

Supplementary Table 1 Initial soil properties of the experimental field

Parameter	Values
pH (1:2.5)	7.82
EC (1:2.5) (dS/m)	0.40
Organic C (%)	0.39
CEC [cmol (p+)/kg]	11.7
Available N (kg/ha)	194
Available P (kg/ha)	21.3
Available K (kg/ha)	291
Available Zn (mg/kg)	1.25
Available Cu (mg/kg)	1.10
Available Fe (mg/kg)	4.13
Available Mn (mg/kg)	5.50

Supplementary Table 2 Effect of nitrogen fertilizer treatments on chlorophyll content (mg/g of leaf) of maize and wheat crop

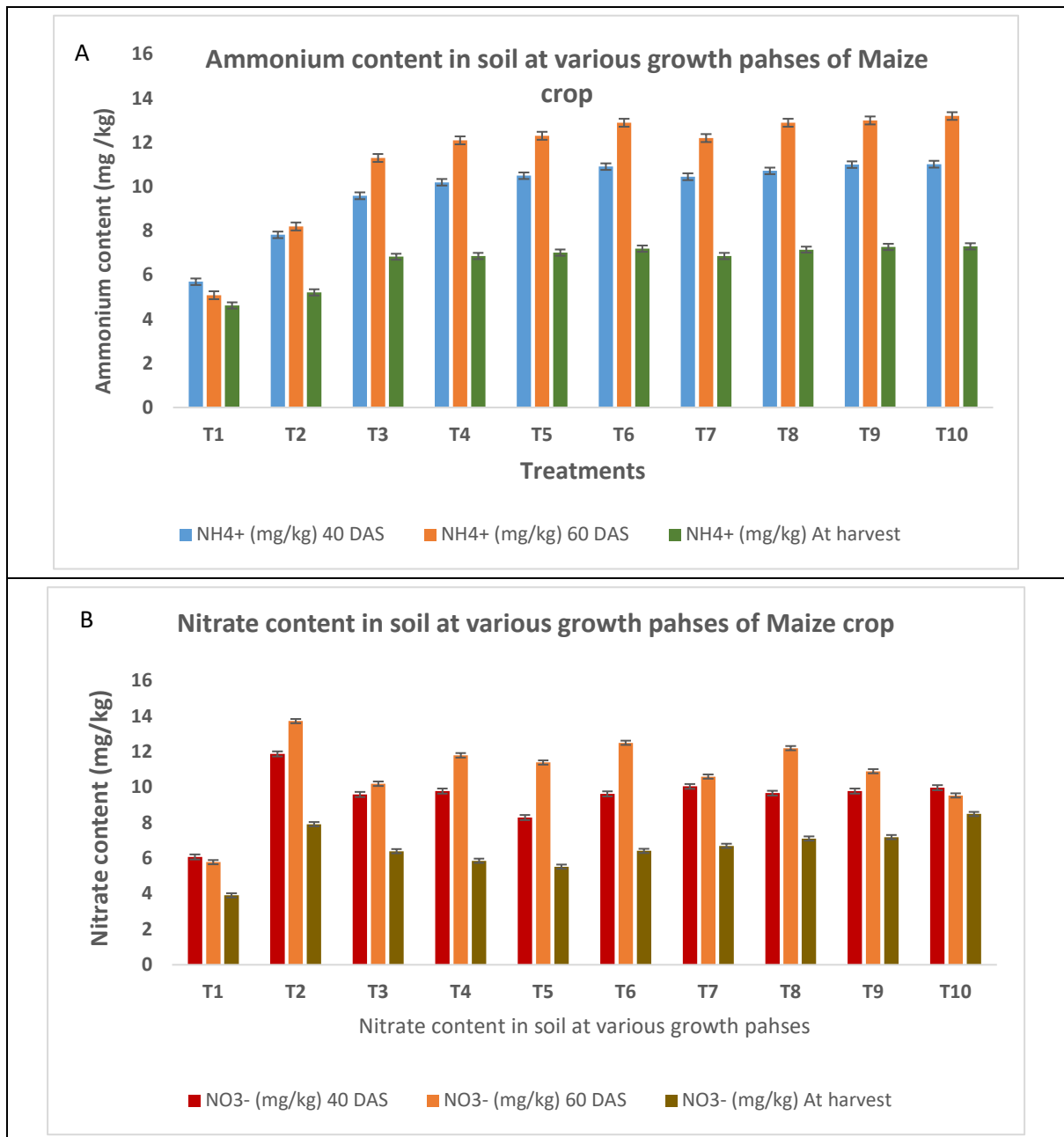
Treatment	Maize						Wheat					
	40 days after sowing			60 days after sowing			40 days after sowing			60 days after sowing		
	Chl a	Chl b	Total Chlorophyll	Chl a	Chl b	Total Chlorophyll	Chl a	Chl b	Total Chlorophyll	Chl a	Chl b	Total Chlorophyll
