

Supplementary Table I- List of primers used for real-time RT-qPCR

Uniprot Identifier	Protein Name	Gene name	Forward Primer sequences	Reverse Primer sequences
Q7XZI9	Actin	NM_114519.2	TGCGTCTTGATCTTGCAGGT	GAAGCACTTCCTGTGGACGA
Q9SXT2	Ascorbate peroxide	AB024991.1	ATGCCACCAAAGGTTCTGAC	AGGCCTTCCTTCTCACCATT
Q9XF98	Calreticulin	AF134733.1	ACTGGTAGCCTCTACAGCGA	TGCAGCTTCTTCTCCAGCTC
Q93XE6	Chalcone flavone isomerase	Glyma 20g38560	GTGCGTGTGTGTCTTACAGC	ATCATGGTCTCCAAGACCGC
O82560	Glutamine synthetase	Glyma 14g39430	ATGACAGGCTACCAT	TTTGCAATCGCAAGT
P26413	Heat shock Protein 70	Glyma 17g08020	TAGCGTTGATTTTGGCCTGC	GCGTCCAATTGCGTCAAAC
Q9SZH2	Peroxidase	BX829145.1	ATGGCTCGATCCTCGTGAAC	ACGCACGTGACACTAACACA
Q9FE12	Peroxiredoxin	AJ288896.1	TTGCCAGGGCTTCGGTAATT	TTGCTTCAAAGGTCAGGCCA
C6ZJZO	Serine hydroxyl methyltransferase 5	Glyma 18g150000	TTGAGAGATGGGCAAGAGCA	ATGTGACGCGCACTACCATT
C6SZ56	Superoxide dismutase	Glyma 19g42890	GCTGTCTGTCGCTTTTGACG	CTGGAGCTAATGGTCAGCAGT

All primers were designed using NCBI database and the Primer3Plus.

Supplementary Table II: Two-DE Reproducibility of two-dimensional electrophoresis gels

Sl. No.	Treatment	Cultivar DS	% Change	Cultivar DS	% Change
1	Control	224		212	
2	Water Stress (WS)	167	Decrease (25)	198	Decrease (6.6)
3	Heat Stress (HS)	242	Increase (8)	142	Decrease (33)
4	Water and Heat Stress (WS+HS)	201	Decrease (10)	190	Decrease (10)

Average number of protein spots in three replicates. Protein Spots having high quality score as assigned by PD Quest V 8.2.1

Supplementary Table III: Promotive and Inhibitive Effect of Stress Responsive Proteins

Cultivar PI 471938				Cultivar R95-1705		
Sl. No.	Source Protein #	Sink Protein #		Source Protein #	Sink Protein #	
		Promotive	Inhibitive		Promotive	Inhibitive
1				2	26,28,36	3,7,12
2	1		2,11,15,16,29,30,34	3	7,12	2,6,26,28,36
3	2		3,9	5	9,14,22,23,24	2,6,26,27,33,34,35
4	3	9,18	2	6	2,26,27,28,33,35	5,9,14,22,23,24
5	5	28	7	7	3,12	2,6,26,28,36
6	6	8,23,25,27,39	12,19,26	8	5,15,31	13,16,19,34,38
7	7	6,12,23,25,39	19	9	5,14,22,23,24	2,6,26,27,28,33,35
8	8	10,12,18,23,25,27	26	11		39
9	9	3,18	2,15,16	12	3,7	2,26,28,36
10	10	8,12,18,25,27	26	13	16,19,34,38	8,15,31
11	11	20	5,28	14	5,9,22,23,24	2,6,27,28,33,34,35,37
12	12	6,8,10,23,25,27,39	19,26	15	5,8,22,23,31	13,16,19,34,38
13	13	19	6,12,23,39	16	13,19,38	8,15,31
14	15	2,16	1,9	19	13,16,38	8,15,31
15	16	2,15,29,34,30	1	22	5,9,14,15,23,24	2,6,27,33,34,35
16	17	20,22,37	5,28	23	5,9,14,22,24	2,6,26,27,33,34,35
17	18	3,8,9,10,25,27	26	24	5,9,14,22,23	2,6,26,27,28,33,34,34,37
18	19	26	6,8,12,23,25,27,39	26	2,6,27,28,33,35	3,5,7,9,14,22,23,24
19	20	7	28	27	2,6,28,33,34,35,37	5,9,14,22,23,24
20	21	22		28	2,6,27,35,37	9,14,24,22,23
21	22	7,38,	13			
22	23	6,8,10,12,25,27,39	19,26	31	8	13,16,19,38

