

CROPBOOSTER-P SURVEY

PLEASE NOTE: Data collected until 15.09 2019 will be used in the primary analysis. However, the survey will remain active after 15.09 2019. Data collected after this may be used for supplementary analysis, you are welcome to add entries after this period. The updated entries will be made available periodically on the database update folder.

* Required

CROPBOOSTER-P SURVEY

Partners Information- This section is for INTERNAL USE only, to make certain all partners (and consequently, fields of expertise) are represented in the data collection.

1. Name *

2. Affiliation *

Description of entry- general survey

(This section is common to all 3 subtasks, and forms a common information base for the data collected. Subsequent sections will be specific to the respective subtask you choose.)

3. Is this entry documenting a review? *

Mark only one oval.

☐

Yes

After the last question in this section, stop filling out this form.

☐

No

4. Title of publication *

5. Author List *

Recommended format: Doe J., Taylor E., etc

6. Year of publication *

7. Abstract / Summary *

8. Bibliographic reference/ PMID/ DOI/ Other identifiers *

Please use other identifiers (such as URLs) only in cases where no standard identifiers are available.

9. Gene/ Protein /QTL involved *

Provide standard accession numbers/ identifiers.
You can enter multiple genes separated by (;). For reviews with multiple genes of varying degrees of priority, this question may be skipped.

10. Biological pathway (eg. Photosynthesis)

11. Technologies and Methods

Select the technologies and methods that are relevant and have been utilized in the study of this gene/ trait. If you would like to add a physiological trait without/ with yet unknown genetic basis please select not known/ not yet identified. Include a description in the relevance to CropBooster descriptive answer for ranking / qualification purposes.

Check all that apply.

- ☐ Conventional Breeding
- ☐ Conventional GMO
- ☐ Epimutation
- ☐ Gene Editing
- ☐ GWAS
- ☐ MAS
- ☐ Metabolic design
- ☐ Modelling
- ☐ Mutagenesis
- ☐ Mutant Populations
- ☐ Phenotyping
- ☐ Plastid transformation
- ☐ Populations/Mapping, Magic, Diversity Sets
- ☐ Speed Breeding
- ☐ Synthetic Biology
- ☐ Tagged populations
- ☐ TILLING
- ☐ Transposon mobilisation
- ☐ Other
- ☐ Not known/ not yet identified

12. If other, specify

13. Crop category / group *

Check all that apply.

- ☐ Algae
- ☐ Fibres/ Lignocellulose
- ☐ Forage grasses
- ☐ Grain staples
- ☐ Model Plants
- ☐ N2 fixers
- ☐ Oilseed
- ☐ Root staples
- ☐ Vegetables / fruits
- ☐ Other: _____

14. If other, specify

15. Species *

Species marked with asterisk (*) are of particular relevance to this survey. Other species may also be selected, but only in the case that gene/ trait under consideration is not studied in the asterisked species.

Mark only one oval.

- ☐ Arabidopsis*
- ☐ Alfafa*
- ☐ Barley
- ☐ Brassicas
- ☐ Carrot
- ☐ Citrus
- ☐ Clover
- ☐ Douglas
- ☐ Durum wheat
- ☐ Eucalyptus
- ☐ Field bean
- ☐ Grape*
- ☐ Sunflower*
- ☐ Hemp
- ☐ Laminaria*
- ☐ Lettuce*
- ☐ Lupin
- ☐ Maize*
- ☐ Millet
- ☐ Miscanthus*
- ☐ Oat
- ☐ Olive
- ☐ Onion
- ☐ Parsnip
- ☐ Pea*
- ☐ Pome*
- ☐ Poplar*
- ☐ Porphyra*
- ☐ Potato*
- ☐ Rapeseed*
- ☐ Raspberry
- ☐ Rice
- ☐ Ryegrass*
- ☐ Saccharina spp.
- ☐ Sitka
- ☐ Soybean*
- ☐ Sorghum
- ☐ Spinach
- ☐ Spruce
- ☐ Strawberry
- ☐ Sugarcane
- ☐ Sugarbeet*
- ☐ Tomato*
- ☐ Switchgrass
- ☐ Ulva*
- ☐ Wheat*
- ☐ Tobacco*
- ☐ Willow
- ☐ Other

16. If other, specify

17. Scale/ geographical region

Mention the regions the species is cultivated in. (This is relevant for the final report and analysis)
Check all that apply.

- ☐ Mediterranean
- ☐ Humid subtropical
- ☐ Marine
- ☐ Humid continental
- ☐ Subarctic/ Tundra
- ☐ Highland
- ☐ Oceanic
- ☐ Other / do not know/ multiple regions

18. If other/ multiple regions specify

19. Orthologues in other species

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ Other:

20. If yes, specify

21. Bibliographic references for orthologues (PMID/ DOI/ Other identifiers)

22. Transferability potential/ existing examples of transferability?

Mark only one oval.

- ☐ Yes
- ☐ No
- ☐ Other:

23. If yes, specify

24. Bibliographic references for examples of transferability (PMID/ DOI/ Other identifiers)

25. Subtask **Mark only one oval.*

- ☐ Yield *After the last question in this section, skip to question 103.*
- ☐ Nutritional quality *After the last question in this section, skip to question 30.*
- ☐ Sustainability *After the last question in this section, skip to question 149.*

26. Relevance to subtask *

How does this example fit into the subtask (yield, nutrition or sustainability)? Short description for qualification purposes.

27. Does this gene/ trait involve or affect other subtasks? If yes, state which one(s): **Check all that apply.*

- ☐ Yield
- ☐ Nutrition
- ☐ Sustainability
- ☐ No, it does not

28. If yes, how?

29. GENERAL COMMENTS

Please include any comments that might be relevant to this entry. If documenting a review, please emphasise the pathways reviewed , relevance to cropBooster-P

Subtrait Nutrient Quality

30. Nutrient Class **Mark only one oval.*

- ☐ Protein *Skip to question 31.*
- ☐ Carbohydrate *Skip to question 39.*
- ☐ Oils and fats *Skip to question 46.*
- ☐ Minerals *Skip to question 65.*
- ☐ Vitamins *Skip to question 72.*
- ☐ Specialized metabolites *Skip to question 55.*
- ☐ Antinutrients *Skip to question 83.*
- ☐ Toxic compounds *Skip to question 90.*
- ☐ Fibre/feedstock *Skip to question 97.*

Protein

31. Protein Category **Check all that apply.*

- ☐ Amino acids
- ☐ Peptides
- ☐ Enzymes
- ☐ Storage proteins- gliadines/ glutenines
- ☐ Storage proteins- general
- ☐ Other

32. If other, specify

33. Type of amino acid

Check all that apply.

