Supplementary Information for

Modeling the effects of tropospheric ozone on the growth and yield of global staple crops with DSSAT v4.8.0

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Table S1: Soil lower limit (LL), drained upper limit (DUL), and saturation (SAT) at varying depths for the soil series at the experimental locations simulated. Values determined from USDA Web Soil Survey database (Nrcs, 2023).

Depth (cm)	Champaign, IL Drummer silty clay loam			Champaign, IL Flanagan silt loam			Stuttgart, AR Dewitt silt loam			Maricopa, AZ Trix clay loam		
	LL	DUL	SAT	LL	DUL	SAT	LL	DUL	SAT	LL	DUL	SAT
5	0.171	0.349	0.481	0.136	0.321	0.463	0.166	0.360	0.424	0.202	0.320	0.417
10	0.171	0.349	0.481	0.136	0.321	0.463	0.166	0.360	0.424	0.201	0.319	0.424
15	0.171	0.349	0.481	0.136	0.321	0.463	0.157	0.346	0.425	0.201	0.319	0.424
20	0.171	0.349	0.481	0.136	0.321	0.463	0.157	0.346	0.425	0.199	0.319	0.424
30	0.171	0.349	0.481	0.160	0.342	0.463	0.121	0.290	0.431	0.199	0.319	0.424
40	0.171	0.349	0.478	0.160	0.342	0.463	0.121	0.290	0.431	0.198	0.318	0.419
50	0.171	0.349	0.470	0.178	0.357	0.456	0.121	0.290	0.431	0.198	0.318	0.419
60	0.171	0.349	0.470	0.206	0.382	0.445	0.168	0.342	0.446	0.198	0.318	0.387
70	0.171	0.349	0.470	0.206	0.382	0.445	0.239	0.420	0.468	0.198	0.318	0.387
90	0.171	0.349	0.470	0.193	0.369	0.445	0.239	0.420	0.468	0.186	0.299	0.359
110	0.160	0.332	0.460	0.177	0.354	0.445	0.239	0.420	0.468	0.159	0.275	0.347
130	0.135	0.266	0.409	0.141	0.302	0.387	0.239	0.420	0.468	0.159	0.275	0.347
150	0.131	0.253	0.391	0.121	0.266	0.319	0.239	0.420	0.468	0.136	0.254	0.336
170	0.131	0.253	0.391	0.121	0.266	0.319	0.239	0.420	0.468	0.136	0.254	0.336
190	0.131	0.253	0.391	0.121	0.266	0.319	0.239	0.420	0.468	0.128	0.244	0.331
210	0.131	0.253	0.391	0.121	0.266	0.319	0.239	0.420	0.468	0.128	0.244	0.331

Table S2: CERES-Maize simulated yield (kg ha^{-1}) for sensitivity analysis of FOZ$_1$ values (SFOZ$_1$ = 0.0) for 2018 FACE experiment at Champaign, IL, USA. "Dry" treatment = 50% rainfall and "Wet" treatment = normal rainfall. CO$_2$ was either a constant 350 ppm or 550 ppm. All treatments used cv. B73xHp301.

M7 Ozone (ppb)	Treatment	FOZ$_1$ = 1.0	FOZ$_1$ = 0.9	FOZ$_1$ = 0.8	FOZ$_1$ = 0.7	FOZ$_1$ = 0.6	FOZ$_1$ = 0.5	FOZ$_1$ = 0.4	FOZ$_1$ = 0.3	FOZ$_1$ = 0.2	FOZ$_1$ = 0.1	FOZ$_1$ = 0.0
0	Dry_350ppm	8976	8976	8976	8976	8976	8976	8976	8976	8976	8976	8976
25	Dry_350ppm	8976	8976	8976	8976	8976	8976	8976	8976	8976	8976	8976
40	Dry_350ppm	7697	7826	7958	8088	8221	8359	8490	8631	8760	8894	8976
50	Dry_350ppm	6801	7037	7257	7472	7697	7918	8130	8359	8580	8802	8976
60	Dry_350ppm	5880	6193	6543	6843	7165	7472	7782	8088	8402	8717	8976
70	Dry_350ppm	4939	5356	5797	6193	6632	7037	7422	7826	8221	8631	8976
80	Dry_350ppm	4018	4551	5026	5554	6055	6586	7076	7553	8044	8535	8976
90	Dry_350ppm	2969	3667	4312	4905	5503	6096	6717	7294	7873	8445	8976
100	Dry_350ppm	1652	2744	3501	4260	4939	5660	6338	7037	7697	8359	8976
120	Dry_350ppm	41	399	1492	2828	3827	4728	5611	6483	7338	8175	8976
0	Wet_350ppm	9853	9853	9853	9853	9853	9853	9853	9853	9853	9853	9853
25	Wet_350ppm	9853	9853	9853	9853	9853	9853	9853	9853	9853	9853	9853
40	Wet_350ppm	8458	8605	8752	8899	9046	9192	9337	9479	9622	9765	9853
50	Wet_350ppm	7472	7718	7965	8211	8458	8703	8948	9192	9432	9670	9853
60	Wet_350ppm	6488	6833	7178	7521	7866	8211	8556	8899	9240	9574	9853
70	Wet_350ppm	5484	5944	6389	6833	7276	7718	8162	8605	9046	9479	9853
80	Wet_350ppm	4324	4982	5586	6145	6685	7227	7767	8310	8850	9384	9853
90	Wet_350ppm	2934	3904	4686	5431	6095	6735	7375	8014	8654	9289	9853
100	Wet_350ppm	1435	2606	3653	4626	5484	6243	6980	7718	8458	9192	9853
120	Wet_350ppm	41	384	1286	2729	4083	5207	6194	7129	8063	8997	9853
0	Dry_550ppm	9612	9612	9612	9612	9612	9612	9612	9612	9612	9612	9612
25	Dry_550ppm	9612	9612	9612	9612	9612	9612	9612	9612	9612	9612	9612
40	Dry_550ppm	8557	8705	8845	8998	9150	9307	9463	9612	9612	9612	9612
50	Dry_550ppm	7547	7791	8045	8298	8557	8801	9050	9307	9568	9612	9612
60	Dry_550ppm	6531	6898	7257	7593	7942	8298	8655	8998	9357	9612	9612
70	Dry_550ppm	5497	5959	6429	6898	7358	7791	8248	8705	9150	9612	9612
80	Dry_550ppm	4414	5028	5607	6169	6749	7306	7839	8405	8948	9515	9612
90	Dry_550ppm	3260	4049	4722	5442	6113	6796	7449	8093	8754	9408	9612
100	Dry_550ppm	1931	3006	3880	4677	5497	6278	7048	7791	8557	9307	9612
120	Dry_550ppm	46	466	1762	3109	4208	5233	6223	7212	8141	9100	9612
0	Wet_550ppm	10242	10242	10242	10242	10242	10242	10242	10242	10242	10242	10242
25	Wet_550ppm	10242	10242	10242	10242	10242	10242	10242	10242	10242	10242	10242
40	Wet_550ppm	9158	9316	9471	9626	9780	9935	10090	10242	10242	10242	10242
50	Wet_550ppm	8094	8362	8628	8894	9158	9420	9677	9935	10194	10242	10242
60	Wet_550ppm	7028	7400	7772	8147	8522	8894	9264	9626	9987	10242	10242
70	Wet_550ppm	5958	6440	6921	7400	7880	8362	8841	9316	9780	10242	10242
80	Wet_550ppm	4786	5460	6068	6654	7241	7826	8415	9000	9574	10142	10242
90	Wet_550ppm	3385	4331	5158	5904	6600	7294	7987	8681	9368	10038	10242
100	Wet_550ppm	1766	2978	4135	5098	5958	6761	7559	8362	9158	9935	10242
120	Wet_550ppm	46	445	1578	3126	4528	5683	6708	7719	8734	9729	10242

Table S3: CERES-Maize simulated yield (kg ha^{-1}) for sensitivity analysis of SFOZ$_1$ values (FOZ$_1$ = 0.0) for 2018 FACE experiment at Champaign, IL, USA. “Dry” treatment = 50% rainfall and “Wet” treatment = normal rainfall. CO$_2$ was either a constant 350 ppm or 550 ppm. All treatments used cv. B73xHp301.

