Electronic Supplementary Material (ESI) for Environmental Science: Nano.

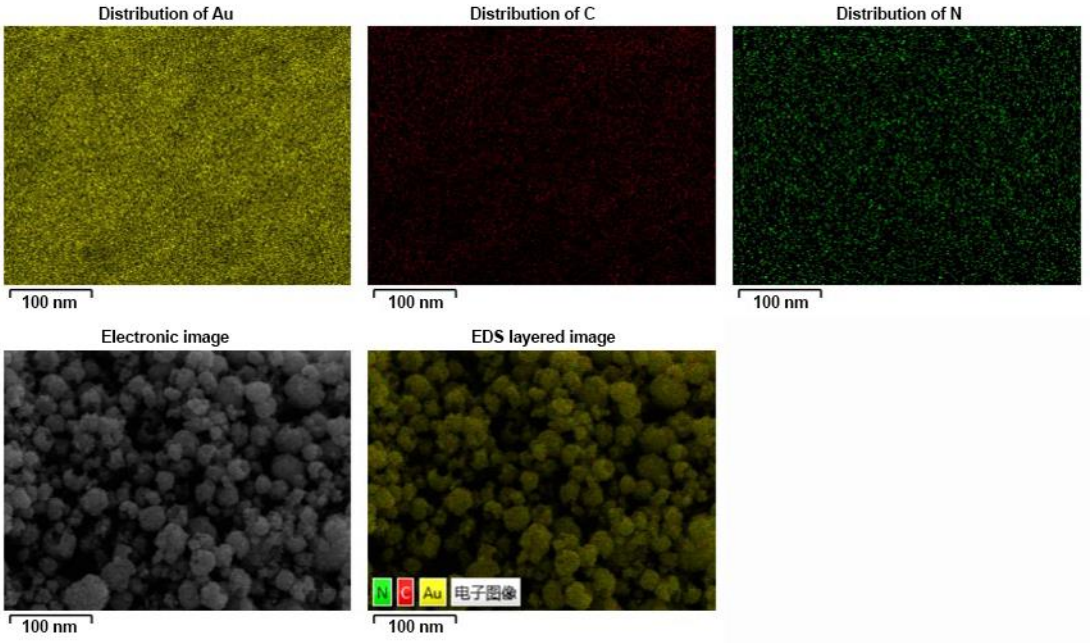

Fig. S1 EDS layered image of Mel-AuNPs.

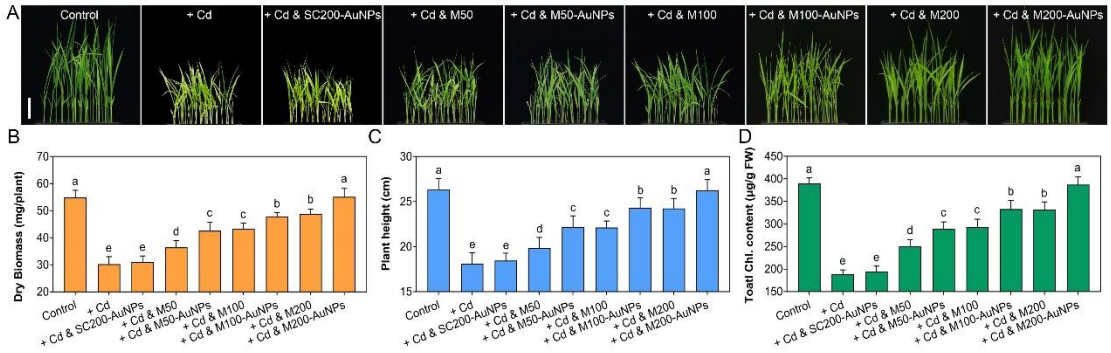

Fig. S2 The growth of rice seedlings in media supplemented with different forms of cadmium (Cd). Rice seedlings were first grown in ½ MS liquid medium for two weeks after germination, then transferred to medium supplemented for ten days with different supplements. (A) Seedlings were phenotyped ten days after treatment. Scale bar = 5 cm. Data were shown in mean ± SD, with 20 (B, C, D) and 3 (E, F, G) replicates. The different letters above error bars show the significant differences at a probability of $P < 0.05$. Medium compositions: Control: 0 μM $CdSO_4$; + Cd: 100 μM $CdSO_4$; + Cd & SC200-AuNPs: 100 μM $CdSO_4$, 200 μM sodium citrate (SC)-AuNPs; + Cd & M50/100/200: 100 μM $CdSO_4$, 50/100/200 μM melatonin; + Cd & M50/100/200-AuNPs: 100 μM $CdSO_4$, 50/100/200 μM Mel-AuNPs.

