

Appendix 3

Table 1.1.1 — Plant Dry Weight (Biomass) Responses to Atmospheric CO₂ Enrichment

Table 1.1.1 reports the results of hundreds of peer-reviewed scientific studies indicating the biomass growth response of plants to a standardized 300 ppm increase in atmospheric CO₂ concentration. Plants are listed by common and/or scientific names, followed by the number of experimental studies conducted on each plant, the mean biomass response to a 300 ppm increase in the air's CO₂ content, and the standard error of that mean. Whenever the CO₂ increase for a given study was not exactly 300 ppm, a linear adjustment was computed. For example, if the CO₂ increase was 350 ppm and the growth response was a 60 percent enhancement, the adjusted 300 ppm CO₂ growth response was calculated as $(300/350) \times 60\% = 51\%$.

The data in this table are printed by permission of the Center for the Study of Carbon Dioxide and Global Change and were taken from its Plant Growth database on 1 January 2014. The table summarizes CO₂ enrichment results from 3,586 separate experimental conditions conducted on 549 plant species. New data are added to the database at approximately weekly intervals and can be accessed free of charge at the center's Web site at http://www.co2science.org/data/plant_growth/dry/dry_subject.php. This online database also archives information pertaining to the experimental conditions under which each plant growth experiment was conducted, as well as the complete reference to the journal article from which the experimental results were obtained. The center's online database also lists percent increases in plant biomass for 600 and/or 900 ppm increases in the air's CO₂ concentration.

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Abelmoschus esculentus [Okra]	1	8%	0%
Abies alba [Silver Fir]	5	33.20%	11.60%
Abies faxoniana [Minjiang Fir]	4	20.30%	2.90%
Abutilon theophrasti [Velvet Leaf]	14	32.10%	13.70%
Acacia karroo [Sweet Thorn]	3	53.70%	5.90%
Acacia aneura [Mulga Acacia]	1	0%	0%
Acacia auriculiformis [Acacia, Earleaf]	1	0%	0%
Acacia catechu [Black Cutch]	7	71.10%	10.70%
Acacia coleii [Acacia]	1	89%	0%
Acacia coriacea [Wiry Wattle]	1	50%	0%
Acacia dealbata [Silver Wattle]	1	106%	0%
Acacia implexa	1	77%	0%
Acacia irrorata	1	64%	0%

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Acacia magium [Brown Saiwood]	3	19%	6.90%
Acacia mearnsii [Black Wattle]	1	48%	0%
Acacia melanoxylon [Blackwood]	1	164%	0%
Acacia minuta [Coastal Scrub Wattle]	2	110%	22.60%
Acacia nilotica [Gum Arabic Tree]	11	241.50%	53.90%
Acacia saligna [Orange Wattle]	1	55%	0%
Acacia tetragonophylla [Acacia]	1	55%	0%
Acer barbatum [Southern Sugar Maple]	1	95%	0%
Acer pensylvanicum [Striped Maple]	4	28.80%	8.40%
Acer pseudoplatanus [Sycamore]	3	34.30%	12.80%
Acer rubrum [Red Maple]	13	44.20%	13.30%
Acer saccharum [Sugar Maple]	12	48.30%	13.10%
Achillea millefolium [Yarrow]	3	24.70%	12.60%

Climate Change Reconsidered II: Biological Impacts

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Aechmea cuculata x a. fasciata [Bromelaid Cv. Maya]	1	-6%	0%
Aechmea fasciata [Silver Vase Bromeliad]	5	26.20%	14.90%
Aechmea magdalenae [Understory Herb]	1	30%	0%
Agave deserti [Desert Agave]	4	34.80%	10.30%
Agave salmiana [Agave]	1	43%	0%
Agave vilmoreniana [Leaf Succulent]	2	14%	9.90%
Agropyron repens [C ₃ Grass]	1	41%	0%
Agropyron smithii [Western Wheatgrass]	3	50.30%	42.20%
Agrostemma githago [Corncockle]	1	21%	0%
Agrostis canina [Velvet Bentgrass]	1	124%	0%
Agrostis capillaris [Colonial Bentgrass]	9	37.10%	11.70%
Ailanthus excelsa [Indian Tree Of Heaven]	1	49%	0%
Albizia procera [Tall Albiza]	8	125.60%	16.30%
Allium fistulosum [Scallion]	1	135%	0%
Allotriopsis semialata [Cockatoo Grass]	6	41.20%	3.70%
Alnus maximowiczii [Alder Tree]	4	0.80%	6.20%
Alnus glutinosa [Black Alder]	6	32.50%	6.10%
Alnus hirsuta [Manchurian Alder]	7	17.10%	5.70%
Alnus incana [Mountain Alder]	1	50%	0%
Alnus rubra [Red Alder]	6	34.50%	7.70%
Amaranthus hybridus [Slim Amaranth]	6	14%	5.60%
Amaranthus hypochondriacus [Grain Amaranth]	2	5.50%	3.90%
Amaranthus retroflexus [Redroot Amaranth]	17	6.40%	3.30%
Amaranthus tricolor [Amaranth]	1	20%	0%
Amaranthus viridis [Slender Amaranth]	4	-2.30%	3.20%
Ambrosia artemisiifolia [Annual Ragweed]	13	28.80%	7%
Ambrosia dumosa [White Burrobush]	2	164%	36.10%
Ambrosia trifida [Great Ragweed]	3	26%	8.20%
Amorpha canescens [Leadplant]	3	40.30%	63.30%
Amur Silvergrass [Miscanthus sacchariflorus]	1	-27%	0%
Ananas comosus [Pineapple]	2	5%	9.20%
Andropogon appendiculatus [Vlei Bluegrass]	6	50.50%	6.90%
Andropogon gerardii [Big Bluestem]	12	20.30%	7.20%
Andropogon virginicus [Broomsedge]	2	0%	0%
Anemone cylindrica [Candle Anemone]	1	84%	0%
Anthoxanthum odoratum [Sweet Vernal Grass]	1	170%	0%
Anthyllis vulneraria [Common Kidney]	6	45.30%	17.50%