M7 Ozone (ppb)	Treatment	SFOZ$_1$ = 1.0	SFOZ$_1$ = 0.9	SFOZ$_1$ = 0.8	SFOZ$_1$ = 0.7	SFOZ$_1$ = 0.6	SFOZ$_1$ = 0.5	SFOZ$_1$ = 0.4	SFOZ$_1$ = 0.3	SFOZ$_1$ = 0.2	SFOZ$_1$ = 0.1	SFOZ$_1$ = 0.0
0	Dry_350ppm	8976	8976	8976	8976	8976	8976	8976	8976	8976	8976	8976
25	Dry_350ppm	8976	8976	8976	8976	8976	8976	8976	8976	8976	8976	8976
40	Dry_350ppm	8400	8432	8509	8572	8625	8708	8782	8883	8956	8966	8976
50	Dry_350ppm	7996	8076	8186	8325	8400	8473	8589	8708	8856	8960	8976
60	Dry_350ppm	6483	6979	7553	8011	8128	8325	8425	8572	8731	8934	8976
70	Dry_350ppm	4776	5492	6294	6979	7725	8076	8300	8432	8625	8883	8976
80	Dry_350ppm	3485	4044	4887	5867	6746	7591	8091	8357	8547	8831	8976
90	Dry_350ppm	2527	3136	3816	4722	5808	6859	7798	8208	8454	8755	8976
100	Dry_350ppm	1852	2379	2929	3773	4776	6049	7176	8076	8400	8708	8976
120	Dry_350ppm	972	1289	1809	2437	3251	4398	5991	7442	8234	8610	8976
0	Wet_350ppm	9853	9853	9853	9853	9853	9853	9853	9853	9853	9853	9853
25	Wet_350ppm	9853	9853	9853	9853	9853	9853	9853	9853	9853	9853	9853
40	Wet_350ppm	9004	9119	9231	9340	9446	9548	9648	9744	9828	9841	9853
50	Wet_350ppm	8173	8389	8600	8806	9004	9194	9375	9548	9713	9833	9853
60	Wet_350ppm	6222	6928	7652	8217	8516	8806	9081	9340	9582	9805	9853
70	Wet_350ppm	4497	5246	6033	6928	7832	8389	8765	9119	9446	9744	9853
80	Wet_350ppm	3360	3898	4714	5609	6549	7787	8431	8886	9304	9681	9853
90	Wet_350ppm	2437	2930	3679	4444	5550	6740	7921	8642	9157	9615	9853
100	Wet_350ppm	1789	2296	2824	3637	4497	5794	7224	8389	9004	9548	9853
120	Wet_350ppm	1017	1250	1747	2351	3134	4241	5735	7545	8683	9411	9853
0	Dry_550ppm	9612	9612	9612	9612	9612	9612	9612	9612	9612	9612	9612
25	Dry_550ppm	9612	9612	9612	9612	9612	9612	9612	9612	9612	9612	9612
40	Dry_550ppm	8931	9000	9080	9156	9239	9325	9424	9519	9594	9605	9612
50	Dry_550ppm	8523	8614	8737	8823	8931	9057	9181	9325	9490	9599	9612
60	Dry_550ppm	6843	7532	8142	8547	8673	8823	8978	9156	9355	9574	9612
70	Dry_550ppm	5045	5863	6724	7532	8199	8614	8812	9000	9239	9519	9612
80	Dry_550ppm	3687	4438	5162	6246	7274	8170	8631	8864	9134	9459	9612
90	Dry_550ppm	2756	3321	4034	4988	6118	7370	8467	8755	9016	9385	9612
100	Dry_550ppm	1966	2524	3206	3988	5045	6366	7729	8614	8931	9325	9612
120	Dry_550ppm	1105	1458	1919	2585	3520	4648	6306	7999	8779	9212	9612
0	Wet_550ppm	10242	10242	10242	10242	10242	10242	10242	10242	10242	10242	10242
25	Wet_550ppm	10242	10242	10242	10242	10242	10242	10242	10242	10242	10242	10242
40	Wet_550ppm	9376	9492	9606	9717	9825	9930	10032	10130	10216	10230	10242
50	Wet_550ppm	8540	8760	8970	9176	9376	9568	9753	9930	10098	10221	10242
60	Wet_550ppm	6624	7321	8098	8584	8887	9176	9453	9717	9965	10193	10242
70	Wet_550ppm	4851	5580	6407	7321	8189	8760	9135	9492	9825	10130	10242
80	Wet_550ppm	3541	4107	4964	5963	7006	8143	8803	9257	9680	10066	10242
90	Wet_550ppm	2575	3189	3876	4796	5833	7068	8450	9012	9530	9999	10242
100	Wet_550ppm	1890	2425	2981	3832	4851	6150	7652	8760	9376	9930	10242
120	Wet_550ppm	1071	1406	1845	2484	3305	4467	6024	7956	9053	9789	10242

Table S4: CERES-Rice simulated yield (kg ha^{-1}) for sensitivity analysis of FOZ$_1$ values (SFOZ$_1$ = 0.0) for 2009 experiment at Stuttgart, AR, USA. “Dry” treatment = 50% rainfall and “Wet” treatment = normal rainfall. CO$_2$ was either a constant 350 ppm or 550 ppm. All treatments used the default DSSAT cv. N. America.

M7 Ozone (ppb)	Treatment	FOZ$_1$ = 1.0	FOZ$_1$ = 0.9	FOZ$_1$ = 0.8	FOZ$_1$ = 0.7	FOZ$_1$ = 0.6	FOZ$_1$ = 0.5	FOZ$_1$ = 0.4	FOZ$_1$ = 0.3	FOZ$_1$ = 0.2	FOZ$_1$ = 0.1	FOZ$_1$ = 0.0
0	Dry_350ppm	11299	11299	11299	11299	11299	11299	11299	11299	11299	11299	11299
25	Dry_350ppm	11299	11299	11299	11299	11299	11299	11299	11299	11299	11299	11299
40	Dry_350ppm	10143	10297	10450	10609	10765	10902	11010	11113	11215	11298	11299
50	Dry_350ppm	8959	9262	9588	9862	10143	10410	10657	10902	11067	11271	11299
60	Dry_350ppm	7554	8251	8642	9012	9443	9862	10269	10609	10939	11187	11299
70	Dry_350ppm	6069	6851	7438	8251	8739	9262	9801	10297	10765	11113	11299
80	Dry_350ppm	4347	5239	6258	7137	8069	8698	9320	9970	10556	11034	11299
90	Dry_350ppm	2877	3847	4802	5986	7077	8123	8850	9645	10363	10976	11299
100	Dry_350ppm	1393	2487	3626	4689	6069	7270	8409	9262	10143	10902	11299
120	Dry_350ppm	25	270	1162	2637	4074	5622	7203	8583	9704	10713	11299
0	Wet_350ppm	12616	12616	12616	12616	12616	12616	12616	12616	12616	12616	12616
25	Wet_350ppm	12616	12616	12616	12616	12616	12616	12616	12616	12616	12616	12616
40	Wet_350ppm	11225	11397	11570	11734	11915	12059	12234	12405	12553	12615	12616
50	Wet_350ppm	9863	10221	10554	10912	11225	11517	11793	12059	12355	12581	12616
60	Wet_350ppm	8337	8916	9445	9932	10422	10912	11339	11734	12145	12516	12616
70	Wet_350ppm	6067	6872	7657	8916	9580	10221	10845	11397	11915	12405	12616
80	Wet_350ppm	4539	5359	6230	7223	8684	9517	10288	11045	11682	12298	12616
90	Wet_350ppm	2951	3965	4999	5989	7140	8778	9723	10620	11453	12182	12616
100	Wet_350ppm	1473	2542	3721	4922	6067	7397	9135	10221	11225	12059	12616
120	Wet_350ppm	25	280	1241	2706	4205	5659	7313	9354	10695	11861	12616
0	Dry_550ppm	13054	13054	13054	13054	13054	13054	13054	13054	13054	13054	13054
25	Dry_550ppm	13054	13054	13054	13054	13054	13054	13054	13054	13054	13054	13054
40	Dry_550ppm	12997	13054	13054	13054	13054	13054	13054	13054	13054	13054	13054
50	Dry_550ppm	12048	12350	12617	12874	12997	13054	13054	13054	13054	13054	13054
60	Dry_550ppm	10670	11234	11658	12077	12521	12874	13054	13054	13054	13054	13054
70	Dry_550ppm	9064	9712	10500	11234	11718	12350	12820	13054	13054	13054	13054
80	Dry_550ppm	7026	8335	9208	10058	10961	11709	12408	12968	13054	13054	13054
90	Dry_550ppm	4614	6150	7675	8976	9983	11064	11962	12661	13054	13054	13054
100	Dry_550ppm	2621	4150	5780	7585	9064	10227	11456	12350	12997	13054	13054
120	Dry_550ppm	43	462	2420	4353	6520	8646	10144	11610	12686	13054	13054
0	Wet_550ppm	14106	14106	14106	14106	14106	14106	14106	14106	14106	14106	14106
25	Wet_550ppm	14106	14106	14106	14106	14106	14106	14106	14106	14106	14106	14106
40	Wet_550ppm	14096	14106	14106	14106	14106	14106	14106	14106	14106	14106	14106
50	Wet_550ppm	13094	13411	13675	13931	14096	14106	14106	14106	14106	14106	14106
60	Wet_550ppm	11483	12092	12658	13175	13567	13931	14106	14106	14106	14106	14106
70	Wet_550ppm	9702	10575	11329	12092	12813	13411	13901	14106	14106	14106	14106
80	Wet_550ppm	6924	8738	9899	10905	11846	12728	13462	14017	14106	14106	14106
90	Wet_550ppm	4789	6095	7624	9610	10824	11925	12967	13755	14106	14106	14106
100	Wet_550ppm	2669	4244	5788	7512	9702	11068	12340	13411	14096	14106	14106
120	Wet_550ppm	43	494	2457	4467	6422	9194	10990	12575	13792	14106	14106

Table S5: CERES-Rice simulated yield (kg ha^{-1}) for sensitivity analysis of SFOZ$_1$ values (FOZ$_1$ = 0.0) for 2009 experiment at Stuttgart, AR, USA. “Dry” treatment = 50% rainfall and “Wet” treatment = normal rainfall. CO$_2$ was either a constant 350 ppm or 550 ppm. All treatments used the default DSSAT cv. N. America.

