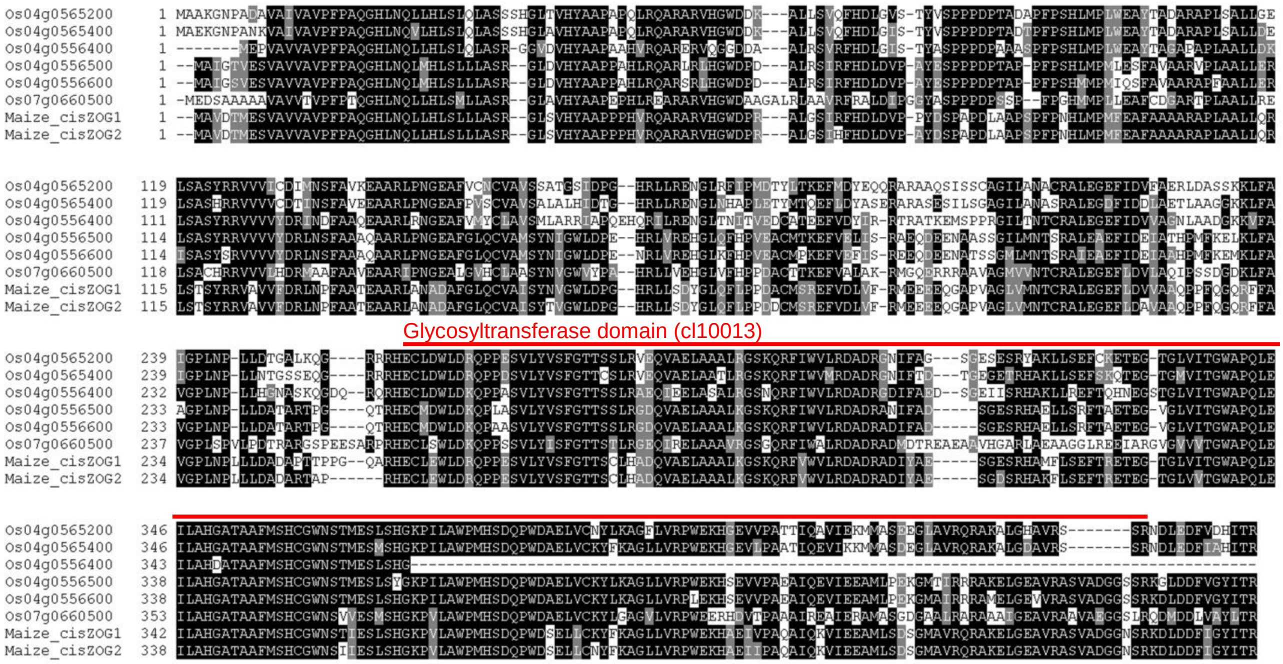
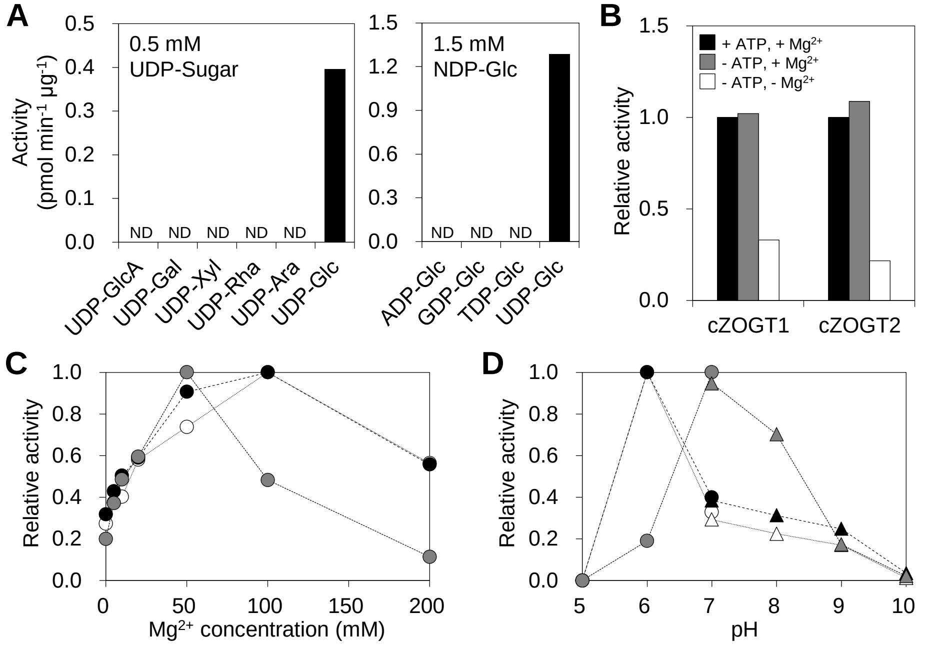
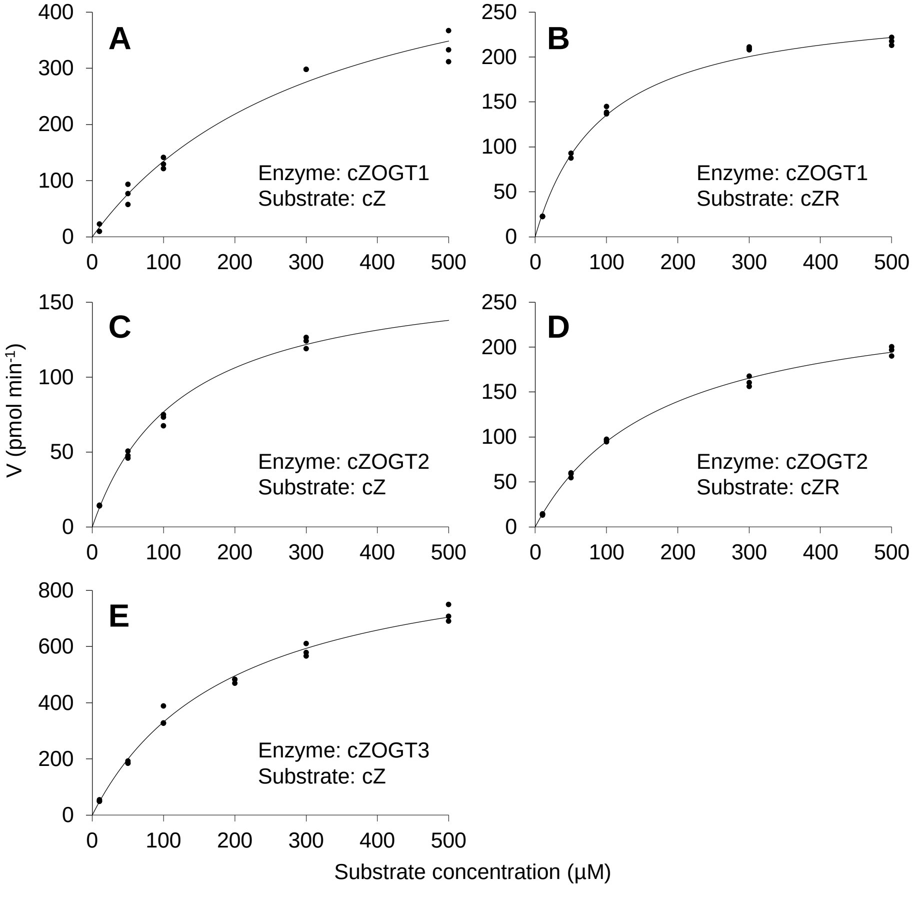


