Supplementary Information

The impact of environmental changes on the yield and nutritional quality of fruits, nuts and seeds: a systematic review

A. Database Search Strategies.

i. Fruits Yields

AGRIS

1. ((climate adj1 (change* OR variability OR disruption)) OR (land* adj1 degradation) OR ((increas* OR elevat* OR fertilization) adj2 (carbon-dioxide OR carbon dioxide OR "carbon dioxide" OR co2)) OR (soil adj2 (fertilization OR eutrophication)) OR “global warming” OR “greenhouse effect*” OR ((water OR soil*) adj4 (sodium OR salinity 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 seallevel)) OR flood* OR “storm surge” OR landslide* OR (wildfire* OR wild fire) OR windstorm* OR cyclone* OR (humidity adj2 (increas* OR change* OR elevation* OR variabilit* OR pattern*)) OR “rainfall pattern*” OR ((acid OR acidify*) 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 fresh-water OR "fresh water" OR surface-water OR surface-water OR "surface water" OR "irrigation water")) OR aquifer* OR (water adj2 (availability 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. (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).ti,ab.

3. ((yield adj2 change) OR "crop production" OR "crop growth" OR producti* OR growth OR yield OR harvest OR biomass OR “dry weight” OR “fresh weight”).ti,ab.

CAB Abstracts

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 fertilization) adj2 (carbon-dioxide OR carbon dioxide OR “carbon dioxide” OR CO2)) OR “carbon footprint” OR (ozone* adj2 depletion) OR climate pollutant* OR (soil adj2 (fertilization OR eutrophication)) OR ((soil OR water) adj4 (sodium OR salinity 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 sealvel) adj4 rise) OR flood* OR "storm surge" OR landslide* OR wildfire* OR wild-fire* OR tropical cyclone* OR windstorm* OR (humidity adj2 (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 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 biodiverse* 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 N1 contamination) OR (pest* adj4 (crop OR plant)) OR (plant adj1 (pathogen* OR disease*)).ti,ab.

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).ti,ab.

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”).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 (fertilization OR fertilisation 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 sealvel)) OR flood* OR storm surge* OR landslide* OR (wildfire* or wild-fire* or wild fire) OR windstorm* OR cyclone* OR (humidity* N2 (increase* 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 pollinat* OR ((bee OR bees OR insect OR insects) N2 decline) OR ecosystem* change* OR (health* N2 planet) OR environment* change* OR (chemical N1 contamination) OR (pest* N4 (crop* OR plant*)) OR (plant adj1 (pathogen* OR disease*)).

2. 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 strawberry* OR raspberry* OR 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*

3. (yield N3 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 near/2 (change* OR variability OR disruption)) OR (land* near/1 degradation) OR ((increase* OR elevat* OR fertilization) near/2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR co2)) OR (soil near/2 (fertilization 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* OR increase*) 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 (increase* 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 surface-water OR surface-water OR "surface water" OR "irrigation water")) OR aquifer* OR (water near/2 (available* 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* near/2 change*) OR (health* near/2 planet) OR (environment* near/2 change*) OR (chemical* near/1 contamination) OR (pest* near/4 (crop* OR plant*)) OR (plant* near/1 (pathogen* OR disease*))

2. 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 strawberry* OR raspberry* OR blackberry* 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*)

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. TITLE-ABS-KEY ((climate W/2 (change* OR variability OR disruption))) OR (land* W/1 degradation) OR ((increase* OR elevat* OR fertilization) W/2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR co2)) OR (soil W/2 (fertilization 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 (increas* 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 OR increase) 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 (increase* 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 surface-water OR surface-water OR "surface water" OR "irrigation water")) OR aquifer* OR (water W/2 (available* 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* W/2 change*) OR
“health of the planet” OR (environment* W/2 change*) OR (chemical* W/1 contamination) OR (pest* W/4 (crop* OR plant*)) OR (plant* W/1 (pathogen* OR disease*))

2. TITLE-ABS-KEY (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 strawberry* OR raspberry* OR blackberry* 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*)

3. TITLE-ABS-KEY ((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")

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 (humidity adj2 (increas* OR change* OR elevation* OR variabili* OR pattern*)) OR rainfall pattern* OR ((acid OR acidi* OR) 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. (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 strawberry* OR raspberry* OR blackberry* 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.

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").ti,ab.

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 (humidity adj2 (increas* OR change* OR elevation* OR temperature* OR variab* OR trend*)) OR wildfire* OR (extension* OR cover*) 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.
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 aqifier* OR (water adj2 (availab* OR security OR stress OR scarcity)) OR (water adj2 quality) OR biodivers* OR biological divers* OR pollinatar* 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. (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 strawberry* OR raspberry* OR blackberry* 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 brocoli OR sprout*).ti,ab.

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").ti,ab.

ii. Fruits Nutritional Quality

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 aqifier* OR (water adj2 (availab* OR security OR stress OR scarcity)) OR (water adj2 quality) OR biodivers* OR “biological divers*” OR pollinatar* 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. (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 strawberry* OR raspberry* OR blackberry* 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 brocoli OR sprout*).ti,ab.

3. ((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 variet* OR individuals OR group*)).ti,ab.
CAB Abstracts

1. ((climate adj1 (change* OR variability OR disruption)) OR (land* adj1 degradation) OR ((increase* OR elevat* OR fertilisation) adj2 (carbon-dioxide OR carbon dioxide OR "carbon dioxide" OR co2)) OR (soil adj2 (fertilisation OR eutrophication)) OR “global warming” OR “greenhouse effect*” OR ((water OR soil*) adj4 (sodium OR saline OR saline OR salinity)) OR global temperature* OR (temperature* adj2 (increase* OR variabil* 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 variabil* 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 surface-water OR "surface water" OR "irrigation water") OR aquifer* OR (water adj2 (available 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. (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 strawberry* OR raspberry* blackberry* 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.

3. ((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* OR Carotenoids).ti,ab.

GreenFILE

1. (climate N1 (change* OR variability OR disruption)) OR (land* N1 degradation) OR ((increase* OR elevat* OR fertilisation OR fertilization) N2 (carbon-dioxide OR carbon dioxide 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 saline OR salinity)) OR global temperature* OR (temperature* N2 (increase* OR variabil* 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 variabil* 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 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* OR Carotenoids).ti,ab.
OR "ground water" OR freshwater OR fresh-water OR "fresh water" OR surface-water OR surface-water OR "surface water" OR "irrigation water") OR aquifer* OR (water N2 (available* 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. 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 strawberry* OR raspberry* blackberry* 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*

3. (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 folic* OR "folic acid*" OR "folic-acid*" OR folicacid* OR "amino acid*" OR "amino-acid*" OR aminoacid* OR Carotenoids

