

Supplementary Materials

Supplementary Tables

Table S1 The specific combining ability (SCA) effects of heat tolerant donors and CIMMYT elite lines evaluated under heat stress and optimal conditions during 2020 winter season.

Entry	Cross	Managed Heat		Optimal Management		Across	
		SCA (tha-1)	Rank	SCA (tha-1)	Rank	SCA (tha-1)	Rank
171	DJ265-15 x VL1018816	1.05**	1	0.03	84	0.53	18
30	DJ267-9 x CAL1440	0.73*	2	0.7	24	0.74	8
2	DJ267-9 x CAL14138	0.7	3	-0.21	107	0.2	56
123	DJ267-9 x ZL1312	0.67	4	0.93	12	0.86	4
16	DJ265-15 x CAL1412	0.62	5	0.3	53	0.49	23
93	DJ267-6 x VL1010762	0.6	6	-0.23	114	0.17	63
81	DJ265-14 x VL143518	0.6	7	0.39	44	0.52	19
109	DJ267-5 x CAL14113	0.54	8	1	9	0.83	5
102	DJ265-15 x VL1010762	0.54	9	0.63	29	0.62	14
37	DJ265-15 x CAL1440	0.53	10	-0.43	133	0	97
23	DJ194-3 x CAL1412	0.51	11	-0.15	100	0.17	64
66	DJ267-5 x VL109126	0.45	12	-0.48	136	-0.04	103
49	DJ265-13 x ZL132077	0.44	13	-0.26	118	0.08	81
53	DJ194-3 x VL109126	0.44	14	0.16	71	0.31	40
166	DJ194-10 x VL1018816	0.44	15	0.86	14	0.68	10
165	DJ267-5 x VL1018816	0.42	16	0.53	32	0.51	20
63	DJ194-2 x CAL1469	0.42	17	0.05	81	0.22	55
159	DJ265-14 x CAL152	0.42	18	-0.48	137	-0.06	109
112	DJ265-6 x CAL14113	0.42	19	-0.48	135	-0.05	105
122	DJ265-14 x ZL1312	0.41	20	-0.22	111	0.09	79
61	DJ267-9 x CAL1469	0.41	21	-0.7	153	-0.2	125
110	DJ267-8 x CAL14113	0.4	22	0.39	43	0.42	29
18	DJ267-7 x CAL1412	0.38	23	0.04	83	0.23	52
6	DJ267-8 x CAL14138	0.38	24	-0.14	97	0.07	82
11	DJ265-10 x CAL14138	0.36	25	1.34*	4	0.89*	1
41	DJ265-8 x ZL132077	0.35	26	0.23	62	0.31	41
148	DJ265-15 x ZL111056	0.35	27	-0.32	122	-0.01	100
28	DJ265-15 x CAL1440	0.34	28	0.26	58	0.29	45
170	DJ265-8 x VL1018816	0.34	29	1.09	8	0.77	6
103	DJ267-8 x VL1010762	0.33	30	-0.4	130	-0.04	102
72	DJ265-13 x VL109126	0.32	31	0.15	74	0.24	51
9	DJ194-2 x CAL14138	0.31	32	0.74	20	0.55	17
17	DJ265-8 x CAL1412	0.31	33	0.14	75	0.25	50

