

Table S1 Soil properties in the experimental field site.

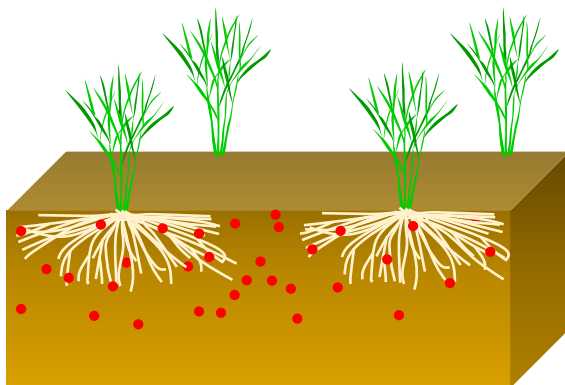
Experimental site	Experiment 1 Morioka (Iwate)		Experiment 2 Date (Fukushima)
Soil type	Mixture of volcanic soil and alluvial soil		Brown forest soil
Experimental year	2020	2021	2021
Exchangeable K (mg 100 g ⁻¹)	19.5	14.4	Mix_KCl: 11.5 ± 1.8 L_KCl: 11.0 ± 0.5 0 K: 11.7 ± 1.7
Phosphate absorption coefficient (mg 100 g ⁻¹)	1282	1440	805
CEC (meq 100 g ⁻¹)	31.8	31.0	22.5

Exchangeable K in Fukushima experiment are shown as mean ± SD (n=3).

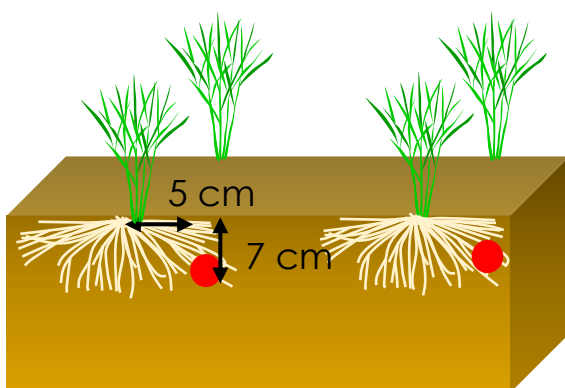
Table S2 Biomass production and grain yield in field experiment 1 (Iwate University).

Year	Treatment	Above ground dry matter weight (g/ m ²)			Grain yield (g/m ²)
		Panicle formation	Heading	Maturity	
2020	Mix_KCI	262.8 a	826.7 a	1187.7 a	817.4 a
	L_KCI	213.1 b	782.6 a	1279.1 a	791.2 a
	L_Kcoat	229.3 ab	817.7 a	1173.8 a	761.7 a
2021	Mix_KCI	257.6 a	842.7 a	1340.1 a	815.0 a
	L_KCI	270.7 a	912.5 a	1379.8 a	817.5 a
	L_Kcoat	244.1 a	912.3 a	1239.7 a	780.3 a
	OK	234.1 a	804.8 a	1164.5 a	724.7 a
ANOVA	Year (Y)	n.s.	n.s.	n.s.	n.s.
	Treatment (T)	n.s.	n.s.	n.s.	n.s.
	Y*T	n.s.	n.s.	n.s.	n.s.

Different letters indicate significant differences at $P < 0.05$ probability level determined using the Tukey's HSD test. n.s. indicates no significant effect in analysis of variance (ANOVA)



Mix



Local KCl/ Kcoat



Fig. S1 Fertilizer placement and application method of local-K fertilization

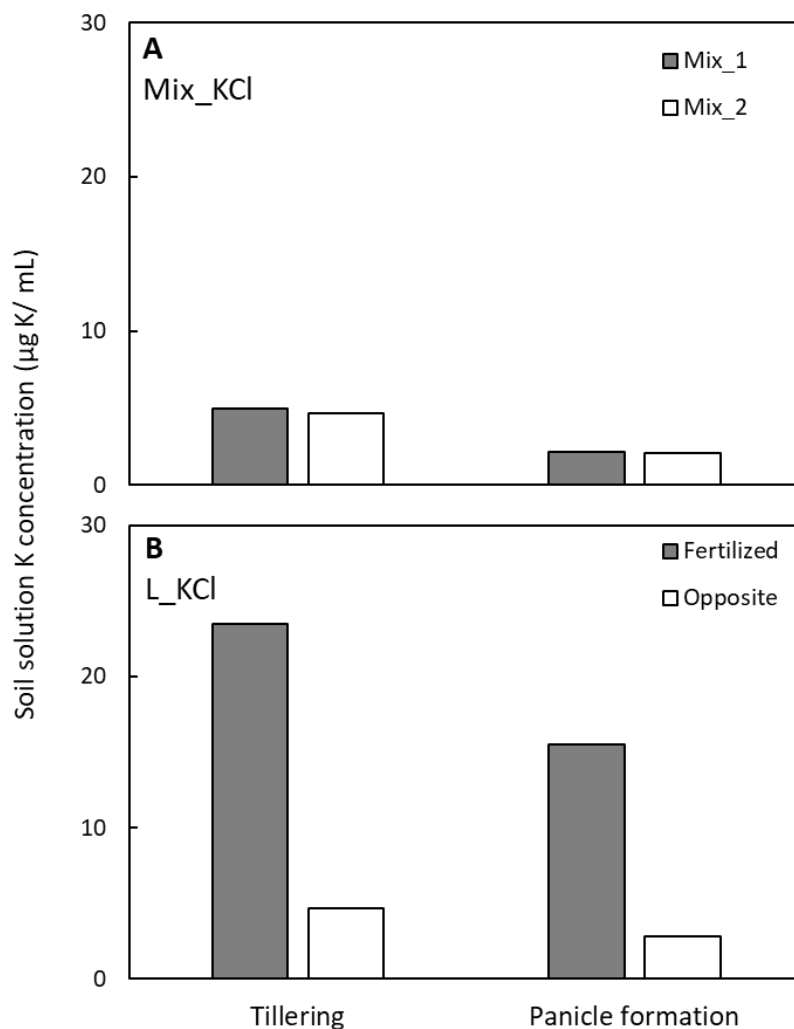


Fig. S2 Potassium (K) concentration of soil solution in the experimental field in (A) Mix_KCl and (B) L_KCl plots at the time of the sampling for gene expression analysis in 2022. Soil solution was collected at approximately 3 cm from the plant on each side of the fertilizer application (fertilized) and on the opposite (unfertilized) side for L_KCl, and on the same positions for Mix_KCl (Mix_1 and Mix_2) (n = 2).