Table S1. List of primer sequences used for qRT-PCR in the present study

OsHMA2-F	GACGCCATCTCCCAATCC
OsHMA2-R	CGAACAGCGACACGACCA
OsIRT2-F	ATTTCATGGGGCCCAAGCTG
OsIRT2-R	ATATCTTCGACCCTGACGCC
OsLCT1-F	TCTTCTATCTTTGCTGCGTTCT
OsLCT1-R	TCAGGTGCCGTGTCGTTG
OsNRAMP2-F	TTGCCCTCATTGTCTCGTTC
OsNRAMP2-R	CAGTCCCATATTTCTGCTGTAAGT

Table S2: Relationship between cadmium levels and morphological and physiological traits of diploid rice (E285).

Indices	BY	CAR	CAT	Cd S	CdR	Chl ab	Chla	Chlb	EL	FeR	FeS	GSH	H2O2	MDA	POD	RFW	RL	SFW	SL	SOD
BY	1	0.749**	0.351	-0.79**	-0.799**	0.9**	0.899**	0.901**	-0.843**	0.201	0.089	0.052	-0.801**	-0.723**	0.015	0.989**	0.928**	0.984**	0.922**	0.427*
CAR		1	0.558**	-0.633**	-0.491*	0.764**	0.767**	0.76**	-0.571**	0.455*	0.363	0.407*	-0.53**	-0.711**	0.408*	0.699**	0.78**	0.795**	0.618**	0.659**
CAT			1	-0.287	-0.062	0.597**	0.604**	0.587**	-0.141	0.961**	0.895**	0.927**	-0.098	-0.747**	0.902**	0.336	0.343	0.385	0.325	0.97**
Cd S				1	0.948**	-0.674**	-0.679**	-0.665**	0.933**	-0.108	-0.067	0.004	0.932**	0.827**	-0.013	-0.77**	-0.682**	-0.773**	-0.791**	-0.38
CdR					1	-0.624**	-0.626**	-0.619**	0.982**	0.129	0.194	0.256	0.986**	0.686**	0.262	-0.789**	-0.697**	-0.766**	-0.816**	-0.143
Chlab						1	1**	1**	-0.707**	0.48*	0.347	0.351	-0.658**	-0.794**	0.304	0.888**	0.881**	0.9**	0.874**	0.645**
Chla							1	0.999**	-0.71**	0.486*	0.353	0.358	-0.661**	-0.802**	0.312	0.886**	0.88**	0.9**	0.874**	0.651**
Chlb								1	-0.703**	0.472*	0.339	0.34	-0.653**	-0.782**	0.293	0.891**	0.883**	0.9**	0.875**	0.634**
EL									1	0.061	0.156	0.182	0.996**	0.729**	0.193	-0.828**	-0.768**	-0.817**	-0.856**	-0.211
FeR										1	0.968**	0.959**	0.106	-0.595**	0.932**	0.204	0.207	0.223	0.188	0.948**
FeS											1	0.928**	0.198	-0.517**	0.933**	0.098	0.062	0.102	0.101	0.903**
GSH												1	0.22	-0.508*	0.977**	0.03	0.095	0.105	0.02	0.901**
H2O2													1	0.705**	0.23	-0.787**	-0.726**	-0.773**	-0.819**	-0.166
MDA														1	-0.498*	-0.697**	-0.667**	-0.735**	-0.739**	-0.784**
POD															1	-0.014	0.039	0.073	-0.007	0.881**
RFW																1	0.915**	0.949**	0.925**	0.412*
RL																	1	0.922**	0.834**	0.409*
SFW																		1	0.891**	0.456*
SL																			1	0.398
SOD																				1

Note: Relationship between rice's morphological and physiological indices and cadmium concentration. The correlation coefficient, rho>0.5 and rho<0.5, was calculated by Pearson. The symbols * and ** in the table denote correlations at $P \leq 0.05$ (significant) and $P \leq 0.01$ (highly significant), respectively.

Table S3: Relationship between cadmium levels and morphological and physiological traits of tetraploid rice (T485).