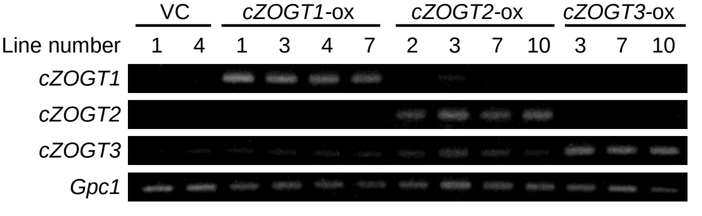
Supplemental Figure S1. Multiple alignment of the deduced amino acid sequences of maize *cis*ZOGs and putative rice *cis*-zeatin-*O*-glucosyltransferases. The deduced amino acid sequences were obtained from GenBank (accession numbers AF318075 for maize *cis*ZOG1, and AY082660 for *cis*ZOG2; http://www.ncbi.nlm.nih.gov/genbank/) and The Rice Annotation Project Database (locus IDs Os04g0556400, Os04g0556500, Os04g0556600, Os04g0565200, Os04g0565400, and Os07g0660500 for putative rice *cis*-zeatin-*O*-glucosyltransferases; http://rapdb.dna.affrc.go.jp/). The alignment was performed using CLUSTAL W (http://www.genome.jp/tools/clustalw/). Identical and similar residues are shaded in black and grey, respectively. Dashes indicate gaps introduced to maximize sequence similarity. The glycosyltransferase domain (accession number cl10013) predicted by an NCBI Conserved Domain Search (http://www.ncbi.nlm.nih.gov/Structure/cdd/wrpsb.cgi) is highlighted in red.



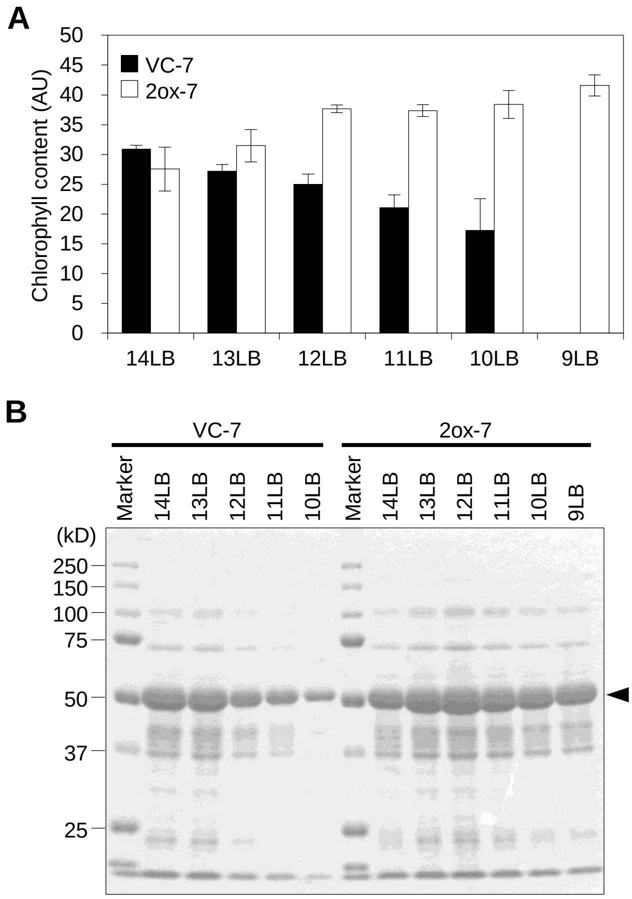
Supplemental Figure S2. Preliminary tests to determine conditions for an enzymatic activity assay for rice cZ-*O*-glucosyltransferases. A, substrate specificity of cZOGT1 for various sugar donors in *O*-glucosylation of *cis*-zeatin-riboside (cZR). UDP-GlcA, Gal, Xyl, Rha, Ara, and Glc were tested at 0.5 mM (left panel) while ADP-, GDP-, TDP-, and UDP-Glc were tested at 1.5 mM (right panel). ND, not detected. B, relative cZR-*O*-glucosylation activity of cZOGT1 and cZOGT2 in the presence of 50 mM Mg^{2+} as well as 0.5 mM ATP (black bars), of 50 mM Mg^{2+} only (gray bars), and in the absence of both (white bars). cZR was used as a glucose acceptor. Activities were normalized to maximal values observed for a given enzyme. C, optimum concentrations of magnesium ions for cZOGT1 (black circles), cZOGT2 (gray circles), and cZOGT3 (white circles) in cZR-*O*-glucosylation. Activities were normalized to the maximal values observed for each enzyme. D, optimum pH for cZOGT1 (black symbols), cZOGT2 (gray symbols), and cZOGT3 (white symbols) in cZR-*O*-glucosylation. Tris-acetate buffer (circles) was used to prepare solutions of pH 5.0, 6.0, and 7.0, and Tris-HCl (triangles) was used to buffer solutions at pH 7.0, 8.0, 9.0, and 10.0. Activities were normalized to the maximal values observed for a given enzyme.