Web of Science

1. TS=((climate near/1 (change* OR variability OR disruption)) OR (land* near/1 degradation) OR ((increase* OR elevat* OR fertilization) near/2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR co2)) OR (soil near/2 (fertilization OR eutrophication)) OR “global warming” OR “greenhouse effect*” OR ((water OR soil*) near/4 (sodium OR salination 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 (humidity* near/2 (increase* OR change* OR elevation* OR variabilit* OR pattern*)) OR “rainfall pattern*” OR "(acid or acidiff*) 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 surface-water OR surface-water OR "surface water" OR "irrigation water") OR aquifer* OR (water near/2 (available* 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=(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 strawberry* OR raspberry* blackberry* 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*)

3. 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 folic* OR "folic acid*" OR "folic-acid*" OR folic acid OR "amino acid*" OR "amino-acid*" OR aminoacid* OR Carotenoids

Scopus

1. TITLE-ABS-KEY ((climate W/2 (change* OR variability OR disruption)) OR (land* W/1 degradation) OR ((increas* OR elevat* OR fertili?ation) W/2 (carbon-dioxide OR carbon dioxide OR "carbon dioxide" OR co2)) OR (soil W/2 (fertilization OR eutrophication)) OR "global warming" OR "greenhouse effect*" OR ((water OR soil*) W/4 (sodium OR salinity OR saline OR salinity)) OR "global temperature*" OR (temperature* W/2 (increas* 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 OR increase) 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 (availability OR security OR stress OR scarcity)) OR (water W/2 (quality OR availability) OR groundwater OR ground-water OR "ground water") OR (crop OR plant*)) OR (plant* W/1 ((chemical* OR "climate pollutant*" OR disease*))

2. (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 strawberry* OR raspberry* blackberry* 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*)

3. TITLE-ABS-KEY ((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 folic acid OR "amino acid*" OR "amino-acid*" OR aminoacid* OR Carotenoids)

EMBASE

1. ((climate adj1 (change* OR variability OR disruption)) OR (land* adj1 degradation) OR ((increas* OR elevat* OR fertili?ation) adj2 (carbon-dioxide OR carbon dioxide OR "carbon dioxide" OR co2)) OR (soil adj2 (fertilization OR eutrophication)) OR global warming OR greenhouse effect* OR ((water OR soil*) adj4 (sodium OR salinity 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 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 (available 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. (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 strawberry* OR raspberry* OR blackberry* 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.

3. (((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 nutrient* 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* OR Carotenoids)).ti,ab.

MEDLINE

1. (((climate adj1 (change* OR variability OR disruption)) OR (land* adj1 degradation) OR ((increases OR elevates OR fertilization) adj2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR co2)) OR (soil adj2 (fertilization OR eutrophication)) OR global warming OR greenhouse effect* OR ((water OR soil*) adj4 (sodium OR salinity OR saline OR salinity)) OR global temperature* OR (temperature* adj2 (increase* OR variability 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 (humidity* adj2 (increases OR change* OR elevation* OR variability 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 (available 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. (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 strawberry* OR raspberry* OR blackberry* 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.

3. (((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 nutrient* 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* OR Carotenoids)).ti,ab.
iii. Nuts & Seeds Yield

Web of Science

1. TS=(nut* OR seed* OR cashew* OR "cashew nut" OR peanut* OR walnut* OR pistachio* OR "pistachio nut*" OR hazelnut* OR "sunflower seed*" OR chestnut* OR pecan* OR "pecan nut*" OR groundnut* OR macadamia* OR "macadamia nut*" OR almond* OR "pine nut*" OR hempseed* OR "hemp seed*" OR sheanut* OR kola nut OR linseed OR rape seed OR "chia seed")

2. TS=((pest* near/4 (crop* OR plant* OR tree*)) OR (chemical* near/1 contamination) OR (environment* near/2 (change* OR damage*)) OR (ecosystem* near/2 change*) OR ((bee or bees OR insect OR insects) near/2 decline) OR (pollinator* near/2 (loss OR deplet* OR declin*)) OR pollinator* OR (environment* near/2 chang*) OR "environmental stressor*" OR "environmental change*" OR (biodiversity near/2 (loss OR deplet* OR decreas*)) OR (water near/2 (available* OR quality OR stress OR security OR scarcity OR deplet*)) OR ((quality OR availability) near/1 (groundwater OR ground-water OR "ground water" OR freshwater OR fresh-water OR "fresh water" OR "surface water" OR surface-water OR "irrigation water")) OR ((rise* OR increas* OR elevated OR elevat*) near/2 ("UV" OR "ultraviolet" OR "ultra-violet" OR "UV radiation" OR "ultraviolet radiation" OR "ultra-violet radiation")) OR ("atmospheric CO2" OR "atmospheric carbon dioxide" OR "atmospheric carbon-dioxide") OR (rise* OR elevated OR elevation OR increas*) near/2 "tropospheric ozone") OR "tropospheric ozone" OR "soil erosion" OR "soil quality" OR (change near/2 ("land use" OR "land cover")) OR ((acid OR acidic OR near/1 rain*) OR (ozone near/2 depletion) OR (humidity near/2 (increas* OR change* OR elevation OR variabilit* OR pattern*)) OR "extended drought*" OR "extreme drought*" OR "climate pollutant" OR "carbon footprint" OR "rainfall pattern*" OR "windstorm*" OR "storm surge" OR "landslide" OR (rise* OR increase*) near/4 ("sea level" OR sea-level OR seallevel)) OR cyclone* OR (cold near/1 extreme*) OR flood* OR (heatwave* OR heat-wave* OR "heat wave") OR (temperature near/2 (elevated OR elevation OR rise OR rising OR increas*)) OR "extreme temperature" OR "extreme weather" OR ((water OR soil*) near/4 (sodium OR salini?ation OR saline OR salinity)) OR "greenhouse effect" OR (soil near/2 (fertilization OR eutrophication)) OR "global warming" OR (increas* OR elevat* OR fertili?) near/2 (carbon-dioxide OR carbone-dioxide OR "carbon dioxide" OR CO2)) OR (land* near/1 degradation) OR (climate near/2 (change* OR variability OR disruption))

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")

MEDLINE

1. (nut* OR seed* OR cashew* OR "cashew nut*" OR peanut* OR walnut* OR pistachio* OR "pistachio nut*" OR hazelnut* OR "sunflower seed*" OR chestnut* OR pecan* OR "pecan nut*" OR groundnut* OR macadamia* OR "macadamia nut*" OR almond* OR "pine nut*" OR hempseed* OR "hemp seed*" OR sheanut* OR kola nut* OR linseed* OR "chio seed")