23	25	8,10,12,18,23,27	26	32	39	
24	26	27	3,8,10,12,18,25	33	2,6,26,27,28,35	5,7,9,14,22,23,24
25	27	8,10,12,18,25	26	34	2,13,27,38	5,9,8,15,22,23,31
26	28		7	35	2,6,22,27,28,33,34,37	5,9,14,23,24
27	29	2,11,15,16,30,34	1	36	2,26,28	3,7,12
28	30	11,20,32,34	31	37	2,27,34,35	9,14,22,24
29	31	14		38	13,16,19,34	5,8,15,31
30	34	2,11,15,16,29,30	1	39	2,30	12
	37	7,22	28			
	38	6,23,39	13			
	39	12,17,23,25	19,26			
Total	32	95	61	29	113	139

**Supplementary Table IV: Promotive and Inhibitive Effect of Stress Responsive Proteins to combined stresses
Cultivar PI 471938**

Source		Sink	
Protein #	Biological Function	Biological Function of Promotive interaction	Biological Function of inhibitive interaction
3	Response to heat	9 Glycolytic process	2 Protein refolding
		18 Carbohydrate metabolic process, Malat metabolic process, Tricarboxylic acid process	
31	Response to heat	14 Oxidation, reduction	
34	Response to heat	2 protein refolding	1 Stress-related, Protein refolding
		11 Signal transduction	
		15 TCA	
		16 Photosynthesis	
		29 Cell Redox hemostasis	
		30 Photosynthesis, carbon fixation, photorespiration	
5	Oxidation-reduction	28 Stress-related	7 Glutamine biosynthetic process, Metabolism
7	Metabolism	6 Signal transduction	19 Redox, cellular response to oxidative stress
		12, 23, 39 Metabolism	
		25 Photosynthesis, light harvesting	
12	Metabolism	6 Signal transduction	19 Redox, cellular response to oxidative stress

		8	Photosynthesis	26	Redox
		10			
		23, 39	Metabolism		
		25	Photosynthesis,light harvesting		
		27	Stress-related		
15	Metabolism	2	Protein refolding	1	Stress-related, Protein refolding
		16	Photosynthesis	9	Glycolytic process
22	Metabolism	7	Glutamine biosynthetic process, Metabolism	13	Metabolism
		38	Photosynthesis,glycolytic process		
23		6	Signal transduction	19	Redox, cellular response to oxidative stress
		8	Photosynthesis	26	Redox
		10			
		12, 39	Metabolism		
		25	Photosynthesis,light harvesting		
		27	Stress-related		
8	Photosynthesis	10		26	Redox
		12, 23	Metabolism		
		18	Carbohydrate metabolic process, Malat metabolic process,Tricarboxylicacid process		
		25	Photosynthesis,light harvesting		
		27	Stress-related		
9	Photosynthesis	3	Stress-related, Protein refolding	2	Protein refolding