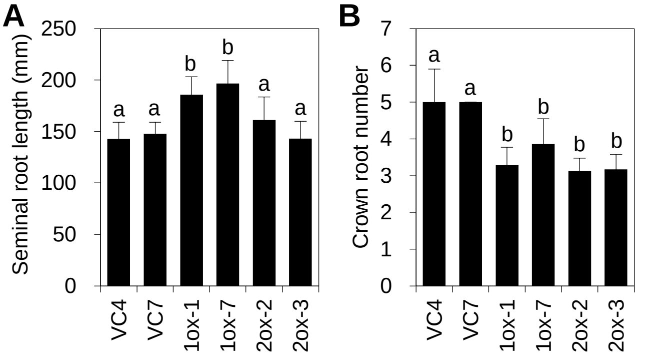
Supplemental Figure S3. Plots of velocities (v) of *O*-glucosylation catalyzed by cZOGT1 (A, B), cZOGT2 (C, D), and cZOGT3 (E) against the concentrations of cZ (A, C, E) or cZR (B, D). Results from 3 technical repeats are shown.



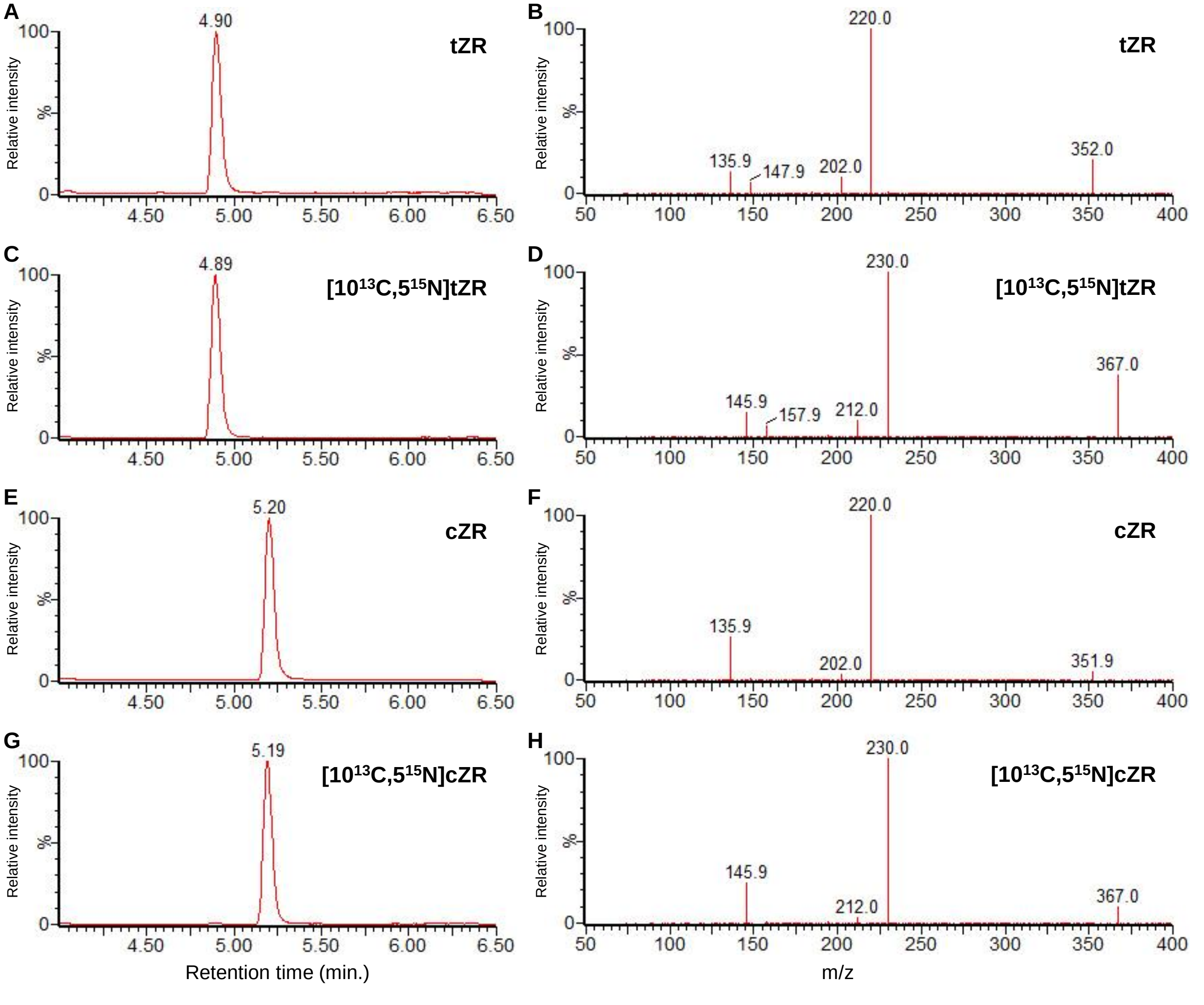
Supplemental Figure S4. Over-expression of *cZOGT* genes in transgenic lines. Full-length coding sequences of *cZOGT* genes under the control of the *actin* promoter were introduced into rice. Total RNAs were extracted from seedling shoots of the transgenic rice and subjected to RT-PCR using gene-specific primers. The *Gpc1* gene encoding glyceraldehyde-3-phosphate dehydrogenase was used as a control.



Supplemental Figure S5. Delay of leaf senescence in *cZOGT2* over-expressing rice. A transgenic rice line over-expressing *cZOGT2* (2ox-7, black bars) and the corresponding vector control (VC-7, white bars) were grown in soil for 104 days after seed imbibition. A, relative chlorophyll contents in leaf blades at the ninth (9LB), tenth (10LB), eleventh (11LB), twelfth (12LB), thirteenth (13LB), and fourteenth (14LB) nodal position of main culms, expressed as arbitrary units (AU). The 9LB in VC-7 plants had withered at the time of measurement. Mean values ± SD of three plants are shown. B, Crude soluble proteins were extracted from the distal third of the leaf blades used for the experiments presented in A, and were separated by SDS-PAGE. Crude proteins equivalent to 1 mg of fresh weight were loaded onto each lane. On this photograph of the poly-acrylamide gel stained by Coomassie Brilliant Blue, the arrowhead indicates the large subunit of Rubisco. Molecular weights are given on left.



