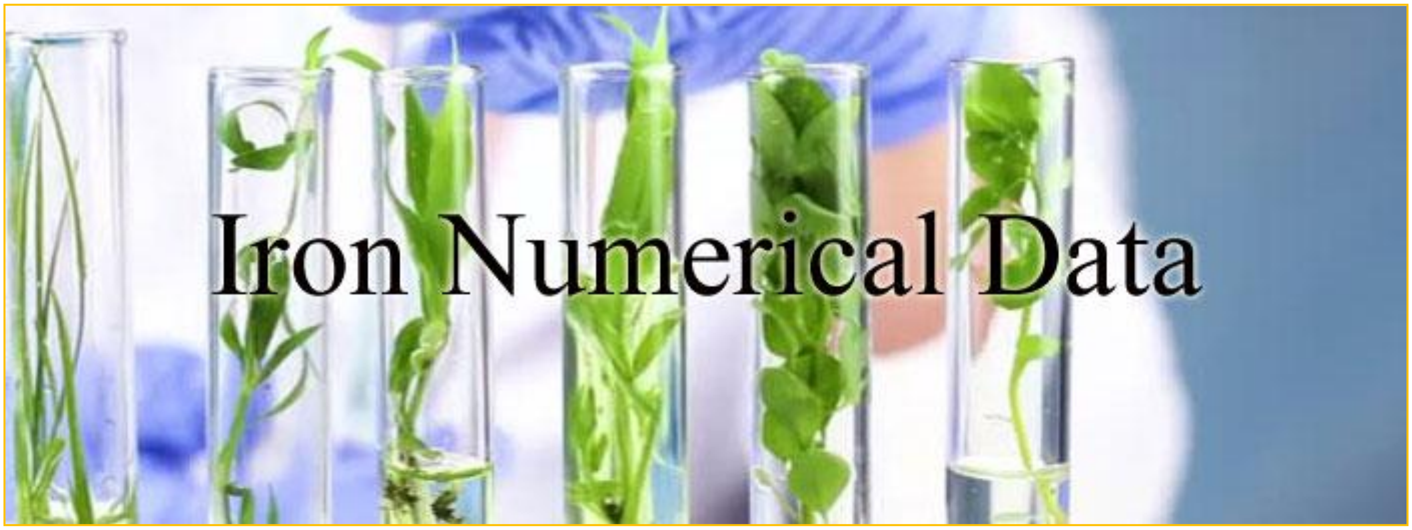

Iron homeostasis in plants and its crosstalk with copper, zinc, and manganese (2021)

Table 1: Metal ion ligands and transporters.

Name	Function	Found in	References
Mugineic acid (MA)	It chelates metal ions (Fe, Zn and Cu) and make them available for uptake by plants	Graminaceous monocots	Connorton et al., 2017
Nicotinamide (NA)	It chelates iron as well as other divalent metals, such as copper, zinc and manganese and is involved in their transport in plants.	Monocots as well as dicots	Connorton et al., 2017
YS1	It is involved in the uptake of metal-MA complexes from the rhizosphere into the plant cell.	Monocots	Connorton et al., 2017
YSL transporters	It aids in the intercellular transport of a complex of metals with nicotianamine	Monocots as well as dicots	Connorton et al., 2017
IRT1	It is the primary root iron transporter but it can also transport zinc and manganese.	*Arabidopsis*	Grotz and Guerinot, 2006
OsZIP1–4 and OsHMA2	It transports either Fe2+ or Zn2+	*Oryza sativa*	Banakar et al., 2017a
Ctr/COPT transporters	These proteins are thought to be involved in copper uptake and transport	*Arabidopsis*	Festa and Thiele, 2011
NRAMP transporters	These are involved in iron and manganese transport.	Monocots and dicots	Grotz and Guerinot, 2006
CDF transporters	These efflux Mn2+, Zn2+, and Fe2+, into subcellular compartments or out of the cytoplasm	Monocots and dicots	Gustin et al., 2011

Source: https://www.sciencedirect.com/science/article/pii/S2667064X21000075#tbl0001

Unraveling the toxic effects of iron oxide nanoparticles on nitrogen cycling through manure-soil-plant continuum (2021)

Table 1: Mean (n #3) characteristics of farmyard manure, poultry manure, and soil used in this study. Values in the parenthesis represent the ±standard error of the mean.

Parameters	Units	Farmyard manure	Poultry Manure	Soil
Dry matter	(%)	75.96 (±9.82)	42.54 (±3.30)	-
Organic matter	(%)	16.92 (±1.33)	27.60 (±5.72)	0.62 (±0.04)
N_{total}	(%)	1.23 (±0.10)	3.75 (±0.02)	-
N_{min}	(%)	0.34 (±0.07)	1.27 (±0.09)	
Total C	(%)	19.80 (±0.12)	51.36 (±5.61)	-
C:N ratio	–	16.09	13.69	-
pH_{H2O}	1:10	8.2 (±0.90)	8.0 (±1.0)	7.82 (±1.70)
EC (1:5)	dSm^{-1}	4.1 (±0.07)	8.2 (±0.76)	2.0 (±0.09)

Table 2: Soil chemical parameters and N mineralization efficiency of different treatments after 90 days of soil incubation. Values are mean of three replicates (n = 3). Small letters show significant differences among treatments.

Treatments	pH	EC $dS\ m^{-1}$	OM (%)	TOC (%)	N_{min}[d]
FYM	8.4 ± 0.22	0.97 ± 0.11a	0.23 ± 0.12	0.14 ± 0.07	73.2 ± 1.06 b
FYM + IONPs	8 ± 0.09	0.64 ± 0.09 b	0.27 ± 0.13	0.16 ± 0.08	62.6 ± 14.5 c
PM	8.4 ± 0.33	0.76 ± 0.13ab	1.8 ± 1.4	1.01 ± 0.79	91.8 ± 2.4 a
PM + IONPs	8.2 ± 0.33	0.59 ± 0.12 b	0.39 ± 0.10	0.23 ± 0.06	72.1 ± 3.2 b
IONPs	8.5 ± 0.13	0.81 ± 0.12b	0.58 ± 0.35	0.32 ± 0.19	_
P-value	0.4090	0.023	0.4247	0.4286	0.0021

[d] Nitrogen mineralization efficiency = . $\frac{\text{N min (treatment)-N min (control)}}{\text{N (applied)}} \times 100$

Source: https://www.sciencedirect.com/science/article/pii/S0147651320309386#tbl1

Immobilization of cadmium and lead using phosphorus-rich animal-derived and iron-modified plant-derived biochars under dynamic redox conditions in a paddy soil (2021)

Table 1: Properties of used P-rich, raw and Fe-rich biochars.

Properties	P-rich biochar	Raw biochar	Fe-rich biochar
pH (H_2O)	10.6	9.3	4.4
Electrical conductivity (mS cm^{-1})	2.0	0.4	4.5
Total C (%)	30.8	69.3	59.9
Total N (%)	2.1	1.1	0.9
Total H (%)	1.3	2.7	2.2
Total S (%)	0.2	0.4	0.2
Surface area (m^2 g^{-1})	18.4	110.7	74.5
Ash content (%)	50.9	9.7	15.3
Total P (g kg^{-1})	82.8	1.9	3.0
Total Fe (g kg^{-1})	20.6	7.6	54.6
Total Cd (mg kg^{-1})	ldl	ldl	ldl
Total Pb (mg kg^{-1})	1.6	7.0	11.4

ldl: lower than detection limits.

Table 2: Variation of concentration of Eh, dissolved Cd and Pb and measured governing factors in the slurry of soil treated with different biochars (four replicates).

