

Supplementary

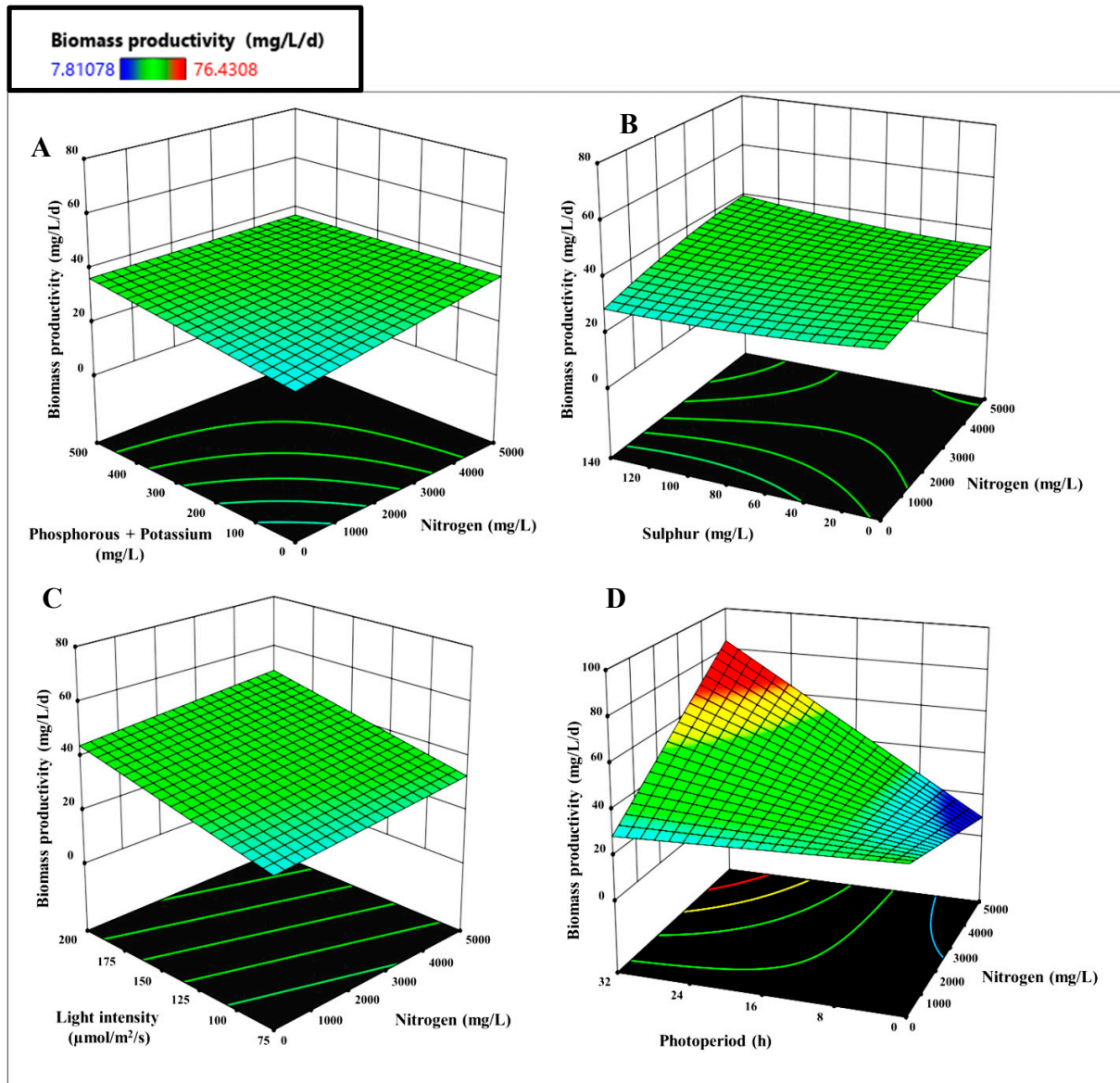
Table S1 Optimization of a combination of nutrients and light by RSM-CCD matrix for the analysis of chlorophyll *a* and *b*

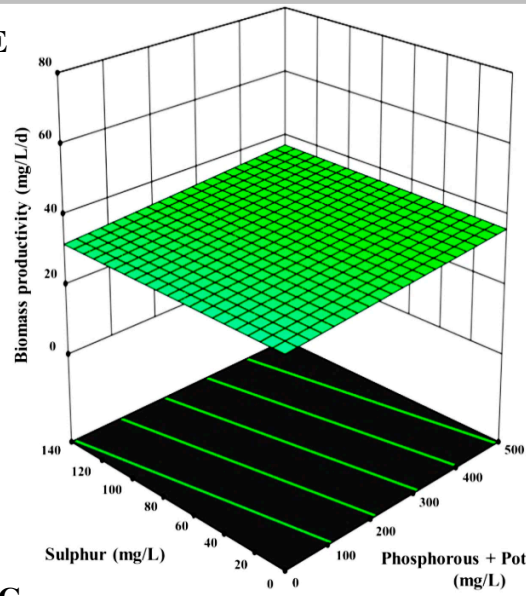
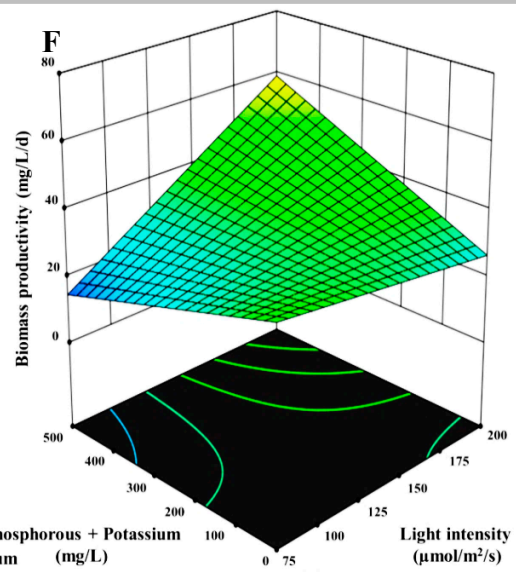
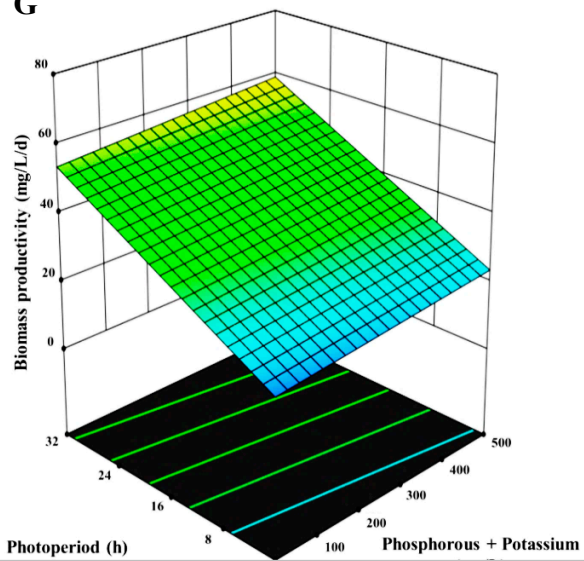
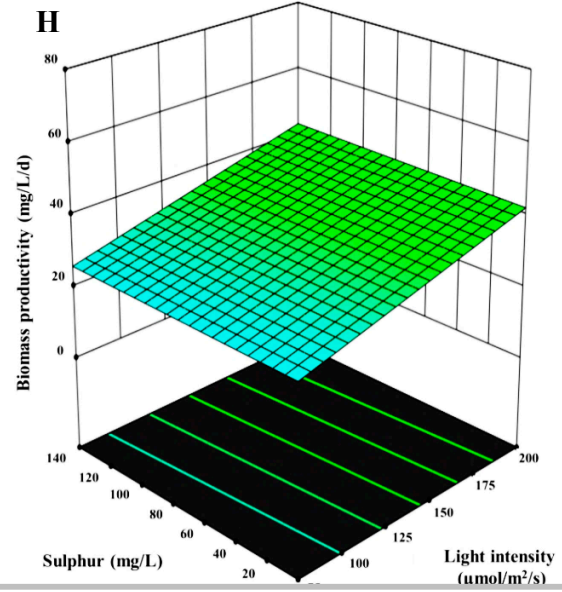
Run	Factor		Factor		Factor E : PP (h)	Chlorophyll <i>a</i>		Chlorophyll <i>b</i>	
	Factor	B:	Factor	D : LI		productivity		productivity	
	A:N	P+K	C: S	($\mu\text{molm}^{-2}\text{s}^{-1}$)					
	(mg/L)	(mg/L)	(mg/L)			Actual	Predicted	Actual	Predicted
						Value	Value	Value	Value
1	2500	250	70	137.5	12	9.76	11.19	6.11	3.71
2	2500	0	70	137.5	24	11.12	11.65	3.17	5.93
3	2500	500	70	137.5	24	12.47	13.35	7.16	5.26
4	2500	0	140	137.5	12	11.16	10.63	6.4	4.11
5	5000	250	70	137.5	0	3.01	3.82	2.78	3.44
6	5000	250	70	75	12	9	9.85	10.19	4.75
7	2500	250	140	75	12	9.55	11	4.34	3.21
8	5000	0	70	137.5	12	10.52	10.55	9.07	5.65
9	2500	250	0	200	12	13.97	13.23	6.9	4.22
10	2500	250	0	137.5	24	12.45	12.59	6.95	5.54
11	2500	250	140	137.5	24	12.96	11.44	3.99	5.65
12	0	250	70	137.5	24	12.6	11.92	1.47	3.99
13	2500	500	70	137.5	0	4.4	4.44	0.2385	1.5
14	0	0	70	137.5	12	10.3	12.26	1.48	2.45
15	2500	500	0	137.5	12	12.44	12.45	1.57	3.32
16	0	250	0	137.5	12	12.41	12.32	1.85	2.05

