APPENDIX

Effect of environmental changes on vegetable and legume yields and nutritional quality

Pauline Scheelbeek, Frances Bird, Hanna Tuomisto, Rosemary Green, Francesca Harris, Edward Joy, Zaid Chalabi, Elizabeth Allen, Andy Haines, Alan Dangour

Contents

Appendix 1a - Database Search Strategies Nutritional Quality

Medline

1. ((climate adj1 (change* OR variability OR disruption)) OR (land* adj1 degradation) OR ((increas* OR elevat* OR fertili#ation) adj2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR co2)) OR (soil adj2 (fertili#ation OR eutrophication)) OR “global warming” OR “greenhouse effect*” OR ((water OR soil*) adj4 (sodium OR salini#ation OR saline OR salinity)) OR global temperature* OR (temperature* adj2 (increase* OR variab* OR trend*)) OR “extreme weather” OR “extreme temperature” OR (heatwave* OR heat-wave* OR "heat wave") OR (cold adj1 extreme*) OR (rise adj4 (sea level OR sea-level OR sealevel)) OR flood* OR “storm surge” OR landslide* OR (wildfire* OR wild-fire* OR wild fire) OR windstorm* OR cyclone* OR (humidit* adj2 (increas* OR change* OR elevation* OR variabilit* OR pattern*)) OR “rainfall pattern*” OR ((acid OR acidifi*) adj1 rain*) OR “carbon footprint” OR (ozone* adj2 depletion) OR “climate pollutant*” OR “extended drought*” OR “cloud cover” OR (change adj2 ("land use" OR "land cover")) OR “soil erosion” OR “soil quality” OR (nutrient* adj1 (run-off OR runoff OR "run off")) OR ((quality OR availability) adj1 (groundwater OR ground-water OR "ground water" OR freshwater OR fresh-water OR "fresh water" OR surfacewater OR surface-water OR "surface water" OR "irrigation water")) OR aquifer* OR (water adj2 (availab* OR security OR stress OR scarcity)) OR (water adj2 quality) OR biodivers* OR “biological divers*” OR pollinator* OR ((bee OR bees OR insect OR insects) adj2 decline) OR “ecosystem* change*” OR "health of the planet" OR “environment* change*” OR (chemical adj1 contamination) OR (pest* adj4 (crop* OR plant*)) OR (plant* adj1 (pathogen* OR disease*))).ti,ab.
2. ((quality adj2 (crop OR vegetable OR fruit OR yield)) OR (taste adj2 (crop OR vegetable OR fruit)) OR ((micronutrient* OR macronutrient* OR nutrient* OR nutrition* OR nutritious OR nutriti* OR vitamin* OR mineral OR iron OR zinc OR calcium) adj2 (value* OR content* OR composition* OR concentration* OR quality)) OR (beta-carotene OR "beta carotene" OR betacarotene) OR (folate* OR "folic acid*" OR "folic-acid*" OR folicacid*) OR ("amino acid*" OR "amino-acid*" OR aminoacid*)).ti,ab.

EMBASE

1. ((climate adj1 (change* OR variability OR disruption)) OR (land* adj1 degradation) OR ((increas* OR elevat* OR fertili#ation) adj2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR co2)) OR (soil adj2 (fertili#ation OR eutrophication)) OR “global warming” OR “greenhouse effect*” OR ((water OR soil*) adj4 (sodium OR salini#ation OR saline OR salinity)) OR global temperature* OR (temperature* adj2 (increase* OR variab* OR trend*)) OR “extreme weather” OR “extreme temperature” OR (heatwave* OR heat-wave* OR "heat wave") OR (cold adj1 extreme*) OR (rise adj4 (sea level OR sea-level OR sealevel)) OR flood* OR “storm surge” OR landslide* OR (wildfire* OR wild-fire* OR wild fire) OR windstorm* OR cyclone* OR (humidit* adj2 (increas* OR change* OR elevation* OR variabilit* OR pattern*)) OR “rainfall pattern*” OR ((acid OR acidifi*) adj1 rain*) OR “carbon footprint” OR (ozone* adj2 depletion) OR “climate pollutant*” OR “extended drought*” OR “cloud cover” OR (change adj2 ("land use" OR "land cover")) OR “soil erosion” OR “soil quality” OR (nutrient* adj1 (run-off OR runoff OR "run off"))

OR ((quality OR availability) adj1 (groundwater OR ground-water OR "ground water" OR freshwater OR fresh-water OR "fresh water" OR surfacewater OR surface-water OR "surface water" OR "irrigation water")) OR aquifer* OR (water adj2 (availab* OR security OR stress OR scarcity)) OR (water adj2 quality) OR biodivers* OR “biological divers*” OR pollinator* OR ((bee OR bees OR insect OR insects) adj2 decline) OR “ecosystem* change*” OR "health of the planet" OR “environment* change*” OR (chemical adj1 contamination) OR (pest* adj4 (crop* OR plant*)) OR (plant* adj1 (pathogen* OR disease*))).ti,ab.

2. ((quality adj2 (crop OR vegetable OR fruit OR yield)) OR (taste adj2 (crop OR vegetable OR fruit)) OR ((micronutrient* OR macronutrient* OR nutrient* OR nutrition* OR nutritious OR nutriti* OR vitamin* OR mineral OR iron OR zinc OR calcium) adj2 (value* OR content* OR composition* OR concentration* OR quality)) OR (beta-carotene OR "beta carotene" OR betacarotene) OR (folate* OR "folic acid*" OR "folic-acid*" OR folicacid*) OR ("amino acid*" OR "amino-acid*" OR aminoacid*)).ti,ab.
3. (pulses OR banana* OR tomato* OR Orange* OR mandarin* OR apple* OR grapes OR plantain* OR Coconut* OR Pineapple* OR Lemon* OR Lime* OR citrus OR Grapefruit* OR Dates OR Olive* OR berries OR strawberr* OR raspberr* blackberr* OR melon* OR Cherry OR cherries OR Kiwi* OR plum* OR Pomegranate OR Peach* OR avocado* OR papaya* OR pumpkin* OR onion* OR bean* OR Peas OR Pepper* OR piment* OR Spinach OR Lettuce OR kale OR garlic OR broccoli OR sprout*).ti,ab.

AGRIS

1. ((climate adj1 (change* OR variability OR disruption)) OR (land* adj1 degradation) OR ((increas* OR elevat* OR fertili#ation) adj2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR co2)) OR (soil adj2 (fertili#ation OR eutrophication)) OR “global warming” OR “greenhouse effect*” OR ((water OR soil*) adj4 (sodium OR salini#ation OR saline OR salinity)) OR global temperature* OR (temperature* adj2 (increase* OR variab* OR trend*)) OR “extreme weather” OR “extreme temperature” OR (heatwave* OR heat-wave* OR "heat wave") OR (cold adj1 extreme*) OR (rise adj4 (sea level OR sea-level OR sealevel)) OR flood* OR “storm surge” OR landslide* OR (wildfire* OR wild-fire* OR wild fire) OR windstorm* OR cyclone* OR (humidit* adj2 (increas* OR change* OR elevation* OR variabilit* OR pattern*)) OR “rainfall pattern*” OR ((acid OR acidifi*) adj1 rain*) OR “carbon footprint” OR (ozone* adj2 depletion) OR “climate pollutant*” OR “extended drought*” OR “cloud cover” OR (change adj2 ("land use" OR "land cover")) OR “soil erosion” OR “soil quality” OR (nutrient* adj1 (run-off OR runoff OR "run off")) OR ((quality OR availability) adj1 (groundwater OR ground-water OR "ground water" OR freshwater OR fresh-water OR "fresh water" OR surfacewater OR surface-water OR "surface water" OR "irrigation water")) OR aquifer* OR (water adj2 (availab* OR security OR stress OR scarcity)) OR (water adj2 quality) OR biodivers* OR “biological divers*” OR pollinator* OR ((bee OR bees OR insect OR insects) adj2 decline) OR “ecosystem* change*” OR "health of the planet" OR “environment* change*” OR (chemical adj1 contamination) OR (pest* adj4 (crop* OR plant*)) OR (plant* adj1 (pathogen* OR disease*))).ti,ab.
2. ((quality adj2 (crop OR vegetable OR fruit OR yield)) OR (taste adj2 (crop OR vegetable OR fruit)) OR ((micronutrient* OR macronutrient* OR nutrient* OR nutrition* OR nutritious OR nutriti* OR vitamin* OR mineral OR iron OR zinc OR calcium) adj2 (value* OR content* OR composition*

OR concentration* OR quality)) OR (beta-carotene OR "beta carotene" OR betacarotene) OR (folate* OR "folic acid*" OR "folic-acid*" OR folicacid*) OR ("amino acid*" OR "amino-acid*" OR aminoacid*)).ti,ab.

3. (pulses OR banana* OR tomato* OR Orange* OR mandarin* OR apple* OR grapes OR plantain* OR Coconut* OR Pineapple* OR Lemon* OR Lime* OR citrus OR Grapefruit* OR Dates OR Olive* OR berries OR strawberr* OR raspberr* blackberr* OR melon* OR Cherry OR cherries OR Kiwi* OR plum* OR Pomegranate OR Peach* OR avocado* OR papaya* OR pumpkin* OR onion* OR bean* OR Peas OR Pepper* OR piment* OR Spinach OR Lettuce OR kale OR garlic OR broccoli OR sprout*).ti,ab.

CAB Abstracts

1. ((climate adj1 (change* OR variability OR disruption)) OR (land* adj1 degradation) OR ((increas* OR elevat* OR fertili#ation) adj2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR co2)) OR (soil adj2 (fertili#ation OR eutrophication)) OR “global warming” OR “greenhouse effect*” OR ((water OR soil*) adj4 (sodium OR salini#ation OR saline OR salinity)) OR global temperature* OR (temperature* adj2 (increase* OR variab* OR trend*)) OR “extreme weather” OR “extreme temperature” OR (heatwave* OR heat-wave* OR "heat wave") OR (cold adj1 extreme*) OR (rise adj4 (sea level OR sea-level OR sealevel)) OR flood* OR “storm surge” OR landslide* OR (wildfire* OR wild-fire* OR wild fire) OR windstorm* OR cyclone* OR (humidit* adj2 (increas* OR change* OR elevation* OR variabilit* OR pattern*)) OR “rainfall pattern*” OR ((acid OR acidifi*) adj1 rain*) OR “carbon footprint” OR (ozone* adj2 depletion) OR “climate pollutant*” OR “extended drought*” OR “cloud cover” OR (change adj2 ("land use" OR "land cover")) OR “soil erosion” OR “soil quality” OR (nutrient* adj1 (run-off OR runoff OR "run off")) OR ((quality OR availability) adj1 (groundwater OR ground-water OR "ground water" OR freshwater OR fresh-water OR "fresh water" OR surfacewater OR surface-water OR "surface water" OR "irrigation water")) OR aquifer* OR (water adj2 (availab* OR security OR stress OR scarcity)) OR (water adj2 quality) OR biodivers* OR “biological divers*” OR pollinator* OR ((bee OR bees OR insect OR insects) adj2 decline) OR “ecosystem* change*” OR "health of the planet" OR “environment* change*” OR (chemical adj1 contamination) OR (pest* adj4 (crop* OR plant*)) OR (plant* adj1 (pathogen* OR disease*))).ti,ab.
2. ((quality adj2 (crop OR vegetable OR fruit OR yield)) OR (taste adj2 (crop OR vegetable OR fruit)) OR ((micronutrient* OR macronutrient* OR nutrient* OR nutrition* OR nutritious OR nutriti* OR vitamin* OR mineral OR iron OR zinc OR calcium) adj2 (value* OR content* OR composition* OR concentration* OR quality)) OR (beta-carotene OR "beta carotene" OR betacarotene) OR (folate* OR "folic acid*" OR "folic-acid*" OR folicacid*) OR ("amino acid*" OR "amino-acid*" OR aminoacid*)).ti,ab.
3. (pulses OR banana* OR tomato* OR Orange* OR mandarin* OR apple* OR grapes OR plantain* OR Coconut* OR Pineapple* OR Lemon* OR Lime* OR citrus OR Grapefruit* OR Dates OR Olive* OR berries OR strawberr* OR raspberr* blackberr* OR melon* OR Cherry OR cherries OR Kiwi* OR plum* OR Pomegranate OR Peach* OR avocado* OR papaya* OR pumpkin* OR onion* OR bean* OR Peas OR Pepper* OR piment* OR Spinach OR Lettuce OR kale OR garlic OR broccoli OR sprout*).ti,ab.

GreenFile

1. ((climate N1 (change* OR variability OR disruption)) OR (land* N1 degradation) OR ((increas* OR elevat* OR fertilisation OR fertilization) N2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR co2)) OR (soil N2 (fertilisation OR fertilization OR eutrophication)) OR “global warming” OR “greenhouse effect*” OR ((water OR soil*) N4 (sodium OR salinisation OR salinization OR saline OR salinity)) OR global temperature* OR (temperature* N2 (increase* OR variab* OR trend*)) OR “extreme weather” OR “extreme temperature” OR (heatwave* OR heat-wave* OR "heat wave") OR (cold N1 extreme*) OR (rise N4 (sea level OR sea-level OR sealevel)) OR flood* OR “storm surge” OR landslide* OR (wildfire* OR wild-fire* OR wild fire) OR windstorm* OR cyclone* OR (humidit* N2 (increas* OR change* OR elevation* OR variabilit* OR pattern*)) OR “rainfall pattern*” OR ((acid OR acidifi*) N1 rain*) OR “carbon footprint” OR (ozone* N2 depletion) OR “climate pollutant*” OR “extended drought*” OR “cloud cover” OR (change N2 ("land use" OR "land cover")) OR “soil erosion” OR “soil quality” OR (nutrient* N1 (run-off OR runoff OR "run off")) OR ((quality OR availability) N1 (groundwater OR ground-water OR "ground water" OR freshwater OR fresh-water OR "fresh water" OR surfacewater OR surface-water OR "surface water" OR "irrigation water")) OR aquifer* OR (water N2 (availab* OR security OR stress OR scarcity)) OR (water N2 quality) OR biodivers* OR “biological divers*” OR pollinator* OR ((bee OR bees OR insect OR insects) N2 decline) OR “ecosystem* change*” OR "health of the planet" OR “environment* change*” OR (chemical N1 contamination) OR (pest* N4 (crop* OR plant*)) OR (plant* N1 (pathogen* OR disease*)))
2. ((quality N2 (crop OR vegetable OR fruit OR yield)) OR (taste N2 (crop OR vegetable OR fruit)) OR ((micronutrient* OR macronutrient* OR nutrient* OR nutrition* OR nutritious OR nutriti* OR vitamin* OR mineral OR iron OR zinc OR calcium) N2 (value* OR content* OR composition* OR concentration* OR quality)) OR (beta-carotene OR "beta carotene" OR betacarotene) OR (folate* OR "folic acid*" OR "folic-acid*" OR folicacid*) OR ("amino acid*" OR "amino-acid*" OR aminoacid*))

Web of Science

1. TS=(((climate near/1 (change* OR variability OR disruption)) OR (land* near/1 degradation) OR ((increas* OR elevat* OR fertili?ation) near/2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR co2)) OR (soil near/2 (fertili?ation OR eutrophication)) OR “global warming” OR “greenhouse effect*” OR ((water OR soil*) near/4 (sodium OR salini?ation OR saline OR salinity)) OR global temperature* OR (temperature* near/2 (increase* OR variab* OR trend*)) OR “extreme weather” OR “extreme temperature” OR (heatwave* OR heat-wave* OR "heat wave") OR (cold near/1 extreme*) OR (rise near/4 (sea level OR sea-level OR sealevel)) OR flood* OR “storm surge” OR landslide* OR (wildfire* OR wild-fire* OR wild fire) OR windstorm* OR cyclone* OR (humidit* near/2 (increas* OR change* OR elevation* OR variabilit* OR pattern*)) OR “rainfall pattern*” OR ((acid OR acidifi*) near/1 rain*) OR “carbon footprint” OR (ozone* near/2 depletion) OR “climate pollutant*” OR “extended drought*” OR “cloud cover” OR (change near/2 ("land use" OR "land cover")) OR “soil erosion” OR “soil quality” OR (nutrient* near/1 (run-off OR runoff OR "run off")) OR ((quality OR availability) near/1 (groundwater OR ground-water OR "ground water" OR freshwater OR fresh-water OR "fresh water" OR surfacewater OR surface-water OR "surface water" OR "irrigation water")) OR aquifer* OR (water near/2 (availab* OR security OR stress OR scarcity)) OR (water near/2

quality) OR biodivers* OR “biological divers*” OR pollinator* OR ((bee OR bees OR insect OR insects) near/2 decline) OR “ecosystem* change*” OR "health of the planet" OR “environment* change*” OR (chemical near/1 contamination) OR (pest* near/4 (crop* OR plant*)) OR (plant* near/1 (pathogen* OR disease*)))

2. TS=((quality near/2 (crop OR vegetable OR fruit OR yield)) OR (taste near/2 (crop OR vegetable OR fruit)) OR ((micronutrient* OR macronutrient* OR nutrient* OR nutrition* OR nutritious OR nutriti* OR vitamin* OR mineral OR iron OR zinc OR calcium) near/2 (value* OR content* OR composition* OR concentration* OR quality)) OR (beta-carotene OR "beta carotene" OR betacarotene) OR (folate* OR "folic acid*" OR "folic-acid*" OR folicacid*) OR ("amino acid*" OR "amino-acid*" OR aminoacid*))
3. TS=(pulses OR banana* OR tomato* OR Orange* OR mandarin* OR apple* OR grapes OR plantain* OR Coconut* OR Pineapple* OR Lemon* OR Lime* OR citrus OR Grapefruit* OR Dates OR Olive* OR berries OR strawberr* OR raspberr* blackberr* OR melon* OR Cherry OR cherries OR Kiwi* OR plum* OR Pomegranate OR Peach* OR avocado* OR papaya* OR pumpkin* OR onion* OR bean* OR Peas OR Pepper* OR piment* OR Spinach OR Lettuce OR kale OR garlic OR broccoli OR sprout*)

Scopus

1. ((climate W/1 (change* OR variability OR disruption)) OR (land* W/1 degradation) OR ((increas* OR elevat* OR fertili?ation) W/2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR co2)) OR (soil W/2 (fertili?ation OR eutrophication)) OR “global warming” OR “greenhouse effect*” OR ((water OR soil*) W/4 (sodium OR salini?ation OR saline OR salinity)) OR global temperature* OR (temperature* W/2 (increase* OR variab* OR trend*)) OR “extreme weather” OR “extreme temperature” OR (heatwave* OR heat-wave* OR "heat wave") OR (cold W/1 extreme*) OR (rise W/4 (sea level OR sea-level OR sealevel)) OR flood* OR “storm surge” OR landslide* OR (wildfire* OR wild-fire* OR wild fire) OR windstorm* OR cyclone* OR (humidit* W/2 (increas* OR change* OR elevation* OR variabilit* OR pattern*)) OR “rainfall pattern*” OR ((acid OR acidifi*) W/1 rain*) OR “carbon footprint” OR (ozone* W/2 depletion) OR “climate pollutant*” OR “extended drought*” OR “cloud cover” OR (change W/2 ("land use" OR "land cover")) OR “soil erosion” OR “soil quality” OR (nutrient* W/1 (run-off OR runoff OR "run off")) OR ((quality OR availability) W/1 (groundwater OR ground-water OR "ground water" OR freshwater OR fresh-water OR "fresh water" OR surfacewater OR surface-water OR "surface water" OR "irrigation water")) OR aquifer* OR (water W/2 (availab* OR security OR stress OR scarcity)) OR (water W/2 quality) OR biodivers* OR “biological divers*” OR pollinator* OR ((bee OR bees OR insect OR insects) W/2 decline) OR “ecosystem* change*” OR "health of the planet" OR “environment* change*” OR (chemical W/1 contamination) OR (pest* W/4 (crop* OR plant*)) OR (plant* W/1 (pathogen* OR disease*))).ti,ab.
2. ((quality W/2 (crop OR vegetable OR fruit OR yield)) OR (taste W/2 (crop OR vegetable OR fruit)) OR ((micronutrient* OR macronutrient* OR nutrient* OR nutrition* OR nutritious OR nutriti* OR vitamin* OR mineral OR iron OR zinc OR calcium) W/2 (value* OR content* OR composition* OR concentration* OR quality)) OR (beta-carotene OR "beta carotene" OR betacarotene) OR (folate* OR "folic acid*" OR "folic-acid*" OR folicacid*) OR ("amino acid*" OR "amino-acid*" OR aminoacid*)).ti,ab.

