**Supplemental Table 2.** Performance comparison between predictive models built with either the entire training population (full model) or 80% of the training population (80% model). Also shown is the correlation generated by applying the 80% model to predict trait values of the samples removed from the training population.

Trait	Model parameter	Full model	80% model	80% model applied to removed samples (R <sup>2</sup> )
Chlorophyll	Cross validation R <sup>2</sup>	0.850	0.849	0.874
	RMSE	3.329	3.296	
	Model bias	0.0012	0.0161	
	Training population	268	214	
	Model components	8	9	
N content	Cross validation R <sup>2</sup>	0.956	0.954	0.961
	RMSE	0.234	0.234	
	Model bias	-0.0014	-0.0017	
	Training population	203	162	
	Model components	10	10	
SLA	Cross validation R <sup>2</sup>	0.777	0.767	0.803
	RMSE	1.116	1.095	
	Model bias	0.0005	0.0031	
	Training population	182	146	
	Model components	11	11	
Sucrose content	Cross validation R <sup>2</sup>	0.622	0.583	0.725
	RMSE	0.945	0.943	
	Model bias	-0.0210	-0.0242	
	Training population	61	49	
	Model components	5	5	
$V_{max}$	Cross validation R <sup>2</sup>	0.654	0.666	0.592
	RMSE	6.595	6.385	
	Model bias	-0.0073	-0.0153	
	Training population	214	171	
	Model components	7	7	

**Supplemental Table 3.** Analysis of variance (ANOVA) degrees of freedom (df), F value and significance level (p) for measured and partial least squares regression (PLSR) modeled leaf traits. Inbred and hybrid genotypes B73, Mo17 and B73 x Mo17 were included in the analysis. Chl: chlorophyll content, N: leaf N content,  $V_{\text{max}}$ : [CO<sub>2</sub>]-saturated rate of photosynthesis, SLA: specific leaf area

			Measured			PLSR_modeled		
		df	F	р	df	F	p	
	Genotype	2	15.31	< 0.0001	2	30.85	< 0.0001	
Chl	$O_3$	1	2.53	0.122	1	1.07	0.308	
	Gen x O <sub>3</sub>	2	0.63	0.538	2	0.05	0.955	
	Genotype	2	3.22	0.050	2	5.86	0.006	
N	$O_3$	1	0.21	0.648	1	1.74	0.195	
	Gen x O <sub>3</sub>	2	1.12	0.338	2	1.27	0.293	
	Genotype	2	5.76	0.009	2	8.06	0.002	
$V_{ m max}$	$O_3$	1	5.40	0.029	1	4.80	0.039	
	Gen x O <sub>3</sub>	2	0.84	0.442	2	1.13	0.338	
	Genotype	2	22.99	< 0.0001	2	20.36	< 0.0001	
SLA	$O_3$	1	7.06	0.012	1	2.96	0.095	
	Gen x O <sub>3</sub>	2	5.31	0.010	2	8.66	0.001	

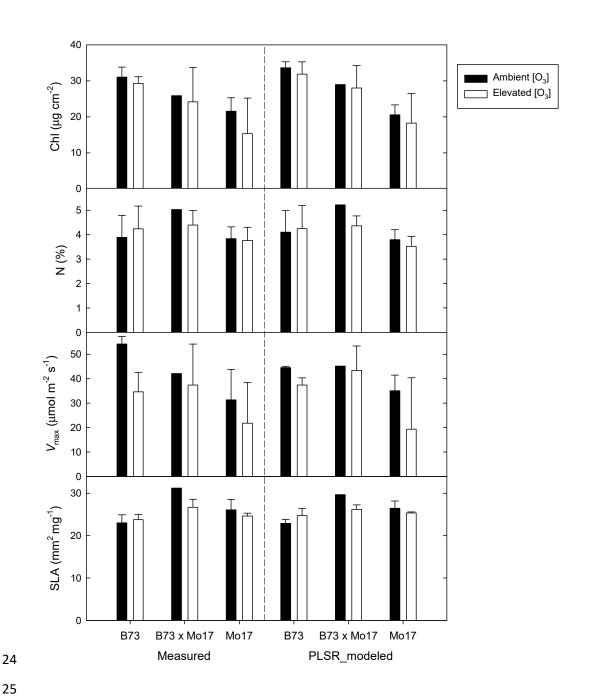
**Supplemental Table 4.** List of inbred and hybrid maize genotypes grown at ambient ( $\sim$ 40 ppb) and elevated [O<sub>3</sub>] ( $\sim$ 100 ppb) in the 2013, 2014 and 2015 growing seasons.