T ₁	1.66	0.44	2.10	1.16	0.22	1.38	1.12	0.21	1.33	0.93	0.30	1.23
T ₂	1.96	0.60	2.56	1.35	0.31	1.66	1.57	0.30	1.87	1.31	0.41	1.72
T ₃	2.11	0.67	2.78	1.64	0.31	1.95	1.58	0.30	1.88	1.32	0.42	1.74
T ₄	2.12	0.68	2.80	1.65	0.33	1.98	1.58	0.32	1.90	1.32	0.42	1.74
T ₅	2.17	0.70	2.87	1.65	0.36	2.01	1.65	0.35	2.00	1.38	0.51	1.89
T ₆	2.20	0.72	2.92	1.73	0.54	2.27	1.68	0.56	2.24	1.40	0.54	1.94
T ₇	2.15	0.70	2.85	1.65	0.35	2.00	1.59	0.34	1.93	1.32	0.51	1.83
T ₈	2.20	0.72	2.92	1.72	0.50	2.22	1.68	0.48	2.16	1.40	0.52	1.92
T ₉	2.23	0.75	2.98	1.74	0.58	2.32	1.76	0.58	2.34	1.47	0.60	2.07
T ₁₀	2.26	0.76	3.02	1.77	0.60	2.37	1.80	0.62	2.42	1.50	0.65	2.15
SEm±	0.02	0.01	0.03	0.02	0.01	0.03	0.02	0.01	0.02	0.02	0.01	0.03
LSD (P=0.05)	0.06	0.03	0.09	0.07	0.02	0.10	0.06	0.02	0.07	0.06	0.02	0.08

