



SARGASSUM VALORIZATION BY PYROLYSIS - APPLICATION FOR FOOD SAFETY

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Laboratory COVACHIMM2E

International Joint call on Sargassum, 19/10/24, CWTC Guadeloupe

The consortium

Partner	Research Unit	Name	Role	Expertise
UNIVERSITY OF ANTILLES	COVACHIMM2E	Pr Gaspard	LPI*	Environmental chemistry – Activated carbon – Energy storage
		Dr Yacou	member	
		Dr Jeanne-Rose V.	member	
		Dr Passe-Coutrin	member	
	Jean-Marius	Member		
UMR ECOFOG	Dr Dulorme	PPI*	Plant ecophysiology	
LARGE	Pr Soubdhan	PPI*	Energetic and process engineering	
CREDDI	Pr Maurin	Dr Mathouraparsad	PPI*	Economic modelling
		Dr K Lanneau	member	Economic analysis
		F Navis	member	Social sciences
UMR ISYEB	Pr. O. Gros	PPI*	Soil mesofauna and macrofauna	
Dr Loranger-Merciris	Member	Marine biology		
UNIVERSITY OF LORRAINE	UR AFPA - INRA	Pr Rychen	LPI*	POP transfer food chain
		Pr C Feidt	member	
INRA	ASTRO	Dr Delannoy	member	Environmental Chemistry / pedology / Agronomy
		Dr Richard	PPI*	
NST	NST	Dr Tournebize	Member	Activated carbon production
		Dr M. Ugolin	PPI*	
ARS – IREPS	ARS-IREPS	Dr N. Ugolin	PPI*	Food safety
		M Thalmensi	PPI*	
		M Bocharel	member	
		Mme Batoul	member	





