

APPENDIX C

Adsorption Isotherm Tests

Table C.1 Equilibrium time of Cd onto biosoil

Type	Time (min)	Dup.	Cd(II) (mg/L)	Average (mg/L)
Biosoil	0	1	98.621	98.621
		2	98.621	
		3	98.621	
	5	1	25.124	25.694
		2	25.746	
		3	26.212	
	10	1	23.228	23.843
		2	24.642	
		3	23.661	
	15	1	22.627	22.545
		2	23.735	
		3	21.273	
	20	1	20.845	20.727
		2	22.822	
		3	18.514	
	25	1	15.977	16.055
		2	16.246	
		3	15.943	
	30	1	15.331	14.089
		2	14.142	
		3	12.795	
	50	1	11.027	11.334
		2	10.413	
		3	12.562	
	60	1	10.067	9.693
		2	9.574	
		3	9.440	
	90	1	6.118	6.214
		2	6.593	
		3	5.931	
	120	1	6.262	6.143
		2	6.133	
		3	6.035	

Table C.2 Equilibrium time of biosoil with MKP fertiliser

Type	Time (min)	Dup.	Concentration of available phosphorus (mg/L)			Average (mg-P/L)
			Abs.	µg P from curve	mg-P/L	
Biosoil	0	1	0.934	64.414	1610.344	1622.41
		2	0.937	64.620	1615.517	
		3	0.952	65.655	1641.379	
	5	1	0.868	59.862	1496.552	1506.89
		2	0.872	60.137	1503.448	
		3	0.882	60.827	1520.689	
	10	1	0.433	29.862	746.552	736.21
		2	0.419	28.896	722.414	
		3	0.429	29.586	739.655	
	15	1	0.251	17.310	432.759	425.86
		2	0.242	16.689	417.241	
		3	0.248	17.103	427.586	
	20	1	0.212	14.620	365.517	339.65
		2	0.184	12.689	317.241	
		3	0.195	13.448	336.206	
	25	1	0.193	13.310	332.758	315.52
		2	0.175	12.069	301.724	
		3	0.181	12.483	312.069	
	30	1	0.193	13.310	332.758	313.79
		2	0.174	12.000	300.000	
		3	0.179	12.344	308.621	
	40	1	0.172	11.862	296.552	289.65
		2	0.162	11.172	279.310	
		3	0.170	11.724	293.103	
	50	1	0.168	11.582	289.655	284.48
		2	0.161	11.103	277.586	
		3	0.166	11.448	286.207	
	60	1	0.159	10.965	274.138	262.07
		2	0.146	10.069	251.724	
		3	0.151	10.414	260.344	
	90	1	0.157	10.827	270.689	256.89
		2	0.141	9.724	243.103	
		3	0.149	10.275	256.896	
	120	1	0.139	9.586	239.655	220.69
		2	0.125	8.621	215.517	
		3	0.120	8.276	206.896	

Table C.3 Equilibrium time of biosoil with organic manure fertiliser

Type	Time (min)	Dup.	Concentration of available phosphorus (mg/L)			Average (mg-P/L)
			Abs.	µg P from curve	mg-P/L	
Biosoil	0	1	0.792	54.621	54.621	54.896
		2	0.794	54.758	54.758	
		3	0.802	55.310	55.310	
	5	1	0.341	23.517	11.758	11.069
		2	0.324	22.344	11.172	
		3	0.298	20.551	10.275	
	10	1	0.179	12.344	6.172	5.758
		2	0.169	11.655	5.827	
		3	0.153	10.552	5.275	
	15	1	0.073	5.034	2.517	2.310
		2	0.062	4.275	2.138	
		3	0.066	4.552	2.275	
	20	1	0.041	2.827	1.413	1.551
		2	0.043	2.965	1.482	
		3	0.051	3.517	1.758	
	25	1	0.042	2.896	1.448	1.517
		2	0.048	3.310	1.655	
		3	0.042	2.896	1.448	
	30	1	0.049	3.379	1.689	1.448
		2	0.043	2.965	1.482	
		3	0.034	2.344	1.172	
	40	1	0.036	2.482	1.241	1.344
		2	0.041	2.827	1.413	
		3	0.040	2.758	1.379	
	50	1	0.037	2.552	1.275	1.241
		2	0.033	2.275	1.138	
		3	0.038	2.621	1.310	
	60	1	0.033	2.276	1.138	1.172
		2	0.034	2.344	1.172	
		3	0.035	2.413	1.207	
	90	1	0.028	1.931	0.965	1.103
		2	0.037	2.551	1.275	
		3	0.031	2.137	1.068	
	120	1	0.028	1.931	0.965	1.068
		2	0.032	2.206	1.103	
		3	0.033	2.275	1.137	

