



# 30 projects overview

Mapping of the selected 30 projects

14/08/2025

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Funded by  
the European Union

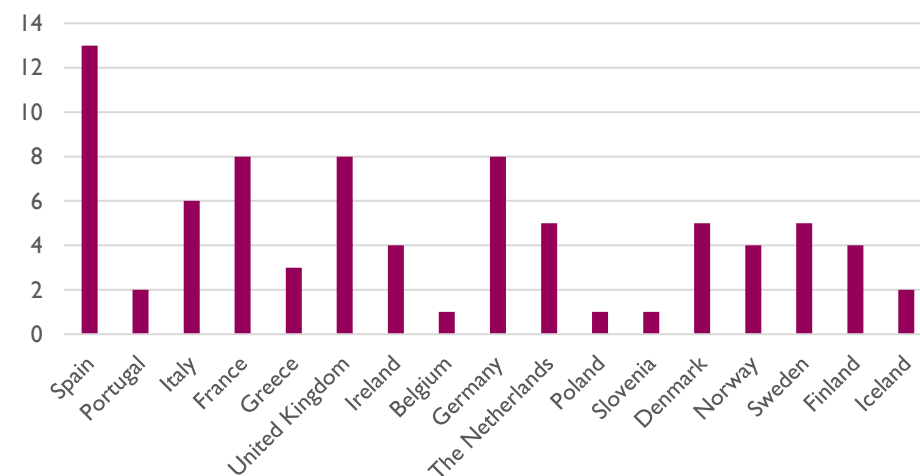
# Screening of projects

## Search string

- “alternative AND protein\* AND sustainable\* AND (food OR feed)”, additional filter: end date projects from 2020-01-01
- The search string was not compatible with all databases. Modifications to search string is written in the excel file.

| Database        | Hits       | Relevant hits             | Selected projects (30 total) |
|-----------------|------------|---------------------------|------------------------------|
| CORDIS          | 202        | 46                        | 18                           |
| CBE             | 11         | 8                         | 8                            |
| Keep.eu         | 7          | 1                         | 1                            |
| EIT             | 23         | 5                         | 0                            |
| OpenAIRE        | 30         | 8                         | 3                            |
| LIFE            | 8          | 5                         | 2                            |
| CNR-IRBIM       | 16         | 0                         | 0                            |
| INTERREG        | 1          | 1                         | 1                            |
| GFI             | 66         | 13                        | 3                            |
| Network Nature  | 3          | 0                         | 0                            |
| Erasmus+        | 0          | 0                         | 0                            |
| Susfood ERA-NET | 0          | 0                         | 0                            |
| FNSSA           | 7          | 4                         | 4                            |
| FOSC-ERA        | 22         | 1                         | 1                            |
| ICT-AGRI-FOOD   | 8          | 2                         | 0                            |
| <b>Total</b>    | <b>414</b> | <b>94/80 (14 doubles)</b> | <b>41/30 (11 doubles)</b>    |

Lead country in projects (80)



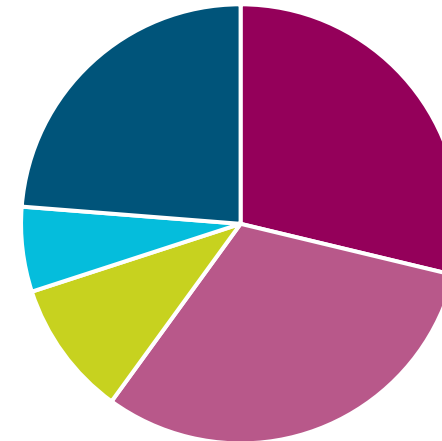
## Criteria going from 80 to 30 projects

The selection reflects the proportions observed in the initial screening (microbial/plant-based/insect/cultured meat/mixed sources) and was based on the following criteria:

- Technology Readiness Level (TRL) (excluding projects working exclusively >TRL6)
- Number of participants (projects with only 1 or 2 participants were excluded)
- Availability of sufficient information
- Project start date (recent projects starting in 2024 or 2025 were excluded, as results are not yet available)
- Focus on ingredients other than proteins was excluded

The final project selection includes:

- 8 on microbial proteins
- 9 on plant-based proteins
- 3 on insect proteins
- 2 on cultured meat
- 8 on a mix of protein-rich sources
  - Mix = mix of the other categories