17	0	250	140	137.5	12	9.34	10.42	1.68	2.17
18	2500	0	70	75	12	13.6	12.86	1.49	3.49
19	2500	250	70	200	0	3.7	3.9	2.17	2.4
20	2500	250	70	200	24	12.35	12.83	6.89	6.16
21	2500	500	70	75	12	7.2	9.1	2.37	2.81
22	2500	250	70	75	24	11.74	10.7	5.59	5.03
23	2500	250	0	75	12	10.58	9.99	1.14	3.09
24	0	500	70	137.5	12	11.47	11.44	0.3587	1.78
25	5000	250	70	137.5	24	10.88	12.07	5.82	7.2
26	0	250	70	137.5	0	4.74	3.68	1.2	0.2308
27	2500	500	70	200	12	14.66	15.33	6.46	3.94
28	2500	250	70	137.5	12	12.59	11.19	3.59	3.71
29	2500	0	0	137.5	12	11.21	12.22	2.75	3.99
30	5000	500	70	137.5	12	15.41	13.45	5.98	4.98
31	2500	0	70	137.5	0	4.39	4.08	1.68	2.17
32	2500	250	70	137.5	12	11.23	11.19	4	3.71
33	2500	500	140	137.5	12	13.99	12.47	0.5249	3.43
34	2500	250	70	75	0	4.47	3.15	0.6074	1.27
35	2500	250	140	137.5	0	3.58	3.57	1.76	1.89
36	2500	250	0	137.5	0	2.32	3.98	0.5298	1.78
37	5000	250	140	137.5	12	11.92	11.68	4.92	5.37
38	0	250	70	75	12	11.61	11.09	4.77	1.55

39	2500	0	70	200	12	11.47	9.51	3.97	4.61
40	0	250	70	200	12	11.81	11.15	7.22	2.67
41	5000	250	70	200	12	11.96	12.68	4.29	5.88
42	2500	250	140	200	12	9.34	10.64	1.63	4.33
43	5000	250	0	137.5	12	12.76	11.35	2.64	5.26