Appendix 1b - Database Search Strategies Yield

Medline

1. (climate adj1 (change OR variability OR disruption OR warming)) OR (global adj1 (warming OR temperature)) OR “greenhouse effect” OR “elevated CO2” OR ((increas* OR elevat* OR fertilisation OR fertilization) adj2 (carbon-dioxide OR carbondioxide OR “carbon dioxide” OR CO2)) OR “carbon footprint” OR (ozone adj2 depletion) OR climate pollutant OR (soil adj2 (fertilisation OR fertilization OR eutrophication)) OR ((soil OR water) adj4 (sodium OR salinisation OR salinization OR salin*)) OR (temperature adj2 (increas* OR variability OR trend) OR extreme weather OR extreme temperature OR heatwave OR heat-wave OR (cold adj1 extreme) OR ((“sea level” OR sea-level OR sealevel) adj4 rise) OR flood OR “storm surge” OR landslide OR wildfire OR wild-fire OR tropical cyclone OR windstorm OR (humidity adj2 (increas* OR change OR elevat* OR variability OR pattern)) OR “rainfall pattern” OR “acid rain” OR “drought stress” OR “water stress” OR “water scarcity” OR “extended drought” OR “cloud cover” OR (change adj1 (“land use” OR land-use OR “land cover”)) OR soil erosion OR soil quality OR “nutrient run-off” OR ((quality OR availability) adj1 (groundwater OR ground-water OR “ground water” OR freshwater OR fresh-water OR “fresh water”)) OR aquifer OR “water security” OR (water adj2 availab*) OR (water adj2 quality) OR biodivers* OR biological divers* OR pollinat* OR ((bee OR insect) adj2 decline)) OR “ecosystem change” OR “health of the planet” OR planet* health OR environment* change OR (chemical adj1 contamination) OR (pest adj4 (crop OR plant)) OR (plant adj1 (pathogen OR disease))

2. fruit OR watermelon OR banana OR apple OR grape OR orange OR tangerine OR mandarin OR satsuma OR clementine OR citrus OR coconut OR mango OR mangosteen OR guava OR melon OR pear OR pineapple OR vegetable OR bean OR tomato OR onion OR cabbage OR cucumber OR gherkin OR eggplant OR aubergine OR carrot OR turnip OR pepper OR lettuce OR garlic OR brassica OR allium

3. (yield adj3 change) OR "crop production" OR "crop growth" OR producti* OR growth OR yield OR harvest OR biomass OR “dry weight” OR “fresh weight”

EMBASE

1. (climate adj1 (change OR variability OR disruption OR warming)) OR (global adj1 (warming OR temperature)) OR “greenhouse effect” OR “elevated CO2” OR ((increas* OR elevat* OR fertilisation OR fertilization) adj2 (carbon-dioxide OR carbondioxide OR “carbon dioxide” OR CO2)) OR “carbon footprint” OR (ozone adj2 depletion) OR climate pollutant OR (soil adj2 (fertilisation OR fertilization OR eutrophication)) OR ((soil OR water) adj4 (sodium OR salinisation OR salinization OR salin*)) OR (temperature adj2 (increas* OR variability OR trend) OR extreme weather OR extreme temperature OR heatwave OR heat-wave OR (cold adj1 extreme) OR ((“sea level” OR sea-level OR sealevel) adj4 rise) OR flood OR “storm surge” OR landslide OR wildfire OR wild-fire OR tropical cyclone OR windstorm OR (humidity adj2 (increas* OR change OR elevat* OR variability OR pattern)) OR “rainfall pattern” OR “acid rain” OR “drought stress” OR “water stress” OR “water scarcity” OR “extended drought” OR “cloud cover” OR (change adj1 (“land

use" OR land-use OR "land cover")) OR soil erosion OR soil quality OR "nutrient run-off" OR ((quality OR availability) adj1 (groundwater OR ground-water OR "ground water" OR freshwater OR fresh-water OR "fresh water")) OR aquifer OR "water security" OR (water adj2 availab*) OR (water adj2 quality) OR biodivers* OR biological divers* OR pollinat* OR ((bee OR insect) adj2 decline)) OR "ecosystem change" OR "health of the planet" OR planet* health OR environment* change OR (chemical adj1 contamination) OR (pest adj4 (crop OR plant)) OR (plant adj1 (pathogen OR disease))

2. fruit OR watermelon OR banana OR apple OR grape OR orange OR tangerine OR mandarin OR satsuma OR clementine OR citrus OR coconut OR mango OR mangosteen OR guava OR melon OR pear OR pineapple OR vegetable OR bean OR tomato OR onion OR cabbage OR cucumber OR gherkin OR eggplant OR aubergine OR carrot OR turnip OR pepper OR lettuce OR garlic OR brassica OR allium

3. (yield adj3 change) OR "crop production" OR "crop growth" OR producti* OR growth OR yield OR harvest OR biomass OR "dry weight" OR "fresh weight"

AGRIS

1. (((“climate change”~1) OR (“climate variability”~1) OR (“climate disruption”~1) OR (“climate warming” ~1) OR (“global warming” ~1) OR (“global temperature” ~1) OR “greenhouse effect” OR “elevated CO2” OR (“increas* carbon-dioxide” ~2) OR (“increas* carbondioxide” ~2) OR (“increas* carbon dioxide” ~2) OR (“increas* CO2” ~2) OR (“elevat* carbon-dioxide” ~2) OR (“elevat* carbondioxide” ~2) OR (“elevat* carbon dioxide” ~2) OR (“elevat* CO2” ~2) OR (“fertili?ation carbon-dioxide” ~2) OR (“fertili?ation carbondioxide” ~2) OR (“fertili?ation carbon dioxide”~2) OR (“fertili?ation CO2” ~2) OR “carbon footprint” OR (“ozone* depletion” ~2) OR climate pollutant OR (“soil fertili?ation” ~2) OR (“soil eutrophication” ~2) OR (“soil sodium” ~4) OR (“soil salini?ation” ~4) OR (“soil salin*” ~4) OR (“water sodium” ~4) OR (“water salini?ation” ~4) OR (“water salin*” ~4) OR (“temperature increas*” ~2) OR (“temperature variability” ~2) OR (“temperature trend” ~2) OR extreme weather OR extreme temperature OR heatwave OR heat-wave OR (“cold extreme” ~1) OR (“sea level rise” ~4) OR (“sea-level rise” ~4) OR (“sealevel rise” ~4) OR flood OR “storm surge” OR landslide OR wildfire OR wild-fire OR tropical cyclone OR windstorm OR (“humidity increase” ~2) OR (“humidity change” ~2) OR (“humidity elevat*” ~2) OR (“humidity variability” ~2) OR (“humidity pattern” ~2) OR “rainfall pattern” OR “acid rain” OR “drought stress” OR “water stress” OR “water scarcity” OR “extended drought” OR “cloud cover” OR (“change land use” ~1) OR (“change land-use” ~1) OR (“change land cover” ~1) OR soil erosion OR soil quality OR “nutrient run-off” OR (“quality groundwater” ~1) OR (“quality ground-water” ~1) OR (“quality ground water” ~1) OR (“quality freshwater” ~1) OR (“quality fresh-water” ~1) OR (“quality fresh water” ~1) OR (“availability groundwater” ~1) OR (“availability ground-water” ~1) OR (“availability ground water” ~1) OR (“availability freshwater” ~1) OR (“availability fresh-water” ~1) OR (“availability fresh water” ~1) OR aquifer OR “water security” OR (“water availab*” ~2) OR (“water quality” ~2) OR biodiverse* OR biological divers* OR pollinat* OR (bee W/2 decline) OR (“insect decline” ~2) OR “ecosystem change” OR “health of

the planet" OR planet* health OR environment* change OR ("chemical contamination" ~1) OR ("pest crop" ~4) OR ("pest plant" ~4) OR ("plant pathogen" ~1) OR ("plant disease" ~1))
2. (fruit OR watermelon OR banana OR apple OR grape OR orange OR tangerine OR mandarin OR satsuma OR clementine OR citrus OR coconut OR mango OR mangosteen OR guava OR melon OR pear OR pineapple OR vegetable OR bean OR tomato OR onion OR cabbage OR cucumber OR gherkin OR eggplant OR aubergine OR carrot OR turnip OR pepper OR lettuce OR garlic OR brassica OR allium)
3. (("yield change" ~3) OR "crop production" OR "crop growth" OR producti* OR growth OR yield OR harvest OR biomass OR "dry weight" OR "fresh weight")

CAB Abstracts

1. (climate N/1 (change* OR variability OR disruption OR warming)) OR (global N/1 (warming OR temperature)) OR "greenhouse effect" OR "elevated CO2" OR ((increas* OR elevat* OR fertili?ation) N/2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR CO2)) OR "carbon footprint" OR (ozone* N/2 depletion) OR climate pollutant* OR (soil N/2 (fertili?ation OR eutrophication)) OR ((soil OR water) N/4 (sodium OR salini?ation OR salin*)) OR (temperature N/2 (increas* OR variability OR trend*)) OR extreme weather OR extreme temperature OR heatwave OR heat-wave OR (cold N/1 extreme) OR (("sea level" OR sea-level OR sealevel) N/4 rise) OR flood* OR "storm surge" OR landslide* OR wildfire* OR wild-fire* OR tropical cyclone* OR windstorm* OR (humidity N/2 (increase OR change OR elevat* OR variability OR pattern)) OR "rainfall pattern" OR "acid rain" OR "drought stress" OR "water stress" OR "water scarcity" OR "extended drought" OR "cloud cover" OR (change N/1 ("land use" OR "land-use" OR "land cover")) OR soil erosion OR soil quality OR "nutrient run-off" OR ((quality OR availability) N/1 (groundwater OR ground-water OR "ground water" OR freshwater OR fresh-water OR "fresh water")) OR aquifer* OR "water security" OR (water N/2 availab*) OR (water N/2 quality) OR biodiverse* OR biological divers* OR pollinat* OR ((bee* OR insect) N/2 decline) OR "ecosystem change" OR "health of the planet" OR planet* health OR environment* change OR (chemical N/1 contamination) OR (pest* N/4 (crop OR plant)) OR (plant N/1 (pathogen* OR disease*))

2. fruit* OR watermelon* OR banana* OR apple* OR grape* OR orange* OR tangerine* OR mandarin* OR satsuma* OR clementine* OR citrus OR coconut* OR mango** OR mangosteen* OR guava* OR melon* OR pear* OR pineapple* OR vegetable* OR bean* OR tomato** OR onion* OR cabbage* OR cucumber* OR gherkin* OR eggplant* OR aubergine* OR carrot* OR turnip* OR pepper* OR lettuce OR garlic* OR brassica* OR allium

3. (yield N/3 change) OR "crop production" OR "crop growth" OR producti$ OR growth OR yield* OR harvest OR biomass OR "dry weight" OR "fresh weight"

GreenFile

1. (climate W/1 (change* OR variability OR disruption OR warming)) OR (global W/1 (warming OR temperature)) OR "greenhouse effect" OR "elevated CO2" OR ((increas* OR elevat* OR fertili?ation) W/2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR CO2)) OR "carbon footprint" OR (ozone* W/2 depletion) OR climate pollutant* OR (soil W/2 (fertili?ation OR

eutrophication)) OR ((soil OR water) W/4 (sodium OR salini?ation OR salin*)) OR (temperature W/2 (increas* OR variability OR trend*)) OR extreme weather OR extreme temperature OR heatwave OR heat-wave OR (cold W/1 extreme) OR ((“sea level” OR sea-level OR sealevel) W/4 rise) OR flood* OR “storm surge” OR landslide* OR wildfire* OR wild-fire* OR tropical cyclone* OR windstorm* OR (humidity W/2 (increase OR change OR elevat* OR variability OR pattern)) OR “rainfall pattern” OR “acid rain” OR “drought stress” OR “water stress” OR “water scarcity” OR “extended drought” OR “cloud cover” OR (change W/1 (“land use” OR “land-use” OR “land cover”)) OR soil erosion OR soil quality OR “nutrient run-off” OR ((quality OR availability) W/1 (groundwater OR ground-water OR “ground water” OR freshwater OR fresh-water OR “fresh water”)) OR aquifer* OR “water security” OR (water W/2 availab*) OR (water W/2 quality) OR biodiverse$ OR biological divers* OR pollinat* OR ((bee* OR insect) W/2 decline) OR “ecosystem change” OR “health of the planet” OR planet* health OR environment* change OR (chemical W/1 contamination) OR (pest* W/4 (crop OR plant)) OR (plant W/1 (pathogen* OR disease*))

2. fruit* OR watermelon* OR banana* OR apple* OR grape* OR orange* OR tangerine* OR mandarin* OR satsuma* OR clementine* OR citrus OR coconut* OR mango** OR mangosteen* OR guava* OR melon* OR pear* OR pineapple* OR vegetable* OR bean* OR tomato** OR onion* OR cabbage* OR cucumber* OR gherkin* OR eggplant* OR aubergine* OR carrot* OR turnip* OR pepper* OR lettuce OR garlic* OR brassica* OR allium

3. (yield W/3 change) OR "crop production" OR "crop growth" OR producti$ OR growth OR yield* OR harvest OR biomass OR “dry weight” OR “fresh weight”

Web of Science

1. TS=("climate change" OR "climate warming" OR "global warming" OR "greenhouse effect" OR “climate variability” OR “elevated CO2” OR “elevated carbon-dioxide” OR “elevated carbon dioxide” OR “increased CO2” OR “increased carbon-dioxide” OR “increased carbon dioxide” OR “elevated temperature” OR “increased temperature” OR “increase in temperature” OR “CO2 fertilisation” OR “carbon dioxide fertilisation” OR “carbon-dioxide fertilisation” OR “CO2 fertilization” OR “carbon dioxide fertilization” OR “carbon-dioxide fertilization” OR “CO2 enrichment” OR “carbon dioxide enrichment” OR “carbon-dioxide enrichment” OR “ozone depletion” OR “depleted ozone” OR “water salinization” OR “soil salinization” OR “water stress” OR drought OR flood OR “drought stress” OR “increased rainfall” OR “increase in precipitation” OR “increased precipitation” OR “increase in rainfall” OR pollination OR “decreased pollination” OR “environmental change” OR “increased pest” OR “increased disease”)

2. TS=(fruit OR watermelon OR banana OR apple OR grape OR orange OR tangerine OR mandarin OR satsuma OR clementine OR citrus OR coconut OR mango OR mangosteen OR guava OR melon OR pear OR pineapple OR vegetable OR bean OR tomato OR onion OR cabbage OR cucumber OR gherkin OR eggplant OR aubergine OR carrot OR turnip OR pepper OR lettuce OR garlic OR brassica OR allium)

3. TS=(“change in yield” OR “yield change” OR “crop production” OR “crop growth” OR productivity OR production OR growth OR yield OR harvest OR biomass OR “dry weight” OR dry-weight OR “fresh weight” OR fresh-weight)

Scopus

1. (climate W/1 (change OR variability OR disruption OR warming)) OR (global W/1 (warming OR temperature)) OR “greenhouse effect” OR “elevated CO2” OR ((increas* OR elevat* OR fertili?ation) W/2 (carbon-dioxide OR carbondioxide OR “carbon dioxide” OR CO2)) OR “carbon footprint” OR (ozone* W/2 depletion) OR climate pollutant OR (soil W/2 (fertili?ation OR eutrophication)) OR ((soil OR water) W/4 (sodium OR salini?ation OR salin*)) OR (temperature W/2 (increas* OR variability OR trend)) OR extreme weather OR extreme temperature OR heatwave OR heat-wave OR (cold W/1 extreme) OR ((“sea level” OR sea-level OR sealevel) W/4 rise) OR flood OR “storm surge” OR landslide OR wildfire OR wild-fire OR tropical cyclone OR windstorm OR (humidity W/2 (increase OR change OR elevat* OR variability OR pattern)) OR “rainfall pattern” OR “acid rain” OR “drought stress” OR “water stress” OR “water scarcity” OR “extended drought” OR “cloud cover” OR (change W/1 (“land use” OR “land-use” OR “land cover”)) OR soil erosion OR soil quality OR “nutrient run-off” OR ((quality OR availability) W/1 (groundwater OR ground-water OR “ground water” OR freshwater OR fresh-water OR “fresh water”)) OR aquifer OR “water security” OR (water W/2 availab*) OR (water W/2 quality) OR biodiverse* OR biological divers* OR pollinat* OR ((bee OR insect) W/2 decline) OR “ecosystem change” OR “health of the planet” OR planet* health OR environment* change OR (chemical W/1 contamination) OR (pest W/4 (crop OR plant)) OR (plant W/1 (pathogen OR disease))

2. fruit* OR watermelon* OR banana* OR apple* OR grape* OR orange* OR tangerine* OR mandarin* OR satsuma* OR clementine* OR citrus OR coconut* OR mango* OR mangosteen* OR guava* OR melon* OR pear* OR pineapple* OR vegetable* OR bean* OR tomato* OR onion* OR cabbage* OR cucumber* OR gherkin* OR eggplant* OR aubergine* OR carrot* OR turnip* OR pepper* OR lettuce OR garlic OR brassica* OR allium

3. (yield W/3 change) OR "crop production" OR "crop growth" OR producti* OR growth OR yield OR harvest OR biomass OR “dry weight” OR “fresh weight”

Appendix 2 – Quality Assessment Criteria

Modified checklist derived from the Critical Appraisal Skills Programme for randomised controlled trials

#	Criterion description	Issues considered
1.	Clear study description	• Did the authors provide a clear description of the crops evaluated? • Did the authors provide a clear description of (combination of) environmental changes, including levels/concentrations evaluated? • Was a clear description given of crops, field / greenhouse conditions? • Did they give a clear justification of study in particular area – including a description of environmental conditions and trends?
2.	Appropriate comparison group/situation	• Were crops under the "intervention" compared to an appropriate and comparable baseline group/situation?
3.	Clear methods description	• Were the methods of measuring exposure clearly described? • Were the methods of measuring outcome clearly described?
4.	Rigorous and clearly described analysis	• Are sufficient data presented to support the findings? • Were analyses described in detail? (Could they be repeated by someone not involved in the study) • Did the researchers critically examine their potential biases during measurement, analysis and selection of data for presentation?