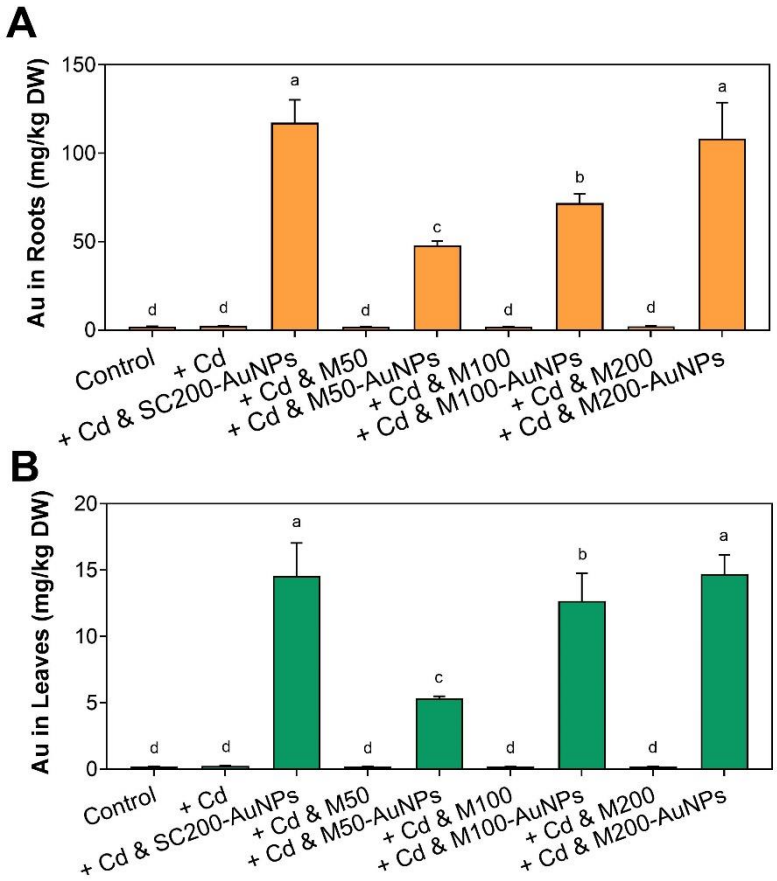

Fig. S3 Gold (Au) accumulation in rice seedlings. Fourteen-day-old rice seedlings were further grown in ½ MS medium with different supplements for ten days and used for determination of Au content in roots (A) and leaves (B). All analyses were performed with three replicates. The different letters show a significant difference at a probability of $P < 0.05$. See FIGURE S2 for details of different supplements.