■ Microbial ■ Plant-based ■ Insects ■ Cultured meat ■ Mix

# Overview of the selected 30 projects

| #  | Duration  | Funding source                                          | EU contribution | Partners | Acronym and project title                                                                                                                                                                                                  |
|----|-----------|---------------------------------------------------------|-----------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | 2019-2023 | H2020-SFS-2019-1                                        | € 7,775,109     | 32       | Profuture: Microalgae protein ingredients for the food and feed of the future                                                                                                                                              |
| 2  | 2023-2027 | HORIZON-JU-CBE-2022                                     | € 4,535,098     | 10       | PROMISEANG: Alternative PROteins from Microbial                                                                                                                                                                            |
| 3  | 2020-2025 | H2020-BBI-JTI-2019                                      | € 6,588,732     | 10       | MULTI-STR3AM: A sustainable multi-strain, multi-method, multi-product microalgae biorefinery integrating industrial side streams to create high-value products for food, feed and fragrance                                |
| 4  | 2019-2025 | H2020-BBI-JTI-2018                                      | € 16,937,253    | 10       | PLENTITUDE: First-of-its-kind, large-scale, lowest-cost, zero-waste biorefinery for the production of proteins for food and feed application from low cost sustainable feedstocks                                          |
| 5  | 2023-2027 | HORIZON-JU-CBE-2022                                     | € 4,592,391     | 15       | INNOPROTEIN: New sustainable proteins for food, feed and non-food bio-based applications                                                                                                                                   |
| 6  | 2023-2028 | HORIZON-JU-CBE-2022                                     | € 4,995,504     | 8        | SynoProtein: Carbon capture from syngas to Single Cell Protein (SCP) and use as fish feed ingredient                                                                                                                       |
| 7  | 2017-2022 | Interreg NWE                                            | € 3,900,000     | 11       | ALG-AD: Creating value from waste nutrients by integrating algal and anaerobic digestion technology                                                                                                                        |
| 8  | 2023-2027 | HORIZON-EIC-2022-PATHFINDERCHALLENGES-01                | € 3,963,836     | 3        | Hydrocow: Hydrogen oxidizing bacteria engineered to valorize CO2 for whey protein production                                                                                                                               |
| 9  | 2022-2026 | Horizon-CL6-2021-Farm2fork, RIA                         | € 11,303,944    | 21       | HealthFerm: Innovative pulse and cereal-based food fermentations for human health and sustainable diets                                                                                                                    |
| 10 | 2020-2025 | H2020-BBI-JTI-2019                                      | € 5,140,274     | 16       | ALEHOOP: Biorefineries for the valorisation of macroalgal residual biomass and legume processing by-products to obtain new protein value chains for high-value food and feed applications                                  |
| 11 | 2017-2021 | H2020-SFS-2016-2                                        | € 4,999,928     | 24       | TRUE: Transition paths to sustainable legume based systems in Europe                                                                                                                                                       |
| 12 | 2018-2021 | H2020-BBI-JTI-2017                                      | € 3,312,890     | 17       | PRO-ENRICH: Development of novel functional proteins and bioactive ingredients from rapeseed, olive, tomato and citrus fruit side streams for applications in food, cosmetics, pet food and adhesives                      |
| 13 | 2016-2021 | H2020-BBI-PPP-2015-02                                   | € 4,227,361     | 15       | GREENPROTEIN: Revalorisation of vegetable processing industry remnants into high-value functional proteins and other food ingredients                                                                                      |
| 14 | 2023-2026 | Interreg OKS                                            | € 3,030,386     | 7        | Green Valleys 2.0                                                                                                                                                                                                          |
| 15 | 2022-2026 | Programme for the Environment and Climate Action (LIFE) | € 2,455,135     | 7        | SEEDSPRO2WINE: Circular-based alternative protein extraction from grape seeds for the wine-making process                                                                                                                  |
| 16 | 2023-2027 | HORIZON-CL6-2022-FARM2FORK-02-two-stage                 | € 5,995,271     | 16       | Innoaqua: Innovative Approaches for an Integrated Use of Algae in Sustainable Aquaculture Practices and High-Value Food applications                                                                                       |
| 17 | 2022-2025 | FOSC, SUSFOOD2 (joint call)                             | € 830,000       | 9        | IPSUS : Climate-smart food innovation using plant and seaweed proteins from upcycled sources                                                                                                                               |
| 18 | 2019-2023 | H2020-SFS-2019-1                                        | € 7,952,547     | 35       | SUSINCHAIN: SUStainable INsect CHAIN                                                                                                                                                                                       |
| 19 | 2019-2025 | H2020-BBI-JTI-2018                                      | € 19,630,411    | 27       | FARMYING: FLAGship demonstration of industrial scale production of nutrient Resources from Mealworms to develop a bioeconomy New Generation                                                                                |
| 20 | 2021-2025 | PRIMA (DG RTD main funder)                              | € 2,299,388     | 8        | SUSTAvianFEED: Alternative animal feeds in Mediterranean poultry breeds to obtain sustainable products                                                                                                                     |
| 21 | 2020-2023 | H2020-EIC-FTI-2018-2020                                 | € 1,906,961     | 4        | Meat4All: Industrialization and commercialization of a competitive, sustainable and consumer oriented alternative animal protein source                                                                                    |
| 22 | 2022-2027 | HORIZON-EIC                                             | € 2,805,404     | 5        | PRISM-LT: PRInted Symbiotic Materials as a dynamic platform for Living Tissues production                                                                                                                                  |
| 23 | 2019-2023 | H2020-SFS-2019-1                                        | € 7,985,150     | 24       | NextGenProteins: Bioconversion of underutilized resources into next generation proteins for food and feed                                                                                                                  |
| 24 | 2020-2024 | H2020-SFS-2019-1                                        | € 8,179,214     | 33       | SMART PROTEIN: Smart Protein for a Changing World. Future-proof alternative terrestrial protein sources for human nutrition encouraging environment regeneration, processing feasibility and consumer trust and acceptance |
| 25 | 2022-2026 | HORIZON-CL6-2022-FARM2FORK-01                           | € 11,999,660    | 43       | LIKE-A-PRO: From niche to mainstream – alternative proteins for everybody and everywhere                                                                                                                                   |
| 26 | 2022-2026 | HORIZON-CL6-2021-CIRCBIO-01                             | € 10,272,862    | 35       | Giant Leaps: Gap resolution in safety, nutritional, allergenicity and environmental assessments to promote alternative protein utilization and the dietary shift                                                           |
| 27 | 2022-2026 | HORIZON-CL6-2021-FARM2FORK-01                           | € 5,670,152     | 12       | Cheers: Producing novel non-plant biomass feedstocks and bio-based products through upcycling and the cascading use of brewery side-streams                                                                                |
| 28 | 2023-2026 | PRIMA (DG RTD main funder)                              | € 4,054,642     | 17       | CIPROMED: Circular and Inclusive utilisation of alternative PROteins in the MEDiterranean value chains                                                                                                                     |
| 29 | 2023-2026 | PRIMA (DG RTD main funder)                              | € 4,095,700     | 17       | ProxiMed : Exploration and Implementation of Products with Alternative Proteins in the Mediterranean Region                                                                                                                |
| 30 | 2018-2022 | H2020-SFS-2018-2020                                     | € 8,375,472     | 20       | VALUEWASTE: Unlocking new VALUE from urban bioWASTE                                                                                                                                                                        |

## Criteria going from 30 to 10 projects

The selection reflects the proportions observed in the initial screening (microbial/plant-based/insect/cultured meat/mixed sources) and was based on the following criteria:

- Output material (published results etc.) available
- Balance between different protein sources and food/feed focus