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Vetch]			
Arabidopsis thaliana [Thale Cress]	17	162.30%	51.20%
Arachis glabrata [Florigraze Peanut]	2	20.50%	1.10%
Arachis hypogaea [Peanut]	38	60.30%	16.10%
Armeria maritima [Thrift Seapink]	1	-45%	0%
Arrhenatherum elatius [Tall Oatgrass]	7	18.60%	9.60%
Artemisia absinthium [Absinth Sagewort]	2	161.50%	44.20%
Artemisia tridentata [Big Sagebrush]	4	24.30%	6.10%
Asclepias syriaca [Common Milkweed]	3	31%	15.50%
Asclepias tuberosa [Butterfly Milkweed]	1	108%	0%
Aster pilosus [White Oldfield Aster]	2	62.50%	26.50%
Austrodanthonia caespitosa [Wallaby Grass]	2	78%	4.20%
Avena barbata [Slender Oat]	6	22.80%	5.80%
Avena fatua [Wild Oat]	8	32.90%	8.40%
Avena sativa [Red Oat]	15	40.60%	15.40%
Avicennia germinans [Black Mangrove]	2	22.50%	5.30%
Azolla caroliniana [Water Fern]	3	28%	9.10%
Azolla filiculoides [Water Fern]	4	20.80%	3.80%
Azolla pinnata [Water Fern]	4	54.30%	27%
Bauhinia variegata [Mountain Ebony]	7	78.90%	9.10%
Bellis perennis [Lawn Daisy]	3	95.70%	0.30%
Beta vulgaris [Common Beet]	33	65.70%	19.30%
Betula ermanii [Birch, Ermans]	2	6%	0.70%
Betula maximowicziana [Birch, Monarch]	2	15%	1.40%
Betula alleghaniensis [Yellow Birch]	15	34.30%	10.20%
Betula nana [Bog Birch]	1	0%	0%
Betula pendula [European White Birch]	32	32.30%	4.80%
Betula platyphylla [Japanese White Birch]	6	15.80%	3.40%
Betula populifolia [Gray Birch]	4	19.80%	8.30%
Betula pubescens [Downy Birch]	4	25.50%	6.50%
Bouteloua curtipendula [Sideoats Grama]	2	7%	22.60%
Bouteloua eriopoda [Black Grama]	1	21%	0%
Bouteloua gracilis [Blue Grama]	8	2.10%	9.80%
Brachypodium pinnatum [Heath Falsebrome]	1	0%	0%
Brassica alboglabra [Chinese Broccoli]	2	9%	0.70%
Brassica campestris	6	55.80%	8.50%
Brassica carinata [Abyssinian Mustard]	2	28%	1.40%

Appendix 3 – Plant Dry Weight (Biomass) Responses

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Brassica juncea [India Mustard]	2	28.50%	1.80%
Brassica kaber [Field Mustard]	1	29%	0%
Brassica napus [Oilseed Rape]	38	43.80%	5.20%
Brassica nigra [Black Mustard]	2	40.50%	10.30%
Brassica oleracea [Broccoli]	5	28.80%	8.50%
Brassica rapa [Mustard]	1	21%	0%
Bromus erectus [Erect Brome]	7	34.60%	6.80%
Bromus hordeaceus [Soft Brome]	2	43%	9.90%
Bromus inermis [Smooth Brome]	1	-13%	0%
Bromus madritensis [Compact Brome]	2	7%	14.10%
Bromus mollis [Soft Brome]	2	53.50%	2.50%
Bromus rubens [Foxtail Brome]	2	25%	7.80%
Bromus sterilis [Poverty Brome]	1	0%	0%
Bromus tectorum [Cheatgrass]	1	36%	0%
Buchloe dactyloides [Buffalo Grass]	1	-5%	0%
Bulbophyllum longissimum [Orchid, Tropical]	4	15.50%	13.70%
Cajanus cajan [Pigeon Pea]	4	75%	20.50%
Calamagrostis angustifolia [Reed Grass]	24	14.80%	2.10%
Calamagrostis purpurea [Scandinavian Small Reed]	2	18%	7.80%
Calamagrostis epigeios [Chee Reedgrass]	2	98.50%	0.40%
Calcidiscus leptoporus [Marine Coccolithophore]	2	18.50%	3.20%
Calluna vulgaris [Heather]	9	17.10%	5.40%
Capsicum chinense [Yellow Lantern Chili]	1	49%	0%
Caragana intermedia [Deciduous Shrub of Semi-arid Northern China]	6	54.50%	4.50%
Cardamine hirsuta [Hairy Bittercress]	2	-0.50%	3.90%
Carex arenaria [Sand Sedge]	1	26%	0%
Carex bigelowii [Bigelow's Sedge]	1	0%	0%
Carex flacca [Heath Sedge]	5	73.80%	18.20%
Carex rostrata [Beaked Sedge]	1	44%	0%
Cariniana legalis [Jequitiba Tree]	2	20%	2.80%
Carpinus betulus [European Hornbeam]	3	35.30%	26.40%
Cassia fasciculata [Sleepingplant]	2	17.50%	27.20%
Cassia nictitans [Partridge Pea]	1	22%	0%
Cassia obtusifolia [Coffeeweed]	2	31.50%	7.40%
Castanea sativa [Sweet Chesnut]	4	12.80%	2.20%
Casuarina equisetifolia [Beach Sheoak]	1	54%	0%
Catopsis juncifolia [Bromeliad, Tropical]	4	13.30%	5.20%