2013   3316	_	2013	1		2015		
3811	3316			NC336			
A226							
A214N							
A239							
A4415         CML10         K4         NC358         B79         B73xCML322         M37W           A6         CML103         K64         NC360         B97         B73xCML333         M017           A619         CML108         K111         NC362         C123         B73xCML69         MS71           A632         CML154Q         K114         NC366         CH70130         B73xCML69         NC338           A634         CML158Q         K13         NC368         CI21E         B73xHp301         OH43           A635         CML218         K143         ND246         CM7         B73xIl14H         B73xC123           A641         CML220         K144         OH40B         CML103         B73xK11         B73xC123           A654         CML227         KY226         OH603         CML218         B73xKy21         B73xL114H           A659         CML247         KY226         OH603         CML228         B73xKy21         B73xL114H           A660         CML254         KY228         OH7B         CML247         B73xM017         B73xM017           A680         CML287         LH82         P39         CML373         B73xM018W         B73xM018W							
A6         CML103         K64         NC360         B97         B73xCML333         MO17           A619         CML108         K111         NC362         CL23         B73xCML69         NC338           A632         CML154Q         K114         NC368         CH70130         B73xCML69         NC338           A634         CML158Q         K13         NC368         CI21E         B73xHp301         OH43           A635         CML218         K143         ND246         CM7         B73xH14H         B73xCI23           A641         CML220         K144         OH40B         CML103         B73xK111         B73xCML333           A659         CML247         KY226         OH603         CML228         B73xK921         B73xM162W           A661         CML254         KY226         OH603         CML228         B73xM37W         B73xM37W           A679         CML277         L758         OS420         CML277         B73xM37W         B73xM017           A680         CML287         LH82         P39         CML322         B73xM37W         B73xM017           A682         CML314         M14         PA875         CML333         B73xM018W         B73xM018W							
A619         CML108         KI11         NC362         C123         B73xCML52         MS71           A632         CML154Q         K114         NC368         CH70130         B73xCML69         NC338           A634         CML158Q         K13         NC368         C121E         B73xHp301         OH43           A635         CML218         K143         ND246         CM7         B73xHp301         OH43           A641         CML220         K144         OH40B         CML013         B73xKi11         B73xCML333           A654         CML228         KY21         OH43         CML218         B73xKi31         B73xM164W           A659         CML247         KY226         OH603         CML228         B73xM162W         B73xM114W           A661         CML254         KY228         OH7B         CML247         B73xM37W         B73xM017W           A679         CML277         L578         OS420         CML247         B73xM37W         B73xM018W           A680         CML287         LH82         P39         CML322         B73xM57W         B73xM018W           A682         CML314         M14         PA875         CML333         B73xM57W         B73xM018W <tr< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr<>							
A632 CML154Q KI14 NC366 CH70130 B73xCML69 A634 CML158Q KI3 NC368 CI21E B73xHp301 A635 CML218 KI43 ND246 CM7 B73xII14H A641 CML220 KI44 OH40B CML103 B73xKi11 B73xCML333 A654 CML228 KY21 OH43 CML218 B73xKi3 B73xCML333 A654 CML227 KY226 OH603 CML228 B73xKy21 B73xLM14M A669 CML277 KY226 OH603 CML228 B73xKy21 B73xL14H A661 CML254 KY228 OH7B CML247 B73xM162W A679 CML277 L578 OS420 CML277 B73xM37W A680 CML287 LH82 P39 CML322 B73xM017 B73xM017 A680 CML287 LH82 P39 CML322 B73xM017 B73xMS71 B10 CML323 M37W PA880 CML525 B73xMS71 B73xMS71 B10 CML323 M37W PA91 CML69 B73xNC350 B103 CML328 M017 PH207 C0125 B73xNC358 B104 CML331 M018W PHG47 F6 B73xO443 B105 CML333 M01W R168 H99 B73xO47B B164 CML331 M045 R177 Hp301 B73xP39 B164 CML54 M047 SC213R Ki11 B73xTx303 B37 CML5 M047 SC213R Ki11 B73xTx303 B37 CML5 M047 SC213R Ki11 B73xTx18 B46 CML52 MP339 SC357 Ki3 B73xB97 B52 CML61 MS1334 SD44 Ky21 B73xCML103 B73 CML92 N192 TX601 Mo17 B73-bm1 C0106 N28HT TZ110 M018W B73-bm2 C0125 N6 TZ116 MS1334 B73-bm4 DE811 NC230 TZ18 NC250 B75 EP1 NC236 U267Y NC258 B76 F2834T NC250 VA102 NC358 B77 F44 NC258 VA14 NC350 B79 F6 NC260 VA17 NC358 B84 F7 NC262 VA26 ND246 B97 FBLA NC264 VA35 Oh43 B77 FBLA NC264 VA35 Oh43 B77 FBLA NC264 VA35 Oh43							