Suggestions for the 10 projects are marked with a star ★

# Overview of the selected 30 projects

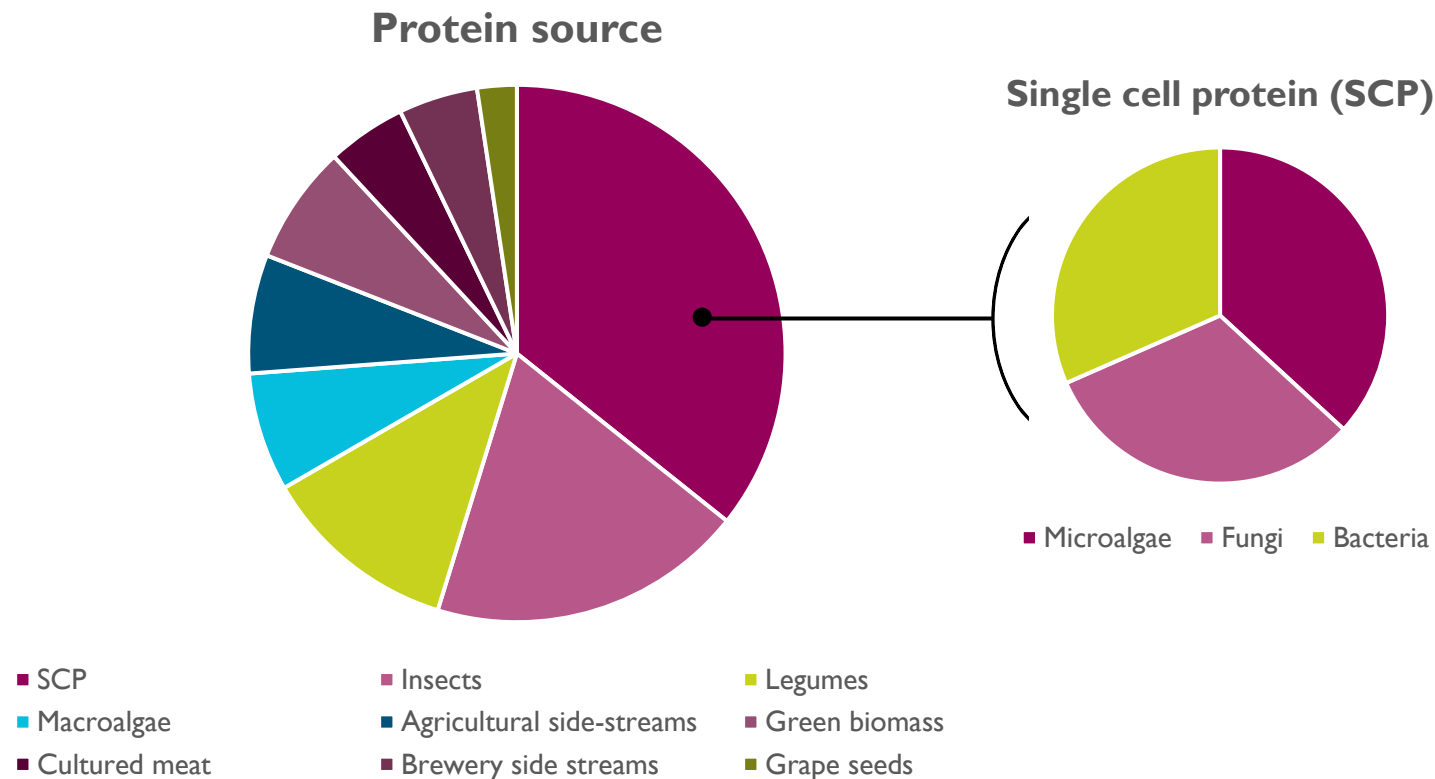
| #    | Duration  | Funding source                                       | EU contribution | Partners | Acronym and project title                                                                                                                                                                             | Output                      | Protein source                                                    | Feed/food | Note for selection                          |
|------|-----------|------------------------------------------------------|-----------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------------------------------------------------|-----------|---------------------------------------------|
| ★ 1  | 2019-2023 | H2020-SFS-2019-1                                     | € 7,775,109     | 32       | Profuture: Microalgae protein ingredients for the food and feed of the future                                                                                                                         | 19 articles                 | SCP (microalgae)                                                  | Both      | Microalgae, high output number              |
| 2    | 2023-2027 | HORIZON-JU-CBE-2022                                  | € 4,535,098     | 10       | PROMISEANG: Alternative PROteins from Microbial fermentation of non-conventional SEA sources for Next-Generation food, feed and non-food bio-based applications                                       | 2 book chapters             | Microbial fermentation of marine residues – SCP (fungi, bacteria) | Both      |                                             |
| 3    | 2020-2025 | H2020-BBI-JTI-2019                                   | € 6,588,732     | 10       | MULTI-STR3AM: A sustainable multi-strain, multi-method, multi-product microalgae biorefinery integrating industrial side streams to create high-value products for food, feed and fragrance           | 10 articles                 | SCP (Microalgae biorefinery using industrial side streams)        | Both      |                                             |
| 4    | 2019-2025 | H2020-BBI-JTI-2018                                   | € 16,937,253    | 10       | PLENTITUDE: First-of-its-kind, large-scale, lowest-cost, zero-waste biorefinery for the production of proteins for food and feed application from low cost sustainable feedstocks                     | -                           | SCP (Mycoprotein) with cereals as feedstock                       | Food      |                                             |
| 5    | 2023-2027 | HORIZON-JU-CBE-2022                                  | € 4,592,391     | 15       | INNOPROTEIN: New sustainable proteins for food, feed and non-food bio-based applications                                                                                                              | -                           | SCP (microalgae, fungi, bacteria)                                 | Both      |                                             |
| ★ 6  | 2023-2028 | HORIZON-JU-CBE-2022                                  | € 4,995,504     | 8        | SynoProtein: Carbon capture from syngas to Single Cell Protein (SCP) and use as fish feed ingredient                                                                                                  | 4 articles                  | SCP (bacteria) using sawmill residues                             | Feed      | Bacteria, output available                  |
| 7    | 2017-2022 | Interreg NWE                                         | € 3,900,000     | 11       | ALG-AD: Creating value from waste nutrients by integrating algal and anaerobic digestion technology                                                                                                   | 8 articles                  | SCP (Microalgae using waste nutrients)                            | Feed      |                                             |
| 8    | 2023-2027 | HORIZON-EIC-2022-PATHFINDERCHALLENGES-01             | € 3,963,836     | 3        | Hydrocow: Hydrogen oxidizing bacteria engineered to valorize CO2 for whey protein production                                                                                                          | -                           | SCP (bacteria)                                                    | Food      |                                             |
| 9    | 2022-2026 | Horizon-CL6-2021-Farm2fork, RIA                      | € 11,303,944    | 21       | HealthFerm: Innovative pulse and cereal-based food fermentations for human health and sustainable diets                                                                                               | 1 article                   | Fermented grains and legumes                                      | Food      |                                             |
| ★ 10 | 2020-2025 | H2020-BBI-JTI-2019                                   | € 5,140,274     | 16       | ALEHOOP: Biorefineries for the valorisation of macroalgal residual biomass and legume processing by-products to obtain new protein value chains for high-value food and feed applications             | 7 articles, 5 book chapters | Macroalgae and legumes                                            | Both      | Macroalgae, output available                |
| ★ 11 | 2017-2021 | H2020-SFS-2016-2                                     | € 4,999,928     | 24       | TRUE: Transition paths to sustainable legume based systems in Europe                                                                                                                                  | 29 articles, 1 trademarks   | Legumes                                                           | Both      | Legumes, high output                        |
| ★ 12 | 2018-2021 | H2020-BBI-JTI-2017                                   | € 3,312,890     | 17       | PRO-ENRICH: Development of novel functional proteins and bioactive ingredients from rapeseed, olive, tomato and citrus fruit side streams for applications in food, cosmetics, pet food and adhesives | 4 articles                  | Agricultural sidestreams (olive, rapeseed, tomato, citrus)        | Both      | Agricultural side streams, output available |
| 13   | 2016-2021 | H2020-BBI-PPP-2015-02                                | € 4,227,361     | 15       | GREENPROTEIN: Revalorisation of vegetable processing industry remnants into high-value functional proteins and other food ingredients                                                                 | 2 articles                  | Vegetal residues (e.g. sugar beet tops)                           | Food      |                                             |
| 14   | 2023-2026 | Interreg OKS                                         | € 3,030,386     | 7        | Green Valleys 2.0                                                                                                                                                                                     | -                           | Grass and clover                                                  | Feed      |                                             |
| 15   | 2022-2026 | Progr. for the Environment and Climate Action (LIFE) | € 2,455,135     | 7        | SEEDSPRO2WINE: Circular-based alternative protein extraction from grape seeds for the wine-making process                                                                                             | -                           | Grape seeds                                                       | Food      |                                             |