- ☐ Isoleucine
- ☐ Leucine
- ☐ Lysine
- ☐ Methionine
- ☐ Phenylalanine
- ☐ Threonine
- ☐ Valine
- ☐ Arginine
- ☐ Tryptophan

If other, specify

34. Factors affecting nutritional quality *

Please select the nutritional quality factors affected/ modified by the current entry

Check all that apply.

- ☐ Sulfur deficiency
- ☐ Nitrogen deficiency
- ☐ Digestibility
- ☐ Heat stress
- ☐ Drought stress
- ☐ Fermentation properties
- ☐ None of the above/other factors/don't know, can't say





35. If other, specify

36. Comments

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1

Scenario 1	Scenario 2	Scenario 3	Scenario 4
 <p>Innovation solutions are intensively used, providing steady and high-quality food in a sustainable way as well as large volumes of feedstock for a thriving bioeconomy.</p>	 <p>Health and sustainability concerns drive agriculture and food businesses towards being diverse and transparent, meeting the needs and preferences of individuals.</p>	 <p>Due to severe environmental degradation, the EU is struggling to fulfill basic food demand. In response to the crisis, the EU has seen the introduction of a large-scale and technology-driven agricultural system to mitigate the most dire consequences.</p>	 <p>Consumers have little trust in politicians, scientists and big industry. Society is highly polarized and rejects new food-related technologies – despite the dissatisfaction with the current state of affairs (like limited food choice and high prices).</p>

37. Under which scenarios would this entry have special relevance?*Check all that apply.*

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

38. Comments to the scenarios

*Stop filling out this form.***Carbohydrate****39. Carbohydrates ****Check all that apply.*

- ☐ Sugars
- ☐ Oligosaccharides
- ☐ Polysaccharides

40. Type of nutrient **Check all that apply.*

- ☐ Monosaccharides
- ☐ Disaccharide
- ☐ Polyols
- ☐ Starch
- ☐ Non- starch polysaccharides
- ☐ Non- starch glycogen
- ☐ Other: _____

41. Factors affecting nutritional quality *

Please select the nutritional quality factors affected/ modified by the current entry

Check all that apply.

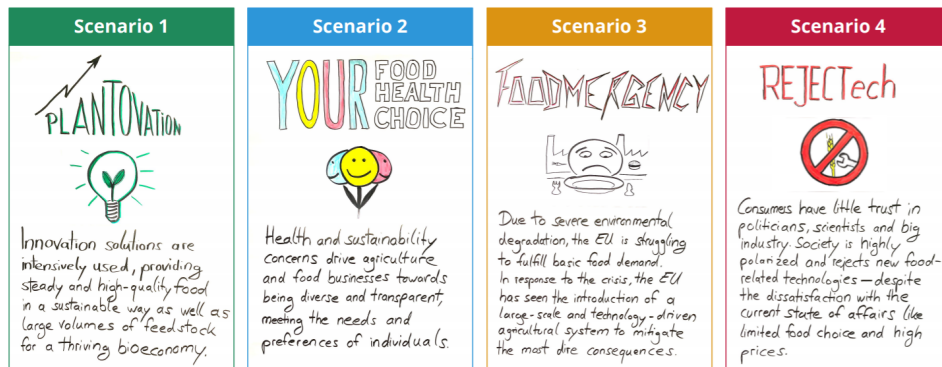
- ☐ Stress - UV radiation
- ☐ Stress - light intensity and photoperiod
- ☐ Stress - Water high or low
- ☐ Stress - heat
- ☐ Stress - high nitrogen
- ☐ Genetic variation
- ☐ Genes affecting biosynthesis/regulation/transport/
- ☐ Metabolism
- ☐ Biomass allocation
- ☐ Sulfur deficiency
- ☐ Nitrogen deficiency
- ☐ Digestibility
- ☐ Fermentation properties
- ☐ Stress - other
- ☐ None of the above/other factors/don't know, can't say

42. If other, specify

43. Comments

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1

44. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

45. Comments to the scenarios

Stop filling out this form.

Oils and Fats

46. Type *

Check all that apply.

- ☐ Sterols
- ☐ Saturated fatty acids
- ☐ Unsaturated fatty acids
- ☐ Long chain polyunsaturated fatty acids
- ☐ Monohydroxy fatty acid derivatives
- ☐ Crude extract
- ☐ Other

47. If other, specify

48. Fatty Acid type*Check all that apply.*

- ☐ Myristic
- ☐ Palmitic
- ☐ Stearic
- ☐ Oleic
- ☐ Linoleic
- ☐ α linoleic
- ☐ Other

49. If other, specify

50. Factors affecting nutritional quality *

Please select the nutritional quality factors affected/ modified by the current entry
Check all that apply.

- ☐ Structural characteristics - Stability - heat
- ☐ Structural characteristics- Stability - light
- ☐ Structural characteristics Stability - humidity
- ☐ Molecular characteristics - Antioxidant capacity
- ☐ Accumulation - storage root
- ☐ Accumulation - seed
- ☐ Accumulation - shoot system
- ☐ Accumulation - root system
- ☐ None of the above/other factors/don't know, can't say





51. If other, specify

52. Comments

Application to Scenarios (WP 1.1)

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53. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

54. Comments to the scenarios

Stop filling out this form.

Specialized metabolites

55. Secondary metabolites-

plant based compounds that play a potentially nutritive role / in the prevention and treatment of disease

Check all that apply.

- ☐ Organic acids
- ☐ Bioactive compounds
- ☐ terpenoids
- ☐ glucosinolates
- ☐ phenolics

56. If other, specify

57. Low molecular weight antioxidant

Check all that apply.

- ☐ glutathione
- ☐ ascorbate
- ☐ Other: _____

58. If other, specify

59. Comments to entry

60. Factors affecting nutritional quality

Please select the nutritional quality factors affected/ modified by the current entry
Check all that apply.

- ☐ Stress - UV radiation
- ☐ Stress - light intensity and photoperiod
- ☐ Stress - flood
- ☐ Stress - drought
- ☐ Stress - heavy metal
- ☐ Stress - high nitrogen
- ☐ Biostimulants
- ☐ Microbes in rhizosphere
- ☐ intra/inter-species variation
- ☐ Genes affecting biosynthesis/regulation
- ☐ None of the above/other factors/don't know, can't say





61. If other, specify

62. Comments to entry

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

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63. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

64. Comments to the scenarios

Stop filling out this form.