Parameter	Control			P-rich biochar treatment			Raw biochar treatment			Fe-rich biochar treatment		
	n	Minimum	Maximum	n	Minimum	Maximum	n	Minimum	Maximum	n	Minimum	Maximum
$E_{H\ all}$ (mV)	13,778	-465	+293	13,764	-457	+278	13,774	-484	+281	13,779	-446	+359
$E_{H\ 6h}$ (mV)	36	-386	+248	36	-420	+247	36	-436	+277	36	-398	+352
pH_{all}	13,775	4.3	7.6	13,777	5.1	8.9	13,779	4.8	8.8	13,780	4.6	7.8
pH_{6h}	36	5.0	7.1	36	5.5	8.1	36	5.1	8.7	36	4.8	7.4
Cd (µg L^{-1})	36	LDL	13.2	36	LDL	9.6	36	LDL	7.6	36	LDL	6.3
Pb (µg L^{-1})	36	LDL	221.5	36	LDL	76.9	36	LDL	171.9	36	LDL	179.1
Fe (mg L^{-1})	36	0.05	240.1	36	0.03	211.3	36	0.05	193.7	36	0.03	250.4
Mn (mg L^{-1})	36	0.9	35.2	36	0.4	28.1	36	0.35	28.09	36	6.8	31.2
Fe^{2+} (mg L^{-1})	36	0	152.2	36	0	123.5	36	0	96.8	36	0	101.4
DOC (mg L^{-1})	36	46.5	1185.0	36	52.04	1257.2	36	15.4	1208.0	36	20.5	1198.2
SO_4^{2-}(mg L^{-1})	36	13.2	42.1	36	8.0	38.5	36	37.0	49.6	36	29.2	37.0

LDL: lower than detection limit.

Table 3: Impact of biochars on the changes (%) of the mobilization Cd and Pb in the treated soil as compared to the control.

Eh (mV)	P-rich biochar treatment	Raw biochar treatment	Fe-rich biochar treatment
Cd			
+200	14.58	--	--
-400	-8.56	-42.91	-59.46
-300	-18.62	-59.31	-55.86
-200	-13.11	-47.75	-31.23
-100	--	9.76	31.71
0	--	8.70	-16.52
+100	-35.15	-54.22	-54.22
+200	-2.46	--	-48.84
+300	-1.44	--	--
Pb			
+200	-0.48	-73.76	--
-400	-54.75	22.27	-44.07
-300	-62.48	-47.64	-4.82
-200	-59.31	12.28	119.21
-100	-61.18	16.43	83.04
0	-82.06	-23.73	-11.55
+100	0.00	--	--
+200	0.00	--	--
+300	0.00	--	--

Source: https://www.sciencedirect.com/science/article/pii/S0160412021002531#m0005

Enhancing Iron uptake and Alleviating Iron Toxicity in Wheat by Plant Growth-Promoting Bacteria: Theories and Practices (2020)

Table 1: Potential iron transporters in wheat based on proteome data.

Entry Q5G1L7	**Protein names Zinc transporter ZIP**	**Gene names ?**	**Length 360**	**Status un-reviewed**
A0A1D6BHT7	ZIP metal ion transporter	ZTP29	277	**un-reviewed**
A9NIW8	**Putative zinc transporter**	**ZIP1 TRAES_3BF074300090CFD_c1**	**355**	**un-reviewed**

Table 2: Examples of plant growth-promoting bacteria enhancing wheat iron uptake and iron fortification.

PGPB	**Treatment**	**Tissue**	**Iron increase**	**Study conditions**	**Reference**
B.M-3	Information unavailable	leaf, grain, straw	90-105%	Turkey, field experiment	Turan *et al.* (2010)
P. jessenii, *P. synxantha*, and AMF	10^5-10^6 CFU bacteria per seed, 20 infectious propagules per seed, seed encapsulation	grain	30%	India, field experiment	Mäder *et al.* (2011)
***B.* spp. AW1, *Providencia* sp.AW5 and *Brevundimonas* spp. AW7**	10^9 CFU/mL, mixed with charcoal: soil(3:1), prior to sowing of seeds	grain	107-144%	India, pot experiment	Rana *et al.* (2012)
***B. megaterium, Arthrobacter chlorophenolicus*, and *Enterobacter* spp.**	10^7 CFU/mL, co-incubation for 30 minutes before seeding	grain	42-49%	India, pot and field experiments	Kumar *et al.* (2014)
***Serratia marcescens, Microbacterium arborescens*, and *Enterobacter* spp.**	10^7-10^8 CFU per seed, co-incubation for 5 days before seeding	grain	16-18%	India, pot and field experiments	Kumar *et al.* (2017)
P. putida	extracted bacterial siderophores, co-incubation with seedlings	root	51-90%	Iran, hydroponic culture	Rasouli-Sadaghiani *et al.* (2014)
Arthrobacter spp. and Lysinibacillus fusiformis	iron fortified bacterial siderophore, foliar application during flowering	grain	200%	India, field experiment	Sharma *et al.* (2019)

Source:https://www.researchgate.net/publication/337674542_Enhancing_Iron_uptake_and_Alleviating_Iron_Toxicity_in_Wheat_by_Plant_Growthpromoting_Bacteria_Theories_and_Practices

Phenotypic Assessment of Natural Diversity in Low-Land Rice Germplasm as Affected by Iron Toxicity (2020)

Table 1: Morphological Performance of rice genotypes under iron toxicity condition