# Overview of the selected 30 projects

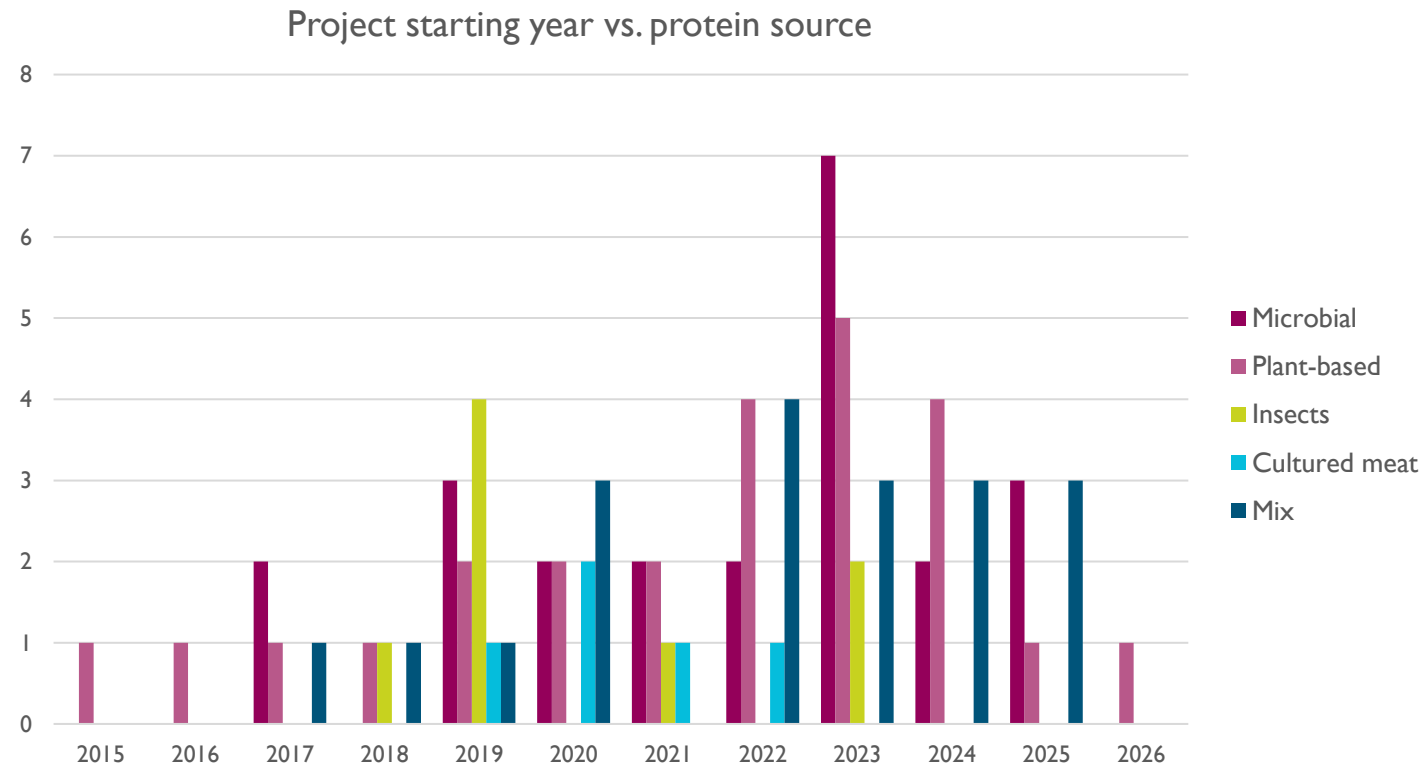
| #    | Duration  | Funding source                          | EU contribution | Partners | Acronym and project title                                                                                                                                                                                                  | Output                                      | Protein source                                                   | Feed/food | Note for selection                    |
|------|-----------|-----------------------------------------|-----------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------|-----------|---------------------------------------|
| 16   | 2023-2027 | HORIZON-CL6-2022-FARM2FORK-02-two-stage | € 5,995,271     | 16       | Innoaqua: Innovative Approaches for an Integrated Use of Algae in Sustainable Aquaculture Practices and High-Value Food applications                                                                                       | 1 article                                   | SCP (microalgae) and seaweeds                                    | Food      |                                       |
| 17   | 2022-2025 | FOSC, SUSFOOD2 (joint call)             | € 830,000       | 9        | IPSUS : Climate-smart food innovation using plant and seaweed proteins from upcycled sources                                                                                                                               |                                             | Plants (pumpkin, potato..) and seaweeds                          | Food      |                                       |
| ★ 18 | 2019-2023 | H2020-SFS-2019-1                        | € 7,952,547     | 35       | SUSINCHAIN: SUSTainable INsect CHAIN                                                                                                                                                                                       | 55 articles, 1 dissertation                 | Insects                                                          | Both      | Insects, high output number           |
| 19   | 2019-2025 | H2020-BBI-JTI-2018                      | € 19,630,411    | 27       | FARMYING: FLAGship demonstration of industrial scale production of nutrient Resources from Mealworms to develop a bioeconomy New Generation                                                                                | 3 articles, 4 patents                       | Insects                                                          | Feed      |                                       |
| 20   | 2021-2025 | PRIMA (DG RTD main funder)              | € 2,299,388     | 8        | SUSTAvianFEED: Alternative animal feeds in Mediterranean poultry breeds to obtain sustainable products                                                                                                                     | 3 articles                                  | Insects                                                          | Feed      |                                       |
| 21   | 2020-2023 | H2020-EIC-FTI-2018-2020                 | € 1,906,961     | 4        | Meat4All: Industrialization and commercialization of a competitive, sustainable and consumer oriented alternative animal protein source                                                                                    | -                                           | Cultured meat                                                    | Food      |                                       |
| ★ 22 | 2022-2027 | HORIZON-EIC                             | € 2,805,404     | 5        | PRISM-LT: PRInted Symbiotic Materials as a dynamic platform for Living Tissues production                                                                                                                                  | 2 articles, 1 dissertation                  | Cultured meat                                                    | Food      | Cultured meat, output available       |
| ★ 23 | 2019-2023 | H2020-SFS-2019-1                        | € 7,985,150     | 24       | NextGenProteins: Bioconversion of underutilized resources into next generation proteins for food and feed                                                                                                                  | 7 articles, 5 dissertations, 1 book chapter | SCP (microalgae, fungi), insects                                 | Both      | SCP and insects, output available     |
| ★ 24 | 2020-2024 | H2020-SFS-2019-1                        | € 8,179,214     | 33       | SMART PROTEIN: Smart Protein for a Changing World. Future-proof alternative terrestrial protein sources for human nutrition encouraging environment regeneration, processing feasibility and consumer trust and acceptance | 31 articles, 1 dissertation                 | Legumes and SCP (fungi)                                          | Food      | Legumes and fungi, high output number |
| ★ 25 | 2022-2026 | HORIZON-CL6-2022-FARM2FORK-01           | € 11,999,660    | 43       | LIKE-A-PRO: From niche to mainstream – alternative proteins for everybody and everywhere                                                                                                                                   | 4 articles, 1 trademark                     | Legumes, SCP (fungi), insects - consumer insight                 | Food      | Consumer insight, output available    |
| 26   | 2022-2026 | HORIZON-CL6-2021-CIRCBIO-01             | € 10,272,862    | 35       | Giant Leaps: Gap resolution in safety, nutritional, allergenicity and environmental assessments to promote alternative protein utilization and the dietary shift                                                           | 7 articles                                  | Methodologies to assess alternative protein                      | Food      |                                       |
| 27   | 2022-2026 | HORIZON-CL6-2021-FARM2FORK-01           | € 5,670,152     | 12       | Cheers: Producing novel non-plant biomass feedstocks and bio-based products through upcycling and the cascading use of brewery side-streams                                                                                | -                                           | Brewery side-streams as feedstock for insects and SCP (bacteria) | Both      |                                       |
| 28   | 2023-2026 | PRIMA (DG RTD main funder)              | € 4,054,642     | 17       | CIPROMED: Circular and Inclusive utilisation of alternative PROteins in the MEDiterranean value chains                                                                                                                     | 2 articles                                  | Agri-industrial side-streams for insect and SCP (microalgae)     | Both      |                                       |
| 29   | 2023-2026 | PRIMA (DG RTD main funder)              | € 4,095,700     | 17       | ProxiMed : Exploration and Implementation of Products with Alternative Proteins in the Mediterranean Region                                                                                                                | 2 articles                                  | Duckweed, mallow leaves                                          | Both      |                                       |
| 30   | 2018-2022 | H2020-SFS-2018-2020                     | € 8,375,472     | 20       | VALUEWASTE: Unlocking new VALUE from urban bioWASTE                                                                                                                                                                        | 3 articles, 4 patents, 2 trademarks         | Urban biowaste for SCP (bacteria) and insects                    | Both      |                                       |

