Supporting Information

Effectively Enhancing Topical Delivery of Agrochemicals onto Plant Leaves with Nanocelluloses

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This supporting information contains:

1. Figure S1-S11;
2. Table S1-S3.

Figure S1. The process of liquid holding capacity (LHC) test.

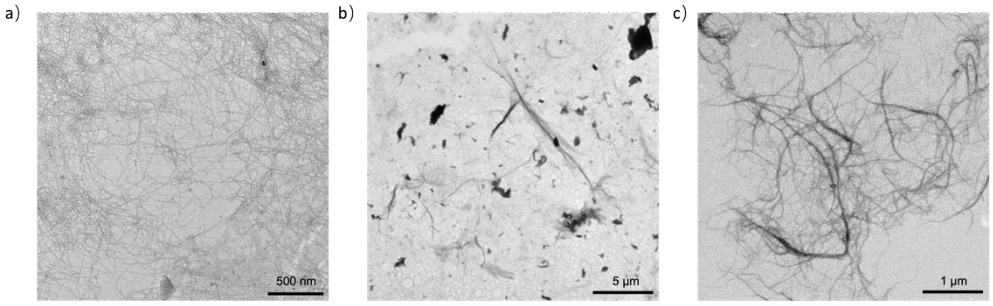

Figure S2. TEM image of (a) dried CNF^{+} nanocellulose; (b) dried CMF^{+} cellulose; (c) dried MCNF nanocellulose .

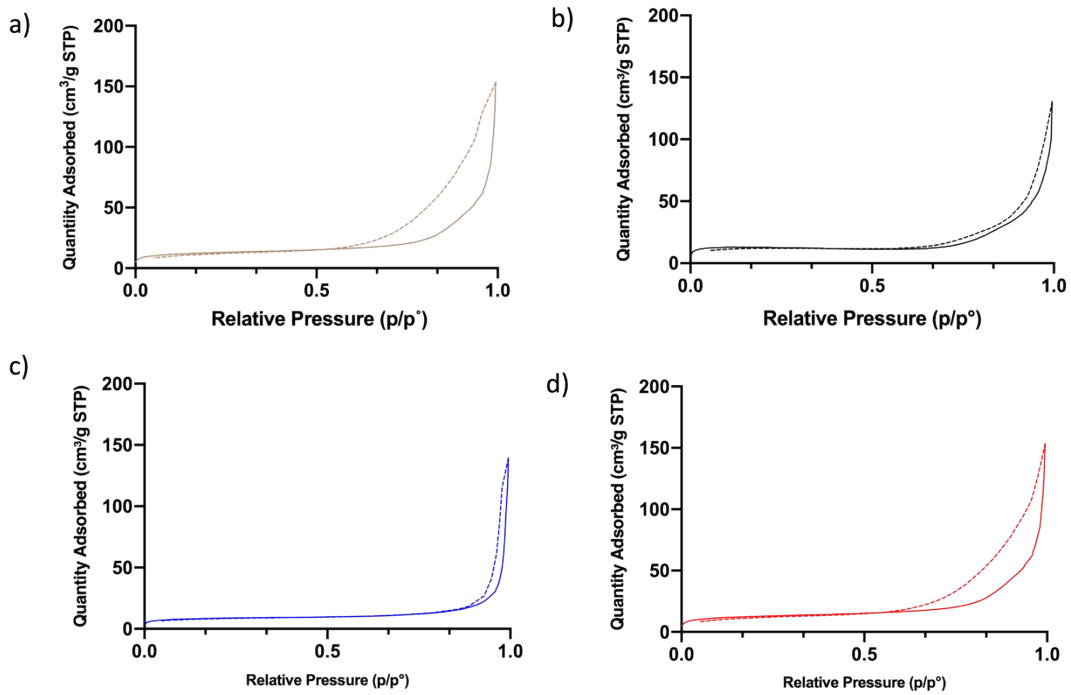

Figure S3. BET isotherm patterns of nanocellulose matrix (a)dried MCNF; (b) dried CMF^{+}; (c) dried CNC^{-}; (d) dried CNF^{+}.