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Cenchrus ciliaris [Buffel Grass]	1	242%	0%
Centaurea solstitialis [Yellow Star Thistle]	1	500%	0%
Centella asiatica [Centella]	1	145%	0%
Cerastium fontanum [Chickweed]	1	51%	0%
Ceratonia siliqua [Carob]	10	38.10%	9.70%
Ceratophyllum tetragonolobum	2	60%	42.40%
Chaetoceros muelleri [Marine Diatom]	2	18%	6.40%
Chamaecrista nictitans [Partridge Pea]	1	0%	0%
Chamelaucium uncinatum (Schauer) x Chamelaucium uncinatum (MS) [Lady Stephanie]	3	20.70%	3.40%
Chamerion angustifolium	1	228%	0%
Chamerops humilis [Mediterranean Fan Palm]	1	67%	0%
Chenopodium album [Lambsquarters]	20	46%	7.70%
Chenopodium bonus-henricus [Good King Henry]	1	21%	0%
Chlorella pyrenoidosa [Common Freshwater Microalga]	2	8%	0.70%
Chloris gayana [Rhodes Grass]	1	39%	0%
Cicer arietinum [Chickpea]	16	42.80%	3.80%
Cirsium arvense [Canadian Thistle]	3	83.30%	33.50%
Citrus [Ambersweet Orange Tree]	3	30.70%	1.20%
Citrus aurantium [Sour Orange Tree]	5	69.40%	9.10%
Citrus reticulata [Mandarin Orange Tree]	2	29.50%	3.90%
Citrus sinensis [Sweet Orange Tree]	2	38.50%	4.60%
Citrus sinensis x poncirus trifoliata [Carrizo Citrange]	2	40.50%	1.80%
Clarkia rubicunda [Ruby Chalice Fairyfan]	1	35%	0%
Coffea arabusta [Coffee]	2	175.50%	76.70%
Commelina benghalensis [Tropical Spiderwort]	1	61%	0%
Conium maculatum [Poison Hemlock]	1	21%	0%
Cornus florida [Eastern Flowering Dogwood]	2	121.50%	37.10%
Correa schlechtendalii	3	9.70%	0.30%
Crotalaria juncea [Sunn Hemp]	2	45%	9.90%
Croton urucurana [Dragons Blood Tree]	2	23.50%	4.60%
Cucumis melo [Cantaloupe]	3	4.70%	0.70%
Cucumis sativus [Garden Cucumber]	12	44.80%	6%
Cuphea viscosissima [Clammy Cuphea]	1	17%	0%
Cycas revoluta [Sago Palm]	1	172%	0%
Cynosurus cristatus [Crested Dogstailgrass]	1	30%	0%
Cyperus esculentus [Yellow Nutsedge]	1	16%	0%

Climate Change Reconsidered II: Biological Impacts

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Cyperus rotundus [Purple Nutsedge]	1	38%	0%
Dactylis glomerata [Orchardgrass]	15	18.30%	4.30%
Dalbergia latifolia [Indian Rosewood]	7	55.60%	7.80%
Danthonia richardsonii Cashmore [Wallaby Grass]	9	25%	8.60%
Datura stramonium [Jimsonweed]	3	36.70%	15.80%
Daucus carota [Carrot]	5	77.80%	32.30%
Deschampsia flexuosa [Wavy Hairgrass]	1	19%	0%
Desmazeria rigida [Ferngrass]	1	26%	0%
Digitalis purpurea [Purple Foxglove]	2	17.50%	2.50%
Digitaria natalensis [Natal Crabgrass]	6	13%	3.20%
Digitaria sanguinalis [Hairy Crabgrass]	2	39%	12.70%
Echinacea purpurea [Eastern Purple Coneflower]	4	191.50%	75.50%
Echinochloa crus-galli [Barnyard Grass]	19	49.80%	16.90%
Echium plantagineum [Salvation Jane]	4	15.80%	6.20%
Eichhornia crassipes [Common Water Hyacinth]	10	43.80%	12.20%
Elaeis guineensis [African Oil Palm]	1	89%	0%
Eleusine indica [Indian Goosegrass]	6	34%	17.40%
Elymus athericus	4	46.30%	20%
Elymus elymoides [Botlebrush Squirreltail]	1	24%	0%
Emiliania huxleyi [Marine Coccolithophores]	3	45%	34.70%
Epilobium hirsutum [Codlins and Cream]	1	9%	0%
Eragrostis curvula [Weeping Lovegrass]	7	48.10%	10.10%
Eragrostis orcuttiana [Annual Weed, C4]	1	462%	0%
Eragrostis racemosa [Narrowheart Lovegrass]	6	11.70%	1.80%
Erica tetralix [Crossleaf Heath]	4	23.80%	10.50%
Eriophorum vaginatum [Tussock Cottongrass]	5	105%	71.60%
Eucalyptus degluptax x e. camaldulensis [Eucalypt Hybrid]	2	45.50%	20.90%
Eucalyptus pauciflora [Snow Gum Tree]	10	67.10%	9.50%
Eucalyptus saligna [Sydney Blue Gum]	4	139.50%	46.80%
Eucalyptus cladocalyx [Sugargum]	2	87.50%	9.50%
Eucalyptus miniata [Darwin Woollybutt]	9	-2%	5.40%
Eucalyptus tetrodonta	9	132.80%	19.90%
Eupatorium adenophorum [Sticky Snakeroot]	5	27.40%	4.50%
Eupatorium japonicum [Pei Lan]	1	24%	0%
Eupatorium stoechadosmum [Orchid Herb]	3	15.30%	5.20%
Euphorbia lathyris [Myrtle Spurge]	2	36.50%	4.60%