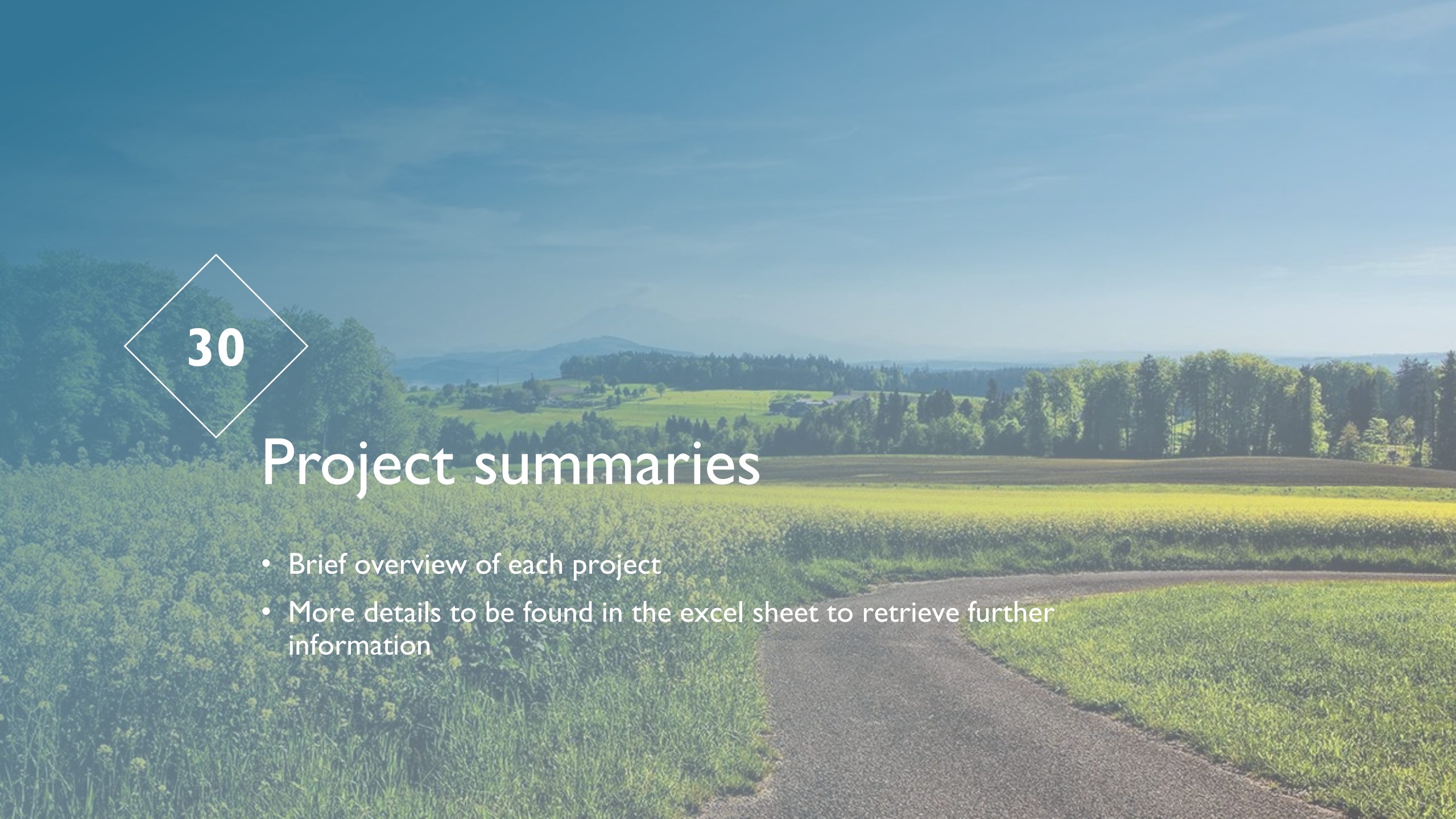
# 30 projects – protein sources

- The figure shows the relative proportion between the different protein sources in the 30 projects
- 15 of the projects involved SCP
  - 8 projects with SCP as the only focus, 7 of the "mix projects" also included SCP



# 30 projects – protein sources





30

## Project summaries

- Brief overview of each project
- More details to be found in the excel sheet to retrieve further information

**Title:** Microalgae protein ingredients for the food and feed of the future

**Webpage:** <https://www.pro-future.eu/> , <https://cordis.europa.eu/project/id/862980>

**Duration:** 1.10.2019-31.12.2023

**Funding:** €7,775,109 (H2020-SFS-2019-1)

**Lead (partners):** IRTA, Spain (32)

**Main objective:**

Set the basis for market uptake of innovative, socially responsible and sustainable food and feed products, reformulated with protein-rich ingredients from microalgal biomasses

**Output:** 19 peer reviewed articles

**Main results:**

Demonstrated the potential of microalgae for sustainable protein production in food and feed. It has delivered tangible innovations, valuable consumer insights, and a clearer roadmap for market development. However, scaling, cost-reduction, regulatory reform, and consumer education remain the critical challenges that must be addressed to unlock the full potential of microalgae in Europe's food system

**Title:** Alternative PROteins from Microbial fermentation of non-conventional SEA sources for Next-Generation food, feed and non-food bio-based applications

**Webpage:** <https://promiseang-project.eu/> , <https://cordis.europa.eu/project/id/101112378>

**Duration:** 01.09.2023-31.08.2027

**Funding:** €4,535,098 (HORIZON-JU-CBE-2022)

**Lead (partners):** University of Vigo, Spain (I0)

## **Main objective:**

Develop novel alternative proteins from marine underexploited sources (marine invertebrate, macroalgae discards and industrial biowastes) through biomass fermentation (solid-state and submerge processes), generating new microbial protein biomass (fungi, bacteria), meeting market requirements for food, feed, and non-food (biomedicine, pharma and cosmetic) bio-based applications.

**Output:** 2 book chapters

## **Main results:**

Out of 30 samples analyzed, 10 biomasses/byproducts were selected as potential candidates for use in solid-state and submerged fermentation processes, based on their favorable biochemical profiles. Preliminary fermentation trials using selected microorganisms demonstrated a notable increase in final protein content, validating the relevance and effectiveness of the selected biomasses/byproducts.

# #3: MULTI-STR3AM



**Title:** A sustainable multi-strain, multi-method, multi-product microalgae biorefinery integrating industrial side streams to create high-value products for food, feed and fragrance

**Webpage:** <https://www.multi-str3am.com/en> , <https://cordis.europa.eu/project/id/887227>

**Duration:** 01.09.2023-31.08.2027

**Funding:** €6,588,732 (H2020-BBI-JTI-2019)

**Lead (partners):** A4F – Algafuel, Portugal (I0)

## **Main objective:**

Improve microalgae productivity by up to 20 % and valorise eight sidestreams of production. This will create sustainable new sources of proteins, oils and high-value compounds, to address the needs of end-users within the food, feed and fragrance sectors.

**Output:** 10 peer reviewed articles

## **Main results:**

Integration of industrial side streams (effluent rich in nitrogen and industrial brine effluent) as feedstock for microalgae cultivation: *Dunaliella salina* and *Nannochloropsis* sp. The biorefinery has produced 26 microalgal biomass samples for testing in food, feed, and fragrance applications. The project made significant strides toward a circular, zero-waste bioeconomy. However, challenges remain in scaling up production, achieving regulatory clarity, and ensuring economic viability.

# #4: PLENITUDE



**Title:** A First-of-its-kind, large-scale, lowest-cost, zero-waste biorefinery for the production of proteins for food and feed application from low-cost sustainable feedstocks

**Webpage:** <https://plenitude-eu.com/> , <https://cordis.europa.eu/project/id/838104>

**Duration:** 01.10.2019-31.12.2025

**Funding:** €16,937,254 (H2020-BBI-JTI-2018)

**Lead (partners):** 3F Biolimited, United Kingdom (10)

## **Main objective:**

Produce food-grade mycoprotein sustainably by integrating an aerobic fermentation plant with a conventional first-generation biorefinery. The process will use sustainable cereal crops as its feedstock. The project aims to launch 10 new products spanning the food, pet food, and bioplastics industries.

## **Output: -**

## **Main results:**

Delivered a working large-scale biorefinery, validated the performance of mycoprotein, and laid the groundwork for its commercialization. The project created 40 direct jobs in a rural area in South Netherlands. By the end of the project, a >20% reduction in carbon footprint from protein production is expected, which will be achieved through improved processes and lower resource utilization in comparison to traditional protein production methods

# #5: INNOPROTEIN



**Title:** New sustainable proteins for food, feed and non-food bio-based applications

**Webpage:** <https://innoprotein.eu/> , <https://cordis.europa.eu/project/id/101112072>

**Duration:** 01.06.2023-31.5.2027

**Funding:** €4,592,392 (HORIZON-JU-CBE-2022)

**Lead (partners):** Fundacion technalia research & innovation, Spain (15)

## **Main objective:**

Provide Single Cells Proteins (microalgae, bacteria & fungal) and entomological alternative high-quality protein to food, feed and non-food biobased applications.

## **Output: -**

## **Main results:**

Several species of microalgae, bacteria, fungal and insects has been screened to produce rich-protein biomass. Several culture and growth conditions have been tested to increase the protein content of SCP and insect biomass at the laboratory scale. Regarding protein recovery from biomass, so far, the best results have been obtained with ultrasound-assisted (UAE) and ultra-turrax (UT). The protein extraction yield has increased to close to or more than 20% with UAE and UT for microalgae and fungal biomass.

# #6: SynoProtein



**Title:** Carbon capture from syngas to Single Cell Protein (SCP) and use as fish feed ingredient

**Webpage:** <https://synoprotein.eu/> , <https://cordis.europa.eu/project/id/101112345>

**Duration:** 01.09.2023-29.2.2028

**Funding:** €4,995,505 (HORIZON-JU-CBE-2022)

**Lead (partners):** WAI environmental solutions, Norway (8)

## **Main objective:**

Develop and demonstrate a carbon-negative process that converts residues from sawmills into single-cell proteins (hydrogen-oxidizing bacteria) for fish feed, as well as producing biochar for animal feed.