M7 Ozone (ppb)	Treatment	SFOZ$_1$ = 1.0	SFOZ$_1$ = 0.9	SFOZ$_1$ = 0.8	SFOZ$_1$ = 0.7	SFOZ$_1$ = 0.6	SFOZ$_1$ = 0.5	SFOZ$_1$ = 0.4	SFOZ$_1$ = 0.3	SFOZ$_1$ = 0.2	SFOZ$_1$ = 0.1	SFOZ$_1$ = 0.0
0	Dry_350ppm	11299	11299	11299	11299	11299	11299	11299	11299	11299	11299	11299
25	Dry_350ppm	11299	11299	11299	11299	11299	11299	11299	11299	11299	11299	11299
40	Dry_350ppm	10832	10912	10987	11058	11159	11213	11243	11259	11270	11277	11299
50	Dry_350ppm	10308	10450	10565	10688	10832	10960	11120	11213	11255	11278	11299
60	Dry_350ppm	9869	10039	10104	10310	10505	10688	10884	11058	11225	11270	11299
70	Dry_350ppm	9642	9643	9817	10039	10189	10450	10662	10912	11159	11259	11299
80	Dry_350ppm	9686	9599	9661	9659	9963	10126	10451	10742	11035	11250	11299
90	Dry_350ppm	9520	9572	9572	9649	9631	9988	10218	10592	10936	11236	11299
100	Dry_350ppm	9440	9507	9570	9640	9642	9720	10102	10450	10832	11213	11299
120	Dry_350ppm	9370	9399	9468	9524	9617	9617	9688	10099	10621	11140	11299
0	Wet_350ppm	12616	12616	12616	12616	12616	12616	12616	12616	12616	12616	12616
25	Wet_350ppm	12616	12616	12616	12616	12616	12616	12616	12616	12616	12616	12616
40	Wet_350ppm	12106	12177	12263	12323	12401	12452	12480	12531	12575	12608	12616
50	Wet_350ppm	11347	11553	11798	11970	12106	12202	12341	12452	12528	12582	12616
60	Wet_350ppm	10818	11115	11103	11386	11666	11970	12153	12323	12449	12580	12616
70	Wet_350ppm	10789	10786	10777	11115	11178	11553	11910	12177	12401	12531	12616
80	Wet_350ppm	10944	10795	10803	10761	10976	11127	11589	12001	12280	12516	12616
90	Wet_350ppm	10632	10840	10935	10846	10734	11051	11255	11817	12182	12464	12616
100	Wet_350ppm	10513	10608	10794	10920	10789	10760	11231	11553	12106	12452	12616
120	Wet_350ppm	10413	10457	10487	10583	10885	10798	10769	11074	11874	12360	12616
0	Dry_550ppm	13054	13054	13054	13054	13054	13054	13054	13054	13054	13054	13054
25	Dry_550ppm	13054	13054	13054	13054	13054	13054	13054	13054	13054	13054	13054
40	Dry_550ppm	12677	12746	12803	12844	12887	12919	12925	12973	13029	13063	13054
50	Dry_550ppm	12150	12340	12481	12530	12677	12786	12856	12919	12953	13034	13054
60	Dry_550ppm	11759	11943	12047	12239	12440	12530	12716	12844	12899	13020	13054
70	Dry_550ppm	11489	11468	11708	11943	12109	12340	12529	12746	12887	12973	13054
80	Dry_550ppm	11573	11433	11483	11586	11855	12087	12370	12598	12833	12939	13054
90	Dry_550ppm	11335	11505	11448	11494	11557	11896	12149	12498	12764	12914	13054
100	Dry_550ppm	11215	11310	11456	11523	11489	11631	12037	12340	12677	12919	13054
120	Dry_550ppm	11116	11161	11250	11342	11555	11462	11614	12023	12514	12872	13054
0	Wet_550ppm	14106	14106	14106	14106	14106	14106	14106	14106	14106	14106	14106
25	Wet_550ppm	14106	14106	14106	14106	14106	14106	14106	14106	14106	14106	14106
40	Wet_550ppm	13697	13785	13857	13883	13926	13964	14011	14065	14094	14102	14106
50	Wet_550ppm	13204	13396	13511	13617	13697	13803	13895	13964	14055	14100	14106
60	Wet_550ppm	12674	12895	13019	13277	13452	13617	13737	13883	13982	14091	14106
70	Wet_550ppm	12183	12248	12564	12895	13075	13396	13595	13785	13926	14065	14106
80	Wet_550ppm	12223	12232	12181	12373	12778	13046	13438	13639	13834	14034	14106
90	Wet_550ppm	12006	12264	12197	12186	12342	12855	13145	13552	13776	13997	14106
100	Wet_550ppm	11841	11974	12206	12172	12183	12433	13006	13396	13697	13964	14106
120	Wet_550ppm	11689	11756	11880	11945	12320	12201	12403	12991	13547	13896	14106

Table S6: CROPGRO-Soybean simulated yield (kg ha^{-1}) for sensitivity analysis of FOZ_1 values ($SFOZ_1$ = 0.0) for 2010 SoyFACE experiment at Champaign, IL, USA. "Dry" treatment = 50% rainfall and "Wet" treatment = normal rainfall. CO_2 was either a constant 350 ppm or 550 ppm. All treatments used cv. Dwight93B.

M7 Ozone (ppb)	Treatment	FOZ_1 = 1.0	FOZ_1 = 0.9	FOZ_1 = 0.8	FOZ_1 = 0.7	FOZ_1 = 0.6	FOZ_1 = 0.5	FOZ_1 = 0.4	FOZ_1 = 0.3	FOZ_1 = 0.2	FOZ_1 = 0.1	FOZ_1 = 0.0
0	Dry_350ppm	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939
25	Dry_350ppm	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939
40	Dry_350ppm	1694	1726	1759	1793	1827	1859	1893	1927	1939	1939	1939
50	Dry_350ppm	1488	1531	1582	1638	1694	1748	1805	1859	1916	1939	1939
60	Dry_350ppm	1307	1372	1429	1497	1561	1638	1716	1794	1870	1939	1939
70	Dry_350ppm	1136	1209	1293	1372	1449	1531	1627	1726	1827	1927	1939
80	Dry_350ppm	948	1051	1149	1247	1346	1438	1541	1661	1782	1904	1939
90	Dry_350ppm	575	824	1007	1128	1237	1356	1467	1594	1737	1881	1939
100	Dry_350ppm	190	451	774	997	1136	1269	1391	1531	1694	1859	1939
120	Dry_350ppm	4	41	166	500	873	1085	1256	1419	1605	1816	1939
0	Wet_350ppm	3948	3948	3948	3948	3948	3948	3948	3948	3948	3948	3948
25	Wet_350ppm	3948	3948	3948	3948	3948	3948	3948	3948	3948	3948	3948
40	Wet_350ppm	3319	3405	3492	3578	3659	3746	3830	3916	3948	3948	3948
50	Wet_350ppm	2761	2895	3034	3178	3319	3463	3605	3746	3888	3948	3948
60	Wet_350ppm	2229	2412	2596	2787	2979	3178	3377	3578	3774	3948	3948
70	Wet_350ppm	1681	1934	2175	2412	2654	2895	3148	3405	3659	3916	3948
80	Wet_350ppm	1145	1436	1737	2042	2334	2622	2924	3235	3549	3859	3948
90	Wet_350ppm	559	946	1298	1653	2015	2360	2708	3063	3434	3802	3948
100	Wet_350ppm	191	441	857	1273	1681	2095	2490	2895	3319	3746	3948
120	Wet_350ppm	5	41	167	486	1041	1545	2069	2569	3093	3633	3948
0	Dry_550ppm	2716	2716	2716	2716	2716	2716	2716	2716	2716	2716	2716
25	Dry_550ppm	2716	2716	2716	2716	2716	2716	2716	2716	2716	2716	2716
40	Dry_550ppm	2716	2716	2716	2716	2716	2716	2716	2716	2716	2716	2716
50	Dry_550ppm	2561	2655	2716	2716	2716	2716	2716	2716	2716	2716	2716
60	Dry_550ppm	2169	2305	2442	2577	2713	2716	2716	2716	2716	2716	2716
70	Dry_550ppm	1775	1935	2130	2305	2483	2655	2716	2716	2716	2716	2716
80	Dry_550ppm	1452	1617	1808	2034	2251	2463	2675	2716	2716	2716	2716
90	Dry_550ppm	1140	1353	1545	1759	2014	2269	2523	2716	2716	2716	2716
100	Dry_550ppm	594	1055	1293	1530	1775	2074	2364	2655	2716	2716	2716
120	Dry_550ppm	9	103	527	1100	1396	1692	2054	2421	2716	2716	2716
0	Wet_550ppm	4700	4700	4700	4700	4700	4700	4700	4700	4700	4700	4700
25	Wet_550ppm	4700	4700	4700	4700	4700	4700	4700	4700	4700	4700	4700
40	Wet_550ppm	4700	4700	4700	4700	4700	4700	4700	4700	4700	4700	4700
50	Wet_550ppm	4393	4581	4700	4700	4700	4700	4700	4700	4700	4700	4700
60	Wet_550ppm	3624	3899	4169	4431	4693	4700	4700	4700	4700	4700	4700
70	Wet_550ppm	2849	3192	3547	3899	4245	4581	4700	4700	4700	4700	4700
80	Wet_550ppm	2114	2516	2923	3350	3780	4206	4619	4700	4700	4700	4700
90	Wet_550ppm	1364	1854	2333	2810	3311	3821	4319	4700	4700	4700	4700
100	Wet_550ppm	571	1190	1742	2298	2849	3430	4015	4581	4700	4700	4700
120	Wet_550ppm	9	104	503	1257	1965	2664	3390	4129	4700	4700	4700

Table S7: CROPGRO-Soybean simulated yield (kg ha^{-1}) for sensitivity analysis of SFOZ$_1$ values (FOZ$_1$ = 0.0) for 2010 SoyFACE experiment at Champaign, IL, USA. “Dry” treatment = 50% rainfall and “Wet” treatment = normal rainfall. CO$_2$ was either a constant 350 ppm or 550 ppm. All treatments used cv. Dwight93B.