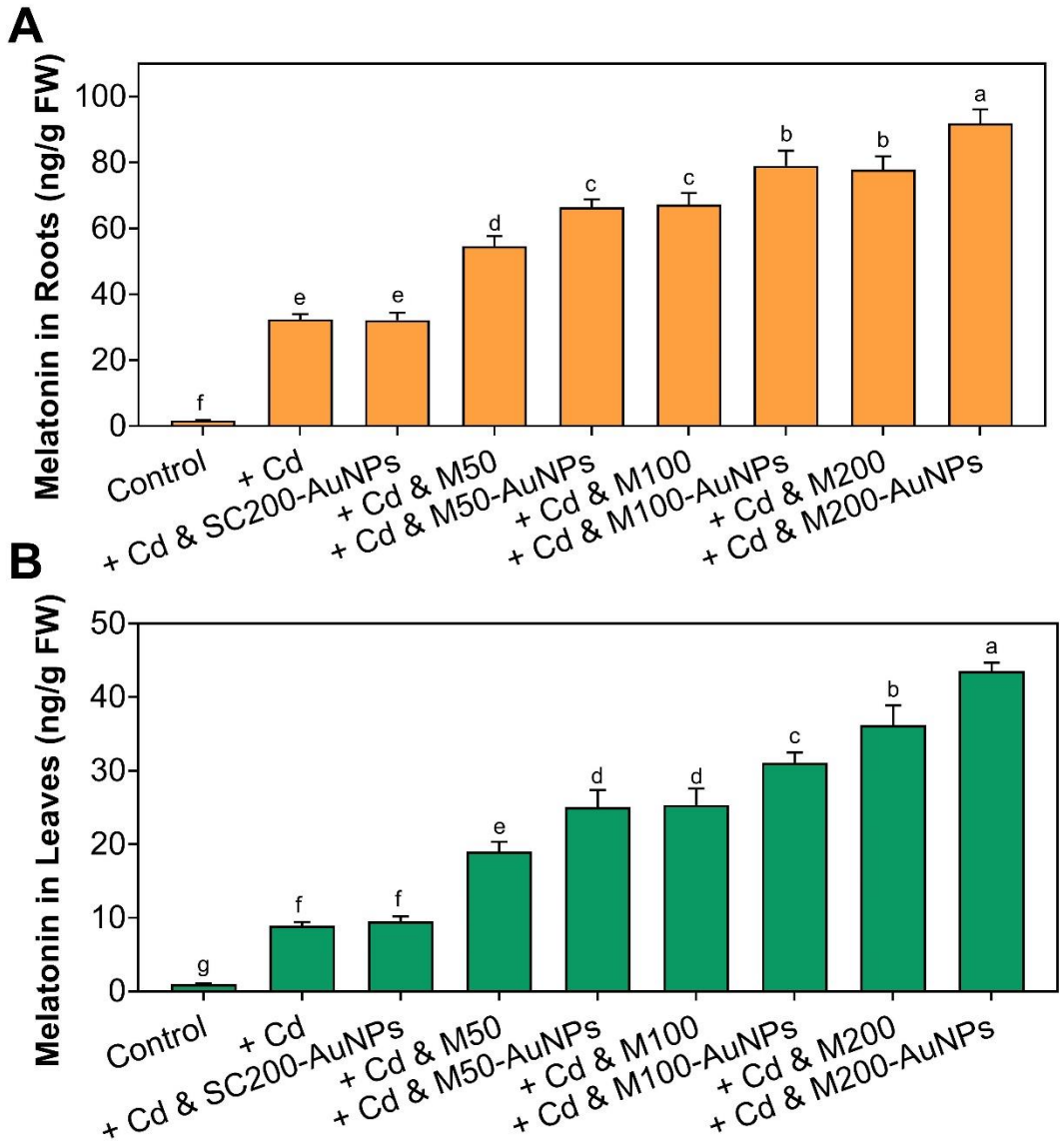

Fig. S4 Melatonin accumulation in rice seedlings. Fourteen days rice seedlings were grown in ½ MS medium with supplements of Cd and other supplements for ten days. Melatonin Content in roots (A) and leaves (B) were determined after ten days. All analyses were performed with three replicates. The different letters show a significant difference at a probability of $P < 0.05$. See FIGURE S2 for details of different supplements.

