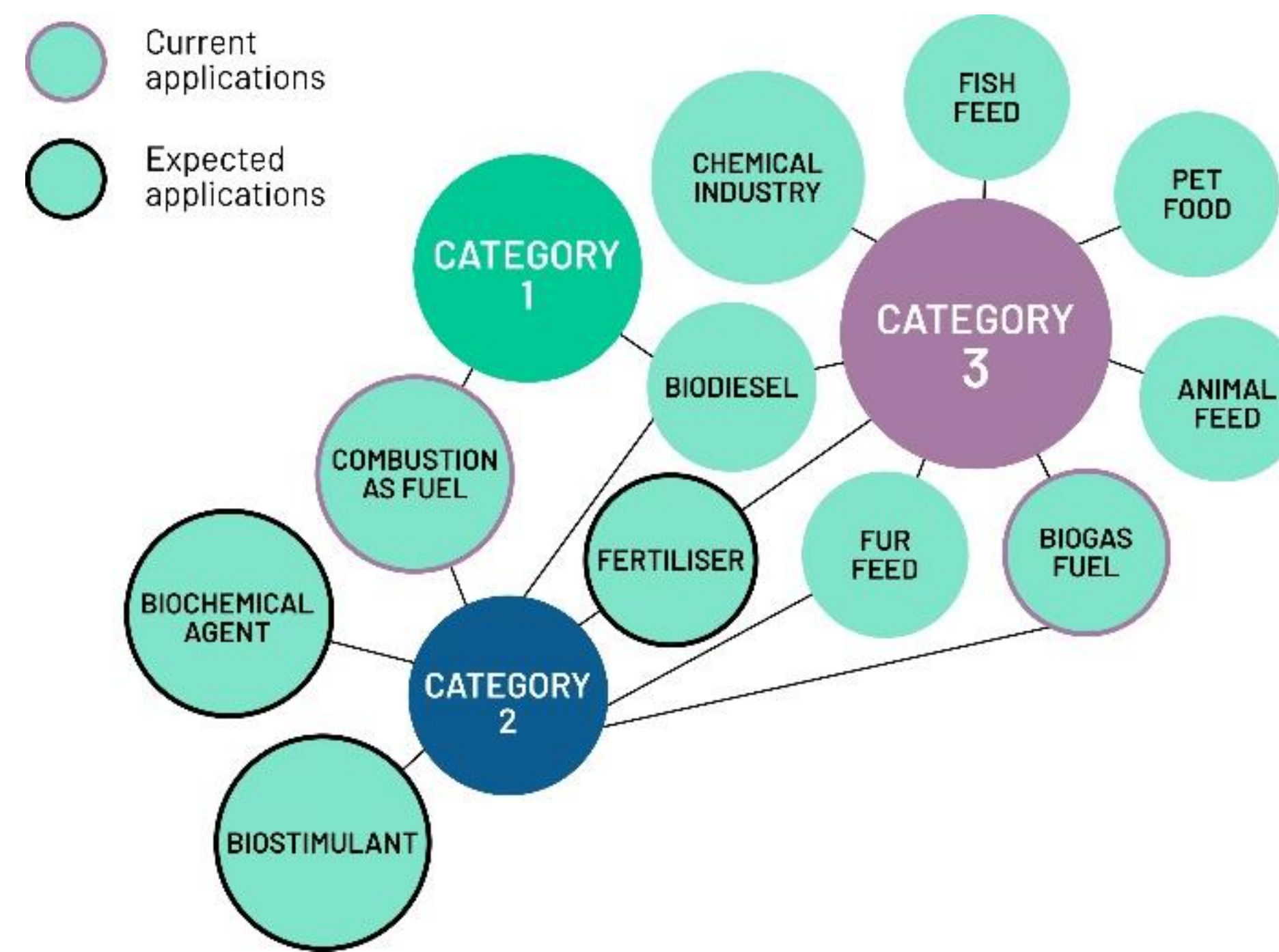


INTRODUCTION

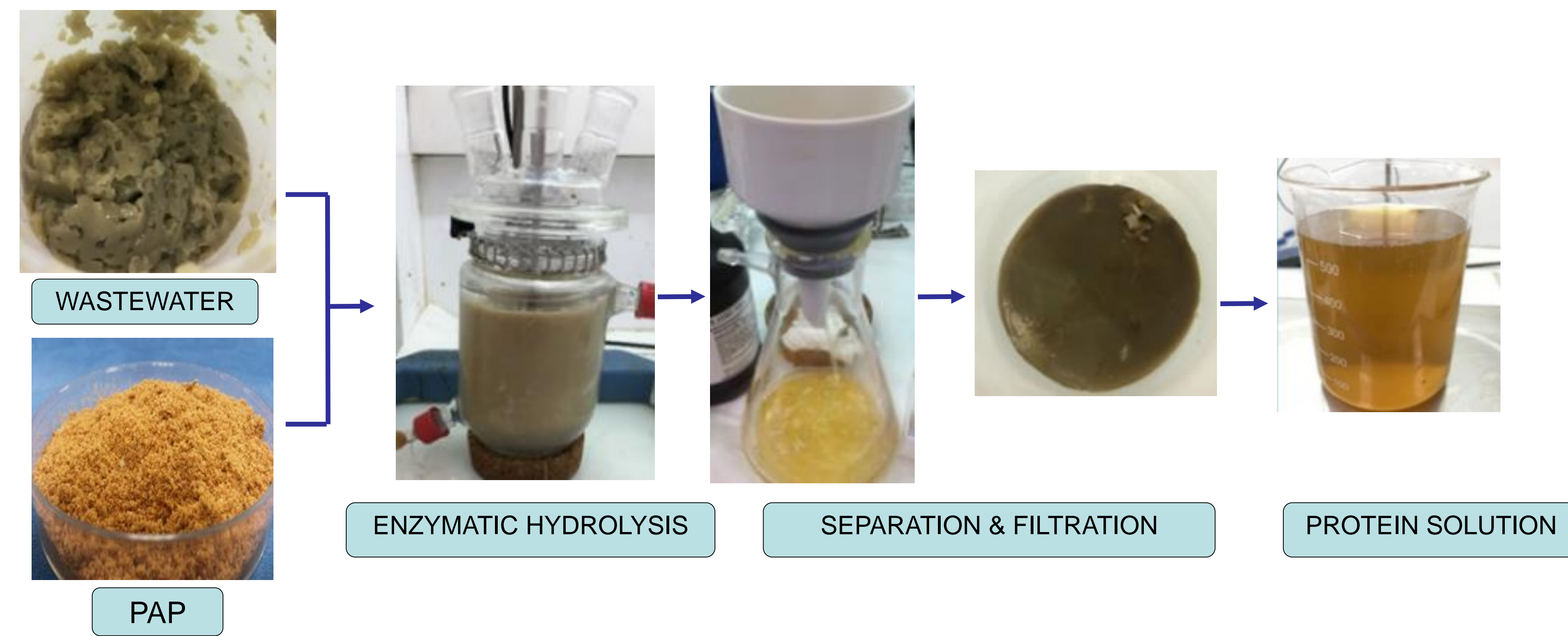
Europe is currently moving towards a bioeconomy that could achieve sustainable production, processing and storage as well as an efficient use of biological resources and recycling while mitigating environmental issues, climate change, fossil resources shortage, and the increasing needs of a growing population. In this sense without a doubt, the use of animal by-products (ABPs) and waste streams from livestock industry is an immense contribution towards a **circular bioeconomy** where biological resources might be recovered into **value-added bioproducts** due to their high content of protein, fats, carbohydrates, minerals, vitamins and other nutrients.

LIFE byProtVal aims to recover valuable animal proteins and their hydrolysates from greaves and protein-containing processing wastewater generated in rendering facilities (Category 2 and 3 ABPs), for high added value applications. Including amongst others, organic fertilizers or free amino acid based biostimulants, contributing towards sustainable agriculture representing a greener alternative to mineral fertilizers.



MATERIALS & METHODS

PROPOSED STRATEGY FOR PROTEIN RECOVERY FROM DIFFERENT ANIMAL BY-PRODUCTS



RAW MATERIALS CHARACTERISATION

Parameters	Wastewater cat 3	PAP-1 Cat 2
pH	6.29	6.48
Solids content (%)	19.49	91.49
Moisture (%)	80.51	1.5
Fat content (%in dry matter)	35.44	39.95
Ash content (%in dry matter)	6.84	7.7
Total aminoacids content (% in dry matter)	40.31	43.84