2. ((pest* adj4 (crop* OR plant* OR tree*)) OR (chemical* adj1 contamination) OR (environment* adj2 (change* OR damage*)) OR (ecosystem* adj2 change*) OR ((bee or bees OR insect OR insects) adj2 decline) OR (pollinator* adj2 (loss OR deplet* OR declin*)) OR pollinator* OR (environment* adj2 chang*) OR "environmental stressor*" OR "environmental change*" OR (biodiversity adj2 (loss OR deplet* OR decreas*)) OR (water adj2 (available* OR quality OR stress OR security OR scarcity OR deplet*)) OR ((quality OR availability) adj1 (groundwater OR ground-water OR "ground water" OR freshwater OR fresh-water OR "fresh water" OR "surface water" OR surface-water OR "irrigation water")) OR ((rise* OR increas* OR elevated OR elevat*) adj2 ("UV" OR "ultraviolet" OR ultraviolet OR "UV radiation" OR "ultraviolet radiation") OR ("atmospheric CO2" OR "atmospheric carbon dioxide" OR "atmospheric carbon-dioxide") OR (rise* OR elevated OR elevation OR increas*) adj2 "tropospheric ozone") OR "tropospheric ozone" OR "soil erosion"
OR "soil quality" OR (change adj2 ("land use" OR "land cover")) OR ((acid OR acidifi* OR (acid OR acidifi* OR (acid OR acidifi*) adj1 rain*)) OR (ozone adj2 depletion) OR (humidit* adj2 (increas* OR change* OR elevation OR variabilit* OR pattern*)) OR "extended drought*" OR "extreme drought*" OR "climate pollutant*" OR "carbon footprint" OR "rainfall pattern*" OR windstorm* OR "storm surge" OR landslide OR ((rise* OR increase*) adj4 ("sea level" OR sea-level OR sealevel)) OR (pollinator* OR (cold adj1 extreme*) OR (heatwave* OR heat-wave* OR "heat wave") OR (temperature adj2 (elevated OR elevation OR rise OR rising OR increas*)) OR "extreme temperature*" OR "extreme weather" OR ((water or soil*) adj4 (sodium or salini#ation or saline or salinity)) OR "greenhouse effect" (soil adj2 (fertilization OR eutrophication)) OR "global warming" OR ((increas* OR elevat* OR fertilization) adj2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR CO2)) OR (land* adj1 degradation) OR (climate adj2 (change* OR variability OR disruption))).ti,ab.

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

EMBASE

1. (nut* OR seed* OR cashew* OR "cashew nut"* OR peanut* OR walnut* OR pistachio* OR "pistachio nut"* OR hazelnut* OR "sunflower seed"* OR chestnut* OR pecan* OR "pecan nut"* OR groundnut* OR macadamia* OR "macadamia nut"* OR almond* OR "pine nut"* OR hempseed* OR "hemp seed"* OR sheanut* OR "kola nut"* OR linseed* OR rapeseed* OR "chia seed"*).ti,ab.

2. ((pest* adj4 (crop* OR plant* OR tree*)) OR (chemical* adj1 contamination) OR (environment* adj2 (change* or damage*)) OR (ecosystem* adj2 change*) OR ((bee OR bees OR insect OR insects) adj2 decline) OR (pollinator* adj2 (loss OR deplet* OR declin*)) OR (environment* adj2 chang*) OR "environmental stressor*" OR "environmental change*" OR "climate pollutant*" OR "carbon dioxide" OR "atmospheric carbon dioxide" OR (land* adj1 degradation) OR (climate adj2 (change* OR variability OR disruption))).ti,ab.

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

GreenFILE

1. (nut* OR seed* OR cashew* OR "cashew nut" OR peanut* OR walnut* OR pistachio* OR "pistachio nut"* OR hazelnut* OR "sunflower seed"* OR chestnut* OR pecan* OR "pecan nut"* OR groundnut* OR macadamia* OR "macadamia nut"* OR almond* OR "pine nut"* OR hempseed* OR "hemp seed"* OR sheanut* OR "kola nut"* OR linseed* OR rapeseed* OR "chia seed"*)
2. ((pest* N4 (crop* OR plant* OR tree*)) OR (chemical* N1 contamination) OR (environment* N2 change* OR damage*)) OR (ecosystem* N2 change*) OR ((bee OR bees OR insect OR insects) N2 decline) OR (pollinator* N2 (loss OR deplet* OR declin*)) OR pollinator* OR (environment* N2 chang*) OR "environmental stressor*" OR "environmental change*" OR (biodiversity N2 (loss OR deplet* OR decreas*)) OR (water N2 (availab* OR quality OR stress OR security OR scarcity OR deplet*)) OR ((quality OR availability) N1 (groundwater OR ground-water OR "ground water" OR fresh-water OR fresh-water OR "fresh water" OR "surface water" OR surface-water OR "irrigation water")) OR ((rise* OR increas* OR elevated OR elevat*) N2 ("UV" OR "ultraviolet" OR ultra-violet OR "UV radiation" OR "ultraviolet radiation" OR "ultra-violet radiation") OR ("atmospheric CO2" OR "atmospheric carbon dioxide" OR "atmospheric carbon-dioxide") OR ((rise* OR elevated OR elevation OR increas*) N2 "tropospheric ozone") OR "tropospheric ozone" OR "soil erosion" OR "soil quality" OR (change N2 ("land use" OR "land cover")) OR (acid OR acidifi* N1 rain*) OR (ozone N2 depletion) OR (humidit* N2 (increase* OR change* OR elevation OR variabilit* OR pattern*)) OR "extended drought*" OR "extreme drought*" OR "climate pollutant" OR "carbon footprint" OR "rainfall pattern*" OR windstorm* OR "storm surge" OR "landslide" OR ((rise* OR increase*) N4 ("sea level" OR sea-level OR sealevel)) OR cyclone* OR (cold N1 extreme*) OR flood* OR (heatwave* OR heat-wave* OR "heat wave*") OR (temperature N2 (elevated OR elevation OR rise OR rising OR increas*)) OR "extreme temperature" OR "extreme weather" OR ((water or soil*) N4 (sodium or salini?ation or saline or salinity)) OR "greenhouse effect" OR (soil N2 (fertili?ation OR eutrophication)) OR "global warming" OR ((increas* OR elevat* OR fertili?ation) N2 (carbon-dioxide OR carbondioxide OR "carbon dioxide" OR CO2)) OR (land* N1 degradation) OR (climate N2 (change* OR variability OR disruption)))

3. ((yield N3 change) OR "crop production" OR "crop growth" OR producti* OR growth OR yield OR harvest OR biomass OR dry weight).
## B. Modified CASP checklist