For inclusion in meta-analysis:

5.	Precision of measure of effect	• What are the confidence limits? • Were they statistically significant?

Appendix 3 – IPCC forecasts, evaluated exposures and standardised changes

To define the standardised changes for this study, IPCC forecasts and evaluated exposure in included experiments we considered. The table below gives an overview of:

- Five environmental exposures included in this review (column A)
- IPCC AR5 forecasts (ensemble means) for mid-century (column B)
- IPCC AR5 forecasts (ensemble means) for end of century (column C)
- Evaluated ranges of exposures in included papers (column D1) & their median values (D2)
- Changes in environmental exposure level used for comparative analysis, standardisation and meta-analysis in this review (column E).

A	B	C	D1	D2	E
Environmental Exposure	**IPCC forecast 2050 (RCP 4.5/8.5)[1]**	**IPCC forecast 2100 (RCP 4.5/8.5)**	**Range evaluated in included experiments**	***Median***	**Standardised change used for this study**
Temperature(1) *(relative to 1986 – 2005)*	+1.4/+2.0 °C	+1.9/+3.8°C	+0.6°C / +16°C		**+4°C**
CO_2(2, 3) *(relative to 2000)*	+108 / +162 ppm	+160 / +557 ppm	+87 / +860ppm		**+250ppm**
Tropospheric O_3(4, 5) *(relative to 2000)*	-9.3%/+5.3%[2]	-2.6%/+22.0%	+10% / +2300%[3]	**84%**	**+25%**
Water availability(1) *(RCP 8.5 only – relative to 1986 – 2005)*	-30% (arid)/ +40% (arctic)	-50% (arid)/ +50% (arctic)	-10% /-100%		**-50%**
Salinity	N.A.[4]	N.A.[3]	+14% / +1665%[5]	**325%**	**+25%**

[1] RCPs (Representative Concentration Pathways) are greenhouse gas concentration trajectories adopted by the IPCC: RCP4.5 assumes a global annual greenhouse gas emission increase (in CO_2 equivalents) leading to stabilisation of radiative forcing of +4.5 W/m² by 2100 (compared to 2000); RCP8.5 assumes an increase of +8.5 W/m² over the same period.

[2] Average annual O_3 concentration

[3] Median of evaluated O_3 ranges = +84% (N.B. many papers looked at yield improvement by testing different varieties rather than simulating environmental change conditions – see discussion)

[4] Various forecasts depending on multiple geographic characteristics and environmental changes

[5] Median of evaluated salinity ranges = +325% (N.B. many papers looked at salt resistant varieties rather than simulating environmental change conditions – see discussion)

Appendix 4 – Overview of included papers in systematic review

#	Author & Year	Title	Study design	Location	Climatic Zone	Crop Type	Crop Group	Environmental exposure	Standardised Exposure	Yield/Nutritional Quality		Change (%)	Min.Max Change (%)	Q1	Q2.	Q3	Q4.	Q5.	Total quality score
1	Abd El-Mageed & Semida 2015	Effect of deficit irrigation and growing seasons on plant water status, fruit yield and water use efficiency of squash under saline soil	Field Experiment	Egypt	Tropical	Squash	Cucurbits	Water Availability	-50%	Yield		-27.2537	-47.05, -7.45	1	1	1	1	1	5
2	Adams et al 2001	Effect of temperature on the growth and development of tomato fruits	Greenhouse Experiment	UK	N.A.	Tomato	Solanum	Temperature	+4°C	Yield		-37.5217	-45.75, -29.29	1	1	1	1	0	4
3	Agele et al 2014	Growth and water-yield functions of dry-season fadama-grown pepper (Capsicum annuum L.) under differential irrigation in a rainforest zone of Nigeria	Field Experiment	Nigeria	Tropical	Pepper	Solanum	Water Availability	-50%	Yield		-35.1756	-46.88, -26.79	1	1	1	1	0	4
4	Ahmed et al 2014	Deficit irrigation affects growth, yield, vitamin C content and irrigation water use efficiency of hot pepper grown in soilless culture	Greenhouse Experiment	China	N.A.	Hot pepper	Solanum	Water Availability	-50%	Yield		-79.2363	-89.78, -70.34	1	1	1	1	1	5
5	Akilli et al 2000	Effect of CO2 enrichment on yield of some vegetables grown in greenhouses	Greenhouse Experiment	Turkey	N.A.	Pepper	Solanum	CO2	+250ppm	Yield		25.64103		1	1	1	1	0	4
6	Akinbile et al 2011	Growth, yield and water use pattern of chilli pepper under different irrigation scheduling and management	Field Experiment	Nigeria	Tropical	Chilli Pepper	Solanum	Water Availability	-50%	Yield		52.43056	24.48, 106.25	1	1	1	1	0	4
7	Al Sahli et al 2013	Effect of Ozone and Ascorbic Acid on the Anatomical, Physiological and Biochemical Parameters of Pepper (Capsicum frutescens L.)	Field Experiment	Saudi Arabia	Tropical	Pepper	Solanum	O3	+25%	Nutr. Quality	Carotenoids	3.469792	1.02, 5.92	1	1	1	1	1	5
											Antioxidants	1.982761	-0.47, 4.43						
8	Aladenola & Madramootoo 2014	Response of greenhouse-grown bell pepper (Capsicum annuum L.) to variable irrigation	Greenhouse Experiment	Canada	N.A.	Red Pepper	Solanum	Water Availability	-50%	Yield		-64.8611	-116.67, -12.50	1	1	1	1	0	4
9	Ammar et al 2014	Physiological and yield responses of faba bean (Vicia faba L.) to drought stress in managed and open field environments	Greenhouse Experiment	Saudi Arabia	N.A.	Bean	Legume	Water Availability	-50%	Yield		-43.6738	-62.08, -17.04	1	1	1	1	0	4
10	Aragues et al 2010	Five-year growth and yield response of two young olive cultivars (Olea europaea L., cvs. Arbequina and Empeltre) to soil salinity	Field Experiment	Spain	Temperate	Olive	Drupe	Salinity	+25%	Yield		0.297075	-4.69, 12.73	1	1	1	1	0	4

11	Assefa et al 2014	Improving adaptation to drought stress in small red common bean: phenotypic differences and predicted genotypic effects on grain yield, yield components and harvest index	Field Experiment	Ethiopia	Tropical	Bean	Legume	Water Availability	-50%	Yield		-55.7	-58.97, -51.20	1	1	1	1	0	4
12	Azam et al 2013	Yield, chemical composition and nutritional quality responses of carrot, radish and turnip to elevated atmospheric carbon dioxide	Greenhouse Experiment	Pakistan	N.A.	Carrot	Root	CO2	+250ppm	Yield		28.82121		1	1	1	1	1	5
						Radish						58.0631							
						Turnip						30.23847							
13	Bandyopadhyay et al 2003	Actual evapotranspiration and crop coefficients of onion (Allium cepa L.) under varying soil moisture levels in the humid tropics of India	Field Experiment	India	Tropical	Onion	Root	Water Availability	-50%	Yield		-47.2831	-50.56, -44.01	1	1	1	1	0	4
14	Barbagallo et al 2012	Yield, physicochemical traits, antioxidant pattern, polyphenol oxidase activity and total visual quality of field-grown processing tomato cv. Brigade as affected by water stress in Mediterranean climate	Field Experiment	Italy	Sub-tropical	Tomato	Solanum	Water Availability	-50%	Nutr. Quality	Vit. C	9.72		1	1	1	1	1	5
											Carotenoids	-6.21934	-6.26, -6.18						
											Flavonoids	0.29							
											Phenols	-8.89203	-24.29, 6.51						
											Antioxidants	-3.69111	-13.49, 6.11						
15	Barnes et al 1992	The influence of CO2 and O3, singly and in combination, on gas exchange, growth and nutrient status of radish (Raphanus sativus L.)	Greenhouse Experiment	Germany	N.A.	Radish	Root	CO2	+250ppm	Nutr. Quality	K	-5.09894	-5.29, -4.91	1	1	1	1	0	4
											Mg	-14.8006	-14.99, -14.61						
											Ca	-12.2377	-13.84, -10.64						
								CO2 & O3	+250ppmCO2 & +25%O3		K	-							
											Mg	-							
											Ca	-							
16	Baslam et al 2012	Elevated CO2 may impair the beneficial effect of arbuscular mycorrhizal fungi on the mineral and phytochemical quality of lettuce	Greenhouse Experiment	Spain	N.A.	Lettuce	Leafy	CO2	+250ppm	Nutr. Quality	Ca	5.76	-24.98, 31.76	1	1	1	1	1	5
											K	1.31	-9.44, 9.66						
											Mg	2.55	-25.37, 28.80						
											Zn	-1.06	-37.06, 32.81						
											Fe	243.67	-32.58, 534.01						

											Mn	0.72	-30.86, 32.47							
											Carotenoids	-12.05	-27.06, 0							
											Flavonoids	25.34	-5.41, 91.31							
											Vit. C	-4.94	-9.44, 0							
										Yield		13.26	8.41, 18.09							
17	Becker & Klaring 2015	CO2 enrichment can produce high red leaf lettuce yield while increasing most flavonoid glycoside and some caffeic acid derivative concentrations	Greenhouse Experiment	UK	N.A.	Lettuce	Leafy	CO2	+250ppm	Yield		31.32	29.17, 33.48	1	1	1	1	0	4
18	Ben Ahmed et al 2009	Saline water irrigation effects on fruit development, quality, and phenolic composition of virgin olive oils, cv. Chemlali	Field Experiment	Tunisia	Tropical	Olive	Drupe	Salinity	+25%	Nutr. Quality	Carotenoids	0.301349	0.23, 0.38	1	1	1	1	1	5
											Phenols	0.736787	0.62, 0.86						
										Yield		-1.85285	-2.01, -1.70						
19	Bhattarai et al 2005	Influence of soil moisture on yield and quality of tomato on a heavy clay soil	Greenhouse Experiment	Australia	N.A.	Tomato	Solanum	Water Availability	-50%	Nutr. Quality	Vit. C	37.55546	13.49, 61.62	1	1	1	1	0	4
										Yield		17.13307	-69.57, 103.83						
20	Birhanu et al 2010	Fruit yield and quality of drip-irrigated tomato under deficit irrigation	Field Experiment	Ethiopia	Tropical	Tomato	Solanum	Water Availability	-50%	Yield		-43.41	-47.35, -39.47	1	1	1	1	0	4
21	Borghesi et al 2011	Effects of salinity stress on carotenoids, anthocyanins, and color of diverse tomato genotypes	Greenhouse Experiment	France	N.A.	Lettuce	Leafy	Salinity	+25%	Nutr. Quality	Carotenoids	25.58	-38.95, 89.11						
										Yield		-13.1947	-24.45, -2.41	1	1	1	1	0	4
22	Bortolin et al 2014	Effects of chronic elevated ozone concentration on the redox state and fruit yield of red pepper plant Capsicum baccatum	Field Experiment	Brazil	Sub-Tropical	Chilli Pepper	Solanum	O3	+25%	Yield		*		1	1	1	1	1	5
23	Bourgault et al 2010	Effects of deficit irrigation and salinity stress on common bean (Phaseolus vulgaris L.) and mungbean (Vigna radiata L.) grown in a controlled environment	Greenhouse Experiment	Canada	N.A.	Common Bean	Legume	Water Availability	-50%	Yield		-91.19	-102.17, -81.30	1	1	1	1	0	4
						Mung Bean						-40.86	-51.45, -25.45						
24	Bunce JA 2008	Contrasting responses of seed yield to elevated carbon dioxide under field conditions within Phaseolus vulgaris	Field Experiment	US	Temperate	Bean	Legume	CO2	+250ppm	Yield		20.38	17.11, 22.70	1	1	1	1	0	4
25	Burkey et al 2005	Assessment of ambient ozone effects on vegetation using snap bean as a bioindicator species	Field Experiment	US	Sub-Tropical	Snap Bean	Legume	O3	+25%	Yield		-4.15	-13.49, 7.38	1	1	1	1	1	5

26	Burkey et al 2012	Field assessment of a snap bean ozone bioindicator system under elevated ozone and carbon dioxide in a free air system	Field Experiment	US	Temperate	Snap Bean	Legume	O3	+25%	Yield		-25.41	-43.58, -8.58	1	1	1	1	1	5
								CO2	+250ppm			6.52	0, 16.45						
27	Buttaro et al 2015	Irrigation management of greenhouse tomato and cucumber using tensiometer: effects on yield, quality and water use	Greenhouse Experiment	Italy	N.A.	Tomato	Solanum	Water Availability	-50%	Yield		-25.49		1	1	1	1	0	4
28	Cano-Lamadrid et al 2016	Antioxidant capacity, fatty acids profile, and descriptive sensory analysis of table olives as affected by deficit irrigation	Field Experiment	Spain	Sub-Tropical	Olive	Drupe	Water Availability	-50%	Nutr. Quality	Ca	-24.4239	-35.37, -13.48	1	1	1	1	0	4
											Mg	-18.5966	-24.25, -12.94						
											K	-10.6994	-21.40, 0						
											Fe	-2.40642	-4.81, 0						
											Zn	-20.3501	-20.49, -20.21						
											Cu	-8.65542	-14.27, -3.05						
											Mn	-9.48805	-12.37, -6.60						
											Flavonoids	-0.90492	-1.81, 0						
											Antioxidants	-9.1605	-29.17, -1.11						
											Vit. C	-7.18114	-18.90, -1.24						
											phenols	-0.23693	-0.23, -0.25						
29	Caporn et al 1989	The effects of oxides of nitrogen and carbon dioxide enrichment on photosynthesis and growth of lettuce (Lactuca sativa L.)	Greenhouse Experiment	UK	N.A.	Lettuce	Leafy	CO2	+250ppm	Yield		4.13763		1	1	1	1	0	4
30	Chagvardieff et al 1994	Specific effects of irradiance and CO2 concentration doublings on productivity and mineral content in lettuce	Greenhouse Experiment	France	N.A.	Lettuce	Leafy	CO2	+250ppm	Nutr. Quality	K	-4.61		1	1	1	1	0	4
											Ca	0.53							
											Mg	3.96							
											Fe	69.97							
										Yield		19.50984							
31	Chaudhary & Agrawal 2015	The role of elevated ozone on growth, yield and seed quality amongst six cultivars of mung bean	Field Experiment	India	Tropical	Mung Bean	Legume	O3	+25%	Yield		-28.76	-35.67, -22.56	1	1	1	1	1	5
32	Chavan et al 2010	Changes in morphology and yield attributing characters of tomato genotypes due to moisture stress	Field Experiment	India	Tropical	Tomato	Solanum	Water Availability	-50%	Yield		-28.46	-49.72, -1.62	1	1	1	1	0	4
33	Chen et al 1999	Effects of NaCl salinity and CO2 enrichment on pepino (Solanum muricatum Ait.) I. Growth and yield	Greenhouse Experiment	Germany	N.A.	Pepino	Solanum	CO2	+250ppm	Yield		48.12	45.80, 50.43	1	1	1	1	1	5

								CO2 & Salinity	+250ppmCO2 & +25%Salinity			-							
34	Choi et al 2011	Growth and physiological responses of Chinese cabbage and radish to long-term exposure to elevated carbon dioxide and temperature	Greenhouse Experiment	Korea	N.A.	Radish	Root	CO2	+250ppm	Yield		-8.44	-24.81, 11.90	1	1	1	1	0	4
						Cabbage	Leafy					39.89	-50.20, 168.44						
						Radish	Root	Temperature	+4°C			-46.9353	-92.27, -20.41						
						Cabbage	Leafy					-18.1318	-36.14, -8.51						
						Radish	Root	CO2 & Temp	+250ppmCO2 & +4°C			-							
						Cabbage	Leafy					-							
35	Coelho et al 2005	Effect of irrigation level on yield and bioactive amine content of American lettuce	Greenhouse Experiment	Brazil	N.A.	Lettuce	Leafy	Water Availability	-50%	Yield		-21.42	-30.64, -11.07	1	1	1	1	0	4
36	Cucci et al 2014	Yield response of fennel (Foeniculum vulgare Mill.) to irrigation with saline water	Greenhouse Experiment	Italy	N.A.	Fennel	Root	Salinity	+25%	Yield		-1.05467	-1.10, -0.97	1	1	1	1	0	4
37	Da Silva et al 2013	Influences of two CO2 concentrations and water availability on bean crop	Field Experiment	Brazil	Tropical	Bean	Legume	CO2	+250ppm	Yield		15.57316		1	1	1	1	0	4
								CO2 & Water Availability	+250ppmCO2 & -50%Water Av.			-							
38	Dadson et al 2005	Effect of water stress on the yield of Cowpea (Vigna unguiculata L. Walp.) genotypes in the Delmarva region of the United States	Field Experiment	US	Sub-Tropical	Cowpea	Legume	Water Availability	-50%	Yield		-26.79	-46.11, 1.22	1	1	1	1	0	4
39	Daymond et al 1997	The growth, development and yield of onion (Allium cepa L.) in response to temperature and CO2	Greenhouse Experiment	UK	N.A.	Onion	Root	CO2 & Temp	+250ppmCO2 & +4°C	Yield		+		1	1	1	1	0	4
40	De Bock et al 2009	Impact of tropospheric ozone on food and feed quality of Brassica species	Field Experiment	Belgium	Temperate	Broccoli	Leafy	O3	+25%	Nutr. Quality	Vit. C	10.27211	-4.17, 38.47	1	1	1	1	0	4
											Antioxidants	-9.26061	-23.43, 6.5						
											Vit. E	-19.9493	-30.86, -9.04						
41	De Bock et al 2012	Photosynthesis and crop growth of spring oilseed rape and Broccoli under elevated tropospheric ozone	Field Experiment	Belgium	Temperate	Broccoli	Leafy	O3	+25%	Yield		-0.32402		1	1	1	1	1	5
42	De Pascale & Barbieri 1995	Effects of soil salinity from long-term irrigation with saline-sodic water on yield and quality of winter vegetable crops	Field Experiment	Italy	Sub-Tropical	Lettuce	Leafy	Salinity	+25%	Yield		0.2097	-1.00, -0.03	1	1	1	1	0	4
						Endive						-0.31236	-0.60, -0.20						
						Fennel	Root					-0.30755	-0.50, 0.04						