65	DJ265-14 x CAL1469	0.3	34	-0.22	110	0.01	95
83	DJ267-5 x CAL14135	0.3	35	0.24	60	0.3	43
74	DJ265-10 x VL143518	0.3	36	0.29	54	0.32	37
120	DJ194-2 x CAL14113	0.29	37	0.46	40	0.4	31
107	DJ267-7 x VL143518	0.29	38	0.57	30	0.46	25
124	DJ265-15 x ZL1312	0.29	39	-0.25	115	0.01	93
14	DJ265-15 x CAL14138	0.28	40	0.5	34	0.38	33
7	DJ194-10 x CAL14138	0.28	41	0.47	38	0.38	34
132	DJ265-15 x CAL14113	0.26	42	-0.19	106	0.03	88
172	DJ267-8 x VL1018816	0.26	43	0.12	78	0.2	59
76	DJ267-9 x VL143518	0.25	44	0.76	19	0.55	16
43	DJ267-9 x ZL132077	0.25	45	0.12	77	0.19	60
126	DJ267-8 x ZL1312	0.25	46	-0.18	104	0.04	86
108	DJ265-8 x VL143518	0.24	47	0.97	10	0.67	12
137	DJ265-13 x ZL111056	0.24	48	-0.95	163	-0.41	146
135	DJ267-6 x ZL111056	0.24	49	0.25	59	0.25	49
152	DJ267-5 x CAL152	0.23	50	0.18	66	0.2	57
168	DJ267-7 x VL1018816	0.23	51	0.02	86	0.14	70
96	DJ267-5 x VL1010762	0.22	52	0.3	52	0.29	47
154	DJ265-6 x CAL152	0.21	53	0.17	68	0.18	62
118	DJ267-9 x CAL14113	0.2	54	-0.17	102	0.02	92
73	DJ265-6 x VL109126	0.2	55	0.85	15	0.56	15
47	DJ194-10 x ZL132077	0.19	56	0.71	23	0.5	21
92	DJ265-8 x CAL14135	0.19	57	0.03	85	0.13	71
79	DJ267-5 x VL143518	0.18	58	-1.03	166	-0.47	149
97	DJ194-10 x VL1010762	0.18	59	0.65	27	0.46	28
129	DJ265-8 x ZL1312	0.18	60	0.18	67	0.2	58
70	DJ265-10 x VL109126	0.18	61	1.42*	2	0.88*	2
156	DJ265-10 x CAL152	0.18	62	-0.34	127	-0.12	114
88	DJ194-10 x CAL14135	0.18	63	1.12	7	0.73	9
69	DJ267-9 x VL109126	0.18	64	1.19	6	0.75	7
24	DJ265-14 x CAL1412	0.17	65	0.04	82	0.13	72
104	DJ194-3 x VL1010762	0.15	66	0.15	72	0.17	66
82	DJ267-7 x CAL14135	0.15	67	-0.15	98	0.01	94
38	DJ194-2 x CAL1440	0.13	68	0.8	17	0.49	24
64	DJ265-13 x CAL1469	0.12	69	1.49*	1	0.86	3
157	DJ265-15 x CAL152	0.12	70	0.5	35	0.31	39
136	DJ265-6 x ZL111056	0.12	71	0.42	41	0.29	46
36	DJ194-3 x CAL1440	0.11	72	-0.21	108	-0.09	112
45	DJ265-14 x ZL132077	0.11	73	-0.23	113	-0.06	108