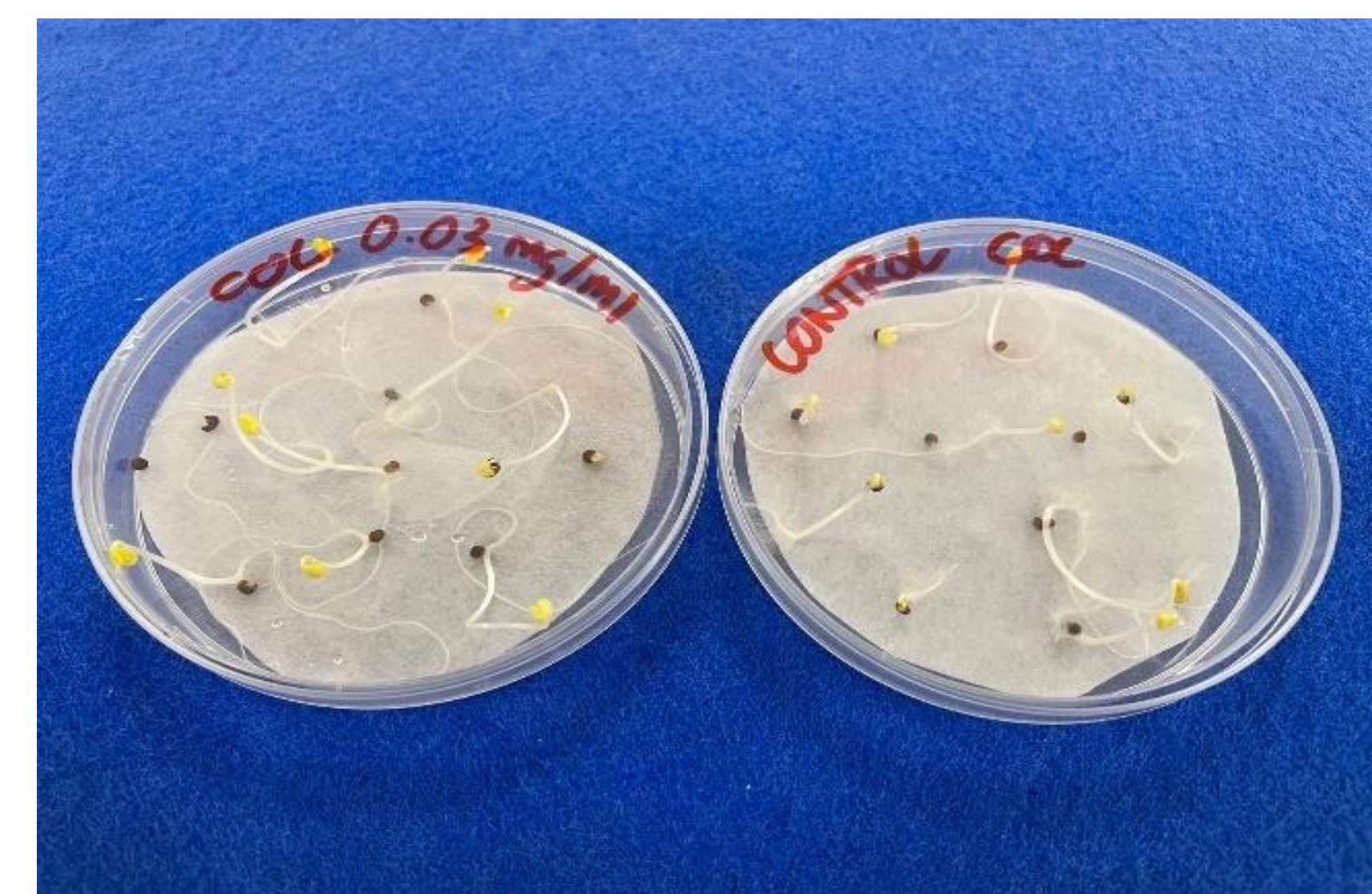
LIFE byProtVal project is working on an enzymatic hydrolysis pilot plant for the protein and wastewater recovery from animal by-products. The developed enzymatic process has proven to be suitable for obtaining up to 85% of proteins and their hydrolysates with suitable properties for the intended applications: mainly **free amino-acids based biostimulants**.