Figures



E**F****G****H**

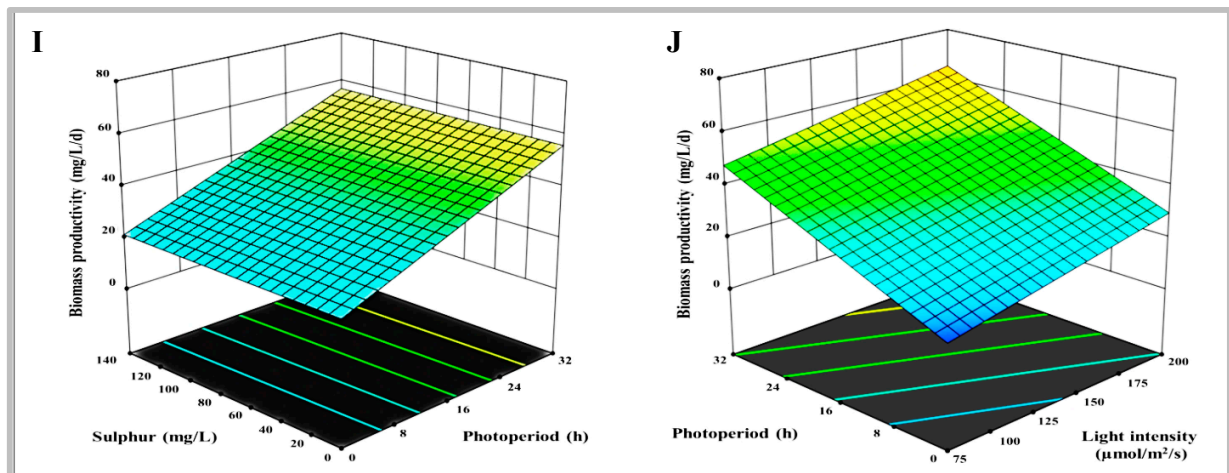
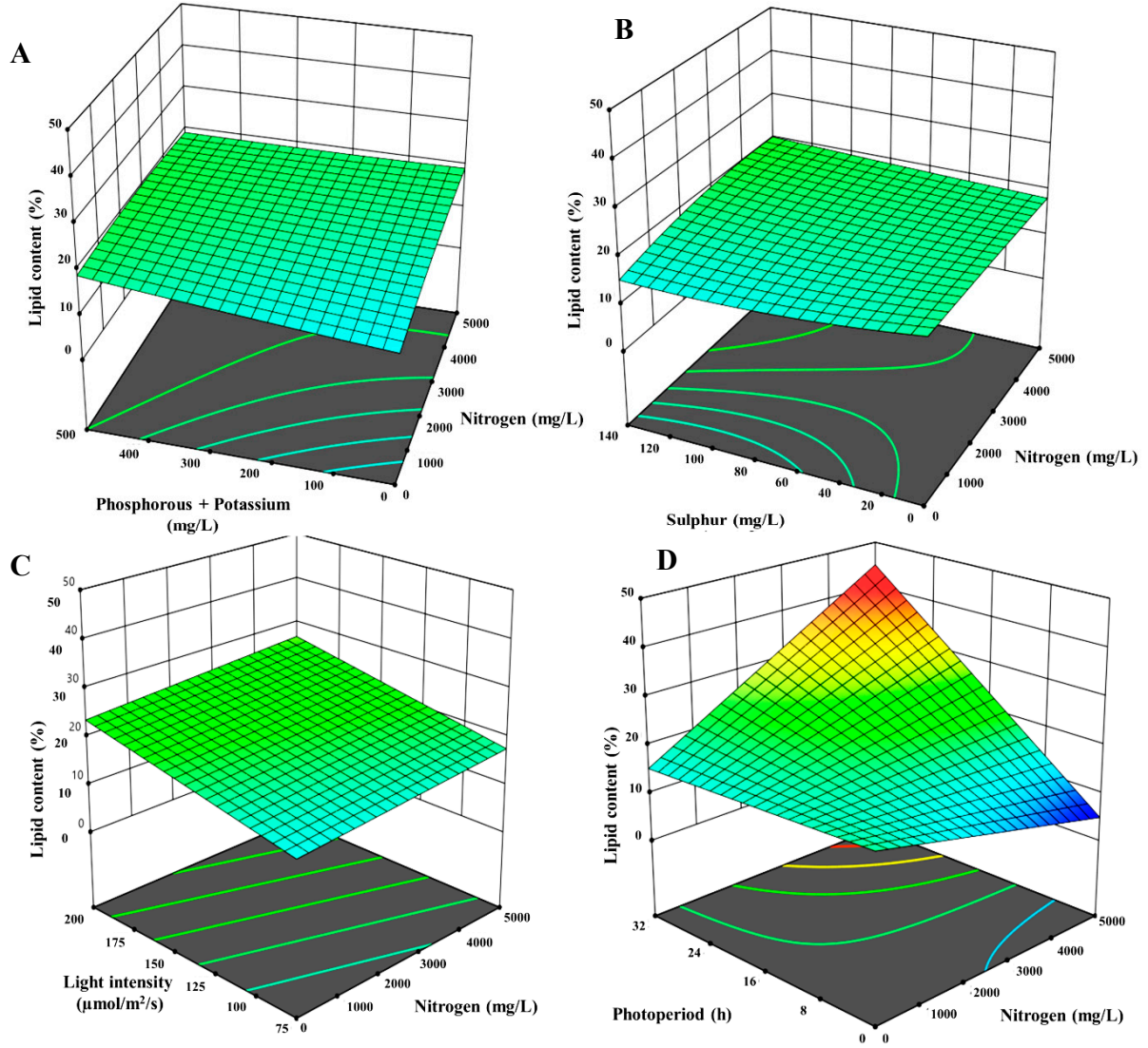
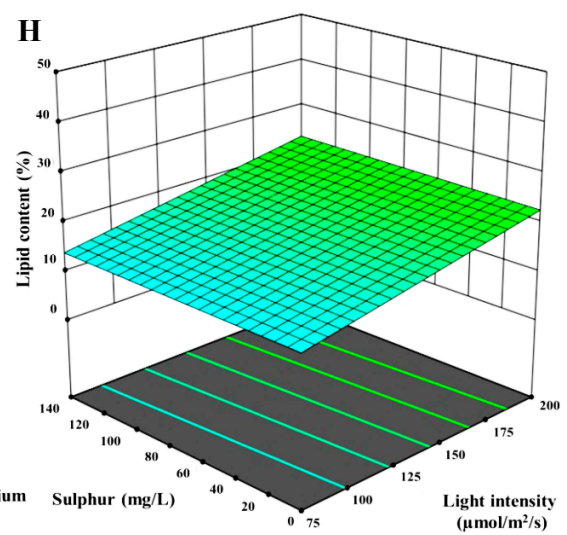
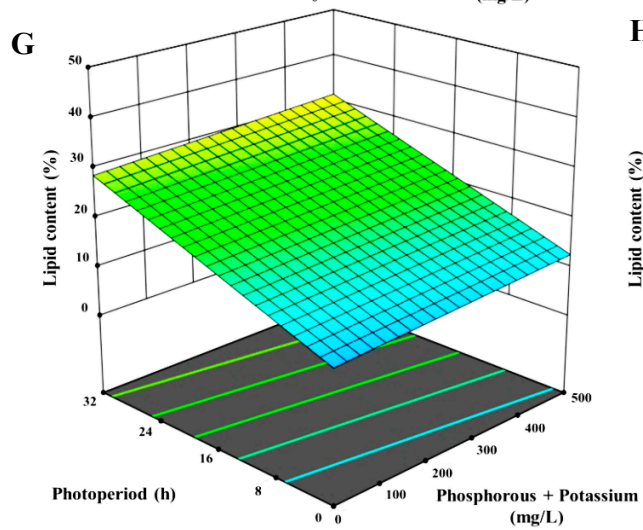
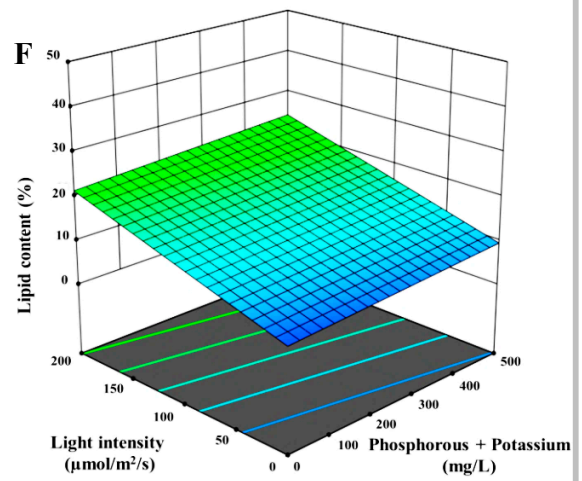
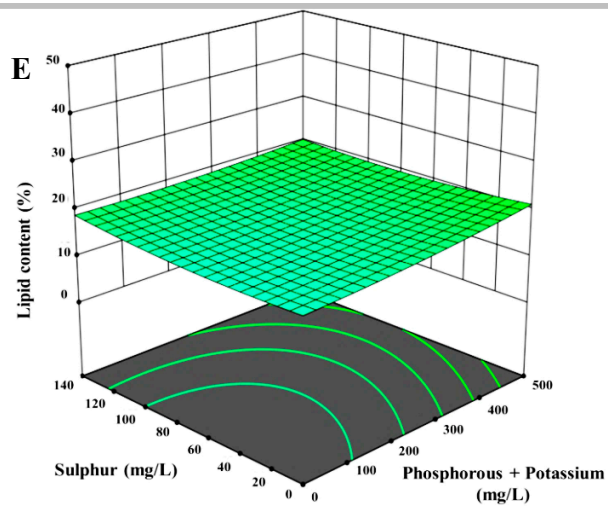


