Supplementary information

Effect of pyrolysis temperature on biochar microstructural evolution, physico-chemical characteristics and its influence on biochar/polypropylene composites

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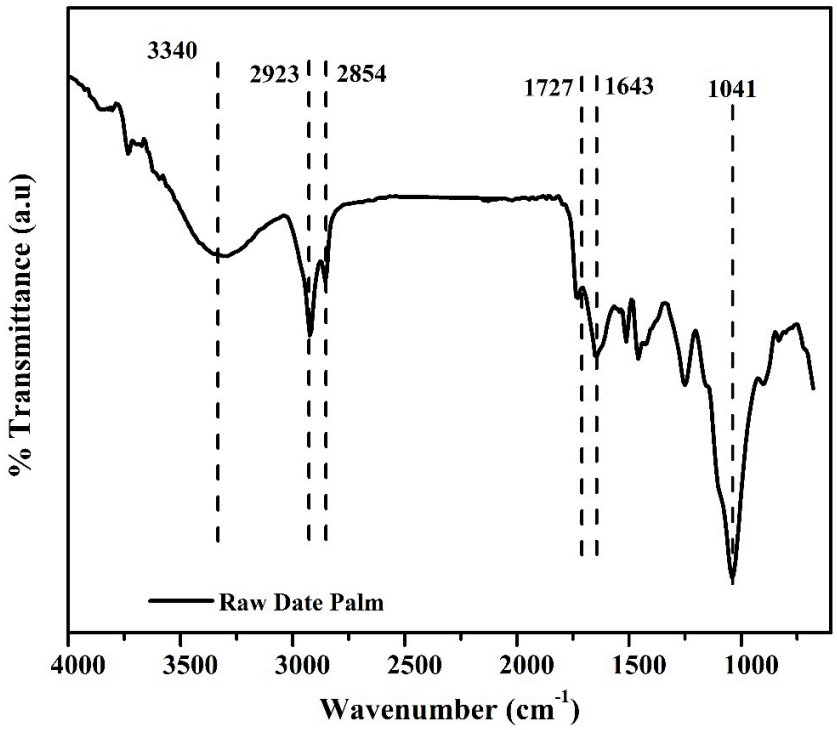

Figure S1: FTIR spectra of raw date palm feedstock

Figure S1 illustrates the FTIR spectra of raw date palm feedstock. The feedstock spectrum is dominated by the broad peak at 3340 cm^{-1} corresponds to the (O–H) stretching of alcoholic and phenolic hydroxyl group. The aliphatic C-H stretch appearing at 2854 and 2923 cm^{-1} suggests the presence of hemicellulose and cellulose. Moreover, the intense broad band at 1727 cm^{-1} is related to the (C=O) stretching arising from

carboxylic group and it derivatives, attributing to hemi-cellulose content of the feedstock. The peak at 1643 cm^{-1} corresponds to the stretching vibrations of the aliphatic (–C=C–). The band at 1041 cm^{-1} is attributed to the (C-O-C) stretching vibrations of polysaccharide components [1].

Table S1. Ultimate and proximate analyses of the date palm feedstock.

Ultimate Analysis				Proximate Analysis		Molar Ratio		
C %	**H %**	**N %**	**O % (*)**	**Moisture %**	**Ash %**	**H/C**	**O/C**	**(O+N)/C**
48.85	5.57 (1.29)	1.17 (0.25)	36.96 (1.70)	7.96 (0.18)	7.45 (0.06)	1.37 (0.03)	0.57 (0.04)	0.61 (1.01)

(*) Oxygen determined by difference (100% - (C + H +N + ash %)), All analyses were conducted in triplicate (n=3), values between brackets represent the standard deviation.

Table S2. Mechanical characteristics of neat PP and BC/PP composites

Sample	TS (Mpa)	TM GPa	EB %	EY %
Neat PP	32.44 ± 0.31 a	0.94 ± 0.00 a	336.00 ± 60.73 a	11.24 ± 0.08 a
20BC300	30.36 ± 0.08 b	1.43 ± 0.01 b	10.44 ± 1.41 bd	4.26 ± 0.12 b
20BC400	29.68 ± 0.43 bc	1.31 ± 0.01 c	14.53 ± 1.13 bc	5.01 ± 0.02 c
20BC500	30.27 ± 0.06 c	1.34 ± 0.02 c	11.70 ± 0.47 bd	5.13 ± 0.12 c
20BC600	31.12 ± 0.07 d	1.36 ± 0.04 cd	10.40 ± 0.80 bd	5.19 ± 0.22 c
20BC700	31.87 ± 0.21 a	1.46 ± 0.02 d	9.17 ± 1.27 cd	4.97 ± 0.01 c

Reference

1. Usman, A.R.; Abduljabbar, A.; Vithanage, M.; Ok, Y.S.; Ahmad, M.; Ahmad, M.; Elfaki, J.; Abdulazeem, S.S.; Al-Wabel, M.I. Biochar production from date palm waste: Charring temperature induced changes in composition and surface chemistry. *Journal of Analytical and Applied Pyrolysis* **2015**, *115*, 392-400.