Indices	BY	CAR	CAT	Cd S	CdR	Chl ab	Chla	Chlb	EL	FeR	FeS	GSH	H2O2	MDA	POD	RFW	RL	SFW	SL	SOD
BY	1	0.734**	0.217	-0.702**	-0.705**	0.855**	0.828**	0.876**	-0.768**	0.164	0.214	0.167	-0.702**	-0.648**	-0.094	0.981**	0.832**	0.987**	0.947**	0.588**
CAR		1	0.591**	-0.552**	-0.542**	0.899**	0.89**	0.894**	-0.588**	0.481*	0.478*	0.56**	-0.512*	-0.777**	0.391	0.793**	0.777**	0.74**	0.716**	0.747**
CAT			1	-0.066	-0.063	0.638**	0.69**	0.552**	-0.043	0.953**	0.944**	0.99**	-0.009	-0.784**	0.923**	0.343	0.505*	0.26	0.175	0.897**
Cd S				1	0.995**	-0.538**	-0.524**	-0.549**	0.955**	0.058	0.033	0.015	0.961**	0.601**	0.216	-0.741**	-0.556**	-0.753**	-0.743**	-0.322
CdR					1	-0.542**	-0.527**	-0.553**	0.965**	0.066	0.043	0.023	0.971**	0.613**	0.232	-0.745**	-0.553**	-0.755**	-0.742**	-0.318
Chl ab						1	0.994**	0.989**	-0.612**	0.545**	0.574**	0.595**	-0.54**	-0.85**	0.357	0.907**	0.856**	0.854**	0.799**	0.85**
Chla							1	0.968**	-0.588**	0.603**	0.63**	0.648**	-0.517**	-0.884**	0.419*	0.887**	0.854**	0.836**	0.771**	0.885**
Chlb								1	-0.636**	0.454*	0.485*	0.509*	-0.562**	-0.787**	0.264	0.919**	0.842**	0.864**	0.824**	0.783**
EL									1	0.107	0.07	0.036	0.991**	0.601**	0.283	-0.799**	-0.578**	-0.8**	-0.804**	-0.311
FeR										1	0.992**	0.968**	0.148	-0.68**	0.934**	0.26	0.487*	0.193	0.13	0.88**
FeS											1	0.958**	0.112	-0.685**	0.905**	0.305	0.509*	0.244	0.172	0.897**
GSH												1	0.074	-0.73**	0.948**	0.287	0.468*	0.198	0.132	0.879**
H2O2													1	0.564**	0.311	-0.739**	-0.518**	-0.743**	-0.743**	-0.256
MDA														1	-0.532**	-0.751**	-0.758**	-0.696**	-0.629**	-0.888**
POD															1	0.017	0.249	-0.056	-0.123	0.724**
RFW																1	0.857**	0.975**	0.925**	0.672**
RL																	1	0.827**	0.821**	0.785**
SFW																		1	0.939**	0.611**
SL																			1	0.551**
SOD																				1

Note: Relationship between rice's morphological and physiological indices and cadmium concentration. The correlation coefficient, rho>0.5 and rho<0.5, was calculated by Pearson. The symbols * and ** in the table denote correlations at $P \leq 0.05$ (significant) and $P \leq 0.01$ (highly significant), respectively.