	Treatments	DF	PH	PL	GN	GW	Yield	LBI	Tillers
1.	Sankaribako	105.73	106.23	21.11	77.81	25.16	11.40	4.67	**6.65**
2.	Kalakrushna	100.75	122.55	25.06	144.57	14.06	13.58	3.83	**6.37**
3.	Assamchudi	100.05	112.50	22.90	102.80	21.70	11.09	4.67	**5.16**
4.	Gelei	97.70	103.93	22.10	120.05	16.04	15.40	3.50	**7.20**
5.	Kalamara	99.08	122.57	21.80	79.43	14.63	3.78	2.33	**4.61**
6.	Nini	96.60	112.84	24.51	97.96	21.09	9.68	3.67	**6.68**
7.	Gurumukhi	104.75	113.08	21.27	86.53	24.55	16.74	4.00	**5.57**
8.	Jubaraj	105.00	109.76	24.13	84.35	18.99	12.51	5.17	**6.15**
9.	Champa	105.33	113.46	20.81	124.10	22.76	24.22	2.67	**6.42**
10.	Veleri	110.25	114.12	24.75	87.85	21.90	17.05	4.00	**5.72**
11.	Dhinkisiali	107.58	114.57	21.45	94.09	18.16	12.34	2.33	**7.51**
12.	Dhabalabhuta	106.17	121.49	21.78	86.17	20.44	23.22	3.00	**6.58**
13.	Bayabhanda	108.25	120.19	23.29	85.87	18.85	17.17	3.17	**6.96**
14.	Lata mahu	102.83	112.13	20.46	89.79	18.94	20.47	3.67	**6.29**
15.	Hatipanjara	105.50	119.90	22.77	87.92	19.04	22.38	3.00	**8.80**
16.	Mugei	103.34	114.84	21.67	76.71	19.94	12.13	3.67	**5.17**
17.	Sagiri	102.00	123.36	22.33	125.97	24.24	15.70	5.00	**4.99**
18.	Kakiri	102.67	111.71	22.31	102.22	23.30	18.27	4.83	**5.79**
19.	Madia	101.75	118.58	24.47	106.22	21.39	19.86	5.67	**5.71**
20.	Dhusura	102.50	113.72	25.70	82.58	23.09	21.18	1.83	**6.54**
21.	Bangali	100.83	115.25	22.84	99.77	21.96	24.11	3.67	**5.32**
22.	Banda	107.22	132.03	25.79	108.51	20.26	13.85	3.00	**4.77**
23.	Jalpaya	103.42	116.77	23.25	99.39	17.12	19.56	3.67	**5.77**
24.	Chudi	107.08	116.41	26.29	127.39	21.17	22.97	4.33	**5.85**
25.	Nilarpati	104.83	118.09	22.34	103.19	26.53	24.65	3.50	**5.13**
26.	Gelei	106.42	116.62	20.82	134.07	16.55	25.43	4.33	**5.96**
27.	Ratanmali	105.25	108.15	25.04	123.58	16.52	19.17	2.50	**6.77**
28.	Umarcudi	103.42	110.79	26.21	125.99	18.25	17.14	4.50	**6.14**
29.	Jaiphula	103.58	115.14	21.40	140.80	13.09	18.44	5.50	**6.32**
30.	Karpurakranti	104.17	115.67	22.69	104.81	12.21	16.64	4.00	**6.51**
31.	Ramakrushnabilash	102.67	113.93	23.44	135.25	12.98	25.72	3.33	**7.45**
32.	Bagudi	104.67	115.05	24.20	140.50	21.61	31.82	4.33	**5.93**
33.	Sunapani	110.58	107.74	25.90	123.62	21.24	45.03	3.17	**6.89**
34.	Anu	100.50	112.43	22.64	148.89	12.79	18.21	3.17	**6.53**
35.	Mayurkantha	100.67	123.85	22.44	101.52	22.54	26.14	3.33	**5.48**
36.	Champeisiali	107.50	120.13	23.89	95.17	21.41	15.66	4.33	**6.14**
37.	Nalijagannath	106.42	119.40	19.88	120.45	21.07	46.92	4.67	**5.60**
38.	Mhasuri	111.25	113.47	26.62	143.37	17.74	42.32	3.00	**7.75**
39.	Ranisaheba	104.17	110.94	23.07	129.63	19.09	25.14	2.50	**6.79**
40.	Punjabniswarna	104.92	116.09	26.30	93.20	20.03	17.38	2.67	**5.24**
41.	Kusuma	102.17	117.18	23.22	119.48	25.48	23.38	1.67	**5.19**
42.	Kenrdajhali	103.17	110.09	23.84	122.56	18.04	12.89	2.67	**6.18**
43.	Jaiphula	100.17	114.43	24.79	98.49	13.79	10.12	2.50	**6.48**
44.	Jabaphula	104.62	109.70	24.50	116.91	21.98	10.83	3.50	**5.72**
45.	Khandasagar	101.33	107.52	22.67	74.25	18.05	11.96	5.83	**5.37**
46.	Pipalbasa	102.67	123.15	24.90	67.66	23.37	11.19	5.00	**6.03**
47.	Budidhan	105.08	115.07	27.24	120.65	15.65	13.91	5.33	**6.29**
48.	Karpuragundi	107.67	112.50	22.65	126.80	13.05	17.83	5.33	**5.79**
49.	Basapatri	100.67	111.94	21.61	100.36	16.59	14.31	4.67	**6.48**
50.	Bagadachinamala	104.00	110.47	22.63	98.51	16.08	23.90	4.00	**6.54**
51.	Kalaheera	105.33	115.63	23.71	118.39	17.14	33.23	4.33	**6.56**

52.	Rasapanjari	106.42	102.81	23.38	126.93	22.01	23.27	4.17	**4.81**
53.	Biridibankoj	109.67	119.02	23.27	108.16	24.65	24.95	3.00	**6.37**
54.	Jagbalia	113.25	110.01	21.85	141.56	38.40	27.05	3.67	**6.36**
55.	Dholamadhoi	109.75	111.53	25.75	107.71	23.56	33.95	3.50	**5.97**
56.	Kaniara	104.50	103.11	20.68	100.63	17.89	20.45	3.17	**5.56**
57.	Bishnupriya	106.75	109.07	21.54	121.40	17.90	21.26	5.67	**6.06**
58.	Madhabi	108.17	109.81	22.07	126.24	22.79	22.53	4.00	**5.12**
59.	Jungajhata	104.83	112.58	25.64	106.07	23.59	21.68	4.00	**6.75**
60.	Rangasiuli	107.00	117.02	25.34	123.16	18.93	21.06	3.33	**6.19**
61.	Sankarachini	107.00	112.88	24.41	99.59	22.54	20.52	2.33	**6.23**
62.	Saluagaja	104.50	114.30	22.72	140.72	18.04	20.35	5.83	**7.36**
63.	Mayurachulia	106.92	107.52	21.71	168.47	13.15	21.67	4.50	**5.46**
64.	Basudha	107.17	105.23	21.06	147.91	15.83	23.18	3.17	**7.67**
65.	Tikimahsuri	107.17	98.37	25.50	127.09	12.60	14.98	3.00	**7.01**
66.	Tulasibasa	104.77	118.09	25.44	112.87	17.72	19.78	3.33	**5.48**
67.	Asinasita	103.17	112.61	23.47	106.23	11.77	20.95	3.50	**7.04**
68.	Bhangar	105.33	94.14	22.04	123.54	12.68	21.24	3.83	**6.67**
69.	Kalajeera	107.17	117.42	22.49	151.79	12.16	19.71	3.17	**6.84**
70.	Gobindabhog	105.17	117.59	23.46	163.49	14.20	22.52	4.67	**6.04**
71.	Basudha	104.50	91.71	21.42	137.73	14.21	20.84	5.50	**5.07**
72.	Agnisar	104.83	112.47	21.37	108.37	20.61	18.56	4.83	**4.58**
73.	Malata	106.17	112.00	21.31	110.79	16.80	20.73	4.50	**5.59**
74.	Kabir	107.00	100.71	21.47	118.32	19.62	14.36	2.17	**6.31**
75.	Nadal ghanta	104.50	117.87	23.13	118.31	21.06	23.59	3.00	**6.88**
76.	Latachaunri	103.00	109.88	23.48	145.96	21.29	17.99	2.67	**5.83**
77.	Nalikalma	103.67	104.79	25.66	144.17	20.95	21.96	4.50	**6.39**
78.	Sarubhajana	102.17	126.05	21.77	124.91	21.13	15.07	3.33	**6.22**
79.	Luna	104.33	121.68	24.78	101.09	23.01	51.58	2.67	**6.10**
80.	Abiram	101.00	118.98	23.24	109.05	21.30	20.91	5.33	**4.86**
81.	Sebati	99.83	81.64	22.48	91.70	18.15	21.88	5.67	**6.99**
82.	Ahiram	104.50	121.49	23.76	105.92	22.52	16.55	4.83	**6.08**
83.	Bhutmundi	107.83	119.73	22.51	96.29	23.55	20.10	2.67	**5.55**
84.	Makarkanda	107.83	116.56	22.14	98.64	23.86	20.63	3.17	**6.92**
85.	Jata	104.17	115.93	24.67	100.89	21.03	18.07	3.67	**6.02**
86.	Khajurikandi	101.92	118.89	21.70	119.05	17.51	15.74	2.67	**6.29**
87.	Tulasimali	102.67	114.92	24.07	104.42	19.99	20.16	3.33	**6.19**
88.	Nalibaunsagaja	103.25	118.99	21.35	102.85	25.18	19.88	3.33	**6.83**
89.	Malabati	105.17	112.57	22.73	112.85	23.35	30.56	3.67	**6.20**
90.	Pateni	108.58	120.43	23.86	130.06	18.77	26.49	2.33	**6.12**
91.	Nikipakhia	106.00	102.62	24.26	108.60	15.14	22.71	2.33	**5.71**
92.	Malliphujajhuli	103.92	104.23	24.76	105.52	15.76	16.78	3.67	**7.57**
93.	Jhilli	103.83	110.75	24.04	126.24	17.81	24.38	3.50	**6.41**
94.	Bharati	104.33	103.41	20.86	123.99	15.88	21.37	3.50	**7.08**
95.	Hunder	103.67	112.78	21.91	123.50	17.26	20.25	3.00	**4.65**
96.	Sapri	103.83	122.20	24.88	99.22	19.86	26.32	3.33	**6.35**
97.	Dholabankoi	106.50	114.72	23.10	98.82	20.58	24.38	3.50	**6.08**
98.	Korkaili	86.17	106.09	22.13	126.84	21.50	29.34	2.67	**5.08**
99.	Kalamulia	114.50	112.94	22.03	103.63	21.75	22.84	4.00	**6.17**
100.	Kusumkunda	110.75	111.34	21.41	101.98	23.57	25.44	2.00	**6.37**
101.	Sarswati	110.83	129.97	22.54	111.17	25.17	26.89	2.67	**6.50**
102.	Budhamanda	111.67	112.07	22.67	114.01	26.14	23.67	2.67	**6.90**
103.	Khajara	112.42	120.95	24.11	121.78	30.90	22.19	2.83	**6.91**
104.	Matia khoja	108.50	121.12	24.81	111.09	19.21	20.27	3.67	**6.22**
105.	Haribhohg	108.50	120.50	22.97	93.57	21.53	31.22	3.83	**6.12**
106.	Labangalata	111.92	101.94	22.12	166.67	18.27	32.85	3.33	**6.78**
107.	Dimapur	111.08	107.93	23.69	157.70	25.78	27.87	3.33	**5.82**
108.	Padmakesari	109.75	100.64	23.38	124.38	19.50	27.01	3.50	**6.66**
109.	Mahipal	110.50	103.32	24.43	153.21	20.47	29.53	4.17	**7.77**
110.	Dhanashree	111.50	100.19	23.66	133.37	17.25	26.43	3.00	**7.34**
111.	Khndiratnachudi	108.58	122.25	24.56	103.92	20.81	24.40	4.50	**6.71**
112.	Ruksal	113.50	132.89	23.25	133.44	22.73	23.30	4.00	**5.44**
113.	Harisankar	111.50	98.17	22.89	129.94	19.34	26.19	5.33	**5.90**
114.	Jagannath	112.75	96.99	21.48	154.35	17.90	27.25	3.67	**6.65**