Supplemental Figure S6. Visible phenotypes in roots of *cZOGT1* and *cZOGT2* over-expressing rice lines at the seedling stage. Length of seminal roots (A) and number of crown roots (B) were determined in transgenic seedlings over-expressing *cZOGT1* (1ox-1, 1-ox-7) and *cZOGT2* (2-ox-2, 2ox-3), and in vector control plants (VC-4, VC-7); all plants had been grown hydroponically for 2 weeks after sowing. Means ± SD of at least 12 and 6 plants are shown for root length (A) and root number (B), respectively. Different lower-case letters indicate statistically significant differences ($P<0.05$) in the Tukey-Kramer test following one-way ANOVA.



Supplemental Figure S7. UPLC-MS/MS analysis of authentic tZR (A and B) and cZR (C and D), and of synthesized [10^{13}C,5^{15}N]tZR (E and F) and [10^{13}C,5^{15}N]cZR (G and H). The numbers shown above the peaks in the chromatograms (A, C, E, and G) and mass spectra (B, D, F, and H) represent retention times and mass to charge ratio (m/z) of detected ions, respectively.

Supplemental Table S1. Time-courses of cytokinin derivative contents of rice seedlings after application of [$10^{13}C,5^{15}N$]tZR.

One μM of [$10^{13}C,5^{15}N$]tZR was supplied to 2-week-old rice seedlings. At the times of exposure indicated, root and shoot contents of cytokinin derivatives containing isotope labels were quantified by UPLC-MS/MS analysis. Values presented are means ± SD of at least 3 plants.

Cytokinins	Contents (pmol g^{-1} FW)				
	1 h	3 h	6 h	12 h	24 h
cZ and cZ-derivatives in roots					
cZRPs	N.D.	N.D.	N.D.	N.D.	N.D.
cZR	N.D.	N.D.	N.D.	0.01 ± 0.02	N.D.
cZ	N.D.	N.D.	N.D.	N.D.	0.68
cZRPsOG	0.05 ± 0.02	0.14 ± 0.16	0.07 ± 0.10	0.57 ± 0.57	0.37 ± 0.25
cZROG	0.03 ± 0.02	0.25 ± 0.08	0.34 ± 0.12	1.24 ± 1.46	1.11 ± 1.03
cZOG	N.D.	N.D.	N.D.	N.D.	N.D.
tZ and tZ-derivatives in roots					
tZRPs	623.2 ± 127.0	804.4 ± 485.8	208.9 ± 70.81	15.37 ± 14.37	216.5 ± 476.2
tZR	130.5 ± 39.0	97.34 ± 54.67	20.96 ± 7.59	1.30 ± 1.22	23.39 ± 51.56
tZ	242.1 ± 39.8	493.2 ± 301.8	241.3 ± 39.57	35.09 ± 15.39	182.8 ± 339.5
tZ7G	N.D.	N.D.	N.D.	N.D.	N.D.
tZ9G	238.6 ± 54.1	2429 ± 1106	3471 ± 706	3510 ± 328	3788 ± 672
tZRPsOG	N.D.	N.D.	N.D.	N.D.	N.D.
tZROG	0.23 ± 0.05	1.07 ± 0.32	1.76 ± 0.53	1.45 ± 0.35	1.36 ± 0.58
tZOG	0.17 ± 0.06	1.23 ± 0.19	2.30 ± 0.75	2.83 ± 1.11	2.11 ± 0.55
DZ and DZ-derivatives in roots					
DZRPs	N.D.	0.07 ± 0.07	N.D.	0.04 ± 0.04	0.08 ± 0.07
DZR	N.D.	0.05 ± 0.02	0.00 ± 0.01	0.05 ± 0.01	0.05 ± 0.02
DZ	N.D.	N.D.	N.D.	N.D.	N.D.
DZ9G	0.22 ± 0.07	3.91 ± 3.61	4.34 ± 0.76	7.45 ± 0.78	8.47 ± 3.52
iP and iP-derivatives in roots					
iPRPs	N.D.	N.D.	N.D.	N.D.	N.D.
iPR	N.D.	N.D.	N.D.	N.D.	N.D.
iP	N.D.	N.D.	N.D.	N.D.	N.D.
iP7G	N.D.	N.D.	N.D.	N.D.	N.D.
iP9G	N.D.	N.D.	N.D.	N.D.	N.D.
cZ and cZ-derivatives in shoots					
cZRPs	N.D.	N.D.	N.D.	N.D.	N.D.
cZR	N.D.	N.D.	N.D.	0.01 ± 0.01	N.D.
cZ	N.D.	N.D.	N.D.	N.D.	N.D.
cZRPsOG	N.D.	N.D.	N.D.	0.01 ± 0.02	0.01 ± 0.03
cZROG	0.19 ± 0.09	0.12 ± 0.10	0.03 ± 0.03	0.04 ± 0.02	0.02 ± 0.02
cZOG	N.D.	N.D.	N.D.	N.D.	N.D.
tZ and tZ-derivatives in shoots					
tZRPs	11.31 ± 3.69	26.55 ± 5.74	6.47 ± 3.46	0.71 ± 0.28	0.45 ± 0.30
tZR	6.00 ± 2.25	5.93 ± 3.02	1.53 ± 0.71	0.27 ± 0.14	0.06 ± 0.05
tZ	9.11 ± 4.55	14.72 ± 2.46	4.05 ± 1.33	1.77 ± 0.50	1.36 ± 0.36
tZ7G	N.D.	N.D.	N.D.	N.D.	N.D.
tZ9G	2.36 ± 0.68	20.04 ± 7.34	18.26 ± 7.02	20.25 ± 4.89	26.99 ± 11.42
tZRPsOG	N.D.	N.D.	N.D.	N.D.	N.D.
tZROG	0.00 ± 0.01	0.05 ± 0.03	0.04 ± 0.01	0.03 ± 0.01	0.01 ± 0.01
tZOG	0.25 ± 0.11	0.20 ± 0.02	0.22 ± 0.08	0.25 ± 0.09	0.23 ± 0.05
DZ and DZ-derivatives in shoots					
DZRPs	0.03 ± 0.03	0.00 ± 0.01	0.01 ± 0.01	N.D.	0.01 ± 0.03
DZR	N.D.	N.D.	N.D.	N.D.	0.00 ± 0.01
DZ	N.D.	N.D.	N.D.	N.D.	N.D.
DZ9G	N.D.	N.D.	N.D.	N.D.	N.D.
iP and iP-derivatives in shoots					
iPRPs	N.D.	N.D.	N.D.	N.D.	N.D.
iPR	N.D.	N.D.	N.D.	N.D.	N.D.
iP	N.D.	N.D.	N.D.	N.D.	N.D.
iP7G	N.D.	N.D.	N.D.	N.D.	N.D.
iP9G	N.D.	N.D.	N.D.	N.D.	N.D.