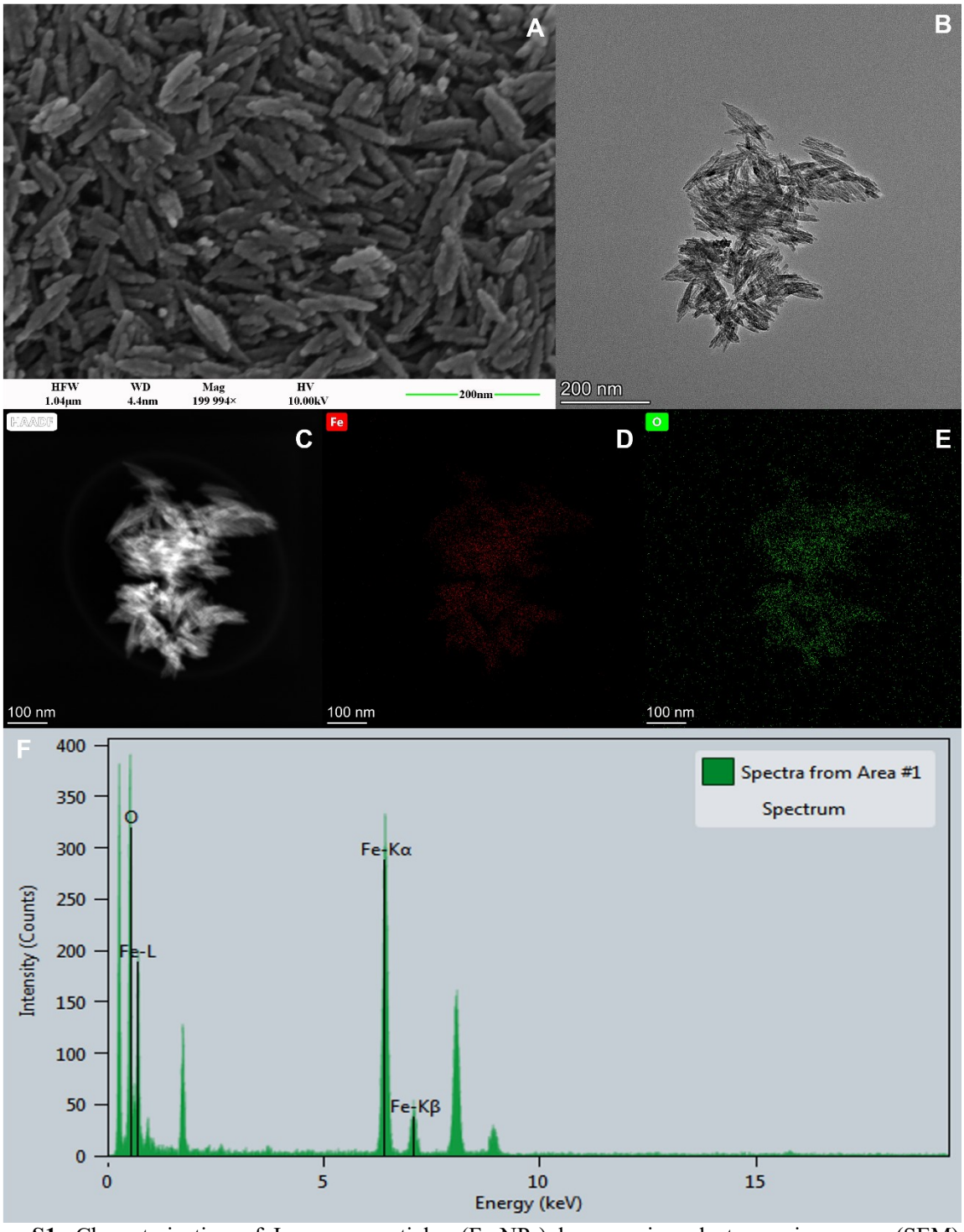

Figure S1: Characterization of Iron nanoparticles (Fe-NPs) by scanning electron microscope (SEM) and transmission electron microscopy (TEM).

Observation of iron nanoparticles by SEM (A). The iron nanoparticles were characterized by TEM (B-E) and the energy spectra (F) were observed.

