

Supplementary



Figure S1. Visual appearance of peat, coir and six processed miscanthus substrates (bar = 1 cm). *Miscanthus x giganteus* was harvested with forage harvester (FC, field-chips), then processed with a mechanical fraying facility through a 5-mm screen (S5, shreds) or a hammermill with screen sizes of 15, 10, 5 and 3 mm (C15, C10, C5 and C3, chips).

Table S1. Substrate porosity: wet mass and bulk density of substrates at packing, porosity mean of substrates.

Substrate	Wet mass at packing (g g ⁻¹)	Bulk density at packing (g cm ⁻³)	Total porosity (%)	Water holding capacity (%)	Air-filled porosity (%)
Peat	1.85 ± 0.16	0.263 ± 0.015	78.1 ± 1.8 e	67.7 ± 6.3 ab	10.4 ± 4.9 f
Coir	5.34 ± 0.15	0.086 ± 0.001	88.0 ± 3.6 d	70.2 ± 2.8 a	17.8 ± 6.3 e
C3	3.72 ± 0.06	0.106 ± 0.006	91.8 ± 1.3 bc	62.5 ± 4.1 b	29.2 ± 5.0 d
C5	3.84 ± 0.18	0.099 ± 0.006	95.6 ± 0.8 a	54.0 ± 5.3 c	41.6 ± 5.7 c
C10	3.60 ± 0.22	0.096 ± 0.002	95.2 ± 2.4 a	45.6 ± 2.4 d	49.7 ± 3.9 b
C15	3.65 ± 0.11	0.095 ± 0.002	95.8 ± 1.0 a	45.4 ± 2.1 d	50.4 ± 2.1 ab
S5	3.11 ± 0.11	0.104 ± 0.003	94.5 ± 1.6 ab	43.7 ± 2.0 d	50.8 ± 2.3 ab
FC	2.64 ± 0.10	0.097 ± 0.002	91.3 ± 1.9 c	34.3 ± 2.8 e	57.0 ± 2.7 a

Different lower case letters indicate statistically significant differences in means among tested substrates at each column (Tukey's HSD, $p \leq 0.05$, mean ± standard deviation, $n = 8$). *Miscanthus x giganteus* was harvested with forage harvester (FC, field-chips), then processed with a mechanical fraying facility through a 5-mm screen (S5, shreds) or a hammermill with screen sizes of 15, 10, 5 and 3 mm (C15, C10, C5 and C3, chips).

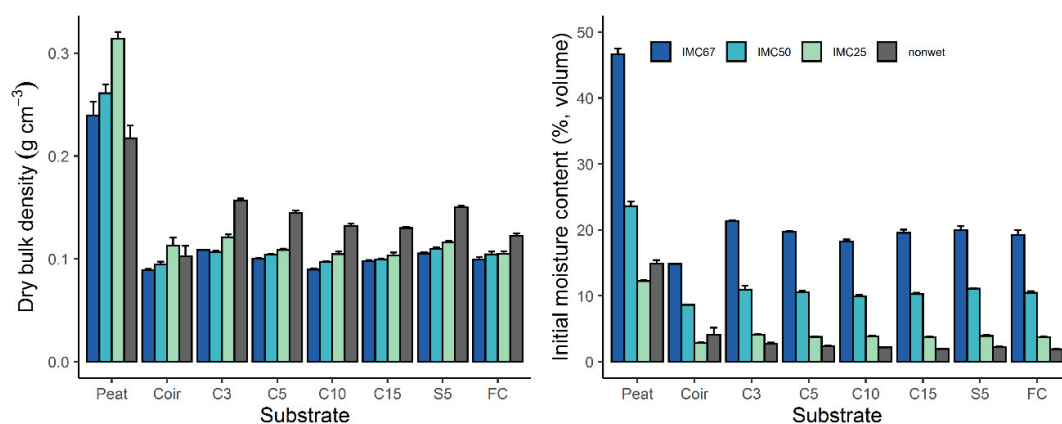


Figure S2. Substrate wettability: packing bulk density, initial moisture content of peat, coir and processed miscanthus substrates. *Miscanthus x giganteus* was harvested with forage harvester (FC, field-chips), then processed with a mechanical fraying facility through a 5-mm screen (S5, shreds) or a hammermill with screen sizes of 15, 10, 5 and 3 mm (C15, C10, C5 and C3, chips).