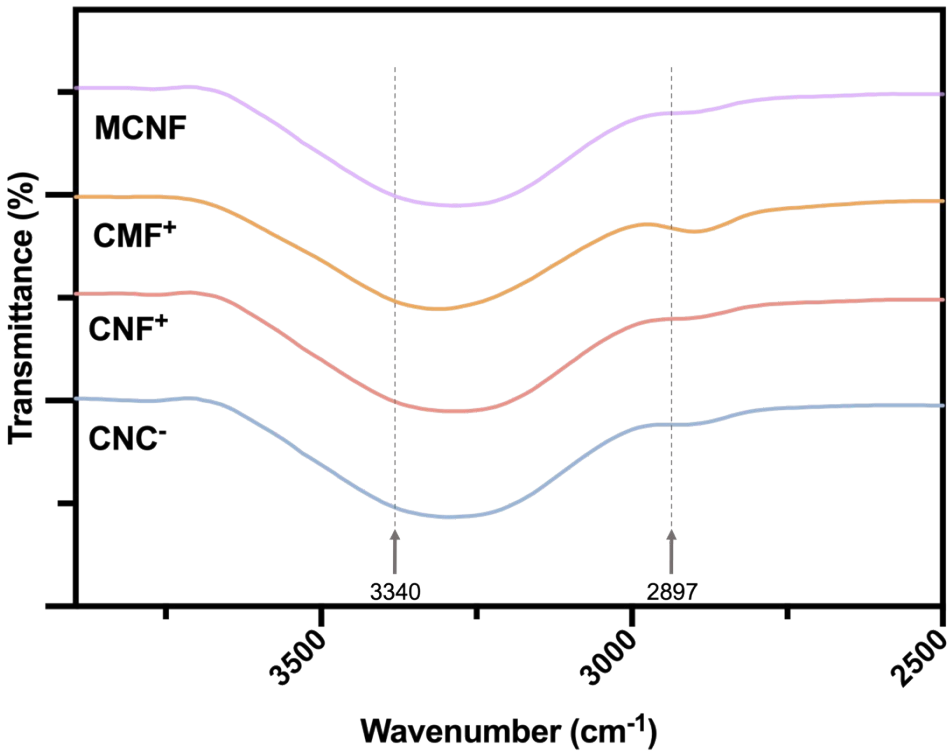

Figure S4. FTIR spectra of MCNF, CNF^+, CMF^+, and CNC^- (2500 – 4000 cm^{-1}).

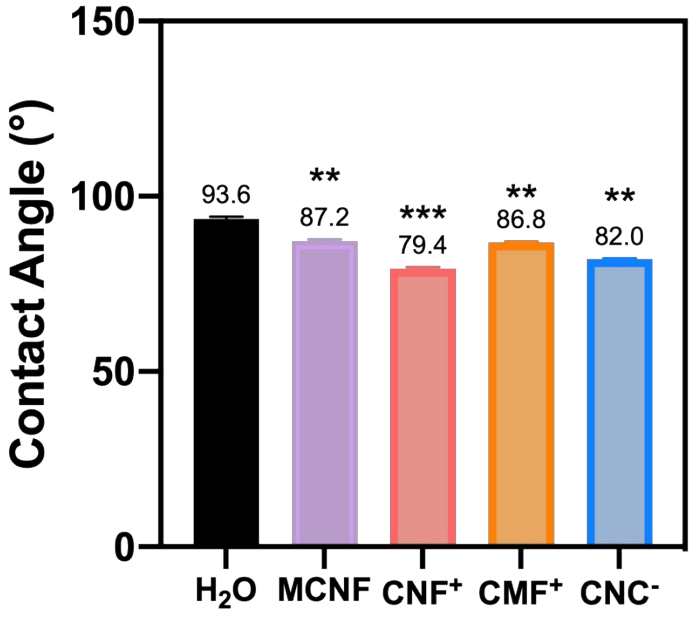

Figure S5. Variation of Contact angles of 100 mg/L cellulose suspensions on artificial leaves (PDMS with PVP)