43	De Pascale et al 2001	Irrigation with saline water improves carotenoids content and antioxidant activity of tomato	Field Experiment	Italy	Sub-Tropical	Tomato	Solanum	Salinity	+25%	Nutr. Quality	K	-0.36937	-0.522, -0.18	1	1	1	1	0	4
											Ca	-0.02521	-0.77, 1.25						
											Mg	-0.55089	-1.07, -0.22						
											Fe	-0.52195	-1.16, -0.14						
											Mn	-0.6914	-1.44, -0.25						
											Cu	-0.52634	-1.20, -0.21						
											Zn	-0.43572	-1.00, -0.17						
											Carotenoids	1.284227	0.10, 2.44						
44	De Pascale et al 2003	Physiological responses of pepper to salinity and drought	Greenhouse Experiment	Italy	N.A.	Pepper	Solanum	Salinity	+25%	Yield		-0.33194	-0.77, -0.59	1	1	1	1	0	4
45	De Pascale et al 2005	Soil salinization affects growth, yield and mineral composition of cauliflower and broccoli	Field Experiment	Italy	Sub-Tropical	Cauliflower	Leafy	Salinity	+25%	Nutr. Quality	K	-2.56671	-3.57, -1.57	1	1	1	1	0	4
											Ca	1.764707	0.86, 2.67						
											Mg	1.040986	0.13, 1.96						
											Fe	6.560721	3.72, 9.41						
											Mn	5.957681	0.84, 11.07						
											Cu	1.114552	0.54, 1.69						
											Zn	-0.01284	-0.63, 0.60						
						Broccoli					K	-1.39738	-2.58, -1.49						
											Ca	-6.69386	-10.46, -3.08						
											Mg	-5.96095	-12.70, -1.48						
											Fe	-2.32688	-17.93, 11.07						
											Mn	9.023392	4.53, 16.67						
											Cu	-2.844	-17.78, 3.63						
											Zn	-8.6951	-22.22, -1.13						
						Cauliflower				Yield		-0.54104	-0.74, -0.38						
						Broccoli						-0.89992	-1.27, -0.57						
46	De Pascale et al 2007	Comparative analysis of water and salt stress-induced modifications of quality parameters in cherry tomatoes	Greenhouse Experiment	Italy	N.A.	Tomato	Solanum	Salinity	+25%	Yield		-11.61		1	1	1	1	0	4
47	De Pascale et al 2000	Effects of irrigating pepper (Capsicum annuum L.) plants with saline water on plant growth, water use efficiency and marketable yield	Field Experiment	Italy	Sub-tropical	Pepper	Solanum	Water Availability	-50%	Yield		-18.25	-37.37, 0	1	1	1	1	0	4
48	De Pascale et al 2012	Seasonal and multiannual effects of salinisation on tomato yield and fruit quality	Field Experiment	Italy	Sub-Tropical	Tomato	Solanum	Salinity	+25%	Nutr. Quality	Antioxidants	1.065097	0.48, 1.61	1	1	1	1	0	4
											Carotenoids	0.557322	0.40, 0.71						
											K	-0.5369	-0.56, -0.52						
											Ca	-0.32989	-0.35, -0.31						
										Yield		-0.79183	-0.84, -0.74						

49	Delfine et al 2000	Effects of water stress on the yield and photosynthesis of field-grown sweet pepper (Capsicum annuum L.)	Field Experiment	Italy	Sub-Tropical	Pepper	Solanum	Water Availability	-50%	Yield		15.60531	-8.79, 40	1	1	1	1	0	4
50	Di Mola et al 2013	Interaction between salinity and crop cycle: effect on yield and quality of lettuce	Field Experiment	Italy	Sub-Tropical	Lettuce	Leafy	Salinity	+25%	Nutr. Quality	Vit. C	-0.71056	-0.97, -0.45	1	1	1	1	0	4
51	El-Aal et al 2011	Effect of sowing dates, irrigation levels and climate change on yield of common bean (Phaseolus vulgaris L.)	Greenhouse Experiment	Egypt	N.A.	Dry Bean	Legume	Water Availability	-50%	Yield		-28.68	-34.77, -23.60	1	1	1	1	0	4
52	El-Tohamy et al 1999	Effect of long term drought stress on growth and yield of bean plants (Phaseolus vulgaris L.)	Greenhouse Experiment	Germany	N.A.	Bean	Legume	Water Availability	-50%	Yield		-38.866	-55.92, -13.16	1	1	1	1	0	4
53	Emam et al 2010	Water stress effects on two common bean cultivars with contrasting growth habits	Greenhouse Experiment	Iran	N.A.	Bean	Legume	Water Availability	-50%	Yield		-64.67	-96.19, 2.96	1	1	1	1	0	4
54	Flowers et al 2007	Photosynthesis, chlorophyll fluorescence, and yield of snap bean (Phaseolus vulgaris L.) genotypes differing in sensitivity to ozone	Field Experiment	US	Sub-Tropical	Snap Bean	Legume	O3	+25%	Yield		*		1	1	1	1	0	4
55	Francois 1994	Yield and quality response of salt-stressed garlic	Field Experiment	US	Temperate	Garlic	Root	Salinity	+25%	Nutr. Quality	Ca	-0.97168	-7.56, 4.92	1	1	1	1	0	4
										Yield		-6.20228	-12.64, 3.11						
56	Fu et al 2015	Unexpected decrease in yield and antioxidants in vegetable at very high CO2 levels	Greenhouse Experiment	China	N.A.	Cabbage	Leafy	CO2	+250ppm	Yield		9.166667		1	1	1	1	0	4
						Lettuce						15							
57	Gao et al 2015	Leaf photosynthesis and yield components of mung bean under fully open-air elevated [CO2]	Field Experiment	China	Temperate	Mung Bean	Legume	CO2	+250ppm	Yield		23.01737		1	1	1	1	0	4
58	Garruna-Hernández et al 2012	Changes in flowering and fruiting of Habanero pepper in response to higher temperature and CO2	Greenhouse Experiment	Mexico	N.A.	Habanero Pepper	Solanum	CO2	+250ppm	Yield		32.36	29.11, 35.59	1	1	1	1	0	4
								Temperature	+4°C			-36.3889	-41.11, -31.67						
59	Gatta et al 2015	Treated agro-industrial wastewater irrigation of tomato crop: Effects on qualitative/quantitative characteristics of production and microbiological properties of the soil	Field Experiment	Italy	Sub-Tropical	Tomato	Solanum	Water Quality	Waste vs. Potable	Nutr. Quality	Ca	8.11		1	1	1	1	1	5
											Mg	-2.48							
											K	0.04							
										Yield		-12.2	-13.2, -12.79						

60	Gatta et al 2015b	Effects of treated agro-industrial wastewater irrigation on tomato processing quality	Field Experiment	Italy	Sub-Tropical	Tomato	Solanum	Water Quality	Waste vs. Potable	Nutr. Quality	Ca	-22.74		1	1	1	1	1	5
										Yield		-7.6							
61	Gencoglan et al 2006	Response of red hot pepper plant (Capsicum annuum L.) to the deficit irrigation	Field Experiment	Turkey	Sub-Tropical	Hot pepper	Solanum	Water Availability	-50%	Yield		-58.5538	-58.60, -58.55	1	1	1	1	0	4
62	González-Fernández et al 2016	Ozone effects on the physiology and marketable biomass of leafy vegetables under Mediterranean conditions: Spinach (Spinacia oleracea L.) and Swiss chard (Beta vulgaris L. var. cycla)	Field Experiment	Spain	Sub-Tropical	Spinach	Leafy	O3	+25%	Yield		-25.81	-115.66, 5.15	1	1	1	1	0	4
						Swiss Chard						-16.76	-80.44, 5.08						
63	Grashoff et al 1995	Effects of climate change on productivity of cereals and legumes; model evaluation of observed year-to-year variability	Greenhouse Experiment	Netherlands	N.A.	Faba bean	Legume	CO2	+250ppm	Yield		32.36607		1	1	1	1	0	4
64	Gutezeit B 2004	Yield and nitrogen balance of Broccoli at different soil moisture levels	Greenhouse Experiment	Germany	N.A.	Broccoli	Leafy	Water Availability	-50%	Yield		-4.59	-22.12, 26.35	1	1	1	1	0	4
65	Hamilton et al 2010	Effect of Saline Irrigation Water on Antioxidants in Three Hydroponically Grown Leafy Vegetables: Diplotaxis tenuifolia, Eruca sativa, and Lepidium sativum	Greenhouse Experiment	US	N.A.	Rocket	Leafy	Salinity	+25%	Nutr. Quality	Phenols	-0.2158	-2.72, 1.66	1	1	1	1	1	5
											Vit. C	-0.01653	-3.39, 5.78						
						Cress					Phenols	0.664123	-1.84, 2.22						
											Vit. C	-2.22851	-4.40, -0.59						
66	Hassan et al 1995	Effect of ozone on radish and turnip under Egyptian field conditions	Field Experiment	Egypt	Tropical	Radish, Turnip	Root	O3	+25%	Yield		*		1	1	1	1	0	4
67	Hassan et al 1999	Effects of ozone and drought stress on growth, yield and physiology of tomatoes (Lycopersicon esculentum Mill cv. Baladey)	Greenhouse Experiment	Egypt	N.A.	Tomato	Solanum	O3	+25%	Yield		-4.8	-4.98, -4.62	1	1	1	1	0	4
68	He et al 2010	Effects of elevated root zone CO2 and air temperature on photosynthetic gas exchange, nitrate uptake, and total reduced nitrogen content in aeroponically grown lettuce plants	Greenhouse Experiment	New Zealand	N.A.	Lettuce	Leafy	Temperature	+4°C	Yield		-29.03		1	1	1	1	0	4
69	Heagle et al 2002	Growth and yield responses of snap bean to mixtures of carbon dioxide and ozone	Field Experiment	US	Sub-Tropical	Snap bean	Legume	O3	+25%	Yield		-5.79	-9.04, -2.54	1	1	1	1	0	4

70	Helyes 2015	The simultaneous effect of heat stress and water supply on total polyphenol content of eggplant	Field Experiment	Hungary	Temperate	Eggplant	Solanum	Water Availability	-50%	Yield		-16.0506	-25.36, -6.75	1	1	1	1	0	4
71	Huang et al 2016	Growth, yield and fruit quality of cherry tomato irrigated with saline water at different developmental stages	Field Experiment	China	Temperate	Cherry Tomato	Solanum	Salinity	+25%	Yield		-0.64		1	1	1	1	0	4
72	Hussein et al 2011	Effect of irrigation (water stress) on vegetative growth and yield in two genotypes of okra	Field Experiment	Egypt	Tropical	Okra	Mallow	Water Availability	-50%	Yield		-35.49	-50.48, 21.11	1	1	1	1	0	4
73	Incerti et al 2007	Effect of sea water on biochemical properties of fruit of tomato (Lycopersicon esculentum Mill.) genotypes differing for ethylene production	Greenhouse Experiment	Italy	N.A.	Tomato	Solanum	Salinity	+25%	Yield		-5.80772	-5.95, -5.55	1	1	1	1	1	5
74	Ismail, SM 2010	Influence of deficit irrigation on water use efficiency and bird pepper production (Capsicum annuum L.)	Greenhouse Experiment	Japan	N.A.	Bird Pepper	Solanum	Water Availability	-50%	Yield		-81.1897	-96.46, -65.92	1	1	1	1	0	4
75	Jain et al 2007	Photosynthesis and nutrient composition of spinach and fenugreek grown under elevated carbon dioxide	Field Experiment	India	Tropical	Spinach	Leafy	CO2	+250ppm	Nutr. Quality	Fe	-55.38		1	1	1	1	1	5
76	Jifon & Wolfe 2005	High temperature-induced sink limitation alters growth & photosynthetic acclimation to elevated CO2 in Bean (Phaseolus vulgaris L.)	Greenhouse Experiment	New York	N.A.	Kidney Bean	Legume	CO2	+250ppm	Yield		43.425		1	1	1	1	0	4
								Temperature	+4°C			-32.85							
								CO2 & Temp	+250ppmCO2 & +4°C			-							
77	Jin et al 2009	Atmospheric nitric oxide stimulates plant growth and improves the quality of spinach (Spinacia oleracea)	Greenhouse Experiment	China	N.A.	Spinach	Leafy	CO2	+250ppm	Nutr. Quality	Flavonoids	1.91		1	1	1	1	1	5
											Vit. C	11.68							
											Antioxidants	8.65							
										Yield		31.74603							
78	Jolliffe & Ehret 1985	Growth of bean plants at elevated CO2 concentrations	Greenhouse Experiment	Canada	N.A.	Bush bean	Legume	CO2	+250ppm	Yield		27.17	21.14, 36.89	1	1	1	1	0	4
79	Juknys et al 2011	Response of different agricultural plants to elevated CO2 and air temperature	Greenhouse Experiment	Lithuania	N.A.	Pea	Legume	CO2	+250ppm	Nutr. Quality	Carotenoids	4.76		1	1	1	1	1	5
						Tomato	Solanum					11.16							
						Radish	Root					-2.98							
80	Karam et al 2002	Yield and nitrogen recovery of lettuce under different irrigation regimes	Field Experiment	Lebanon	Sub-Tropical	Lettuce	Leafy	Water Availability	-50%	Yield		-43.75	-96.46, -65.92	1	1	1	1	0	4

81	Kardoni et al 2013	Effect of salinity stress and silicon application on yield and component yield of faba bean (Vicia faba)	Greenhouse Experiment	Iran	N.A.	Faba bean	Legume	Salinity	+25%	Yield		-3.72314	-4.69, -3.21	1	1	1	1	0	4
82	Katerji et al 1992	Effect of salinity on water stress, growth and yield of broadbeans	Greenhouse Experiment	Italy	N.A.	Broad Bean	Legume	Salinity	+25%	Yield		-9.84703	-13.62, -6.08	1	1	1	1	0	4
83	Katerji et al 1998	Response of tomatoes, a crop of indeterminate growth, to soil salinity	Greenhouse Experiment	Italy	N.A.	Tomato	Solanum	Salinity	+25%	Yield		-1.96032	-2.62, -1.49	1	1	1	1	0	4
84	Katerji et al 2000	Salt tolerance classification of crops according to soil salinity and to water stress day index	Greenhouse Experiment	Italy	N.A.	Broad Bean	Legume	Salinity	+25%	Yield		-1.09692	-2.07, -0.93	1	1	1	1	0	4
85	Katerji et al 2005	Salt tolerance analysis of chickpea, faba bean and durum wheat varieties: I. Chickpea and faba bean	Greenhouse Experiment	Italy	N.A.	Chickpea	Legume	Salinity	+25%	Yield		-3.75833	-5.36, -0.25	1	1	1	1	0	4
						Faba Bean						-1.82321	-2.66, -0.89						
86	Katerji et al 2011	Faba bean productivity in saline-drought conditions	Field Experiment	Italy	Sub-Tropical	Faba Bean	Legume	Water Availability	-50%	Yield		-43.5004	-52.52, -37.50	1	1	1	1	0	4
								Salinity	+25%			-1.94616	-3.04, -1.33						
87	Khan et al 2013	The impact of enhanced atmospheric carbon dioxide on yield, proximate composition, elemental concentration, fatty acid and vitamin C contents of tomato (Lycopersicon esculentum)	Greenhouse Experiment	Pakistan	N.A.	Tomato	Solanum	CO2	+250ppm	Nutr. Quality	Vit. C	-9.3068	-10.30, -8.31	1	1	1	1	1	5
											Protein	-6.65609	-7.62, -5.69						
											Zn	-8.82992	-11.82, -5.84						
											Fe	3.373989	1.26, 5.48						
										Yield		32.89	30.95, 34.83						
88	Kim et al 2016	Effects of irrigation with saline water on crop growth and yield in greenhouse cultivation	Greenhouse Experiment	South Korea	N.A.	Cabbage	Leafy	Salinity	+25%	Yield		-0.67531	-1.27, 0.08	1	1	1	1	0	4
						Lettuce						0.113685	-0.70, 0.79						
89	Kirnak et al 2001	The influence of water deficit on vegetative growth, physiology, fruit yield and quality in eggplants	Field Experiment	Turkey	Sub-Tropical	Eggplant	Solanum	Water Availability	-50%	Yield		-59.28	-62.50, -55.06	1	1	1	1	0	4
90	Kirnak et al 2014	Paprika Pepper Yield and Quality as Affected by Different Irrigation Levels	Field Experiment	Turkey	Tropical	Pepper	Solanum	Water Availability	-50%	Nutr. Quality	Vit. C	-20.5343	-23.72, -17.35	1	1	1	1	0	4
											Carotenoids	-14.3097	-24.58, -4.04						
91	Kohut et al 1983	Yield response of red kidney bean Phaseolus vulgaris to incremental ozone concentrations in the field	Field Experiment	US	Temperate	Kidney Bean	Legume	O3	+25%	Yield		-2.88	-4.03, -1.52	1	1	1	1	0	4

92	Krauss et al 2006	The influence of different electrical conductivity values in a simplified recirculating soilless system on inner and outer fruit quality characteristics of tomato	Greenhouse Experiment	Germany	N.A.	Tomato	Solanum	Salinity	+25%	Nutr. Quality	Vit. C	-3.04477	-4.34, -2.12	1	1	1	1	1	5
											Carotenoids	-0.70823	-3.57, 1.88						
											Phenols	-0.72954	-2.48, 0.45						
										Yield		-14.8539	-20.45, -9.25						
93	Kumar et al 2007	Response of onion (Allium cepa L.) to different levels of irrigation water	Field Experiment	India	Tropical	Onion	Root	Water Availability	-50%	Yield		-33.07	-47.28, -11.96	1	1	1	1	0	4
94	Kumar et al 2015	Influence of growth stage specific water stress on the yield, physico-chemical quality and functional characteristics of tomato grown in shallow basaltic soils	Field Experiment	India	Tropical	Tomato	Solanum	Water Availability	-50%	Nutr. Quality	Vit. C	85.0956	81.84, 88.35	1	1	1	1	1	5
											Carotenoids	304.1795	115.96, 564.02						
											Phenols	55.28905	45.13, 65.45						
											Flavonoids	99.39359	68.30, 140.87						
											Antioxidants	24.29114	18.59, 30.00						
										Yield		-24.6079	-34.58, -14.63						
95	Kurunc et al 2011	Salinity and drought affect yield response of bell pepper similarly	Greenhouse Experiment	Turkey	N.A.	Pepper	Solanum	Water Availability	-50%	Yield		-29.62	-67.31, 18.81	1	1	1	1	0	4
								Salinity	+25%			-2.72294	-3.08, -2.02						
96	Laurie et al 2009	Effect of moisture stress on growth and performance of orange fleshed sweet potato varieties	Field Experiment	South Africa	Sub-Tropical	Sweet Potato	Root	Water Availability	-50%	Yield		-51.14	-63.28, 41.13	1	1	1	1	0	4
97	Leskovar & Ahehara 2012	Crop coefficient -based deficit irrigation and planting density for onion: growth, yield and bulb quality	Field Experiment	US	Sub-Tropical	Onion	Root	Water Availability	-50%	Yield		-22.14	-27.52, -15.54	1	1	1	1	0	4
98	Li et al 1999	Response of tomato plants to saline water as affected by carbon dioxide supplementation I. Growth, yield and fruit quality	Greenhouse Experiment	Israel	N.A.	Tomato	Solanum	CO2	+250ppm	Yield		1.251669		1	1	1	1	0	4
								Salinity	+25%			-2.62736	-3.21, -1.67						
								CO2 & Salinity	+250ppmCO2 & +25%Salinity			-							
99	Luoh et al 2014	Nutritional yield of African indigenous vegetables in water-deficient and water-sufficient conditions	Greenhouse Experiment	Taiwan	N.A.	Kale	Leafy	Water Availability	-50%	Nutr. Quality	Carotenoids	19.11048	19.10, 19.12	1	1	1	1	0	4
						Nightshade	Solanum					46.85651	26.49, 67.23						
						Kale	Leafy				Vit. E	48.11849	37.25, 58.99						
						Nightshade	Solanum					-52.9625	-78.65, -27.27						
						Kale	Leafy				Antioxidants	58.56719	45.89, 71.25						