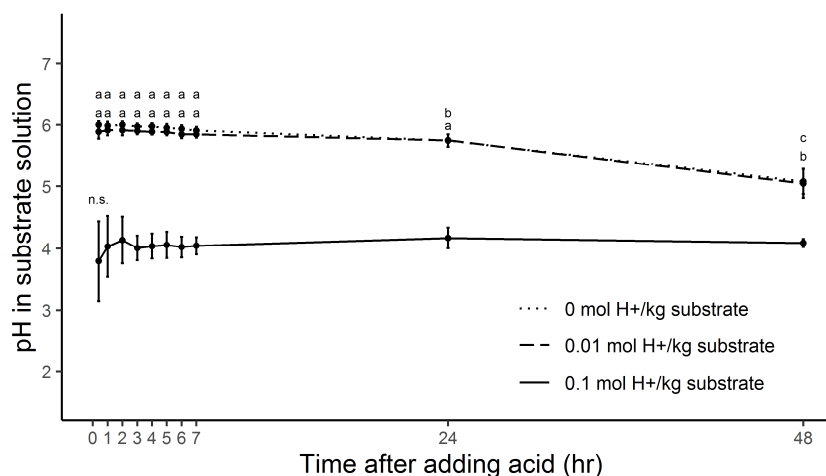


Figure S3. Substrate pH buffering capacity: time to pH stabilization. The curves represent for mean values of S5 and C3. Different lower case letters indicate statistically significant differences in means among time points at each proton concentration (Tukey's HSD, $p \leq 0.05$, mean \pm standard deviation, $n = 10$). The time at 24 hours after acid addition was selected as time when pH stabilization. At 48 hours after acid addition, fungal mycelium on surface of substrate suspension was observed.

Table S2. Nutrient concentration of input nutrient solution for seedling growth.

Nutrient	Concentration
NH ₄	1.20
K	9.50
Ca	5.40
Mg	2.40
NO ₃	16.0
H ₂ PO ₄	1.50
SO ₄	4.40
Fe	15.0
Mn	10.0
Zn	5.0
B	30.0
Cu	0.75

Mo	0.50
EC (dS m ⁻¹)	2.63
pH	5.5

Table S3. pH, EC and water-soluble nutrients from extract solution of sowing cells without plants.