160	DJ194-3 x CAL152	0.1	74	-0.36	129	-0.18	120
	DJ194-3 x VL1018816	0.09	75	-0.04	92	0.02	90
140	DJ194-10 x ZL111056	0.09	76	0.11	79	0.1	78
101	DJ265-10 x VL1010762	0.08	77	-0.62	150	-0.29	132
26	DJ265-6 x CAL1440	0.07	78	-1.2	171	-0.65	160
1	DJ265-6 x CAL14138	0.06	79	0.42	42	0.23	53
67	DJ265-15 x VL109126	0.06	80	-0.15	99	-0.05	104
4	DJ265-8 x CAL14138	0.06	81	-0.51	140	-0.28	131
161	DJ265-8 x CAL152	0.06	82	0.88	13	0.5	22
173	DJ265-15 x VL1018816	0.06	83	-0.18	105	-0.08	111
144	DJ265-8 x ZL111056	0.05	84	0.16	69	0.12	73
85	DJ265-6 x CAL14135	0.05	85	-0.33	124	-0.14	116
68	DJ194-2 x VL109126	0.04	86	0.3	51	0.19	61
113	DJ267-6 x CAL14113	0.04	87	0.77	18	0.46	26
54	DJ265-8 x VL109126	0.03	88	-0.34	125	-0.18	121
130	DJ265-10 x ZL1312	0.02	89	-0.01	87	0.02	91
145	DJ265-15 x ZL111056	0.01	90	0.27	57	0.15	68
46	DJ265-10 x ZL132077	0.01	91	0.69	25	0.4	32
87	DJ265-10 x CAL14135	0	92	-0.29	119	-0.13	115
42	DJ267-5 x ZL132077	0	93	0.27	56	0.17	65
139	DJ267-5 x ZL111056	0	94	0.06	80	0.04	87
22	DJ194-2 x CAL1412	0	95	0.51	33	0.3	44
121	DJ265-8 x CAL14113	-0.01	96	0.56	31	0.31	38
33	DJ265-10 x CAL1440	-0.01	97	0.15	73	0.06	84
99	DJ267-7 x VL1010762	-0.01	98	0.72	21	0.42	30
40	DJ267-5 x ZL1312	-0.02	99	-0.1	95	-0.06	106
5	DJ267-6 x CAL14138	-0.04	100	0.35	48	0.15	69
58	DJ267-7 x CAL1469	-0.05	101	1.22	5	0.64	13
57	DJ194-10 x CAL1469	-0.05	102	0.49	36	0.23	54
75	DJ265-15 x VL143518	-0.05	103	0.64	28	0.34	35
12	DJ265-15 x CAL14138	-0.05	104	-0.52	142	-0.33	139
89	DJ267-9 x CAL14135	-0.06	105	0.48	37	0.26	48
39	DJ267-6 x ZL132077	-0.06	106	-0.26	116	-0.16	119
134	DJ194-2 x VL143518	-0.06	107	-0.31	121	-0.2	124
116	DJ265-15 x CAL14113	-0.06	108	-0.31	120	-0.19	123
82	DJ265-13 x CAL14135	-0.07	109	-0.7	152	-0.39	144
158	DJ194-10 x CAL152	-0.07	110	0.23	61	0.08	80
142	DJ267-7 x ZL111056	-0.07	111	-0.87	161	-0.5	150
20	DJ267-9 x CAL1412	-0.07	112	-0.23	112	-0.15	117
60	DJ265-10 x CAL1469	-0.08	113	-0.08	94	-0.09	113