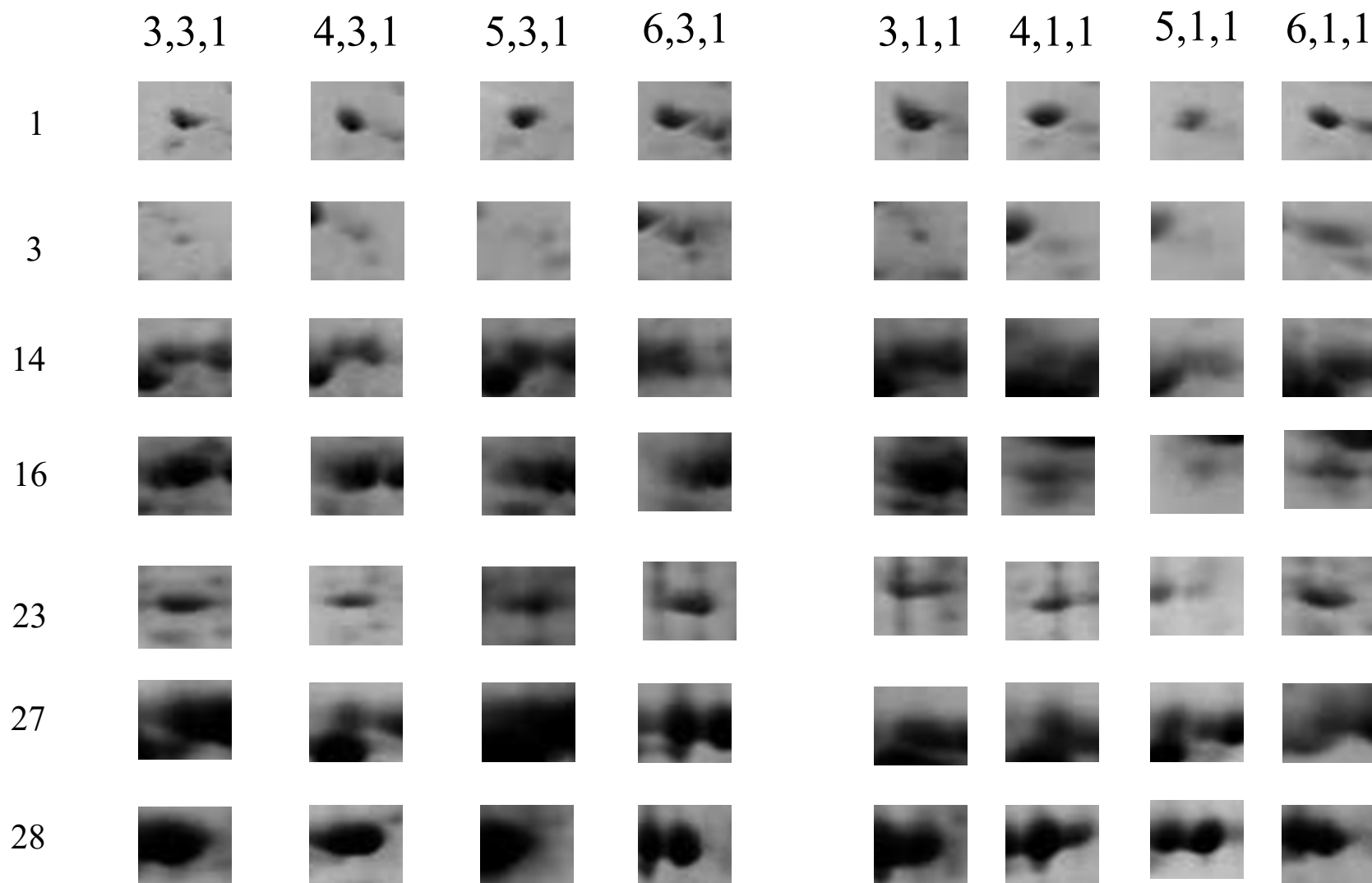
	18	Carbohydrate metabolic process, Malat metabolic process,Tricarboxylicacid process	15	TCA
			16	Photosynthesis
Total 11	41		15	

**Supplementary Table V: Promotive and Inhibitive Effect of Stress Responsive Proteins to combined stresses
Cultivar R95–1705**