115.	Mahalaxmi	114.58	91.42	21.85	187.00	18.05	30.16	5.67	7.37
116.	Manika	112.17	93.42	23.91	152.48	17.03	28.76	4.50	5.79
117.	Urbashi	111.50	119.62	25.02	123.76	19.03	28.17	3.67	5.86
118.	Rambha	115.58	109.45	25.43	135.25	21.36	37.81	4.33	6.00
119.	Salivahar	121.83	99.77	21.69	123.52	15.57	35.41	3.83	6.52
120.	Mhasuri	122.00	97.36	22.23	158.70	18.56	40.82	1.67	8.42
121.	Savitri	122.58	104.75	21.26	138.62	20.59	50.47	3.00	8.64
122.	Mahanandi	121.50	98.11	20.79	151.48	21.84	43.84	4.17	7.70
123.	Ramachandi	124.83	91.74	22.28	100.79	20.81	39.80	3.33	7.53
124.	Indrayati	119.00	92.12	22.12	124.78	23.34	34.01	4.33	6.57
125.	Prachi	119.00	98.66	23.72	124.97	21.73	37.25	2.67	6.30
126.	Jagabandhu	118.83	99.03	22.49	131.00	19.94	35.53	2.83	5.95
127.	Uphar	116.08	98.60	22.29	140.80	20.59	34.14	2.50	7.51
128.	Mrunalini	112.33	99.49	26.45	100.53	21.07	40.60	4.67	6.54
129.	Tanmayee	114.17	99.25	22.08	129.25	17.73	44.43	4.33	6.20
130.	Ashutosh	117.25	99.93	22.38	133.62	19.41	46.96	4.00	6.45
131.	Hasanta	112.67	98.31	22.29	129.88	21.06	35.63	3.33	7.32
132.	Santepheap	108.50	92.82	24.76	182.80	21.92	45.03	4.17	7.91
133.	OR237-23	110.17	107.80	20.43	134.31	21.74	25.73	2.83	6.05
134.	GanjamGedi	108.00	112.57	20.76	153.21	19.06	19.92	1.83	7.04
135.	Seulapana	109.75	99.42	21.05	112.01	21.47	24.47	3.67	6.99
136.	Kandalipenda	103.42	110.95	21.47	101.66	20.37	22.71	3.33	6.90
137.	Kukudimanji	103.33	104.98	20.38	104.18	26.09	21.25	4.83	6.38
138.	Habira	102.67	115.04	22.48	118.32	23.52	25.22	4.00	6.44
139.	Kantha kamal	102.17	120.01	23.74	111.77	22.74	18.92	4.00	5.68
140.	Bankoi	103.33	122.09	22.93	116.22	17.91	25.30	5.17	5.66
141.	Laxmi	105.42	89.58	21.61	128.77	17.23	37.18	3.00	6.29
142.	Pratikhya	110.42	93.43	22.43	147.42	18.71	47.03	1.50	7.47
143.	Ranidhan	111.08	102.88	21.56	153.12	17.18	45.52	2.67	7.37
144.	Swarna	107.92	96.38	24.93	134.85	18.71	44.42	2.17	6.54
145.	Manaswini	104.58	96.93	24.33	141.34	21.73	34.49	3.00	6.24
146.	MTU1010	109.83	100.14	24.78	101.85	15.99	36.20	3.83	6.48
147.	Tejaswini	108.50	104.99	22.93	114.73	18.15	31.18	3.33	6.91
148.	IR 64	102.83	91.25	24.01	89.66	18.55	27.89	4.83	8.27
149.	Hiranmayee	101.58	96.39	25.38	123.21	21.12	36.86	3.17	6.35
150.	Lalat	109.08	93.74	23.46	134.74	16.98	41.79	2.33	8.20
CV %		6.200	13.203	9.516	23.657	24.669	47.257	47.671	20.373
CD		5.299	20.313	3.039	32.828	5.817	12.483	2.10	1.900

Where: DF-Days to flowering; PH- plant height in cm; PL- Panicle length in cm; GN-Grain number per panicle; GW-1000 grain weight in gram; Yield- yield in Q/ha; Tillers- number tillers per hill

Table 2: Character association as revealed from 150 diverse rice genotypes evaluated under Fe-toxicity

	DF	LBI	PH	PL	GN	GW	YIELD	TN
DF	1.000							
LBI	-0.057	1.000						
PH	-0.345***	-0.044	1.000					
PN	-0.082	-0.057	0.144	1.000				
GN	0.341***	0.026	-0.357***	-0.065	1.000			
GW	0.144**	-0.078	0.194*	-0.013	-0.187	1.000		
YIELD	0.566***	-0.093	-0.462	-0.020	0.404***	0.111	1.000	
TN	**0.365*** **	**-0.171***	**-0.379**	**-0.022**	**0.249**	**-0.141**	**0.381*** **	**1.000**

*, ** and *** significant at 0.05, 0.01 and 0.001probability level respectively, DF: days for 50% flowering, LBI: leaf bronzing index, PH: plant height, GN: grain number, GW: grain weight, TN: tiller number

Source: https://www.journalcjast.com/index.php/CJAST/article/view/30715/57627

Preliminary study on the electrocatalytic performance of an iron biochar catalyst prepared from iron-enriched plants (2020)

Table 1: Mass and atom percentages of iron of each sample detected by energy dispersive X-ray spectrometry (EDS).