Minerals

65. Macronutrient

Check all that apply.

- ☐ Nitrogen
- ☐ Phosphorous
- ☐ Potassium
- ☐ Calcium
- ☐ Sulfur
- ☐ Magnesium

66. Micronutrient

Check all that apply.

- ☐ Iron
- ☐ Chloride
- ☐ Potassium
- ☐ Manganese
- ☐ Zinc
- ☐ Iodine
- ☐ Selenium

67. Factors affecting nutritional quality *

Please select the nutritional quality factors affected/ modified by the current entry
Check all that apply.

- ☐ Stress- heat
- ☐ Stress-cold
- ☐ Stress- high humidity
- ☐ Stress- flood
- ☐ Stress- drought
- ☐ Stress-salinity
- ☐ Stress-toxicity
- ☐ Stress-other
- ☐ Stress- nutrient overload
- ☐ Stress- Nutrient deficiency
- ☐ Stress- soil toxins
- ☐ Stress- soil composition
- ☐ Stress- pH
- ☐ Fertilizer- form
- ☐ Fertilizer-quality
- ☐ Biostimulants
- ☐ Geographical factors
- ☐ Bioavailability
- ☐ Microbes- in rhizosphere
- ☐ Microbes-fertilizer use efficiency- nitrogen fixation
- ☐ Sulphur nutrition
- ☐ Pathogen toxins
- ☐ Intra species cultivar- specific variation
- ☐ Uptake and allocation to edible organs
- ☐ Membrane transporters
- ☐ Efflux proteins
- ☐ Organic molecule synthesis
- ☐ Stress- transposable elements
- ☐ None of the above/other factors/don't know, can't say

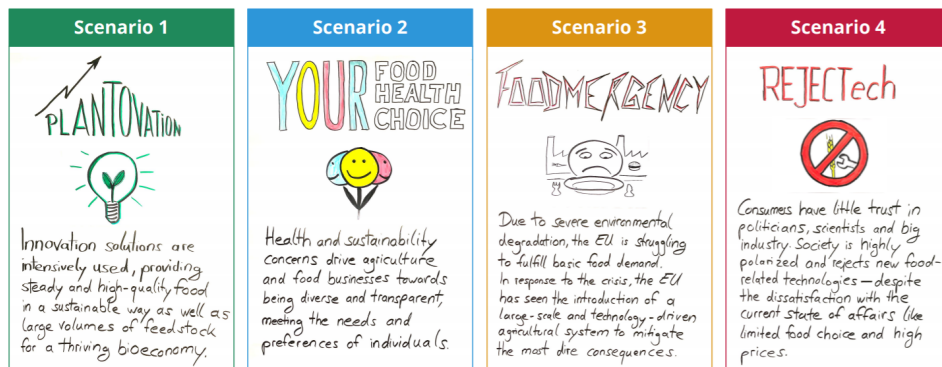
68. If other, specify

69. Comments to entry

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1



70. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

71. Comments to the scenarios

Stop filling out this form.

Vitamins

72. Vitamin A

Check all that apply.

- ☐ α -Carotene
- ☐ β -Carotene
- ☐ β -Cryptoxanthin

73. Vitamin B

Check all that apply.

- ☐ Thiamine
- ☐ Riboflavin
- ☐ Niacin
- ☐ Pantothenic acid
- ☐ Pyridoxal
- ☐ Biotin
- ☐ Folate
- ☐ Cobalamin

74. Vitamin C

Check all that apply.

- ☐ Ascorbate

75. Vitamin E

Check all that apply.

- ☐ Tocopherols
- ☐ Tocotrienols

76. Vitamin K*Check all that apply.*☐ Phylloquinone**77. If other, specify**

78. Factors affecting nutritional quality

Please select the nutritional quality factors affected/ modified by the current entry

Check all that apply.

- ☐ Antioxidant potential
- ☐ Enzymatic cofactor
- ☐ Redox chemistry
- ☐ Enzyme protection
- ☐ Enzyme precursor
- ☐ Biosynthesis of enzymes
- ☐ Root uptake
- ☐ Membrane transporters
- ☐ Nitrogen fertilizers
- ☐ Oxidative stress
- ☐ Component of biological pathway
- ☐ Application of polyamines
- ☐ Stress-temperature
- ☐ Stress-other
- ☐ Pathogen toxins
- ☐ Bioavailability
- ☐ Digestability
- ☐ None of the above/other factors/don't know, can't say





79. If other, specify

80. Comments to entry

Application to Scenarios (WP 1.1)

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81. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

82. Comments to the scenarios

Stop filling out this form.

Antinutrients

83. Category *

Check all that apply.

- ☐ Proteinaceous antinutrients
- ☐ Non proteinaceous antinutrients

84. Types *

Check all that apply.

- ☐ Protease inhibitors
- ☐ Amylase inhibitors
- ☐ Lipase inhibitors
- ☐ Lectins
- ☐ Ribosome Inactivating Proteins
- ☐ Phytate
- ☐ Oxalates
- ☐ Phenolics (tannins, gossypol, other phenolics)
- ☐ Glucosinolates
- ☐ Dietary fibre

85. Factors affecting nutritional quality *

Please select the nutritional quality factors affected/ modified by the current entry
Check all that apply.

- ☐ Intra-species variation
- ☐ Inter-species variation
- ☐ Genes affecting biosynthesis
- ☐ Genes affecting regulation
- ☐ Exogenous factors affecting synthesis and stability
- ☐ Genes affecting biosynthesis/regulation
- ☐ Genes affecting transport/metabolism
- ☐ Transport/competition with mineral nutrients
- ☐ Enzyme inhibitors
- ☐ None of the above/other factors/don't know, can't say





86. If other, specify

87. Comments to entry

Application to Scenarios (WP 1.1)

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88. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

89. Comments to the scenarios

Stop filling out this form.

Toxic compounds**90. toxic compounds**

Check all that apply.

- ☐ Elements
- ☐ Metabolites

91. Type

Check all that apply.

- ☐ Nitrate
- ☐ Heavy metals- Arsenic
- ☐ Heavy metals-Lead
- ☐ Heavy metals- Cadmium
- ☐ Cyanogenic glycosides
- ☐ Saponins
- ☐ Alkaloids
- ☐ Coumarins

92. Factors affecting nutritional quality *

Please select the nutritional quality factors affected/ modified by the current entry

Check all that apply.