Figure S1. Response surface plot with contour lines for biomass productivity ($\text{mg L}^{-1}\text{d}^{-1}$) with varying abiotic stress variable a) Nitrogen with Phosphorous and potassium b) Nitrogen with Sulphur c) Nitrogen with Light Intensity d) Nitrogen with Photoperiod e) Phosphorous and potassium with Sulphur f) Phosphorous and potassium with Light Intensity g) Phosphorous and potassium with Photoperiod h) Sulphur with Light Intensity i) Sulphur with Photoperiod and j) Light Intensity with Photoperiod

Lipid Content (%)
4.17283  40.8324





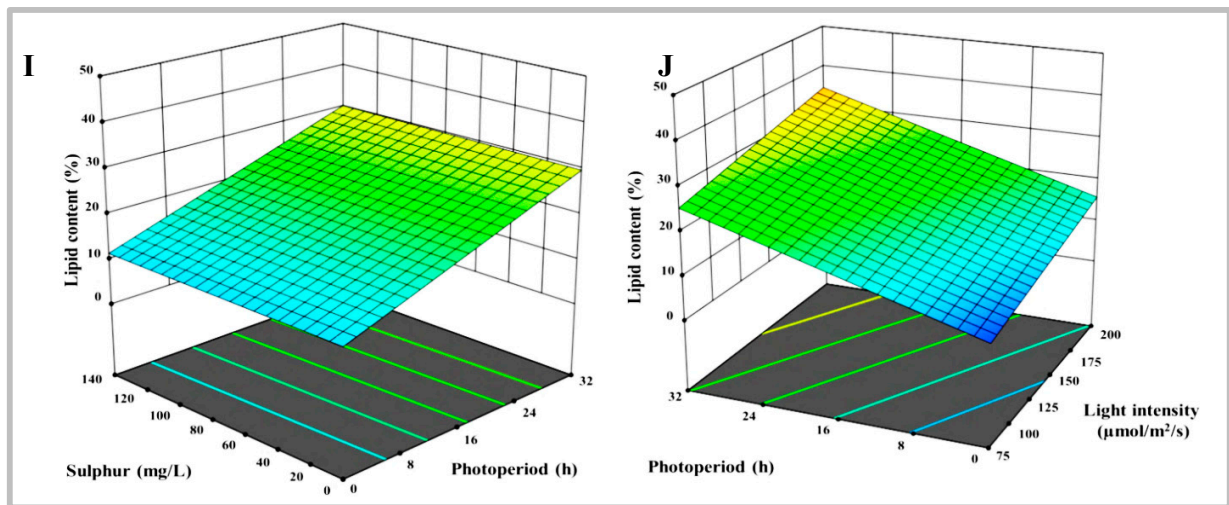
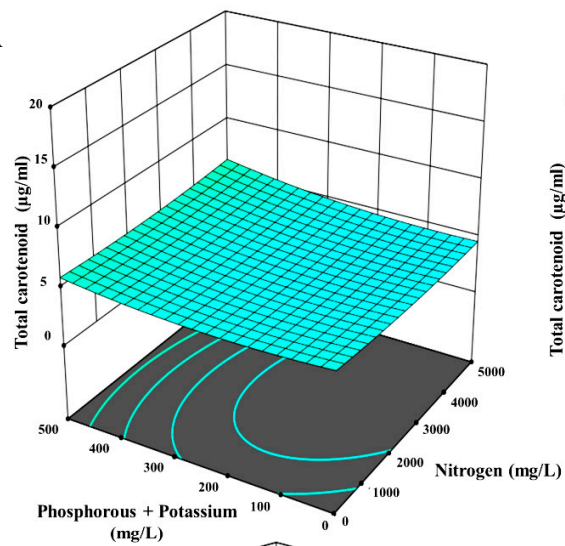


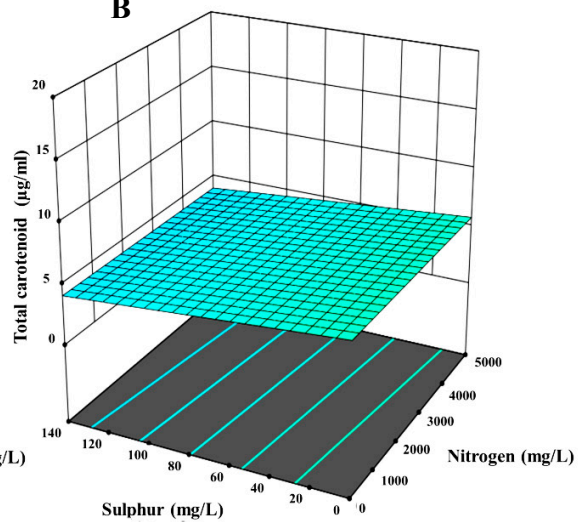
Figure S2. Response surface plot with contour lines for lipid content (%) with varying abiotic variable a) Nitrogen with Phosphorous and potassium b) Nitrogen with Sulphur c) Nitrogen with Light Intensity d) Nitrogen with Photoperiod e) Phosphorous and potassium with Sulphur f) Phosphorous and potassium with Light Intensity g) Phosphorous and potassium with Photoperiod h) Sulphur with Light Intensity i) Sulphur with Photoperiod and j) Light Intensity with Photoperiod