	0-Fe-BC	4-Fe-BC	8-Fe-BC	16-Fe-BC
Mass percentage (%)	ND	ND	9.55	**4.80**
Atom percentage (%)	ND	ND	3.20	**1.58**
ND: not detected.				

Table 2: Summary of the physicochemical properties of the biochar preparations.

Samples	Brunauer-Emmett-Teller specific surface area (BET SSA) (m^2/g)	Pore volume (cm3/g)	Pore diameter (nm)
0-Fe-BC	73.74	0.095	**5.13**
4-Fe-BC	14.15	0.041	**11.59**
8-Fe-BC	13.54	0.038	**11.33**
16-Fe-BC	**14.64**	**0.033**	**9.10**

Source: https://www.sciencedirect.com/science/article/abs/pii/S1001074219309404

Genetic diversity of African's rice (Oryza glaberrima Steud.) accessions cultivated under iron toxicity (2020)

Table 1: Summary of descriptive analyzes and performance of *O. glaberrima* accessions.

Variable	Min.	Max.	Mean	SD	CV (%)	H_2 (%)	F	Pr > F
T30	1,000	10,000	3,361	1,384	41,174	48,1	0,933	**0,695**
H 60	47,167	122,500	80,564	12,926	16,044	64,6	1,835	< **0,0001**
T 60	1,667	15,333	6,934	1,987	28,650	58.7	1,429	**0,005**
Hmat	70,667	131,833	95,232	10,949	11,497	54,8	1,216	**0,076**
DF	67,000	111,000	87,733	9,263	10,559	72,8	2,688	< **0,0001**
Tf	2,833	13,833	6,526	1,910	29,270	56,8	1,302	**0,027**
Gr/p	39,398	217,000	89,496	21,462	23,981	65,3	1,891	< **0,0001**
Ster	0,901	105,639	20,445	15,840	77,473	69,8	2,319	< **0,0001**
yield	125000,000	7100000,000	2202010,618	1002651,029	45,533	58,5	1,417	**0,005**
W1000	**9,950**	**49,383**	**29,729**	**7,081**	**23,820**	**51,9**	**1,083**	**0,280**

Legend : Number of tillers at 30 days after transplanting (T30); Number of tillers at 60 days after transplanting (T60); number of fertile tiller (Tf); Height of plants at 60 days after transplanting (H60) Height of mature plants (Hmat); 50% flowering(DF); sterility rate (Ster), number of seeds per panicle (G / p); weight of 1000 seeds (P1000) yield (yield).

Table 2: Correlations between the measured characters.

Traits	T30	T 60	H60	DF	Hmat	Tf	G/p	Ster	yield	W1000	Tox35	Tox 60	Tox at
T30	1,000												
T 60	0,591*	1.000											
H 60	0.033	0.025	1.000										
DF	-0.098	0.034	-0.559	1.000									
Hmat	0.118	0.178	0.293*	0.168	1.000								
Tf	0.520*	0.704*	0.119	-0.070	0.079	1.000							
G/p	0.030	0.128	-0.024	0.2916*	0.3476*	0.065	1						
Ster	0.026	0.116	-0,065	0.164	0.222*	0.032	0.649*	1					
yield	0.269*	0.271*	0.362*	-0.248*	0.24*	0.347*	0.109	-0.021	1				
W100	0.1506	-0.037	0.196	-0.376	0.0640	-0.034	-0.273*	0.033	0.1707	1			
Tox35	0.0360	-0.002	0.046	-0.046	0.022	-0.039	-0.092	-0.1	-0.059	0.022	1		
Tox60	-0.029	-0.090	-0.313	0.315	-0.017	-0.067	0.011	0.055	-0.225*	-0.044	0.065	1	
Tox mat	**-0.025**	**-0.114**	**-0.231***	**0.214***	**0.029**	**-0.103**	**-0.039**	**0.089**	**-0.143**	**-0.019**	**0.037**	**0.754***	**1**

Legend : Number of tillers at 30 days after transplanting (T30); Number of tillers at 60 days after transplanting (T60); number of fertile tiller (Tf); Height of plants at 60 days after transplanting (H60) Height of mature plants (Hmat); 50% flowering(DF); sterility rate (Ster), number of seeds per panicle (G / p); weight of 1000 seeds (P1000) yield (yield).

Table 3: Eigen values and percent change expressed for the first five axes from the 14 characters in principal component analysis.

Main Component	F1	F2	F3	F4
Eigen value	2.813	2.354	1.775	**1.448**
Variability (%)	20.093	16.814	12.675	**10.346**
% cumulated	20.093	36.907	49.582	**59.928**
T30	0.579	0.295	0.481	**0.069**
T 60	0.623	0.454	0.423	**-0.156**
H 60 (cm)	0.569	-0.322	-0.349	**0. 329**
DF	-0.473	0.623	0.025	**-0.226**
Hmat (cm)	0.294	0.449	-0.433	**0.419**
Tf	0.647	0.340	0.447	**-0.121**
G/p	0.068	0.703	-0.476	**-0.137**
Ster	0.017	0.602	-0.371	**0.030**
yield (g)	0.656	0.041	-0.057	**0.195**
W1000 (g)	0.263	-0.329	0.035	**0.528**
Tox35	-0.024	-0.092	0.095	**0.273**
Tox 60	-0.539	0.355	0.415	**0.491**
Tox mat	-0.488	0.305	0.367	**0.581**
Exe	**0.052**	**0.239**	**-0.410**	**0.284**

Legend : Number of tillers at 30 days after transplanting (T30); Number of tillers at 60 days after transplanting (T60); number of fertile tiller (Tf); Height of plants at 60 days after transplanting (H60) Height of mature plants (Hmat); 50% flowering(DF); sterility rate (Ster), number of seeds per panicle (G / p); weight of 1000 seeds (P1000) yield (yield

Source: https://www.cropj.com/mayaba_14_3_2020_415_421.pdf

Table 1: Subpopulation groups identified in the collection of genotyped cultivars and accessions (n=280) and number of individuals in each group

Eco-geographical zone	**Subpopulation groups (pop)**					**Total population**
	***Oryza glaberrima* sp**	***Oryza sativa japonica***	***indica*_Group 1**	***indica*_Group 2**	**Admixed**	
Landraces from Casamance	2	0	60	2	0	65
Accessions from West Africa adapted varieties	37	20	67	69	1	215
Total	39	20	127	71	1	280
% Percentage	13.9	7.1	45.4	25.4	0.4	-

Table 2: Agro-morphological variation observed in the collection of rice germplasm evaluated under high iron-associated stress and non-stress conditions in hydroponic experiments

Trait	**Treatment**	**Min**	**Max**	**Mean**	**SD**	**RR%**	**Suakoko 8**	**Bouake 189**
SDW	Stress	0.006	0.225	0.07	0.03	59	0.07	0.05
	No stress	0.012	0.45	0.17	0.08		0.16	0.16
RDW	Stress	0.002	0.18	0.02	0.02	50	0.03	0.02
	No stress	0.003	0.225	0.04	0.03		0.05	0.05
PH	Stress	15.18	68.75	36.92	9.22	32	31.53	27.47
	No stress	18.9	80.67	54.54	10.46		42.26	43.57
RL	Stress	1.12	19.3	8.86	2.96	25	9.54	7.31
	No stress	5.6	22.25	11.8	2.27		11.93	11.32
SPAD value	Stress	13.2	32.7	23.82	3.34	20	25.69	22.33
	No stress	20.4	38	29.82	3.07		31.96	31.97
SQRT_LBS	Stress	1	3	2	0.42		1.8	2.34