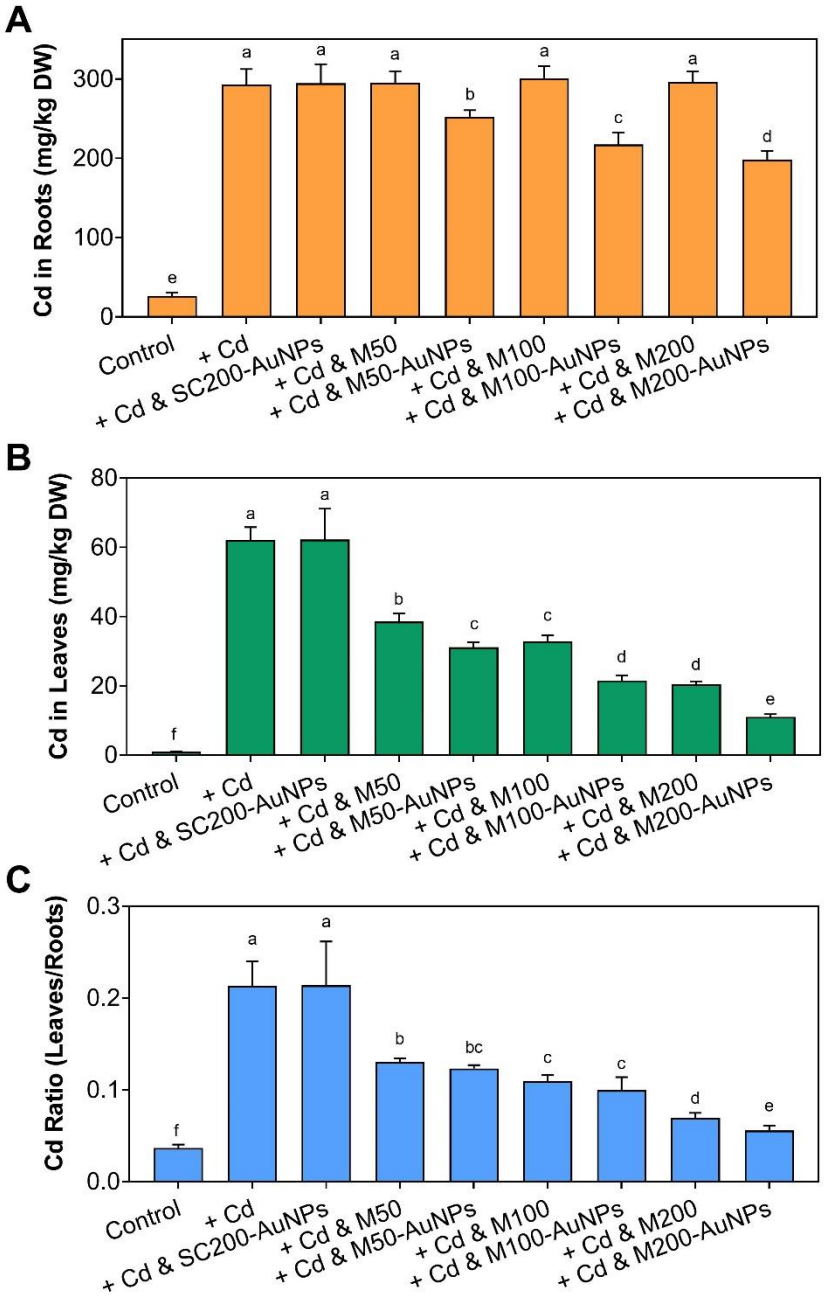

Fig. S5 Cadmium (Cd) accumulation in rice seedlings. Fourteen-day-old rice seedlings were grown in ½ MS medium with various supplements for ten days. Cd content in roots (A), leaves (B), and the ratio of leaves and roots (C) were determined after ten days. All analyses were performed with three replicates. The different letters show a significant difference at a probability of $P < 0.05$. See FIGURE S2 for details of different supplements.

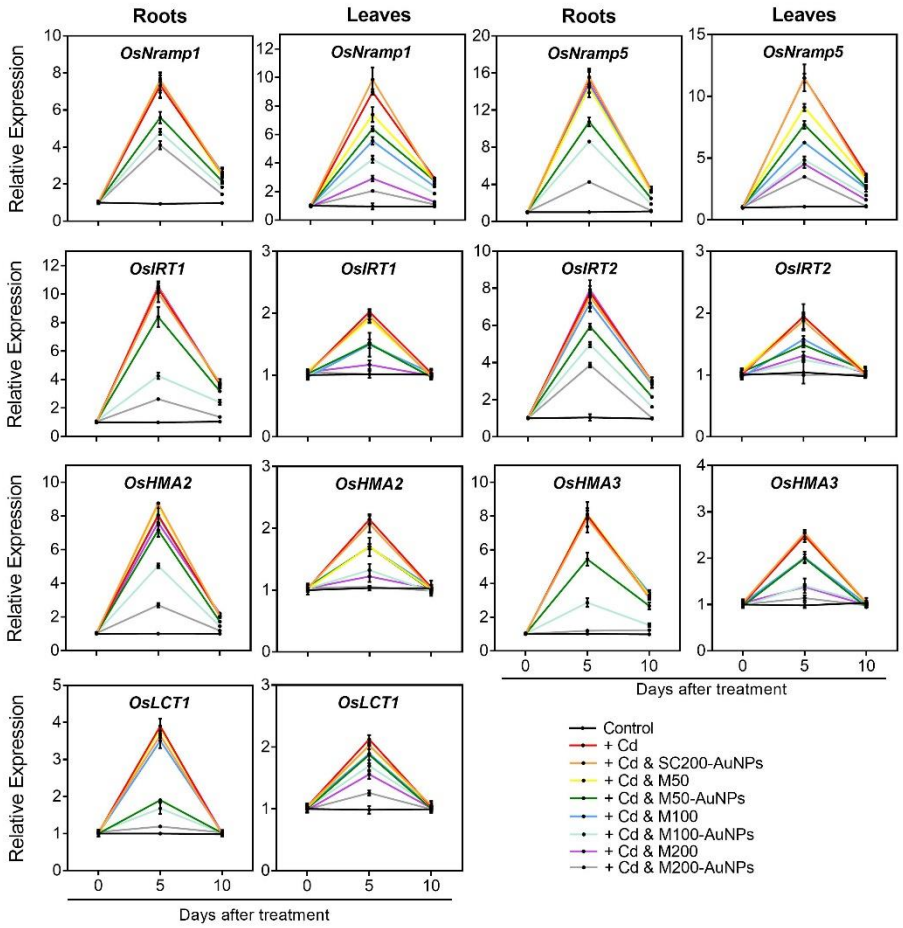

Fig. S6 Relative expression levels of Cd-transporter genes in rice seedlings grown in media supplemented with different forms of Cd. Gene expression was analyzed by qRT-PCR with roots and leaves from seedlings grown in ½ MS medium supplemented with different forms of Cd for five or ten days. The expression levels were first normalized to the internal control gene *OsACTIN* and reported relative to each gene's expression level of control (assigned a value of 1). All analyses were performed with three replicates. See FIGURE S2 for details of different supplements.

