

***In-situ* development of self-defensive antibacterial biomaterials: phenol-g-keratin-EC based bio-composites with characteristics for biomedical applications**

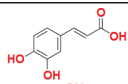
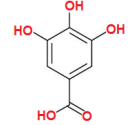
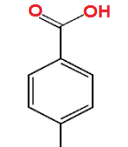
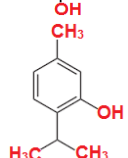
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Supplementary Information

10 **Table S1** Physiochemical characteristics of natural phenols used in this study for grafting purposes using laccase as a model catalyst.

Natural phenols	Appearance	Molecular formula	Molecular mass (g/mol)	Density (g/cm ³)	Melting point (°C)	Functional groups	Structure
Caffeic acid	Yellow solid	C ₉ H ₈ O ₄	180.16	1.478	223 to 225	Hydroxyl and carboxylic	
Gallic acid	White or yellow-white powder	C ₆ H ₂ (OH) ₃ COOH	170.12	1.694	260	Hydroxyl and carboxylic	
<i>p</i> -4-Hydroxybenzoic acid	White crystalline	C ₇ H ₆ O ₃	138.121	1.46	214.5	Hydroxyl and carboxylic	
Thymol	White crystalline	C ₁₀ H ₁₄ O	150.22	0.96	49-51	Hydroxyl	

15 **Table S2** Analysis of variance of the data on grafting parameters *i.e.*, graft yield, grafting efficiency and swelling ratio behaviours of CA, keratin-EC and CA-g-keratin-EC bio-composites.

Source	DF	Seq. SS	Adj. SS	Adj. MS	F-value	P-value
Treat	2	469300	469300	234650	46.31	0.003*
Block	4	32149	32149	8037	-	-
Error	8	40532	40532	5067	-	-
Total	14	541981	-	-	-	-

* = Significant

Table S3 Analysis of variance of the data on grafting parameters *i.e.*, graft yield, grafting efficiency and swelling ratio behaviours of GA, keratin-EC and GA-*g*-keratin-EC bio-composites.

Source	DF	Seq. SS	Adj. SS	Adj. MS	F-value	P-value
Treat	2	377518	377518	188759	29.14	0.008*
Block	4	37953	37953	9488	-	-
Error	8	51827	51827	6478	-	-
Total	14	467297	-	-	-	-

* = Significant

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Table S4 Analysis of variance of the data on grafting parameters *i.e.*, graft yield, grafting efficiency and swelling ratio behaviours of HBA, keratin-EC and HBA-*g*-keratin-EC bio-composites.

Source	DF	Seq. SS	Adj. SS	Adj. MS	F-value	P-value
Treat	2	353162	353162	176581	44.12	0.007*
Block	4	28788	28788	7197	-	-
Error	8	32017	32017	4002	-	-
Total	14	413967	-	-	-	-

* = Significant

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Table S5 Analysis of variance of the data on grafting parameters *i.e.*, graft yield, grafting efficiency and swelling ratio behaviours of T, keratin-EC and T-*g*-keratin-EC bio-composites.

Source	DF	Seq. SS	Adj. SS	Adj. MS	F-value	P-value
Treat	2	209504	209504	104752	89.53	0.010*
Block	4	11743	11743	2936	-	-
Error	8	9361	9361	1170	-	-
Total	14	230608	-	-	-	-

* = Significant

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Table S6 Analysis of variance of the data on the cell viability of HaCaT seeded on the selected bio-composites for prescribed periods.

Source	DF	Seq. SS	Adj. SS	Adj. MS	F-value	P-value
Treat	2	7814.1	7814.1	3907.1	21.45	0.001*
Block	5	2889.6	2889.6	577.9	-	-
Error	10	1821.2	1821.2	182.1	-	-
Total	17	12524.9	-	-	-	-

* = Significant

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Table S7 Analysis of variance of the data on the biodegradability of the selected bio-composites buried for prescribed periods.

Source	DF	Seq. SS	Adj. SS	Adj. MS	F-value	P-value
Treat	4	1180.2	1180.2	295.0	13.68	0.002*
Block	5	19545.1	19545.1	3909.0	-	-
Error	20	431.4	431.4	21.6	-	-
Total	29	21156.7	-	-	-	-

* = Significant