RESULTS

OPTIMISATION OF ENZYME LOADING TO OBTAIN BIOSTIMULANT FROM WASTEWATER

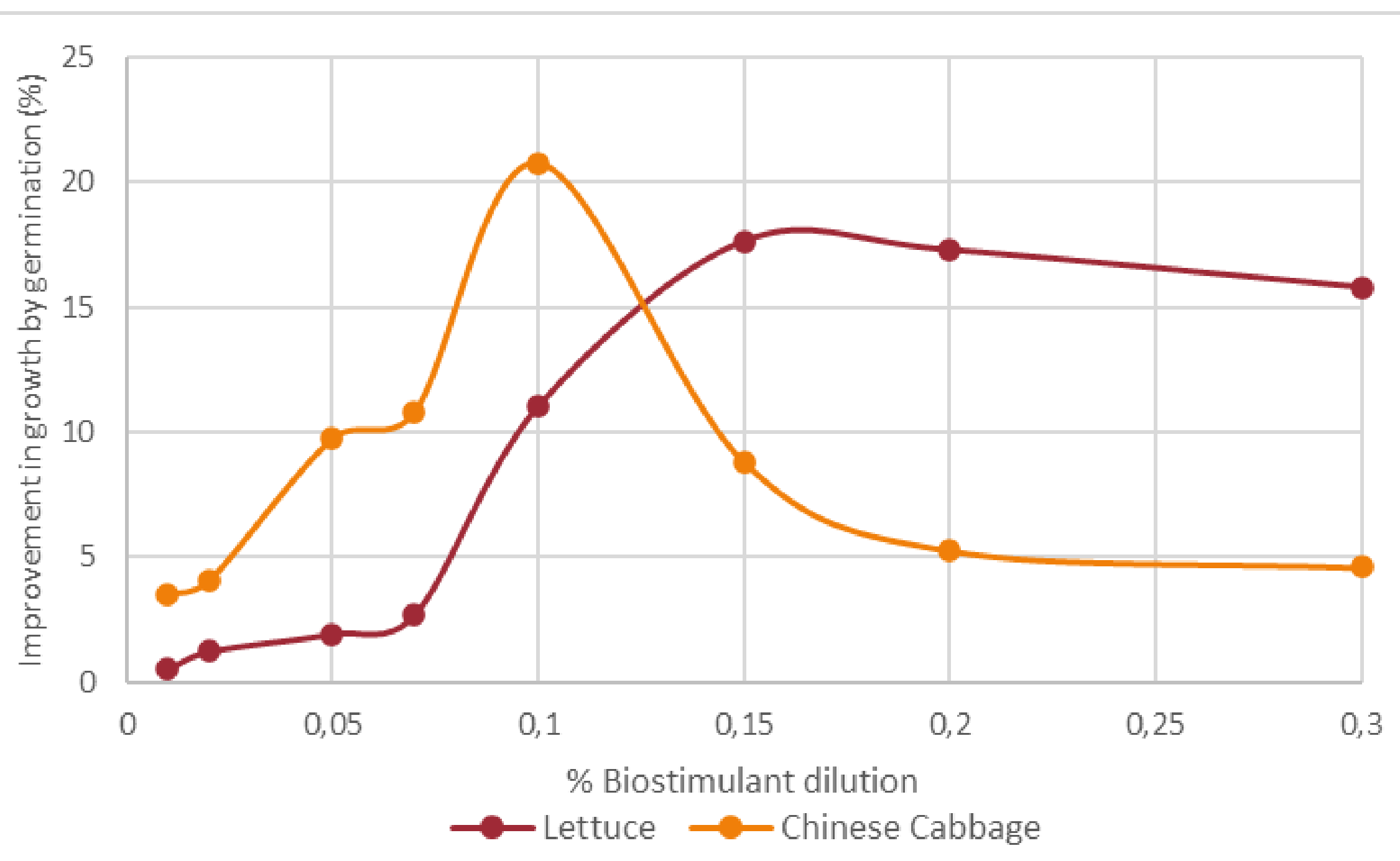
The best results were obtained with 6h hydrolysis time when 1% NP-1 enzyme was used, achieving the highest total amino acid content (60.72%) and the highest proportion of free amino acids in solution (5.09%).

IP-2 (%)	t (h)	Yield (%)	Total amino acid (%)	Protein recovery (%)	Free amino acid solution (%)
0.5	6	74.91	57.98	94.85	4.79
0.7	6	74.04	58.47	94.55	4.70
0.8	6	63.20	58.96	97.22	4.70
1	6	66.49	60.72	87.50	5.09
1.1	6	65.69	55.73	96.26	4.72
1.6	6	53.86	57.25	67.34	4.56
0.8	4	73.27	51.85	97.45	4.26
1	4	75.92	53.73	99.63	4.45