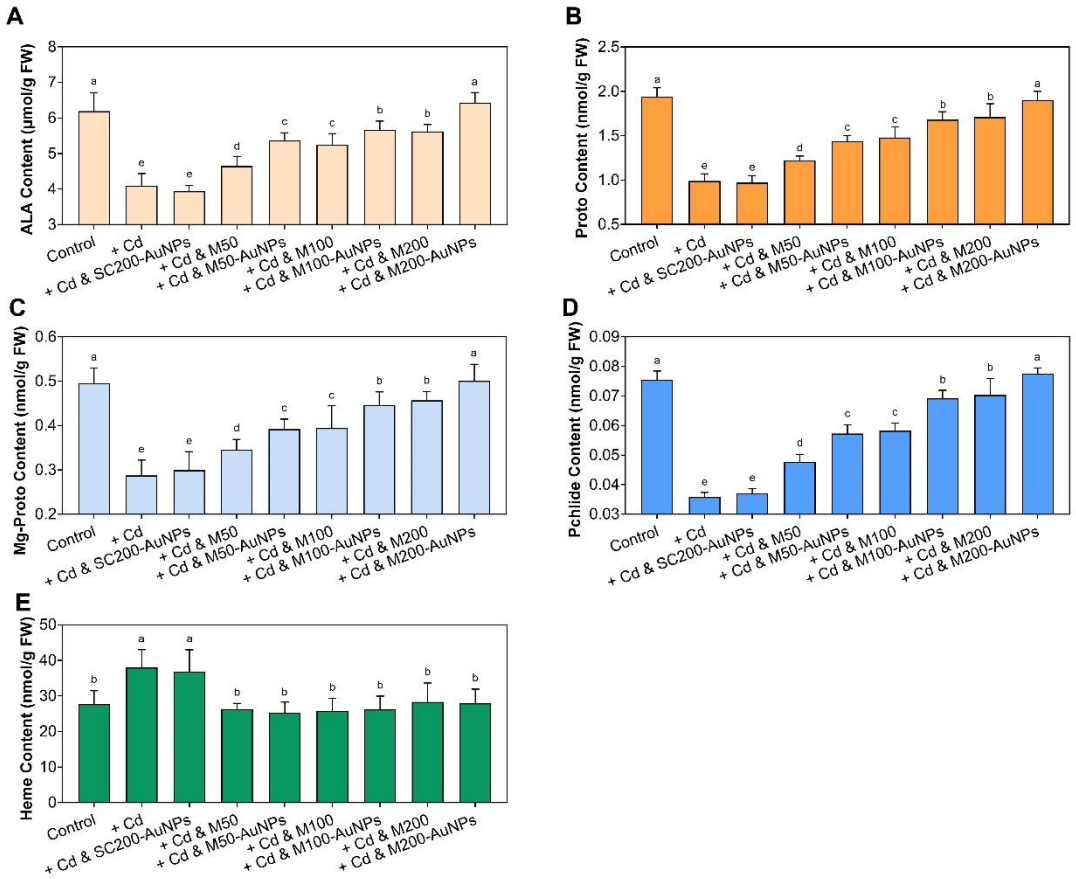

Fig. S7 Steady-state levels of tetrapyrrole intermediates in rice leaves. Rice seedlings were grown in ½ MS medium with different supplements for ten days. All analyses were performed with three replicates. The different letters show a significant difference at a probability of $P < 0.05$. See FIGURE S2 for details of different supplements.