Substrate	day 4	day 8	day 12	day 16	day 20	day 24
<i>pH</i>						
Peat	5.5 ± 0.0 b	5.7 ± 0.0 c	5.9 ± 0.1 e	5.8 ± 0.2 c	6.1 ± 0.1 d	6.3 ± 0.2 d
Coir	5.5 ± 0.1 b	5.6 ± 0.0 c	5.8 ± 0.1 e	5.8 ± 0.1 c	6 ± 0.1 d	6.5 ± 0.2 d
C3	8.0 ± 0.2 a	8.5 ± 0.1 a	7.7 ± 0.1 a	8.6 ± 0.1 a	8.6 ± 0.1 a	8.4 ± 0.1 a
C5	8.1 ± 0.1 a	8.5 ± 0.0 a	7.6 ± 0.1 ab	8.7 ± 0.1 a	8.6 ± 0.1 a	8.0 ± 0.2 ab
C10	8.1 ± 0.1 a	8.5 ± 0.1 a	7.6 ± 0.1 bc	8.6 ± 0.2 a	8.4 ± 0.2 ab	7.7 ± 0.1 bc
C15	8.3 ± 0.1 a	8.5 ± 0.1 a	7.5 ± 0.0 bc	8.6 ± 0.1 a	8.3 ± 0.1 bc	7.6 ± 0.2 c
S5	8.3 ± 0.1 a	8.2 ± 0.1 b	7.4 ± 0.0 cd	8.5 ± 0.1 ab	8.4 ± 0.1 ab	7.5 ± 0.2 c
FC	8.2 ± 0.2 a	8.3 ± 0.1 ab	7.3 ± 0.0 d	8.2 ± 0.1 b	8.0 ± 0.2 c	7.6 ± 0.3 c
<i>EC (dS m⁻¹)</i>						
Peat	1.3 ± 0.1 cd	1.8 ± 0.2 a	2.3 ± 0.4 bc	2.1 ± 0.1 ab	2.3 ± 0.1 bc	2.3 ± 0.1 bc
Coir	1.3 ± 0.1 d	1.7 ± 0.1 a	2.3 ± 0.2 bc	2.0 ± 0.1 b	2.4 ± 0.1 bc	2.0 ± 0.0 c
C3	2.0 ± 0.1 a	1.9 ± 0.2 a	2.7 ± 0.1 a	2.4 ± 0.1 a	3.0 ± 0.2 a	2.9 ± 0.3 a
C5	1.8 ± 0.2 ab	1.8 ± 0.1 a	2.6 ± 0.3 ab	2.5 ± 0.3 a	3.0 ± 0.2 a	2.5 ± 0.3 ab
C10	1.9 ± 0.2 ab	1.9 ± 0.2 a	2.5 ± 0.2 ab	2.3 ± 0.1 ab	2.6 ± 0.3 bc	2.5 ± 0.1 ab
C15	1.7 ± 0.1 ab	1.6 ± 0.1 a	2.0 ± 0.2 bc	1.9 ± 0.1 b	2.2 ± 0.2 c	2.0 ± 0.3 bc
S5	1.7 ± 0 bc	1.8 ± 0.1 a	2.0 ± 0.1 bc	2.0 ± 0.3 b	2.7 ± 0.2 ab	2.1 ± 0.2 bc
FC	1.7 ± 0.2 ab	1.9 ± 0.1 a	1.9 ± 0.1 c	1.9 ± 0.1 b	2.3 ± 0.3 bc	1.9 ± 0.1 c
<i>NO₃ (mg L⁻¹)</i>						
Peat	478 ± 62.2 a	954.0 ± 138.5 a	506.3 ± 100.1 a	334.3 ± 40.0 a	804.0 ± 48.1 a	1040.8 ± 62.5 a
Coir	405.8 ± 55.3 a	862.0 ± 67.1 a	537.8 ± 116.7 a	312.3 ± 17.5 a	772.3 ± 33.1 a	787.3 ± 60.1 b
C3	149.8 ± 17.9 bc	144.0 ± 25.8 b	44.8 ± 4.3 b	31.3 ± 3.3 b	84.8 ± 10.5 b	106.8 ± 10.8 c
C5	160.8 ± 15.8 b	131.3 ± 17.0 b	48.3 ± 10.8 b	34.8 ± 3.0 b	84.5 ± 6.6 b	103.0 ± 8.7 c
C10	148.0 ± 15.0 bc	138.8 ± 11.9 b	33.5 ± 2.5 b	33.8 ± 2.2 b	76.0 ± 5.7 b	111.8 ± 6.8 c
C15	156.0 ± 7.4 b	140.0 ± 24.8 b	28.5 ± 2.1 b	29.0 ± 1.8 b	66.0 ± 3.5 b	94.5 ± 4.4 c
S5	140.5 ± 23.6 bc	113.3 ± 20.4 b	26.8 ± 1.7 b	26.5 ± 3.7 b	70.0 ± 3.2 b	86.8 ± 8.2 c
FC	78.5 ± 16.8 c	126.0 ± 18.1 b	21.8 ± 1.7 b	34.0 ± 2.2 b	77.0 ± 4.5 b	76.8 ± 3.9 c
<i>NH₄ (mg L⁻¹)</i>						
Peat	5.8 ± 0.5 b	8.5 ± 1.9 c	11.0 ± 1.3 d	14.5 ± 1.3 c	12.5 ± 1.0 d	14.3 ± 1.0 c
Coir	9.0 ± 0.8 b	12.0 ± 0.8 c	17.5 ± 1.8 c	21.3 ± 1.0 c	20.3 ± 1.3 c	18.0 ± 0.0 c
C3	33.0 ± 3.2 a	29.3 ± 2.2 ab	37.8 ± 1.3 a	49.3 ± 2.2 ab	42.8 ± 3.7 a	38.5 ± 2.6 a
C5	30.5 ± 2.4 a	28.0 ± 2.2 b	35.5 ± 2.6 ab	52.3 ± 3.6 ab	43.3 ± 2.2 a	34.5 ± 3.7 ab
C10	33.0 ± 2.2 a	29.3 ± 3.9 ab	36.5 ± 2.4 ab	52.0 ± 2.2 ab	41.0 ± 1.8 ab	37.3 ± 1.5 ab