Table C.4 Sorption of biosoil with Cd

Type	Weight of OM (g.)	Concentration of solution at C ₀ (mg/L)	Dup.	Concentration of solution at C _t (mg/L)	Average
Biosoil	2.42	13.42	1	0.512	0.533
	2.42	13.42	2	0.549	
	2.42	13.42	3	0.538	
	2.42	36.63	1	1.547	1.562
	2.42	36.63	2	1.603	
	2.42	36.63	3	1.536	
	2.42	55.21	1	2.762	2.838
	2.42	55.21	2	2.905	
	2.42	55.21	3	2.847	
	2.42	72.84	1	4.357	4.647
	2.42	72.84	2	4.677	
	2.42	72.84	3	4.907	
	2.42	94.12	1	5.342	5.580
	2.42	94.12	2	5.574	
	2.42	94.12	3	5.824	

Table C.5 Sorption of biosoil with MKP fertiliser

Type	Weight of OM (g)	Dup.	Concentration of available phosphorus (mg/L)			Average (mg-P/L)
			Abs.	µg P from curve	mg-P/L	
Biosoil	1.22	1	0.01	0.689	1.38	1.103
		2	0.007	0.483	0.97	
		3	0.007	0.483	0.97	
	0.97	1	0.084	5.793	23.17	23.724
		2	0.089	6.138	24.55	
		3	0.085	5.862	23.45	
	0.74	1	0.132	9.103	91.03	88.965
		2	0.131	9.034	90.34	
		3	0.124	8.552	85.52	
	0.49	1	0.163	11.241	281.03	281.034
		2	0.164	11.310	282.76	
		3	0.162	11.172	279.31	
	0.25	1	0.317	21.862	546.55	543.103
		2	0.313	21.586	539.66	
		3	0.315	21.724	543.10	

Table C.6 Sorption of biosoil with organic manure

Type	Weight (g OM)	Dup.	Concentration of available phosphorus (mg/L)			Average (mg-P/L)
			Abs.	µg P from curve	mg-P/L	
Biosoil	0.72	1	0.027	1.862	0.621	0.713
		2	0.037	2.552	0.850	
		3	0.029	2.000	0.667	
	0.60	1	0.051	3.517	1.172	1.034
		2	0.047	3.241	1.080	
		3	0.037	2.552	0.850	
	0.48	1	0.069	4.758	1.586	1.540
		2	0.062	4.275	1.425	
		3	0.070	4.827	1.609	
	0.36	1	0.094	6.482	2.161	2.344
		2	0.109	7.517	2.505	
		3	0.103	7.103	2.368	
	0.24	1	0.224	15.448	5.149	5.310
		2	0.241	16.621	5.540	
		3	0.228	15.724	5.241	

Table C.7 Sorption of Cd on saturated biosoil with P from MKP-fertiliser

Type	Weight of g P	Concentration of solution at C ₀ (mg/L)	Dup.	Concentration of solution at C _t (mg/L)	Average
Biosoil	0.1637	52.38	1	0.232	0.247
		52.38	2	0.281	
		52.38	3	0.228	
		68.90	1	0.347	0.350
		68.90	2	0.362	
		68.90	3	0.341	
		78.89	1	0.406	0.412
		78.89	2	0.417	
		78.89	3	0.413	
		90.84	1	0.584	0.573
		90.84	2	0.592	
		90.84	3	0.543	

Table C.8 Sorption of Cd on saturated biosoil with P from organic manure

Type	Weight of g P	Concentration of solution at C_0 (mg/L)	Dup.	Concentration of solution at C_t (mg/L)	Average
Biosoil	0.011	52.38	1	3.124	3.161
		52.38	2	3.182	
		52.38	3	3.177	
		68.90	1	4.764	4.621
		68.90	2	4.816	
		68.90	3	4.283	
		78.89	1	5.923	5.610
		78.89	2	5.891	
		78.89	3	5.061	
		90.84	1	6.902	7.030
		90.84	2	7.162	
		90.84	3	7.026	