Table 3: Phenotypic variation observed in the tested genotypes evaluated under mild and severe iron-associated stress conditions in the field at Djibelor

Trait	Mild stress field				Severe stress field				Significance	RR%
	Mean	**SE**	**Min**	**Max**	**Mean**	**SE**	**Min**	**Max**		
Flowering	103.7	0.6	77.9	138.7	106	0.6	72	134	***	-2
Tiller	212	3.1	60	445.8	153.5	3.2	33	345.8	**	28
PH	115.8	1.3	66.3	182.8	91.6	1.2	48.3	160.2	***	21
DBM	2221	47.5	200	4583	982.5	26.6	100	2917	***	56
HI	0.32	0.005	0.008	0.7	0.3	0.005	0.1	0.5	**	6
PanN	459.2	9.6	75	1100	254.1	6.2	50	650	*	45
PW	811.1	20.7	25	2108	322.6	10.5	16.6	966.7	**	60
GY	682.2	17.7	8.3	1475	296	9.9	25	900	**	57
STR	9	0.3	1	35	17.8	0.6	2	78	ns	-98
SPAD value	38.3	0.2	25.3	48.8	33.8	0.2	21.5	46.5	**	12
SQRT_LBS 60 DAT	1.3	0.02	1	2.6	2	0	1	3	***	

Table 4: Correlation of traits under severe iron-associated stress field conditions

	DBM	SPAD value	GY	HI	PanN	PH	PW	Tiller
SPAD value	0.16							
GY	0.87***	0.20						
HI	0.38***	0.15	0.69***					
PanN	0.48***	–0.16	0.52***	0.32***				
PH	0.55***	0.28***	0.46***	0.11	–0.09			
PW	0.88***	0.18	0.99***	0.66***	0.55***	0.45***		
Tiller	0.58***	–0.11	0.48***	0.19	0.55***	0.19	0.49***	
SQRT_LBS 60 DAT	– 0.59***	–0.21**	– 0.57***	– 0.28***	– 0.35***	–0.39***	–0.56***	–0.39***

GY, grain yield (g m−2); HI, harvest index; PanN, panicle number m–2; PH, plant height (cm); PW, panicle weight (g m−2); Tiller, tiller number m–2; SQRT_LBS 60 DAT, square-root leaf bronzing score at 60 d after transplanting; DBM, dry biomass (g m−2). **, ***, Significant at 0.01 and 0.001 probability levels.

Source: https://academic.oup.com/jxb/article/71/14/4188/5819036

The Effect of Intercropping Annual Ryegrass with Pinto Beans in Mitigating Iron Deficiency in Calcareous Soils (2020)

Table: Effect of Treatments (Bean–Annual Ryegrass Intercrop, Bean–Annual Ryegrass Incorporated, and Bean Only Monoculture) on Organic Matter, Soil pH, and Mean Plot Yield Averaged Over the Entire Experiment

Treatment	SOM (%)	Soil pH	Yield (kg plot^{-1})
Intercropped	5.80a	7.56a	0.73 ± 0.19
Incorporated	5.49ab	7.47ab	0.48 ± 0.13
Monoculture	4.43b	7.68b	0.60 ± 0.28
Means within a column followed by the same letter are not significantly different (α = 0.10).			

Source: https://www.tandfonline.com/doi/full/10.1080/10440041003613230

Assessment of photo-modulation, nutrient-use efficiency and toxicity of iron nanoparticles in Vigna radiata (2019)

Table 1: Effect of FeNP and Fe on root and shoot length, fresh and dry weight of 15 days treated mung bean plants. Data represent means ± standard errors (no. of samples = 25).

Treatment	Control	0.05 mg/L	0.1 mg/L	0.5 mg/L	1 mg/L
Root length (cm)					
FeNP	3.98 ± 0.477	7.01 ± 0.45	6.65 ± 0.45	5.67 ± 0.32	4.01 ± 0.29
Fe		5.94 ± 0.01	4.23 ± 0.29	3.58 ± 0.27	1.99 ± 0.01
Shoot length (cm)					
FeNP	5.60 ± 0.294	7.98 ± 0.50	7.02 ± 0.45	6.37 ± 0.29	6.01 ± 0.15
Fe		6.33 ± 0.35	5.89 ± 0.12	4.28 ± 0.29	3.78 ± 0.014
Fresh weight (g)					
FeNP	0.29 ± 0.004	0.42 ± 0.001	0.39 ± 0.005	0.31 ± 0.009	0.30 ± 0.001
Fe		0.34 ± 0.007	0.31 ± 0.09	0.22 ± 0.01	0.19 ± 0.001
Dry weight (g)					
FeNP	0.017 ± 0.004	0.040 ± 0.004	0.032 ±0.001	0.030 ± 0.001	0.028 ±0.002
Fe		0.032 ± 0.003	0.025 ±0.0001	0.019 ± 0.0001	0.011 ±0.0001

To check the effect of FeNPs and Fe, treatments were started on 7 day old mung bean plants under identical experimental conditions in the laboratory for 15 days. The plants were uprooted thereafter to carry out the initial morphological assessment. In the treated plants, 0.05 mg L^{-1} FeNPs showed prominent improvement in all aspects of morphological parameters with respect to control and Fe treatments. Even at higher concentrations, FeNP treated plants did not show any kind of toxic effect unlike Fe treated plants. All FeNP treated plants were healthy and no notable symptoms of chlorosis or necrosis were observed.

Source: https://pubs.rsc.org/en/content/articlelanding/2019/en/c9en00559e/unauth#!divAbstract

Siderophore-Producing Rhizobacteria as a Promising Tool for Empowering Plants to Cope with Iron Limitation in Saline Soils: A Review (2019)

Table: Studies providing experimental evidence of positive effects of plant growth-promoting rhizobacteria (PGPR) on salt-stressed plants

Study	PGPR	Plant(s)	Positive effect(s)
Gutiérrez Mañero	*Aureobacterium* spp., *Cellulomonas* spp.	Wild lupine	**Germination, root surface, N_2 fixation**
***et al.* (2003)**			
Vivas *et al.* (2003)	*Bacillus* sp., *Glomus* sp.	Lettuce	**Stomatal conductance**
Ashraf *et al.* (2004)	*Bacillus* sp., *Aeromonas hydrophila*,	Wheat	**Rhizospheric soil aggregation around**
	Aeromonas caviae		**roots, dry matter yield of roots and shoots, Na^+ exclusion**
Cheng *et al.* (2007)	*Pseudomonas putida*	Canola	**Salt tolerance, 1-aminocyclopropane-**
			1-carboxylate (ACC) deaminase
Saravanakumar and	*Pseudomonas fluorescens*	Groundnut	**Salt tolerance, ACC deaminase**
Samiyappan (2007)			
Estevez *et al.* (2009)	*Chryseobacterium balustinum*,	Common bean,	**Growth, N_2 fixation**
	Rhizobium tropici	soybean	
Naz *et al.* (2009)	Strains Rkh1–Rkh4	Soybean	**Growth, proline content**
Tank and Saraf	*Pseudomonas aeruginosa*, *Pseudomonas*	Tomato	**Root and shoot length, ACC deaminase,**
(2010)	*fluorescens*, *Pseudomonas stutzeri*		**indole-3-acetic acid (IAA), phosphate**
			solubilization, siderophores
Tiwari *et al.* (2011)	*Bacillus pumilus*, *Halomonas* sp.,	Wheat	**Root and shoot biomass, chlorophyll,**
	Arthrobacter sp.		**carotenoids, protein, IAA, ionic balance**
Ramadoss *et al.*	*Halobacillus* spp., *Bacillus*	Wheat	**Root length, dry weight**
(2013) **Younesi and Moradi**	*halodenitrificans* *Pseudomonas fluorescens*	Common bean	**Shoot biomass, proline, K^+, superoxide dis-**
(2014)			**mutase and catalase activities, Na^+ exclusion**
Mahmood *et al.*	*Enterobacter cloacae*, *Bacillus*	Mung bean	**Seed yield, dry biomass, plant height, leaf**
(2016)	*drentensis*		**area, relative water content, chlorophyll,**
			carotenoids, stomatal conductance,
			transpiration, salt tolerance
Khalid *et al.* (2017)	***Azospirillum brasilense***	**White clover**	**Phenols, polyphenols**

