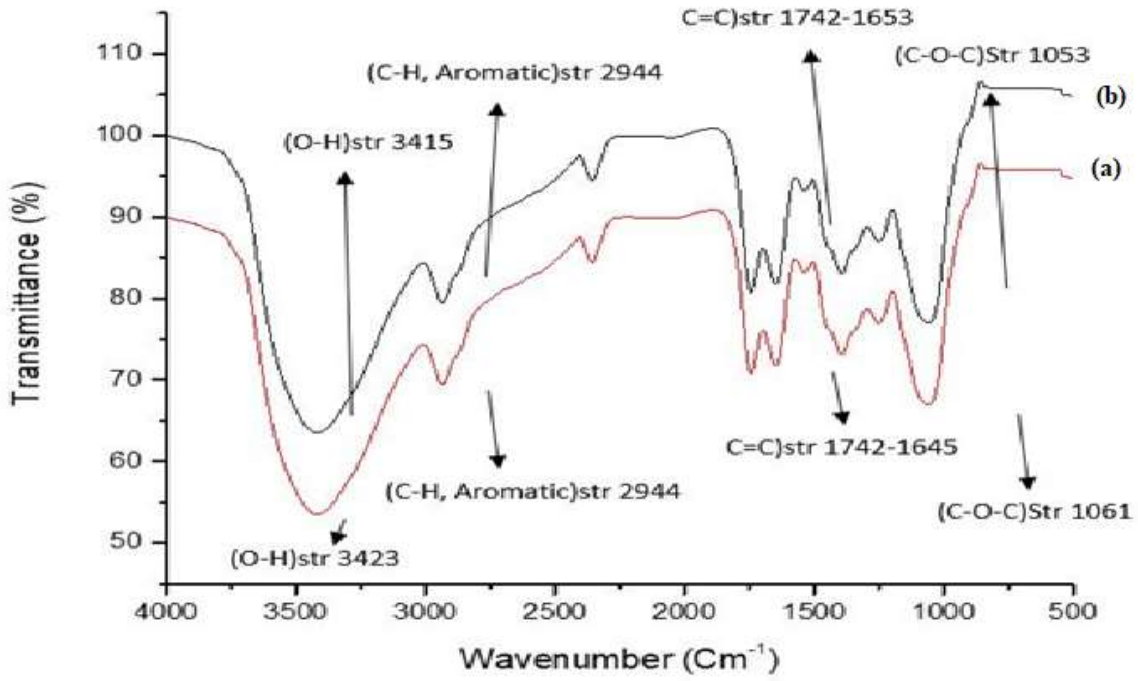

Figure S3. Scanned spectra of binary extract of cocoa and cutch extract before (a) and after MW treatment (b)

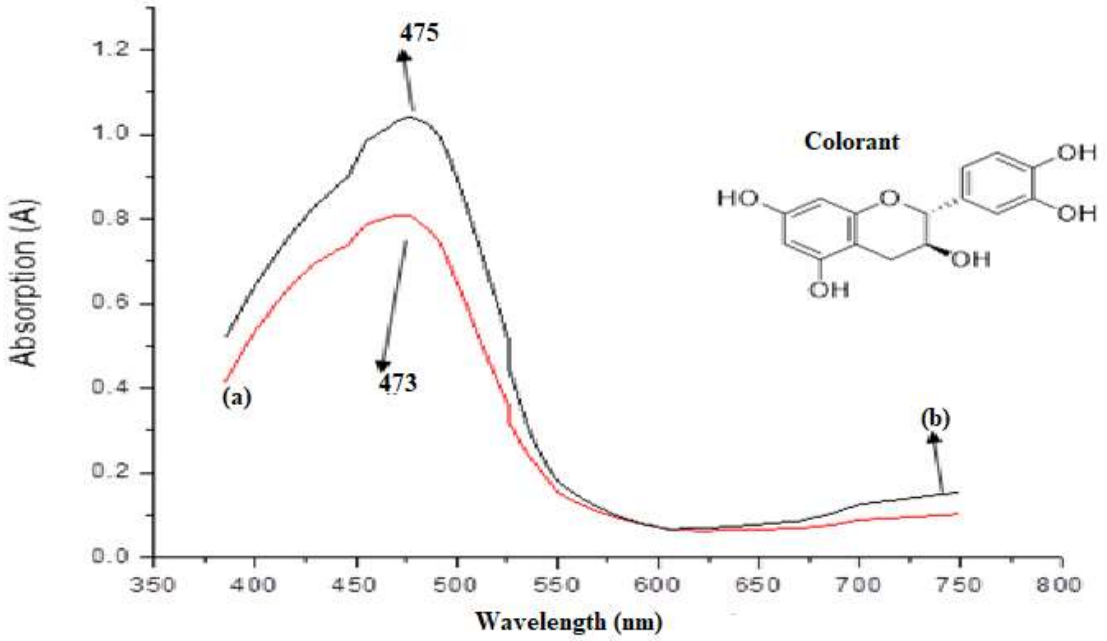

Figure S4. Absorption of binary extract of cocoa and cutch before (a) and after MW treatment (b)