C15	30.5 ± 2.1 a	27.0 ± 2.2 b	32.8 ± 3.3 b	46.5 ± 3.4 b	36.0 ± 2.4 b	33.3 ± 2.5 b
S5	30.5 ± 0.6 a	30.3 ± 2.6 ab	32.5 ± 1.2 b	48.3 ± 5.4 ab	42.8 ± 2.2 a	33.5 ± 1.7 b
FC	33.3 ± 2.5 a	33.8 ± 1.0 a	34.0 ± 2.1 ab	54.5 ± 1.3 a	40.5 ± 3.5 ab	33.0 ± 1.8 b
K (mg L ⁻¹)						
Peat	53.3 ± 9.0 b	100.8 ± 16.9 d	146.8 ± 22.8 c	154.5 ± 12.7 c	168.8 ± 14.5 d	295.0 ± 16.9 c
Coir	104.0 ± 10.8 b	173.8 ± 14.0 c	277.0 ± 30.6 b	241.5 ± 6.7 b	331.5 ± 25.8 c	424.3 ± 8.2 b
C3	394.8 ± 33.3 a	405.0 ± 27.7 ab	589.5 ± 56.5 a	501.3 ± 10.1 a	629.8 ± 44.9 ab	668.0 ± 29.7 a
C5	361.0 ± 33.2 a	390.3 ± 13.1 b	585.5 ± 36.2 a	515.5 ± 19.7 a	666.5 ± 35.6 ab	661.5 ± 54.6 a
C10	382.0 ± 19.4 a	419.8 ± 51.4 ab	616.5 ± 48.2 a	518.3 ± 20.6 a	677.3 ± 21.4 ab	757.8 ± 33.1 a
C15	349.8 ± 21.2 a	389.3 ± 7.0 b	568.3 ± 52.4 a	490.5 ± 30.3 a	609.5 ± 56.9 b	717.5 ± 37.2 a
S5	352.8 ± 13.8 a	416.0 ± 25.4 ab	559.0 ± 21.0 a	489.3 ± 44.8 a	676.8 ± 6.2 ab	737.0 ± 75.9 a
FC	398.0 ± 35.8 a	455.0 ± 13.4 a	606.5 ± 41.9 a	522.8 ± 9.7 a	723.0 ± 73.4 a	716.0 ± 43.9 a
Ca (mg L ⁻¹)						
Peat	214.0 ± 31.6 a	214.0 ± 31.6 a	327.5 ± 68.6 a	303.0 ± 22.2 a	383.0 ± 33.7 a	135.0 ± 10.0 a
Coir	156.5 ± 9.6 b	156.5 ± 9.6 b	277.5 ± 48.0 a	205.5 ± 8.2 b	263.0 ± 33.7 b	75.3 ± 2.6 b
C3	36.8 ± 10.3 c	36.8 ± 10.3 c	46.8 ± 20.2 b	59.5 ± 7.5 c	60.0 ± 15.4 c	27.0 ± 2.2 c
C5	32.0 ± 3.3 c	32.0 ± 3.3 c	41.5 ± 8.0 b	47.8 ± 3.0 cd	49.5 ± 4.0 c	26.8 ± 4.0 c
C10	31.5 ± 3.7 c	31.5 ± 3.7 c	28.8 ± 11.1 b	39.0 ± 3.9 de	36.5 ± 9.5 c	18.8 ± 3.4 cd
C15	26.0 ± 3.2 c	26.0 ± 3.2 c	28.3 ± 8.1 b	35.0 ± 8.7 de	39.0 ± 7.9 c	17.8 ± 1.5 cd
S5	29.3 ± 6.2 c	29.3 ± 6.2 c	29.3 ± 4.3 b	33.8 ± 4.3 de	34.3 ± 3.4 c	17.0 ± 4.2 cd
FC	26.0 ± 11.3 c	26 ± 11.3 c	14.3 ± 6.7 b	19.3 ± 3.4 e	20.5 ± 5.8 c	13.8 ± 3.8 d
P (mg L ⁻¹)						
Peat	9.6 ± 0.8 b	na	na	11.4 ± 0.8 c	na	11.1 ± 0.6 b
Coir	13.2 ± 0.6 b			16.4 ± 0.7 c		15.8 ± 0.5 b
C3	64.2 ± 12.3 a			48.6 ± 4.0 b		41.3 ± 6.6 a
C5	49.4 ± 3.7 a			57.8 ± 1.8 ab		43.9 ± 5.1 a
C10	56.1 ± 7.9 a			58.6 ± 8.8 ab		56.9 ± 7.6 a
C15	44.9 ± 5.3 a			52.8 ± 11.8 ab		50.7 ± 5.1 a
S5	45.8 ± 9.0 a			57.8 ± 12.1 ab		61.1 ± 13.0 a
FC	53.1 ± 7.2 a			71.5 ± 6.0 a		51.4 ± 14.3 a