*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? |
C. Overview of the included studies in the systematic review

| Author & Year | Title | Study design | Location | Crop Type | Crop Group | Environmental Exposure | No. of Experiments | Change in Exposure (min, max) | Yield/Nutritional quality | % Change in Outcome (min, max) | Total Quality Score |
|---------------|-------|--------------|----------|-----------|------------|------------------------|-------------------|-----------------------------|--------------------------|-------------------------------|---------------------|
| 1 Abdel-Aziz and Sadik 2017 | Effect of water and salt stresses on productivity of cantaloupe in Ismailia soil | Field | Egypt | Cantaloupe Melon | Cucurbits | Water availability | 3 | -30, -10 % ETc | Yield | -46.0, -3.4 | 4 |
| | | | | | | Water salinity | 3 | +0.8, +5.5 dS/m | Yield | -44.4, -1.4 |
| | | | | | Water availability & salinity | 9 | -30, -10 % ETc & +0.8, +5.5 dS/m | Yield | -77.6, -6.7 |
| 2 Abu-Awwad AM 2001 | Influence of different water quantities and qualities on lemon trees and soil salt distribution at the Jordan Valley | Field | Jordan | Lemon | Citrus | Water availability | 8 | -100, -25 %ETc | Yield | -100, -1.8 | 4 |
| | | | | | Water salinity | 4 | +1.8, +3.6 dS/m | Yield | -73.5, -18.2 |
| 3 Akrami and Arzani 2018 | "Physiological alterations due to field salinity stress in melon (Cucumis melo L.)" | Field | Iran | Melon | Cucurbits | Water salinity | 1 | +7.3 dS/m | Yield | -42.7 | 4 |
| 4 Atay et al 2017 | Investigating effects of over-irrigation and deficit irrigation on yield and fruit quality in pink lady™ 'Rosy Glow' apple | Field | France | Apple | Pome | Water availability | 1 | -25 % | Yield | -13.1 | 4 |
| 5 Aydinsakir et al 2016 | Assessment of different irrigation levels on peanut crop yield and quality components under Mediterranean conditions | Field | Turkey | Peanut | Nut | Water availability | 8 | -630, -154 mm | Yield | -83.0, -9.5 | 4 |
| 6 Bannayan et al 2009 | Interactive effects of elevated CO₂ and temperature on growth and development of a short- and long-season peanut cultivar | Growth chamber | USA | Peanut | Nut | CO₂ | 2 | +300 µmol/mol | Yield | -53.3, -24.4 | 4 |
| | | | | | Temperature | 4 | +2.5, 5 °C | Yield | -94.6, -36.3 |
| | | | | | Nut CO₂ & temperature | 4 | +300 µmol/mol & +2.5, 5 °C | Yield | -91.6, -45.6 |
|    | Authors          | Title                                                                 | Location | Species/Type                  | Water availability | Yield          | Year | Details                                      |
|----|-----------------|------------------------------------------------------------------------|----------|-------------------------------|--------------------|----------------|------|---------------------------------------------|
| 7  | Besset et al 2001 | Effect of water stress applied during the final stage of rapid growth on peach trees (cv. Big-Top) | Field in France | Peach (Drupe) | 4 -90, -17 L/day | -29.1, +21.2 | 4    |                                             |
| 8  | Bezerra et al 2018 | Physiological alterations and production of guava under water salinity and nitrogen fertilizer application | Field in Brazil | Guava (Berry) | 4 +0.8, +3.2 dS/m | -16, -4 | 4    |                                             |
| 9  | Bignami et al 1997 | Influence of irrigation on the growth and production of young hazelnuts | Field in Italy | Hazelnut (Nut) | 6 -104.6, -21.3 mm | -87.3, +14.1 | 4    |                                             |
| 10 | Bignami et al 2009 | Effects of irrigation on growth and yield components of hazelnut (Corylus avellana L.) in Central Italy. | Field in Italy | Hazelnut (Nut) | 3 -135.2, -33.8 mm | -43.4, +23.4 | 4    |                                             |
| 11 | Bindi et al 1996 | The effect of elevated CO2 concentration on grapevine growth under field conditions | Field in Italy | Grape (Berry) | 1 +341 ppm | +21.2 | 4    |                                             |
| 12 | Bindi et al 2001 | Free Air CO2 Enrichment (FACE) of grapevine (Vitis vinifera L.): II. Growth and quality of grape and wine in response to elevated CO2 concentrations | Field in Italy | Grape (Berry) | 8 +200, +350 ppm Flavonoids | +17.2, 82.7 | 5    |                                             |
| 13 | Bindi et al 2005 | Physiological and yield responses of grapevine (Vitis vinifera L.) exposed to elevated CO2 concentrations in a Free Air CO2 enrichment (FACE) | Field in Italy | Grape (Berry) | 2 +341, +339 Yields | +37.3, +44.3 | 4    |                                             |
| 14 | Blaikie et al 2001 | Productivity and water relations of field-grown cashew: a comparison of sprinkler and drip irrigation | Field in Australia | Cashew (Nut) | 3 -500, -115 L/tree/week | -58.1, -21.6 | 4    |                                             |
| 15 | Boem et al 1994 | Some effects of soil salinity on growth, development and yield of rapeseed (Brassica napus L.) | Field in Argentina | Rapeseed (Seed) | 4 +2.2, +7.7 dS/m | -15.0, +21.0 | 5    |                                             |
| 16 | Boland et al 1993 | Effect of saline water combined with restricted irrigation on peach tree growth and water use | Field in Australia | Peach (Drupe) | 6 +0.15, +0.9 dS/m | -31.2, -2.9 | 4    |                                             |
| ID | Author(s)          | Title                                                                 | Location | Species | Product | Water Type | Water Parameter | Yield Parameter | Notes |
|----|--------------------|----------------------------------------------------------------------|----------|---------|---------|------------|----------------|----------------|-------|
| 17 | Boman BJ 2005      | Salinity effects on Florida grapefruit in the Indian river region    | Field USA | Grapefruit | Citrus   | Water salinity | 24              | +1.6, +4.8 dS/m | Yield | -41.8, +8.6 |
| 18 | Bozkurt et al 2015 | Effects of deficit irrigation treatments on yield and plant growth of young apricot trees | Field Turkey | Apricot    | Drupe   | Water availability | 8              | -100, -25 %ETc | Yield | -93.7, +29.8 |
| 19 | Brito et al 2017   | Physiological characteristics and yield of 'Perola' pineapple in the semi-arid region | Field Brazil | Pineapple  | Bromeliad | Water availability & salinity | 2              | -50, -75 %ETc & +2.85 dS/m | Yield | -64.3, -58.9 |
| 20 | Buchner et al 2008 | Effects of regulated deficit irrigation on walnut (Juglans regia) grafted on Northern California Black (Juglans hindsi) or Paradox rootstock | Field USA | Walnut     | Nut      | Water availability | 16             | -5.8, -2.3 ml/ha | Yield | -43.5, -5.2  |
| 21 | Buendia et al 2008 | Effect of regulated deficit irrigation and crop load on the antioxidant compounds of peaches | Field Spain | Peach      | Drupe    | Water availability | 4              | -75 %ETc         | Vitamin C | -14.4, +15.5 |
|    |                    |                                                                      |          |          |         |             | 8              | -75 %ETc         | Phenols  | -32.9, +140.0 |
|    |                    |                                                                      |          |          |         |             | 4              | -75 %ETc         | Carotenoids | -33.3, -4.6 |
|    |                    |                                                                      |          |          |         |             | 10             | -75 %ETc         | Flavonoids | -63.3, +194.1 |
| 22 | Burkey et al 2007  | Elevated carbon dioxide and ozone effects on peanut: II. Seed yield and quality | Field USA | Peanut    | Nut     | CO₂ & O₃ | 3              | +173, +36.4 µmol/mol | Yield | +18.5, +25.8 |
|    |                    |                                                                      |          |          |         | CO₂ & O₃   | 1              | +29 nmol/mol     |                      |       |
|    |                    |                                                                      |          |          |         | CO₂ & O₃   | 2              | +173, +355 µmol/mol & +29 nmol/mol |                      | 0.9, +12.6  |
| 23 | Cabral et al 2018  | Influence of irrigation on yield and quality of cv. Touriga Franca in the Douro region | Field Portugal | Grape  | Berry    | Water availability | 3              | -304.7, -101.6 L | Yield | -29.2, -5.9  |
|    |                    |                                                                      |          |          |         | Water availability | 3              | -304.7, -101.6 L | Phenols  | -28.4, -17.9 |

