

**A MOF based pH-responsive dual controlled release system
for herbicide Pretilachlor and safener AD-67 delivery
enhances the herbicidal efficacy and reduces the side effects**

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Table S1 Acute toxicity of Pre, 50% Pre EC, AD-67, ZIF-67, Pre@ZIF-67, and

AD-67@Pre@ZIF-67 to earthworms.

Condition	24h					48h				
	Regression equation	LC ₅₀ (mg L ⁻¹)	95% CL (mg L ⁻¹)	χ ²	df	Regression equation	LC ₅₀ (mg L ⁻¹)	95% CL (mg L ⁻¹)	χ ²	df
Pre	y=9.274x-23.408	334.26	273.80~389.98	1.8	4	y=5.295x-12.249	205.74	158.91~256.62	4.0	6
50 % Pre EC	y=8.670x-18.581	139.02	117.53~180.12	1.1	4	y=10.942x-23.044	127.66	111.38~147.22	4.5	5
AD-67	y=6.508x-20.112	1231.39	935.38~1545.10	1.2	4	y=5.236x-14.717	646.42	431.42~856.82	0.9	4
ZIF-67	y=4.179x-12.989	1282.17	1045.82~2583.35	12	9	y=3.892x-11.443	871.76	634.11~1121.63	6.7	8
Pre@ZIF-67	y=14.949x-45.993	1192.99	1032.44~1327.25	1.1	4	y=6.723x-18.408	547.09	388.30~736.38	0.4	3
AD-67@Pre@ZIF-67	y=6.681x-22.251	2139.84	1742.46~3062.95	0.2	4	y=4.555x-13.687	1010.79	707.35~1342.73	4.0	5

Table S2 Horse liver soil physical and chemical properties

Soil type	pH value	Organic matter content (%)	CEC (me/100g)	NH ₄ ⁺ -N (mg/kg)	NO ₃ ⁻ -N (mg/kg)	P (g/kg)	Particle size (%)		
							Clay (<0.002 mm)	Sediment (0.002-0.02 mm)	Sandy soil (>0.02 mm)
Horse liver soil	5.99±0.27	1.84±0.16	15-25	23.92±1.36	71.51±1.87	1.38±0.44	32.6-36.9	37.7-41.7	25.4-27.1