Different lower case letters indicate statistically significant differences in means among tested substrates at each parameter for each day (Tukey's HSD, $p \leq 0.05$, mean ± standard deviation, $n = 4$). *Miscanthus x giganteus* was harvested with forage harvester (FC, field-chips), then processed with a mechanical fraying facility through a 5-mm screen (S5, shreds) or a hammer mills with screen sizes of 15, 10, 5 and 3 mm (C15, C10, C5 and C3, chips).

Table S4. pH, EC and water-soluble nutrients from extract solution of cells with plants.

Substrate	pH	EC (dS/m)	NO ₃ (mg/L)	NH ₄ (mg/L)	K (mg/L)	Ca (mg/L)	P (mg/L)
Day 9							
Peat	6.0 ± 0.1 b	1.6 ± 0.2 c	310.8 ± 48.2 a	8.5 ± 1.7 b	97.0 ± 15.7 b	197.5 ± 29.9 a	7.7 ± 2.3 c

Coir	5.9 ± 0.0 b	1.7 ± 0.3 bc	303.8 ± 82.5 a	13.5 ± 1.9 b	205.5 ± 38.4 b	152.5 ± 26.3 b	18.5 ± 4.2 bc
C3	8.1 ± 0.2 a	2.3 ± 0.5 bc	36.3 ± 5.9 b	35.5 ± 5.7 a	613.3 ± 114.8 a	37.8 ± 18.0 c	59.5 ± 22.7 a
C5	8.1 ± 0.2 a	2.5 ± 0.5 a	38.3 ± 11.6 b	38.8 ± 4.4 a	666.0 ± 46.9 a	30.3 ± 9.6 c	66.4 ± 13.0 a
C10	8.0 ± 0.0 a	2.4 ± 0.2 ab	28.5 ± 4.1 b	39.0 ± 1.6 a	683.8 ± 57.3 a	20.8 ± 10.8 c	67.6 ± 22.4 a
C15	8.0 ± 0.1 a	2.2 ± 0.2 bc	24.8 ± 3.6 b	36.0 ± 3.2 a	646.5 ± 35.1 a	17.3 ± 5.6 c	57.0 ± 3.8 a
S5	8.0 ± 0.1 a	1.9 ± 0.1 bc	18.3 ± 2.9 b	32.0 ± 2.4 a	587.8 ± 59.3 a	23.8 ± 11.5 c	50.7 ± 6.9 ab
FC	7.9 ± 0.1 a	2.0 ± 0.2 bc	19.5 ± 2.9 b	35.3 ± 2.1 a	640.3 ± 55.6 a	2.5 ± 7.4 c	59.4 ± 4.8 a
Day 17							
Peat	6.2 ± 0.0 e	2.1 ± 0.2 cd	425.8 ± 94.4 a	10.3 ± 1.0 b	120.3 ± 16.2 c	327.5 ± 34.2 a	9.0 ± 0.4 b
Coir	6.3 ± 0.1 e	1.8 ± 0.1 d	325.0 ± 19.5 b	15.3 ± 1.0 b	216.0 ± 10.4 b	190.0 ± 12.6 b	15.8 ± 1.7 b
C3	8.4 ± 0.1 a	3.0 ± 0.2 a	107.5 ± 11.0 c	37.0 ± 2.4 a	526.5 ± 24.3 a	51.3 ± 10.0 c	57.4 ± 9.5 a
C5	8.2 ± 0.0 ab	2.8 ± 0.1 ab	95.0 ± 7.8 c	36.3 ± 1.0 a	538.5 ± 7.1 a	54.5 ± 9.2 c	63.4 ± 5.2 a
C10	8.0 ± 0.2 bc	2.5 ± 0.6 bc	82.8 ± 13.7 c	35.0 ± 5.8 a	532.0 ± 79.3 a	38.3 ± 13.1 c	76.1 ± 20.5 a
C15	8.0 ± 0.1 c	2.4 ± 0.2 cd	79.5 ± 5.0 c	33.5 ± 1.3 a	521.8 ± 25.6 a	40.3 ± 7.1 c	52.5 ± 4.7 a
S5	7.9 ± 0.0 c	2.6 ± 0.3 bc	80.0 ± 7.0 c	36.0 ± 2.9 a	561.3 ± 45.2 a	40.0 ± 9.3 c	80.7 ± 21.6 a
FC	7.7 ± 0.0 d	2.1 ± 0.1 cd	77.5 ± 10.9 c	33.5 ± 1.3 a	542.8 ± 29.3 a	28.3 ± 8.1 c	67.9 ± 5.6 a