- **Field**: Indicates the type of location (e.g., field, plantation, etc.).
- **USA**: Indicates the country of origin.
- **Grapefruit**, **Apricot**, **Pineapple**: Indicates the type of plant.
- **Citrus**, **Drupe**, **Bromeliad**, **Walnut**, **Nut**, **Peach**, **Berry**: Indicates the type of plant product.
- **Water salinity** indicates the level of salinity in the water used.
- **Yield** indicates the yield values measured.
- **Notes**: Indicates additional information or specific parameters used in the experiments.
| No. | Authors et al., Year | Description | Location | Crop | Water availability | Flavonoids | Yield | Vitamin C | Phenols | Water availability |
|-----|----------------------|-------------|----------|------|--------------------|------------|-------|-----------|---------|-------------------|
| 24  | Calatayud et al, 2006| Interactions between nitrogen fertilization and ozone in watermelon cultivar Reina de Corazones in open-top chambers. Effects on chlorophyll a fluorescence, lipid peroxidation and yield | Field Spain Watermelon Cucurbits O3 | 2 | +54, +77 nl/l | Yield | 16.5, 156.0 | 4 |
| 25  | Centofanti et al, 2017| Deficit irrigation strategies and their impact on yield and nutritional quality of pomegranate fruit | Field USA Pomegranate Pome | 6 | -65, -25 %ETc | Yield | -25.4, +7.6 | 5 |
|     |                      |             |          |      | Water availability |          |       |           |         |                   |
|     |                      |             |          |      | Water availability |          |       |           |         |                   |
|     |                      |             |          |      | Water availability |          |       |           |         |                   |
| 26  | Chandler & Ferree, 1990| Response of 'Raritan' and 'Surecrop' strawberry plants to drought stress | Greenhouse USA Strawberry Berry | 2 | -190 ml | Yield | -25.0, -6.0 | 4 |
| 27  | Chartzoulakis et al, 1999| Water use, growth, yield and fruit quality of 'Bonanza' oranges under different soil water regimes | Field Greece Orange Citrus | 1 | -36 % | Yield | +2.0 | 4 |
| 28  | Chenafi et al, 2016 | Influence of irrigation strategies on productivity, fruit quality and soil-plant water status of subsurface drip-irrigated apple trees | Field Switzerland Apple Pome | 6 | -149, -66 Lm² | Yield | -18.9, +12.4 | 4 |
|     |                      |             |          |      | Water availability |          |       |           |         |                   |
|     |                      |             |          |      | Water availability |          |       |           |         |                   |
|     |                      |             |          |      | Water availability |          |       |           |         |                   |
| No. | Author(s) Year       | Title                                                                 | Location | Species          | Treatment Details                                                                 | Response Variable | Change | Notes |
|-----|----------------------|----------------------------------------------------------------------|----------|------------------|-----------------------------------------------------------------------------------|------------------|--------|-------|
| 29  | Clifford et al 1993  | The effects of elevated atmospheric carbon dioxide and water stress on light interception, dry matter production and yield in stands of groundnut (Arachis hypogaea L.) | Glasshouse UK Peanut Nut | CO₂ | 2 | +350 ppmv | Yield | +25.4, +25.6 | 5 |
| 30  | Clifford et al 2000  | Effects of elevated CO₂, drought and temperature on the water relations and gas exchange of groundnut (Arachis hypogaea) stands grown in controlled environment glasshouses | Glasshouse UK Peanut Nut | CO₂ | 1 | +325 μmol/mol | Yield | +5.1 | 4 |
|     |                      |                                                                      |          |                  | Temperature                                                                       |                  |        |        |
|     |                      |                                                                      |          |                  | +4 °C                                                                             |                  |        |        |
|     |                      |                                                                      |          |                  | CO₂ & temperature                                                                |                  |        |        |
|     |                      |                                                                      |          |                  | +325 μmol/mol & +4 °C                                                            |                  |        |        |
| 31  | Costello & Patterson 2012 | Regulated deficit irrigation effect on yield and wine color of cabernet sauvignon in central California | Field USA Grape Berry | Water availability | 8 | -75, -50 %ETc | Yield | -35.8, +24.3 | 5 |
| 32  | De Rosas et al 2017  | Loss of anthocyanins and modification of the anthocyanin profiles in grape berries of Malbec and Bonarda grown under high temperature conditions | Field Argentina Grape Berry | Temperature | 35 | +2.75 °C | Flavonoids | -71.4, +896.3 | 5 |
| 33  | DeGaris et al 2015   | Impact of deficit irrigation strategies in a saline environment on Shiraz yield, physiology, water use and tissue ion concentration | Field Australia Grape Berry | Water availability | 3 | -155, -48 mm | Yield | -25.7, -6.4 | 4 |
| 34  | Diaz et al 2016      | Water stress versus yield components and quality must (Vitis vinifera L.) cv. Negra Criolla | Field Peru Grape Berry | Water availability | 2 | -10, -5 L/plant | Yield | -13.3, 0.0 | 4 |
|     |                      |                                                                      |          |                  | 2 | +37.6 ppb | Phenols | -4.0, -3.4 |
|     |                      |                                                                      |          |                  | 2 | -10, -5 L/plant | Flavonoids | -16.7, -1.6 |
| 35  | Dos Santos et al 2007 | Effects of deficit irrigation strategies on cluster microclimate for improving fruit composition of Moscatel field-grown grapevines | Field Portugal Grape Berry | Water availability | 2 | -100, -50 %ETc | Yield | -19.8, +0.7 | 4 |
|     |                      |                                                                      |          |                  | 2 | -100, -50 %ETc | Phenols | +3.9, +13.0 |
| 36  | Drogoudi & Ashmore 2002 | Effects of elevated ozone on yield and carbon allocation in strawberry cultivars differing in developmental stage | Field UK Strawberry Berry | O₃ | 1 | +37.6 ppb | Yield | -40.7% | 5 |
|   | Authors | Title                                                                 | Location | Crop | Product | Water availability | Yield | Reference |
|---|---------|----------------------------------------------------------------------|----------|------|---------|---------------------|-------|-----------|