FW, fresh weight; N.D., not detected; cZ, *cis*-zeatin; tZ, *trans*-zeatin; iP, N^6-(Δ^2-isopentenyl)adenine; DZ, dihydrozeatin; cZR, cZ-riboside; tZR, tZ-riboside; iPR, iP-riboside; DZR, DZ-riboside; cZRPs, cZ-ribotides; tZRPs, tZ-ribotides; iPRPs, iP-ribotides; DZRPs, DZ-ribotides; tZ7G, tZ-7-*N*-glucoside; iP7G, iP-7-*N*-glucoside; tZ9G, tZ-9-*N*-glucoside; iP9G, iP-9-*N*-glucoside; DZ9G, DZ-9-*N*-glucoside; cZOG, cZ-*O*-glucoside; tZOG, tZ-*O*-glucoside; cZROG, cZR-*O* -glucoside tZROG, tZR-*O*-glucoside; cZRPsOG, cZRPs-*O*-glucoside; and tZRPsOG, tZRPs-*O*-glucoside.

Supplemental Table S2. Time-courses of cytokinin derivative contents of rice seedlings after application of [$10^{13}C,5^{15}N$]cZR.

One μM of [$10^{13}C,5^{15}N$]cZR was supplied to 2-week-old rice seedlings. At the times of exposure indicated, root and shoot contents of cytokinin derivatives containing isotope labels were quantified by UPLC-MS/MS analysis. Values presented are means ± SD of at least 3 plants.

Cytokinins	Contents (pmol g^{-1} FW)				
	1 h	3 h	6 h	12 h	24 h
cZ and cZ-derivatives in roots					
cZRPs	54.78 ± 12.50	26.97 ± 18.99	14.26 ± 7.00	2.80 ± 1.36	2.33 ± 0.32
cZR	125.1 ± 19.6	73.11 ± 31.45	17.68 ± 2.31	12.36 ± 1.86	9.88 ± 2.56
cZ	153.7 ± 44.5	196.3 ± 10.1	196.3 ± 34.0	49.39 ± 7.06	29.32 ± 7.27
cZRPsOG	220.8 ± 10.1	258.6 ± 90.5	190.6 ± 50.5	45.52 ± 19.79	30.66 ± 9.00
cZROG	149.9 ± 25.8	492.3 ± 85.0	1127 ± 167	1150 ± 99	1523 ± 39
cZOG	909.0 ± 133.0	5153 ± 1183	6695 ± 474	8582 ± 1518	7698 ± 1272
tZ and tZ-derivatives in roots					
tZRPs	6.52 ± 0.71	5.67 ± 4.21	1.96 ± 1.12	0.60 ± 1.08	0.12 ± 0.15
tZR	3.58 ± 1.01	4.02 ± 1.31	2.86 ± 2.09	2.12 ± 1.46	1.82 ± 1.23
tZ	3.52 ± 0.49	5.47 ± 2.44	3.37 ± 0.52	2.43 ± 2.47	0.48 ± 0.68
tZ7G	N.D.	N.D.	N.D.	N.D.	N.D.
tZ9G	N.D.	N.D.	N.D.	N.D.	N.D.
tZRPsOG	N.D.	N.D.	N.D.	N.D.	N.D.
tZROG	0.11 ± 0.01	0.42 ± 0.08	0.78 ± 0.10	1.26 ± 0.04	1.91 ± 0.18
tZOG	0.28 ± 0.07	1.79 ± 0.17	2.06 ± 0.27	3.52 ± 0.53	5.71 ± 3.77
DZ and DZ-derivatives in roots					
DZRPs	0.34 ± 0.16	N.D.	0.08 ± 0.06	0.01 ± 0.03	N.D.
DZR	0.01 ± 0.02	N.D.	0.01 ± 0.02	0.02 ± 0.02	0.00 ± 0.01
DZ	N.D.	N.D.	N.D.	N.D.	N.D.
DZ9G	N.D.	N.D.	2.47	N.D.	N.D.
iP and iP-derivatives in roots					
iPRPs	N.D.	N.D.	N.D.	N.D.	N.D.
iPR	N.D.	N.D.	N.D.	N.D.	N.D.
iP	N.D.	N.D.	N.D.	N.D.	N.D.
iP7G	N.D.	N.D.	N.D.	N.D.	N.D.
iP9G	N.D.	N.D.	N.D.	N.D.	N.D.
cZ and cZ-derivatives in shoots					
cZRPs	1.04 ± 0.15	0.93 ± 0.64	0.27 ± 0.15	0.16 ± 0.08	0.18 ± 0.04
cZR	9.78 ± 3.45	3.11 ± 2.01	1.97 ± 1.04	1.63 ± 0.87	1.88 ± 0.99
cZ	11.84 ± 2.53	8.96 ± 6.04	4.81 ± 2.50	5.88 ± 1.34	2.72 ± 1.01
cZRPsOG	2.58 ± 0.54	3.92 ± 1.52	1.43 ± 0.71	1.23 ± 0.28	1.20 ± 0.39
cZROG	3.62 ± 1.49	20.17 ± 12.55	21.30 ± 5.68	24.76 ± 7.95	40.22 ± 9.41
cZOG	31.69 ± 13.78	151.5 ± 77.9	141.5 ± 45.0	129.2 ± 43.0	212.2 ± 70.9
tZ and tZ-derivatives in shoots					
tZRPs	0.11 ± 0.02	0.21 ± 0.08	0.10 ± 0.03	0.05 ± 0.02	0.07 ± 0.03
tZR	0.01 ± 0.03	0.03 ± 0.04	0.06 ± 0.09	0.06 ± 0.09	0.16 ± 0.10
tZ	0.33 ± 0.09	0.53 ± 0.30	0.87 ± 0.41	0.32 ± 0.45	0.66 ± 0.20
tZ7G	N.D.	N.D.	N.D.	N.D.	N.D.
tZ9G	N.D.	N.D.	N.D.	N.D.	N.D.
tZRPsOG	N.D.	N.D.	N.D.	N.D.	N.D.
tZROG	N.D.	N.D.	N.D.	0.01 ± 0.02	0.03 ± 0.01
tZOG	0.27 ± 0.13	0.12 ± 0.03	0.12 ± 0.06	0.16 ± 0.03	0.35 ± 0.14
DZ and DZ-derivatives in shoots					
DZRPs	0.00 ± 0.00	N.D.	0.01 ± 0.01	0.02 ± 0.03	0.01 ± 0.01
DZR	N.D.	N.D.	N.D.	N.D.	N.D.
DZ	N.D.	N.D.	N.D.	N.D.	N.D.
DZ9G	N.D.	N.D.	N.D.	N.D.	0.45
iP and iP-derivatives in shoots					
iPRPs	N.D.	N.D.	N.D.	N.D.	N.D.
iPR	N.D.	N.D.	N.D.	N.D.	N.D.
iP	N.D.	N.D.	N.D.	N.D.	N.D.
iP7G	N.D.	N.D.	N.D.	N.D.	N.D.
iP9G	N.D.	N.D.	N.D.	N.D.	N.D.

