

pH

	1	2*	2	3	3	3
1			318000	2		318000
		3		310058		
:		pH				

a
 y
 n
 .6 to 8.4
 onstructed vert
 pH range
 llag Tung^[1]
 sporum) (*Fusarium solani*)
 N₂O
 [2-6]
 [17-18] Liu [16]
 [7] McLain
 ((NH₄⁺ NO₃⁻ NO₂⁻) pH
 20
 Crenshaw [8]
 1) pH
 2) pH
 ~70% 16%~50%
 Seo DeLaune^[10]
 1
 1.1
 (Eh 250~400 mV) Herold
 2014 (121° 21' E,
 Crenshaw [8] 28° 34' N) 20
 0.45 m 0.45 m 1.20 m
 Ma [12] 10 cm
 50 cm (1~2
 [13] 30 cm (4~6 mm) 30 cm
 (50~85 mm) (J
 75%~ *pseudacorus-IP* (*Canna glauca-CG*)
 (*Scirpus validus-SV*) (*Cyperus*
 CA) 2015 3
 [10]
 4
 0-30 0.2 m³/d
 10 d 0.5 d

and

Hoagland

1 mg/L BOD₅ 79.51 mg/L 79.73

4.52 mg/L NH₄⁺-N 38.05 mg/L NO₃⁻-N

C 5 mg/g DW^[5]

3

2

5 (8)

iu ^[16]

0—30 cm

C 5

mg/g DW^[5]

3 cm PVC

N 10

mg/g DW^[19]

3

pH 0.1 mol/L HCl 0.1 mol/L

105

NaOH

^[20]

2

4

pH 6.8

pH

C 5 mg/g DW N 10 mg/g DW

0.1 mol/L HCl

NaOH

pH 2.8 5.6 8.4

3

^[5]

100 mL

1.4

N₂O

2

[(A - B) +

D) 1

10 mL ^[10]

25

: A

8 h

2 h

B

N₂O

CO₂

⁶³Ni

(Shimadzu

GC-14B Kyoto, Japan)

Poropak Q

65

300

N₂O

N₂O

DW

N₂O μg/(g·d) DW

O

(N₂)

