

Electronic Supplementary Information

A lateral flow immunoassay method for the rapid detection of acetochlor and alachlor in vegetable oil by sensitivity enhancement of dimethyl- β -cyclodextrin

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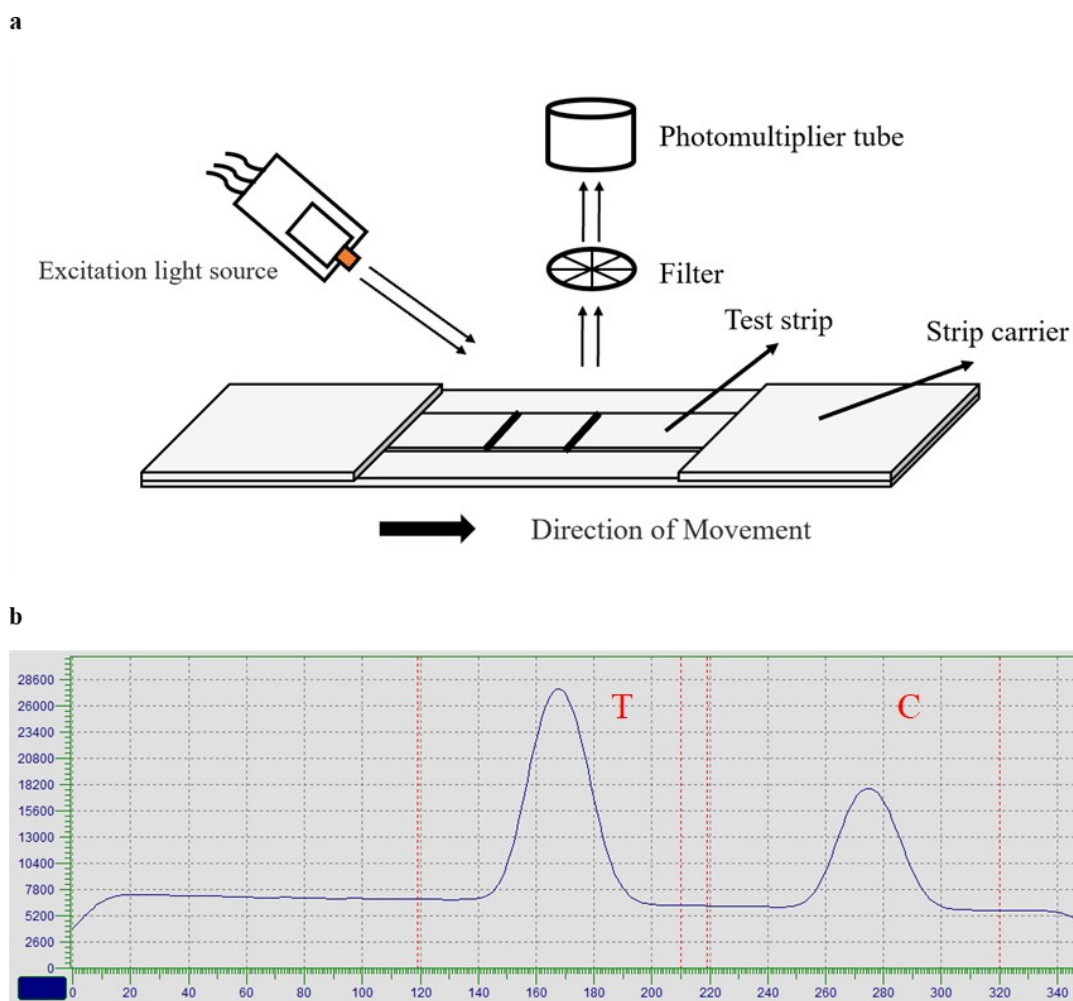


Fig S1 (a) Diagrammatic sketch of fluorescence intensity scanning on nitrocellulose membrane. With the movement of strip carrier, fluorescence signals emitted from the T and C line were detected. (b) The fluorescence intensity spectra of T line and C line. When the labelled antibody is captured at the T and C lines, the TRF-MS of the corresponding position will be irradiated by an excitation light source at a wavelength of 365 nm and subsequently emit the fluorescent light, which could be captured by the detector at a wavelength of 615 nm. The ordinate is fluorescence intensity and the abscissa is the relative position of T and C lines on the NC membrane.