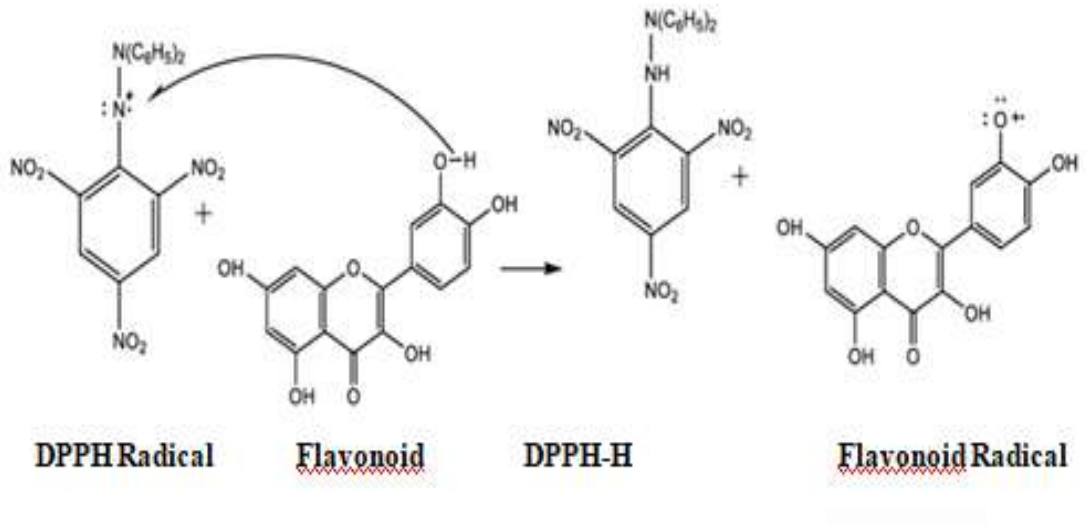

Figure S5. Scavenging activity of radical of colourant by cocoa and cutch with DPPH

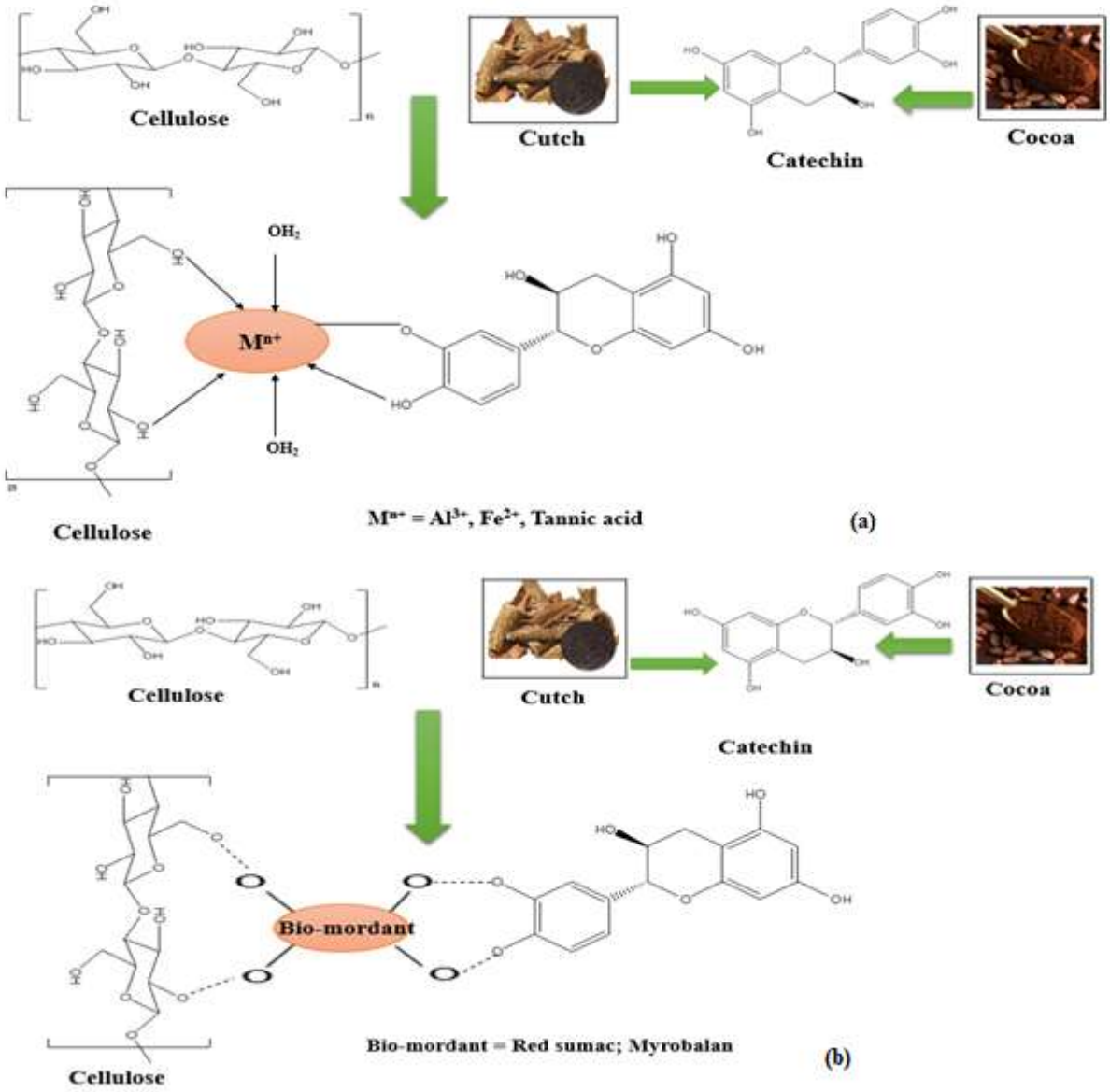

Figure S6. Possible interaction of colorant from cocoa and cutch with - OH^- of cotton, metal mordant (a) and bio-mordant (b)