						Nightshade	Solanum					48.22762	42.38, 54.08							
						Kale	Leafy				Ca	11.97569	11.62, 12.33							
						Nightshade	Solanum					48.80167	24.17, 73.43							
						Kale	Leafy				Fe	9.905887	-6.83, 26.64							
						Nightshade	Solanum					34.36328	30.76, 37.96							
						Kale	Leafy				Zn	32.62985	14.83, 50.43							
						Nightshade	Solanum					9.92647	-13.24, 33.09							
100	Lutfor Rahman et al 2000	Effects of water stress and temperature on sod activity, growth and yield of tomato	Greenhouse Experiment	Japan	N.A.	Tomato	Solanum	Temperature	+4°C	Yield		-2.65078	-3.51, -1.79	1	1	1	1	0	4
101	Magán et al 2008	Effects of salinity on fruit yield and quality of tomato grown in soil-less culture in greenhouses in Mediterranean climatic conditions	Greenhouse Experiment	Spain	N.A.	Tomato	Solanum	Salinity	+25%	Yield		-2.655	-8.76, 9.34	1	1	1	1	0	4
102	Maggio et al 2004	Physiological response of tomato to saline irrigation in long-term salinized soils	Field Experiment	Italy	Sub-Tropical	Tomato	Solanum	Salinity	+25%	Yield		-0.23674	-0.43, -0.14	1	1	1	1	0	4
103	Maggio et al 2005	Physiological response of field-grown cabbage to salinity and drought stress	Field Experiment	Italy	Sub-Tropical	Cabbage	Leafy	Water Availability	-50%	Yield		-95.18		1	1	1	1	0	4
								Salinity	+25%			-0.86277	-1.09, -0.64						
104	Mamatha et al 2014	Impact of elevated CO2 on growth, physiology, yield, and quality of tomato (Lycopersicon esculentum Mill) cv. Arka Ashish	Field Experiment	India	Tropical	Tomato	Solanum	CO2	+250ppm	Nutr. Quality	Flavonoids	-23.5895	-41.51, -5.67	1	1	1	1	0	4
											Vit. C	27.64766	12.60, 42.69						
											Carotenoids	-1.65736	-7.24, 4.46						
										Yield		88.81	79.73, 97.89						
105	Manderscheid & Weigel 1995	Do increasing atmospheric CO2 concentrations contribute to yield increases in German crops?	Field Experiment	Germany	Temperate	Bean	Legume	CO2	+250ppm	Yield		-27.27	-37.92, -16.63	1	1	1	1	1	5
106	Martinez et al 2012	Effects of saline water on water status, yield and fruit quality of Wild (Solanum chilense) and domesticated (Solanum lycopersicum var. Cerasiforme) tomatoes	Greenhouse Experiment	Chile	N.A.	Tomato	Solanum	Salinity	+25%	Yield		-2.08333	-5.12, 0.68	1	1	1	1	0	4
107	May, 1993	Moisture stress to maximize processing tomato yield and fruit quality	Field Experiment	US	Temperate	Tomato	Solanum	Water Availability	-50%	Yield		-22.68	-28.10, 11.76	1	1	1	1	0	4
108	Meng et al 2011	Effects of simulated acid rain on main nutritional indicators of three leafy vegetables	Greenhouse Experiment	China	N.A.	Pakchoi, Lettuce	Leafy	Water Quality	Waste vs. Potable	Nutr. Quality	Vit. C	-6.64	-35.44, 15.52	1	1	1	1	0	4

109	Mishra & Agrawal 2014	Cultivar specific response of CO2 fertilisation on two tropical mung bean (Vigna radiata L.) cultivars: ROS generation, antioxidant status, physiology, growth, yield and seed quality	Field Experiment	India	Tropical	Mung Bean	Legume	CO2	+250ppm	Yield		30.3	27.84, 32.67	1	1	1	1	1	5
110	Mogren et al 2015	Moderate water stress prevents the postharvest decline of ascorbic acid in spinach (Spinacia oleracea L.) but not in spinach beet (Beta vulgaris L.)	Greenhouse Experiment	UK	N.A.	Spinach	Leafy	Water Availability	-50%	Nutr. Quality	Vit. C	4.906825	4.38, 5.43	1	1	1	1	0	4
111	Mortensen LM 1994	Effects of elevated CO2 concentrations on growth and yield of eight vegetable species in a cool climate	Field Experiment	Norway	Boreal	Leek	Leafy	CO2	+250ppm	Yield		2.653745		1	1	1	1	1	5
						Celery						-2.15715							
						Lettuce						4.376796							
						Cabbage						1.706555							
						Parsley						3.670661							
						Carrot	Root					4.719464							
						Onion						12.92492							
						Celeriac						-3.72691							
112	Mzini et al 2015	Effects of irrigation water quality on vegetables Part 2: Chemical and nutritional content	Field Experiment	South Africa	Temperate	Cabbage	Leafy	Water Quality	Waste vs. Potable	Nutr. Quality	Ca	5.47	0, 18.75	1	1	1	1	0	4
											Mg	12.5	0, 25.00						
											K	-7.69	-7.69, -7.69						
											Zn	5.27	-12.50, 34.78						
											Cu	2.88	-10.91, 22.22						
											Fe	166.45	.-16.67, 469.23						
											Mn	29.97	-7.37, 97.24						
						Onion	Root				Ca	13.93	-6.67, 35.71						
											Mg	0	0.00						
											K	-4.17	-8.33, 0.00						
											Zn	30.9	-26.32, 110.53						
											Cu	7.69	-25.00, 25.00						
											Fe	53.83	21.43, 128.57						
											Mn	58.62	-10.34, 144.83						
						Chard	Leafy				Ca	63.64	27.27, 100.00						
											Mg	35.71	-7.14, 78.57						
											K	14.71	11.76, 17.65						
											Zn	32.69	9.62, 55.77						
											Cu	-71.82	-74.55, -69.09						
											Fe	-30	-36.00, -24.00						
											Mn	-3.06	-30.61, 24.49						
											Pb	160.34	33.33, 287.36						
						Beetroot	Root				Ca	8.33	0, 16.67						

											Mg	16.67	0, 33.33						
											K	5.26	-5.26, 15.79						
											Zn	71.43	32.14, 110.71						
											Cu	-28.85	-38.46, -19.23						
											Fe	-40.41	-57.53, -23.29						
											Mn	-32.23	-39.67, -24.79						
											Pb	0.52	-17.53, 18.56						
						Lettuce	Leafy				Ca	-51.52	-57.58, -45.45						
											Mg	12.5	-25.00, 0.00						
											K	28.57	26.19, 30.95						
											Zn	-50	-50.00, -50.00						
											Cu	14.46	-3.61, 32.53						
											Fe	26.79	3.57, 50.00						
											Mn	-13.4	-20.92, -5.88						
											Pb	56.67	-40.00, 153.33						
						Carrot	Root				Ca	-6.25	-25.00, 12.50						
											Mg	-25	-50.00, 0.00						
											K	47.73	9.09, 86.36						
											Zn	-30	-36.00, -24.00						
											Cu	-71.82	-74.55, -69.09						
											Fe	-30	-36.00, -24.00						
											Mn	-3.06	-30.61, 24.49						
											Pb	160.34	33.33, 287.36						
113	Nahar & Ullah 2012	Morphological and physiological characters of tomato (Lycopersicon esculentum Mill) cultivars under water stress	Greenhouse Experiment	Bangladesh	N.A.	Tomato	Solanum	Water Availability	-50%	Yield		56.86526	35.15, 78.59	1	1	1	1	0	4
114	Nahar et al 2002	Effect of water stress on nutrient uptake, yield and quality of tomato (Lycopersicon esculentum Mill.) under subtropical conditions	Field Experiment & Greenhouse Experiment	Bangladesh	N.A.	Tomato	Solanum	Water Availability	-50%	Nutr. Quality	Vit. C	59.52381	55.56, 63.49	1	1	1	1	0	4
										Yield		110.0742	33.50, 186.65						
115	Najarian et al 2015	Interactive effects of drought stress and ozonated water on growth and yield of cucumber (Cucumis sativus L.)	Greenhouse Experiment	Iran	N.A.	Cucumber	Cucurbits	O3	+25%	Yield		*		1	1	1	1	0	4
								Water Availability	-50%			-19.3662	-21.13, -17.61						
116	Nangare et al 2013	Effect of blending fresh-saline water and discharge rate of drip on plant yield, water use efficiency (WUE) and quality of tomato in semi-arid environment	Field Experiment	India	Tropical	Tomato	Solanum	Salinity	+25%	Nutr. Quality	Vit. C	0.17	0.02, 0.35	1	1	1	1	0	4

117	Navarro et al 2006	Changes in the contents of antioxidant compounds in pepper fruits at different ripening stages, as affected by salinity	Greenhouse Experiment	Spain	N.A.	Pepper	Solanum	Salinity	+25%	Nutr. Quality	Vit. C, Carotenoids, Phenols	*		1	1	1	1	0	4
118	Nikou et al 2013	Effect of irrigation on the relationships between leaf gas exchange related traits and yield in dwarf dry bean grown under Mediterranean conditions	Field Experiment	Greece	Sub-Tropical	Common bean	Legume	Water Availability	-50%	Yield		-19.99	-24.51, -15.44	1	1	1	1	0	4
119	Olympios et al 2003	The growth, yield and quality of greenhouse tomatoes in relation to salinity applied at different stages of plant growth	Greenhouse Experiment	Greece	N.A.	Tomato	Solanum	Salinity	+25%	Yield		-4.53204	-5.74, -3.78	1	1	1	1	0	4
120	Ors & Suarez 2016	Salt tolerance of spinach as related to seasonal climate	Field Experiment	US	Sub-Tropical	Spinach	Leafy	Salinity	+25%	Yield		1.358017	-0.70, 5.76	1	1	1	1	1	5
121	Palese 2010	Effects of water deficit on the vegetative response, yield and oil quality of olive trees (Olea europaea L., cv Coratina) grown under intensive cultivation	Field Experiment	Italy	Sub-Tropical	Olive	Drupe	Water Availability	-50%	Nutr. Quality	Phenols	-6.9606	-7.48, -6.44	1	1	1	1	1	5
										Yield		-12.898	-21.68, -4.12						
122	Patane & Cosentino 2009	Effects of soil water deficit on yield and quality of processing tomato under a Mediterranean climate	Field Experiment	Italy	Sub-Tropical	Tomato	Solanum	Water Availability	-50%	Yield		-17.87	-28.58, -7.28	1	1	1	1	0	4
123	Pejic et al 2011	Effect of irrigation schedules on yield and water use of onion (Allium cepa L.)	Field Experiment	Serbia	Temperate	Onion	Root	Water Availability	-50%	Yield		-14.16	-35.53, 0.35	1	1	1	1	0	4
124	Pek et al 2014	Effect of irrigation on yield parameters and antioxidant profiles of processing cherry tomato	Field Experiment	Hungary	Temperate	Tomato	Solanum	Water Availability	-50%	Nutr. Quality	Carotenoids	10.24	-17.86, 48.08	1	1	1	1	1	5
										Yield		-20.8232	-29.07, -12.58						
125	Pereira et al 2014	Genetic variability for iron and zinc content in common bean lines and interaction with water availability	Field Experiment	Brazil	Tropical	Common Bean	Legume	Water Availability	-50%	Nutr. Quality	Fe	3.52	-11.74, 26.20	1	1	1	1	0	4
											Zn	8.5	-21.91, 39.47						
126	Pérez-López et al 2013	Lettuce production and antioxidant capacity are differentially modified by salt stress and light intensity under ambient and elevated CO2	Greenhouse Experiment	Spain	N.A.	Lettuce	Leafy	CO2	+250ppm	Yield		55.27	46.15, 64.39	1	1	1	1	0	4
								CO2 & Salinity	+250ppmCO2 & +25%Salinity			+							

127	Perez-Lopez et al 2015	Growth and nutritional quality improvement in two differently pigmented lettuce cultivars grown under elevated CO2 and/or salinity	Greenhouse Experiment	Spain	N.A.	Lettuce	Leafy	CO2 & Salinity	+250ppmCO2 & +25%Salinity	Yield		+		1	1	1	1	0	4
128	Perez-Lopez et al 2015b	Interacting effects of high light and elevated CO2 on the nutraceutical quality of two differently pigmented Lactuca sativa cultivars (Blonde	Greenhouse Experiment	Spain	N.A.	Lettuce	Leafy	CO2	+250ppm	Nutr. Quality	Antioxidant capacity	89.21372	52.08, 126.34	1	1	1	1	0	4
											K	1.612103	-1.98, 5.21						
											Ca	0.728921	-7.41, 8.87						
											Mg	-8.24991	-10.75, -5.75						
											Fe	-13.3021	-22.06, -4.55						
											Zn	-2.29167	-6.25, 1.67						
											Carotenoids	-8.20707	-13.89, -2.53						
											Vit. C	23.16572	-2.69, 49.02						
											Flavonoids	4.57702	-31.25, 40.40						
										Yield		31.81	6.94, 56.67						
129	Perniola et al 1993	Yield response to water and stress indexes on tomato	Field Experiment	Italy	Sub-Tropical	Tomato	Solanum	Water Availability	-50%	Yield		-39.49	-47.09, -33.85	1	1	1	1	0	4
130	Podlesny et al 2001	The effect of drought on the development and yielding of two different varieties of the fodder broad bean (Vicia faba minor)	Greenhouse Experiment	Poland	N.A.	Bean	Legume	Water Availability	-50%	Yield		-22.66	-37.50, -14.58	1	1	1	1	0	4
131	Pokluda et al 2014	The effect of irrigation on the economic and nutritional characteristics of selected vegetables	Field Experiment	Czech Republic	Temperate	Tomato	Solanum	Water Availability	-50%	Nutr. Quality	Antioxidant capacity	-31.3597	-54.17, -8.55	1	1	1	1	0	4
						Pepper						3.616285	-14.34, 21.57						
						Leek	Leafy					7.781385	-51.52, 67.09						
132	Prasad et al 2002	Effects of elevated temperature and CO2 on seed set and yield of kidney bean	Greenhouse Experiment	US	N.A.	Kidney Bean	Legume	CO2	+250ppm	Yield		10.89588		1	1	1	1	0	4
								Temperature	+4°C			-41.9335	-44.44, -40.68						
								CO2 & Temp	+250ppmCO2 & +4°C			-							
133	Rao et al 2012	Relationship between survival and yield related traits in Solanum pimpinellifolium under salt stress	Field Experiment	Taiwan	Sub-Tropical	Tomato	Solanum	CO2	+250ppm	Yield		80.86	56.10, 105.62	1	1	1	1	0	4
								Salinity	+25%			-0.55352	-0.58, -0.52						
134	Reinert et al 1997	Growth and fruiting of tomato as influenced by elevated carbon dioxide and ozone	Greenhouse Experiment	US	N.A.	Tomato	Solanum	O3	+25%	Yield		*		1	1	1	1	0	4
135	Rezende et al 2003	CO2 and irrigation in relation to yield and water use of the bell pepper crop	Greenhouse Experiment	Brazil	N.A.	Pepper	Solanum	CO2	+250ppm	Yield		0.23	-7.90, 8.58	1	1	1	1	0	4
								Water Availability	-50%			120.27	76.19, 184.62						

								CO2 & Water Availability	+250ppmCO2 & -50%Water Av.			+							
136	Rodriguez et al 2015	Effect of temperature stress on the early vegetative development of Brassica oleracea L.	Greenhouse Experiment	Spain	N.A.	Cabbage	Leafy	Temperature	+4°C	Yield		-10.1		1	1	1	1	0	4
						Kale						-17.54							
137	Rop et al 2016	Effects of deficit irrigation on yield and quality of onion crop	Field Experiment	Kenya	Tropical	Onion	Root	Water Availability	-50%	Yield		-35.37	-45.06, -18.17	1	1	1	0	0	4
138	Salvatori et al 2012	Different O3 response of sensitive and resistant snap bean genotypes (Phaseolus vulgaris L.): the key role of growth stage, stomatal conductance and PSI activity	Greenhouse Experiment	Italy	N.A.	Snap Bean	Legume	O3	+25%	Yield		*		1	1	1	1	1	5
139	Sánchez-González et al 2016	Carbon dioxide enrichment: a technique to mitigate the negative effects of salinity on the productivity of high value tomatoes	Greenhouse Experiment	Spain	N.A.	Tomato	Solanum	CO2	+250ppm	Yield		17.96138		1	1	1	1	1	5
								Salinity	+25%			-10.02							
								CO2 & Salinity	+250ppmCO2 & +25%Salinity			-							
140	Sánchez-Guerrero et al 2005	Effect of variable CO2 enrichment on greenhouse production in mild winter climates	Greenhouse Experiment	Spain	N.A.	Cucumber	Cucurbits	CO2	+250ppm	Yield		13.6646		1	1	1	1	0	4
141	Sanchez-Rodriguez et al 2010	Genotypic differences in some physiological parameters symptomatic for oxidative stress under moderate drought in tomato plants	Greenhouse Experiment	Spain	N.A.	Tomato	Solanum	Water Availability	-50%	Nutr. Quality	Vit. C	30.01	6.76, 82.98	1	1	1	1	1	5
142	Segura et al 2001	The effects of CO2 enrichment on cucumber growth under greenhouse conditions	Greenhouse Experiment	Spain	N.A.	Cucumber	Cucurbits	CO2	+250ppm	Yield		11.99	10.43, 13.54	1	1	1	1	0	4
143	Sezen et al 2008	Yield and quality response of drip irrigated green beans under full and deficit irrigation	Field Experiment	Turkey	Sub-Tropical	Green bean	Legume	Water Availability	-50%	Yield		-7.53	-11.63, -2.89	1	1	1	1	0	4
144	Shimomachi et al 2008	Effect of Residual Salinity on Spinach Growth and Nutrient Contents in Polder Soil	Greenhouse Experiment	Japan	N.A.	Spinach	Leafy	Salinity	+25%	Nutr. Quality	Vit. C, Ca, Mg, K, Fe	*		1	1	1	1	1	5
145	Singh et al 2013	Synergistic action of tropospheric ozone and carbon dioxide on yield and nutritional quality of Indian mustard (Brassica juncea (L.) Czern.)	Field Experiment	India	Tropical	Mustard	Leafy	CO2	+250ppm	Nutr. Quality	Ca	-4.28571	-5.00, -3.57	1	1	1	1	0	4
											Mg	-3.67647	-4.11, -2.94						
											Zn	-4.23211	-4.91, -3.55						
											Fe								