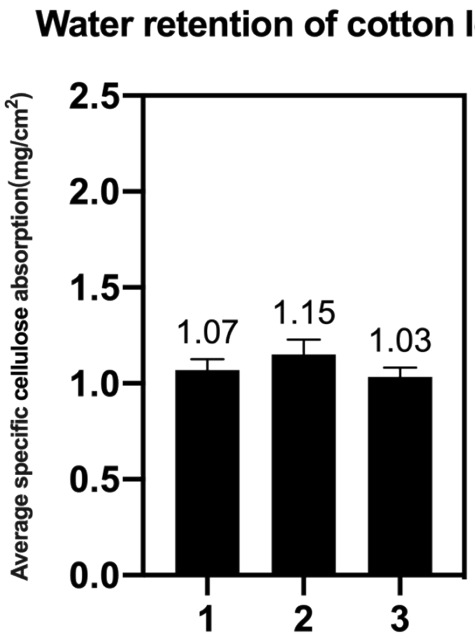

Figure S6. Water retention performance using Milli-Q water on 6-week cotton leaves.

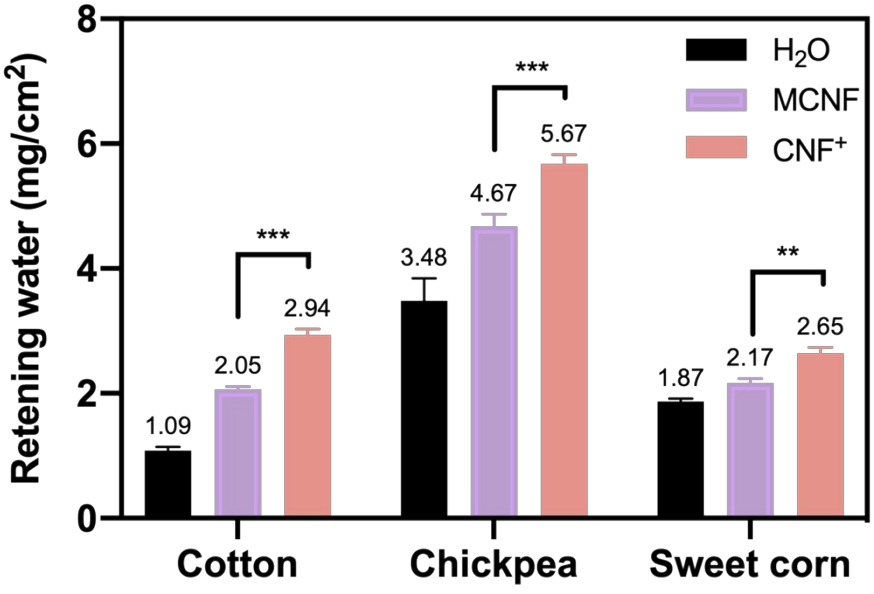

Figure S7. Water retention of cellulose suspensions at the cellulose concentration of 100 mg/L on 6-week cotton, 4~6-week chickpea and 4~5-week sweet corn leaves.

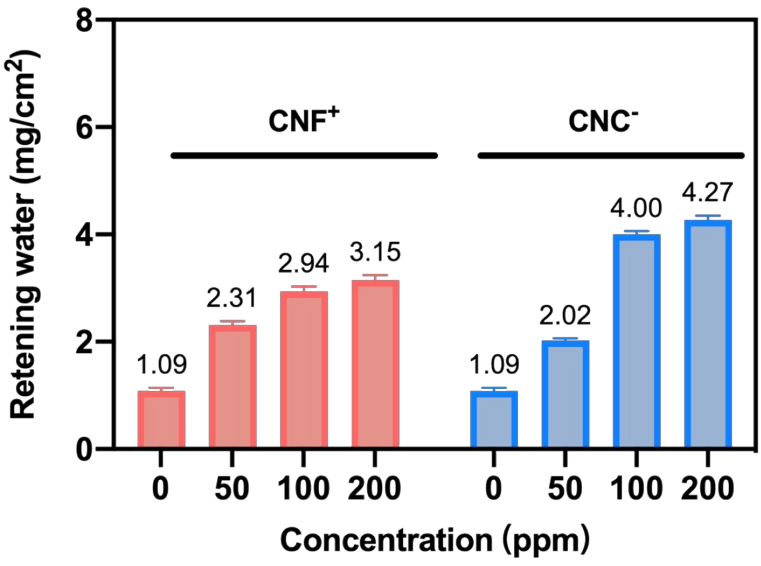

Figure S8. Water retention of CNF^{+} and CNC^{-} suspensions on cotton leaves from the range of 0-200 mg/L.