M7 Ozone (ppb)	Treatment	SFOZ$_1$ = 1.0	SFOZ$_1$ = 0.9	SFOZ$_1$ = 0.8	SFOZ$_1$ = 0.7	SFOZ$_1$ = 0.6	SFOZ$_1$ = 0.5	SFOZ$_1$ = 0.4	SFOZ$_1$ = 0.3	SFOZ$_1$ = 0.2	SFOZ$_1$ = 0.1	SFOZ$_1$ = 0.0
0	Dry_350ppm	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939
25	Dry_350ppm	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939	1939
40	Dry_350ppm	1686	1713	1738	1763	1783	1806	1829	1855	1881	1907	1939
50	Dry_350ppm	1573	1595	1622	1656	1686	1729	1770	1806	1845	1890	1939
60	Dry_350ppm	1469	1513	1547	1581	1609	1656	1704	1763	1815	1871	1939
70	Dry_350ppm	1150	1346	1455	1513	1557	1595	1651	1713	1783	1855	1939
80	Dry_350ppm	789	976	1192	1407	1493	1553	1597	1659	1752	1837	1939
90	Dry_350ppm	526	687	887	1130	1394	1499	1561	1628	1721	1822	1939
100	Dry_350ppm	344	473	646	870	1150	1430	1527	1595	1686	1806	1939
120	Dry_350ppm	140	216	329	494	729	1052	1418	1541	1635	1774	1939
0	Wet_350ppm	3948	3948	3948	3948	3948	3948	3948	3948	3948	3948	3948
25	Wet_350ppm	3948	3948	3948	3948	3948	3948	3948	3948	3948	3948	3948
40	Wet_350ppm	2876	2981	3081	3186	3291	3394	3501	3610	3721	3833	3948
50	Wet_350ppm	2209	2368	2534	2704	2876	3049	3221	3394	3573	3757	3948
60	Wet_350ppm	1630	1819	2022	2241	2467	2704	2945	3186	3430	3683	3948
70	Wet_350ppm	1158	1360	1579	1819	2082	2368	2670	2981	3291	3610	3948
80	Wet_350ppm	793	980	1201	1453	1736	2051	2400	2773	3152	3537	3948
90	Wet_350ppm	532	691	892	1137	1430	1763	2145	2568	3014	3466	3948
100	Wet_350ppm	350	479	650	874	1158	1502	1904	2368	2876	3394	3948
120	Wet_350ppm	144	222	336	500	733	1057	1478	1992	2603	3257	3948
0	Dry_550ppm	2716	2716	2716	2716	2716	2716	2716	2716	2716	2716	2716
25	Dry_550ppm	2716	2716	2716	2716	2716	2716	2716	2716	2716	2716	2716
40	Dry_550ppm	2280	2320	2364	2408	2455	2501	2547	2588	2637	2674	2716
50	Dry_550ppm	2097	2129	2180	2221	2280	2350	2424	2501	2575	2650	2716
60	Dry_550ppm	1952	1998	2045	2105	2160	2221	2306	2408	2514	2622	2716
70	Dry_550ppm	1620	1840	1938	1998	2063	2129	2210	2320	2455	2588	2716
80	Dry_550ppm	1165	1402	1672	1900	1979	2054	2139	2242	2392	2561	2716
90	Dry_550ppm	818	1032	1290	1594	1886	1986	2081	2190	2334	2531	2716
100	Dry_550ppm	564	748	980	1268	1620	1920	2016	2129	2280	2501	2716
120	Dry_550ppm	246	371	543	775	1087	1496	1912	2043	2203	2440	2716
0	Wet_550ppm	4700	4700	4700	4700	4700	4700	4700	4700	4700	4700	4700
25	Wet_550ppm	4700	4700	4700	4700	4700	4700	4700	4700	4700	4700	4700
40	Wet_550ppm	3568	3680	3786	3895	4007	4121	4236	4352	4466	4582	4700
50	Wet_550ppm	2847	3025	3206	3388	3568	3750	3932	4121	4314	4505	4700
60	Wet_550ppm	2188	2406	2639	2883	3134	3388	3642	3895	4159	4428	4700
70	Wet_550ppm	1633	1868	2128	2406	2708	3025	3348	3680	4007	4352	4700
80	Wet_550ppm	1172	1413	1685	1982	2311	2674	3061	3458	3859	4275	4700
90	Wet_550ppm	821	1037	1298	1607	1953	2341	2779	3241	3715	4198	4700
100	Wet_550ppm	568	749	983	1277	1633	2040	2505	3025	3568	4121	4700
120	Wet_550ppm	254	378	548	777	1092	1507	2011	2606	3276	3969	4700

Table S8: NWheat simulated yield (kg ha^{-1}) for sensitivity analysis of FOZ_1 values ($SFOZ_1$ = 0.0) for 1993 FACE experiment at Maricopa, AZ, USA. “Dry” treatment = low irrigation and “Wet” treatment = high irrigation. CO_2 was either a constant 350 ppm or 550 ppm. All treatments used cv. Yecora.

M7 Ozone (ppb)	Treatment	FOZ_1 = 1.0	FOZ_1 = 0.9	FOZ_1 = 0.8	FOZ_1 = 0.7	FOZ_1 = 0.6	FOZ_1 = 0.5	FOZ_1 = 0.4	FOZ_1 = 0.3	FOZ_1 = 0.2	FOZ_1 = 0.1	FOZ_1 = 0.0
0	Dry_350ppm	7088	7088	7088	7088	7088	7088	7088	7088	7088	7088	7088
25	Dry_350ppm	7088	7088	7088	7088	7088	7088	7088	7088	7088	7088	7088
40	Dry_350ppm	6612	6759	6881	6971	7018	7044	7056	7071	7076	7085	7088
50	Dry_350ppm	5599	5860	6118	6367	6612	6845	6989	7044	7067	7079	7088
60	Dry_350ppm	4467	4873	5272	5652	6016	6367	6710	6971	7048	7077	7088
70	Dry_350ppm	3275	3822	4350	4873	5382	5860	6318	6759	7018	7071	7088
80	Dry_350ppm	1760	2617	3399	4059	4700	5327	5912	6466	6945	7063	7088
90	Dry_350ppm	626	1286	2216	3211	3999	4758	5492	6170	6804	7050	7088
100	Dry_350ppm	154	455	1107	2138	3275	4176	5046	5860	6612	7044	7088
120	Dry_350ppm	7	25	131	518	1480	2934	4118	5215	6220	7012	7088
0	Wet_350ppm	8281	8281	8281	8281	8281	8281	8281	8281	8281	8281	8281
25	Wet_350ppm	8281	8281	8281	8281	8281	8281	8281	8281	8281	8281	8281
40	Wet_350ppm	6725	6883	7041	7198	7355	7511	7667	7823	7977	8129	8281
50	Wet_350ppm	5650	5924	6194	6461	6725	6988	7250	7511	7771	8028	8281
60	Wet_350ppm	4489	4899	5309	5706	6086	6461	6830	7198	7563	7926	8281
70	Wet_350ppm	3300	3846	4373	4899	5422	5924	6408	6883	7355	7823	8281
80	Wet_350ppm	1780	2640	3423	4083	4723	5366	5978	6567	7146	7719	8281
90	Wet_350ppm	639	1302	2238	3236	4024	4782	5536	6247	6936	7615	8281
100	Wet_350ppm	157	465	1122	2159	3300	4200	5074	5924	6725	7511	8281
120	Wet_350ppm	7	26	134	529	1498	2958	4142	5250	6301	7303	8281
0	Dry_550ppm	8737	8737	8737	8737	8737	8737	8737	8737	8737	8737	8737
25	Dry_550ppm	8737	8737	8737	8737	8737	8737	8737	8737	8737	8737	8737
40	Dry_550ppm	8594	8663	8710	8735	8737	8737	8737	8737	8737	8737	8737
50	Dry_550ppm	7525	7824	8111	8386	8594	8698	8737	8737	8737	8737	8737
60	Dry_550ppm	6259	6713	7157	7585	7996	8386	8645	8735	8737	8737	8737
70	Dry_550ppm	4860	5515	6128	6713	7282	7824	8332	8663	8737	8737	8737
80	Dry_550ppm	3384	4202	5006	5793	6520	7220	7881	8484	8728	8737	8737
90	Dry_550ppm	1553	2794	3834	4787	5725	6585	7404	8166	8681	8737	8737
100	Dry_550ppm	378	1158	2491	3760	4860	5927	6904	7824	8594	8737	8737
120	Dry_550ppm	7	48	318	1308	3067	4493	5860	7094	8221	8737	8737
0	Wet_550ppm	9425	9425	9425	9425	9425	9425	9425	9425	9425	9425	9425
25	Wet_550ppm	9425	9425	9425	9425	9425	9425	9425	9425	9425	9425	9425
40	Wet_550ppm	8864	9048	9229	9410	9425	9425	9425	9425	9425	9425	9425
50	Wet_550ppm	7604	7925	8241	8554	8864	9169	9425	9425	9425	9425	9425
60	Wet_550ppm	6288	6755	7215	7668	8116	8554	8987	9410	9425	9425	9425
70	Wet_550ppm	4882	5533	6153	6755	7345	7925	8492	9048	9425	9425	9425
80	Wet_550ppm	3410	4228	5028	5813	6556	7280	7989	8678	9350	9425	9425
90	Wet_550ppm	1572	2817	3861	4810	5744	6623	7475	8304	9109	9425	9425
100	Wet_550ppm	386	1173	2514	3786	4882	5949	6953	7925	8864	9425	9425
120	Wet_550ppm	8	49	325	1325	3091	4518	5881	7150	8367	9425	9425

Table S9: NWheat simulated yield (kg ha^{-1}) for sensitivity analysis of SFOZ$_1$ values (FOZ$_1$ = 0.0) for 1993 FACE experiment at Maricopa, AZ, USA. "Dry" treatment = low irrigation and "Wet" treatment = high irrigation. CO$_2$ was either a constant 350 ppm or 550 ppm. All treatments used cv. Yecora.