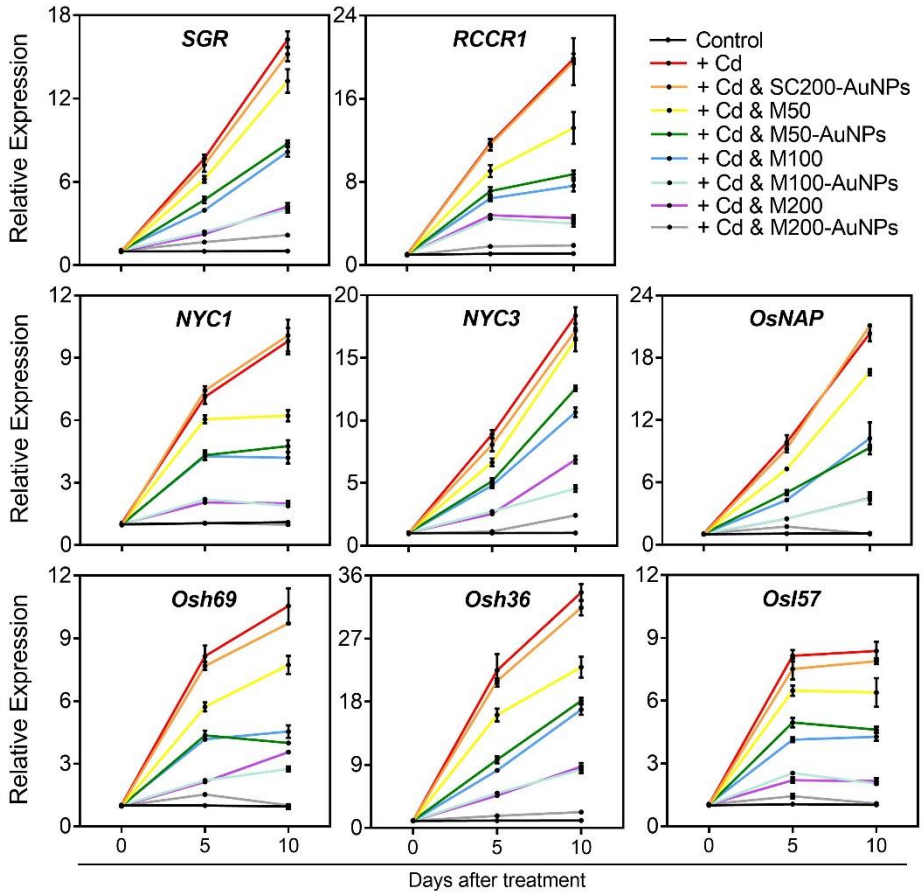

Fig. S8 Relative expression levels of leaf senescence genes in rice seedlings grown in media supplemented with different forms of Cd. Gene expression was analyzed by qRT-PCR with roots and leaves from seedlings grown in ½ MS medium supplemented with different forms of Cd for five or ten days. The expression levels were first normalized to the internal control gene *OsACTIN* and reported relative to each gene's expression level of control (assigned a value of 1). All analyses were performed with three replicates. See FIGURE S2 for details of different supplements.

