



HOKKAIDO UNIVERSITY

Title	Plant responses to nitrogen fertilization differ between post-mined and original peatlands
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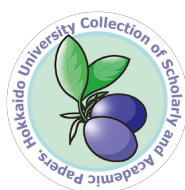


Table 1 Mean groundwater chemistry shown with standard deviation in four vegetation types before nitrogen addition in June, August and November 2003. Numbers of samples were 36 in BG, RA and MJ, and 27 in SS

Site	pH*	EC ($\mu\text{S}/\text{cm}$)	Total nitrogen (mg/l)	NH_4^+ (mg/l)	NO_3^- (mg/l) ^{N.S.}
BG	5.01 ± 0.27^a	144.0 ± 23.1^a	11.1 ± 6.7^{ab}	3.56 ± 1.57^a	0.72 ± 1.27
RA	4.69 ± 0.11^b	86.4 ± 11.1^b	6.6 ± 7.8^{bd}	0.74 ± 0.62^b	0.51 ± 0.27
MJ	4.90 ± 0.25^a	124.2 ± 29.6^c	12.0 ± 14.2^{ac}	1.60 ± 1.58^c	0.84 ± 1.50
SS	4.43 ± 0.14^c	102.5 ± 20.0^d	2.5 ± 3.0^d	0.70 ± 0.67^b	1.62 ± 3.71

Significant differences were investigated among the four types by a *post-hoc* Tukey's test after a one-way repeated-measures ANOVA. Significantly different: *** at $P < 0.001$, ** at $P < 0.01$. N.S.: not significantly different. Same letters indicate non-significant differences between vegetation types ($P < 0.05$). Vegetation type: BG – bare ground, RA – *Rhynchospora alba* sedgeland, MJ – *Moliniopsis japonica* grassland, SS – unmined peatland dominated by *Sphagnum* spp.

Table 2 Shoot densities (/m²) on *Moliniopsis japonica* , *Phragmites communis* and *Carex middendorffii* and capitulum density on *Sphagnum* spp. in 2006 and 2007

N addition (g/m ² /yr)			0.0		4.5		9.0		18.0		36.0	
year			2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Site	Species	Significant variables										
BG	<i>Sphagnum</i>		-	-	-	-	-	-	-	-	-	-
	<i>Moliniopsis</i>		-	-	0.2 ± 0.4	-	-	-	0.2 ± 0.4	0.6 ± 0.9	-	-
	<i>Phragmites</i>		-	-	-	-	-	-	-	-	-	-
	<i>Carex</i>		-	-	-	-	-	0.2 ± 0.4	-	-	-	-
RA	<i>Sphagnum</i>	year	109.0 ± 174.4	904.3 ± 1659.6	1275.0 ± 1155.0	1831.5 ± 1613.1	158.8 ± 230.5	662.0 ± 632.2	140.5 ± 237.9	472.0 ± 472.1	6.8 ± 9.3	148.0 ± 147.9
	<i>Moliniopsis</i>	N.S.	230.0 ± 279.7	292.5 ± 201.7	495.0 ± 264.2	532.5 ± 395.2	540.0 ± 311.0	268.8 ± 212.1	285 ± 202.8	317.5 ± 302.4	330.0 ± 322.8	365.6 ± 289.2
	<i>Phragmites</i>	N.S.	6.2 ± 5.2	4.2 ± 3.3	7.4 ± 8.4	9.4 ± 9.3	6.6 ± 6.6	7.0 ± 7.2	2.8 ± 2.2	3.2 ± 3.4	6.2 ± 8.0	8.0 ± 9.1
	<i>Carex</i>	N.S.		-		47.5 ± 89.8		2.5 ± 5.6		98.8 ± 210.5		164.1 ± 328.2
MJ	<i>Sphagnum</i>	N.S.	7.5 ± 16.8	72.0 ± 161.0	4.5 ± 10.1	12.0 ± 26.8	112.5 ± 251.6	48.3 ± 108.1	16.5 ± 139.8	62.5 ± 139.8	0	57.5 ± 128.6
	<i>Moliniopsis</i>	year	1000.0 ± 393.3	742.5 ± 179.7	787.0 ± 404.1	583.8 ± 348.9	1185.0 ± 695.0	760.0 ± 426.0	615 ± 183.4	451.3 ± 160.3	640.0 ± 156.7	582.5 ± 310.7
	<i>Phragmites</i>	year	35.4 ± 20.2	26.4 ± 14.9	25.8 ± 25.2	23.8 ± 19.8	24.4 ± 12.4	24.6 ± 14.2	33.2 ± 24.1	23.2 ± 18.8	28.6 ± 16.1	28.2 ± 18.1
	<i>Carex</i>	N.S.		165.0 369.0		56.3 125.8		28.8 64.3		118.8 265.5		-
SS	<i>Sphagnum</i>	N + year	18526 ± 6336	24671 ± 10933	10702 ± 4681	18321 ± 5118	5326 ± 2581	10788 ± 5175	1960 ± 2669	3527 ± 3076	147 ± 106.6	47.7 ± 33.6
	<i>Moliniopsis</i>	year	16.0 ± 13.2	15.0 ± 14.4	12.6 ± 16.3	40.0 ± 63.4	16.4 ± 13.3	30.0 ± 41.3	52.6 ± 50.4	107.5 ± 112.7	7.6 ± 7.1	18.8 ± 23.0
	<i>Phragmites</i>	-	-	-	-	-	-	-	-	-	-	-
	<i>Carex</i>	N.S.		286.3 ± 120.2		280.0 ± 64.6		253.8 ± 82.5		272.5 ± 74.9		400.0 ± 119.0

Significance were determined by a one-way repeated-measures ANOVA among nitrogen addition treatments using the year as repeated-measures data to explain the densities of the four taxa. Values are mean ± standard deviation. -: no individuals observed. N.S. : not significant. Blank: not measured