**Output:** 4 peer reviewed articles

## **Main results:**

Developed and optimized the alternative protein processes in lab scales, achieving close to targeted performance. Pre-engineering designs and techno-economic models for full-scale plant were completed, providing scale up potential and guidance for the project. Investigated the preliminary suitability of the single-cell proteins and biochar for aquaculture and agriculture feed. Preliminary LCA were completed, providing guidance for environmental hotspots and process improvements.

**Title:** Creating value from waste nutrients by integrating algal and anaerobic digestion technology

**Webpage:** <https://vb.nweurope.eu/projects/project-search/alg-ad-creating-value-from-waste-nutrients-by-integrating-algal-and-anaerobic-digestion-technology/>

**Duration:** 2017-2022

**Funding:** €3,900,000 (Interreg NWE)

**Lead (partners):** Swansea University, United Kingdom (11)

**Main objective:**

Microalgae will be cultivated, converting the unwanted nutrients into protein-rich biomass. Develop a Decision Support Tools to promote adaption to the new technology.

**Output:** 8 peer reviewed articles

**Main results:**

Proof-of-concept that excess nutrient-rich digestate in North-West Europe can be valorised through integrated microalgal cultivation, converting a regulated waste liability into sustainable algal biomass suitable for animal feed. The project answered key operational and regulatory questions, setting a pathway for scalable implementation.

# #8: Hydrocow



**Title:** Hydrogen oxidizing bacteria engineered to valorize CO<sub>2</sub> for whey protein production

**Webpage:** <https://www.hydrocow.eu/> , <https://cordis.europa.eu/project/id/101115118>

**Duration:** 01.09.2023-31.08.2027

**Funding:** €3,963,836 (HORIZON-EIC-2022-PATHFINDERCHALLENGES-01)

**Lead (partners):** Solar Foods, Finland (3)

## **Main objective:**

To create a net-zero carbon dairy protein production platform. Develop a bacterial protein secretion system using an engineered hydrogen oxidising bacterium. This system will convert CO<sub>2</sub> and soon nitrogen into food-grade protein, decoupling it from agriculture.

## **Output: -**

## **Main results:**

Conducted comprehensive genome annotation using a multi-faceted bioinformatics approach. This genome-scale model will support the design of engineering strategies in silico. Developed a modular cloning toolkit that allows for fine-tuning gene expression levels as needed to implement engineering strategies. Developed and compared various protein detection methods.

**Title:** Innovative pulse and cereal-based food fermentations for human health and sustainable diets

**Webpage:** <https://www.healthferm.eu/> , <https://cordis.europa.eu/project/id/101060247>

**Duration:** 01.09.2022-31.08.2026

**Funding:** €11,303,945 (Horizon-CL6-2021-Farm2fork, RIA)

**Lead (partners):** Katholieke Universiteit Leuven, Belgium (21)

**Main objective:**

Identify and employ suitable microorganisms in the development of novel protein-rich grain-based food sources and assess their impact on gut health.

**Output:** 1 peer reviewed article

**Main results:**

Catalyzed innovation in plant-based fermentation by integrating community science, microbial biotechnology, product design, and consumer research. While early studies confirm strong scientific and social engagement along with promising product prototypes, overcoming knowledge gaps in microbiome–health interactions and consumer acceptance will be critical.

**Title:** Biorefineries for the valorisation of macroalgal residual biomass and legume processing by-products to obtain new protein value chains for high-value food and feed applications

**Webpage:** <https://alehoop.eu/> , <https://cordis.europa.eu/project/id/887259>

**Duration:** 01.06.2020-28.02.2025

**Funding:** €5,140,274 (H2020-BBI-JTI-2019)

**Lead (partners):** Contactica, Spain (16)

**Main objective:**

Develop and validate new bio-based ingredients, in particular biofunctional and technological proteins, from green and brown algae, as well as legume by processing by-products for high-end market

**Output:** 7 peer reviewed articles, 5 book chapters

**Main results:**

Advanced the science and application of low-cost, sustainable proteins from macroalgae and legume by-products, achieving significant technical milestones and laying a strong foundation for future commercialization. High consumer acceptance, nutritional validation, and safety confirmation position these proteins as valuable alternatives for both food and feed sectors. However, scaling challenges, market readiness, and economic competitiveness remain key areas for future work.

**Title:** Transition paths to sustainable legume based systems in Europe

**Webpage:** <https://www.true-project.eu/> , <https://cordis.europa.eu/project/id/727973>

**Duration:** 01.04.2017-30.09.2021

**Funding:** €4,999,928 (H2020-SFS-2016-2)

**Lead (partners):** James Hutton Institute, United Kingdom (24)

**Main objective:**

Identify and enable transition paths to realise successful legume-supported production systems and agri-feed and -food chains.

**Output:** 29 peer reviewed articles, 1 trademark

**Main results:**

Advanced the science and application of low-cost, sustainable proteins from macroalgae and legume by-products, achieving significant technical milestones and laying a strong foundation for future commercialization. High consumer acceptance, nutritional validation, and safety confirmation position these proteins as valuable alternatives for both food and feed sectors. However, scaling challenges, market readiness, and economic competitiveness remain key areas for future work.

**Title:** Development of novel functional proteins and bioactive ingredients from rapeseed, olive, tomato and citrus fruit side streams for applications in food, cosmetics, pet food and adhesives

**Webpage:** <https://www.cbe.europa.eu/projects/pro-enrich> , <https://cordis.europa.eu/project/id/792050>

**Duration:** 01.05.2018-31.10.2021

**Funding:** €3,312,891 (H2020-BBI-JTI-2017)

**Lead (partners):** Teknologisk Institut, Denmark (17)

## **Main objective:**

Demonstrate a new business model for extracting high-value components, novel functional proteins and bioactive ingredients, from agricultural side streams (e.g. side streams from olive oil and rapeseed oil production).

**Output:** 4 peer reviewed articles

## **Main results:**

Demonstrated a new business model for producing high-value compounds from agricultural side streams, demonstrating technical and commercial feasibility with both small and large-scale bioprocessing units. Part of the work of Pro-Enrich was to perform a public perception study to map the knowledge of citizens and their willingness to accept the final products.

Pro-Enrich was able to demonstrate a flexible approach to protein and bioactive compound production, which in many aspects is generic and can provide the basic knowledge for future projects and product developments.

**Title:** Revalorisation of vegetable processing industry remnants into high-value functional proteins and other food Ingredients

**Webpage:** <https://cordis.europa.eu/project/id/720728>

**Duration:** 01.09.2016-31.05.2021

**Funding:** €4,227,361 (H2020-BBI-PPP-2015-02)

**Lead (partners):** Coöperatie Koninklijke Cosun U.A., Netherlands (15)

**Main objective:**

To produce valuable, food-grade proteins and other ingredients from vegetal residues, primarily sourced from sugar beet, through the utilisation of a functional RuBisCo extraction system.

**Output:** 2 peer reviewed articles

**Main results:**

RuBisCO derived from sugar beet leaves is a promising functional and nutritional protein. Environmentally, while sugar beet-derived RuBisCO performs better than animal proteins and some microalgae, its production remains energy-intensive, particularly due to spray drying. Future improvements must focus on process optimization and renewable energy use to increase RuBisCO's viability as a sustainable alternative protein source.

# #14: Green Valleys 2.0



**Title:** Green Valleys 2.0

**Webpage:** <https://greenvalleys.eu/> ,

**Duration:** 01.02.2023-31.03.2026

**Funding:** €3,030,386 (Interreg OKS)

**Lead (partners):** AGROVÄST Livsmedel Aktiebolag, Sweden (7)

**Main objective:**

Demonstrate the profitability, as well as the environmental and climate benefits of green biorefineries, incl. extraction of protein from grass and clover.

**Output: -**

**Main results:**

Has demonstrated that regional grass and clover biomass can be transformed into high value protein concentrate and energy co-products via green biorefining. The project has shown both the technical feasibility and environmental benefits of substituting imported soy with locally produced feed. While challenges around silage processing, seasonal variability, and investment remain, the project lays a foundation for scaling circular, climate-smart agriculture through diversified off takes and integrated biorefinery systems.