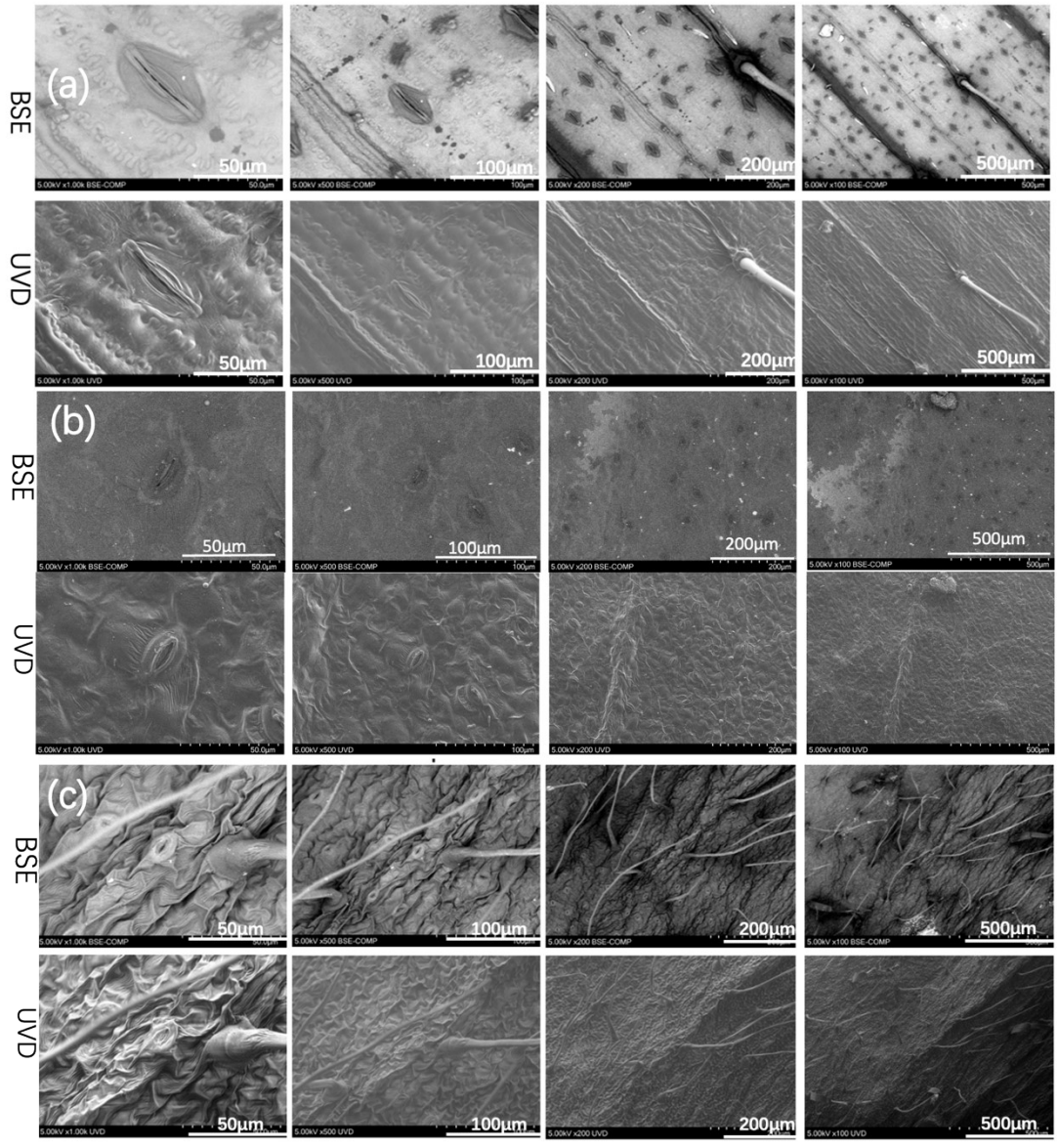

Figure S9. The SEM images of the adaxial surfaces of various leaves. (a) Sweet corn; (b) Cotton; (c) Chickpea.