1.5

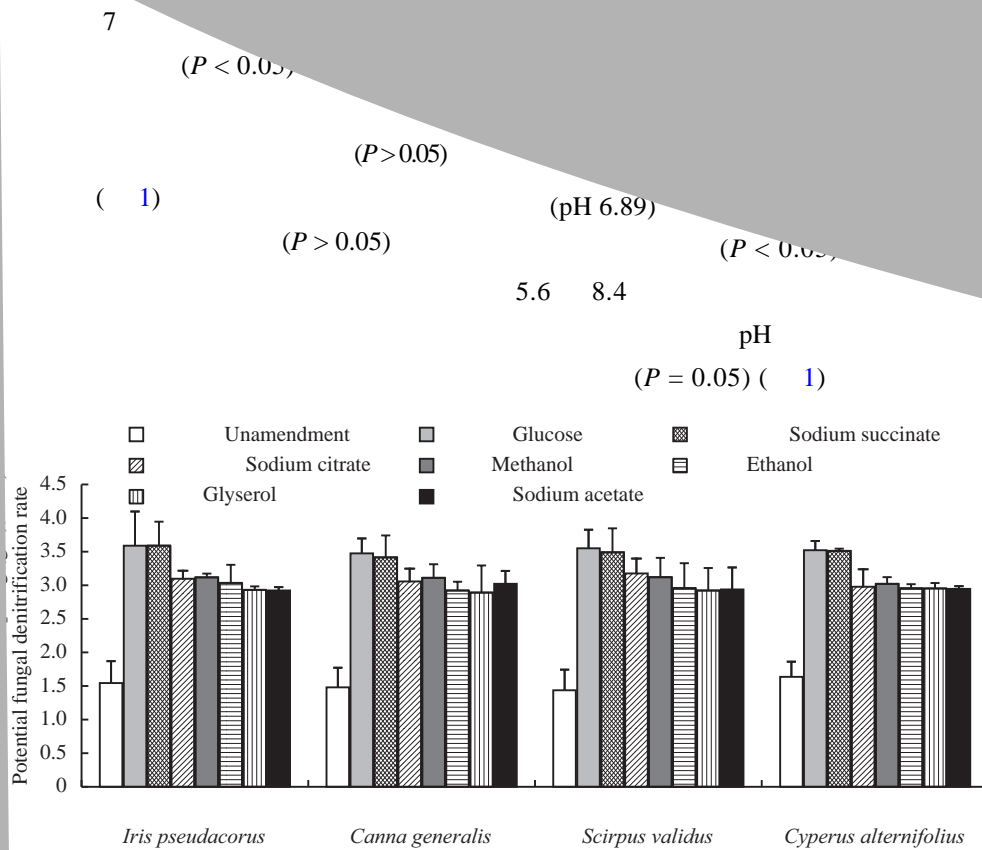
N₂O

N₂O

pH

Turkeyxs

SPSS 11.5



1 Effects of seven carbon sources on fungal denitrification potential in constructed vertical flow wetlands under different plants

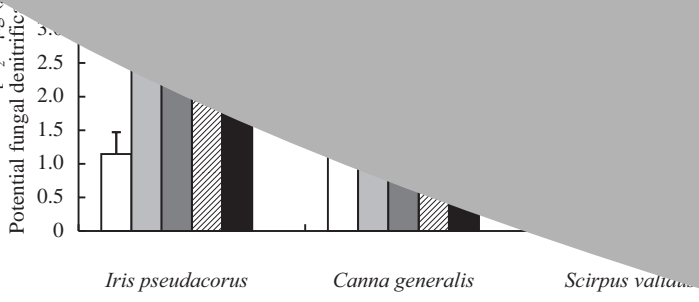
two-way ANOVA of fungal denitrification potential by plant species, carbon and nitrogen sources and pH in simulated wetlands

Sum of squares	Significance
7.04	0.03

3

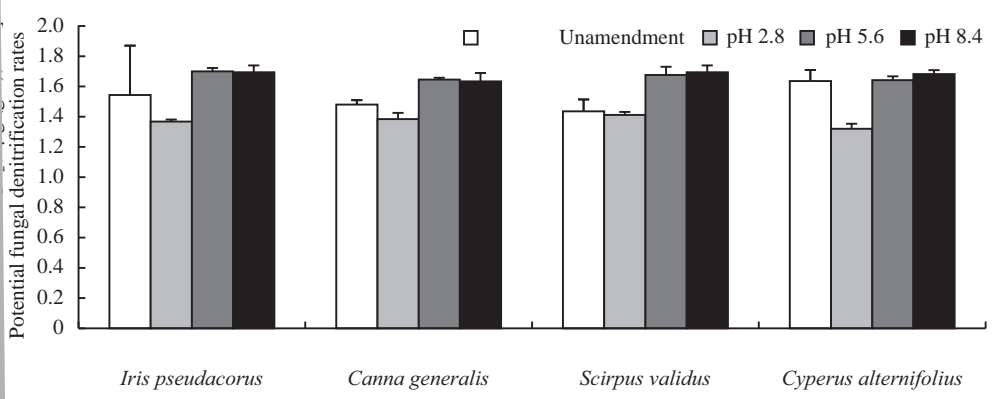
0.00	0.57	0.73
0.02	0.00	0.74
0.05	0.05	0.74

1930-1935 (4) DW1



2 4

2 Effects of four nitrogen sources on fungal denitrification potential in vertical flow constructed wetlands under different plants



3 pH

Effects of pH on fungal denitrification potential in vertical flow constructed wetlands under different plants

Liu [16]

7

5

Bais [24] Esperschütz [25]

4

[28] Crenshaw

[8] [11]

