

MULTI-PURPOSE NEW-GENERATION BIOSTIMULANTS FROM DAIRY INDUSTRY BYPRODUCTS AND BIOWASTE

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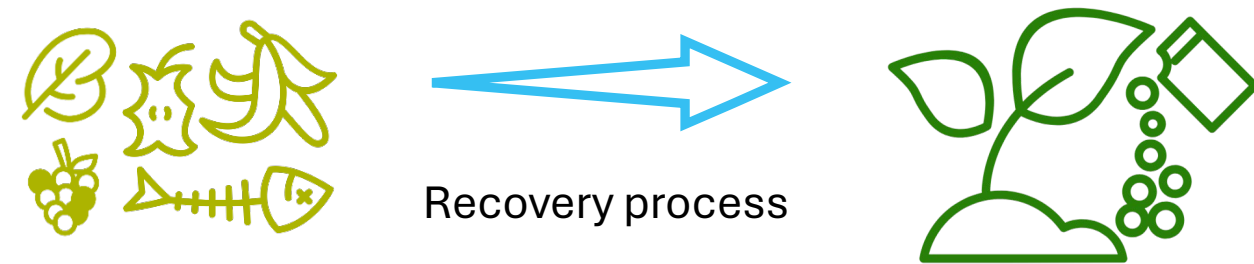
SPOKE, WP AND TASK

- **Spoke 8:** New models of circular economy in agriculture through waste valorization and recycling
- **Work Package 3:** Nutrient and organic matter recovery from wastes to reduce the use of agrochemicals and closing waste cycle
- **Task 8.3.2:** Valorization and biological regeneration of wastes as resources, organic fertilizers or amendments to improve carbon storage and soil quality

BACKGROUND, GAP AND GOAL

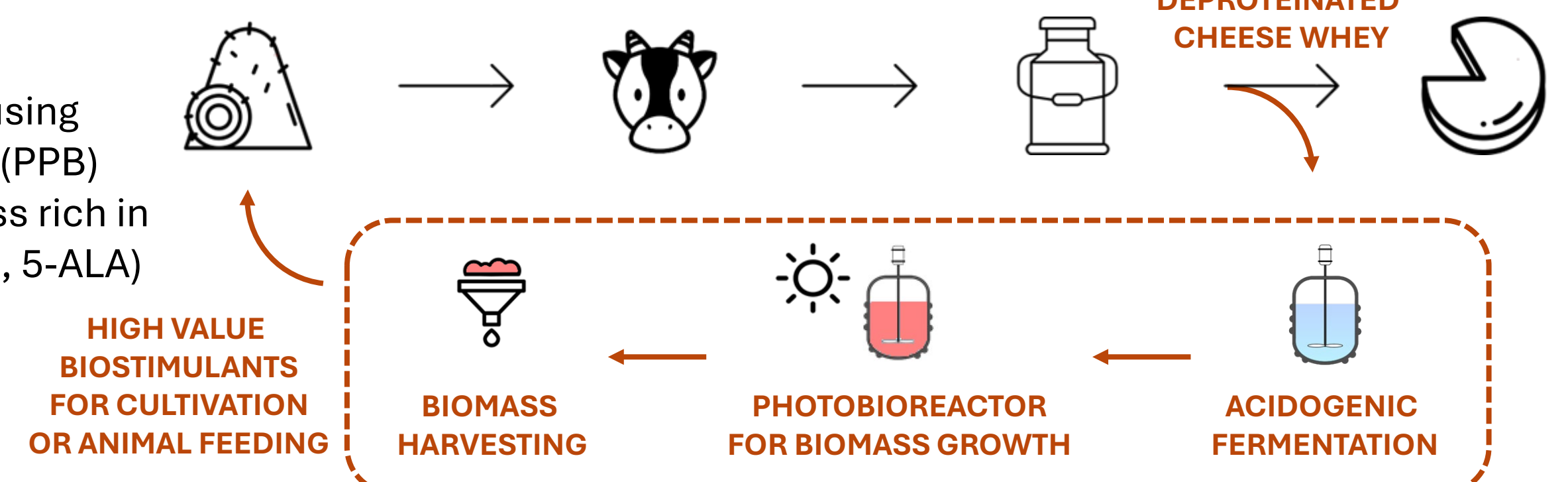
Intro Background and gap

- Nutrients dispersed in production: pollution phenomena and continuous integration from primary resources
- Need for sustainable and circular value chains in the agri-food sector at the local scale



Goal

Develop an innovative solar-based biotechnology using purple phototrophic bacteria (PPB) for recovering high-value biomass rich in biostimulating compounds (e.g., 5-ALA)



WORKFLOW

TECHNOLOGY DEVELOPMENT WITH COMBINED EXPERIMENTAL AND MODELLING APPROACH

- (1) Optical properties characterization and radiation transfer modelling
- (2) Integrated biokinetic modelling and parameter estimation
- (3) Optimized process design and operation in continuous-flow systems