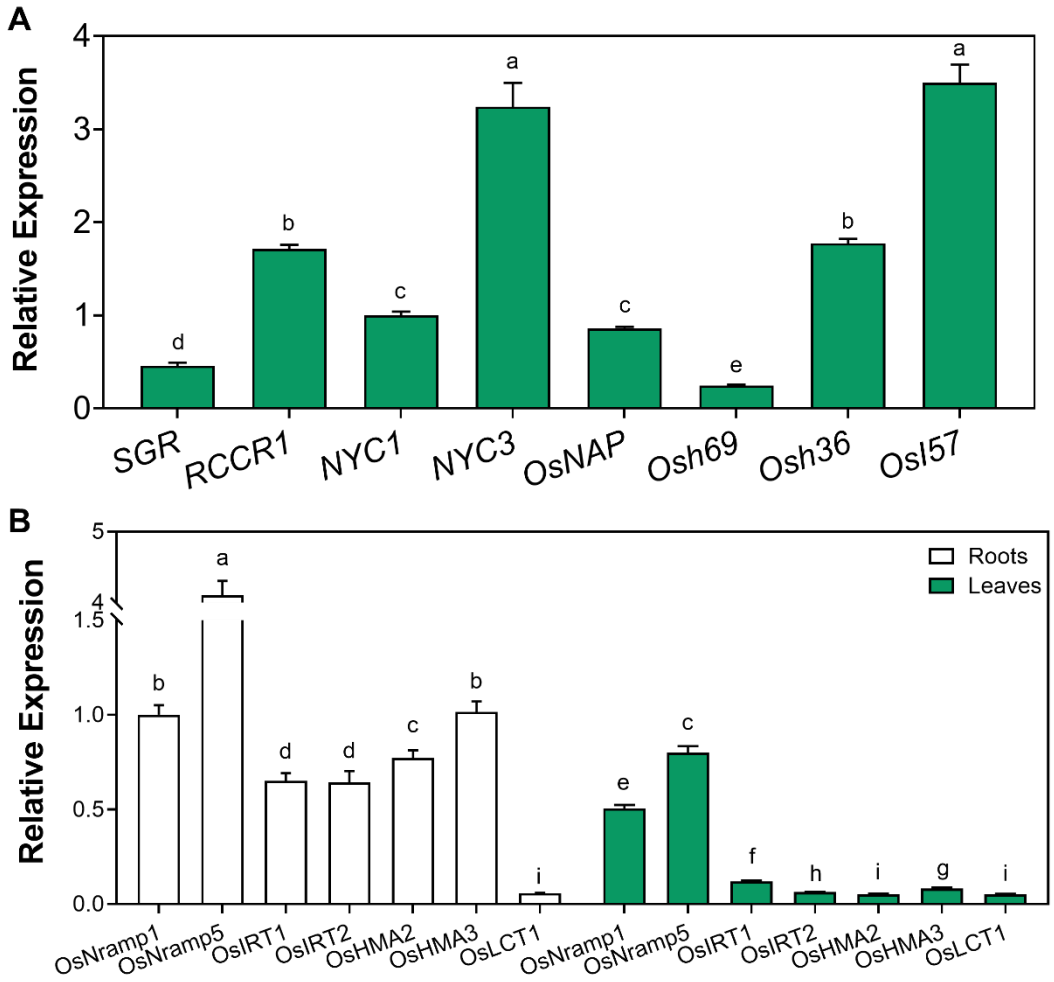

Fig. S9 Expression profiles of the leaf senescence (A) and Cd-transporter (B) genes in rice roots (white) and leaves (grey). Gene expression was analyzed by qRT-PCR with roots and leaves from seedlings grown in ½ MS medium after five- or ten-days. The expression levels were first normalized to the internal control gene *OsACTIN* and reported relative to leaves' *SGR* (A) or roots' *OsNramp1* (B) expression level of control (assigned a value of 1). All analyses were performed with three replicates. Error bars represent standard error. The different letters show a significant difference at a probability of $P < 0.05$.