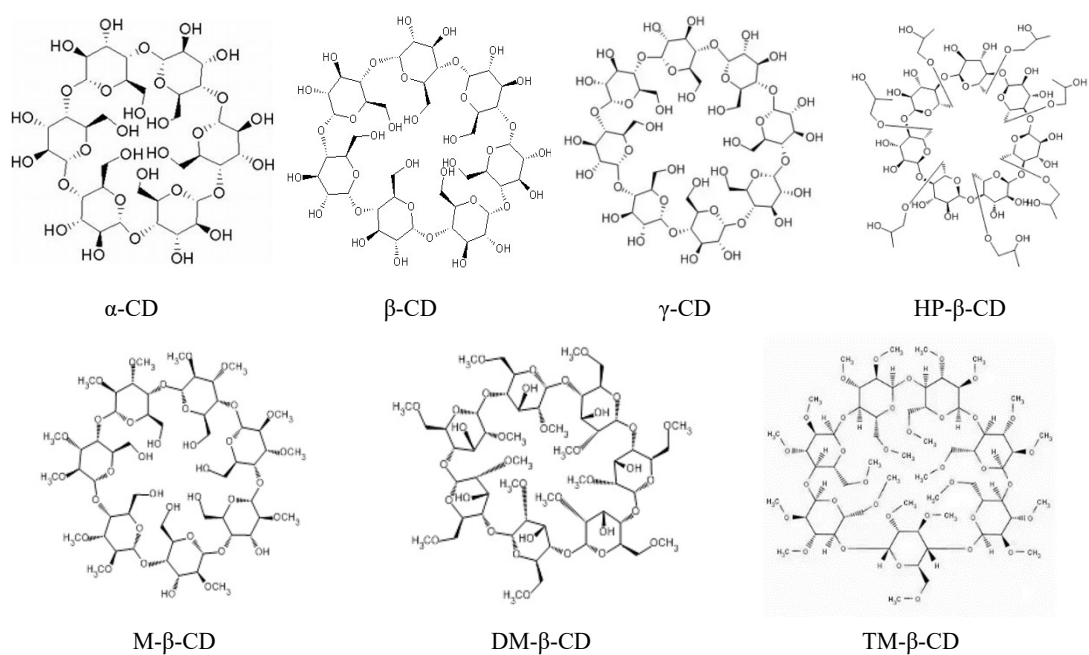


Fig S2 The structures of cyclodextrin derivatives

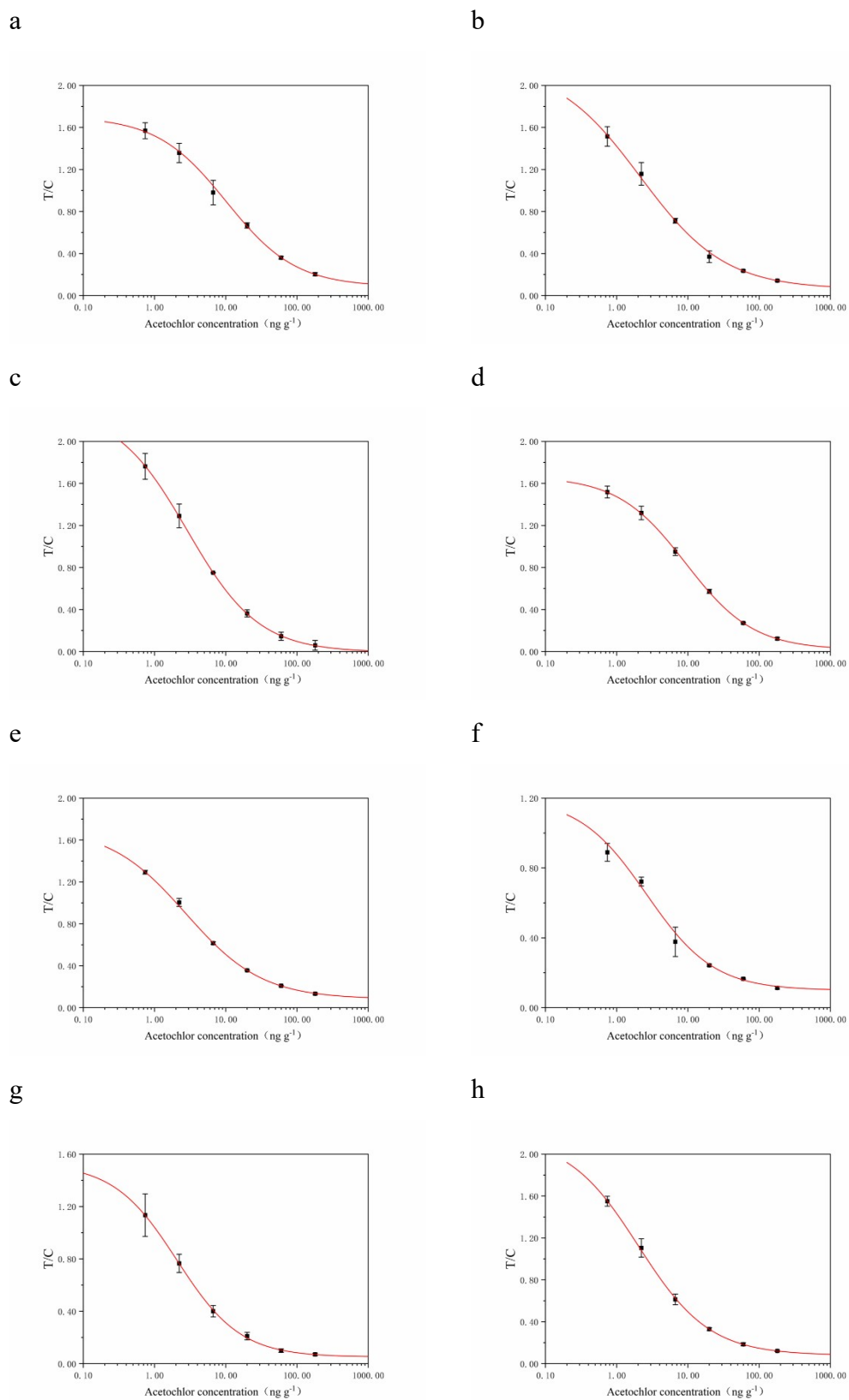
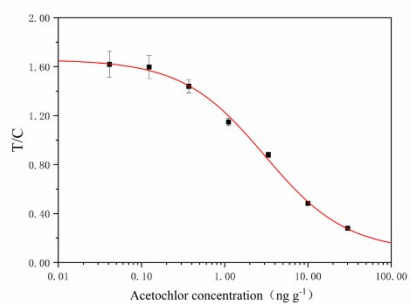