TRL ADVANCE ROADMAP



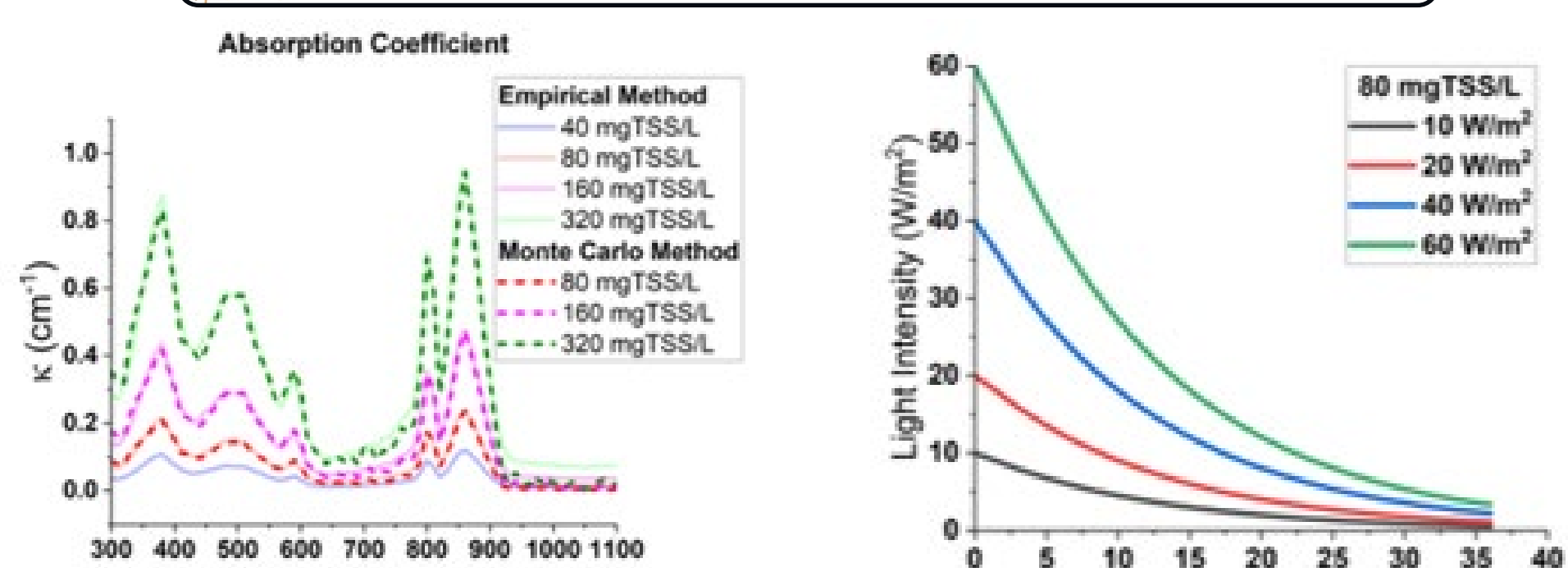
INNOVATIVE STRATEGY FOR BIOMASS HARVESTING (PROCESS BOTTLENECK)

- PPB grown attached to supports (fertilizers, soil amendments)