| 37 | Edwards & Clingeleffer 2013 | Interseasonal effects of regulated deficit irrigation on growth, yield, water use, berry composition and wine attributes of Cabernet Sauvignon grapevines | Field, Australia | Grape | Berry | Water availability | 6 | -729, -531 mm | -12.2, -7.9 | 4 |
| 38 | Egea et al 2010 | Agronomic response and water productivity of almond trees under contrasted deficit irrigation regimes | Field, Spain | Almond | Nut | Water availability | 12 | -522, -138 mm | -34.8, -9.7 | 4 |
| 39 | Egea et al 2013 | Almond agronomic response to long-term deficit irrigation applied since orchard establishment | Field, Spain | Almond | Nut | Water availability | 15 | -524, -123 mm | -52.1, -3.9 | 4 |
| 40 | El Jaouhari et al 2018 | Assessment of sustainable deficit irrigation in a Moroccan apple orchard as a climate change adaptation strategy | Field, Morocco | Apple | Pome | Water availability | 6 | -266, -109 Lm² | -21.5, +55.9 | 4 |
| 41 | Galli et al 2016 | Mild salt stress improves strawberry fruit quality | Greenhouse, Brazil | Strawberry | Berry | Water salinity | 2 | +0.3, +0.7 dS/m | -7.6, +4.6 | 4 |
|     |         |                                                                   |          |      |         | Water salinity | 2 | +0.3, +0.7 dS/m | +3.9, +12.6 |   |
|     |         |                                                                   |          |      |         | Water salinity | 2 | +0.3, +0.7 dS/m | +2.8, +13.8 |   |
|     |         |                                                                   |          |      |         | Water salinity | 2 | +0.3, +0.7 dS/m | +23.0, +59.8 |   |
| 42 | García-Sánchez et al 2003 | Effects of salinity and rate of irrigation on yield, fruit quality and mineral composition of 'Fino 49' lemon | Field, Spain | Lemon | Citrus | Water availability | 3 | -25 %ETc | -25.8, +7.3 | 4 |
|     |         |                                                                   |          |      |         | Water salinity | 6 | +1.5, +3 dS/m | -94.2, +5.6 |   |
| 43 | García-Tejero et al 2011 | Long-Term impact of sustained-deficit irrigation on yield and fruit quality in sweet orange cv. Salustiana (SW Spain) | Field, Spain | Orange | Citrus | Water availability | 12 | -50, -25 %ETc | -20.7, +2.2 | 4 |
| 44 | García-Tejero et al 2011 | Benefits of low-frequency irrigation in citrus orchards | Field | Orange | Citrus | Water availability | 3 | -40 %ETc | -30.0, -26.5 | 4 |
| No. | Authors et al. Year | Research Focus | Location | Crop | Nut | Water Availability | Yield |
|-----|---------------------|----------------|----------|------|-----|-------------------|-------|
| 45  | Garrot et al 1993   | Production, growth, and nut quality in pecans under water stress based on the crop water stress index | Field USA | Pecan | Nut | Water availability | Yield |
| 46  | Gehrmann et al 1985 | Growth, yield and fruit quality of strawberries as affected by water supply | Greenhouse Germany | Strawberry | Berry | Water availability | Yield |
| 47  | Gohari et al 2018   | Estimate of peanut production function under irrigated conditions and salinity | Field Iran | Peanut | Nut | Water availability | Yield |
|     |                     |                             |          |      |     | Water Salinity & Water availability |      |
| 48  | Golombek et al 2001 | Effect of separate pod and root zone temperatures on yield and seed composition of three Spanish cultivars of groundnut (Arachis hypogaea L) | Greenhouse India | Peanut | Nut | Temperature | Yield |
| 49  | Gonzalez-Dugo et al 2018 | The impact of deficit irrigation on transpiration and yield of mandarin and late oranges | Field Spain | Orange | Citrus | Water availability | Yield |
| 50  | Hamdam et al 2017   | The effect of partial root drying and regulated deficit irrigation technique on growth of rock melon (Cucumis melo linn cv. Glamour) | Rain shelter Malaysia | Melon | Cucurbits | Water availability | Yield |
| 51  | Han et al 2012      | Effects of elevated carbon dioxide and temperature on photosynthesis and fruit characteristics of 'Nikita' pear (Pyrus pyrifolia Nakai) | Greenhouse Korea | Pear | Pome | CO₂ & Temperature | Yield |
| 52  | Haro et al 2008     | Seed yield determination of peanut crops under water deficit: Soil strength effects on pod set, the source-sink ratio and radiation use efficiency | Field Argentina | Peanut | Nut | Water availability | Yield |
| ID  | Authors                          | Title                                                                 | Location  | Plant      | Water availability | Yield       | Temperature | Vitamin C | Antioxidants | Flavonoids |
|-----|----------------------------------|----------------------------------------------------------------------|-----------|------------|--------------------|-------------|-------------|-----------|-------------|------------|
| 53  | Heryani et al 2016              | Production and quality enhancement of mango using fan jet sprayer irrigation technique | Field     | Indonesia  | Mango              | Drupe       | 3           | -100, -25 %ETc | -0.9, +81.0 | 4          |
| 54  | Intrigliolo et al 2016          | Effects of post-varaison irrigation regime on Cabernet Sauvignon grapevines in Valencia, Spain: Yield and grape composition | Field     | Spain      | Grape             | Berry       | 9           | -75, -25 % Etc | -26.5, +10.1 | 4          |
| 55  | Josuttis et al 2011             | Effects of air and soil temperatures on the chemical composition of fruit and agronomic performance in strawberry (Fragaria X ananassa Duch.) | Greenhouse | Germany    | Strawberry        | Berry       | 1           | +6 °C      | -12.2       | +22.9      |
|     |                                 |                                                                      |           |            |                    |             | 1           | +6 °C      |             |            |
|     |                                 |                                                                      |           |            |                    |             | 1           | +6 °C      |             |            |
| 56  | Junquera et al 2012             | Long-term effects of different irrigation strategies on yield components, vine vigour, and grape composition in cv. Cabernet-Sauvignon (Vitis vinifera L.) | Field     | Spain      | Grape             | Berry       | 10          | -339, -84 mm | -83.5, +25.5 | 4          |
| 57  | Kapur et al 2018                | Irrigation regimes and bio-stimulant application effects on yield and morpho-physiological responses of strawberry | Field     | Turkey     | Strawberry        | Berry       | 2           | -50, -35 %Epan | -36.9, +3.2  | 4          |
| 58  | Keshavarzpour & Rashidi 2011    | Response of crop yield and yield components of cantaloupe to drought stress | Field     | Iran       | Cantaloupe melon  | Cucurbits   | 3           | -60, -20 %  | -40.7, -8.5  | 4          |