Fig S3 The working curves for acetochlor in different CDs solutions. (a) Solvent control; (b) α -CD; (c) β -CD; (d) γ -CD; (e) HP- β -CD; (f) M- β -CD; (g) DM- β -CD; (h) TM- β -CD. The standard acetochlor solution (0, 0.74, 2.22, 6.67, 20.00, 60.00 and 180.00 ng g⁻¹) were diluted with water (solvent

control) and seven CDs solutions at 5.0 mmol L⁻¹.

a



b

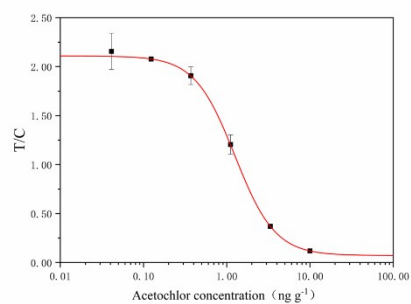


Fig S4 Effect of DM- β -CD on the IC₅₀ of the LFIA method based on antibody B. (a) Solvent control, the calculated value of IC₅₀ was 3.53 ng g⁻¹; (b) DM- β -CD, the calculated value of IC₅₀ was 1.20 ng g⁻¹, DM- β -CD improved the sensitivity of antibody B nearly three times. The standard acetochlor solution (0, 0.04, 0.12, 0.37, 1.11, 3.33 and 10.00 ng g⁻¹) were diluted with water (solvent control) and DM- β -CD solution at 5.0 mmol L⁻¹.