M7 Ozone (ppb)	Treatment	SFOZ$_1$ = 1.0	SFOZ$_1$ = 0.9	SFOZ$_1$ = 0.8	SFOZ$_1$ = 0.7	SFOZ$_1$ = 0.6	SFOZ$_1$ = 0.5	SFOZ$_1$ = 0.4	SFOZ$_1$ = 0.3	SFOZ$_1$ = 0.2	SFOZ$_1$ = 0.1	SFOZ$_1$ = 0.0
0	Dry_350ppm	7088	7088	7088	7088	7088	7088	7088	7088	7088	7088	7088
25	Dry_350ppm	7088	7088	7088	7088	7088	7088	7088	7088	7088	7088	7088
40	Dry_350ppm	5098	5293	5499	5717	5949	6190	6424	6623	6797	6954	7088
50	Dry_350ppm	4070	4295	4546	4809	5098	5427	5795	6190	6559	6852	7088
60	Dry_350ppm	3238	3526	3814	4113	4447	4809	5227	5717	6274	6742	7088
70	Dry_350ppm	2452	2799	3159	3526	3899	4295	4755	5293	5949	6623	7088
80	Dry_350ppm	1766	2127	2528	2961	3399	3857	4345	4920	5640	6492	7088
90	Dry_350ppm	522	1555	1959	2415	2921	3443	3985	4598	5357	6352	7088
100	Dry_350ppm	488	514	1470	1926	2452	3041	3650	4295	5098	6190	7088
120	Dry_350ppm	421	452	484	517	1646	2267	3001	3773	4647	5871	7088
0	Wet_350ppm	8281	8281	8281	8281	8281	8281	8281	8281	8281	8281	8281
25	Wet_350ppm	8281	8281	8281	8281	8281	8281	8281	8281	8281	8281	8281
40	Wet_350ppm	5632	5830	6040	6263	6496	6744	7007	7281	7570	7893	8281
50	Wet_350ppm	4599	4828	5073	5338	5632	5967	6341	6744	7193	7670	8281
60	Wet_350ppm	3737	4038	4336	4642	4972	5338	5764	6263	6835	7470	8281
70	Wet_350ppm	2883	3266	3652	4038	4424	4828	5283	5830	6496	7281	8281
80	Wet_350ppm	2061	2505	2967	3438	3908	4380	4875	5451	6183	7102	8281
90	Wet_350ppm	573	1793	2299	2841	3395	3952	4512	5124	5896	6923	8281
100	Wet_350ppm	535	563	1683	2259	2883	3524	4167	4828	5632	6744	8281
120	Wet_350ppm	461	496	531	567	1906	2672	3481	4294	5173	6418	8281
0	Dry_550ppm	8737	8737	8737	8737	8737	8737	8737	8737	8737	8737	8737
25	Dry_550ppm	8737	8737	8737	8737	8737	8737	8737	8737	8737	8737	8737
40	Dry_550ppm	6144	6365	6599	6847	7108	7385	7680	7981	8258	8504	8737
50	Dry_550ppm	4994	5249	5522	5816	6144	6517	6934	7385	7886	8338	8737
60	Dry_550ppm	4040	4372	4701	5042	5409	5816	6290	6847	7486	8169	8737
70	Dry_550ppm	3092	3520	3946	4372	4799	5249	5755	6365	7108	7981	8737
80	Dry_550ppm	2199	2676	3187	3712	4228	4750	5300	5942	6758	7785	8737
90	Dry_550ppm	619	1917	2455	3045	3665	4276	4897	5577	6438	7585	8737
100	Dry_550ppm	576	608	1801	2412	3092	3806	4514	5249	6144	7385	8737
120	Dry_550ppm	494	533	572	613	2036	2857	3759	4655	5633	7020	8737
0	Wet_550ppm	9425	9425	9425	9425	9425	9425	9425	9425	9425	9425	9425
25	Wet_550ppm	9425	9425	9425	9425	9425	9425	9425	9425	9425	9425	9425
40	Wet_550ppm	6481	6702	6938	7186	7446	7723	8015	8315	8634	8992	9425
50	Wet_550ppm	5337	5589	5860	6154	6481	6856	7273	7723	8219	8745	9425
60	Wet_550ppm	4378	4717	5046	5384	5749	6154	6628	7186	7824	8524	9425
70	Wet_550ppm	3405	3844	4283	4717	5144	5589	6092	6702	7446	8315	9425
80	Wet_550ppm	2441	2965	3502	4041	4571	5095	5641	6280	7096	8119	9425
90	Wet_550ppm	658	2122	2723	3356	3992	4620	5241	5915	6775	7922	9425
100	Wet_550ppm	615	647	1989	2676	3405	4138	4860	5589	6481	7723	9425
120	Wet_550ppm	530	570	610	652	2257	3160	4090	5000	5970	7358	9425

Table S10: Slope, y-intercept, and O_3 sensitivity for each cultivar determined from the linear regression of the O_3 exposure-yield response data (scaled to 25 ppb M7 O_3) for maize, rice, soybean, and wheat (Fig. S2, S3). The data consists of the cultivars examined in the Mills et al. (2018) literature review combined with the maize and soybean cultivars used in this study for a total of 9 maize cultivars, 50 rice cultivars, 49 soybean cultivars, and 23 wheat cultivars.

Crop	Cultivar	Intercept	Slope	O_3 Sensitivity	Literature References
Maize	B73xHp301	113.0	-0.520	Sensitive	(Choquette et al., 2020)
Maize	B73xMo17	106.8	-0.272	Intermediate	(Choquette et al., 2020)
Maize	B73xNC338	122.4	-0.898	Sensitive	(Choquette et al., 2020)
Maize	Mo17xHp301	103.7	-0.149	Tolerant	(Choquette et al., 2020)
Maize	Mo17xNC338	117.5	-0.700	Sensitive	(Choquette et al., 2020)
Maize	NC338xHp301	103.4	-0.134	Tolerant	(Choquette et al., 2020)
Maize	PAG 397	106.2	-0.248	Tolerant	(Kress and Miller, 1985)
Maize	Pioneer 3714	106.2	-0.253	Intermediate	(Mulchi et al., 1995; Rudorff et al., 1996)
Maize	Pioneer 3780	108.8	-0.339	Intermediate	(Kress and Miller, 1985; Mckee, 1993)
Rice	Akitakomachi	101.3	-0.051	Tolerant	(Sawada and Kohno, 2009)
Rice	Basmati-370	116.0	-0.638	Sensitive	(Wahid et al., 2011)
Rice	Basmati-Pak	112.7	-0.506	Sensitive	(Wahid et al., 2011)
Rice	BR11	114.9	-0.597	Sensitive	(Akhtar et al., 2010b)
Rice	BR14	106.3	-0.253	Intermediate	(Akhtar et al., 2010b)
Rice	BR28	110.9	-0.437	Sensitive	(Akhtar et al., 2010b)
Rice	BR29	107.7	-0.310	Intermediate	(Akhtar et al., 2010b)
Rice	Bt-SY63	153.3	-2.133	Sensitive	(Li et al., 2017)
Rice	Fan 3694	109.7	-0.398	Sensitive	(Zheng et al., 2013)
Rice	Gorkor 15	108.1	-0.323	Intermediate	(Ariyaphanphitak et al., 2005)
Rice	Habataki	105.9	-0.260	Intermediate	(Tsukahara et al., 2015)
Rice	Haenuki	100.0	0.002	Tolerant	(Sawada and Kohno, 2009)
Rice	Hitomebore	101.3	-0.051	Tolerant	(Sawada and Kohno, 2009)
Rice	IR 36	109.9	-0.395	Sensitive	(Sawada and Kohno, 2009)
Rice	IR64	103.0	-0.115	Tolerant	(Sawada and Kohno, 2009; Frei et al., 2012)
Rice	IRRI-9	116.0	-0.642	Sensitive	(Wahid et al., 2011)
Rice	Jothi	98.7	0.053	Tolerant	(Sawada and Kohno, 2009)
Rice	Kasalath	105.2	-0.193	Intermediate	(Sawada and Kohno, 2009; Frei et al., 2012; Sawada et al., 2016)
Rice	Khowdokmali 105	104.5	-0.180	Intermediate	(Ariyaphanphitak et al., 2005)
Rice	Kinuhjkari	111.8	-0.474	Sensitive	(Yamaguchi et al., 2008)
Rice	Kirara 397	108.4	-0.350	Intermediate	(Sawada and Kohno, 2009; Frei et al., 2012; Sawada et al., 2012)
Rice	Klongluang 1	104.6	-0.185	Intermediate	(Ariyaphanphitak et al., 2005)
Rice	Koshihikari	103.2	-0.160	Tolerant	(Kobayashi et al., 1995; Yamaguchi et al., 2008; Sawada and Kohno, 2009; Frei et al., 2012; Sawada et al., 2012; Yamaguchi et al., 2014; Sawada et al., 2016)
Rice	KRH-2	96.3	0.147	Tolerant	(Sawada and Kohno, 2009)
Rice	LYPJ	119.7	-0.787	Sensitive	(Shi et al., 2009)
Rice	M7	102.2	-0.087	Tolerant	(Kats et al., 1985)
Rice	M9	105.6	-0.224	Intermediate	(Kats et al., 1985)
Rice	Malviya dhan 36	110.8	-0.430	Sensitive	(Sarkar et al., 2015)
Rice	Massigura	98.4	0.063	Tolerant	(Sawada and Kohno, 2009)
Rice	MR185	109.3	-0.371	Intermediate	(Ishii et al., 2004)
Rice	MR84	104.5	-0.181	Intermediate	(Ishii et al., 2004)
Rice	NDR 97	112.1	-0.485	Sensitive	(Rai and Agrawal, 2008)
Rice	Nipponbare	99.6	-0.005	Tolerant	(Kobayashi et al., 1995; Sawada and Kohno, 2009; Frei et al., 2012)
Rice	Pathumthani 1	114.4	-0.574	Sensitive	(Ariyaphanphitak et al., 2005)
Rice	S-210	104.3	-0.173	Intermediate	(Kats et al., 1985)
Rice	Sasanishiki	102.5	-0.083	Tolerant	(Sawada and Kohno, 2009; Tsukahara et al., 2015)
Rice	Sato-no-yuki	102.6	-0.105	Tolerant	(Sawada and Kohno, 2009)
Rice	Saurabh 950	108.9	-0.358	Intermediate	(Rai and Agrawal, 2008)
Rice	Shivani	113.0	-0.519	Sensitive	(Sarkar et al., 2015)