Total Carotenoid ($\mu\text{g/ml}$)
0.783635 16.2665

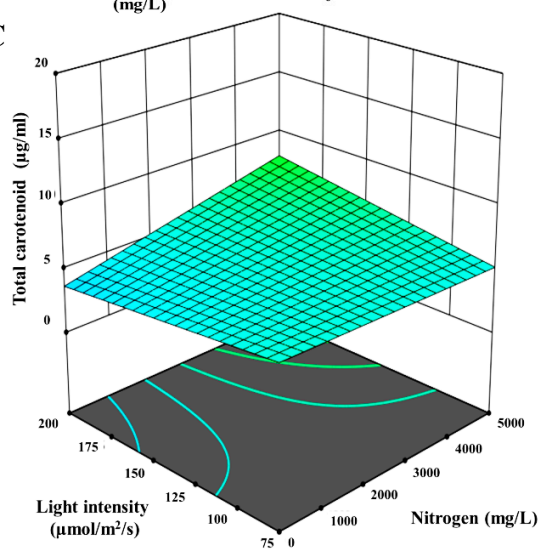
A



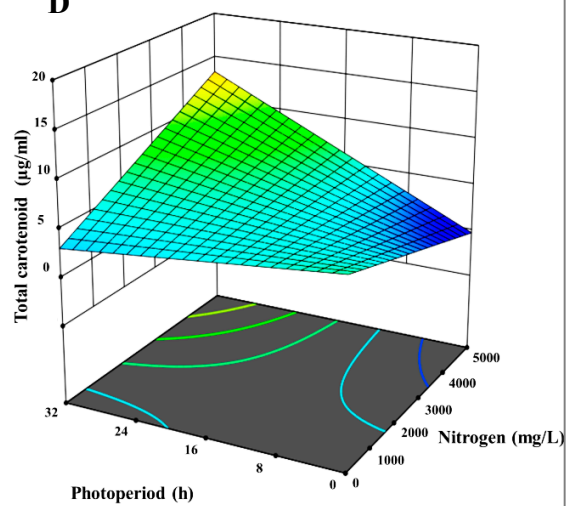
B



C



D



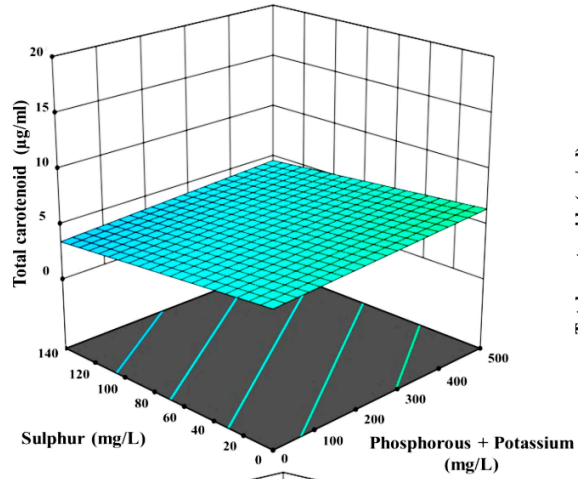
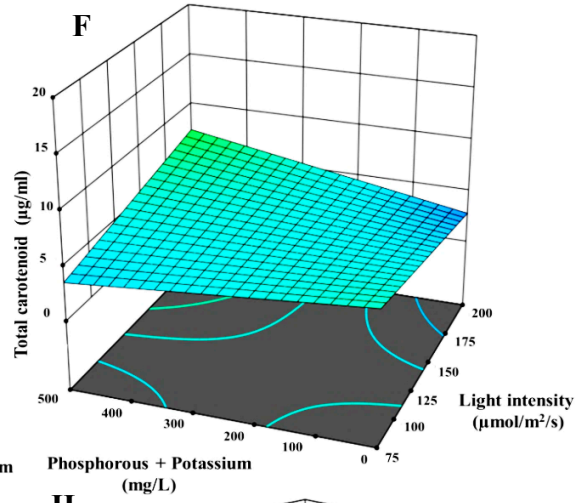
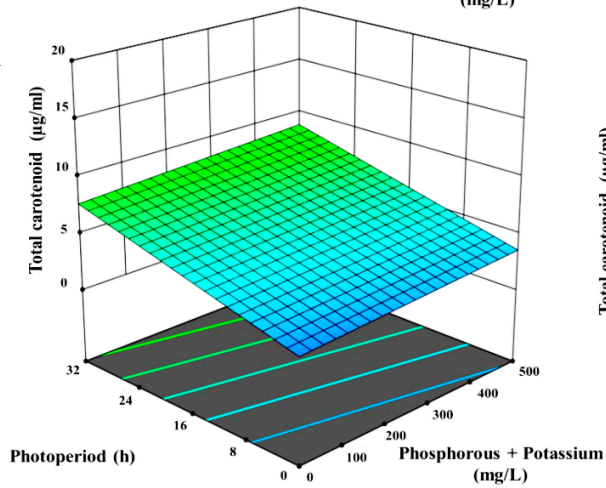
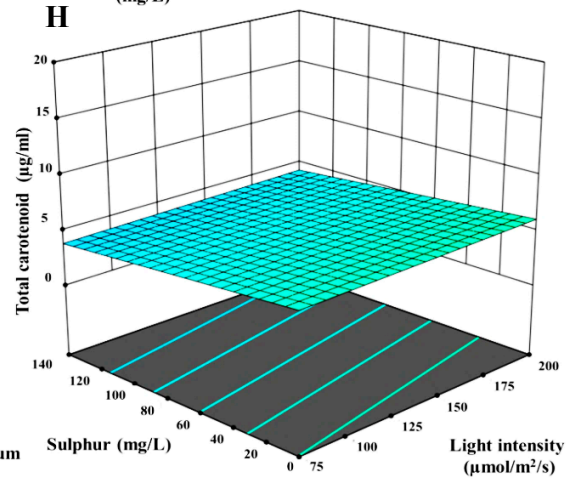
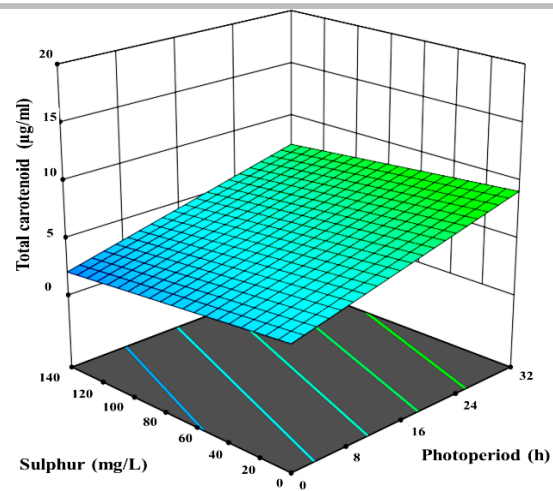
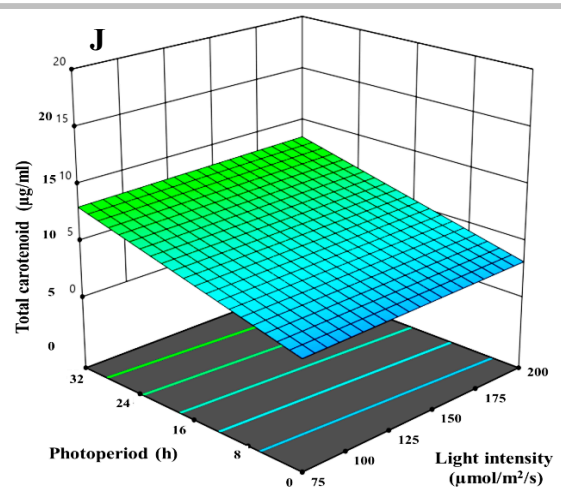
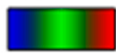
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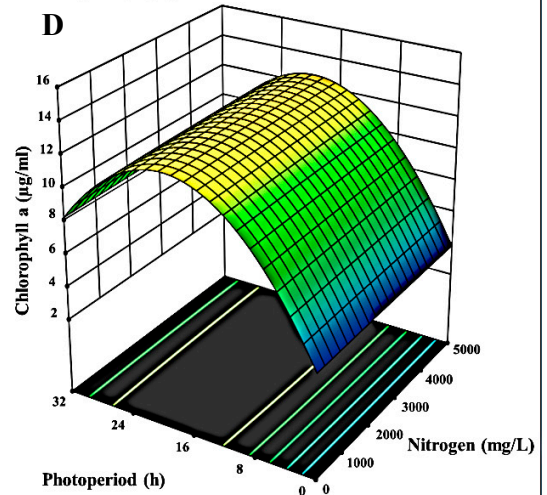
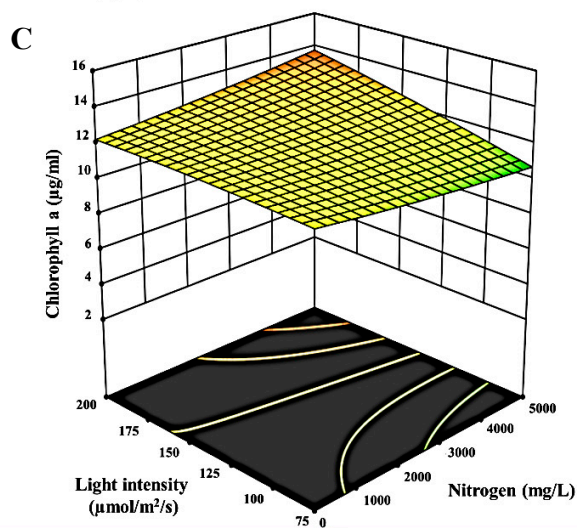
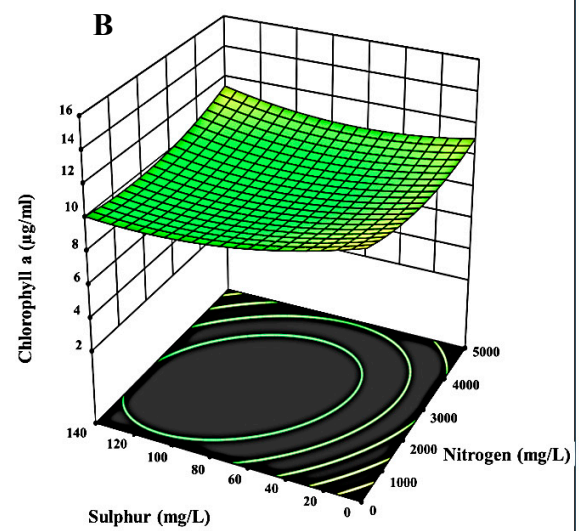
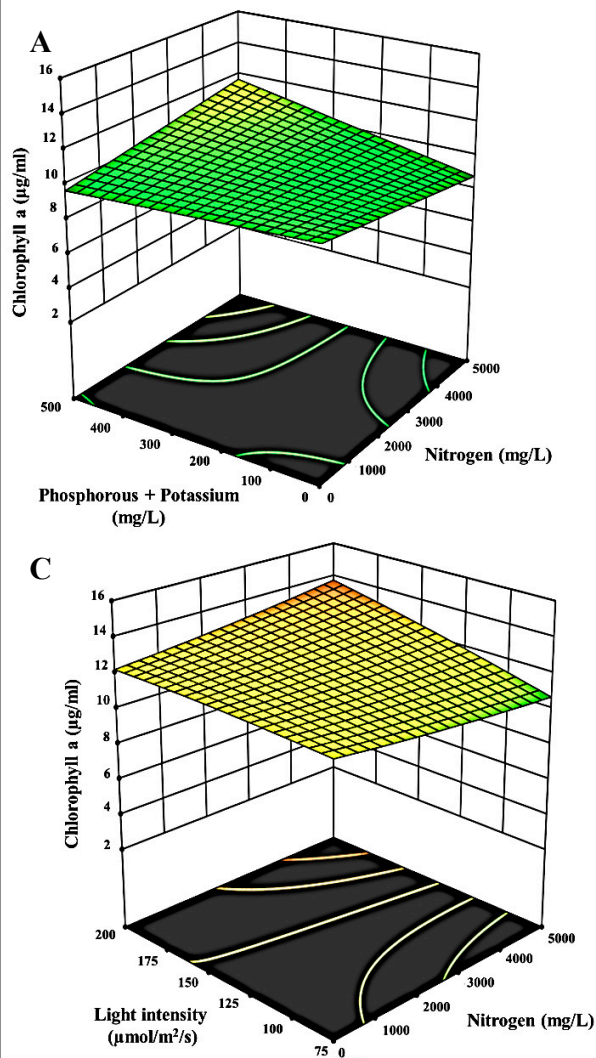
Figure S3. Response surface plot with contour lines for total carotenoid productivity ($\mu\text{g mL}^{-1}$) with varying abiotic stress variables a) Nitrogen with Phosphorous and potassium b) Nitrogen with Sulphur c) Nitrogen with Light Intensity d) Nitrogen with Photoperiod e) Phosphorous and potassium with Sulphur f) Phosphorous and potassium with Light Intensity g) Phosphorous and potassium with Photoperiod h) Sulphur with Light Intensity i) Sulphur with Photoperiod and j) Light Intensity with Photoperiod