A634 CML158Q KI3 NC368 CI21E B73xHp301 B73xC123 A635 CML218 KI43 ND246 CM7 B73xII14H B73xC123 A641 CML220 KI44 OH40B CML103 B73xKi11 B73xC123 A654 CML228 KY21 OH43 CML218 B73xKi3 B73xHP301 A659 CML247 KY226 OH603 CML228 B73xKy21 B73xII14H A661 CML254 KY228 OH7B CML247 B73xM162W B73xM162W A679 CML277 L578 OS420 CML277 B73xM37W B73xM017 A680 CML287 LH82 B39 CML322 B73xM017 B73xM571 A682 CML314 M14 PA875 CML333 B73xM018W AB28A CML322 M162W PA880 CML52 B73xM571 B10 CML323 M37W PA91 CML69 B73xNC350 B103 CML328 M017 PH207 C0125 B73xNC358 B104 CML331 M018W PHG47 F6 B73xO358 B105 CML333 M01W R168 H99 B73xOh7B B164 CML341 M045 R177 Hp301 B73xT238 B37 CML5 M047 SC213R Ki11 B73xT230 B37 CML5 M047 SC213R Ki11 B73xT230 B37 CML5 M047 SC213R Ki11 B73xT230 B37 CML5 M047 SC213R Ki11 B73xT238 B46 CML52 MP339 SC357 Ki3 B73xD97 B52 CML61 MS1334 SD44 Ky21 B73xCML103 B37 CML69 MS71 T234 M162W B73-bm1 C0106 N28HT TZ110 M018W B73-bm2 C0125 N6 TZ116 MS1334 B73xDm1 C0106 N28HT TZ110 M018W B73-bm3 CO255 NC222 TZ125 MS71 B73-bm4 DE811 NC230 TZ18 NC230 B73-bm4 DE811 NC230 TZ18 NC230 B73-bm4 DE811 NC230 TZ18 NC250 B75 EP1 NC236 U267Y NC258 B76 F2834T NC250 VA102 NC358 B77 F44 NC258 VA14 NC350 B84 F7 NC262 VA26 ND246 B97 FBLA NC264 VA35 Oh43 C103 GA209 NC294 VA59 Oh7B							
A635         CML218         KI43         ND246         CM7         B73xII14H         B73xC123           A641         CML220         KI44         OH40B         CML103         B73xKi11         B73xCML333           A654         CML228         KY21         OH43         CML218         B73xKi21         B73xHP301           A659         CML247         KY226         OH603         CML228         B73xKy21         B73xH14H           A661         CML254         KY228         OH7B         CML247         B73xM37W         B73xM37W           A679         CML277         L578         OS420         CML277         B73xM37W         B73xM017           A680         CML287         LH82         P39         CML322         B73xM017         B73xMS71           A682         CML314         M14         PA875         CML332         B73xM018W         B73xCM18W           B10         CML323         M37W         PA91         CML69         B73xNC350         B73xNC350           B104         CML331         M018W         PH647         F6         B73xOh43         B73xCM13           B105         CML331         M018W         R168         H99         B73xP39           B2							
A641         CML220         K144         OH40B A654         CML103         B73xKi11 B73xKi33         B73xCML3333           A654         CML228         KY21         OH43         CML218         B73xKi3         B73xHP301           A659         CML247         KY226         OH603         CML228         B73xKy21         B73xHP301           A661         CML254         KY226         OH603         CML247         B73xM162W         B73xM37W           A679         CML277         L578         OS420         CML277         B73xM37W         B73xM017           A680         CML287         LH82         P39         CML322         B73xM017         B73xMS71           A682         CML314         M14         PA875         CML333         B73xM018         B73xMS71           B10         CML323         M37W         PA880         CML52         B73xMC350         B73xMS71           B10         CML323         M37W         PA880         CML52         B73xMC350         B73xMS71           B10         CML331         M018W         PH647         F6         B73xNC358         B73xNC358           B104         CML331         M045         R177         Hp301         B73xS233         B73xS23 <td></td> <td>•</td> <td></td> <td></td> <td></td> <td></td> <td></td>		•					
A654         CML228         KY21         OH43         CML218         B73xKi3         B73xHP301           A659         CML247         KY226         OH603         CML228         B73xKy21         B73xIL14H           A661         CML254         KY228         OH7B         CML247         B73xM162W         B73xIL14H           A679         CML277         L578         OS420         CML277         B73xM37W         B73xM017           A680         CML287         LH82         P39         CML322         B73xM017         B73xM571           A682         CML314         M14         PA875         CML333         B73xM018W         B73xM071           B10         CML323         M37W         PA91         CML69         B73xMC350         B73xNC350           B103         CML328         M017         PH207         C0125         B73xNC350         B73xOH43           B104         CML331         M018W         PH647         F6         B73xNC350         B73xNC350           B104         CML333         M01W         R168         H99         B73xNC350         B73xNC350           B164         CML341         M045         R177         Hp301         B73xR730         B73xR730							