| 59  | Kirnak & Dogan 2009             | Effect of seasonal water stress imposed on drip irrigated second crop watermelon grown in semi-arid climatic conditions | Field     | Turkey     | Watermelon        | Cucurbits   | 8           | -100, -25 % | -80.9, -13.9 | 4          |
| 60  | Kirnak et al 2003               | Effects of preharvest drip-irrigation scheduling on strawberry yield, quality and growth | Field     | Turkey     | Strawberry        | Berry       | 8           | -100, -25%ETc | -60, -5      | 4          |
| 61  | Kizildeniz et al 2015           | Effects of climate change including elevated CO2 concentration, temperature and water deficit on growth, water status, and yield quality | Greenhouse | Spain      | Grape             | Berry       | 2           | +300 µmol/mol | -23.3, 5.6   | 4          |
|     |                                 |                                                                      |           |            |                    |             | Temperature | +4 °C      | -19.7, -6.1  |            |
| Study | Year | Location | Species | Treatment | Response | Water Availability | Yield | Notes |
|-------|------|----------|---------|-----------|----------|--------------------|-------|-------|
| 62    | Klein et al 2015 | Field, USA | Almond Nut | CO₂ & Temperature | 2 | +300 µmol/mol & +4 °C | Water availability | -7.0, +2.1 |
|       | Le Miere et al 1998 | Greenhouse, UK | Strawberry Berry | CO₂ & Temperature | 1 | +300 µmol/mol & +4 °C | Flavonoids | +50.8 |
| 64    | Ledesma et al 2008 | Greenhouse, Japan | Strawberry Berry | Temperature | 4 | +7 °C | Yield | -60.0, -29.6 |
| 65    | Lepaja et al 2016 | Field, Kosovo | Pear Pome | Temperature | 4 | -70, -40 %ETc | Yield | -93.8, -57.5 |
| 66    | Leskovar et al 2007 | Field, USA | Watermelon Cucurbits | Temperature | 4 | -50, -25 %ETc | Carotenoids | -9.3, +5.1 |
| 67    | Mabhaudhi et al 2013 | Rain shelter, South Africa | Bamburana groundnut Nut | Water availability | 2 | -70, -40 % | Yield | -93.8, -57.5 |
| 68    | Martinez-Ferri et al 2016 | Greenhouse, Spain | Strawberry Berry | Water availability | 7 | -50 %ETc | Yield | -59.7, -15.0 |
| 69    | Martinez-Luscher et al 2014 | Greenhouse, Spain | Grape Berry | CO₂ & Temperature | 4 | +300 ppm, +4 °C | Carotenoids | -8.2, +6.3 |
| Study ID | Authors | Description | Location | Cultivar | Response Parameters | Environmental Conditions | Yields | 4.3 | 4.3 |
|---------|---------|-------------|----------|----------|---------------------|-------------------------|--------|---|---|
| 70      | Masan et al 2018 | Effects of irrigation and fertigation on yield and quality parameters of 'Gala' and 'Fuji' apple | Field | Slovakia | Apple | Pome | Water availability | 2 | +300 ppm, +4 °C | Flavonoids | -77.4, -6.5 |
| 71      | Mavrogianopoulos et al 1999 | Effect of carbon dioxide enrichment and salinity on photosynthesis and yield in melon | Greenhouse | Greece | Melon | Cucurbits | CO2 | 2 | +400, +800 µmol/mol | Yield | +5.6, 28.3 |
| 72      | Mehdi-Tounsi et al 2017 | Long-term field response of pistachio to irrigation water salinity | Field | Tunisia | Pistachio | Nut | Water Salinity | 12 | +3.1, +10.1 dS/m | Yield | -100.0, +5500.0 |
| 73      | Mena et al 2013 | Sustained deficit irrigation affects the colour and phytochemical characteristics of pomegranate juice | Field | Spain | Pomegranate | Pome | Water availability | 4 | -63, -32 %ETc | Flavonoids | -75.1, +10.3 |
| 74      | Mendlinger et al 1993 | Flowering, vegetative growth, yield, and fruit quality in muskmelons under saline conditions | Field | Israel | Muskmelon | Cucurbits | Water Salinity | 16 | +1.78, +3.66 dS/m | Yield | -24.7, +4.1 |
| 75      | Menzel et al 1995 | Water deficits at anthesis reduce CO2 assimilation and yield of lychee (Litchi chinensis Sonn.) trees | Field | South Africa | Lychee | Drupe | Water availability | 1 | -100 % | Yield | -85.6 |
| 76      | Miras-Avalos et al 2017 | Water versus sink:source relationships in a semiarid Tempranillo vineyard: vine performance and fruit composition | Field | Spain | Grape | Berry | Water availability | 2 | -25 %ETc | Yield | -5.7, -3.9 |
|         |         |             |          |         |        |               | 2 | -25 %ETc | Phenols | +4.5, +6.7 |
|         |         |             |          |         |        |               | 2 | -25 %ETc | Flavonoids | -5.1, +9.1 |
| 77      | Mortley et al 2004 | Temperature influences yield, reproductive growth, harvest index, and oil content of hydroponically grown 'Georgia Red' peanut plants | Growth chamber | USA | Peanut | Nut | Temperature | 3 | +4, +12 °C | Yield | +476.5, +1347.1 |
| ID | Authors et al | Study Title | Location | Species | Trait | Measurement | Change | Unit | Notes |
|----|--------------|-------------|----------|---------|-------|-------------|--------|------|-------|
| 78 | Moutinho-Pereira et al 2009 | Effects of elevated CO2 on grapevine (Vitis vinifera L.): physiological and yield attributes | Field | Portugal | Grape Berry CO2 | 3 | +135 ppm | Yield | +27.2, +50.3 | 5 |
| 79 | Myers et al 1995 | Long term effects of saline irrigation on the yield and growth of mature Williams pear trees | Field | Australia | Pear Pome Water salinity | 41 | +0.5, +1.9 dS/m | Yield | -55.3, +31.0 | 4 |
| 80 | Pedrero et al 2018 | Use of reclaimed wastewater on fruit quality of nectarine in Southern Italy | Field | Italy | Nectarine Citrus Water salinity | 1 | +1 dS/m | Yield | -2.8 | 5 |
| 81 | Perez-Perez et al 2016 | Comparison of deficit and saline irrigation strategies to confront water restriction in lemon trees grown in semi-arid regions | Field | Spain | Lemon Citrus Water availability | 1 | -75 %EtC | Yield | -34.3 | 4 |
| 82 | Perez-Sarmiento et al 2016 | Effects of regulated deficit irrigation on physiology, yield and fruit quality in apricot trees under Mediterranean conditions | Field | Spain | Apricot Drupe Water availability | 1 | -149.6 mm | Yield | -1.69 | 4 |
| 83 | Prasad et al 2003 | Super-optimal temperatures are detrimental to peanut (Arachis hypogaea L.) reproductive processes and yield at both ambient and elevated carbon dioxide | Growth chamber | USA | Peanut Nut CO2 | 1 | +350 µmol/mol | Yield | +21.0 | 4 |
|   |   |   |   |   |   | Temperature | 3 | +4, +12 °C |   |   |
|   |   |   |   |   |   | CO2 & Temperature | 3 | +350 µmol/mol & +4, +12 °C |   |   |
| 84 | Redalen et al 1993 | Fruit and shoot development in apple as affected by temperature, light, humidity and a possible greenhouse effect in simulated latitudes | Greenhouse | Sweden | Apple Pome Temperature | 1 | +2 °C | Vitamin C | -81.9 | 4 |
| 85 | Retzlaff et al 1997 | Growth and yield response of commercial bearing-age 'Casselman' plum trees to various ozone partial pressures | Field | USA | Plum Drupe O3 | 2 | +0.04, +0.045 µPa/Pa | Yield | -57.3, -13.4 | 5 |
| 86 | Roccuzzo et al 2016 | Deficit irrigation for enhancing 'Tarocco' orange fruit quality | Field | Italy | Orange Citrus Water availability | 2 | -50, -30% ETc | Yield | -24.3, -7.0 | 5 |
| Study | Year | Treatment | Water availability | Vitamin C | Flavonoids | Carotenoids | Yield | Source |
|-------|------|-----------|--------------------|-----------|------------|-------------|-------|--------|