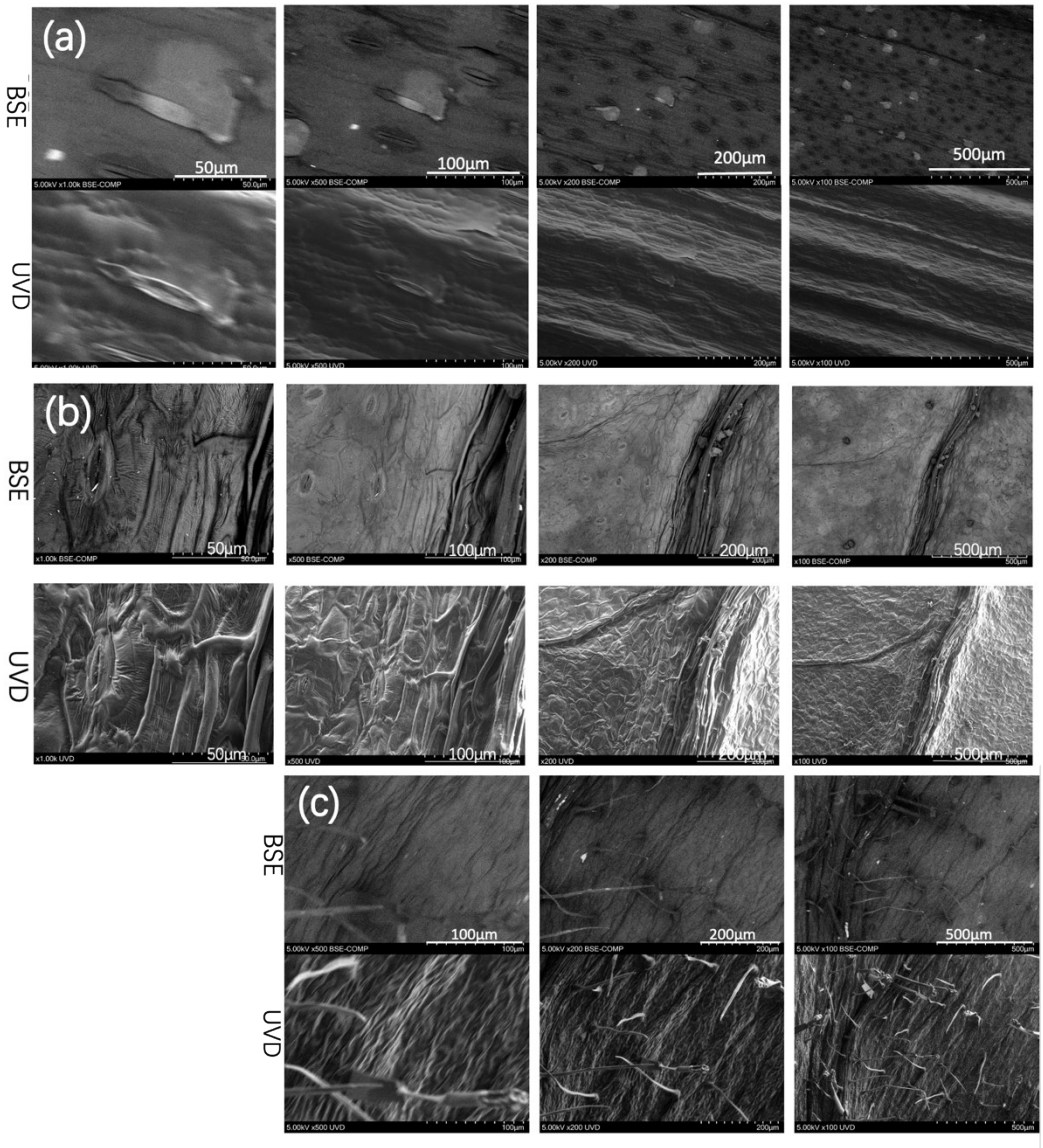

Figure S10. The SEM images of the abaxial

surfaces of various leaves. (a) Sweet corn; (b) Cotton; (c) Chickpea.