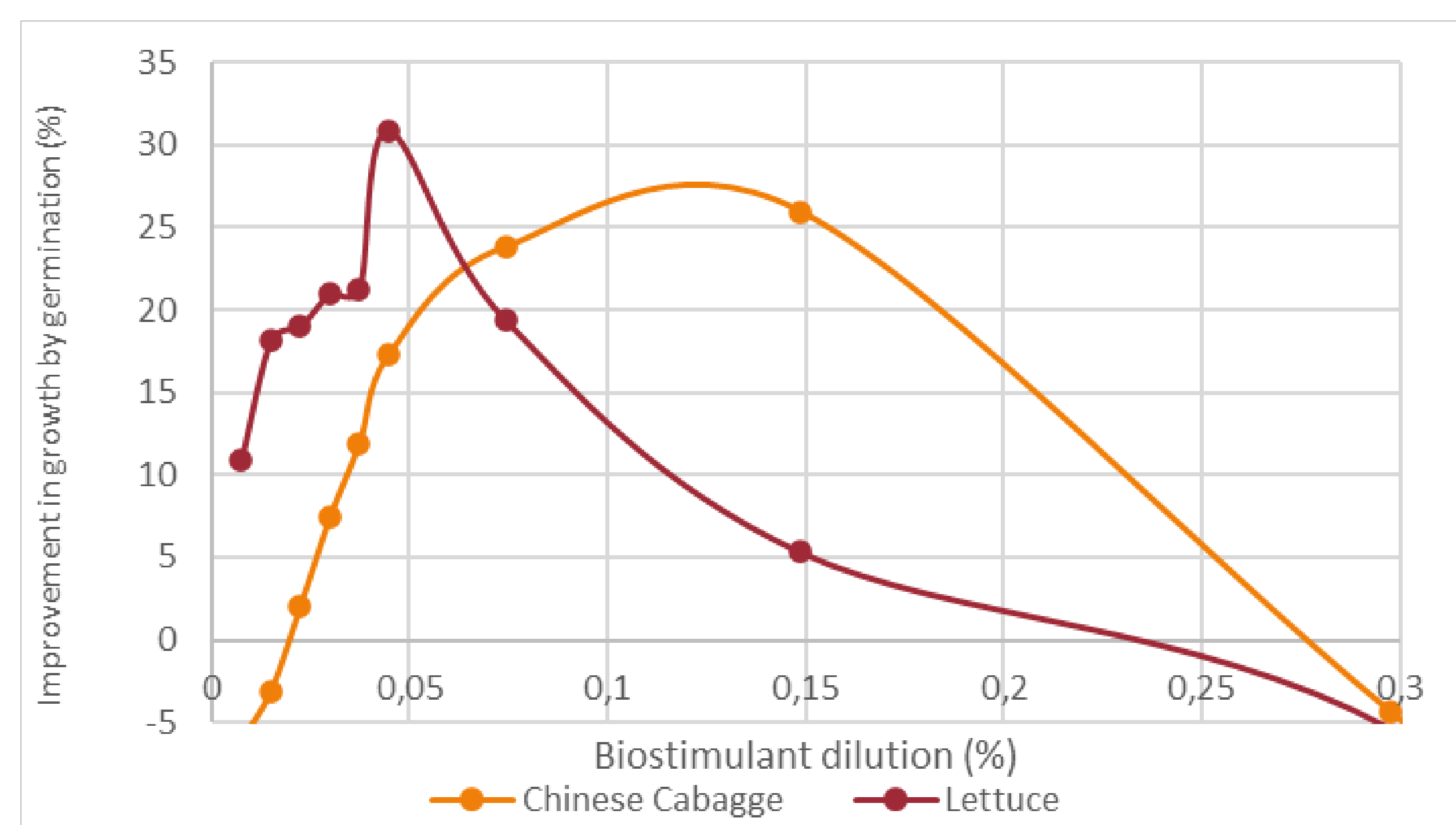
Evaluation of Chinese cabbage and lettuce growth by germination in a Petri dishes

VALIDATION OF HYDROLYSED PRODUCT FROM WASTEWATER AS A BIOSTIMULANT



Chinese cabbage optimum growth at biostimulant concentration range 0.075 - 0.152% and lettuce of 0.14-0.16% (1 mL of biostimulant solution/100mL of water), improving growth over 20% and 17% respectively.

VALIDATION OF BIOPOLYMER BASED FREE AMINO ACIDS AS A BIOSTIMULANT



Chinese cabbage optimum growth at biostimulant concentration range 0.023 - 0.046% and lettuce of 0.14% (1 mL of biostimulant solution/100mL of water).

LIFE ByProtVal RESULTS

The developed bioprocess has proved to allow the recovery up to 78% of mass yields as biostimulants and suitable properties for its implementation as a formulated product in the fertilizer market, so that the valorization of these animal by-products to produce biostimulants could be replicated and implemented in other waste management plants.

LIFE ByProtVal IMPACT

ByProtVal biostimulants are developed by means of a resource-efficient bioprocess, with a much lower carbon and water footprint compared to chemically obtained biostimulants. In addition, GHG emissions are reduced during due to mineral fertilisers substitution. Water quality is also improved as a result of a N leaching reduction.

ACKNOWLEDGEMENTS



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LIFE ByProtVal Consortium:



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