Treatment details can be obtained in Material and Methods section. LSD test (P=0.05) was performed for isolation of mean

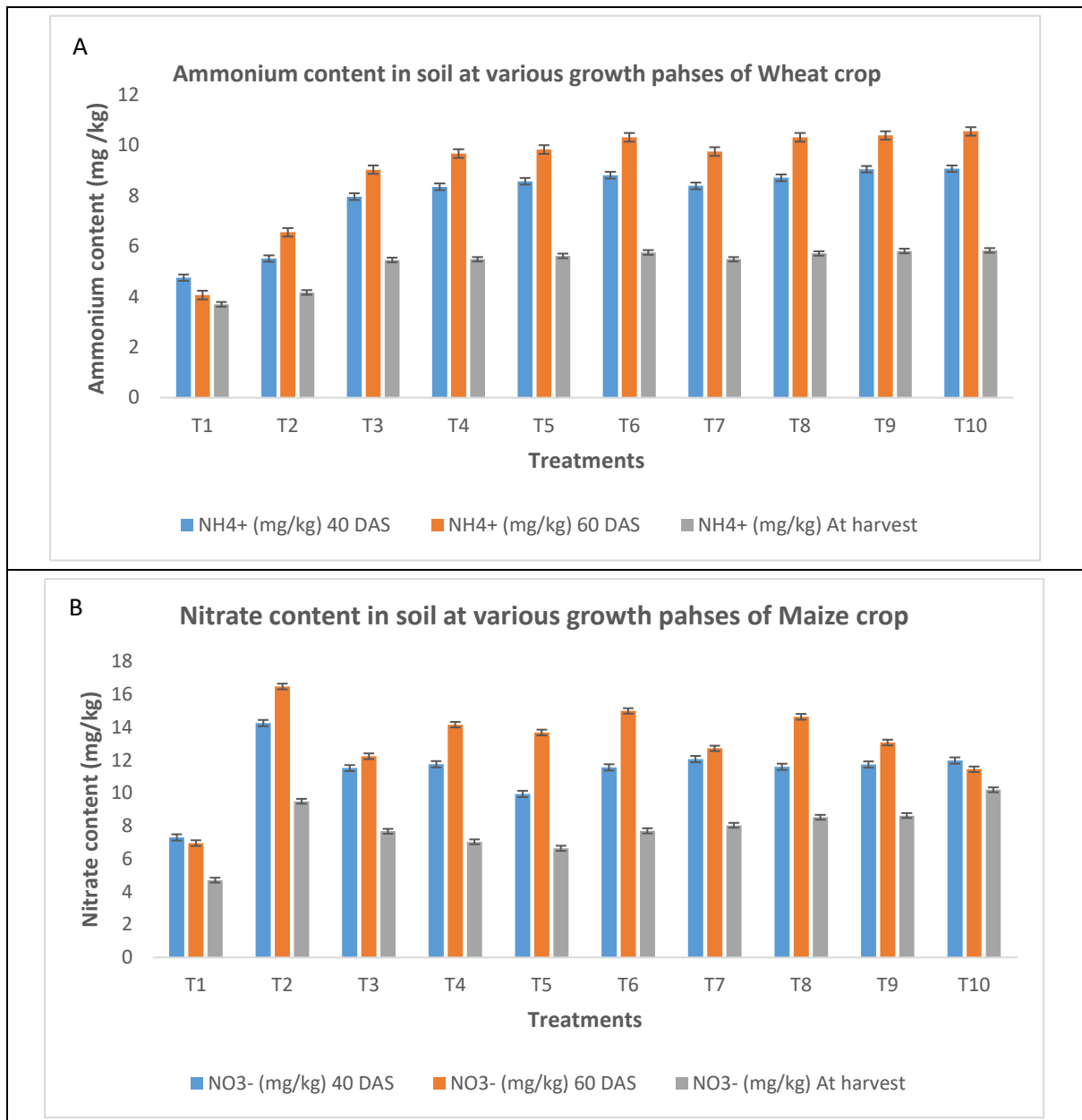
Supplementary Table 3 Effect of nitrogen fertilizer treatments on growth and yield attributes of maize and wheat crop

Treatments	Maize			Wheat		
	Plant height (cm)	Root volume (cm ³)	Root surface area (cm ²)	Plant height (cm)	Root volume (cm ³)	Root surface area (cm ²)
T ₁	174	8.87	278	87	8.25	239
T ₂	198	11.61	370	99	12.93	333
T ₃	200	12.17	4001	100	13.00	389
T ₄	201	12.39	423	101	13.47	405
T ₅	206	13.97	541	103	14.68	450
T ₆	208	15.34	557	104	15.01	463
T ₇	202	13.40	534	103	14.36	409
T ₈	207	14.87	553	103.	14.68	451
T ₉	210	16.57	609	105	15.28	508
T ₁₀	212	16.60	621	106	16.53	518
SEm±	2.81	0.19	6.12	1.44	0.18	5.64
LSD (P=0.05)	8.34	0.57	18.19	4.28	0.53	16.76

Treatment details can be obtained in Material and Methods section. LSD test (P=0.05) was performed for isolation of mean



Supplementary Fig. 1 Effect of different nitrogen fertilizer treatments on ammoniacal and nitrate N content of soil at different growth stages of maize crop.



Supplementary Fig 2. Effect of different nitrogen fertilizer treatments on ammonium and nitrate N content of soil at different growth stages of wheat crop.