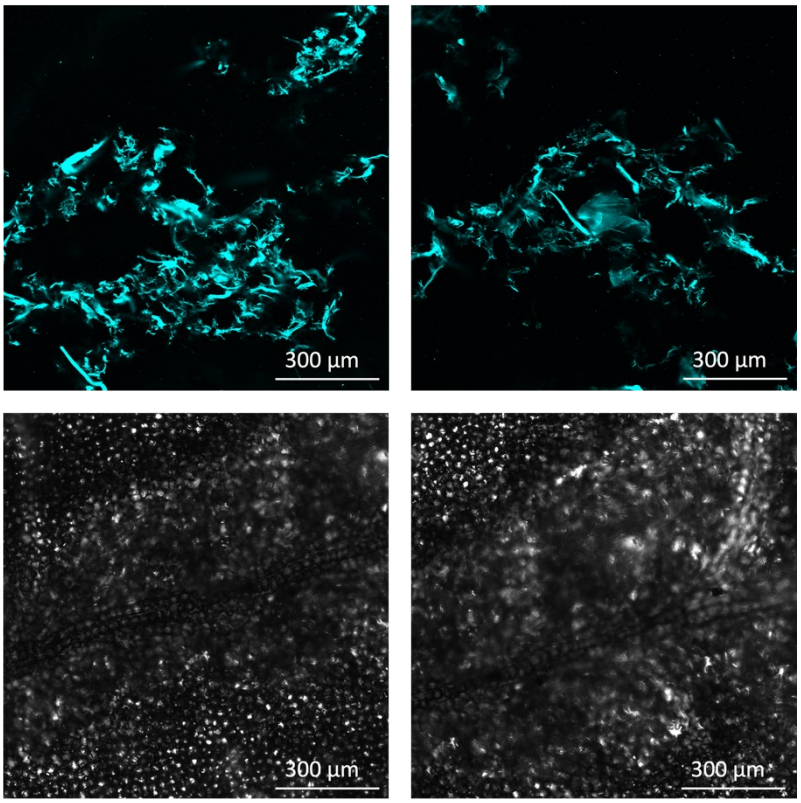

Figure S11. Confocal microscope images of cotton leaves after dipping in 100 mg/L of CMF^{+} stained with CFW.

Table S1. Pore information of nanocellulose dry matrix obtained by TEM and AFM.

Cellulose	**0-1 μm²**		**1 – 10 μm²**	
	Pore area (μm²)	**Density (pre area)**	**Pore area (μm²)**	**Density (pre area)**
CNF⁺	0.21 ± 0.08	0.12	2.54 ± 0.34	0.03
CMF⁺	--	--	--	--
CNC⁻	--	0.11	--	--

Table S2. Increase percent of LHC compared to the milli-Q water (%). D and S represent the dipping and spraying methods, respectively.

	Cotton		Chickpea		Sweet corn	
	D	S	D	S	D	S
CNF⁺	170.0	153	60.2	58.2	41.7	42.2
CMF⁺	89.8	83.8	42.9	40.2	15.0	14.1
CNC⁻	267	256	40.9	37.7	26.2	25.5

Table S3. Characterization of microstructure of various leaves

Leaves type		Stomatal area （μm^2）	Density of Stomata	
			area (%)	number (per/mm^2)
Cotton	adaxial	66	0.22	33
	abaxial	100	0.61	65
Sweet corn	adaxial	120	0.78	55
	abaxial	330	2.99	71
Chickpea	adaxial	50	0.88	170
	abaxial	N/A	N/A	N/A