- ☐ Intra-species variation
- ☐ Inter-species variation
- ☐ Genes affecting biosynthesis
- ☐ Genes affecting regulation
- ☐ Exogenous factors affecting synthesis and stability
- ☐ Genes affecting biosynthesis/regulation
- ☐ Genes affecting transport/metabolism
- ☐ Transport/competition with mineral nutrients
- ☐ Enzyme inhibitors
- ☐ None of the above/other factors/don't know, can't say

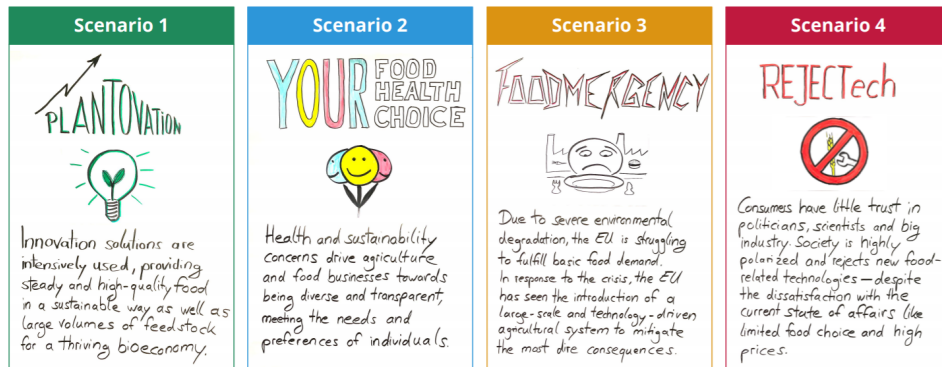
93. If other, specify

94. Comments to entry

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1



95. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

96. Comments to the scenarios

Stop filling out this form.

Fibre/ feedstock

97. Type *

Check all that apply.

- ☐ Ethanol content
- ☐ Digestibility
- ☐ Lignin content
- ☐ Lipid content
- ☐ Fatty acid content
- ☐ Fatty acid composition
- ☐ Alkyl ester content
- ☐ Butanol content
- ☐ Nutrient use efficiency (s)
- ☐ Water use efficiency (s)
- ☐ Acid detergent fibre
- ☐ Neutral detergent fibre
- ☐ Total dietary fiber

98. Factors affecting nutritional quality *

Please select the nutritional quality factors affected/ modified by the current entry
Check all that apply.

- ☐ Soluble/insoluble ratio
- ☐ Polymeric structure
- ☐ Protein content
- ☐ None of the above/other factors/don't know, can't say





99. If other, specify

100. Comments to entry

Application to Scenarios (WP 1.1)

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101. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

102. Comments to the scenarios

Stop filling out this form.

Subtrait Yield

103. Class *

Mark only one oval.

- ☐ Photosynthesis - photochemistry and biochemistry *Skip to question 104.*
- ☐ Uptake and spatial management of resources *Skip to question 114.*
- ☐ Sink/source activity *Skip to question 126.*
- ☐ Plant growth, architecture and phenology *Skip to question 134.*

Photochemistry and Biochemistry

Select relevant subtrait. Choose ONE option from the drop- down columns below that fits gene/ trait best.

104. Photochemistry

Check all that apply.

- ☐ Light harvesting
- ☐ Light capture optimisation
- ☐ Pigment composition
- ☐ Light use efficiency (electron transport)
- ☐ Other

105. If other, specify

106. Biochemistry – Carbon assimilation

Check all that apply.

- ☐ Stomatal aperture
- ☐ Rubisco and other Calvin cycle enzymes
- ☐ Photosynthetic limitations (cofactor, TPU)
- ☐ Chloroplast - cytosol transporters
- ☐ Sucrose - starch balance
- ☐ Photorespiration
- ☐ Dark (mitochondrial) respiration
- ☐ Photosynthetic pathway (C4, C3, CAM, C3-C4 intermediary)
- ☐ Sugar pathways
- ☐ Photoacclimation
- ☐ Photosynthetic induction
- ☐ Other

107. If other, specify

108. Biochemistry - Photoprotection

Check all that apply.

- ☐ NPQ
- ☐ Mehler reaction
- ☐ Repair pathways (Oxidative stress)
- ☐ Photosynthetic by-products
- ☐ Protective molecules
- ☐ Sugars and osmolytes
- ☐ Photosynthetic antioxidants
- ☐ Other

109. If other, specify

110. Factors affecting yield

Please select the yield factors affected/ modified by the current entry
Check all that apply.





- ☐ Stress - Nutrient deficiency
- ☐ Stress - Nutrient overload/form/quality
- ☐ Stress - Drought
- ☐ Stress - Flood
- ☐ Stress - Heavy metals
- ☐ Stress - Salinity
- ☐ Stress - Heat
- ☐ Stress - Cold/frost
- ☐ Stress - pH
- ☐ Stress - O₃, UV, oxidative
- ☐ Stress - Light
- ☐ Stress - Photoperiod
- ☐ Stress - Physical constraints (soil compaction, hail, wind, sun...)
- ☐ Stress - High humidity
- ☐ Stress - Soil composition
- ☐ Stress - Bio-stimulants
- ☐ Stress - Microbes in the rhizosphere
- ☐ Stress - Toxicity
- ☐ Stress - Soil toxins
- ☐ Geographical factors
- ☐ None of the above/other factors/don't know, can't say

111. If other, specify

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1

Scenario 1	Scenario 2	Scenario 3	Scenario 4
 <p>Innovation solutions are intensively used, providing steady and high-quality food in a sustainable way as well as large volumes of feedstock for a thriving bioeconomy.</p>	 <p>Health and sustainability concerns drive agriculture and food businesses towards being diverse and transparent, meeting the needs and preferences of individuals.</p>	 <p>Due to severe environmental degradation, the EU is struggling to fulfill basic food demand. In response to the crisis, the EU has seen the introduction of a large-scale and technology-driven agricultural system to mitigate the most dire consequences.</p>	 <p>Consumers have little trust in politicians, scientists and big industry. Society is highly polarized and rejects new food-related technologies — despite the dissatisfaction with the current state of affairs (like limited food choice and high prices).</p>

112. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

113. Comments to the scenarios

Stop filling out this form.