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Fagopyrum esculentum [Common Buckwheat]	3	17.30%	9.90%
Fagus crenata [Japanese Beech]	1	31%	0%
Fagus grandifolia [American Beech]	1	88%	0%
Fagus sylvatica [European Beech]	23	23.60%	6%
Ferocactus acanthodes [California Barrelcactus]	1	30%	0%
Festuca rubra [Red Fescue]	4	29.50%	12%
Festuca arundinacea [Tall Fescue]	11	25.40%	7.20%
Festuca elatior [Tall Meadow Fescue]	1	40%	0%
Festuca ovina [Sheep Fescue]	6	47.70%	16.60%
Festuca pratensis [Meadow Fescue]	11	20.30%	10%
Flaveria trinervia [Clustered Yellowtops]	1	46%	0%
Fragaria x ananassa [Hybrid Strawberry]	4	42.80%	13.10%
Fraxinus americana [White Ash]	4	33.80%	7.30%
Fraxinus excelsior [European Ash]	10	13.40%	3.60%
Fraxinus pennsylvanica [Green Ash]	1	32%	0%
Galactia elliptii [Elliott's Milkpea]	1	110%	0%
Gentianella germanica [Dwarf Gentian]	1	54%	0%
Ginkgo biloba [Maidenhair Tree]	1	78%	0%
Glycine max [Soybean]	190	45.50%	2.70%
Gmelina arborea [White Teak]	2	150.50%	6%
Gnaphalium affine [Cudweed]	1	21%	0%
Gonolobus cteniophorus	2	3.50%	12.40%
Gossypium hirsutum [Cotton]	41	58.40%	7.80%
Gracilaria lemaneiformis [Red Algae]	4	33.50%	13.90%
Grassland community in antwerp, belgium [Six Perennial Species]	1	48%	0%
Grassland, wyoming, usa [Four C ₃ Grasses In A Mixed-grass Prairie]	1	45%	0%
Grassland, Species-poor on a peaty gley soil	1	50%	0%
Grassland, Species-rich on a brown Earth soil over limestone	1	56%	0%
Guzmania Hilda [Guzmania]	1	63%	0%
Gypsophila paniculata [Babysbreath Gypsophila]	1	23%	0%
Hedera helix [English Ivy]	3	66%	10.60%
Helianthemum nummularium [Sun Rose]	1	0%	0%
Helianthus annuus [Sunflower]	13	36.50%	6.80%
Hemizonia congesta [Hayfield Tarweed]	2	48.50%	10.30%
Heterosigma akashiwo [A Marine Raphidophyte]	2	15%	2.10%
Heterotheca subaxillaris [Camphorweed]	1	20%	0%
Hizikia fusiforme [Hiziki (Brown	1	45%	0%

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Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Seaweed))			
Holcus lanatus [Common Velvetgrass]	11	38.50%	10.40%
Hordeum vulgare [Barley]	35	34.60%	3.40%
Hydrilla verticillata [Water Thyme]	7	21.90%	3.30%
Hymenocallis littoralis [Spider Lily]	2	52%	2.80%
Hyparrhenia rufa [Jaragua]	2	33.50%	1.80%
Hypericum perforatum [St. John's Wort]	1	72%	0%
Hypnea spinella [Red Seaweed]	1	66%	0%
Hyptis suaveolens [Wild Spikenard]	1	1720%	0%
Ilex aquifolium [English Holly]	1	15%	0%
Ipomoea cairica [Mile A Minute Vine]	1	61%	0%
Ipomoea pes-caprae [Beach Morning Glory]	1	29%	0%
Ipomoea batatas [Sweet Potato]	6	33.70%	9.30%
Ipomoea hederacea [Ivyleaf Morningglory]	2	-21%	8.50%
Ipomoea lacunosa [Whitestar]	2	15%	14.80%
Juncus effuses [Soft Rush]	1	-5%	0%
Kielmeyera coriacea [Tropical Savanna Tree]	3	88.70%	55.50%
Koeleria macrantha [Prairie Junegrass]	1	2%	0%
Krameria erecta [Littleleaf Ratany]	2	102.50%	1.10%
Kummerowia striata [Japanese Clover]	1	26%	0%
Lactuca sativa [Garden Lettuce]	2	18.50%	6%
Lantana camara [Lantana]	3	131.70%	40.30%
Larix decidua [European Larch]	1	142%	0%
Larix kaempferi [Japanese Larch]	4	26.80%	10.30%
Larix laricina [Tamarack]	1	56%	0%
Larrea tridentata [Creosote Bush]	8	104.90%	22.90%
Lasthenia californica [California Goldfields]	2	27%	26.90%
Layia platyglossa [Coastal Tidytip]	1	12%	0%
Ledum palustre [Wild Rosemary]	1	0%	0%
Lemna gibba [Swollen Duckweed]	2	47%	11.30%
Lepidium latifolium [Pepperweed]	2	40%	7.10%
Lespedeza capitata [Roundhead Lespedeza]	3	333.70%	136.10%
Lespedeza cuneata [Chinese Lespedeza]	1	0%	0%
Leymus chinensis [Chinese Lyme-grass]	2	19.50%	8.80%
Linum usitatissimum [Common Flax]	2	68.50%	18.70%
Linum usitatissimum [Common Flax] in mixed stands with Linum usitatissimum	2	63.50%	15.90%
Liquidambar styraciflua [Sweetgum]	20	132.40%	23.50%