FW, fresh weight; N.D., not detected; cZ, *cis*-zeatin; tZ, *trans*-zeatin; iP, N^6-(Δ^2-isopentenyl)adenine; DZ, dihydrozeatin; cZR, cZ-riboside; tZR, tZ-riboside; iPR, iP-riboside; DZR, DZ-riboside; cZRPs, cZ-ribotides; tZRPs, tZ-ribotides; iPRPs, iP-ribotides; DZRPs, DZ-ribotides; tZ7G, tZ-7-*N*-glucoside; iP7G, iP-7-*N*-glucoside; tZ9G, tZ-9-*N*-glucoside; iP9G, iP-9-*N*-glucoside; DZ9G, DZ-9-*N*-glucoside; cZOG, cZ-*O*-glucoside; tZOG, tZ-*O*-glucoside; cZROG, cZR-*O*-glucoside; tZROG, tZR-*O*-glucoside; cZRPsOG, cZRPs-*O*-glucoside; and tZRPsOG, tZRPs-*O*-glucoside.

Supplemental Table S3. Cytokinin contents in shoots of *cZOGT* over-expressing lines and vector control lines.

Transgenic rice plants over-expressing *cZOGT1* (1ox-7), *cZOGT2* (2ox-2, 2ox-3), and *cZOGT3* (3ox-7, 3ox-9) were grown in soil with vector control plants (VC-1, VC-3, VC-4). Data shown are means ± SD of three plants.