A659							
A661         CML254         KY228         OH7B         CML247         B73xM162W         B73xM37W           A679         CML277         L578         OS420         CML277         B73xM37W         B73xM017           A680         CML287         LH82         P39         CML322         B73xM017         B73xMS71           A682         CML314         M14         PA875         CML323         B73xM018W         B73xMS71           AB28A         CML322         M162W         PA880         CML52         B73xMS71         B73xOH43           B10         CML323         M37W         PA91         CML69         B73xNC350         B73xOH43           B103         CML328         Mo17         PH207         CO125         B73xNC350         B73xNC358           B104         CML331         M018W         PHG47         F6         B73xOh43         B73xC0h43           B105         CML331         M01W         R168         H99         B73xOh43         B73xP39           B164         CML341         MO45         R177         Hp301         B73xP39         B73xP39           B2         CML52         MP339         SC357         Ki3         B73xCML103           B57         <							
A679         CML277         L578         OS420         CML277         B73xM37W         B73xM017           A680         CML287         LH82         P39         CML322         B73xM017         B73xMS71           A682         CML314         M14         PA875         CML333         B73xM018W         B73xMS71           B10         CML322         M162W         PA880         CML52         B73xMS71         B73xOH43           B10         CML323         M37W         PA91         CML69         B73xNC358         B73xNC358           B104         CML328         Mo17         PH207         CO125         B73xNC358         B73xOh7B           B105         CML331         M018W         PHG47         F6         B73xOh7B         B73xOh7B           B164         CML341         M045         R177         Hp301         B73xP39         B73xOh7B           B2         CML38         M046         R4         II14H         B73xT2i8         B73xT2i8           B46         CML52         MP339         SC357         Ki3         B73xB97           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B73-bm1         C0106         N28H							
A680         CML287         LH82         P39         CML322         B73xMo17         B73xMS71           A682         CML314         M14         PA875         CML333         B73xMo18W         B73xMS71           AB28A         CML322         M162W         PA880         CML52         B73xMS71           B10         CML323         M37W         PA91         CML69         B73xNC350           B103         CML328         Mo17         PH207         CO125         B73xNC358           B104         CML331         MO18W         PH647         F6         B73xOh43           B105         CML333         MO1W         R168         H99         B73xOh7B           B164         CML341         MO45         R177         Hp301         B73xP39           B2         CML38         MO46         R4         II14H         B73xTx303           B37         CML5         MO47         SC213R         Ki11         B73xP39           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
A682         CML314         M14         PA875         CML333         B73xMo18W         B73xOH43           AB28A         CML322         M162W         PA880         CML52         B73xMS71           B10         CML323         M37W         PA91         CML69         B73xNC350           B103         CML328         Mo17         PH207         CO125         B73xNC358           B104         CML331         M018W         PHG47         F6         B73xOh43           B105         CML333         MO1W         R168         H99         B73xOh7B           B164         CML341         M045         R177         Hp301         B73xP39           B2         CML38         M046         R4         II14H         B73xT303           B37         CML5         M047         SC213R         Ki11         B73xT2i8           B46         CML52         MP339         SC357         Ki3         B73xB97           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73-b							
AB28A         CML322         M162W         PA880         CML52         B73xMS71           B10         CML323         M37W         PA91         CML69         B73xNC350           B103         CML328         Mo17         PH207         CO125         B73xNC358           B104         CML331         MO18W         PHG47         F6         B73xOh43           B105         CML333         MO1W         R168         H99         B73xOh7B           B164         CML341         MO45         R177         Hp301         B73xP39           B2         CML38         MO46         R4         II14H         B73xT303           B37         CML5         MO47         SC213R         Ki11         B73xT2i8           B46         CML52         MP339         SC357         Ki3         B73xB97           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73-bm1         CO106         N28HT         TZ110         Mo18W           B73-bm2         CO125         N6							