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Liriodendron tulipifera [Yellow Poplar]	3	34%	4.70%
Lolium multiflorum [Italian Ryegrass]	12	20%	3.80%
Lolium perenne [Perennial Ryegrass]	85	35.20%	4.60%
Lolium temulentum [Darnel Ryegrass]	3	44.70%	29.20%
Lomentaria articulata [Seaweed]	1	269%	0%
Lonicera japonica [Japanese Honeysuckle]	4	312.80%	73.70%
Lonicera sempervirens [Coral Honeysuckle]	1	30%	0%
Lotus corniculatus [Birdfoot Deer Vetch]	8	49.30%	12.90%
Lotus pedunculatus [Big Trefoil]	6	56%	26.50%
Lupinus angustifolius [Narrowleaf Lupine]	3	38%	7%
Lupinus luteus [European Yellow Lupine]	1	21%	0%
Lupinus perennis [Sundial Lupine]	11	56.40%	6.60%
Lycopersicon esculentum [Garden Tomato]	53	31%	3.50%
Lycopersicon lycopersicum [Tomato]	2	29.50%	5.30%
Macroptilium atropurpureum [Purple Bushbean]	1	43%	0%
Mangifera indica [Mango]	1	36%	0%
Manihot esculenta [Cassava]	4	13.80%	40.70%
Maranthos corymbosa	3	69%	14.30%
Medicago glomerata	1	17%	0%
Medicago lupulina [Black Medick]	6	45%	9.40%
Medicago minima [Burr Medick]	1	-6%	0%
Medicago sativa [Alfalfa]	85	37.40%	3.70%
Medicago truncatula [Barrelclover]	10	54.40%	6.30%
Melinis minutiflora [Molassesgrass]	2	32%	8.50%
Melinis repens [Red Natal Grass]	6	25.80%	7%
Mentha x piperita [Peppermint]	1	29%	0%
Microstegium vimineum [Nepalese Browntop]	3	-53.30%	15.60%
Mikania micrantha [Bittervine]	1	92%	0%
Miscanthus sacchariflorus [Amur Silvergrass]	1	-27%	0%
Molinia caerulea [Purple Moorgrass]	9	36.60%	9.40%
Nemophila menziesii [Menzies' Baby Blue Eyes]	1	0%	0%
Nicotiana tabacum [Cultivated Tobacco]	14	38.40%	7.40%
Nitzschia palea [Freshwater Diatom]	2	10%	4.90%
Nymphaea marliac [Water Lily]	2	162%	76.40%
Olea europaea [Olive Tree]	6	35.20%	14.10%
Onobrychis viciaefolia [Sainfoin]	1	21%	0%
Opuntia ficus-indica [Prickly Pear]	9	38.20%	13.30%