Line	Transgene	GEN	Contents (pmol g^{-1} FW)					
cZ and cZ-derivatives			**cZRPs^{s}**	**cZR**	**cZ**	**cZRPsOG^{s}**	**cZROG^{s}**	**cZOG^{s}**
VC-1	Empty vector	T3	0.25 ± 0.05	2.63 ± 0.65	0.84 ± 0.23	1.33 ± 0.22^{a}	10.2 ± 0.37	145 ± 24.6^{ab}
VC-4	Empty vector	T3	0.23 ± 0.01	2.59 ± 0.25	0.83 ± 0.20	1.28 ± 0.09^{ab}	10.3 ± 0.67	160 ± 8.18^{a}
1ox-7	*cZOGT1*	T3	0.34 ± 0.04	3.46 ± 0.47	0.75 ± 0.06	1.63 ± 0.13^{b}	11.3 ± 1.29	182 ± 4.83^{abc}
2ox-2	*cZOGT2*	T3	0.31 ± 0.06	2.68 ± 0.25	0.66 ± 0.02	1.84 ± 0.09^{ab}	11.5 ± 2.33	177 ± 9.42^{c}
2ox-3	*cZOGT2*	T3	0.31 ± 0.04	3.31 ± 0.33	0.76 ± 0.03	1.72 ± 0.18^{ab}	10.0 ± 1.44	174 ± 7.59^{bc}
VC-3	Empty vector	T1	0.26 ± 0.03	2.50 ± 0.22	0.86 ± 0.07	1.37 ± 0.07	11.0 ± 0.56^{a}	161 ± 24.6
VC-4	Empty vector	T1	0.33 ± 0.01	3.02 ± 0.30	1.14 ± 0.36	1.53 ± 0.29	11.5 ± 0.67^{ab}	168 ± 7.61
3ox-7	*cZOGT3*	T1	0.35 ± 0.07	3.87 ± 1.34	1.00 ± 0.05	1.24 ± 0.23	10.8 ± 0.29^{a}	179 ± 13.3
3ox-9	*cZOGT3*	T1	0.22 ± 0.07	3.76 ± 1.18	0.84 ± 0.25	1.34 ± 0.08	13.0 ± 0.66^{b}	156 ± 17.8
tZ and tZ-derivatives			**tZRPs**	**tZR**	**tZ**	**tZ9G**	**tZROG^{s}**	**tZOG^{s}**
VC-1	Empty vector	T3	0.25 ± 0.17	0.21 ± 0.11	0.32 ± 0.11	13.9 ± 2.85	0.03 ± 0.01^{ab}	0.32 ± 0.06^{a}
VC-4	Empty vector	T3	0.36 ± 0.29	0.26 ± 0.21	0.41 ± 0.04	15.5 ± 2.11	0.02 ± 0.00^{a}	0.32 ± 0.03^{a}
1ox-7	*cZOGT1*	T3	0.70 ± 0.36	0.36 ± 0.18	0.51 ± 0.13	19.2 ± 3.77	0.08 ± 0.01^{cd}	0.51 ± 0.07^{a}
2ox-2	*cZOGT2*	T3	0.64 ± 0.09	0.44 ± 0.14	0.41 ± 0.03	21.0 ± 2.98	0.10 ± 0.02^{d}	0.75 ± 0.16^{b}
2ox-3	*cZOGT2*	T3	0.60 ± 0.05	0.37 ± 0.02	0.45 ± 0.04	21.4 ± 4.57	0.06 ± 0.01^{bc}	0.48 ± 0.07^{a}
VC-3	Empty vector	T1	0.26 ± 0.08	0.17 ± 0.06	0.37 ± 0.10	19.2 ± 4.73	0.04 ± 0.00^{a}	0.41 ± 0.06^{a}
VC-4	Empty vector	T1	0.32 ± 0.15	0.23 ± 0.10	0.36 ± 0.11	18.7 ± 2.67	0.05 ± 0.00^{a}	0.47 ± 0.06^{a}
3ox-7	*cZOGT3*	T1	0.29 ± 0.13	0.39 ± 0.13	0.58 ± 0.12	12.8 ± 1.69	0.68 ± 0.27^{b}	18.0 ± 6.18^{b}
3ox-9	*cZOGT3*	T1	0.29 ± 0.09	0.43 ± 0.17	0.38 ± 0.16	13.4 ± 1.61	0.44 ± 0.17^{ab}	12.7 ± 3.80^{b}
iP and iP-derivatives			**iPRPs**	**iPR**	**iP**	**iP9G**		
VC-1	Empty vector	T3	0.54 ± 0,21	0.03 ± 0.01	0.99 ± 0.18	0.50 ± 0.08		
VC-4	Empty vector	T3	0.55 ± 0.10	0.04 ± 0.02	0.24 ± 0.02	0.65 ± 0.10		
1ox-7	*cZOGT1*	T3	0.65 ± 0.14	0.03 ± 0.00	0.31 ± 0.11	0.53 ± 0.06		
2ox-2	*cZOGT2*	T3	0.58 ± 0.06	0.05 ± 0.02	1.37 ± 0.73	0.66 ± 0.14		
2ox-3	*cZOGT2*	T3	0.54 ± 0.12	0.03 ± 0.01	0.23 ± 0.03	0.53 ± 0.09		
VC-3	Empty vector	T1	0.60 ± 0.10	0.06 ± 0.03	0.39 ± 0.07	0.63 ± 0.03		
VC-4	Empty vector	T1	0.45 ± 0.09	0.04 ± 0.01	0.35 ± 0.06	0.50 ± 0.09		
3ox-7	*cZOGT3*	T1	0.45 ± 0.20	0.04 ± 0.01	0.29 ± 0.04	0.44 ± 0.05		
3ox-9	*cZOGT3*	T1	0.67 ± 0.22	0.06 ± 0.03	0.46 ± 0.16	0.46 ± 0.04		
DZ and DZ-derivatives			**DZRPs**	**DZR**	**DZ**	**DZ9G**		
VC-1	Empty vector	T3	N.D.	N.D.	N.D.	N.D.		
VC-4	Empty vector	T3	N.D.	N.D.	N.D.	N.D.		
1ox-7	*cZOGT1*	T3	N.D.	N.D.	N.D.	N.D.		
2ox-2	*cZOGT2*	T3	N.D.	N.D.	N.D.	N.D.		
2ox-3	*cZOGT2*	T3	N.D.	N.D.	N.D.	N.D.		
VC-3	Empty vector	T1	N.D.	N.D.	N.D.	N.D.		
VC-4	Empty vector	T1	N.D.	N.D.	N.D.	N.D.		
3ox-7	*cZOGT3*	T1	N.D.	N.D.	N.D.	N.D.		
3ox-9	*cZOGT3*	T1	N.D.	N.D.	N.D.	N.D.		
oT and oT-derivatives			**oTR**	**oT**	**oTROG**	**oTOG**		
VC-1	Empty vector	T3	N.D.	N.D.	N.D.	N.D.		
VC-4	Empty vector	T3	N.D.	N.D.	N.D.	N.D.		
1ox-7	*cZOGT1*	T3	N.D.	N.D.	N.D.	N.D.		
2ox-2	*cZOGT2*	T3	N.D.	N.D.	N.D.	N.D.		
2ox-3	*cZOGT2*	T3	N.D.	N.D.	N.D.	N.D.		
VC-3	Empty vector	T1	N.D.	N.D.	N.D.	N.D.		
VC-4	Empty vector	T1	N.D.	N.D.	N.D.	N.D.		
3ox-7	*cZOGT3*	T1	N.D.	N.D.	N.D.	N.D.		
3ox-9	*cZOGT3*	T1	N.D.	N.D.	N.D.	N.D.		

[s] Statisticall significant difference between transgenic lines in the same generation were detected by one-way ANOVA (P<0.05).

[a-d] Different lower-case letters indicate statistically significant difference between transgenic lines in the same generation (Tukey-Kramer test, P<0.05).

GEN, generation of transgenic rice; FW, fresh weight; N.D., not detected; cZ, *cis*-zeatin; tZ, *trans*-zeatin; iP, N^{6}-(Δ^{2}-isopentenyl)adenine; DZ, dihydrozeatin; oT, *ortho*-topolin; cZR, cZ-riboside; tZR, tZ-riboside; iPR, iP-riboside; DZR, DZ-riboside; oTR, DZ-riboside; cZRPs, cZ-ribotides; tZRPs, tZ-ribotides; iPRPs, iP-ribotides; DZRPs, DZ-ribotides; tZ9G, tZ-9-*N*-glucoside; iP9G, iP-9-*N*-glucoside; DZ9G, DZ-9-*N*-glucoside; cZOG, cZ-*O*-glucoside; tZOG, tZ-*O*-glucoside; oTOG, oT-*O*-glucoside; cZROG, cZR-*O*-glucoside; tZROG, tZR-*O*-glucoside; oTROG, oTR-*O*-glucoside; and cZRPsOG, cZRPs-*O*-glucoside.

Supplemental Table S4. Primers used in this study.