Rice	SL41	100.7	-0.028	Tolerant	(Frei et al., 2012)
Rice	Suphanburi 1	105.0	-0.199	Intermediate	(Sawada and Kohno, 2009)
Rice	Suphanburi 90	102.6	-0.105	Tolerant	(Sawada and Kohno, 2009)
Rice	SY63	119.8	-1.192	Sensitive	(Pang et al., 2009; Shi et al., 2009; Li et al., 2017)
Rice	Takanari	105.1	-0.210	Intermediate	(Sawada and Kohno, 2009; Sawada et al., 2012)
Rice	Tsugaru Reman	101.5	-0.061	Tolerant	(Sawada and Kohno, 2009)
Rice	WJ15	115.7	-0.626	Sensitive	(Shi et al., 2009)
Rice	WYJ3	113.9	-0.555	Sensitive	(Pang et al., 2009)
Rice	YD6	109.8	-0.391	Intermediate	(Shi et al., 2009)
Rice	Yumehitachi	98.7	0.053	Tolerant	(Sawada and Kohno, 2009)
Rice	Yumetsukushi	101.3	-0.051	Tolerant	(Sawada and Kohno, 2009)
Soybean	93B15	110.6	-0.702	Intermediate	(Morgan et al., 2006; Betzelberger et al., 2012)
Soybean	A3127	112.9	-0.515	Intermediate	(Betzelberger et al., 2010)
Soybean	Amsoy-71	113.1	-0.525	Intermediate	(Kress et al., 1986)
Soybean	Bay	102.0	-0.079	Tolerant	(Mulchi et al., 1988)
Soybean	Beeson	108.2	-0.327	Tolerant	(Troiano et al., 1983)
Soybean	Bragg	104.4	-0.235	Tolerant	(Heagle and Letchworth, 1982; Heagle et al., 1991; Singh et al., 2010)
Soybean	Calland	109.6	-0.384	Tolerant	(Mulchi et al., 1988)
Soybean	Clark	115.0	-0.578	Intermediate	(Mulchi et al., 1995; Betzelberger et al., 2010)
Soybean	Coker (NK) 6955	99.1	0.036	Tolerant	(Heagle et al., 1998)
Soybean	Coker (NK) 9655	115.7	-0.639	Intermediate	(Miller et al., 1994)
Soybean	Corsoy	113.9	-0.555	Intermediate	(Kress and Miller, 1983)
Soybean	Corsoy-79	113.9	-0.564	Intermediate	(Kress et al., 1986; Heggestad et al., 1988)
Soybean	Cumberland	79.7	0.813	Tolerant	(Mulchi et al., 1988)
Soybean	Davis	112.4	-0.506	Tolerant	(Heagle and Letchworth, 1982; Heagle et al., 1983a; Heagle et al., 1983b; Heagle et al., 1986; Heagle et al., 1987; Heagle et al., 1991)
Soybean	Dwight	113.4	-0.643	Intermediate	(Betzelberger et al., 2010; Betzelberger et al., 2012)
Soybean	Essex	113.9	-0.527	Intermediate	(Mulchi et al., 1988; Heggestad and Lesser, 1990; Miller et al., 1994; Fiscus et al., 1997; Heagle et al., 1998; Chernikova et al., 2000; Robinson and Britz, 2000; Booker et al., 2005)
Soybean	Forrest	112.1	-0.500	Tolerant	(Heagle and Letchworth, 1982; Heggestad et al., 1985; Mulchi et al., 1988; Heggestad and Lesser, 1990; Heagle et al., 1991; Chernikova et al., 2000; Robinson and Britz, 2000)
Soybean	HF25	126.2	-1.047	Sensitive	(Zhang et al., 2014)
Soybean	HF35	121.8	-0.872	Sensitive	(Zhang et al., 2014)
Soybean	HF55	121.7	-0.866	Sensitive	(Zhang et al., 2014)
Soybean	HN35	131.3	-1.253	Sensitive	(Zhang et al., 2014)
Soybean	HN37	126.4	-1.055	Sensitive	(Zhang et al., 2014)
Soybean	HN65	128.2	-1.128	Sensitive	(Zhang et al., 2014)
Soybean	Hodgson	110.5	-0.419	Tolerant	(Kohut et al., 1986)
Soybean	Holladay	115.8	-0.633	Intermediate	(Heagle et al., 1998)
Soybean	Holt	111.0	-0.440	Tolerant	(Betzelberger et al., 2010)
Soybean	HS93-4118	119.3	-0.772	Sensitive	(Betzelberger et al., 2010; Betzelberger et al., 2012)
Soybean	IA-3010	112.1	-0.611	Intermediate	(Betzelberger et al., 2010; Betzelberger et al., 2012)
Soybean	LN97-15076	120.8	-0.750	Intermediate	(Betzelberger et al., 2010; Betzelberger et al., 2012)
Soybean	Loda	117.4	-0.817	Sensitive	(Betzelberger et al., 2010; Betzelberger et al., 2012)
Soybean	Miles	104.6	-0.185	Tolerant	(Mulchi et al., 1988)
Soybean	NE3399	116.3	-0.652	Intermediate	(Betzelberger et al., 2010)
Soybean	Pana	117.3	-0.789	Sensitive	(Betzelberger et al., 2010; Betzelberger et al., 2012)
Soybean	Pella	100.2	-0.007	Tolerant	(Mulchi et al., 1988)

Soybean	PK 472	119.4	-0.777	Sensitive	(Singh et al., 2010)
Soybean	Pusa 9712	126.0	-1.040	Sensitive	(Singh and Agrawal, 2011)
Soybean	Pusa 9814	130.2	-1.207	Sensitive	(Singh and Agrawal, 2011)
Soybean	Ransom	109.6	-0.392	Tolerant	(Heagle and Letchworth, 1982; Heagle et al., 1991)
Soybean	S 53-34	115.6	-0.621	Intermediate	(Miller et al., 1994)
Soybean	SN22	130.1	-1.203	Sensitive	(Zhang et al., 2014)
Soybean	SN26	128.4	-1.137	Sensitive	(Zhang et al., 2014)
Soybean	SN31	126.2	-1.048	Sensitive	(Zhang et al., 2014)
Soybean	Sparks	109.6	-0.383	Tolerant	(Mulchi et al., 1988)
Soybean	Union	126.3	-1.053	Sensitive	(Mulchi et al., 1988)
Soybean	Ware	109.0	-0.361	Tolerant	(Mulchi et al., 1988)
Soybean	Williams	119.3	-0.772	Intermediate	(Mulchi et al., 1988)
Soybean	Williams-79	112.9	-0.533	Intermediate	(Heggestad et al., 1985; Heggestad et al., 1988; Heggestad and Lesser, 1990)
Soybean	York	95.5	0.182	Tolerant	(Mulchi et al., 1988)
Soybean	Young	112.4	-0.497	Tolerant	(Miller et al., 1989)
Wheat	Albis	127.7	-1.068	Sensitive	(Fuhrer et al., 1989; Fuhrer et al., 1992)
Wheat	Astron	120.1	-0.805	Sensitive	(Burkart et al., 2013)
Wheat	Bijoy	114.4	-0.575	Intermediate	(Akhtar et al., 2010a)
Wheat	Drabant	111.9	-0.490	Tolerant	(Pleijel et al., 1991)
Wheat	Dragon	121.7	-0.872	Sensitive	(Gelang et al., 2000; Pleijel et al., 2006)
Wheat	FH-7096	106.7	-0.269	Tolerant	(Adrees et al., 2016)
Wheat	FH-8203	107.6	-0.303	Tolerant	(Adrees et al., 2016)
Wheat	Inqilab-91	108.8	-0.351	Tolerant	(Wahid, 2006)
Wheat	Jia 002	113.5	-0.541	Intermediate	(Zheng et al., 2013)
Wheat	Jia 403	110.2	-0.408	Tolerant	(Feng et al., 2007)
Wheat	Lantvete	111.2	-0.449	Tolerant	(Pleijel et al., 2006)
Wheat	Pasban-90	119.3	-0.772	Intermediate	(Wahid, 2006)
Wheat	PBW 343	115.4	-0.615	Intermediate	(Tomer et al., 2015)
Wheat	Pegassos	130.1	-1.206	Sensitive	(Burkart et al., 2013)
Wheat	Pelican	101.7	-0.067	Tolerant	(De Temmerman et al., 1992)
Wheat	Perlo	118.6	-0.750	Intermediate	(Khan and Soja, 2003)
Wheat	Punjab-96	117.6	-0.705	Intermediate	(Wahid, 2006)
Wheat	Riband	106.6	-0.265	Tolerant	(Ollerenshaw and Lyons, 1999)
Wheat	Sufi	112.6	-0.505	Intermediate	(Akhtar et al., 2010a)
Wheat	Y15	128.2	-1.100	Sensitive	(Zhu et al., 2011)
Wheat	Y16	129.7	-1.194	Sensitive	(Zhu et al., 2011)
Wheat	Y19	136.3	-1.365	Sensitive	(Zhu et al., 2011)
Wheat	Y2	137.4	-1.502	Sensitive	(Zhu et al., 2011)