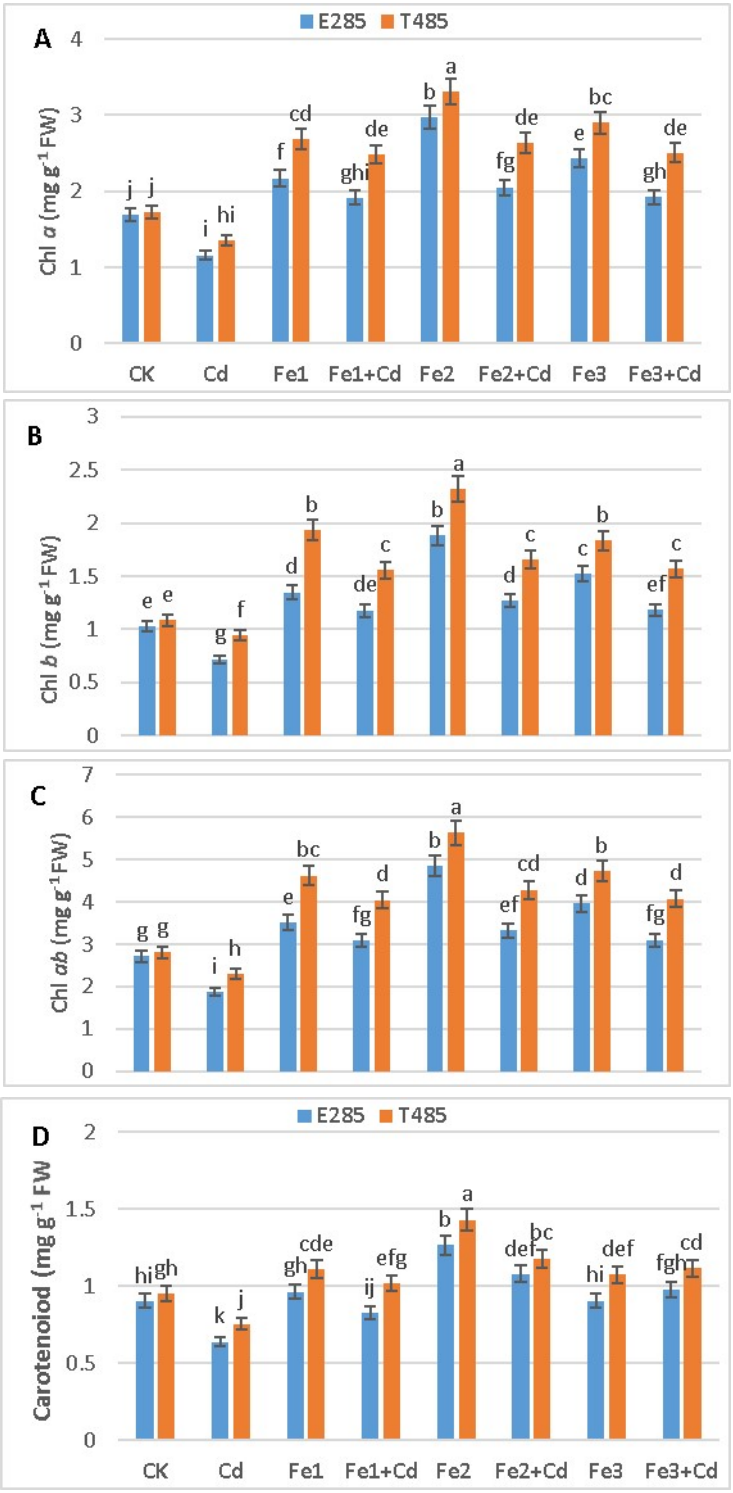

Figure S2 (A-D): Effect of Fe_2O_3 Nanoparticles and cadmium toxicity on photosynthetic parameters of E285 (Diploid) and T485 (Tetraploid) cultivars of rice plants; Chlorophyll *a* (A), Chlorophyll *b* (B), Chlorophyll *ab* (C), Carotenoids (D). The standard errors of four replicates are shown by the bars above the graphs. According to the LSD test, the letters specify significant/non-significant variations between treatments ($p < 0.05$). Fe1, Fe2, and Fe3 indicate 10, 25, and 50 mg L-1 concentrations of Fe nanoparticles.