Climate Change Reconsidered II: Biological Impacts

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Orobanche minor [Hellroot]	1	0%	0%
Orontium aquaticum [Goldenclub]	12	19.80%	3%
Oryza sativa [Rice]	219	36.10%	2%
Oryzopsis hymenoides [Perennial Bunchgrass]	1	0%	0%
Paederia scandens [Chinese Fever Vine]	1	14%	0%
Panicum antidotale [Blue Panicgrass]	4	15.50%	6.30%
Panicum coloratum [Blue Panicgrass]	2	1%	15.60%
Panicum dichotomiflorum (Fall Panicgrass)	1	24%	0%
Panicum laxum [Lax Panicgrass]	4	30%	11%
Panicum maximum [Guineagrass]	1	-2%	0%
Panicum miliaceum [Broomcorn Millet]	1	-13%	0%
Panicum virgatum [Switchgrass]	1	-1%	0%
Papaver setigerum [Dwarf Breadseed Poppy]	1	390%	0%
Pascopyrum smithii [Western Wheatgrass]	5	63%	16.40%
Paspalum conjugatum [Hilograss]	1	18%	0%
Paspalum dilatatum [Dallas Grass]	2	71%	7.80%
Paspalum notatum [Bahia grass]	3	10%	1.90%
Paspalum plicatulum [Brownseed Paspalum]	1	9%	0%
Pasture in Switzerland (Orchard Grass and Red Clover)	12	29.10%	5.70%
Peanut, Rhizoma	1	57%	0%
Pelargonium x hortorum [Pelargonium]	3	3.30%	12.80%
Petalostemum villosum [Silky Prairie-Clover]	3	-9.30%	23.40%
Petunia hybrida [Petunia]	6	55%	9.80%
Phaeocystis [Phytoplankton]	1	0%	0%
Phalaris aquatica [Harding Grass]	13	24.60%	8.50%
Phalaris arundinacea [Canary Grass]	8	34.30%	12.10%
Pharus latifolius [Broad Stalkgrass]	1	144%	0%
Phaseolus acutifolius [Tepary Bean]	2	70%	9.90%
Phaseolus vulgaris [Garden Bean]	17	64.30%	20.30%
Phleum pratense [Timothy]	20	14.90%	3.40%
Phragmites communis [Wetland Reed]	1	-8%	0%
Phragmites japonica [Wetland Reed]	1	-11%	0%
Phyllanthus emblica [Emblic]	8	165%	16%
Physalis peruviana [Peruvian Groundcherry]	1	23%	0%
Phytolacca americana [American Pokeweed]	8	-2.40%	13.80%
[Phytoplankton]	1	7%	0%
Picea abies [Norway Spruce]	15	33.50%	4.90%

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Picea glauca [White Spruce]	7	106.10%	52.40%
Picea koraiensis [Spruce]	7	37.90%	8.70%
Picea mariana [Black Spruce]	17	37.70%	10.60%
Picea sitchensis [Sitka Spruce]	7	20.70%	5%
Pinus banksiana [Jack Pine]	3	18.30%	8.80%
Pinus densiflora [Japanese Red Pine]	9	22.40%	7.60%
Pinus eldarica [Eldarica Pine]	1	153%	0%
Pinus koraiensis [Korean Pine]	2	27%	15.60%
Pinus merkusii [Merkus Pine]	2	200%	43.10%
Pinus nigra [Black Pine]	1	22%	0%
Pinus palustris [Longleaf Pine]	8	19%	7.40%
Pinus ponderosa [Ponderosa Pine]	47	63.30%	11.60%
Pinus radiata [Monterey Pine]	1	36%	0%
Pinus strobus [Eastern White Pine]	3	31.70%	9%
Pinus sylvestris [Scots Pine]	63	35%	4.30%
Pinus taeda [Loblolly Pine]	67	60.90%	7.70%
Pinus uncinata [Mountain Pine]	1	0%	0%
Pisum sativum [Garden Pea]	29	29.20%	3.10%
Plantago erecta [Dwarf Plantain]	2	4.50%	11.70%
Plantago lanceolata [Narrowleaf Plantain]	11	46.20%	15.20%
Plantago major [Common Plantain]	3	31.70%	4.60%
Plantago maritima [Sea Plantain]	3	101.70%	27.90%
Plantago media [Hoary Plantain]	2	26.50%	5.30%
Plantago virginica [Virginia Plantain]	1	45%	0%
Poa alpina [Alpine Bluegrass]	2	79.50%	4.60%
Poa annua [Annual Bluegrass]	10	20.20%	9.10%
Poa pratensis [Kentucky Bluegrass]	9	113.90%	29.80%
Poa trivialis [Rough Bluegrass]	1	3%	0%
Polygonum cuspidatum [Japanese Knotweed]	3	48%	14.80%
Polygonum hydropiper [Marshpepper Knotweed]	2	40.50%	15.90%
Polygonum lapathifolium [Curlytop Knotweed]	5	19.40%	4.20%
Polygonum pensylvanicum [Pennsylvania Smartweed]	3	55.70%	1.80%
Polygonum persicaria [Spotted Ladythumb]	2	38%	9.20%
Populus cathayana [Qing Yang]	4	39.80%	9.50%
Populus tremula x alba [Poplar, Hybrid]	2	17%	0.70%
Populus alba [White Poplar]	14	43.90%	4.70%
Populus deltoides [Eastern Cottonwood]	7	53.70%	13.60%