Supplementary Figures

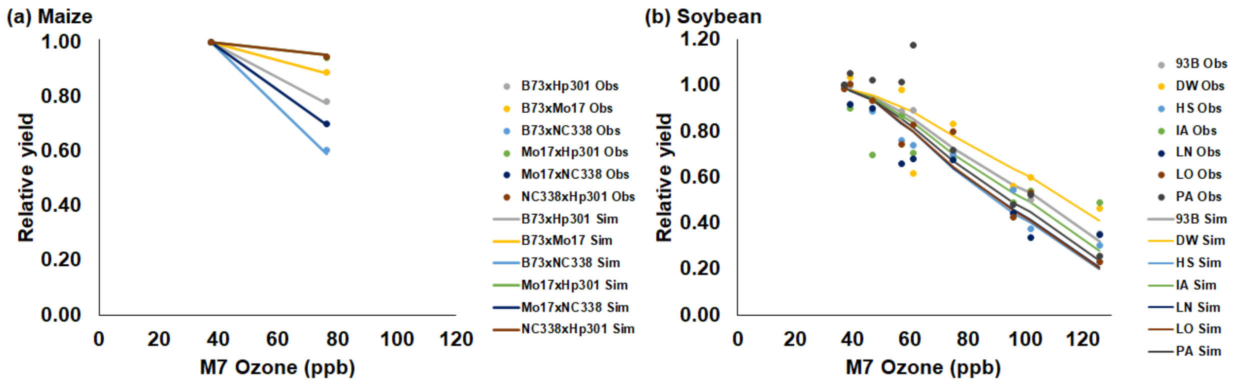

Figure S1: Observed (symbols) and simulated (lines) relative yield for increasing M7 O_3 concentrations for (a) six maize cultivars and (b) seven soybean cultivars. The maize data are from the 2018 FACE experiment conducted at Champaign, IL, USA consisting of two O_3 treatments (Choquette et al., 2020). The soybean data are from the 2009 SoyFACE experiment conducted at Champaign, IL, USA consisting of nine O_3 treatments (Betzelberger et al., 2012). The simulated data are from the DSSAT CERES-Maize and CROPGRO-Soybean models. The cultivar and O_3 parameters used for the simulations are shown in Tables 4 and 5. Relative yield is scaled to the ambient control treatment (Table 2). The statistical comparison between the observed and simulated data is shown in Figures 2 and 3.

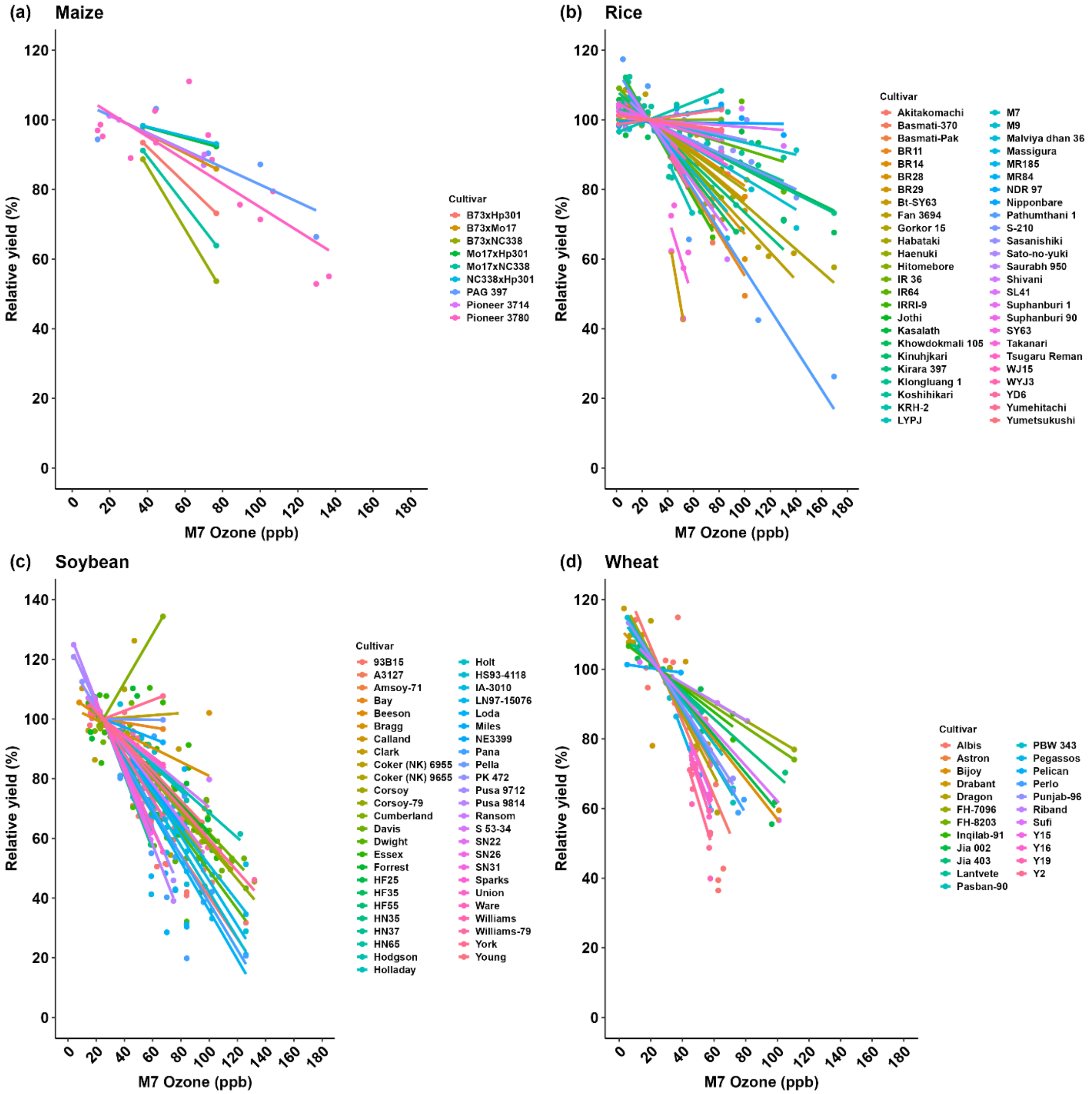

Figure S2: The cultivar exposure-yield response for increasing M7 O_3 concentrations. The data consists of the relative yields (scaled to 25 ppb M7 O_3) of the cultivars examined in the Mills et al. (2018) literature review combined with the maize and soybean cultivars used in this study for a total of (a) 9 maize cultivars, (b) 50 rice cultivars, (c) 49 soybean cultivars, and (d) 23 wheat cultivars (colored symbols). The colored lines show the linear regression of the exposure-yield response for each cultivar. The slope and y-intercept of the linear fit for each cultivar are shown in Table S10.