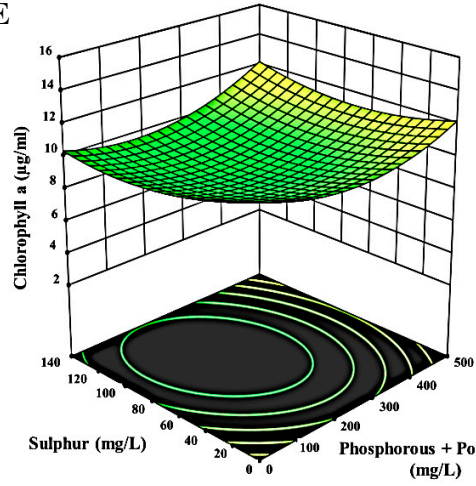
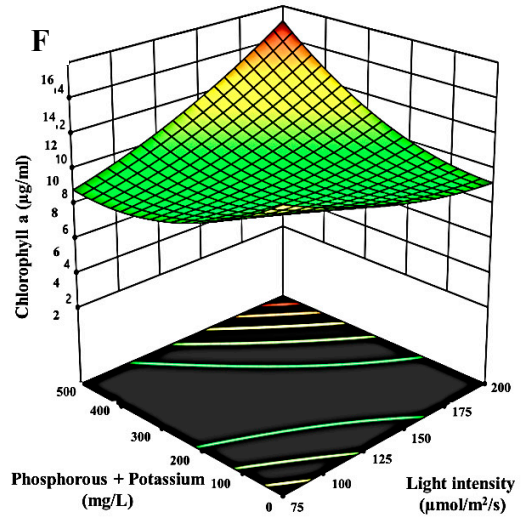
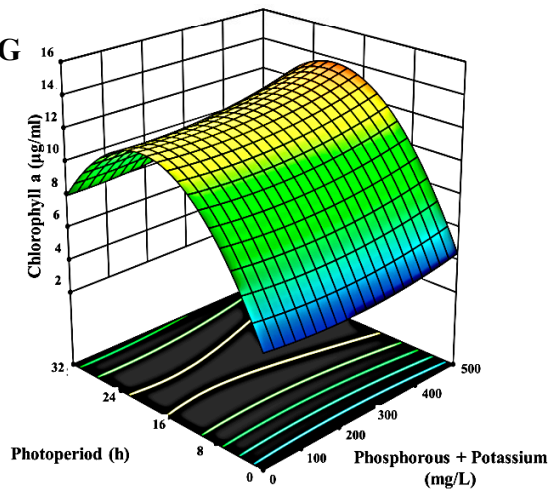
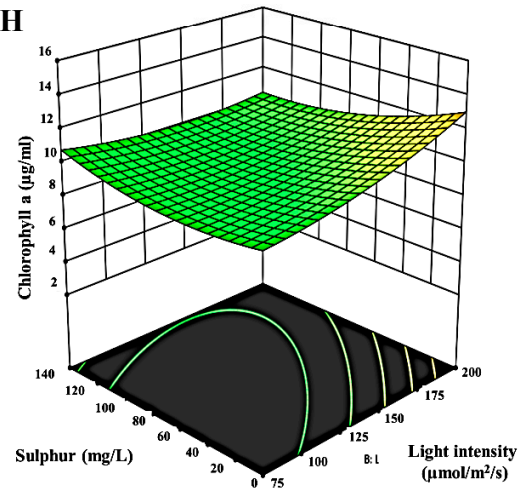
Chlorophyll a ($\mu\text{g/ml}$)