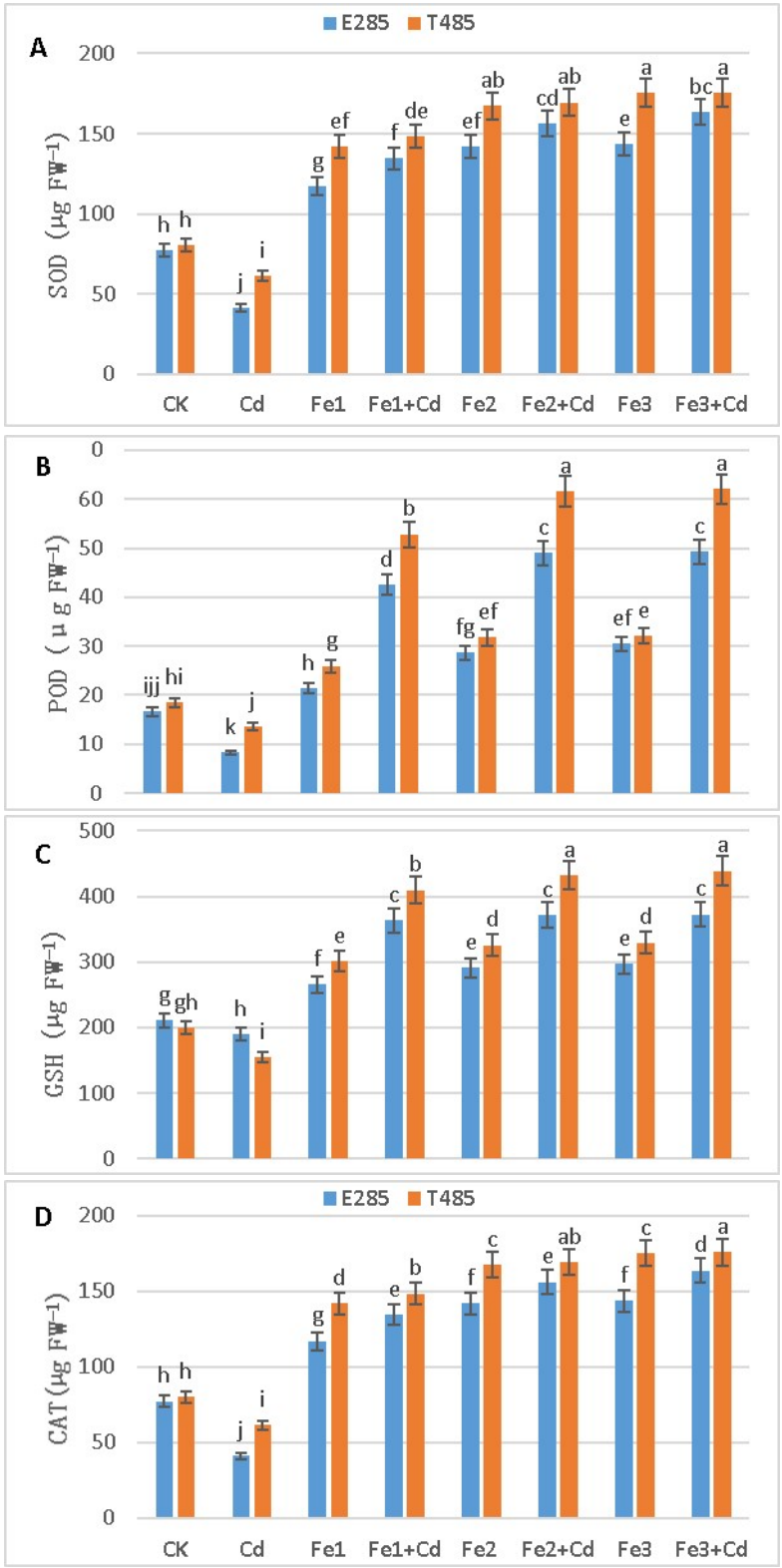

Figure S3 (A-C): Effect of Fe_2O_3 nanoparticles and cadmium toxicity on antioxidants enzymatic parameters of E285 (Diploid) and T485 (Tetraploid) cultivars of rice plants; (SOD) Superoxide dismutase (A), (POD) Peroxidase (B), (GSH) Glutathione (C), (CAT) Catalase (D). The standard errors of four replicates are

shown by the bars above the graphs. According to the LSD test, the letters designate significant/non-significant variations between treatments ($p < 0.05$, $n = 4$).