| Romero et al 2004 | Effects of regulated deficit irrigation during the pre-harvest period on gas exchange, leaf development and crop yield of mature almond trees | Field | Spain | Almond | Nut | Water availability | 2 | -50, -30% ETc | +4.7, +6.0 |
| Sadras & Moran 2013 | Asymmetric warming effect on the yield and source:sink ratio of field-grown grapevine | Field | Australia | Grape | Berry | Temperature | 2 | +1.6 °C | -16.9, +104 |
| Selahvarzi et al 2017 | Effect of deficit irrigation on flowering and fruit properties of pomegranate (Punica granatum cv. Shahvar) | Field | Iran | Pomegranate | Pome | Water availability | 2 | -50 %ETc | -52.1, -36.1 |
| Sharma et al 2014 | Root growth, yield and fruit quality responses of reticulatus and inodurus melons (Cucumis melo L.) to deficit subsurface drip irrigation | Field | USA | Melon | Cucurbits | Water availability | 6 | -50 %ETc | -42.9, -12.3 |
| Sharma et al 2016 | Differential response of muskmelon (Cucumis melo L.) cultivars to deficit irrigation | Field | USA | Melon | Cucurbits | Water availability | 6 | -50 %ETc | -43.3, -16.6 |
| Silvestre et al 2012 | Influence of timing and intensity of deficit irrigation on vine vigour, yield and berry and wine composition of 'Tempranillo' in S. Portugal | Field | Portugal | Grape | Berry | Water availability | 6 | -130, -10 mm | -20.4, +7.7 |
| ID | Authors          | Experiment Description                                                                 | Location | Plant Type   | Product Type | Water Availability | CO₂ Enrichment | Yield Effect | Comments |
|----|------------------|---------------------------------------------------------------------------------------|----------|--------------|--------------|-------------------|----------------|--------------|----------|
| 93 | Sofo et al 2012  | Berry morphology and composition in irrigated and non-irrigated grapevine (Vitis vinifera L.) | Field    | Italy        | Grape        | Yield            | -100 %ETc      | -33.3        | 4        |
| 94 | Spreer et al 2009| Yield and fruit development in mango (Mangifera indica L. cv. Chok Anan) under different irrigation regimes | Field    | Thailand     | Mango        | Water availability | -100 %ETc | 28.3         | 4        |
| 95 | Stagno et al 2015| Response of orange trees to deficit irrigation strategies: Effects on plant nutrition, yield and fruit quality | Field    | Italy        | Orange       | Water availability | -50, -30 %ETc | -49.1, +10.6 | 4        |
| 96 | Stanciel et al 2000| Growth, pod, and seed yield, and gas exchange of hydroponically grown peanut in response to CO2 enrichment | Growth chamber | USA | Peanut | Nut | CO₂ | +400, +800 µmol/mol | +55.9, +61.9 | 4        |
| 97 | Sun et al 2012   | Effects of elevated CO2 and temperature on yield and fruit quality of Strawberry (Fragaria ananassa Duch.) at 2 levels of nitrogen application | Greenhouse | China | Strawberry | Berry | CO₂ | +360 ppm | +133.4 | 4        |
|     |                  |                                                                                       |          |              |              |                  |                |              |          |
|     |                  |                                                                                       |          |              |              |                  |                |              |          |
|     |                  |                                                                                       |          |              |              |                  |                |              |          |
| 98 | Sung & Chen 1991 | Gas exchange rate and yield response of strawberry to carbon dioxide enrichment       | Greenhouse | Taiwan | Strawberry | Berry | CO₂ | +660 µmol/mol | +43.4 | 4        |
| 99 | Tarricone et al 2017| Berry morphology and composition in irrigated and non-irrigated grapevine (Vitis vinifera L.) | Field    | Italy        | Grape        | Water availability | -20 %ETc      | -6.6        | 4        |
| Study | Title                                                                 | Location | Treatment | Parameter 1          | Parameter 2                   | Change | Context |
|-------|----------------------------------------------------------------------|----------|-----------|----------------------|-------------------------------|--------|---------|
| 100   | Terry et al 2007 Effect of water deficit irrigation and inoculation with Botrytis cinerea on strawberry (Fragaria x ananassa) fruit quality | Greenhouse UK Strawberry Berry | Water availability | -20 %ETc | Phenols | +13.2 |         |
|       |                                                                      |          |           | 2                    | -20 %ETc                      |        |         |
| 101   | Tripathi et al 2013 Interactive effect of supplemental ultraviolet B and elevated ozone on seed yield and oil quality of two cultivars of linseed (Linum usitatissimum L.) carried out in open top chambers | Open top chamber India Linseed Seed | Water availability | -20 %ETc | Antioxidants | +1.5, +12.0 |         |
|       |                                                                      |          |           | 2                    | -150, -100 ml/day             |        |         |
| 102   | Yang et al 2018 Fruit yield and quality response of Newhall navel orange to different irrigation regimes and ground cover in Chongqing Three Gorges Reservoir area | Field China Orange Citrus | Water availability | -20 %ETc | Yield | +31.3, +56.3 |         |
|       |                                                                      |          |           | 2                    | -50, -110 %ETc                |        |         |
| 103   | Zhang et al 2017 Biophysical response of young pomegranate trees to surface, subsurface and drip irrigation and deficit irrigation | Field USA Pomegranate Pome | Water availability | -20 %ETc | Yield | +13.8, +17.8 |         |
|       |                                                                      |          |           | 2                    | -65, -25 %                     |        |         |
| 104   | Zhou et al 2017 Peach yield and fruit quality is maintained under mild deficit irrigation in semi-arid China | Field China Peach Drupe | Water availability | -20 %ETc | Yield | -42.5, +0.4 |         |
|       |                                                                      |          |           | 2                    | -75, -25 %ETc                 |        |         |
| 105   | Zong et al 2011 Effect of different irrigation water salinities on some yield and quality components of two field-grown Cucurbit species | Field China Melon Cucurbits Watermelons | Water salinity | -20 %ETc | Vitamin C | +3.2, +22.5 |         |
|       |                                                                      |          |           | 2                    | +1.24, +4.95 dS/m             |        |         |
|       |                                                                      |          |           | 2                    | +1.24, +4.95 dS/m             |        |         |