2.3236



15.4106



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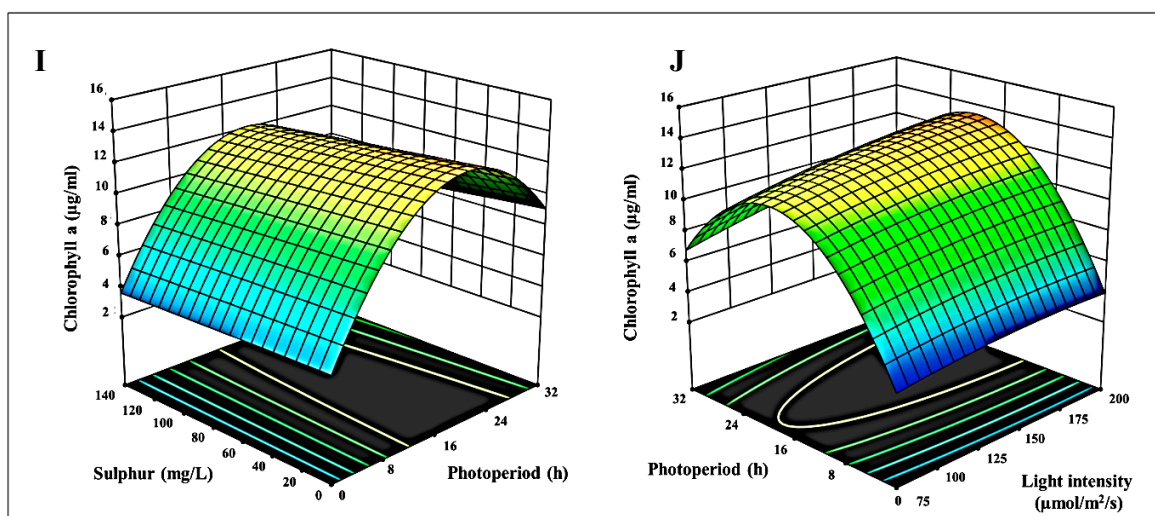
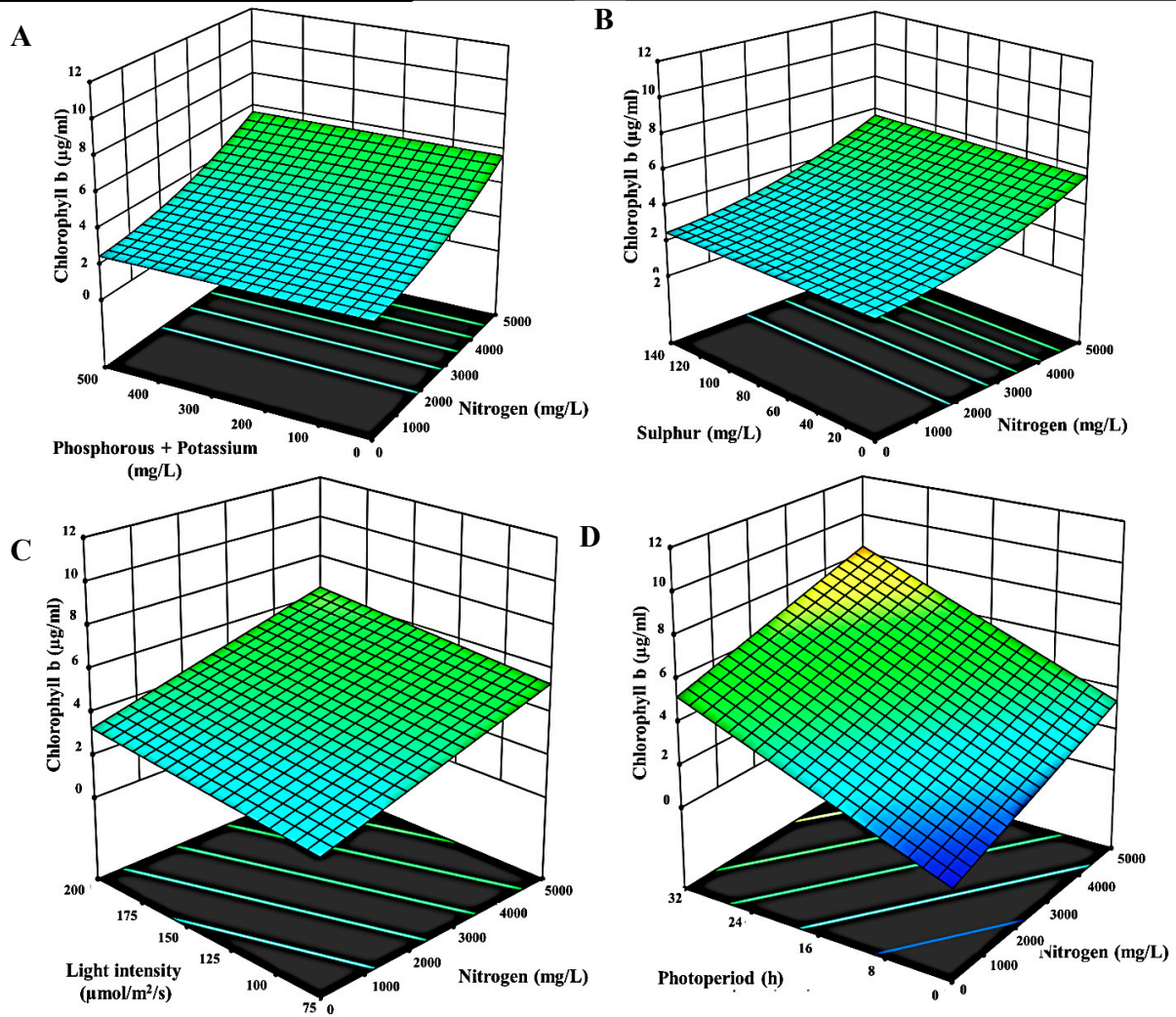
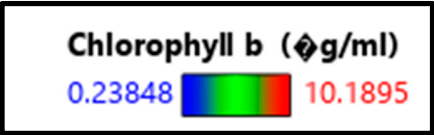
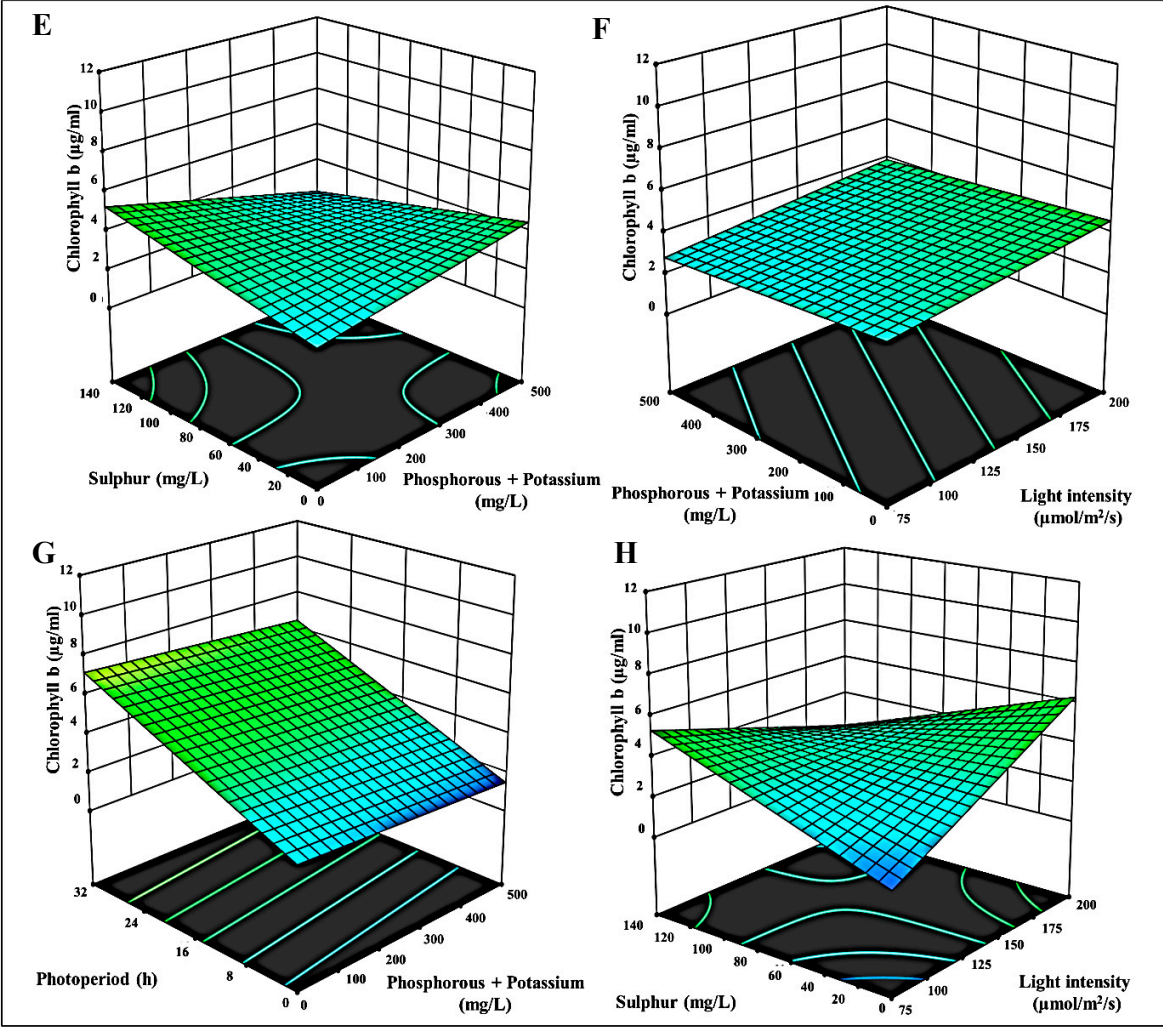