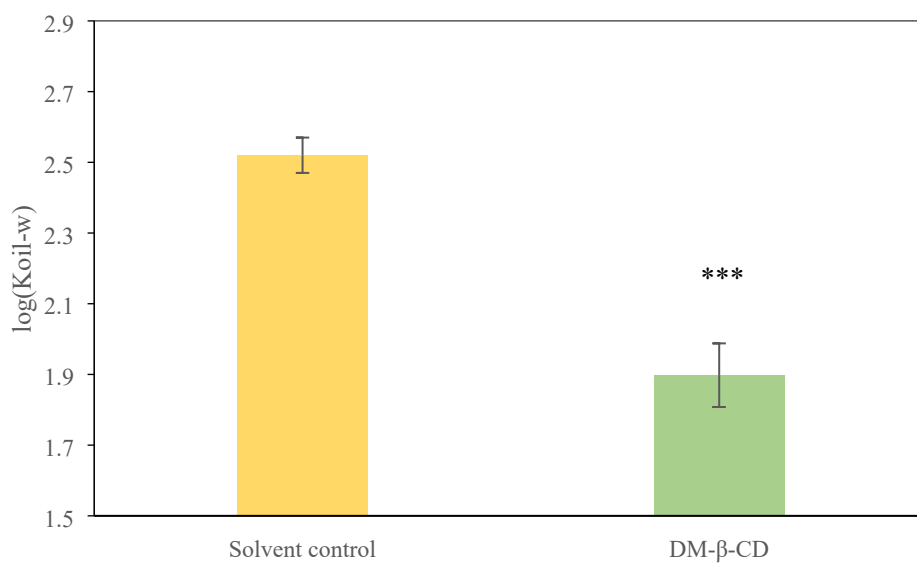


Fig S5 Effect of DM- β -CD on the $\log(K_{oil-w})$ of alachlor (two-tailed Student's t test; ** $P < 0.01$, *** $P < 0.001$, **** $P < 0.0001$). The spiked oil samples (300 ng g^{-1}) were extracted by water and DM- β -CD solution (5.0 mmol L^{-1}) with the W/O ratio of 4, and the vortex time of 90 s, the LFIA method was based on antibody B.

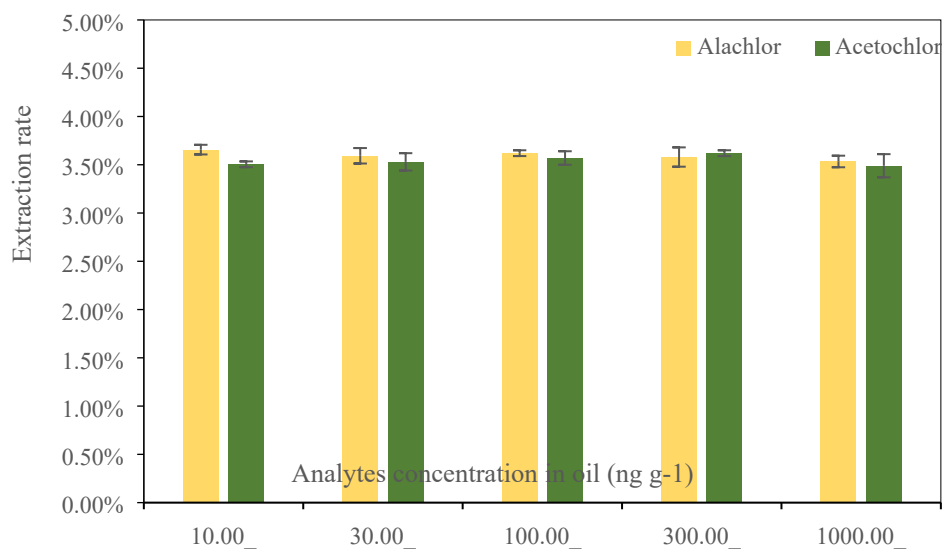


Fig S6 Extraction rate of different concentrations of alachlor and acetochlor in oil. The spiked oil samples were extracted by optimized procedure (5.0mmol L⁻¹ of DM- β -CD, the W/O ratio of 3 and the vortex time of 90s) and detected by LFIA method which was based on antibody B.

Table S1 Recoveries of acetochlor and alachlor in oil (n=3, the LFIA method was based on antibody B).

Oil sample	Spiked	Detected	Recovery (%)	Detected	Recovery (%)
	acetochlor or alachlor (ng g ⁻¹)	acetochlor (ng g ⁻¹)		alachlor (ng g ⁻¹)	
Peanut oil	0.00	ND ^a	NC ^b	ND ^a	NC ^b
	50.00	48.55	97.10±2.90	55.21	110.43±5.94
	100.00	93.95	93.95±1.24	103.78	103.78±9.73
	300.00	307.93	102.64±3.19	318.19	106.06±5.09
Soybean oil	0.00	ND ^a	NC ^b	ND ^a	NC ^b
	50.00	45.85	91.69±1.12	55.82	111.65±6.05
	100.00	103.35	103.35±3.21	100.02	100.02±7.12
	300.00	295.84	98.61±4.05	315.68	105.23±2.79
Corn oil	0.00	ND ^a	NC ^b	ND ^a	NC ^b
	50.00	56.78	112.23±2.20	46.45	92.90±8.03
	100.00	96.65	96.65±1.55	99.98	99.98±3.90
	300.00	303.99	101.33±5.73	317.32	105.77±4.01
Rapeseed oil	0.00	ND ^a	NC ^b	ND ^a	NC ^b
	50.00	46.72	93.43±2.90	53.54	107.08±8.02
	100.00	104.97	100.97±2.98	108.64	108.64±4.58
	300.00	320.44	106.81±6.34	340.59	113.53±3.40

^a Not detected. ^b Not calculated