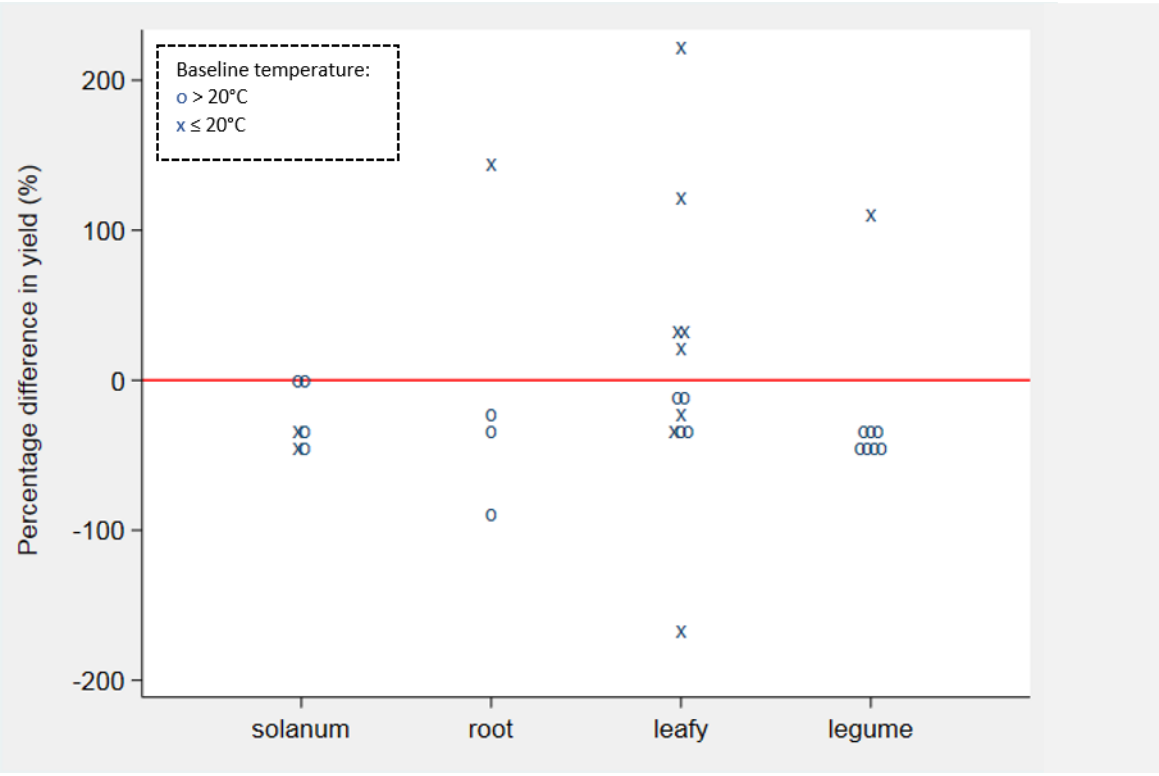
								O3	+25%		Ca								
											Mg								
											Zn								
											Fe								
								CO2 & O3	+250ppmCO2 & +25%O3		Ca	-							
											Mg	-							
											Zn	-							
											Fe	-							
								CO2	+250ppm	Yield		6.24	5.99, 6.49						
								O3	+25%			-6.05	-6.13, -5.97						
								CO2 & O3	+250ppmCO2 & +25%O3			-							
146	Soltekin et al 2012	Response of Pepino (Solanum muricatum Aiton) to salinity	Greenhouse Experiment	Turkey	N.A.	Pepino	Solanum	Salinity	+25%	Yield		-3.27744	-3.71, -2.85	1	1	1	1	0	4
147	Sun et al 2014	Effect of water stress on yield and nutrition quality of tomato plant overexpressing StAPX	Greenhouse Experiment	China	N.A.	Tomato	Solanum	Water Availability	-50%	Nutr. Quality	Vit. C	20.19231	13.46, 26.92	1	1	1	1	0	4
										Yield		-66.0803	-68.33, -63.83						
148	Temple PJ 1991	Variations in responses of dry bean (Phaseolus vulgaris) cultivars to ozone	Field Experiment	US	Sub-Tropical	Pea Bean	Legume	O3	+25%	Yield		-15.85	-29.11, -2.59	1	1	1	1	0	4
						Kidney Bean						0.17	-2.14, 2.49						
						Pink Bean						-4.01	-4.81, -3.44						
149	Tognetti et al 2006	The effect of deficit irrigation on crop yield and vegetative development of Olea europaea L. (cvs. Frantoio and Leccino)	Field Experiment	Italy	Sub-Tropical	Olive	Drupe	Water Availability	-50%	Yield		-25.17	-39.60, -12.32	1	1	1	1	0	4
150	Tripp et al 1991	CO2 enhanced yield and foliar deformation among tomato genotypes in elevated CO2 environments	Greenhouse Experiment	US	N.A.	Tomato	Solanum	CO2	+250ppm	Yield		6.3	2.84, 13.10	1	1	1	1	0	4
151	Ullah et al 1994	Effect of seawater and soil salinity on ion uptake, yield and quality of tomato (fruit)	Field Experiment	Austria	Temperate	Tomato	Solanum	Salinity	+25%	Nutr. Quality	Vit. C	*		1	1	1	1	0	4
152	Unlukara et al 2015	Green long pepper growth under different saline and water regime conditions and usability of water consumption in plant salt tolerance	Greenhouse Experiment	Turkey	N.A.	Hot Pepper	Solanum	Water Availability	-50%	Yield		-28.38	-54.42, 7.15	1	1	1	1	0	4
								Salinity	+25%			-2.66014	-3.71, -2.00						
153	Vanaja et al 2008	Growth and yield responses of castor bean (Ricinus communis L.) to two enhanced CO2 levels	Field Experiment	India	Tropical	Castor Bean	Legume	CO2	+250ppm	Yield		167.26	124.75, 209.76	1	1	1	1	0	4
154	Vandermeiren et al 2012	Ozone effects on yield quality of spring oilseed rape and broccoli	Field Experiment	Belgium	Temperate	Broccoli	Leafy	O3	+25%	Nutr. Quality	Vit. C	-		1	1	1	1	0	4

155	Veit-Kohler et al 1999	Effect of different water supply on plant growth and fruit quality of Lycopersicon esculentum	Greenhouse Experiment	Germany	N.A.	Tomato	Solanum	Water Availability	-50%	Nutr. Quality	Vit. C	76.58383	51.85, 101.32	1	1	1	1	1	5
										Yield		-53.26							
156	Villora et al 2000	Yield improvement in zucchini under salt stress: determining micronutrient balance	Greenhouse Experiment	Spain	N.A.	Zucchini	Cucurbits	Salinity	+25%	Nutr. Quality	Fe, Mn, Zn, Cu	*		1	1	1	1	0	4
157	Visser et al 1997	The combined effects of CO2 concentration and solar UVB radiation on faba bean grown in open top chambers	Greenhouse Experiment	Netherlands	N.A.	Faba bean	Legume	CO2	+250ppm	Yield		59.52381		1	1	1	1	0	4
158	Wan et al 2007	Effect of drip irrigation with saline water on tomato (Lycopersicon esculentum Mill) yield and water use in semi-humid area	Field Experiment	China	Temperate	Tomato	Solanum	Salinity	+25%	Yield		0.131112	-0.65, 1.31	1	1	1	1	0	4
159	Wang et al 2012	Effects of different water supply on water consumption and yield of pumpkins in a cold high altitude semiarid region	Field Experiment	China	temperate	Pumpkin	Cucurbit	Water Availability	-50%	Yield		-14.8911	-51.40, 21.62	1	1	1	1	0	4
160	Webber et al 2009	Response of two legume crops to soil salinity in gypsiferous soils	Greenhouse Experiment	Canada	N.A.	Bean	Legume	Salinity	+25%	Yield		-0.26032	-0.49, -0.09	1	1	1	1	0	4
						Mung Bean						-0.58238	-0.68, -0.48						
161	Wheeler et al 1994	The effects of CO2, temperature and their interaction on the growth and yield of carrot (Daucus carota L.)	Greenhouse Experiment	UK	N.A.	Carrot	Root	CO2	+250ppm	Yield		19.70443		1	1	1	1	0	4
								Temperature	+4°C			148							
162	Wheeler et al 1995	Effects of CO2, temperature and their interaction on the growth, development and yield of cauliflower (Brassica oleracea L. botrytis)	Greenhouse Experiment	UK	N.A.	Cauliflower	Leafy	CO2	+250ppm	Yield		33.5871		1	1	1	1	0	4
								Temperature	+4°C			-162.55							
								CO2 & Temp	+250ppmCO2 & +4°C			-							
163	Wu & Wang 1999	Interaction of CO2 enrichment and drought on growth, water use, and yield of broad bean (Vicia faba)	Field Experiment	China	Temperate	Broad Bean	Legume	CO2	+250ppm	Yield		80.71429		1	1	1	1	0	4
								Water Availability	-50%			-47	-60.00, -34.00						
								CO2 & Water Availability	+250ppmCO2 & -50%Water Av.			-							

164	Wurr et al 1996	Investigating trends in vegetable crop response to increasing temperature associated with climate change	Greenhouse Experiment	UK	N.A.	Lettuce Leek Cauliflower	Leafy	Temperature	+4°C	Yield		125 45.8333 38.19445	25, 225 -33.34, 125 37.50, 38.89	1	1	1	1	0	4
165	Wurr et al 2000	Climate change: a response surface study of the effects of CO2 and temperature on the growth of French beans	Greenhouse Experiment	UK	N.A.	French beans	Legume	CO2 Temperature	+250ppm +4°C	Yield		40.3 107.85	-0.11, 80.71	1	1	1	1	0	4
166	Xiao et al 2009	Effects of temperature increase on pea production in a semi-arid region of China	Field Experiment	China	Temperate	Pea	Legume	Temperature	+4°C	Yield		-35.1512	-42.14, -31.49	1	1	1	1	0	4
167	Xu et al 2016	Responses of Spinach to Salinity and Nutrient Deficiency in Growth, Physiology, and Nutritional Value	Greenhouse Experiment	US	N.A.	Spinach	Leafy	Salinity	+25%	Nutr. Quality	Carotenoids Phenols Flavonoids Antioxidants	2.47 0.35 2.667403 -0.27	 1.86, 3.47 	1	1	1	1	0	4
168	Yonekura et al 2005	Impacts of O3 and CO2 enrichment on growth of Komatsuna (Brassica campestris) and Radish (Raphanus sativus)	Greenhouse Experiment	Japan	N.A.	Spinach Radish	Leafy Root	O3	+25%	Yield		-0.15 -0.39	-0.25, -0.03 -0.56, -0.14	1	1	1	1	0	4
169	Zare et al 2012	Influence of drought stress on some traits in five mung bean (Vigna radiata L. R.Wilczek) genotypes	Field Experiment	Iran	Sub-Tropical	Mung Bean	Legume	Water Availability	-50%	Yield		-22.14	-42.42, -9.25	1	1	1	1	0	4
170	Zhai et al 2015	The Effects of Saline Water Drip Irrigation on Tomato Yield, Quality, and Blossom-End Rot Incidence --- A 3a Case Study in the South of China	Field Experiment	China	Sub-Tropical	Tomato	Solanum	Salinity	+25%	Nutr. Quality Yield	Vit. C	1.802154 -0.75184	0.91, 2.86 -1.30, 0.07	1	1	1	1	0	4
171	Zhao et al 2011	Inter- and intra-specific differences in the response of Chinese leafy vegetables to ozone	Greenhouse Experiment	UK	N.A.	Pakchoi, Mustard Leaf, Lettuce, Coriander	Leafy	O3	+25%	Yield		*		1	1	1	1	0	4
172	Zheng et al 2013	Effects of water deficits on growth, yield and water productivity of drip-irrigated onion (Allium cepa L.) in an arid region of NW China	Field Experiment	China	Temperate	Onion	Root	Water Availability	-50%	Yield		-32.63	-43.04, -15.90	1	1	1	1	0	4

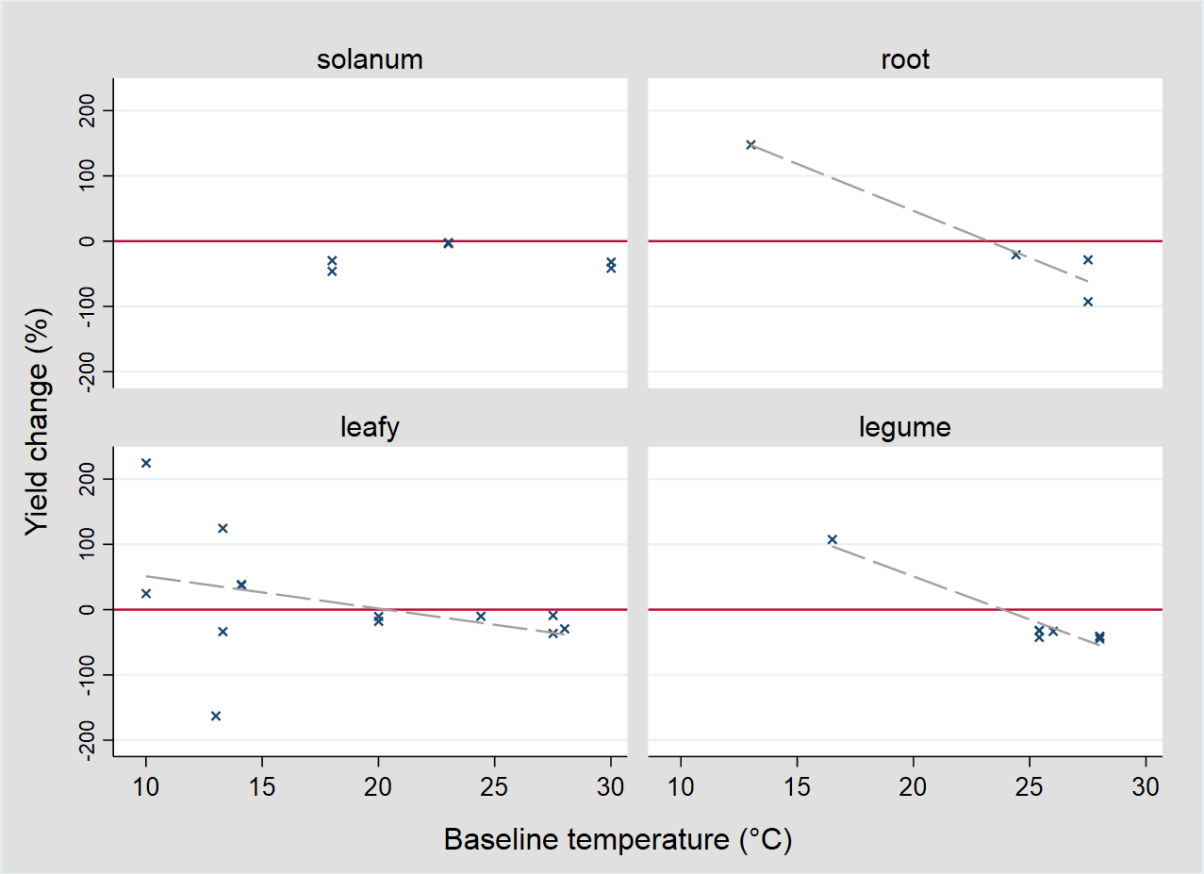
173	Ziska et al 2007	A quantitative and qualitative assessment of mung bean (Vigna mungo L. Wilczek) seed in response to elevated atmospheric carbon dioxide: potential changes in fatty acid composition	Field Experiment	US	Temperate	Mung Bean	Legume	CO2	+250ppm	Yield		67.41748		1	1	1	1	0	4
174	Zushi et al 2006	Free amino acid contents of tomato fruit grown under water and salinity stresses	Greenhouse Experiment	Japan	N.A.	Tomato	Solanum	Salinity	+25%	Yield		-0.08		1	1	1	1	0	4
								Water Availability	-50%			-29.03							

Appendix 5 – Results impact of ambient temperature

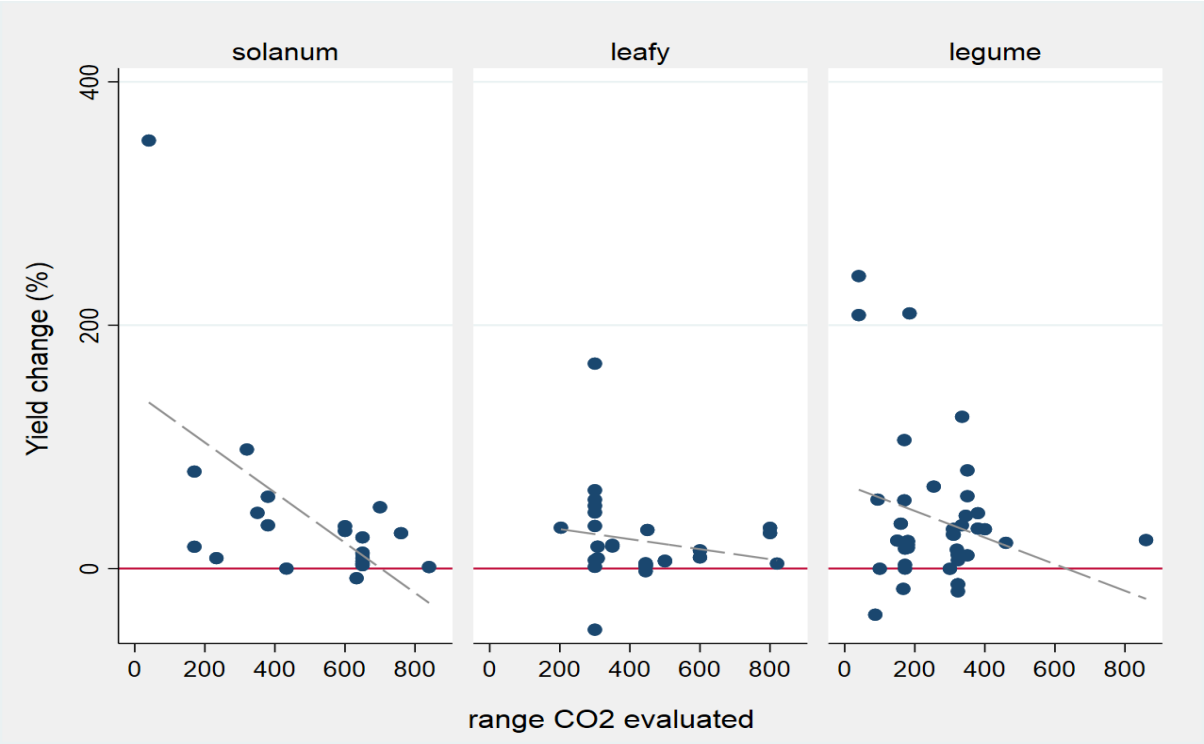


Appendix 6 – Scatter Plots for "Tipping Point" Analysis

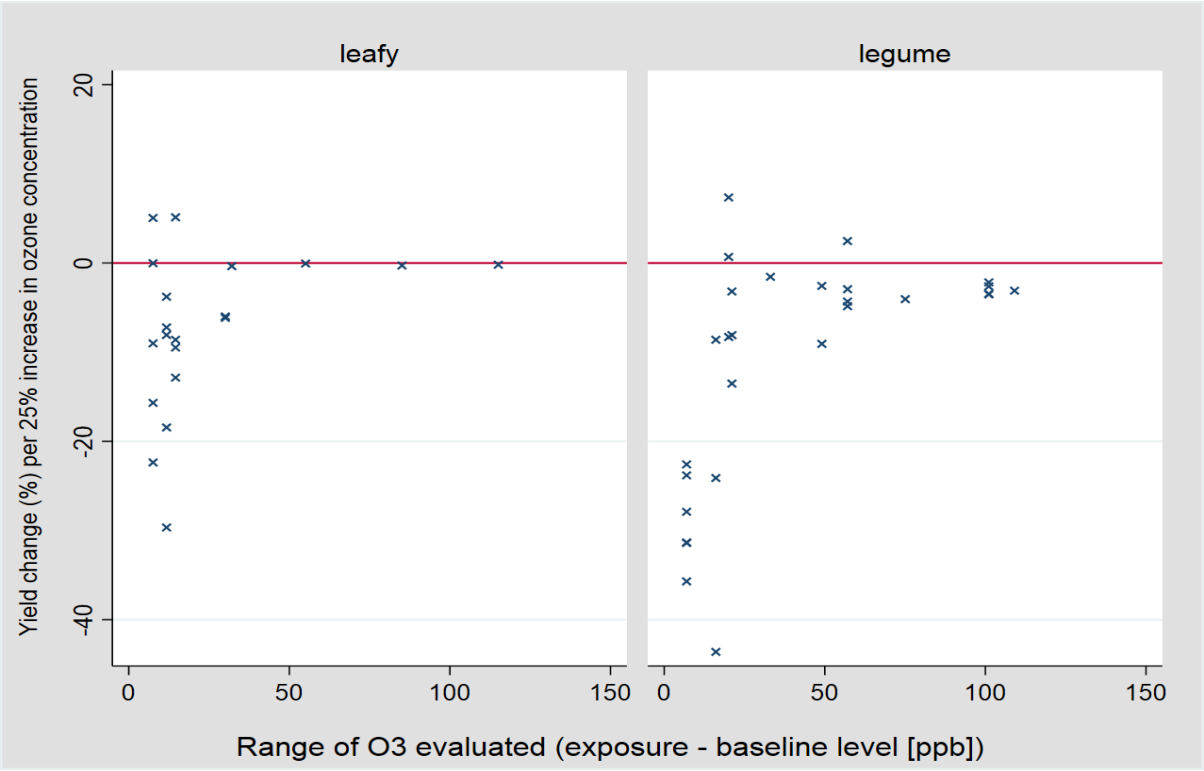
A. Yield change per baseline temperature of experiments