4

McLain

/ NH₄⁺ NO₃⁻ NO₂⁻ NO₂⁻

[28]

NO₃⁻ NO₂⁻

pH

[28] Herold [5]

pH 4.5~7.6

Šimek [20] Chen [30]

pH pH pH

pH 6.89

2.8

pH

H 4.0 [5, 30] pH

H

H⁺ OH⁻

pH pH

[31-32]

5.6 8.4 6.89 pH

5.6 8.4

pH

4 pH 2.8

[3] McLain J E 1, ... transformations in a semiarid soil[J]. Soil Biology and Biochemistry, 2012, 54: 253-263.

[4] Mothapo N, Chen H H, Cubeta M A, *et al.* Phylogenetic, taxonomic and functional diversity of fungal denitrifiers and associated N₂O production efficacy[J]. Soil Biology and Biochemistry, 2015, 83: 160-175.

[5] Herold M B, Baggs E M, Daniell T J. Fungal and bacterial denitrification are differently affected by long-term pH amendment and cultivation of arable soil[J]. Soil Biology and Biochemistry, 2012, 54: 25-35.

[6] Marusenko Y, Huber D P, Hall S J. Fungi mediate nitrous oxide production but not ammonia oxidation in arid land soils of the southwestern US[J]. Soil Biology and Biochemistry, 2013, 63: 24-36.

[7] Wallenstein M D, Myrold D D, Firestone M, Voytek M. Environmental controls on denitrifying communities and denitrification rates: insights from molecular methods[J]. Ecological Applications, 2006, 16: 2143-2152.

[8] Crenshaw C L, Lauber C, Sinsabaugh R L, Staveland L K. Fungal control of nitrous oxide production in semiarid grassland[J]. Biogeochemistry, 2008, 87: 17-27.

[9] Lavrent'ev R B, Zaitsev S A, Sudnitsyn I I, Kurakov A V. Nitrous oxide production by fungi in soils under different moisture levels[J]. Moscow University Soil Science Bulletins, 2008, 63: 178-183.

[10] Seo D C, DeLaune R D. Fungal and bacterial mediated denitrification in wetlands: Influence of sediment redox condition[J]. Water Research, 2010, 44: 2441-2450.

[11] Wei W, Isobe K, Shiratori Y, *et al.* N₂O emission from cropland soil through fungal denitrification after surface application of organic fertilizer[J]. Soil Biology and Biochemistry, 2014, 69: 157-167.

[12] M... Farrell R E, Siciliano S D. Soil formate regulates the fungal nitrous oxide emission pathway[J]. Applied and Environmental Microbiology, 2008, 74: 6690-6696.

[13] Vymazal J. Constructed wetlands for wastewater treatment: decades of experience[J]. Environmental Science and Technology, 2011, 45: 61-69.

[14] Truu M, Juhanson J, Truu J. Microbial community composition in constructed wetlands[J]. Total Environment, 2008, 137: 1-10.

[15] Song K, Lee J, Kang H. Denitrification rates and community structure of denitrifying bacteria in newly constructed wetland[J].

University
, 2011, 160:

heximide on N_2O and NO_3^-
cultural soil[J]. *Biology and Fertility*

, Hopkins D W. What is the so-called optimum pH
ation in soil?[J]. *Soil Biology and Biochemistry*, 2002,
34.

an N, Arias C A, *et al.* Can root exudates from emergent
ts fuel denitrification in subsurface flow constructed
ms?[J]. *Ecological Engineering*, 2013, 61(19): 555–563.

Eldhuset T D, Wollebæk G. Organic acids in root
soil solution of Norway spruce and silver birch[J]. *Soil
Biochemistry*, 2005, 37: 259–269.

, Santaella C, Heulin T, Achouak W. Root exudates
interactions belowground[J]. *Soil Biology and
2004, 77: 69–80.*

air T L, Perry L G, *et al.* The role of root exudates in