B10         CML323         M37W         PA91         CML69         B73xNC350           B103         CML328         Mo17         PH207         CO125         B73xNC358           B104         CML331         MO18W         PHG47         F6         B73xOh43           B105         CML333         MO1W         R168         H99         B73xOh7B           B164         CML341         MO45         R177         Hp301         B73xP39           B2         CML38         MO46         R4         III4H         B73xTx303           B37         CML5         MO47         SC213R         Ki11         B73xZTxi8           B46         CML52         MP339         SC357         Ki3         B73xB97           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73-bm1         CO106         N28HT         TZI10         Mo18W           B73-bm2         CO125         N6         TZI16         MS1334           B73-bm4         DE811         NC230         TZI8							B73xOH43
B103         CML328         Mo17         PH207         CO125         B73xNC358           B104         CML331         MO18W         PHG47         F6         B73xOh43           B105         CML333         MO1W         R168         H99         B73xOh7B           B164         CML341         MO45         R177         Hp301         B73xP39           B2         CML38         MO46         R4         III4H         B73xTx303           B37         CML5         MO47         SC213R         Ki11         B73xTzi8           B46         CML52         MP339         SC357         Ki3         B73xB97           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73-bm1         CO106         N28HT         TZI10         Mo18W           B73-bm2         CO125         N6         TZI16         MS1334           B73-bm4         DE811         NC230         TZI8         NC230           B73HTRHM         E2558W         NC236         U267Y         NC258 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
B104         CML331         MO18W         PHG47         F6         B73xOh43           B105         CML333         MO1W         R168         H99         B73xOh7B           B164         CML341         MO45         R177         Hp301         B73xP39           B2         CML38         MO46         R4         III4H         B73xTx303           B37         CML5         MO47         SC213R         Ki11         B73xTzi8           B46         CML52         MP339         SC357         Ki3         B73xB97           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73-bm1         CO106         N28HT         TZ110         Mo18W           B73-bm2         CO125         N6         TZ116         MS1334           B73-bm3         CO255         NC222         TZ125         MS71           B73-bm4         DE811         NC230         TZ18         NC230           B75         EP1         NC236         U267Y         NC258 <td< td=""><td></td><td></td><td></td><td></td><td></td><td>B73xNC350</td><td></td></td<>						B73xNC350	
B105         CML333         MO1W         R168         H99         B73xOh7B           B164         CML341         MO45         R177         Hp301         B73xP39           B2         CML38         MO46         R4         II14H         B73xTx303           B37         CML5         MO47         SC213R         Ki11         B73xTzi8           B46         CML52         MP339         SC357         Ki3         B73xB97           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73         CML92         N192         TX601         Mo17           B73-bm1         CO106         N28HT         TZI10         Mo18W           B73-bm2         CO125         N6         TZI16         MS1334           B73-bm3         CO255         NC222         TZI25         MS71           B73-bm4         DE811         NC230         TZI8         NC230           B73HTRHM         E2558W         NC232         TZI9         NC250           B75 <t< td=""><td>B103</td><td>CML328</td><td>Mo17</td><td>PH207</td><td></td><td>B73xNC358</td><td></td></t<>	B103	CML328	Mo17	PH207		B73xNC358	