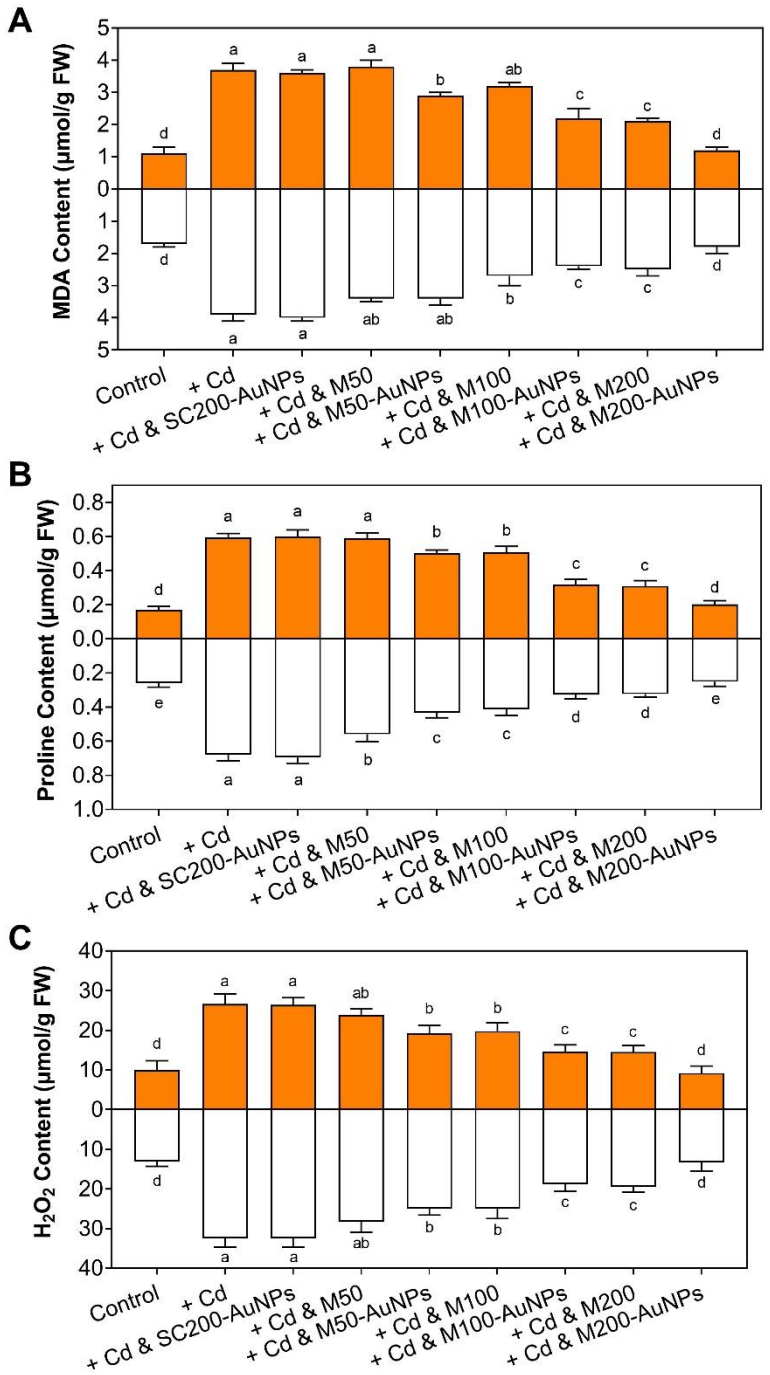

Fig. S10 Accumulation of MDA, proline, and H_2O_2 in rice seedlings. The levels of MDA (A), proline (B), and H_2O_2 (C) in leaves (color pillars) and roots (white pillars) were determined after ten days. All analyses were performed with three replicates. The different letters show a significant difference at a probability of $P < 0.05$. See FIGURE S2 for details of different supplements.

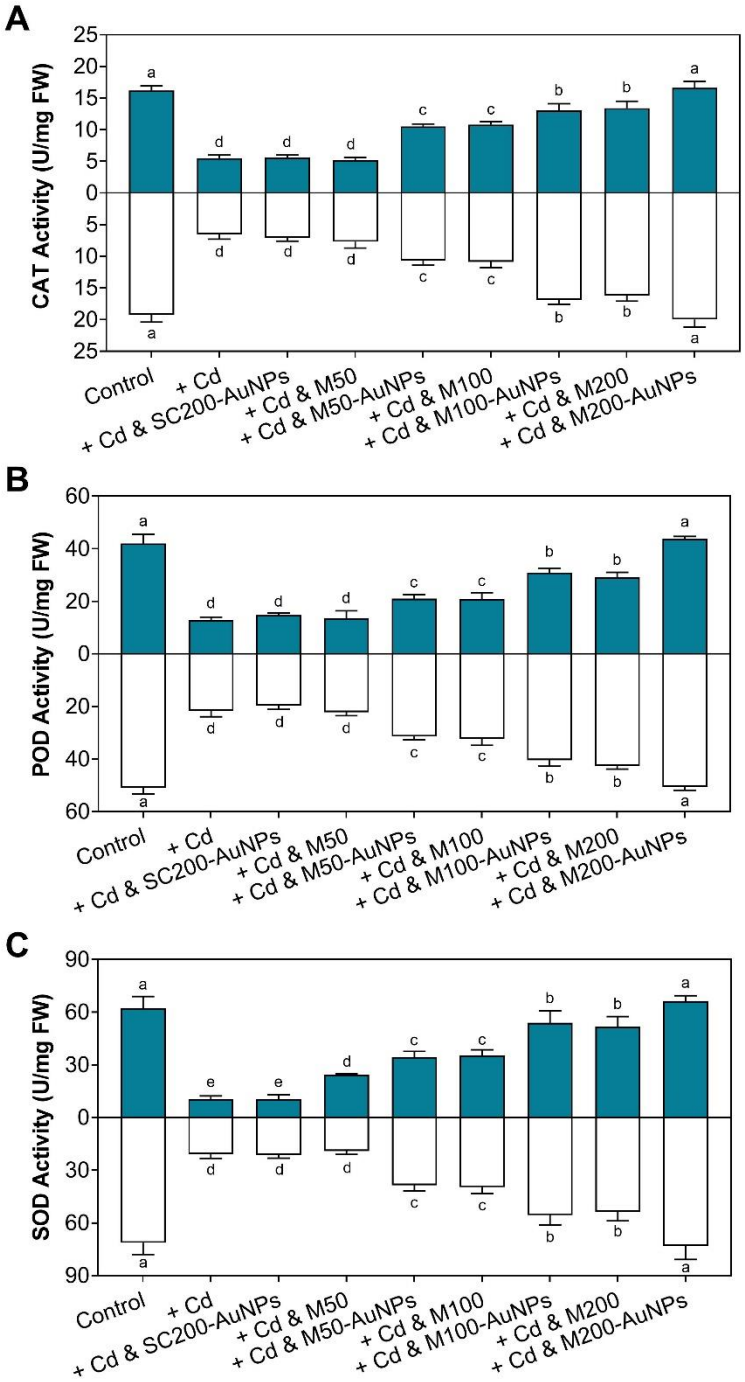

Fig. S11 Activities of CAT, POD and SOD in rice seedlings. The activities of CAT (A), POD (B), and SOD (C) were assayed in leaves (color pillars) and roots (white pillars). All analyses were performed with three replicates. The different letters show a significant difference at a probability of $P < 0.05$. See FIGURE S2 for details of different supplements.