Uptake and spatial management of resources

Select relevant subtrait:

114. Water and Nutrient uptake/assimilation vs use

Check all that apply.

- ☐ Water and Nutrients uptake (transporter channel regulators...)
- ☐ Other: _____

115. If other, specify

116. Primary and secondary metabolism

Check all that apply.

- ☐ Osmolites
- ☐ Proteins
- ☐ Metabolic compounds accumulation
- ☐ Other: _____

117. If other, specify

118. Nutrient use efficiency (NutUE)

Check all that apply.

- ☐ Local Water and Nutrients transport (root, stem and leaf tissues)
- ☐ Long distance Water and Nutrients transport (xylem)
- ☐ Nutrient metabolism
- ☐ Nutrient partitioning
- ☐ Nutrient storage
- ☐ Nutrients recycling
- ☐ Alternative metabolic pathways
- ☐ Ion homeostasis
- ☐ Other

119. If other, specify

120. Heavy metals and salt

Check all that apply.

- ☐ Uptake (transporter channel regulators...)
- ☐ Local and long distance transport metabolism
- ☐ partitioning
- ☐ storage
- ☐ Alternative metabolic pathways
- ☐ Ion homeostasis
- ☐ Other: _____

121. If other, specify

122. Factors affecting yield

Please select the yield factors affected/ modified by the current entry
Check all that apply.

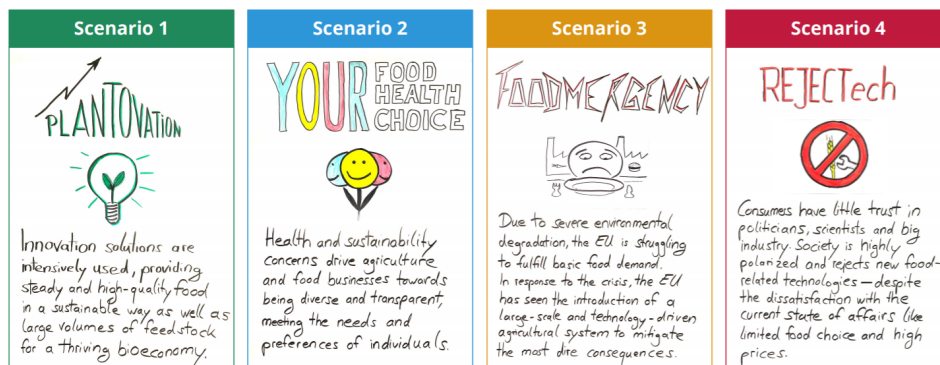
- ☐ Stress - Heat
- ☐ Stress - Cold
- ☐ Stress - High humidity
- ☐ Stress - Flood
- ☐ Stress - Drought
- ☐ Stress - Salinity
- ☐ Stress - Toxicity
- ☐ Stress - Nutrient overload
- ☐ Stress - Nutrient deficiency
- ☐ Stress - Soil toxins
- ☐ Stress - Soil composition
- ☐ Stress - pH
- ☐ Geographical factors
- ☐ None of the above/other factors/don't know, can't say

123. If other, specify

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1



124. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

125. Comments to the scenarios

Stop filling out this form.

Sink/ source activity

Select relevant subtrait:

126. Nutrient metabolism, transport, remobilization and partitioning

Check all that apply.

- ☐ Sucrose metabolism (source)
- ☐ Nutrient metabolism (source)
- ☐ Water and nutrients storage
- ☐ Storage compound metabolism (source)
- ☐ Carbon transfer
- ☐ Nutrient transfer
- ☐ Coordination of C and Nutrient assimilation
- ☐ Other micronutrients
- ☐ Other

127. If other, specify

128. Source sink balance

Check all that apply.

- ☐ Sink to source feedback
- ☐ Source to sink feedforward
- ☐ Senescence of source organs
- ☐ Sink/grain development
- ☐ Seed filling
- ☐ Senescence of sink organs
- ☐ Other

129. If other, specify

130. Factors affecting yield

Please select the yield factors affected/ modified by the current entry

Check all that apply.

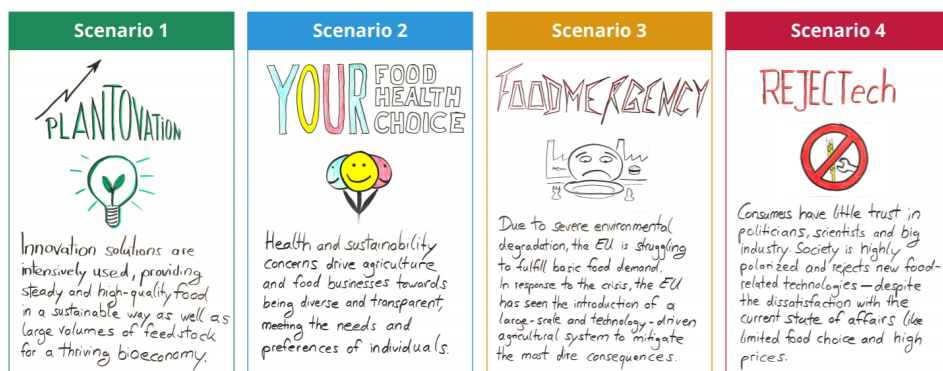
- ☐ Stress - Heat
- ☐ Stress - Cold
- ☐ Stress - High humidity
- ☐ Stress - Flood
- ☐ Stress - Drought
- ☐ Stress - Salinity
- ☐ Stress - Toxicity
- ☐ Stress - Nutrient overload
- ☐ Stress - Nutrient deficiency
- ☐ Stress - Soil toxins
- ☐ Stress - Soil composition
- ☐ Stress - pH
- ☐ Geographical factors
- ☐ None of the above/other factors/don't know, can't say

131. If other, specify

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1



132. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

133. Comments to the scenarios

Stop filling out this form.

Plant growth, architecture and phenology

134. Shoot architecture anatomy and canopy profile

Check all that apply.