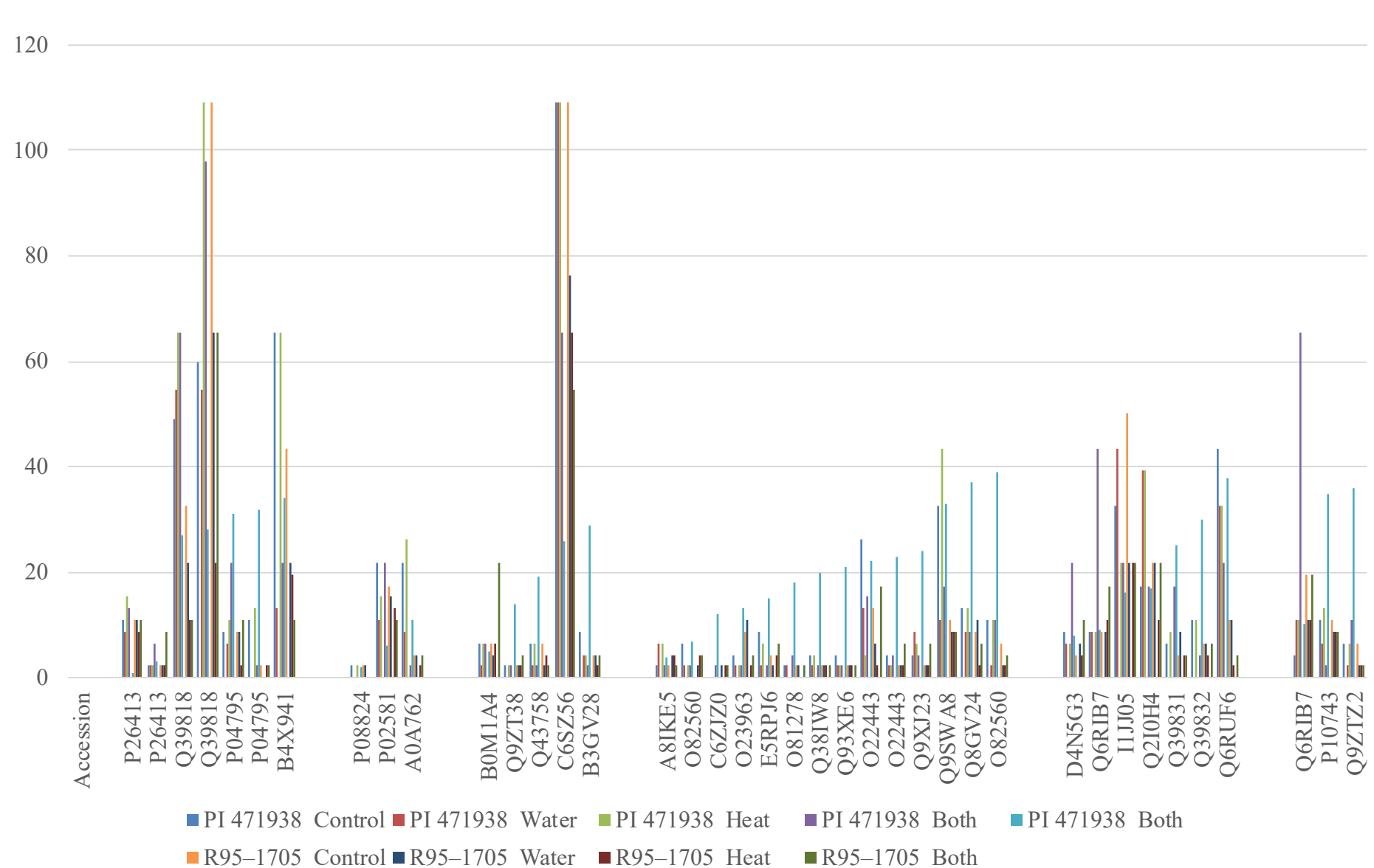
Source		Sink			
Protein #	Biological Function	Promotive	Biological Function	Inhibitive	Biological Function
3	Response to heat	7,12	Metabolism	2	Protein refolding
				6	Signal transduction
				26	redox
				28	Stress-related
				36	Seed developemnt
27	Response to heat	2	Protein refolding	5	Redox, responsive to hydrogen peroxide
		6	Signal transduction	9	Glycolytic process
		28,34	Response to heat	14	Oxidation, reduction
		33,37	Metabolism	22	Hydrogen peroxide catabolic processMetabolism
		35	Seed storage	23,24	Metabolism
28	Response to heat	2	Protein refolding	9	Glycolytic process
		6	Signal transduction	14	Oxidation, reduction
		27	Stress-related	22	Hydrogen peroxide catabolic process, Metabolism

		35	Acid and other phosphatases	23,24	Metabolism
		37	Metabolism		
31	Response to heat	8	Photosynthesis	13	Metabolism
				16	Photosynthesis
				19	Redox, cellular response to oxidative stress
				38	Photosynthesis, glycolytic process
12	Metabolism	3	Stress-related, Protein refolding	2	Protein refolding
		7	Glutamine biosynthetic process, Metabolism	26	redox
				28	Stress-related
				36	Seed developemnt
8	Photosynthesis	5	Redox, responsive to hydrogen peroxide	13	Metabolism
		15	TCA	16	Photosynthesis
		31	Stress-related, Protein complex oligomerization, Proteing folding, Response to heat	19	Redox, cellular response to oxidative stress
				34	Stress-related
				38	Photosynthesis, glycolytic process
9	Photosynthesis	5	Redox, responsive to hydrogen peroxide	2	Protein refolding
		14	Oxidation, reduction	6	Signal transduction