RESULTS

Detailed description of multi-physical system

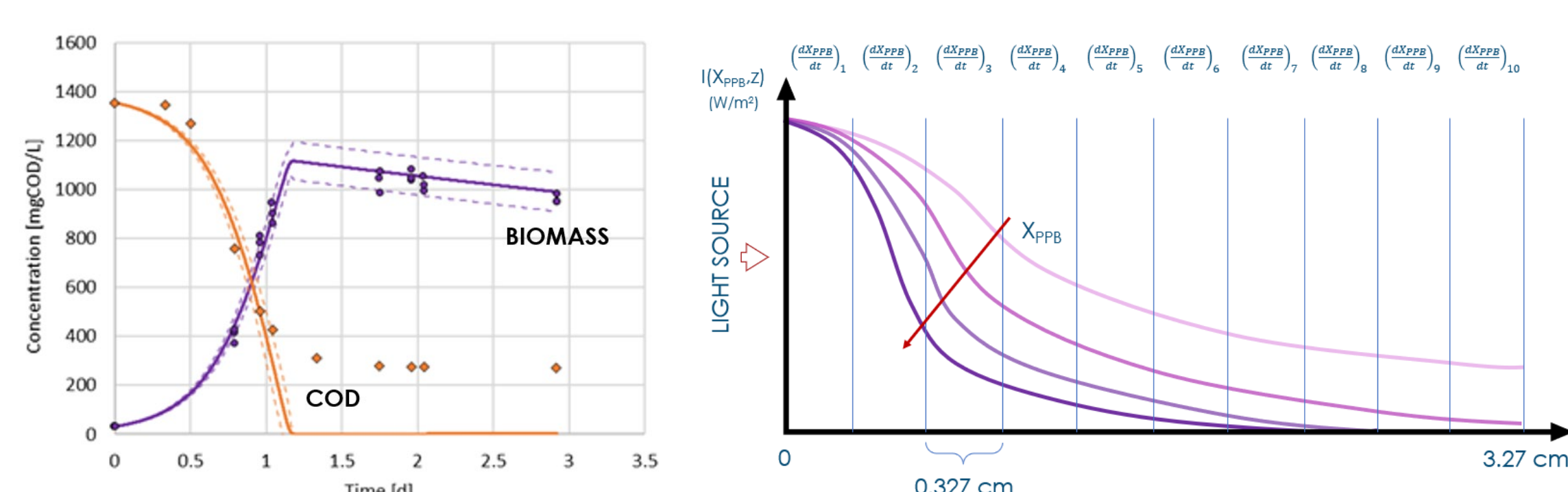
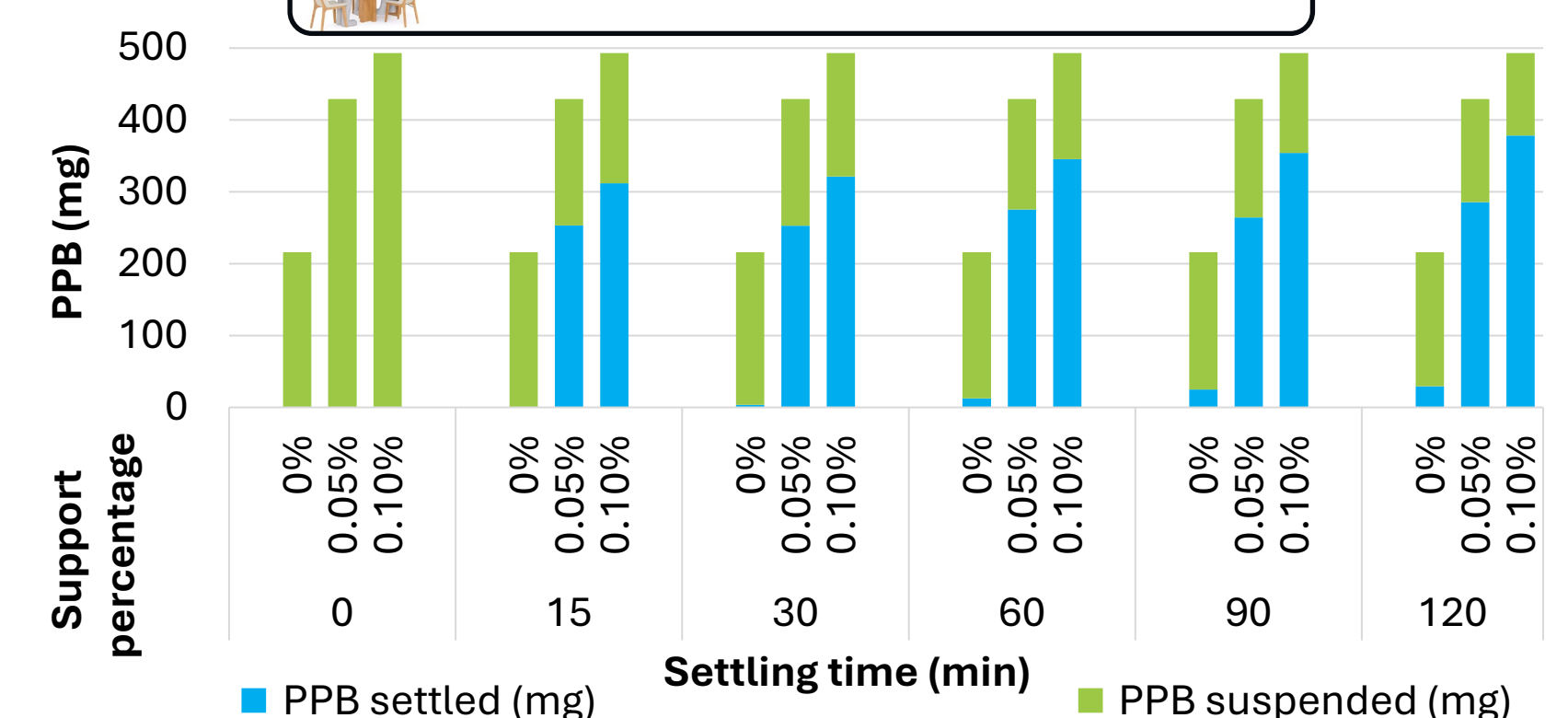


Process optimization strategy

Identification of optimal parameters for maximizing biomass productivity

- Photobioreactor geometry
- Process operating conditions
 - o PPB biomass and support
 - o media concentration
 - o HRT and SRT
 - o Organic loading rate

Improved biomass separability



FUTURE DEVELOPMENTS

- Testing of different types of supports (e.g. biochar, struvite)
- Assessment of the influence of operating conditions (e.g., support media concentration, feedstock characteristics)
- Design of an optimized integrated continuous-flow process
- Testing of characteristic properties of recovered products (e.g., regulatory compliance, composition, biostimulating properties)
- Technology scale-up and validation in realistic environment