- ☐ Phyllotaxy
- ☐ Self - shading
- ☐ Compactness
- ☐ Stem anatomy and composition
- ☐ Shoot and canopy hydraulics
- ☐ Vascular tissues anatomy (density, structure) and functioning
- ☐ Profile of photosynthetic resources
- ☐ Leaf angle (erectness)
- ☐ Leaf morphology/shape
- ☐ Organ length/width/strength
- ☐ Wound healing
- ☐ Other

135. If other, specify

136. Leaf anatomy and activity*Check all that apply.*

- ☐ Cuticular thickness
- ☐ Wax/cutin ratio and content
- ☐ Stomatal properties (morphology, densities, distribution, location and resistance)
- ☐ Mesophyll thickness
- ☐ Mesophyll conductance
- ☐ Mesophyll resistance
- ☐ Mesophyll structure
- ☐ CAM/C3/C4 intermediary structure
- ☐ Vascular tissues anatomy (density, structure) and functioning
- ☐ Leaf hydraulics
- ☐ Stomatal aperture and functioning regulation
- ☐ Organelle properties (density, positioning and movement)
- ☐ Cellular subcellular and Ultrastructural adaptations
- ☐ Wound healing
- ☐ Other

137. If other, specify

138. Growth rate*Check all that apply.*

- ☐ Meristem activity
- ☐ Cell division
- ☐ Growth mechanics
- ☐ Cell expansion
- ☐ Cell wall composition
- ☐ Cell turgor
- ☐ Other

139. If other, specify

140. Root architecture, anatomy and activity*Check all that apply.*

- ☐ Root length
- ☐ Root number (lateral, seminal, adventitious)
- ☐ Root growth angle
- ☐ Root density
- ☐ Root plasticity
- ☐ Root competition ability
- ☐ Root hydraulics
- ☐ Cell layer number
- ☐ Cells layers structure
- ☐ Aerenchyma (PCD)
- ☐ Cell division/elongation
- ☐ Cell wall composition
- ☐ Lignification, Suberisation
- ☐ Cellular subcellular and Ultrastructural adaptations
- ☐ Wound healing
- ☐ Storage capacity
- ☐ Respiration
- ☐ Exudation
- ☐ Other

141. If other, specify

142. Root/shoot coordination*Check all that apply.*

- ☐ Root/shoot ratio
- ☐ Root/shoot transport and signalling
- ☐ Other

143. If other, specify

144. Phenology*Check all that apply.*

- ☐ Reproductive switch
- ☐ Flower development/abortion
- ☐ Flowering time
- ☐ Flower number
- ☐ Fertilization and seed set efficiency
- ☐ Seed number/abortion
- ☐ Seed filling rate
- ☐ Inflorescence plasticity
- ☐ Early vigour
- ☐ Ageing/senescence/juvenility
- ☐ Plastid/chloroplast lifetime
- ☐ Stay-green
- ☐ Other

145. If other, specify

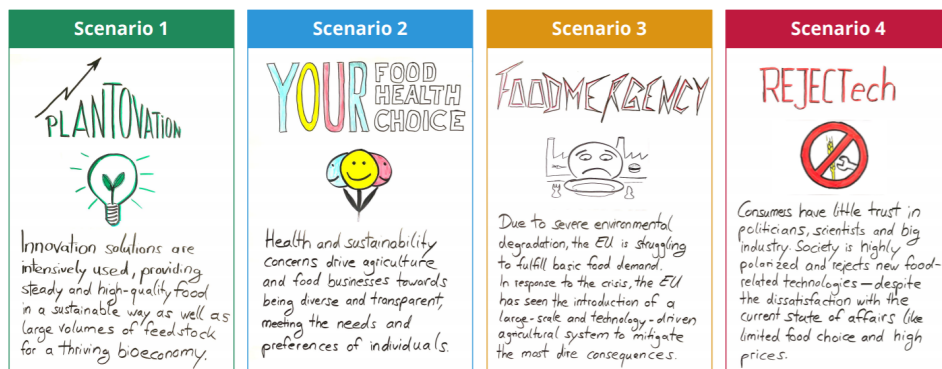
146. Factors affecting yield

Please select the yield factors affected/ modified by the current entry
Check all that apply.

- ☐ Stress - Heat
- ☐ Stress - Cold
- ☐ Stress - High humidity
- ☐ Stress - Flood
- ☐ Stress - Drought
- ☐ Stress - Salinity
- ☐ Stress - Toxicity
- ☐ Stress - Nutrient overload
- ☐ Stress - Nutrient deficiency
- ☐ Stress - Soil toxins
- ☐ Stress - Soil composition
- ☐ Stress - pH
- ☐ Geographical factors
- ☐ None of the above/other factors/don't know, can't say

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1**147. Under which scenarios would this entry have special relevance?**

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

148. Comments to the scenarios

Stop filling out this form.

Subtrait Sustainability

149. Class **Mark only one oval.*

- ☐ Photosynthesis - photochemistry and biochemistry *Skip to question 104.*
- ☐ Uptake and spatial management of resources *Skip to question 114.*
- ☐ Sink/source activity *Skip to question 126.*
- ☐ Plant growth, architecture and phenology *Skip to question 134.*

Photochemistry and Biochemistry

Select relevant subtrait:

150. Photochemistry*Check all that apply.*

- ☐ Light harvesting
- ☐ Light capture optimisation
- ☐ Pigment composition
- ☐ Light use efficiency (electron transport)
- ☐ Other

151. If other, specify

152. Biochemistry – Carbon assimilation*Check all that apply.*

- ☐ Stomatal aperture
- ☐ Rubisco and other Calvin cycle enzymes
- ☐ Photosynthetic limitations (cofactor, TPU)
- ☐ Chloroplast-cytosol transporters
- ☐ Sucrose - starch balance
- ☐ Photorespiration
- ☐ Dark (mitochondrial) respiration
- ☐ Photosynthetic pathway (C4, C3, CAM, C3-C4 intermediary)
- ☐ Sugar pathways
- ☐ Photoacclimation
- ☐ Photosynthetic induction
- ☐ Other

153. If other, specify

154. Biochemistry - Photoprotection*Check all that apply.*

- ☐ NPQ
- ☐ Mehler reaction
- ☐ Repair pathways (Oxidative stress)
- ☐ Photosynthetic by-products
- ☐ Protective molecules
- ☐ Sugars and osmolytes
- ☐ Photosynthetic antioxidants
- ☐ Other

155. If other, specify

156. Factors affecting sustainability

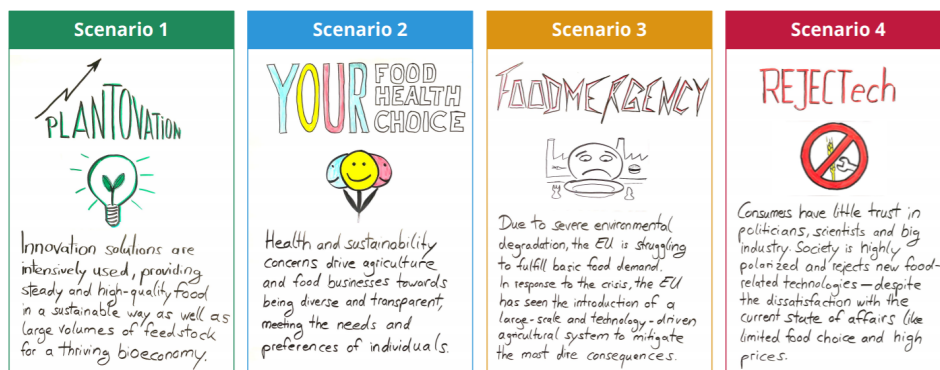
Please select the sustainability factors affected/ modified by the current entry
Check all that apply.