Different lower case letters indicate statistically significant differences in means among tested substrates at each parameter for each day (Tukey's HSD, $p \leq 0.05$, mean \pm standard deviation, $n = 4$). *Miscanthus x giganteus* was harvested with forage harvester (FC, field-chips), then processed with a mechanical fraying facility through a 5-mm screen (S5, shreds) or a hammer mills with screen sizes of 15, 10, 5 and 3 mm (C15, C10, C5 and C3, chips).

Table S5. Cation exchange capacity (CEC) of miscanthus substrates *M. x giganteus* ($n = 2$) using ammonium acetate.

Substrate	Cation exchange capacity (cmolc kg ⁻¹)			
	K	Na	Ca	Mg
C15	13.03	0.12	2.21	3.19
S5	12.37	0.16	1.66	2.17



Figure S4. Seedlings at harvest day, from left to right: peat, coir, FC, S5, C15, C10, C3.

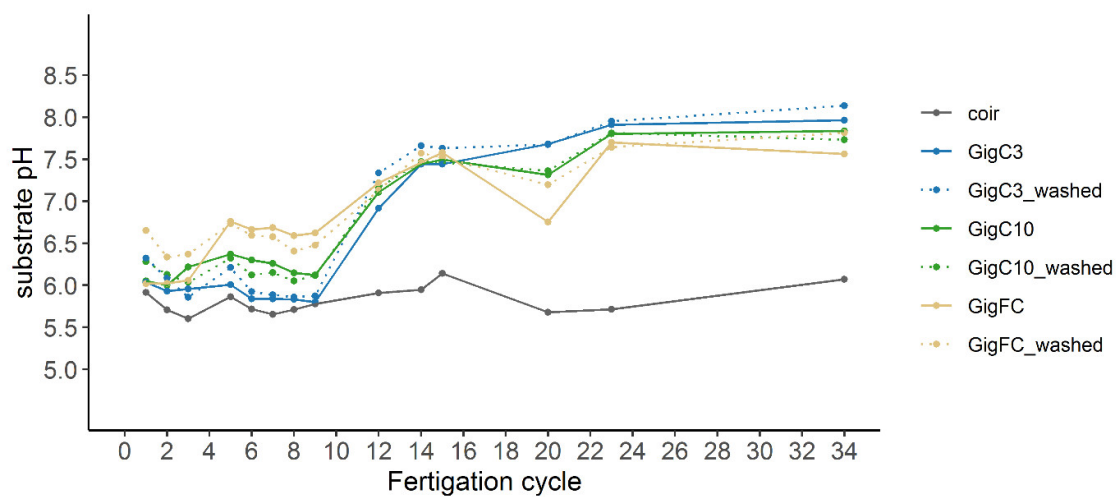


Figure S5. pH evolution of washed and non-washed substrates.