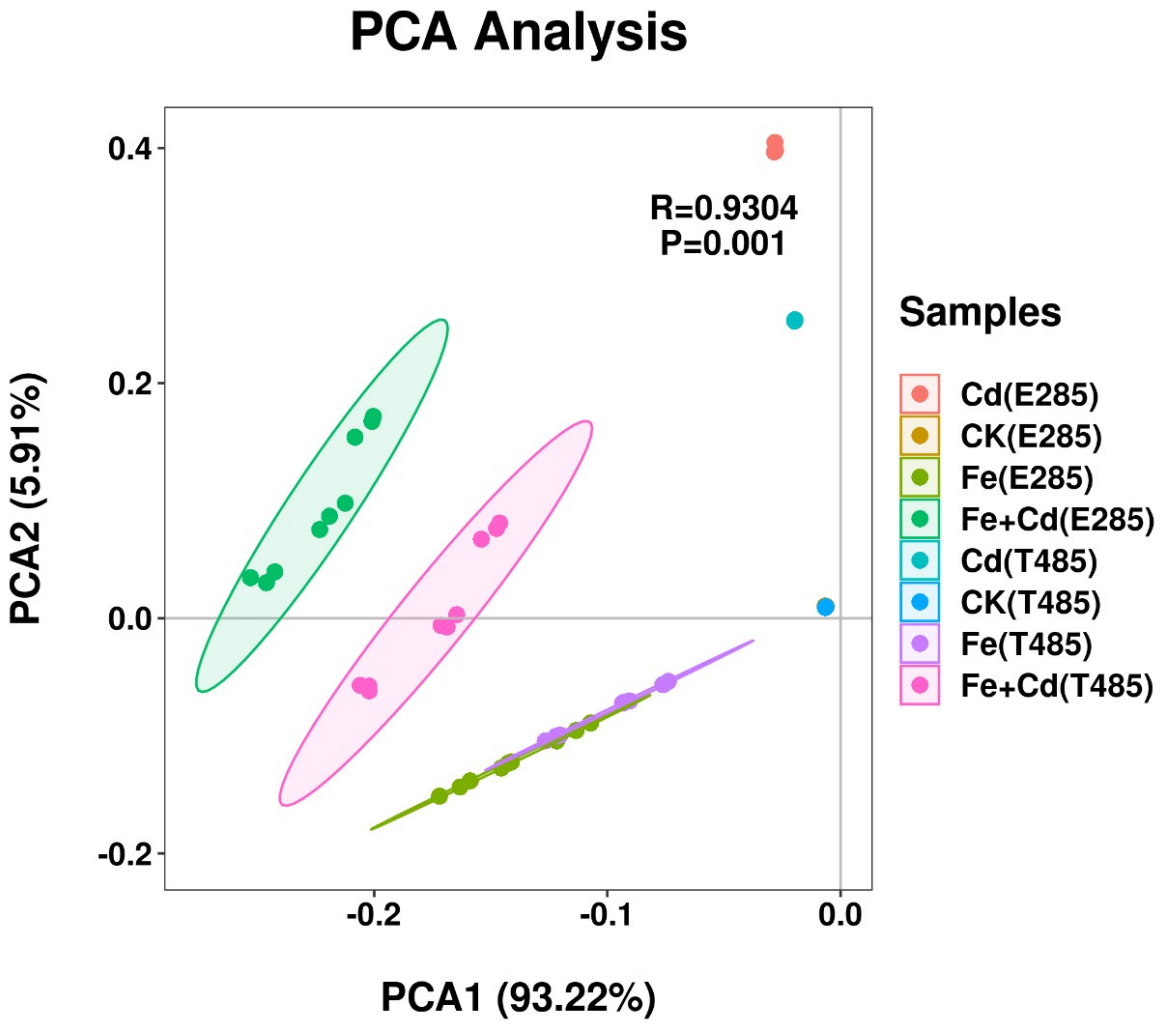

Figure S4: Fe nanoparticles and Cd were used in principal component analysis (PCA) of diploid (E285) and tetraploid (T485) rice. The biplot of the first two main components is shown by the PCA. The variables include CK, Cd, Fe and Fe+Cd treatments.