Figure S4. 3-D surface and contour plots representing the interaction between the selected parameters on Chlorophyll a yield ($\mu\text{g ml}^{-1}$), a) Nitrogen with Phosphorous and potassium b) Nitrogen with Sulphur c) Nitrogen with Light Intensity d) Nitrogen with Photoperiod e) Phosphorous and potassium with Sulphur f) Phosphorous and potassium with Light Intensity g) Phosphorous and potassium with Photoperiod h) Sulphur with Light Intensity i) Sulphur with Photoperiod and j) Light Intensity with Photoperiod





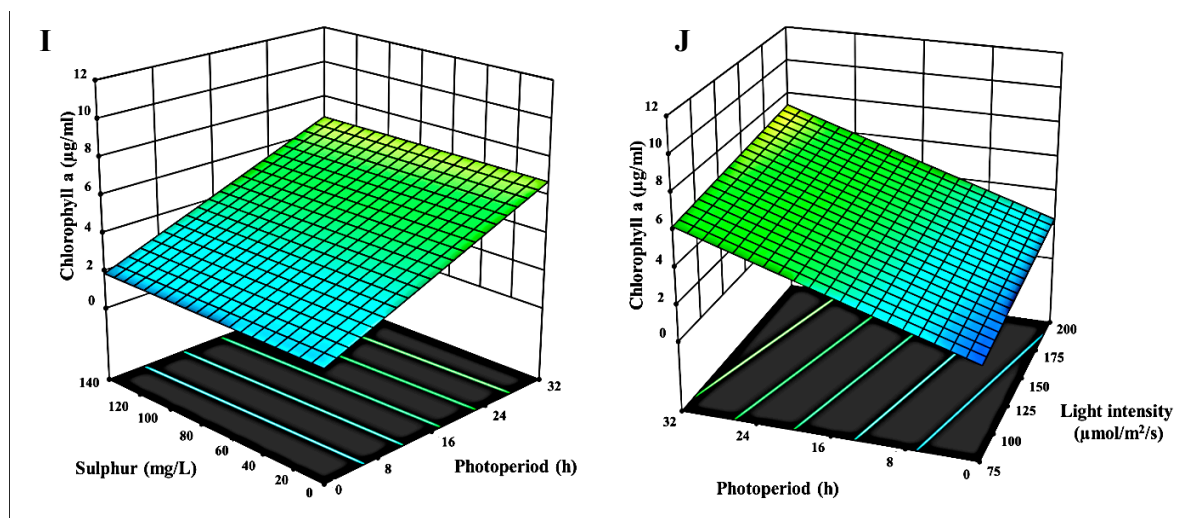


Figure S5. 3-D surface and contour plots representing the interaction between the selected parameters on Chlorophyll b yield ($\mu\text{g ml}^{-1}$), a) Nitrogen with Phosphorous and potassium b) Nitrogen with Sulphur c) Nitrogen with Light Intensity d) Nitrogen with Photoperiod e) Phosphorous and potassium with Sulphur f) Phosphorous and potassium with Light Intensity g) Phosphorous and potassium with Photoperiod h) Sulphur with Light Intensity i) Sulphur with Photoperiod and j) Light Intensity with Photoperiod