**Title:** Circular-based alternative protein extraction from grape seeds for the wine-making process

**Webpage:** <https://webgate.ec.europa.eu/life/publicWebsite/project/LIFE21-ENV-IT-SEEDSPRO2WINE-101074362/circular-based-alternative-protein-extraction-from-grape-seeds-for-the-wine-making-process>

**Duration:** 01.08.2022-31.07.2026

**Funding:** €2,455,135 (Programme for the Environment and Climate Action - LIFE)

**Lead (partners):** Caviro, Italy (7)

**Main objective:**

Implement a circular business model based on an industrial process for extracting proteins from de-tannified grapes to be used as a fining agent in the wine industry

**Output: -**

**Main results: -**

**Title:** Innovative Approaches for an Integrated Use of Algae in Sustainable Aquaculture Practices and High-Value Food applications

**Webpage:** <https://innoaquaproject.eu/> , <https://cordis.europa.eu/project/id/101084383>

**Duration:** 01.06.2023-31.05.2027

**Funding:** €5,995,271 (HORIZON-CL6-2022-FARM2FORK-02)

**Lead (partners):** NORCE, Norway (16)

**Main objective:**

Lay the foundations for the future in-land aquaculture industry in Europe. Demonstrate the benefits of algae and various advanced technologies.

**Output:** 1 peer reviewed article

**Main results:**

Confirmed that cultivating microalgae using aquaculture effluent is an effective method for both nutrient removal and biomass production. While continuous cultivation yields slightly higher biomass under supplemented conditions, perfusion offers better environmental performance at the expense of higher capital and operational costs.

**Title:** Climate-smart food innovation using plant and seaweed proteins from upcycled sources

**Webpage:** <https://ipsus.org/en/>

**Duration:** 14.04.2022-13.04.2025

**Funding:** €830,000 (FOSC, SUSFOOD2)

**Lead (partners):** Natural Resources Institute, United Kingdom (9)

**Main objective:**

Exploit inter-disciplinary and eco-innovative approaches to explore opportunities for upcycling plant and seaweed proteins from agri-food raw materials.

**Output:** -

**Main results:** -

**Title:** SUStainable INsect CHAIN

**Webpage:** <https://susinchain.eu/> , <https://cordis.europa.eu/project/id/861976>

**Duration:** 01.10.2019-31.09.2023

**Funding:** €7,952,547 (H2020-SFS-2019-1)

**Lead (partners):** WUR, Netherlands (35)

**Main objective:**

To test and validate recently emerged technologies and processes aiming at a sustainable EU insect industry producing safe insect products or products from insect-fed animals which are appreciated by consumers.

**Output:** 55 peer reviewed articles, 1 dissertation

**Main results:**

The project has laid essential groundwork for scaling insect production and market adoption. However, realizing this potential requires overcoming several critical challenges—most notably regulatory fragmentation, limited stakeholder coordination, insufficient consumer awareness, and lack of targeted financial support. The project roadmap's 20 proposed actions across six strategic areas present a practical, multi-stakeholder pathway to foster innovation, build public trust, and harmonize policy and market frameworks.

**Title:** FIAGship demonstration of industrial scale production of nutrient Resources from Mealworms to develop a bioeconomY New Generation

**Webpage:** <https://www.farmyng.eu/> , <https://cordis.europa.eu/project/id/837750>

**Duration:** 01.06.2019-30.06.2025

**Funding:** €19,630,411 (H2020-BBI-JTI-2018)

**Lead (partners):** Ynsect, France (27)

## **Main objective:**

To build a fully automated industrial vertical plant for insect-ingredients production, to demonstrate at large scale bio-based value chain producing a wide range of sustainable products from insects: protein meal, oil and organic fertilizer.

**Output:** 3 peer reviewed articles, 4 patents

## **Main results:**

Established the world's largest fully automated vertical insect farm, demonstrating that insect-based solutions are no longer a theoretical niche but a commercially viable reality with product outputs such as insect protein and frass fertilizer. This breakthrough supports key EU priorities around circular economy, climate mitigation, and food system resilience. However, the path forward requires ongoing effort to scale market uptake, secure further authorizations across food and feed applications, and enhance consumer trust and awareness.

**Title:** Alternative animal feeds in Mediterranean poultry breeds to obtain sustainable products

**Webpage:** <https://sustavianfeed.eu/> ,

**Duration:** 01.04.2021-31.03.2025

**Funding:** €2,299,388 (PRIMA (DG RTD main funder))

**Lead (partners):** Sociedad Agraria De Transformacion - ALIA, Spain (8)

**Main objective:**

Develop a sustainable nutritional formula for poultry farming in which insects will play a key role and lead to an innovative poultry farming approach.

**Output:** 3 peer reviewed articles

**Main results:**

Demonstrated that insect-based poultry feed is a promising, sustainable alternative to conventional protein sources, aligning with circular economy principles and reducing environmental impacts. By successfully piloting insect feed in Mediterranean countries and involving diverse local stakeholders, the project laid strong foundations for future scaling. However, regulatory barriers, market acceptance, and long-term integration into agri-food systems remain key challenges that must be addressed to fully unlock its potential.

**Title:** Industrialization and commercialization of a competitive, sustainable and consumer oriented alternative animal protein source

**Webpage:** <https://cordis.europa.eu/project/id/958660> ,

**Duration:** 01.08.2020-31.01.2023

**Funding:** €1,906,961 (H2020-EIC-FTI-2018-2020)

**Lead (partners):** Biotech Foods SL, Spain (4)

**Main objective:**

Scale up cultured meat production technology, work on market acceptance and perform safety assessment tests to allow the industrialization and commercialization of poultry cultured meat.

**Output: -**

**Main results:**

Through technical advancements like serum-free culture media and pilot-scale production, the project demonstrated real potential for disrupting the processed meat market. However, challenges such as cost reduction, regulatory approval, and consumer acceptance remain critical for full market integration.

**Title:** PRInted Symbiotic Materials as a dynamic platform for Living Tissues production

**Webpage:** <https://insociety.eu/projects/prism-lt> , <https://cordis.europa.eu/project/id/101070913>

**Duration:** 01.11.2022-31.10.2027

**Funding:** €2,805,404 (HORIZON - EIC)

**Lead (partners):** IN SRL Impresa Sociale, Italy (5)

**Main objective:**

Create a flexible platform for next generation living tissue manufacturing based on Hybrid Living Materials, developing two independent symbiotic materials, targeting biomedical and food applications, respectively.

**Output:** 2 peer reviewed articles, 1 dissertation

**Main results:**

Made advances in synthetic biology, tissue engineering, and biofabrication by integrating microbial engineering, intelligent biomaterials, and precision bioprinting. With demonstrated capabilities in both medical and food domains the platform holds strong potential for wide-ranging impact. Its flexible design allows for adaptation to various applications, but success hinges on scaling, regulatory alignment, and market integration. The project now enters a critical phase of translating innovation into real-world solutions and long-term sustainability.

**Title:** Bioconversion of underutilized resources into next generation proteins for food and feed

**Webpage:** <https://nextgenproteins.eu/> , <https://cordis.europa.eu/project/id/862704>

**Duration:** 01.10.2019-30.09.2023

**Funding:** €7,985,150 (H2020-SFS-2019-1)

**Lead (partners):** Matis, Iceland (24)

## **Main objective:**

Optimise the production of three alternative proteins (microalgae, single cell protein and insects) and verify their use in various feed and food applications, in order to meet customers' needs and ensure consumer acceptance.

**Output:** 7 peer reviewed articles, 5 dissertations, 1 book chapter, 24 conference presentations

## **Main results:**

Demonstrated that novel protein sources derived from microalgae, single-cell organisms, and insects are viable, sustainable alternatives to conventional proteins in both food and feed. Through successful production scaling, product development, and regulatory groundwork, the project made significant strides toward market readiness. However, challenges remain, particularly in terms of cost-competitiveness, regulatory clarity, and consumer acceptance. Continued innovation, policy support, and stakeholder engagement will be essential to fully realize the potential of these next-generation proteins.