Nos.	Sequence	Use application
1	5'-GATGGTCAAACGGCTGCTTCCTCAA-3'	Quantitative RT-PCR for *OsRR1*
2	5'-CAGTTGCAGCCTGCCTTTGCATTTG-3'	Quantitative RT-PCR for *OsRR1*
3	5'-GATGCCCACTCAAATCATGCGTTCC-3'	Quantitative RT-PCR for *OsRR2*
4	5'-TGATACGCTGATGCAACTGTCCGGAG-3'	Quantitative RT-PCR for *OsRR2*
5	5'-TGGAGGAGGGGGCTGAAGACTTTTTG-3'	Quantitative RT-PCR for *OsRR3*
6	5'-CATTTCATGATGACGCGGTTGCAAAG-3'	Quantitative RT-PCR for *OsRR3*
7	5'-AACAGCAGCAGCAGCACTAGCAGCAA-3'	Quantitative RT-PCR for *OsRR9/10*
8	5'-CAGTGTCAAATGACCAGTCAGATGCT-3'	Quantitative RT-PCR for *OsRR9/10*
9	5'-CCATATGATGGAGCCGGTGGCCGTC-3'	Cloning of Os04g0556400 CDS into pCold-I
10	5'-GGTCGACCTACCCGTGGCTCAGGCTC-3'	Cloning of Os04g0556400 CDS into pCold-I
11	5'-AGGTACCATGGCGATTGGCACGGTGG-3'	Cloning of Os04g0556500 (*cZOGT1*) CDS into pCold-I
12	5'-CTCTAGATCATCTTGTGATGTAGCCAACG-3'	Cloning of Os04g0556500 (*cZOGT1*) CDS into pCold-I
13	5'-AGGTACCATGGCGATTGGCTC-3'	Cloning of Os04g0556600 (*cZOGT2*) CDS into pCold-I
14	5'-CGTCGACTCATCTTGTGATGTAGCCAACGAAGTCATCCAG-3'	Cloning of Os04g0556600 (*cZOGT2*) CDS into pCold-I
15	5'-CCATATGATGGCAGCGAAGGGAAAC-3'	Cloning of Os04g0565200 CDS into pCold-I
16	5'-GGTCGACTCATCTTGTGATATGATC-3'	Cloning of Os04g0565200 CDS into pCold-I
17	5'-CCATATGATGGCAGAGAAGGGGAAC-3'	Cloning of Os04g0565400 (*cZOGT3*) CDS into pCold-I
18	5'-GGTCGACTCACCTTGTGATGTGAGC-3'	Cloning of Os04g0565400 (*cZOGT3*) CDS into pCold-I
19	5'-GCTCGGTACCCTCGAGATGGAGGACTCCGCCGCCGCCGCTG-3'	Cloning of Os07g0660500 CDS into pCold-I
20	5'-ATTCGGATCCCTCGATCACCTCGTCAGGTAGGCGACGAGGTCGTC-3'	Cloning of Os07g0660500 CDS into pCold-I
21	5'-ATTGAGGAGGCGATGCTGCCTGAGA-3'	Quantitative/semi-quantitative RT-PCR for *cZOGT1*
22	5'-GATGTAGCCAACGAAGTCATCCAAGC-3'	Quantitative/semi-quantitative RT-PCR for *cZOGT1*
23	5'-TCATCGAAGAGGCGATGCTGCCTGAGA-3'	Quantitative/semi-quantitative RT-PCR for *cZOGT2*
24	5'-GTGATGTAGCCAACGAAGTCATCCAGGT-3'	Quantitative/semi-quantitative RT-PCR for *cZOGT2*
25	5'-TTCCCCTCCCACCTCATGCCCCTCT-3'	Quantitative/semi-quantitative RT-PCR for *cZOGT3*
26	5'-TGGTGTCGCACACGACGACGACCCGA-3'	Quantitative/semi-quantitative RT-PCR for *cZOGT3*
27	5'-GGCTGGAATTGCTCTTAAC-3'	Quantitative/semi-quantitative RT-PCR for *Gpc1*
28	5'-CAGCATAGACAAAGCATACC-3'	Quantitative/semi-quantitative RT-PCR for *Gpc1*
29	5'-AAAAAGCAGGCTTCATCTTCAGACAATCAAGTGCTATGAGGGG-3'	Cloning of *cZOGT1* promoter into pDONR221
30	5'-AGAAAGCTGGGTCGAGTGCTCTTGTCACTGGTTGCTTG-3'	Cloning of *cZOGT1* promoter into pDONR221
31	5'-AAAAAGCAGGCTATCAGGGGCGAAGCCAGGATTTGAGATTAG-3'	Cloning of *cZOGT2* promoter into pDONR221
32	5'-AGAAAGCTGGGTTGAGCGCTTATGTCGTCACTGATATATGG-3'	Cloning of *cZOGT2* promoter into pDONR221
33	5'-AAAAAGCAGGCTATATCCTCGGCCTCCGTTTTCC-3'	Cloning of *cZOGT3* promoter into pDONR221
34	5'-AGAAAGCTGGGTTCTCCGTGCCTCTCAATGCCTGAATG-3'	Cloning of *cZOGT3* promoter into pDONR221
35	5'-GGGGACAAGTTTGTACAAAAAAGCAGGCT-3'	Adapter PCR for *att* B1 site
36	5'-GGGGACCACTTTGTACAAGAAAGCTGGGT-3'	Adapter PCR for *att* B2 site
37	5'-CCGGCGCGCCAAGCTATCACAAGTTTGTACAAAAAAGC-3'	Insertion of a gateway cassette into pCAMBIA1390-GUS
38	5'-ACCTGCAGCCAAGCTATCACCACTTTGTACAAGAAAGC-3'	Insertion of a gateway cassette into pCAMBIA1390-GUS
39	5'-TTCTAGAATGGCGATTGGCAC-3'	Insertion of *cZOGT1* CDS into pACT-Nos/Hmz
40	5'-GGATATCTCATCTTGTGATGTAGCCAACG-3'	Insertion of *cZOGT1* CDS into pACT-Nos/Hmz
41	5'-TTCTAGAATGGCGATTGGCTC-3'	Insertion of *cZOGT2* CDS into pACT-Nos/Hmz
42	5'-GGATATCTCATCTTGTGATGTAGCCAACGAAGTCATCCAG-3'	Insertion of *cZOGT2* CDS into pACT-Nos/Hmz
43	5'-TTCTAGAATGGCAGAGAAGGGGAAC-3’	Insertion of *cZOGT3* CDS into pACT-Nos/Hmz
44	5'-CCCCGGGTCACCTTGTGATGTGAGC-3’	Insertion of *cZOGT3* CDS into pACT-Nos/Hmz

CDS, coding sequence; Nos., numbers, RT-PCR, reverse transcription-PCR.