Appendix 3 – Plant Dry Weight (Biomass) Responses

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Populus deltoides x Populus deltoides [Robusta Poplar Clone]	6	63.30%	13.70%
Populus euramericana [Robusta Poplar]	18	110.30%	37.60%
Populus grandidentata [Bigtooth Aspen]	1	29%	0%
Populus nigra [Black Poplar]	15	53.90%	12.20%
Populus tremula x Populus tremula [Hybrid Aspen]	6	40.30%	18%
Populus tremuloides [Quaking Aspen]	35	58.10%	9.30%
Populus trichocarpa [Black Cottonwood]	5	124%	93.20%
Populus trichocarpa x Populus trichocarpa [Hybrid Poplar]	7	76.70%	23.40%
Prorocentrum minimum [A Marine Dinoflagellate]	2	20%	3.50%
Prosopis flexuosa [Deciduous Tree]	1	42%	0%
Prosopis glandulosa [Honey Mesquite]	13	37.70%	5.20%
Prunella vulgaris [Selfheal]	2	78%	17.70%
Prunus avium [Sweet Cherry]	8	59.80%	7.80%
Prunus laurocerasus [English Laurel]	1	56%	0%
Prunus persica [Peach Tree]	4	27.80%	0.80%
Prunus serotina [Black Cherry]	2	42%	1.40%
Pseudotsuga menziesii [Douglas-Fir]	6	9.70%	3.90%
Pteridium revolutum [Hairy Bracken]	3	49%	7.40%
Pteridium aquilinum [Bracken]	4	45.30%	20.50%
Pteris vittata [Ladder brake]	3	38.30%	6.90%
Puccinellia maritima [Seaside Alkaligrass]	4	61%	31%
Pueraria lobata [Leguminous Weed]	1	98%	0%
Pyrrosia piloselloides [Tropical Fern]	1	78%	0%
Pyrus pyrifolia [Asian Pear]	2	23.50%	5.30%
Quercus alba L. [White Oak]	6	146.70%	30.10%
Quercus cerrioides [Oak]	1	35%	0%
Quercus chapmanii Sargenti [Chapman's Oak]	3	278.70%	90.80%
Quercus geminata [Sand Live Oak]	6	8.70%	4.50%
Quercus ilex L. [Holly Oak]	4	38%	4.80%
Quercus margaretta [Sand Post Oak]	2	20.50%	14.50%
Quercus mongolica [Mongolian Oak]	6	54.30%	19.50%
Quercus myrtifolia Wild. [Myrtle Oak]	9	136.90%	56.30%
Quercus petraea (Mattuschka) Liebl. [Durmast Oak]	6	53.20%	18.70%
Quercus robur L. [Pedunculate Oak]	8	30.60%	12.80%
Quercus rubra L. [Northern Red Oak]	7	55.30%	25.20%
Quercus suber L. [Cork Oak]	4	46.80%	13.70%
Raphanus sativus [Wild Radish]	22	71.20%	12.20%

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Raphanus sativus x raphanistrum [Wild Radish]	1	33%	0%
Rhinanthus alectorolophus [European Yellowrattle]	2	75%	68.60%
Rhinanthus minor [Yellow Rattle]	1	50%	0%
Rhizophora mangle [American Mangrove]	3	39.30%	6.10%
Ricinus communis [Castor Bean]	7	53.60%	16.30%
Robinia pseudoacacia [Black Locust]	4	346%	242.10%
Rosa hybrida [Rose]	4	26.50%	7.90%
Rubus [Blackberry]	1	675%	0%
Rubus idaeus [Red Raspberry]	4	111.80%	32.80%
Rudbeckia hirta [Black-eyed Susan]	1	0%	0%
Rumex acetosella [Common Sheep Sorrel]	2	24%	2.10%
Rumex obtusifolius [Bitter Dock]	6	18.70%	12.50%
Saccharina latissima [Sugar Kelp]	74	35.10%	5.30%
Saccharum officinarum [Sugarcane]	11	34%	6.50%
Salix jiangsuensis [Willow]	2	38.50%	8.80%
Salix myrsinifolia [Dark Leaved Willow]	8	70.80%	13.70%
Salvia officinalis [Sage]	2	21%	11.30%
Salvia pitcheri [Pitcher Sage]	2	25.50%	2.50%
Sanguisorba minor [Small Burnet]	6	81.20%	15.20%
Schima superba [Subtropical Tree]	2	27.50%	11%
Schizachyrium scoparium [Little Bluestem]	9	18.20%	9%
Schoenoplectus americanus [Chairmaker's Bulrush]	1	27%	0%
Scindapsus aureus [Pothos]	1	39%	0%
Scirpus lacustris [Softstem Bulrush]	1	-2%	0%
Scirpus olneyi [Salt Marsh Sedge]	10	17.40%	7.70%
Sedum alfredii [Perennial Herb]	6	23.30%	2.40%
Senecio jacobaea [Ragwort]	1	21%	0%
Senecio vulgaris [Common Groundsel]	2	66%	25.50%
Sesbania vesicaria [Bagpod]	1	60%	0%
Setaria glauca [Yellow Bristle Grass]	1	16%	0%
Seteria faberi [Japanese Bristlegrass]	5	18.80%	6.70%
Seteria viridis [Green Bristlegrass]	4	16%	0.80%
Shorea leprosula	2	38.50%	11%
Silene cretica in mixed stands with Silene cretica [Common Flax]	2	98.50%	17.30%
Silene latifolia [White Campion]	6	43.50%	9%
Silene noctiflora [Night-flowering Catchfly]	1	44%	0%
Sinapis alba [White Mustard]	4	21.30%	4.10%