B164         CML341         MO45         R177         Hp301         B73xP39           B2         CML38         MO46         R4         II14H         B73xTx303           B37         CML5         MO47         SC213R         Ki11         B73xTzi8           B46         CML52         MP339         SC357         Ki3         B73xB97           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73         CML92         N192         TX601         Mo17           B73-bm1         CO106         N28HT         TZI10         Mo18W           B73-bm2         CO125         N6         TZI16         MS1334           B73-bm3         CO255         NC222         TZI25         MS71           B73-bm4         DE811         NC230         TZI8         NC230           B73HTRHM         E2558W         NC232         TZI9         NC258           B76         F2834T         NC250         VA102         NC338           B77         F44	B104	CML331	MO18W	PHG47	F6	B73xOh43	
B2         CML38         MO46         R4         III4H         B73xTx303           B37         CML5         MO47         SC213R         Ki11         B73xTzi8           B46         CML52         MP339         SC357         Ki3         B73xB97           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73         CML92         N192         TX601         Mo17           B73-bm1         CO106         N28HT         TZI10         Mo18W           B73-bm2         CO125         N6         TZI16         MS1334           B73-bm3         CO255         NC222         TZI25         MS71           B73-bm4         DE811         NC230         TZI8         NC230           B73HTRHM         E2558W         NC232         TZI9         NC250           B75         EP1         NC236         U267Y         NC258           B77         F44         NC250         VA102         NC338           B77         F44         NC260         VA17 <td>B105</td> <td>CML333</td> <td>MO1W</td> <td>R168</td> <td>H99</td> <td>B73xOh7B</td> <td></td>	B105	CML333	MO1W	R168	H99	B73xOh7B	
B37         CML5         MO47         SC213R         Ki11         B73xTzi8           B46         CML52         MP339         SC357         Ki3         B73xB97           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73         CML92         N192         TX601         Mo17           B73-bm1         CO106         N28HT         TZI10         Mo18W           B73-bm2         CO125         N6         TZI16         MS1334           B73-bm3         CO255         NC222         TZI25         MS71           B73-bm4         DE811         NC230         TZI8         NC230           B73HTRHM         E2558W         NC232         TZI9         NC250           B75         EP1         NC236         U267Y         NC258           B76         F2834T         NC250         VA102         NC338           B77         F44         NC258         VA14         NC350           B84         F7         NC262         VA26         ND246 <td>B164</td> <td>CML341</td> <td>MO45</td> <td>R177</td> <td>Hp301</td> <td>B73xP39</td> <td></td>	B164	CML341	MO45	R177	Hp301	B73xP39	
B46         CML52         MP339         SC357         Ki3         B73xB97           B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73         CML92         N192         TX601         Mo17           B73-bm1         CO106         N28HT         TZI10         Mo18W           B73-bm2         CO125         N6         TZI16         MS1334           B73-bm3         CO255         NC222         TZI25         MS71           B73-bm4         DE811         NC230         TZI8         NC230           B73HTRHM         E2558W         NC232         TZI9         NC250           B75         EP1         NC236         U267Y         NC258           B76         F2834T         NC250         VA102         NC338           B77         F44         NC258         VA14         NC350           B84         F7         NC262         VA26         ND246           B97         FBLA         NC264         VA35         Oh43	B2	CML38	MO46		Il14H	B73xTx303	
B52         CML61         MS1334         SD44         Ky21         B73xCML103           B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73         CML92         N192         TX601         Mo17           B73-bm1         CO106         N28HT         TZI10         Mo18W           B73-bm2         CO125         N6         TZI16         MS1334           B73-bm3         CO255         NC222         TZI25         MS71           B73-bm4         DE811         NC230         TZI8         NC230           B73HTRHM         E2558W         NC232         TZI9         NC250           B75         EP1         NC236         U267Y         NC258           B76         F2834T         NC250         VA102         NC338           B77         F44         NC258         VA14         NC350           B79         F6         NC260         VA17         NC358           B84         F7         NC262         VA26         ND246           B97         FBLA         NC264         VA35         Oh43           C103 <t< td=""><td>B37</td><td>CML5</td><td>MO47</td><td>SC213R</td><td>Ki11</td><td>B73xTzi8</td><td></td></t<>	B37	CML5	MO47	SC213R	Ki11	B73xTzi8	