Source: https://sci-hub.tw/https://doi.org/10.1016/S1002-0160(19)60810-6

Vetiver grass is a potential candidate for phytoremediation of iron ore mine spoil dumps (2019)

Table: Relative translocation (TF) and bioaccumulation (BF) of heavy metals in vetiver varieties (S2, S4, TH, and BL) grown on iron mine overburden soil.

	Time (Months)	Vetiver varieties	Treatment condition	Fe	Cu	Zn	Cr	Mn
TF	6	S2	Garden soil	0.434	1.289	0.389	0.422	0.699
			Mine soil	0.319	1.288	0.419	0.525	0.765
		S4	Garden soil	0.358	1.369	0.483	0.752	0.475
			Mine soil	0.301	1.345	0.605	0.679	0.457
		TH	Garden soil	0.374	1.355	0.436	0.471	0.627
			Mine soil	0.332	0.841	0.541	0.652	0.798
		BL	Garden soil	0.272	0.847	0.482	0.673	0.347
			Mine soil	0.335	0.828	0.582	0.494	0.457
	12	S2	Garden soil	0.272	1.604	0.480	0.607	0.583
			Mine soil	0.427	1.511	0.290	0.420	0.574
		S4	Garden soil	0.216	0.935	0.377	0.526	0.691
			Mine soil	0.283	1.578	0.419	0.543	0.437
		TH	Garden soil	0.304	1.230	0.424	0.713	0.630
			Mine soil	0.265	0.987	0.375	0.521	0.599
		BL	Garden soil	0.213	0.931	0.333	0.618	0.524
			Mine soil	0.300	0.972	0.403	0.329	0.343
BF_{shoot}	6	S2	Garden soil	0.236	0.935	0.087	0.158	0.185
			Mine soil	0.025	1.273	0.078	0.035	0.240
		S4	Garden soil	0.266	1.746	0.081	0.212	0.129
			Mine soil	0.025	1.645	0.085	0.035	0.156
		TH	Garden soil	0.248	1.167	0.080	0.207	0.180
			Mine soil	0.028	1.013	0.096	0.039	0.249
		BL	Garden soil	0.315	1.399	0.088	0.162	0.132
			Mine soil	0.029	1.253	0.091	0.031	0.184
	12	S2	Garden soil	0.350	1.815	0.152	0.451	0.312
			Mine soil	0.067	3.437	0.140	0.070	0.432
		S4	Garden soil	0.373	2.245	0.138	0.403	0.269
			Mine soil	0.054	4.441	0.154	0.070	0.280
		TH	Garden soil	0.409	1.910	0.147	0.461	0.260
			Mine soil	0.048	2.734	0.174	0.078	0.448
		BL	Garden soil	0.446	2.697	0.134	0.413	0.252
			Mine soil	0.062	3.383	0.165	0.062	0.332
BF_{root}	6	S2	Garden soil	0.545	0.726	0.223	0.374	0.264
			Mine soil	0.078	0.989	0.186	0.067	0.314
		S4	Garden soil	0.743	1.276	0.168	0.282	0.271
			Mine soil	0.084	1.223	0.141	0.052	0.341
		TH	Garden soil	0.662	0.861	0.184	0.438	0.287
			Mine soil	0.086	1.204	0.178	0.060	0.312
		BL	Garden soil	1.160	1.652	0.181	0.241	0.379
			Mine soil	0.087	1.513	0.157	0.062	0.403
	12	S2	Garden soil	1.286	1.132	0.316	0.742	0.535
			Mine soil	0.157	2.274	0.484	0.166	0.754
		S4	Garden soil	1.728	2.401	0.365	0.767	0.389
			Mine soil	0.193	2.814	0.367	0.129	0.642
		TH	Garden soil	1.347	1.553	0.347	0.646	0.412
			Mine soil	0.181	2.769	0.463	0.150	0.748
		BL	Garden soil	2.092	2.897	0.402	0.668	0.481
			Mine soil	0.208	3.479	0.408	0.187	0.968

The ability of translocation of metals from root to shoot was assessed using TF expressed as the ratio of [Metal]shoot/ [Metal]root (Maiti and Nandhini, 2006). In most of the genotypes the TF values of the metals Fe, Zn, Cu, Mn and Cr were lower than 1.

Source: https://www.sciencedirect.com/science/article/abs/pii/S0925857418303896

Table 1: Iron nutrition and drought stress tolerance.

Mode of Fe application	Plant species	Plant attributes	References
Foliar application of Iron	Soybean	Improvements in yield	Kobraee et al., 2011; Afshar et al., 2013
Foliar application of Iron	Wheat crop	Increases in 1,000 seed weight	Arif et al., 2006; Afshar et al., 2013
Foliar application of Iron with Zinc	Cumin	Diminishes oxidative stress by reducing H_2O_2 content and lessening lipid peroxidation	Akbari et al., 2013
Iron with zinc Spray	Calendula officinalis	Improves the leaf characters (weight, area and numbers) resulting into enhancement in the effects triggered by drought stress	Pirzad and Shokrani, 2012
Iron application with sulfur	Sesame	Improves growth, nutrient, yield, and their components	Mostafa et al., 2011
Nano-iron application	Cowpea	Improvement of protein quality being advantageous in increasing resistance to drought stress	Parhamfar, 2006; Afshar et al., 2012
Fe spraying	Creeping Bentgrass	Modifies drought resistance through its effects on root growth	Snyder and Schmidt, 1974; Glinski et al., 1992
Iron application	Turf grasses	Leads to color enrichment and growth improvement in Fe-deficient conditions	Deal and Engel, 1965; Minner and Butler,1984; Glinski et al., 1992
Iron application	Turf grass	Gives darker green color for cool-season in Fe-sufficient condition	Snyder and Schmidt, 1974; Carrow et al.,1988; Schmidt and Snyder, 1984; Yust et al.,1984; Wehner and Haley, 1990; Glinski et al.,1992
Iron application	Legumes	Positive responses to iron nutrition	Slatni et al., 2008; Rotaru, 2011
Application of Iron with Zinc	Rapeseed (Brassica napus)	Influence on prolin, protein and nitrogen related metabolism of leaf	Pourgholam et al., 2013
Iron Foliar Fertilization	Sunflower	Improves yield of oil and growth and development of seeds	Elanz et al., 2011

Table 2: Iron-mediated up-regulation of antioxidative enzymes (SOD, APX, and CAT) and heavy-metal stress tolerance.