91	DJ265-15 x CAL14135	-0.09	114	-0.52	141	-0.31	134
151	DJ265-15 x CAL152	-0.1	115	0.71	22	0.33	36
35	DJ194-10 x CAL1440	-0.1	116	0.29	55	0.1	77
34	DJ267-8 x CAL1440	-0.1	117	1.35*	3	0.68	11
138	DJ265-10 x ZL111056	-0.11	118	0.22	63	0.06	83
147	DJ194-3 x ZL111056	-0.12	119	0.93	11	0.46	27
8	DJ267-5 x CAL14138	-0.12	120	-0.26	117	-0.21	126
25	DJ267-6 x CAL1440	-0.13	121	-0.34	126	-0.27	129
150	DJ267-6 x CAL152	-0.14	122	-0.35	128	-0.28	130
153	DJ267-9 x CAL152	-0.15	123	0.13	76	-0.02	101
141	DJ267-9 x ZL111056	-0.15	124	0.32	49	0.11	74
133	DJ267-6 x VL143518	-0.16	125	-0.03	89	-0.07	110
59	DJ267-6 x CAL1469	-0.17	126	-0.43	131	-0.33	137
162	DJ267-6 x VL1018816	-0.17	127	-0.6	149	-0.42	147
115	DJ265-10 x CAL14113	-0.2	128	-0.57	147	-0.39	143
131	DJ267-7 x ZL1312	-0.2	129	-0.53	144	-0.39	142
174	DJ265-13 x VL1018816	-0.21	130	0.2	64	0	96
90	DJ194-3 x CAL14135	-0.22	131	-0.43	132	-0.32	136
143	DJ265-14 x ZL111056	-0.22	132	-0.5	138	-0.38	140
106	DJ265-14 x VL1010762	-0.22	133	0.38	45	0.11	76
32	DJ265-14 x CAL1440	-0.22	134	-0.12	96	-0.18	122
13	DJ194-3 x CAL14138	-0.24	135	-0.83	160	-0.61	158
105	DJ265-15x VL1010762	-0.26	136	0.2	65	-0.01	99
94	DJ265-6 x VL1010762	-0.26	137	-0.69	151	-0.5	151
149	DJ194-2 x ZL111056	-0.27	138	-0.18	103	-0.23	128
31	DJ267-7 x CAL1440	-0.29	139	0.46	39	0.11	75
146	DJ267-8 x ZL111056	-0.29	140	-0.04	91	-0.16	118
71	DJ267-6 x VL109126	-0.29	141	-0.88	162	-0.62	159
167	DJ267-9 x VL1018816	-0.3	142	0.35	47	0.05	85
44	DJ265-6 x ZL132077	-0.31	143	-0.47	134	-0.4	145
169	DJ265-14 x VL1018816	-0.31	144	0.16	70	-0.06	107
27	DJ265-13 x CAL1440	-0.32	145	0.36	46	0.02	89
164	DJ265-10 x VL1018816	-0.32	146	-0.79	158	-0.6	156
128	DJ265-8 x ZL1312	-0.33	147	0.8	16	0.3	42
29	DJ267-5 x CAL1440	-0.34	148	-1	165	-0.73	163
19	DJ267-6 x CAL1412	-0.34	149	-0.71	154	-0.55	153
119	DJ265-14 x CAL14113	-0.35	150	-1.15	170	-0.8	165
62	DJ265-6 x CAL1469	-0.36	151	-0.07	93	-0.22	127
10	DJ265-14 x CAL14138	-0.38	152	0.68	26	0.16	67
111	DJ267-7 x CAL14113	-0.38	153	-0.75	156	-0.59	155

155	DJ267-7 x CAL152	-0.39	154	-0.22	109	-0.32	135
48	DJ194-3 x ZL132077	-0.39	155	-0.76	157	-0.6	157
114	DJ194-3 x CAL14113	-0.4	156	0.3	50	-0.01	98
80	DJ194-3 x VL143518	-0.41	157	-0.57	146	-0.51	152
51	DJ267-7 x VL109126	-0.43	158	-1.08	167	-0.81	166
98	DJ267-9 x VL1010762	-0.45	159	-0.16	101	-0.29	133
78	DJ194-10 x VL143518	-0.49	160	-0.81	159	-0.68	161
95	DJ265-13x VL1010762	-0.5	161	-1.32*	173	-0.96*	169
100	DJ265-8 x VL1010762	-0.58	162	-0.32	123	-0.46.	148
86	DJ267-6 x CAL14135	-0.62	163	-0.52	143	-0.57	154
175	DJ194-2 x VL1018816	-0.64	164	-1.08	168	-0.91*	167
55	DJ267-5 x CAL1469	-0.66	165	-1.25	172	-1.03*	171
3	DJ265-13 x CAL14138	-0.69	166	-0.03	90	-0.39	141
15	DJ267-5 x CAL1412	-0.7	167	-0.02	88	-0.33	138
50	DJ194-2 x ZL132077	-0.79*	168	-0.58	148	-0.7	162
117	DJ194-10 x CAL14113	-0.94**	169	-0.51	139	-0.74	164
77	DJ265-15 x VL143518	-0.95*	170	-1.33*	174	-1.21**	173
163	DJ265-6 x VL1018816	-1.02**	171	-0.74	155	-0.92*	168
52	DJ265-14 x VL109126	-1.04**	172	-1.12	169	-1.14**	172
21	DJ265-6 x CAL1412	-1.25***	173	-0.55	145	-0.98*	170
127	DJ265-6 x ZL1312	-1.49***	174	-0.98	164	-1.34**	174