B. Yield change per range of CO_2 concentration evaluated (exposure – baseline) of included experiments

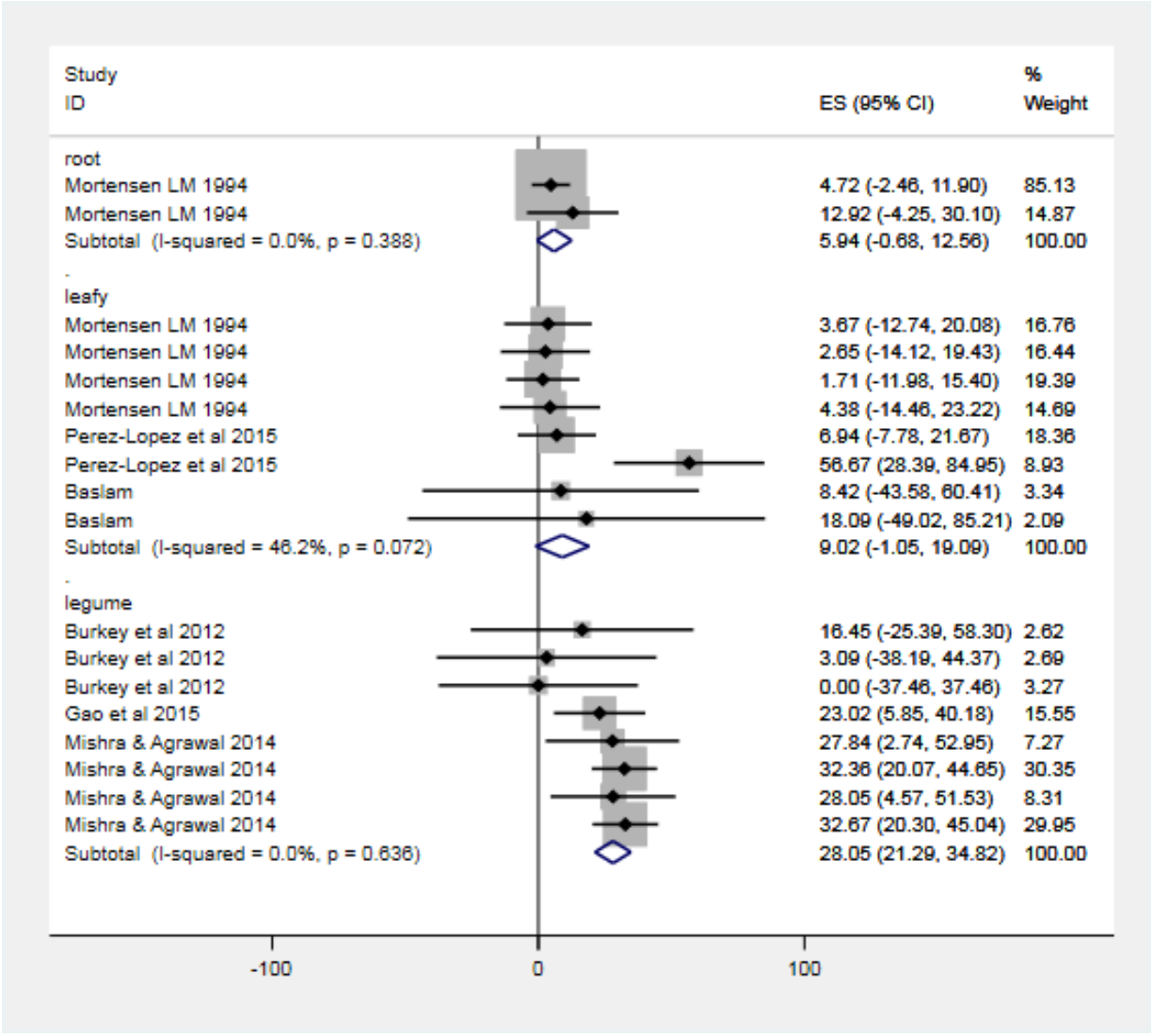


C. Yield change for standardised increase in O_3 per range of O_3 concentration evaluated (exposure – baseline) of included experiments

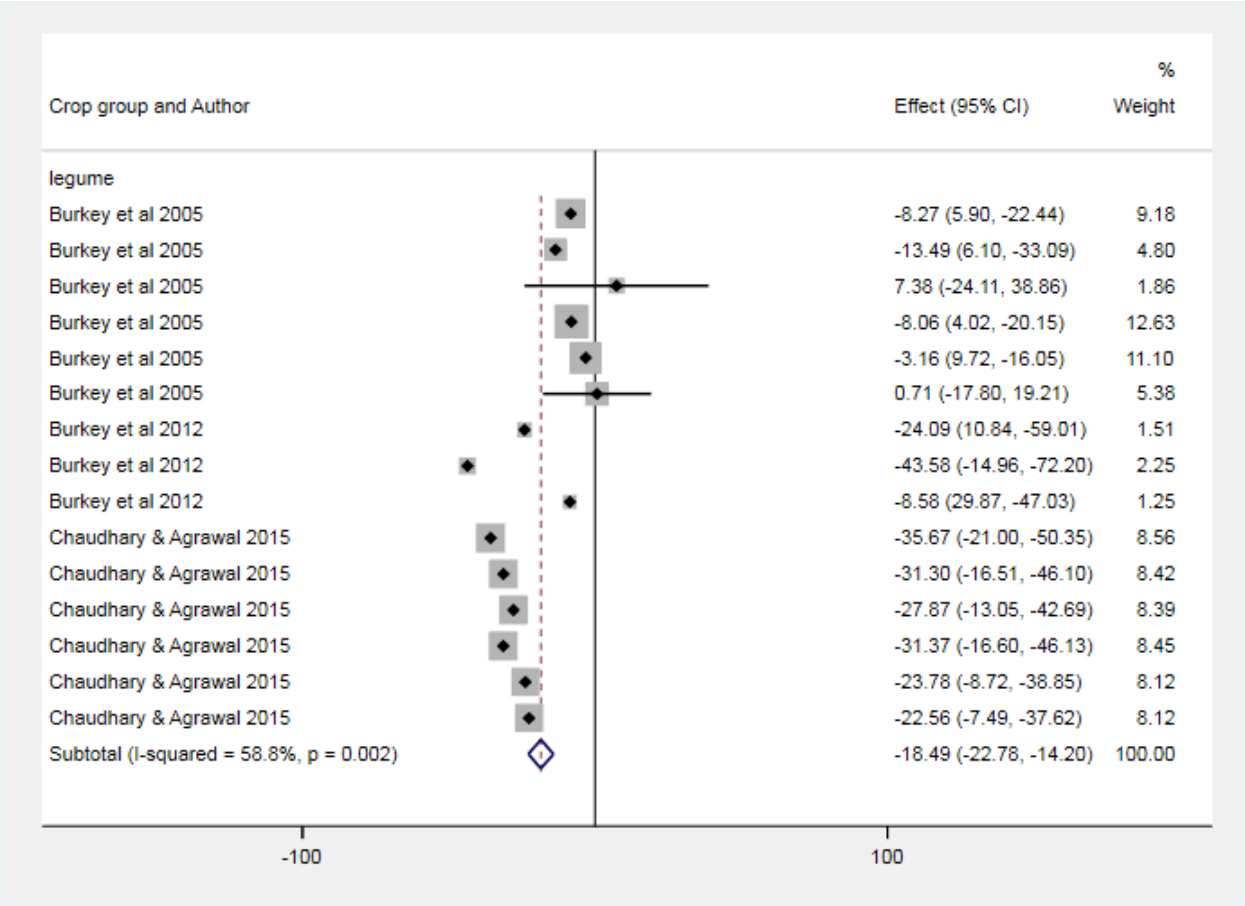


Appendix 7 – Detailed Forest Plot Information Figure 3B and 4B

Forest plot yield changes in vegetables and legumes resulting from a standardised increase of 250ppm CO_2 concentration

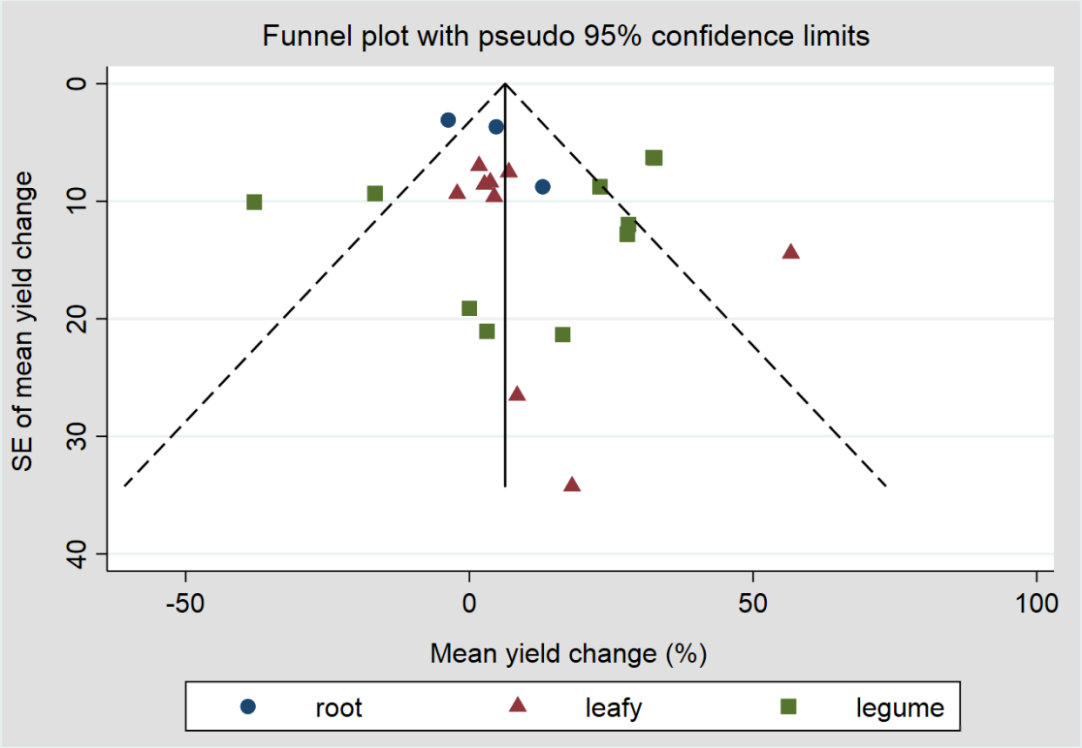


Forest plot yield changes in vegetables and legumes resulting from a standardised 25% increase in O_3 concentration

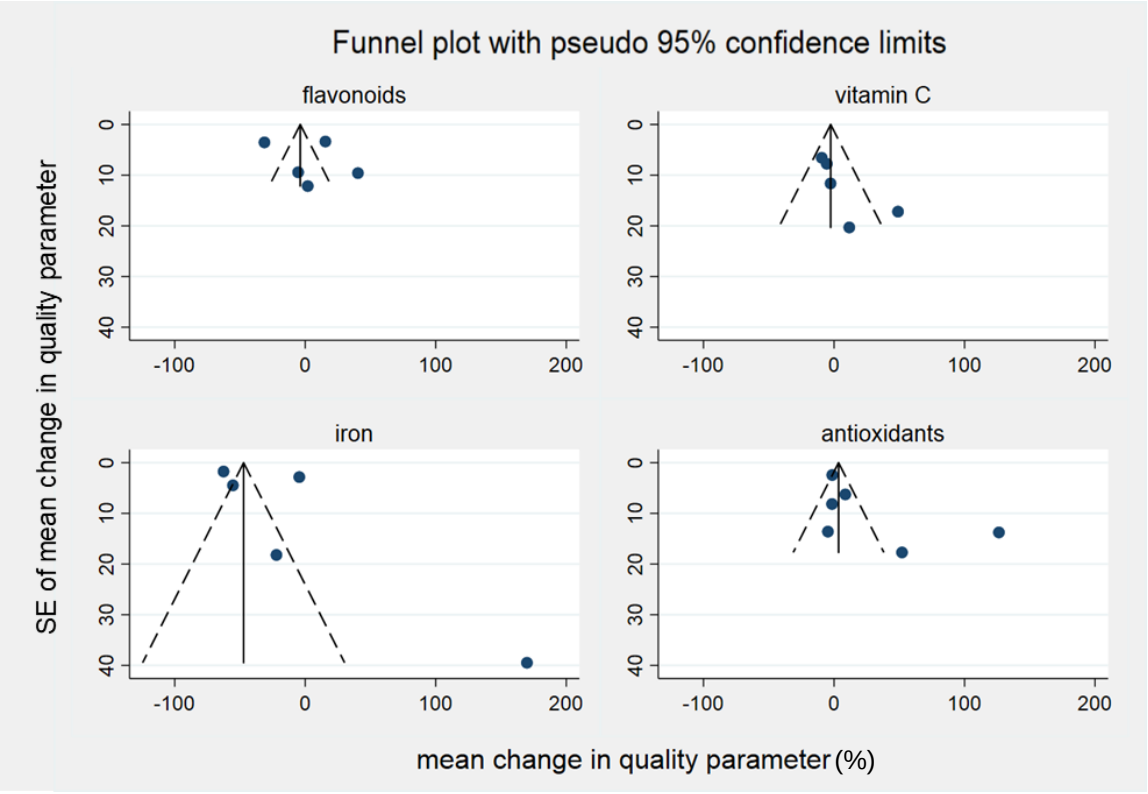


Appendix 8 - Funnel Plots Meta-Analysis

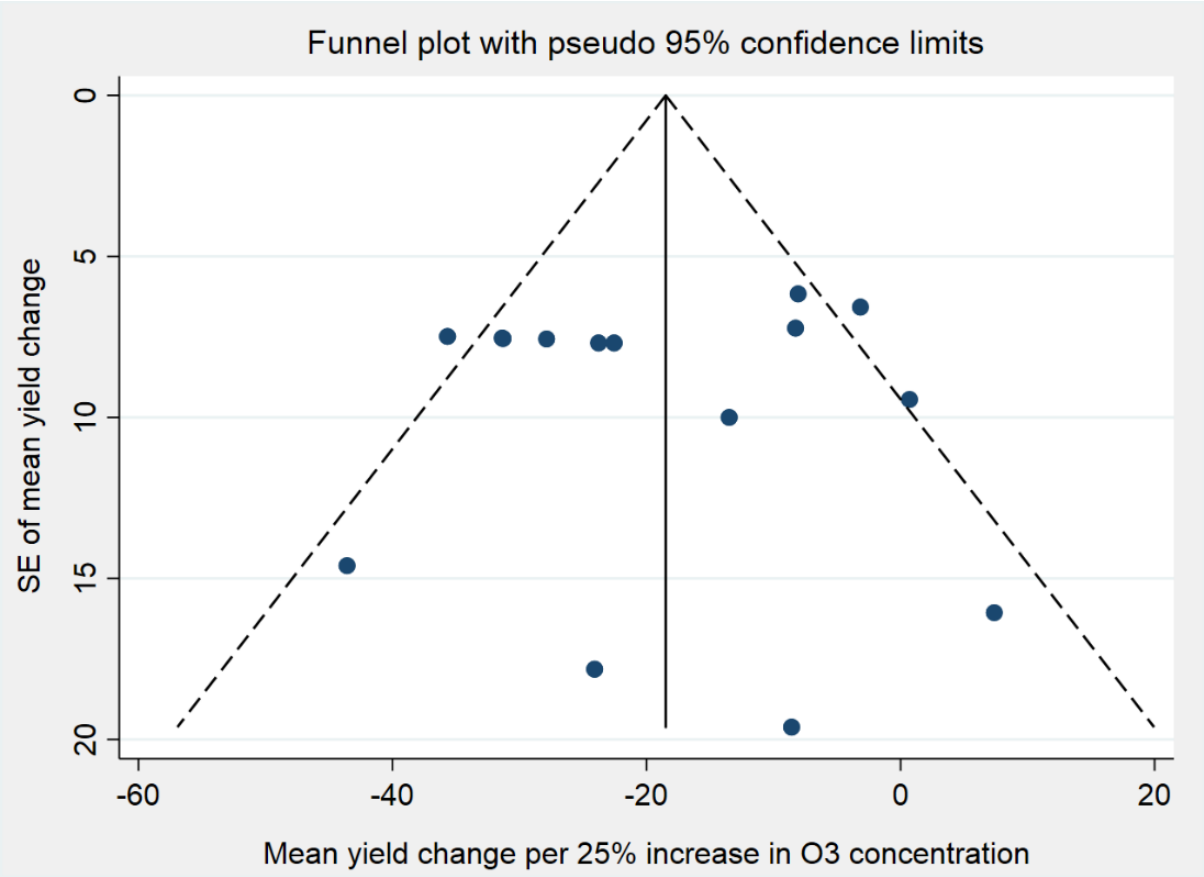
A. Funnel plot meta-analysis increased 250ppm increase in CO2 concentration on the yield of three vegetable and legume groups