B57         CML69         MS71         T234         M162W           B64         CML91         MT42         TX303         M37W           B73         CML92         N192         TX601         Mo17           B73-bm1         CO106         N28HT         TZI10         Mo18W           B73-bm2         CO125         N6         TZI16         MS1334           B73-bm3         CO255         NC222         TZI25         MS71           B73-bm4         DE811         NC230         TZI8         NC230           B73-bm4         DE811         NC230         TZI8         NC230           B73-bm4         DE811         NC230         TZI8         NC250           B75         EP1         NC236         U267Y         NC258           B76         F2834T         NC250         VA102         NC338           B77         F44         NC258         VA14         NC350           B79         F6         NC260         VA17         NC358           B84         F7         NC262         VA26         ND246           B97         FBLA         NC264         VA35         Oh43           C103         GA209         N	B46	CML52	MP339	SC357	Ki3	B73xB97	
B64       CML91       MT42       TX303       M37W         B73       CML92       N192       TX601       Mo17         B73-bm1       CO106       N28HT       TZI10       Mo18W         B73-bm2       CO125       N6       TZI16       MS1334         B73-bm3       CO255       NC222       TZI25       MS71         B73-bm4       DE811       NC230       TZI8       NC230         B73-bm4       DE811       NC230       TZI8       NC230         B75       EP1       NC236       U267Y       NC258         B76       F2834T       NC250       VA102       NC338         B77       F44       NC258       VA14       NC350         B79       F6       NC260       VA17       NC358         B84       F7       NC262       VA26       ND246         B97       FBLA       NC264       VA35       Oh43         C103       GA209       NC294       VA59       Oh7B	B52	CML61	MS1334	SD44	Ky21	B73xCML103	
B73         CML92         N192         TX601         Mo17           B73-bm1         CO106         N28HT         TZI10         Mo18W           B73-bm2         CO125         N6         TZI16         MS1334           B73-bm3         CO255         NC222         TZI25         MS71           B73-bm4         DE811         NC230         TZI8         NC230           B73HTRHM         E2558W         NC232         TZI9         NC250           B75         EP1         NC236         U267Y         NC258           B76         F2834T         NC250         VA102         NC338           B77         F44         NC258         VA14         NC350           B79         F6         NC260         VA17         NC358           B84         F7         NC262         VA26         ND246           B97         FBLA         NC264         VA35         Oh43           C103         GA209         NC294         VA59         Oh7B	B57	CML69	MS71	T234	M162W		
B73-bm1         CO106         N28HT         TZI10         Mo18W           B73-bm2         CO125         N6         TZI16         MS1334           B73-bm3         CO255         NC222         TZI25         MS71           B73-bm4         DE811         NC230         TZI8         NC230           B73HTRHM         E2558W         NC232         TZI9         NC250           B75         EP1         NC236         U267Y         NC258           B76         F2834T         NC250         VA102         NC338           B77         F44         NC258         VA14         NC350           B79         F6         NC260         VA17         NC358           B84         F7         NC262         VA26         ND246           B97         FBLA         NC264         VA35         Oh43           C103         GA209         NC294         VA59         Oh7B	B64	CML91	MT42	TX303	M37W		
B73-bm2       CO125       N6       TZI16       MS1334         B73-bm3       CO255       NC222       TZI25       MS71         B73-bm4       DE811       NC230       TZI8       NC230         B73HTRHM       E2558W       NC232       TZI9       NC250         B75       EP1       NC236       U267Y       NC258         B76       F2834T       NC250       VA102       NC338         B77       F44       NC258       VA14       NC350         B79       F6       NC260       VA17       NC358         B84       F7       NC262       VA26       ND246         B97       FBLA       NC264       VA35       Oh43         C103       GA209       NC294       VA59       Oh7B	B73	CML92	N192	TX601	Mo17		