- ☐ Stress - Nutrient deficiency
- ☐ Stress - Nutrient overload/form/quality
- ☐ Stress - Drought
- ☐ Stress - Flood
- ☐ Stress - Heavy metals
- ☐ Stress - Salinity
- ☐ Stress - Heat
- ☐ Stress - Cold/frost
- ☐ Stress - pH
- ☐ Stress - O₃, UV, oxidative
- ☐ Stress - Light
- ☐ Stress - Photoperiod
- ☐ Stress - Physical constraints (soil compaction, hail, wind, sun...)
- ☐ Stress - High humidity
- ☐ Stress - Soil composition
- ☐ Stress - Bio stimulants
- ☐ Stress - Microbes in the rhizosphere
- ☐ Stress - Toxicity
- ☐ Stress - Soil toxins
- ☐ Geographical factors
- ☐ None of the above/other factors/don't know, can't say

157. If other, specify

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1**158. Under which scenarios would this entry have special relevance?**

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

159. Comments to the scenarios

Stop filling out this form.

Uptake and spatial management of resources

Select relevant subtrait:

160. Water and Nutrient uptake/assimilation vs use

Check all that apply.

- ☐ Water and Nutrients uptake (transporter channel regulators...)
- ☐ Other: _____

161. If other, specify

162. Primary and secondary metabolism

Check all that apply.

- ☐ Osmolites
- ☐ Proteins
- ☐ Metabolic compounds accumulation
- ☐ Other: _____

163. If other, specify

164. Nutrient use efficiency (NutUE)

Check all that apply.

- ☐ Local Water and Nutrients transport (root, stem and leaf tissues)
- ☐ Long distance Water and Nutrients transport (xylem)
- ☐ Nutrient metabolism
- ☐ Nutrient partitioning
- ☐ Nutrient storage
- ☐ Nutrients recycling
- ☐ Alternative metabolic pathways
- ☐ Ion homeostasis
- ☐ Other

165. If other, specify

166. Heavy metals and salt

Check all that apply.

- ☐ Uptake (transporter channel regulators...)
- ☐ Local and long distance transport metabolism
- ☐ Partitioning
- ☐ Storage
- ☐ Alternative metabolic pathways
- ☐ Ion homeostasis
- ☐ Other: _____

167. If other, specify

168. Factors affecting sustainability

Please select the sustainability factors affected/ modified by the current entry
Check all that apply.

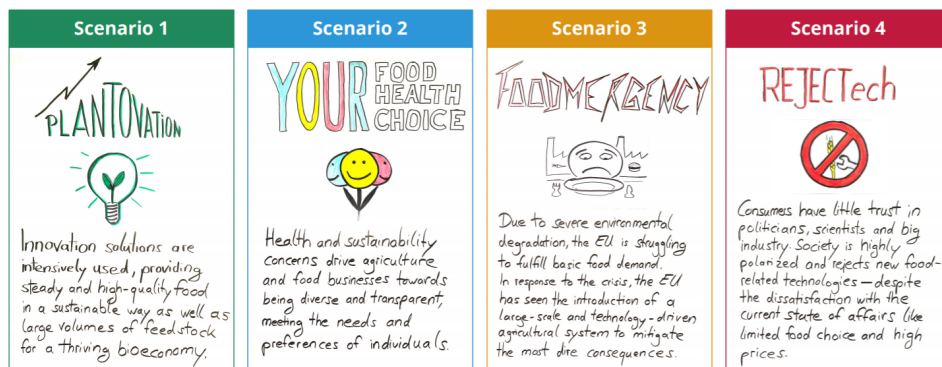
- ☐ Stress - Heat
- ☐ Stress - Cold
- ☐ Stress - High humidity
- ☐ Stress - Flood
- ☐ Stress - Drought
- ☐ Stress - Salinity
- ☐ Stress - Toxicity
- ☐ Stress - Nutrient overload
- ☐ Stress - Nutrient deficiency
- ☐ Stress - Soil toxins
- ☐ Stress - Soil composition
- ☐ Stress - pH
- ☐ Geographical factors
- ☐ None of the above/other factors/don't know, can't say

169. If other, specify

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1



170. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

171. Comments to the scenarios

Stop filling out this form.

Sink/ source activity

Select relevant subtrait:

172. Nutrient metabolism, transport, remobilization and partitioning

Check all that apply.

- ☐ Sucrose metabolism (source)
- ☐ Nutrient metabolism (source)
- ☐ Water and nutrients storage
- ☐ Storage compound metabolism (source)
- ☐ Carbon transfer
- ☐ Nutrient transfer
- ☐ Coordination of C and Nutrient assimilation
- ☐ Other micronutrients
- ☐ Other

173. If other, specify

174. Source sink balance

Check all that apply.

- ☐ Sink to source feedback
- ☐ Source to sink feedforward
- ☐ Senescence of source organs
- ☐ Sink/grain development
- ☐ Seed filling
- ☐ Senescence of sink organs
- ☐ Other

175. If other, specify

176. Factors affecting sustainability

Please select the sustainability factors affected/ modified by the current entry

Check all that apply.