# #24: SMART PROTEIN



**Title:** Smart Protein for a Changing World. Future-proof alternative terrestrial protein sources for human nutrition encouraging environment regeneration, processing feasibility and consumer trust and Acceptance

**Webpage:** <https://smartproteinproject.eu/> , <https://cordis.europa.eu/project/id/862957>

**Duration:** 01.01.2020-30.06.2024

**Funding:** €8,179,214 (H2020-SFS-2019-1)

**Lead (partners):** University College Cork, Ireland (33)

## **Main objective:**

1) Validating and demonstrating innovative, cost-effective and resource-efficient plant protein products from fava bean, lentil, chickpea and quinoa. 2) Microbial biomass proteins will be created from edible fungi by upcycling side streams from pasta (pasta residues), bread (bread crust) and beer (spent yeast and malting rootlets) industries.

**Output:** 31 peer reviewed articles, 1 dissertation

## **Main results:**

Demonstrated strong potential for alternative protein sources, such as legumes, fungi, and microbial biomass, to contribute to a sustainable, secure, and resilient European food system. The project validated scalable and nutritious alternatives to animal protein. Despite significant achievements in product development, consumer engagement, and environmental performance, further efforts are needed to overcome regulatory, economic, and technological barriers. Policy reforms, funding increases, and stronger value chain integration will be essential to enable widespread adoption and impact.

**Title:** From niche to mainstream – alternative proteins for everybody and everywhere

**Webpage:** <https://www.like-a-pro.eu/> , <https://cordis.europa.eu/project/id/101083961>

**Duration:** 01.11.2022-31.10.2026

**Funding:** €11,999,660 (HORIZON-CL6-2022-FARM2FORK-01)

**Lead (partners):** CNTA, Spain (43)

## **Main objective:**

Explore the production of new food products from alternative protein sources such as rapeseed, mealworms, krill, microbes, mushrooms, fermented fungi and peas. Investigate the consumers' needs and ways to meet them with new products.

**Output:** 4 peer reviewed articles, 1 trademark

## **Main results:**

Demonstrated that consumer interest in alternative proteins is strong, but widespread adoption is still limited by sensory, cultural, infrastructural, and regulatory challenges. Mainstreaming these products will require coordinated actions across the entire value chain, including tailored communication, supportive policies, improved labeling, and optimized product development to ensure affordability, appeal, and accessibility.

# #26: Giant Leaps



**Title:** Gap resolution in safety, nutritional, allergenicity and environmental assessments to promote alternative protein utilization and the dietary shift

**Webpage:** <https://giant-leaps.eu/> , <https://cordis.europa.eu/project/id/101059632>

**Duration:** 01.09.2022-31.08.2026

**Funding:** €10,272,862 (HORIZON-CL6-2021-FARM2FORK-01)

**Lead (partners):** WUR, The Netherlands (35)

## **Main objective:**

Develop improved, fast and animal-friendly methodologies for the health, safety and environmental assessment of alternative proteins.

**Output:** 7 peer reviewed articles

## **Main results:**

Developed tools and data platforms to support evidence-based decisions. While progress has been made in understanding the benefits and risks of alternative proteins, challenges remain in standardizing assessments and ensuring regulatory and consumer trust. Continued co-creation, open data sharing, and targeted policy integration will be key to accelerating the protein transition for a more sustainable and resilient food system.

**Title:** Producing novel non-plant biomass feedstocks and bio-based products through upcycling and the cascading use of brewery side-streams

**Webpage:** <https://cheers-project.eu/> , <https://cordis.europa.eu/project/id/101060814>

**Duration:** 01.09.2022-31.08.2026

**Funding:** €5,670,152 (HORIZON-CL6-2021-CIRCBIO-01)

**Lead (partners):** Mahou SA, Spain (35)

**Main objective:**

Revalorise under-utilised or waste by-streams from the brewing industry for 5 bio-based products with attractive market opportunities: insect protein, disinfectant, microbial protein, ectoine and caproic acid. All value chains are based on new bioprocesses and/or innovative biofermentors combined with sustainable downstream processes, which will be validated at demoscale at an industrial brewery.

**Output:** - (lot of news on website though)

**Main results:**

significant progress in developing a circular biorefinery model that valorizes brewery waste into multiple high-value products, including substantial amounts of insect protein and microbial bioproducts. The pilot facility has demonstrated promising yields and sustainability benefits, including carbon footprint reduction.

**Title:** Circular and Inclusive utilisation of alternative PROteins in the MEDiterranean value chains

**Webpage:** <https://cipromed-project.com/>

**Duration:** 01.05.2023-01.05.2026

**Funding:** €4,054,642 (PRIMA (DG RTD main funder))

**Lead (partners):** University of Thessaly, Greece (17)

## **Main objective:**

Increase the stability and resilience of Mediterranean agri-food production systems through direct exploitation of locally produced traditional crops, as well as by valorising the proteins from locally generated agri-industrial side-streams (e.g., brewer's spent grain, oilseed presscakes), and the upcycling and bioconversion of their extraction residues to protein produced by insects, legumes, microalgae and fermentation to be further utilized in the agri-food and feed sectors.

**Output:** 2 peer reviewed articles

## **Main results:**

Significant progress in utilizing agro-industrial side streams for sustainable insect and microalgae production. Promising results have been achieved in formulating poultry feeds with black soldier fly larvae meal and aquafeeds for rainbow trout incorporating both insect meal and Chlorella microalgae, with feeding trials underway to validate nutritional performance. The project has demonstrated the potential of insect frass as an effective biofertilizer, with field trials showing enhanced growth and yield in legume cultivation. Ongoing environmental and socio-economic impact assessments, along with consumer studies, will support the sustainable scaling and market introduction.

**Title:** Exploration and Implementation of Products with Alternative Proteins in the Mediterranean Region

**Webpage:** <https://proximedprima.eu/>

**Duration:** 01.04.2023-01.04.2027

**Funding:** €4,095,700 (PRIMA (DG RTD main funder))

**Lead (partners):** Weihenstephan-Triesdorf University of Applied Science, Germany (I7)

**Main objective:**

Introduce proteins from sustainable sources into the Mediterranean food and feed systems to promote and establish the use of alternative proteins.

**Output:** 2 peer reviewed articles

**Main results:**

Summary of published results so far: Ultrasound-assisted extraction is a promising technique for improving protein yields from unconventional plant sources such as duckweed and mallow leaves. The duckweed study offers deeper nutritional and biochemical insight, while the mallow study focuses on process optimization. However, both studies underscore the need for further research on protein functionality, nutritional completeness, and industrial feasibility to support the development of sustainable plant-based protein ingredients.

**Title:** Unlocking new VALUE from urban bioWASTE

**Webpage:** <https://valuewaste.eu/> ,

**Duration:** 01.11.2018-31.10.2022

**Funding:** €8,375,472 (H2020-SFS-2018-2020)

**Lead (partners):** Cetenma, Spain (20)

**Main objective:**

An integrated approach in urban biowaste upcycling for the production of high-value biobased products, such as food and feed proteins.

**Output:** 3 peer reviewed articles, 4 patents, 2 trademarks

**Main results:**

Demonstrated the conversion of urban biowaste into high-value products. Two protein value chains were validated: one producing 80 t/year of single-cell protein from methanotrophic bacteria, and another yielding 14,500 kg/year of insect protein from black soldier fly larvae. Both proteins showed lower environmental impact than traditional sources like soybean meal and gluten. A third chain recovered nutrients as EU-compliant fertilizers. All value chains reached high TRLs (7–8) and passed safety, environmental, and social acceptance assessments. Business models and scale-up plans were developed, with strong market potential for single-cell protein. Citizen engagement improved waste quality and acceptance. The project continues through follow-up initiatives such as HOOP, FER-PLAY, and SOILUTIONS.

# THANK YOU

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