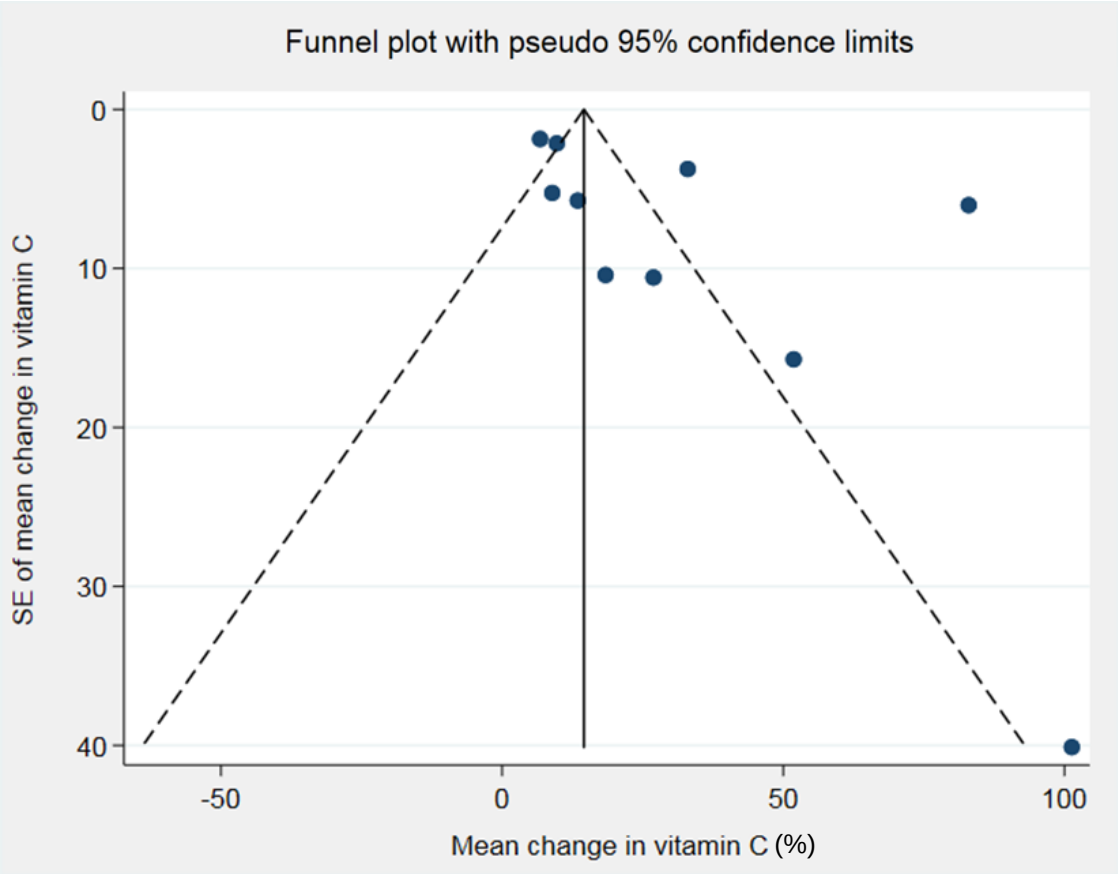
B. Funnel Plot meta-analysis of a 250ppm standardised increase in CO_2 concentration on nutritional quality parameters in leafy vegetables



C. Funnel plot meta-analysis 25% increase in O_3 concentration on the yield of legumes

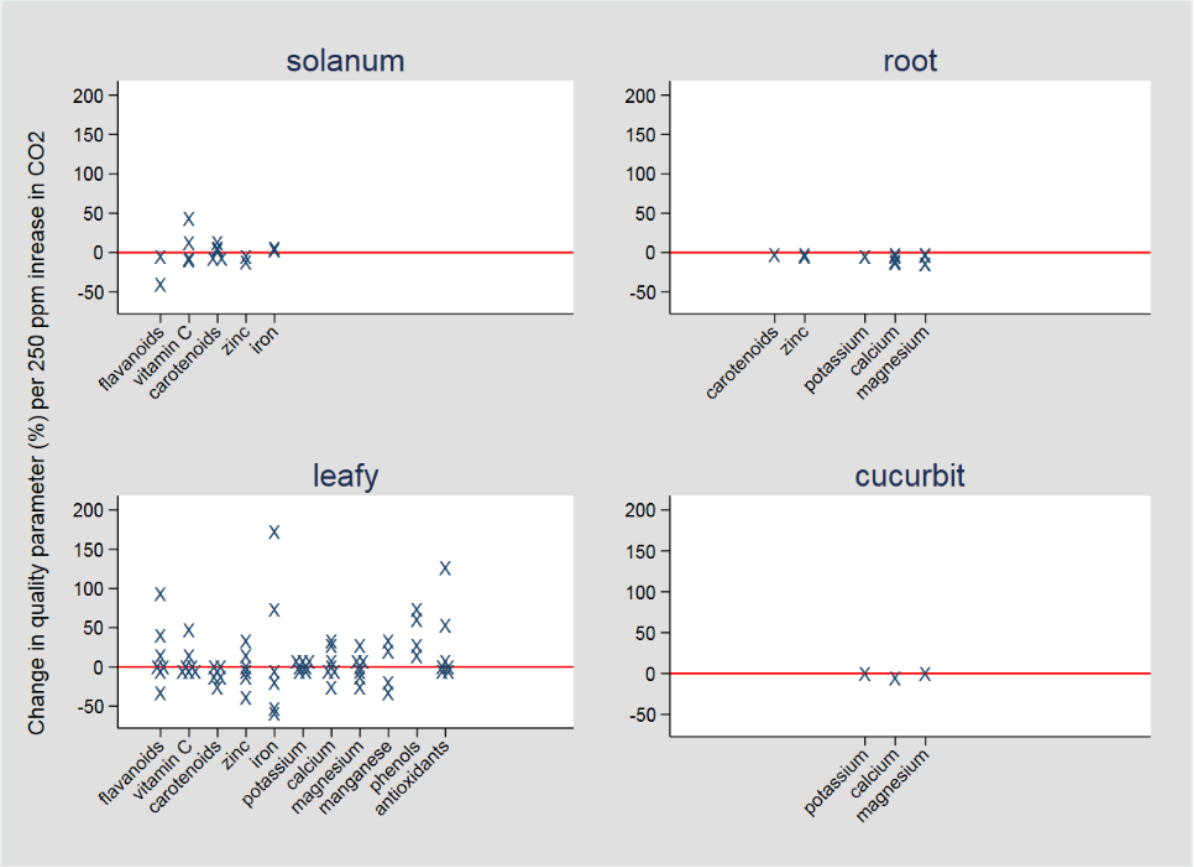


D. Funnel Plot meta-analysis of reduced water availability and Vitamin C concentration in *Solanaceae*

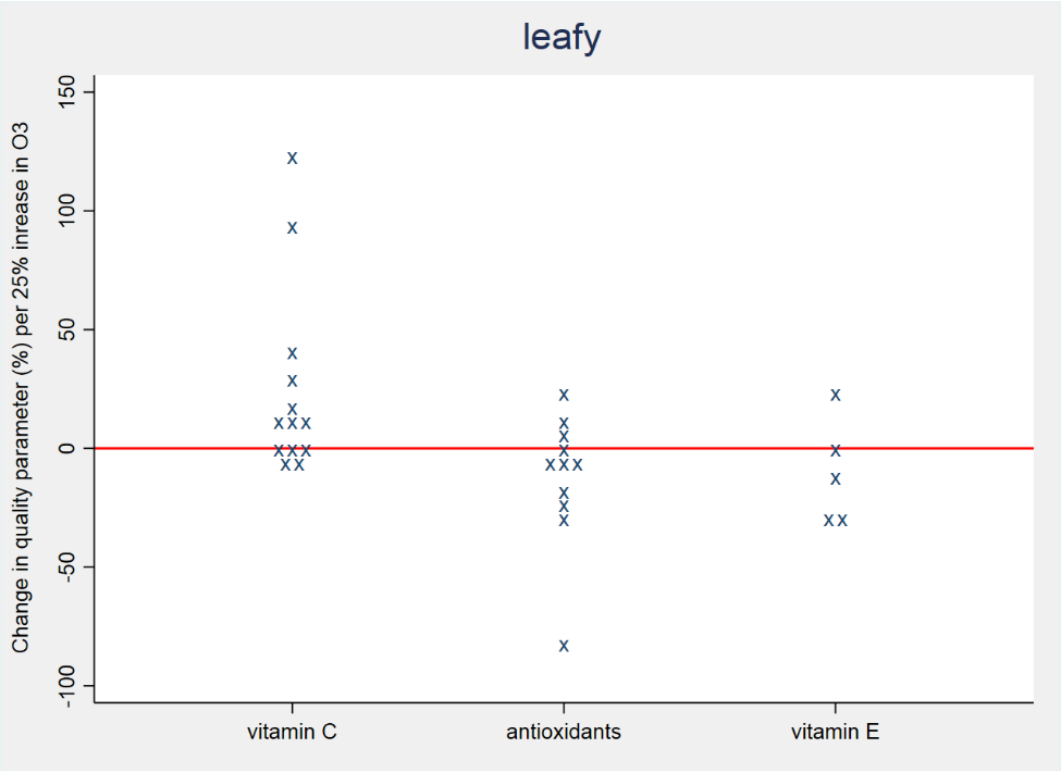


Appendix 9 – Additional Analyses Nutritional Quality

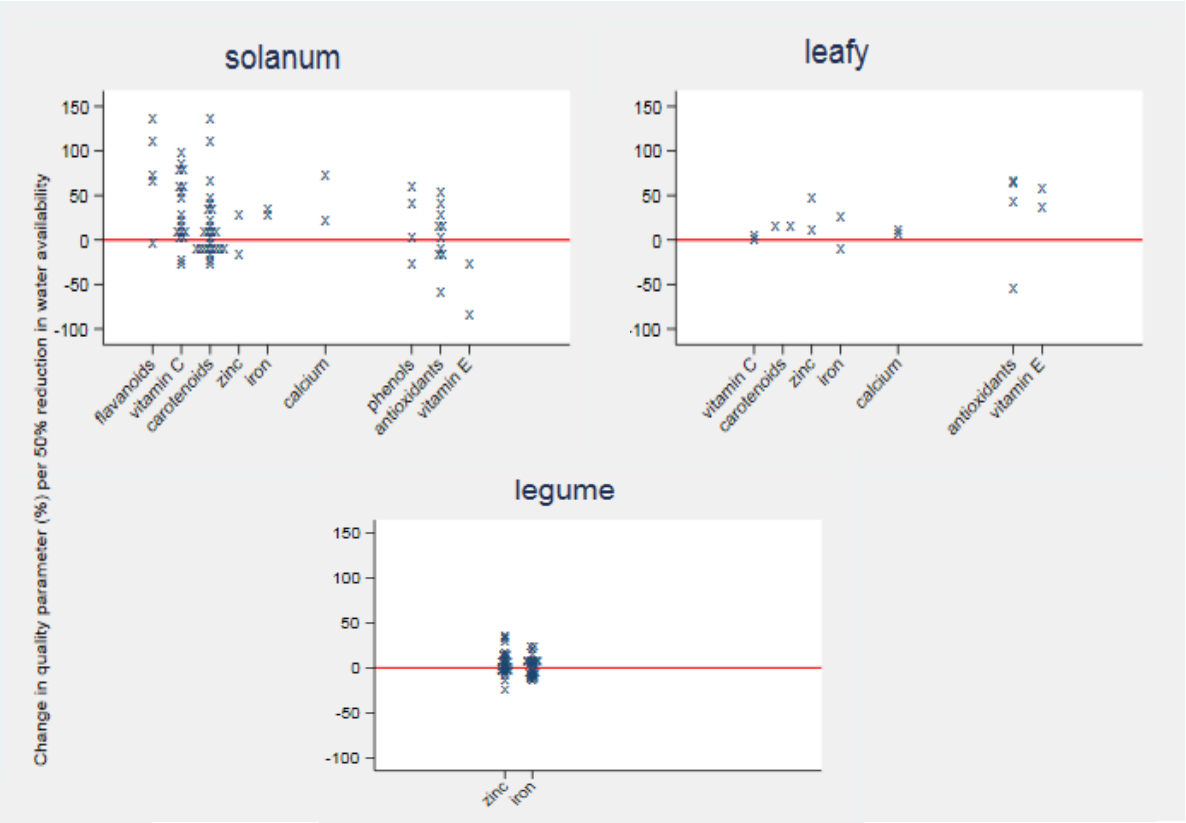
A. Dot plot showing the available experimental evidence of changes in nutritional quality in vegetables resulting from a standardised 250ppm increase in CO2 concentration



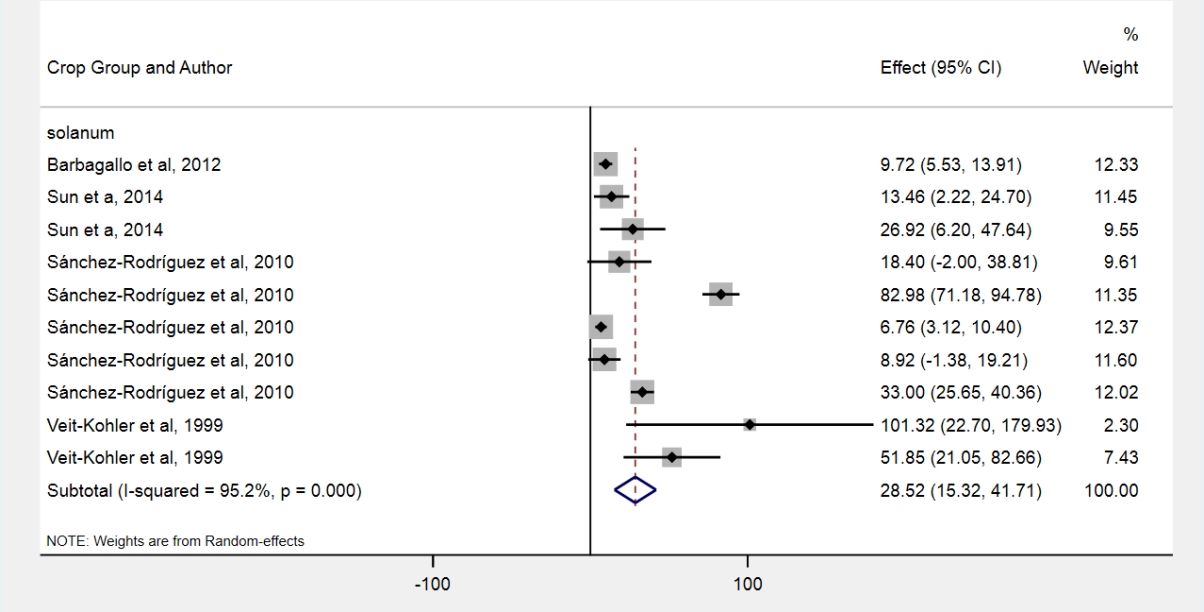
B. Effect of a 25% increase in O_3 exposure on three quality parameters in leafy vegetables



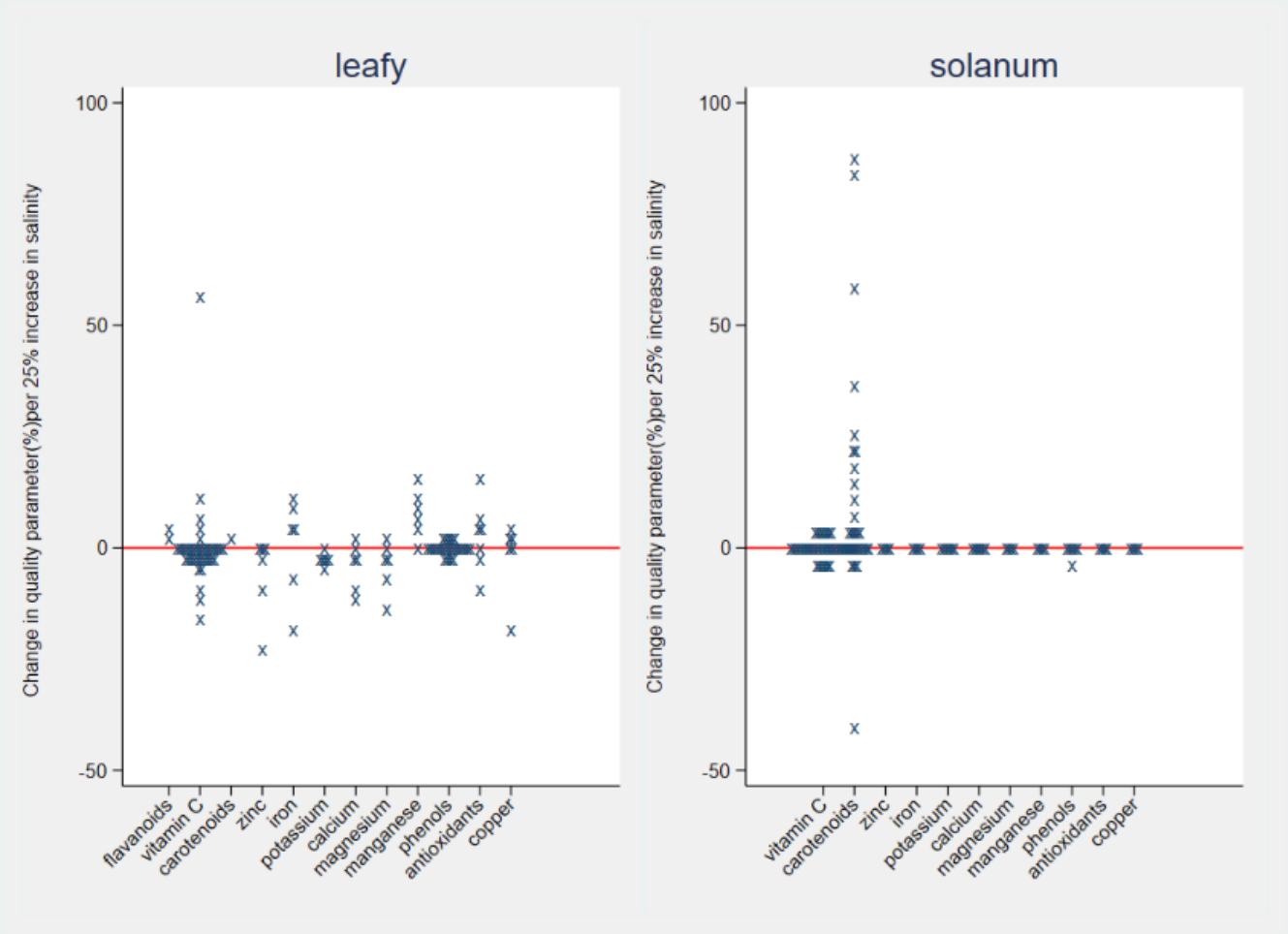
C. Dot plot showing the difference in nutritional quality parameters for three crop groups under a standardised 50% reduction in water availability



D. Forest plot showing the effect of a 50% decrease in water availability on changes vitamin C concentration of Solanaceae



E. Effect of a 25% increase in salinity exposure on quality parameters in leafy vegetables and *Solanaceae*



Appendix 10 – Results combined impact of multiple environmental exposures

Environmental exposure combinations		n (experiments)	Direction of effect on yield
Increased CO_2 & O_3 concentrations	*Root vegetables*	3	±
	Leafy vegetables	12	-
Increased CO_2 concentrations & elevated salinity levels	*Solanaceae*	6	±
	Leafy vegetables	4	+
Increased CO_2 concentration & reduced water availability	*Solanaceae*	9	+
	Legumes	3	±
Increased CO_2 concentration & elevated temperature	*Root vegetables*	7	±
	Leafy vegetables	4	-
	Legumes	4	-

± *Both positive and negative impacts on yields reported*
\- *Negative impacts on yields reported*
\+ *Positive impacts on yields reported*

References

1. Collins M, Knutti R, Arblaster J, Dufresne J-L, Fichefet T, Friedlingstein P, et al. Long-term climate change: projections, commitments and irreversibility. 2013.
2. Clarke L, Edmonds J, Jacoby H, Pitcher H, Reilly J, Richels R. Scenarios of greenhouse gas emissions and atmospheric concentrations. US Department of Energy Publications. 2007:6.
3. Riahi K, Grübler A, Nakicenovic N. Scenarios of long-term socio-economic and environmental development under climate stabilization. Technological Forecasting and Social Change. 2007;74(7):887-935.
4. Kim MJ, Park RJ, Ho C-H, Woo J-H, Choi K-C, Song C-K, et al. Future ozone and oxidants change under the RCP scenarios. Atmospheric Environment. 2015;101:103-15.
5. Kawase H, Nagashima T, Sudo K, Nozawa T. Future changes in tropospheric ozone under Representative Concentration Pathways (RCPs). Geophysical Research Letters. 2011;38(5).