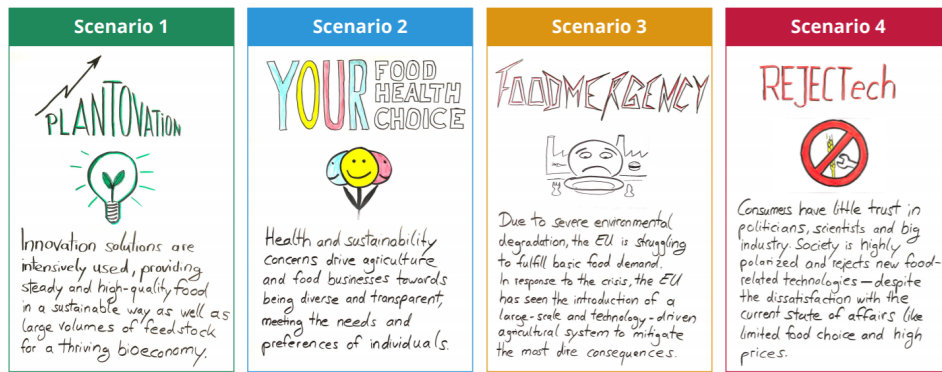
- ☐ Stress - Heat
- ☐ Stress - Cold
- ☐ Stress - High humidity
- ☐ Stress - Flood
- ☐ Stress - Drought
- ☐ Stress - Salinity
- ☐ Stress - Toxicity
- ☐ Stress - Nutrient overload
- ☐ Stress - Nutrient deficiency
- ☐ Stress - Soil toxins
- ☐ Stress - Soil composition
- ☐ Stress - pH
- ☐ Geographical factors
- ☐ None of the above/other factors/don't know, can't say

177. If other, specify

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1



178. Under which scenarios would this entry have special relevance?

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

179. Comments to the scenarios

Stop filling out this form.

Plant growth, architecture and phenology

180. Shoot architecture anatomy and canopy profile

Check all that apply.

- ☐ Phyllotaxy
- ☐ Self-shading
- ☐ Compactness
- ☐ Stem anatomy and composition
- ☐ Shoot and canopy hydraulics
- ☐ Vascular tissues anatomy (density, structure) and functioning
- ☐ Profile of photosynthetic resources
- ☐ Leaf angle (erectness)
- ☐ Leaf morphology/shape
- ☐ Organ length/width/strength
- ☐ Wound healing
- ☐ Other

181. If other, specify

182. Leaf anatomy and activity*Check all that apply.*

- ☐ Cuticular thickness
- ☐ Wax/cutin ratio and content
- ☐ Stomatal properties (morphology, densities, distribution, location and resistance)
- ☐ Mesophyll thickness
- ☐ Mesophyll conductance
- ☐ Mesophyll resistance
- ☐ Mesophyll structure
- ☐ CAM/C3/C4 intermediary structure
- ☐ Vascular tissues anatomy (density, structure) and functioning
- ☐ Leaf hydraulics
- ☐ Stomatal aperture and functioning regulation
- ☐ Organelle properties (density, positioning and movement)
- ☐ Cellular subcellular and Ultrastructural adaptations
- ☐ Wound healing
- ☐ Other

183. If other, specify

184. Growth rate*Check all that apply.*

- ☐ Meristem activity
- ☐ Cell division
- ☐ Growth mechanics
- ☐ Cell expansion
- ☐ Cell wall composition
- ☐ Cell turgor
- ☐ Other

185. If other, specify

186. Root architecture, anatomy and activity*Check all that apply.*

- ☐ Root length
- ☐ Root number (lateral, seminal, adventitious)
- ☐ Root growth angle
- ☐ Root density
- ☐ Root plasticity
- ☐ Root competition ability
- ☐ Root hydraulics
- ☐ Cell layer number
- ☐ Cells layers structure
- ☐ Aerenchyma (PCD)
- ☐ Cell division/elongation
- ☐ Cell wall composition
- ☐ Lignification, Suberisation
- ☐ Cellular subcellular and Ultrastructural adaptations
- ☐ Wound healing
- ☐ Storage capacity
- ☐ Respiration
- ☐ Exudation
- ☐ Other

187. If other, specify

188. Root/shoot coordination*Check all that apply.*

- ☐ Root/shoot ratio
- ☐ Root/shoot transport and signalling
- ☐ Other

189. If other, specify

190. Phenology*Check all that apply.*

- ☐ Reproductive switch
- ☐ Flower development/abortion
- ☐ Flowering time
- ☐ Flower number
- ☐ Fertilization and seed set efficiency
- ☐ Seed number/abortion
- ☐ Seed filling rate
- ☐ Inflorescence plasticity
- ☐ Early vigour
- ☐ Ageing/senescence/juvenility
- ☐ Plastid/chloroplast lifetime
- ☐ Stay-green
- ☐ Other

191. If other, specify

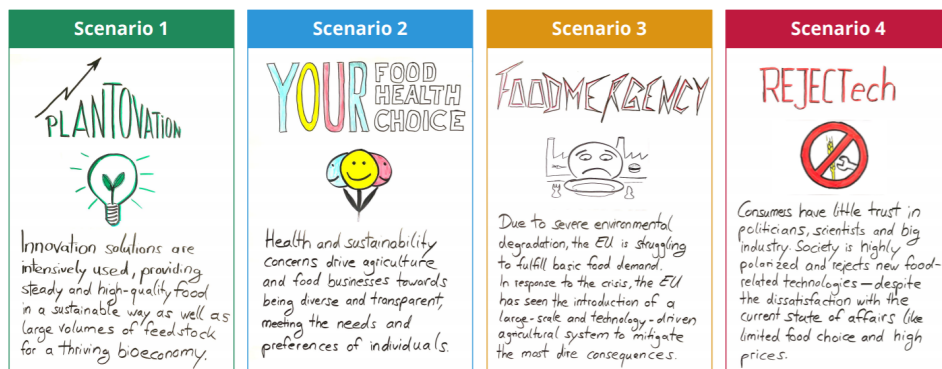
192. Factors affecting sustainability

Please select the sustainability factors affected/ modified by the current entry
Check all that apply.

- ☐ Stress - Heat
- ☐ Stress - Cold
- ☐ Stress - High humidity
- ☐ Stress - Flood
- ☐ Stress - Drought
- ☐ Stress - Salinity
- ☐ Stress - Toxicity
- ☐ Stress - Nutrient overload
- ☐ Stress - Nutrient deficiency
- ☐ Stress - Soil toxins
- ☐ Stress - Soil composition
- ☐ Stress - pH
- ☐ Geographical factors
- ☐ None of the above/other factors/don't know, can't say

Application to Scenarios (WP 1.1)

Please share your thoughts about the scenarios under which the listed example is relevant. Subjective opinions are accepted here

Scenarios from the outcome of WP 1.1**193. Under which scenarios would this entry have special relevance?**

Check all that apply.

- ☐ Scenario 1
- ☐ Scenario 2
- ☐ Scenario 3
- ☐ Scenario 4

194. Comments to the scenarios