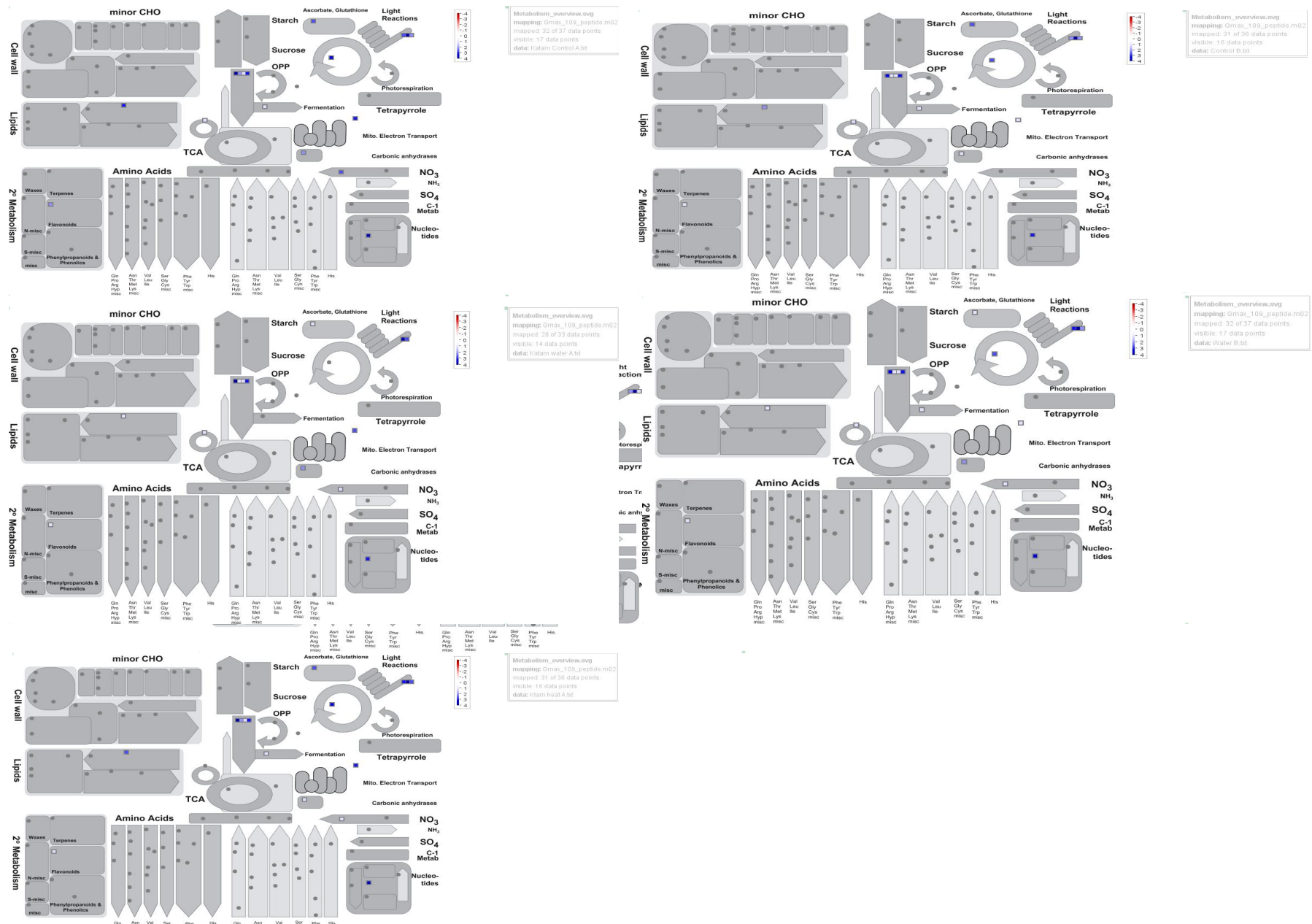
		22	Hydrogen peroxide catabolic processMetabolism	26	Redox
		23,24	Metabolism	27,28	Stress-related
				33	Metabolism
				35	Acid and other phosphatases
36	Others	2	Protein refolding	NA	
		26	redox		
		28	Stress-related		
	Subtotal	28		36	



Supplementary Figure I: Close up view of selected proteins



Supplementary Figure II. Relative protein abundance to water, heat, and both water and heat stresses in soybean cultivars



Supplementary Figure III: Protein abundance in stress treatments relative to control determined by MapMan