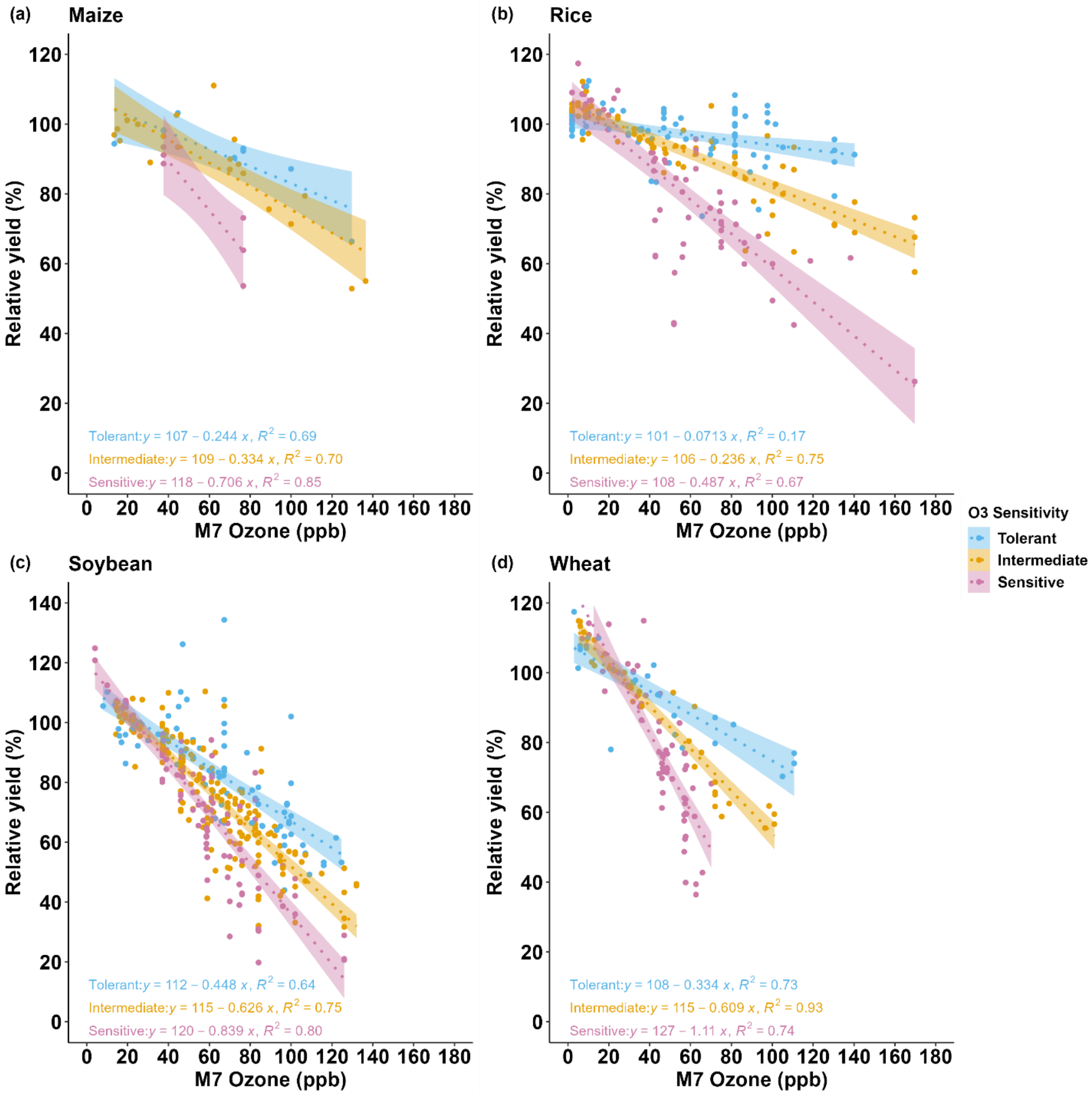

Figure S3: The O_3 exposure linear relationships (dotted lines) calculated from the literature data (symbols, Fig. S2) for (a) maize, (b) rice, (c) soybean, and (d) wheat. The data consists of the relative yields (scaled to 25 ppb M7 O_3) of the cultivars examined in the Mills et al. (2018) literature review combined with the maize and soybean cultivars used in this study for a total of (a) 9 maize cultivars, (b) 50 rice cultivars, (c) 49 soybean cultivars, and (d) 23 wheat cultivars (Fig S2). The cultivars were classified into three O_3 sensitivities: tolerant (blue), intermediate (gold), and sensitive (magenta) by grouping the cultivar O_3 exposure response (Fig. S2 slope) into three evenly distributed quantiles: 66%-100%, 33%-66%, and 0%-33%, respectively. The O_3 sensitivities determined for each cultivar are listed in Table S10. For each crop, the O_3 exposure-yield response equations and the coefficient of determination (r^2) of the linear fit for each cultivar O_3 sensitivity are labeled. The color shaded area shows the standard error of the linear fit for each of the cultivar O_3 sensitivities.

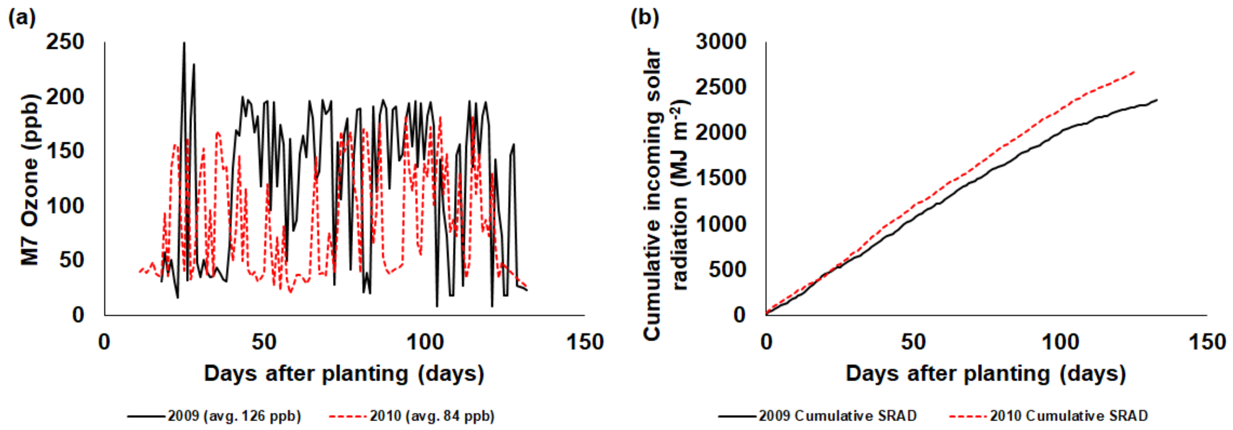

Figure S4: (a) Daily mean 7-hour O_3 concentrations of the highest O_3 treatment and (b) cumulative incoming solar radiation for the 2009 (solid line) and 2010 (dashed line) growing seasons of the SoyFACE experiment conducted at Champaign, IL, USA.

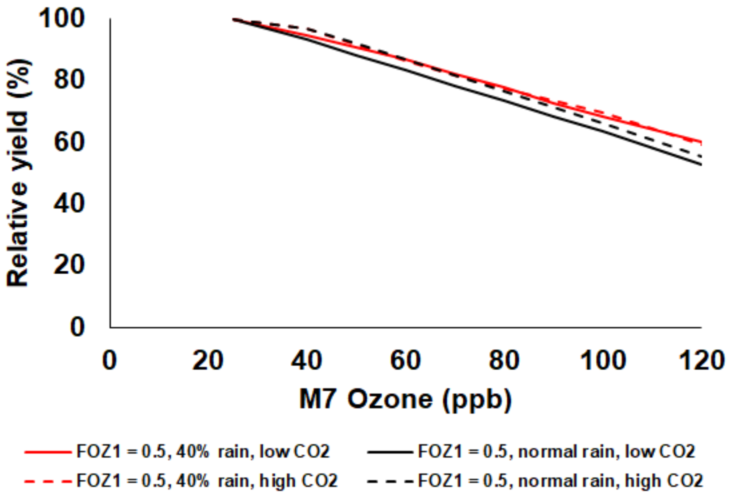

Figure S5: Sensitivity analysis using the CERES-Maize model to simulate O_3 relative yield loss for an example of FOZ_1 set at 0.5 under the 40% reduced rainfall and 350 ppm CO_2 (solid red line), normal rainfall and 350 ppm CO_2 (solid black line), 40% less rainfall and 550 ppm CO_2 (dashed red line), and normal rainfall and 550 CO_2 (dashed black line) scenarios. The Champaign, Illinois, USA 2018 FACE weather, soil, and dominant management conditions were used for the reference location. FOZ_1 was tested independently, i.e., $SFOZ_1$ was set to zero. The 50% reduced rainfall shown in Fig. 4c had low simulated water deficit stress which obscured the O_3-water stress dynamics. Reducing the rainfall to 40% increased simulated water deficit stress to allow for a better representation of the O_3-water stress dynamics.

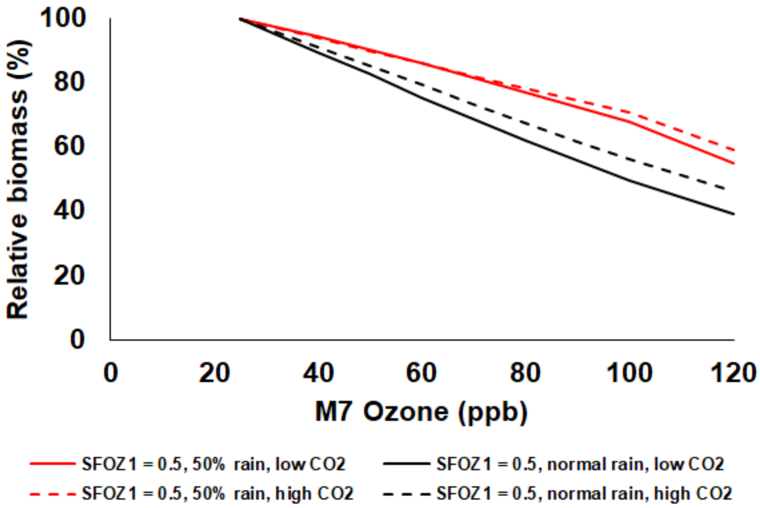

Figure S6: Sensitivity analysis using the CROPGRO-Soybean model to simulate O_3 relative biomass loss for $SFOZ_1$ set at 0.5 under the 50% reduced rainfall and 350 ppm CO_2 (solid red line), normal rainfall and 350 ppm CO_2 (solid black line), 50% less rainfall and 550 ppm CO_2 (dashed red line), and normal rainfall and 550 CO_2 (dashed black line) scenarios. The Champaign, Illinois, USA 2009 SoyFACE weather, soil, and dominant management conditions were used for the reference location. FOZ_1 was set to zero.

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