Metals against which iron used	**Antioxidant defense machinery and iron assimilatory enzymes and iron plaque**	**Plant species**	**Responses**	**References**
Cd	Iron plaque	Rice	Promotes enhancement in iron uptake by plant; reduces the damaging effect of Cd; helps in their ultimate sequestration on the root surface	Liu et al., 2007, 2008
		Rice	Fe-plaque formation altered significantly the accumulation of Se in the aerial part of the plant	Xin-Bin and Wei-Ming, 2007
		Rice	Formation of plaque increases the sequestration of Pb on root surface; thereby prevents their uptake and accumulation of Se inside the plant	Liu et al., 2011
	Iron fertilizer ($EDTA·Na_2Fe$) and $FeSO_4$	Rice	Soil/foliar application of Fe fertilizer ($EDTA·Na_2Fe$) and $FeSO_4$ reduces the adverse effect of Cd on rice root, shoot and rice grains	Shao et al., 2008
	Fe-nutrition	Rice	Cd uptake and accumulation inside the plant could be reduced by modifying the iron status of soil	Shao et al., 2007
As	Fe plaque	Rice	Fe-plaque increases As (III and IV) adsorption and its translocation to shoot; decreases the effect of root anatomy characteristic, on As uptake inside the root	Deng et al., 2010
		Spirodela polyrhiza L.	Arsenate uptake occurred through the phosphate uptake pathways in S. polyrhiza by physico-chemical adsorption on Fe-plaques of plant surface as well	Rahmana et al., 2008
P	Fe plaque	*Pilea cadierei*	Such plant in wetland condition removes the phosphorus from Fe-rich soil, hence suitable for construction of artificial wetland	Yang et al., 2011

Source: https://www.frontiersin.org/articles/10.3389/fenvs.2017.00086/full

Role of Iron in Alleviating Heavy Metal Stress (2017)

Table 1: Role of Fe in alleviating heavy metals stress in different plants.

Fe dosage	HM conc.	Plant species	Effect	References
Fe + EDTA at 5, 10, 20 ppm	Cd at 0, 50, 100 μM	Rice *(Oryza sativa L.)*	Improve plant growth, leaf area, and leaf water content; reduce Cd toxic effects, decrease proline, MDA xontent, antioxidant enzyme activities	Ali et al. (2014)
Fe at 2.77, 5.54, and 8.31 μM	Cd and Pb at 10 μM	*Typha latifolia*	Decrease Cd and Pb uptake and translocation in plant shoots and roots, absorb Pb on roots at maximum Fe	Rodriguez-Hernandez Et al. (2015)
Fe at 1.89 and 16.8 mg L^{-1}	Cd at 5 μM	Rice *(Oryza sativa L.)*	Increased MDA content, improve plant growth and SPAD value, enhanced antioxidant enzyme activities	Shao et al. (2007)
Fe at 0.54–2.6 mg kg^{-1}	Pb at 45–199 mg kg^{-1} Cd at 1.1–3.5 mg kg^{-1}	Rice plant tissues	Promote metal deposition on root surfaces, limit Pb and Cd translocation, and distribution in plant tissues	Cheng et al. (2014)
Fe at 10, 30,50, 80, and 100 mg L^{-1}	Cd at 0.1 and 1 mg L^{-1}	Rice *(Oryza sativa L.)*	Decrease Cd supply in shoots and roots, inhibit Cd uptake and translocation within rice plant, decrease radioactivity of 109Cd in shoots of seedlings	Liu et al. (2007)
Fe at 10 and 250 μM	Cd at 25 μM	Barley	Enhance antioxidant enzyme activities, improve plant growth and biochemical parameters, reduce Cd toxic effects	Sharma et al. (2004)
Fe at 40 μM	Cd as $Cdcl_2$	Indian mustard	Reduce oxidative stress and metal toxicity, stabilize thylakoid complex, retention of chloroplast and chlorophyll contents	Qureshi et al. (2010)

Source:
https://www.researchgate.net/publication/318837852_Role_of_Iron_in_Alleviating_Heavy_Metal_Stress

Responses of rice to chronic and acute iron toxicity: genotypic differences and biofortification aspects (2016)

Table 1: Statistical analysis of the effects of chronic and acute Fe toxicity on visible symptom formation and growth parameters of six different rice genotypes on eight measuring days.

Variable	DAT	ANOVA results (Pr > F)			LS means (Treatment)		
		Treatment	**Genotype**	**Interaction**	**Control**	**Acute**	**Chronic**
Leaf bronzing score	28	0.4999	<0.0001	0.0481	n.d.	2.5	1.3
	35	0.1861	<0.0001	0.3260	n.d.	3.0	1.2
	42	0.5102	<0.0001	0.3090	n.d.	0.5	0.7
	49	0.0006	<0.0001	0.0508	n.d.	0.3b	0.6a
	56	0.0004	<0.0001	0.0023	n.d.	0.2b	0.5a
	63	0.0368	<0.0001	0.0028	n.d.	0.2b	0.3a
	70	<0.0001	0.0588	0.2020	n.d.	0.1b	0.6a
	77	<0.0001	0.0869	0.1905	n.d.	0.0b	0.6a
Plant height (cm)	28	0.1708	<0.0001	0.0193	52.6	49.6	50.8
	35	0.0684	<0.0001	0.0216	64.6	60.4	62.0
	42	0.0066	<0.0001	0.0316	73.6a	68.6b	72.3ab
	49	0.0088	<0.0001	0.0881	82.5a	77.0b	81.7a
	56	0.0109	<0.0001	0.1035	97.3ab	93.1b	100.2a
	63	0.0258	<0.0001	0.2828	103.7ab	100.8b	107.2a
	70	0.0434	<0.0001	0.1187	107.5ab	104.9b	111.0a
	77	0.0390	<0.0001	0.1530	112.9ab	108.9b	115.9a
Tiller number	28	0.3391	<0.0001	0.2006	2.0	1.6	1.5
	35	0.0584	<0.0001	0.4206	4.0	3.1	3.2
	42	0.3226	<0.0001	0.3487	5.3	4.7	4.3
	49	0.1750	<0.0001	0.5816	8.2	7.0	6.7
	56	0.5095	<0.0001	0.5376	10.9	9.4	9.8
	63	0.7687	<0.0001	0.4203	11.8	11.0	11.3
	70	0.7640	<0.0001	0.3720	11.7	10.9	11.6
	77	0.6730	<0.0001	0.5650	11.6	10.8	11.3

LS means = least square means; DAT = days after transplanting. LS mean values not sharing the same superscript letter within one line differ significantly from each other at $P < 0.05$. n.d. = not determined

Table 2: Statistical analysis of the effects of acute and chronic Fe toxicity on yields and yield components of six different rice genotypes.

Variable	ANOVA results (Pr > F)			LS means (Treatment)		
	Treatment	Genotype	Interaction	Control	Acute	Chronic
Grain yield (t ha^{-1})	0.0001	<0.0001	0.2068	4.9[a]	4.8[a]	4.0[b]
Straw yield (t ha^{-1})	0.0684	<0.0001	0.3513	7.5	8.0	7.3
Harvest index	0.0019	<0.0001	0.1876	0.40[a]	0.38[a]	0.36[b]
Panicles (number m^{-2})	0.2641	<0.0001	0.4191	198	207	199
Grains per panicle	<0.0001	<0.0001	0.6232	156[a]	159[a]	145[b]
Spikelet sterility (%)	0.0148	<0.0001	0.0400	23[a]	27[ab]	30[b]
Thousand kernel weight (g)	0.0496	>0.0001	0.3029	20.6[a]	20.5[ab]	20.0[b]
Grain Fe concentration (mg kg^{-1})	0.4037	<0.0001	0.0004	30	34	33
Grain Zn concentration (mg kg^{-1})	0.3151	<0.0001	0.6365	21		

LS means = least square means; LS mean values not sharing the same superscript letter within one line differ significantly from each other at $P < 0.05$

Source: https://link.springer.com/article/10.1007/s11104-016-2918-x