B73-bm2         CO125         N6         TZI16         MS1334           B73-bm3         CO255         NC222         TZI25         MS71           B73-bm4         DE811         NC230         TZI8         NC230           B73HTRHM         E2558W         NC232         TZI9         NC250           B75         EP1         NC236         U267Y         NC258           B76         F2834T         NC250         VA102         NC338           B77         F44         NC258         VA14         NC350           B79         F6         NC260         VA17         NC358           B84         F7         NC262         VA26         ND246           B97         FBLA         NC264         VA35         Oh43           C103         GA209         NC294         VA59         Oh7B	B73-bm1	CO106	N28HT	TZI10	Mo18W		
B73-bm4         DE811         NC230         TZI8         NC230           B73HTRHM         E2558W         NC232         TZI9         NC250           B75         EP1         NC236         U267Y         NC258           B76         F2834T         NC250         VA102         NC338           B77         F44         NC258         VA14         NC350           B79         F6         NC260         VA17         NC358           B84         F7         NC262         VA26         ND246           B97         FBLA         NC264         VA35         Oh43           C103         GA209         NC294         VA59         Oh7B	B73-bm2	CO125	N6	TZI16	MS1334		
B73HTRHM         E2558W         NC232         TZI9         NC250           B75         EP1         NC236         U267Y         NC258           B76         F2834T         NC250         VA102         NC338           B77         F44         NC258         VA14         NC350           B79         F6         NC260         VA17         NC358           B84         F7         NC262         VA26         ND246           B97         FBLA         NC264         VA35         Oh43           C103         GA209         NC294         VA59         Oh7B	B73-bm3	CO255	NC222	TZI25	MS71		
B75       EP1       NC236       U267Y       NC258         B76       F2834T       NC250       VA102       NC338         B77       F44       NC258       VA14       NC350         B79       F6       NC260       VA17       NC358         B84       F7       NC262       VA26       ND246         B97       FBLA       NC264       VA35       Oh43         C103       GA209       NC294       VA59       Oh7B	B73-bm4	DE811	NC230	TZI8	NC230		
B75       EP1       NC236       U267Y       NC258         B76       F2834T       NC250       VA102       NC338         B77       F44       NC258       VA14       NC350         B79       F6       NC260       VA17       NC358         B84       F7       NC262       VA26       ND246         B97       FBLA       NC264       VA35       Oh43         C103       GA209       NC294       VA59       Oh7B	B73HTRHM	E2558W	NC232	TZI9	NC250		
B76       F2834T       NC250       VA102       NC338         B77       F44       NC258       VA14       NC350         B79       F6       NC260       VA17       NC358         B84       F7       NC262       VA26       ND246         B97       FBLA       NC264       VA35       Oh43         C103       GA209       NC294       VA59       Oh7B	B75	EP1	NC236		NC258		
B77 F44 NC258 VA14 NC350 B79 F6 NC260 VA17 NC358 B84 F7 NC262 VA26 ND246 B97 FBLA NC264 VA35 Oh43 C103 GA209 NC294 VA59 Oh7B							
B79 F6 NC260 VA17 NC358 B84 F7 NC262 VA26 ND246 B97 FBLA NC264 VA35 Oh43 C103 GA209 NC294 VA59 Oh7B							
B84 F7 NC262 VA26 ND246 B97 FBLA NC264 VA35 Oh43 C103 GA209 NC294 VA59 Oh7B							
B97 FBLA NC264 VA35 Oh43 C103 GA209 NC294 VA59 Oh7B							
C103 GA209 NC294 VA59 Oh7B							
C49A H84 NC300 VA99 Tx303							
CH70130 H99 NC302 VAW6 TZI16							
CH9 HI27 NC304 W182B TZI25							

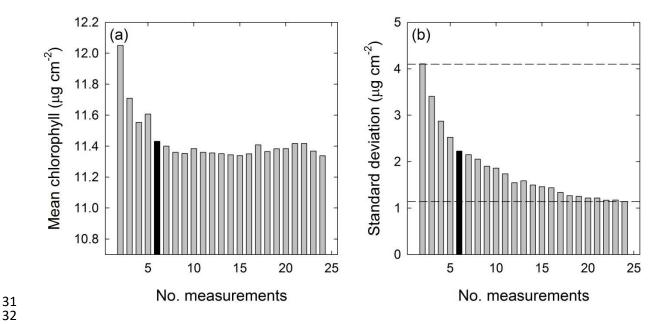
CI21E	HP301	NC306	W22	Tzi8	
CI28A	HY	NC314	W64A	TZI9	
CI31A	I137TN	NC314 NC318	WF9	VA14	
			WF9		
CI64	I205	NC320		VA17	
				W/64A	

Supplemental Table 5. Seasonal average daily [O<sub>3</sub>] exposure at the SoyFACE facility in 2013, 2014 and
 2015.

	2013	2014		2015		
	Inbred	Inbred	Hybrid	Inbred	Hybrid	
Ambient [O <sub>3</sub> ]						
8 hr ave ( $nL L^{-1}$ )	40.80	40.04	40.04	39.81	39.81	
AOT40 (ppm h)	4.54	4.87	4.87	4.86	4.86	
SUM06 (ppm h)	0.87	3.55	3.55	2.91	2.91	
Elevated [O <sub>3</sub> ]						
8 hr ave ( $nL L^{-1}$ )	70.85	69.68	70.21	62.30	61.64	
AOT40 (ppm h)	34.86	39.12	38.19	29.37	28.93	
SUM06 (ppm h)	56.38	63.72	62.29	47.28	47.04	



**Supplemental Figure 1**. Mean measured and PLSR-modeled leaf traits +/- 1 standard deviation for maize genotypes B73, B73 x Mo17 and Mo17. Genotypes were grown in the field at ambient and elevated [O<sub>3</sub>] and sampled for both 'gold-standard' measurements of leaf traits and for leaf reflectance from which PLSR-modeled traits were estimated.



**Supplemental Figure 2.** Bootstrap estimate of mean chlorophyll content and standard deviation from 1 to 24 spectra taken on an individual leaf. Based on this analysis, it was determined that 6 spectra per leaf were required to accurately estimate the mean value and reduce the standard deviation and amount of time needed to gather one replicate.