Climate Change Reconsidered II: Biological Impacts

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Solanum viarum [Tropical Soda Apple]	1	39%	0%
Solanum curtilobum [Shortlobe Solanum]	2	63%	5.70%
Solanum dulcamara [Climbing Nightshade]	10	46.50%	9.30%
Solanum lycopersicum [Tomato]	2	152.50%	23%
Solanum melongena [Eggplant]	1	41%	0%
Solanum muricatum [Pepino]	4	69.80%	20.50%
Solanum tuberosum [White Potato]	36	29.50%	3.30%
Solidago canadensis [Canadian Goldenrod]	2	1750%	1237.40%
Solidago rigida [Stiff Goldenrod]	1	27%	0%
Sorghastrum nutans [Yellow Indian Grass]	3	9.70%	14.40%
Sorghum bicolor [Sorghum]	28	19.90%	3.50%
Sorghum halepense [Johnsongrass]	3	-13%	14.30%
Sorghum sudanense [Sudan Grass]	1	14%	0%
Spartina densiflora [Dense Flowered Cordgrass]	3	24.30%	12.40%
Spartina alterniflora [Smooth Cordgrass]	2	0%	0%
Spartina anglica [Common Cordgrass]	3	19%	25.10%
Spergula arvensis [Corn Spurrey]	2	-20%	7.80%
Sphagnum cuspidatum [Toothed Sphagnum]	1	42%	0%
Sphagnum magellanicum [Magellan's Sphagnum]	1	26%	0%
Sphagnum papillosum [Papillose Sphagnum]	2	57.50%	0.40%
Sphagnum recurvum [Recurved Sphagnum]	4	12.30%	7%
Spinacia oleracea [Spinach]	3	24.30%	5.70%
Sporobolus indicus [Smut Grass]	1	-5%	0%
Sporobolus pyramidalis [Whorled Dropseed]	6	33.50%	21.70%
Stipa thurberiana [Thurber Needlegrass]	1	11%	0%
Striga hermonthica [Purple Witchweed]	1	-65%	0%
Stylosanthes hamata [Pencil Flower]	1	18%	0%
Stylosanthes scabra [Pencilflower]	2	72%	10.60%
Symphiocarpos orbiculatus [Buck Brush]	2	98.50%	42.10%
Syracosphaera pulchra [Marine Coccolithophore]	2	9%	2.80%
Taxodium distichum [Bald Cypress]	5	28%	5.40%
Taxus baccata [English Yew]	5	28%	5.40%
Tectona grandis [Teak, Common]	8	44.60%	7.20%
Terminalia arjuna [Terminalia]	8	190.60%	35.10%
Terminalia chebula [Myrobalan]	8	442.50%	52.50%
Themeda triandra [Kangaroo Grass]	9	54.90%	15.80%

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Thinouia tomentosa [Standley]	2	94%	28.30%
Thymus vulgaris [Thyme]	1	0%	0%
Toxicodendron radicans [Poison Ivy]	7	75.70%	13.70%
Trachypogon plumosus [C ₄ South American Grass]	2	-28.50%	3.20%
Tridens flavus [Purpletop Tridens]	1	0%	0%
Trifolium alexandrinum [Berseem]	1	41%	0%
Trifolium incarnatum [Crimson Clover]	2	21.50%	0.40%
Trifolium pratense [Purple Clover]	6	16.30%	3.70%
Trifolium repens [White Clover]	49	64.90%	15.70%
Trifolium subterraneum [Subterranean Clover]	1	756%	0%
Trigonella foenum-graecum [Fenugreek]	2	91%	33.20%
Triticum dicoccoides [Wheat]	1	378%	0%
Triticum monococcum [Einkorn Wheat]	1	180%	0%
Triticum aestivum [Common Wheat]	260	33.40%	1.80%
Triticum turgidum [Rivet Wheat]	8	26.30%	1.80%
Tropaeolum majus [Nasturtium]	3	42.30%	10.80%
Tsuga canadensis [Eastern Hemlock]	3	34%	4.50%
Typha angustifolia [Narrowleaf Cattail]	3	41.30%	8.50%
Typha x glauca [White Cattail]	1	16%	0%
Typha latifolia [Cattail]	2	12.50%	10.30%
Ulmus alata [Winged Elm]	1	30%	0%
Urtica dioica [Stinging Nettle]	1	26%	0%
Vaccinium myrtillus [Whortleberry]	6	60.70%	10%
Vallisneria spiralis [Corkscrew Vallisneria]	2	14%	5.70%
Vernonia herbacea [Fructan Accumulating Plant]	2	31%	4.20%
Veronica didyma [Gray Field Speedwell]	1	26%	0%
Vicia cracca [Bird Vetch]	1	47%	0%
Vicia faba [Faba Bean]	4	46.30%	13.50%
Vicia lathyroides [Spring Vetch]	1	114%	0%
Vigna angularis [Adzuki Bean]	4	60%	5.20%
Vigna mungo [Blackgram]	2	87%	19.80%
Vigna radiata [Mungbean]	2	31.50%	16.60%
Vigna unguiculata [Black-eyed Pea]	4	77%	10.80%
Viola x wittrockiana [Pansy]	1	30%	0%
Vitis vinifera [Grapevine, Common]	5	68.20%	16.60%
Vulpia microstachys [Small Fescue]	2	-4.50%	8.10%
Wedelia chinensis [Herb, Perennial]	2	47.50%	0.40%

Appendix 3 – Plant Dry Weight (Biomass) Responses

Plant Name	# of Studies	Mean CO ₂ Growth Response	Standard Error
Wedelia trilobata [Creeping Daisy]	2	59.50%	0.40%
Weeds, Unspecified	2	0%	0%
Xanthium strumarium var. Xanthium strumarium [Canada Cocklebur]	7	30.60%	6.40%
Yucca brevifolia [Joshua Tree]	1	65%	0%
Yucca schidigera [Mojave Yucca]	1	86%	0%
Yucca whipplei [Chaparral Yucca]	1	13%	0%
Zea mays [Corn]	24	24.10%	5%
Zingiber officinale [Ginger]	2	46.50%	7.40%
Zizania latifolia [Manchurian Wildrice]	1	-5%	0%
Zostera marina [Eelgrass, Common]	1	24%	0%