Background



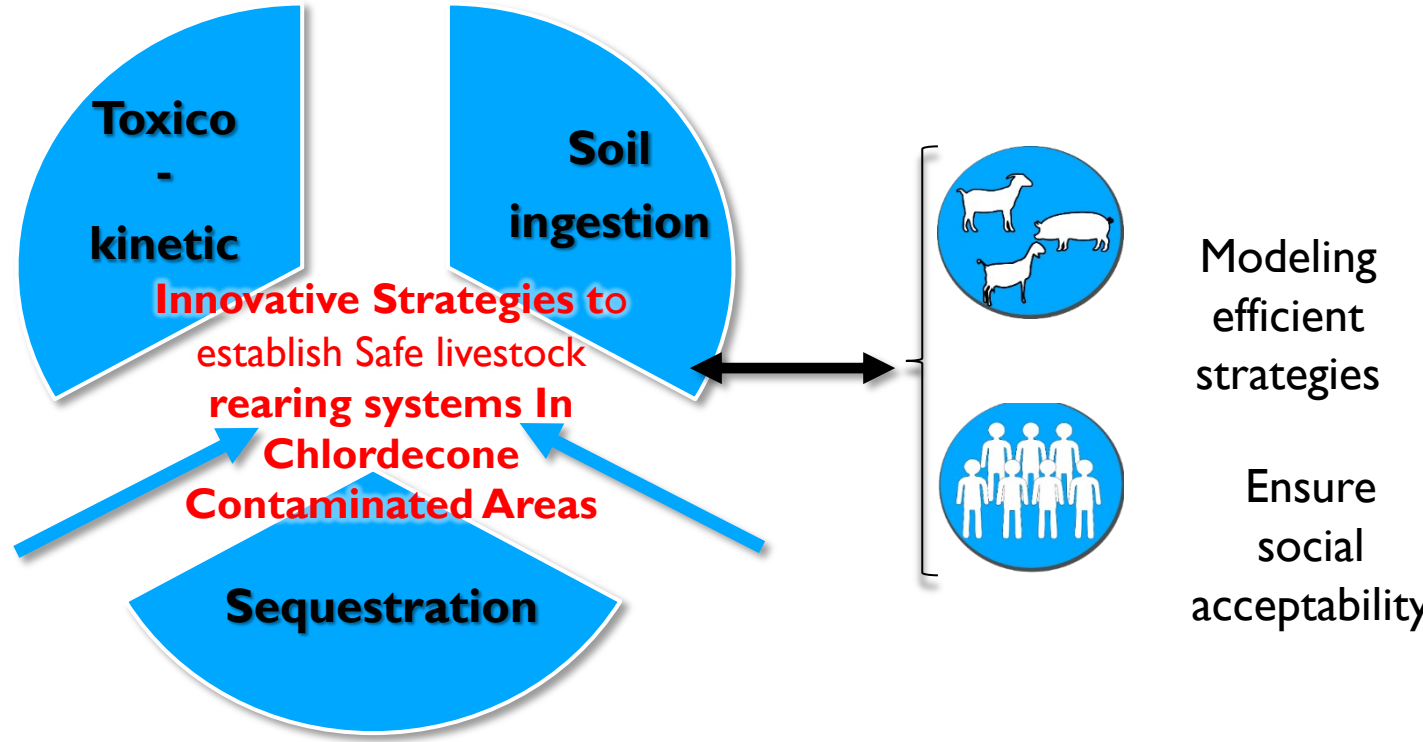
Results of ANR project INSSICCA



2016-2021



PITE Antilleans funding



Assessing the retention of CLD during digestive processes of piglets after amendment of soils with biochars or ACs



Sargassum fluitans



Cocos Nucifera

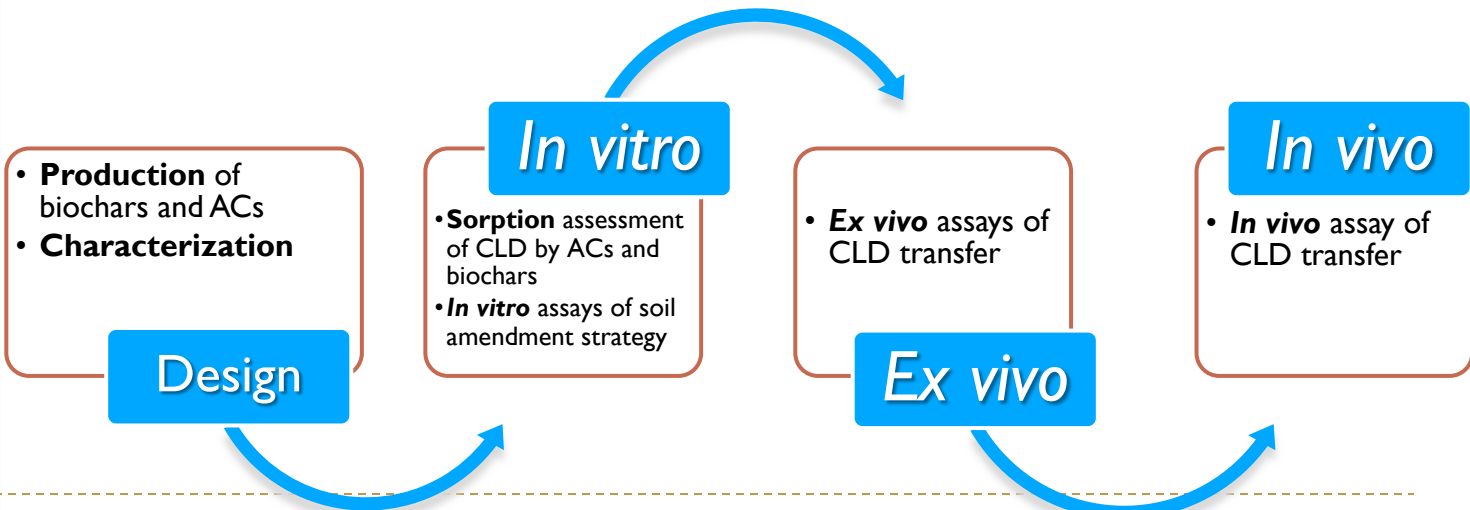
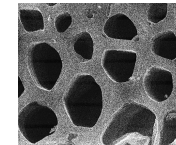


Quercus ilex

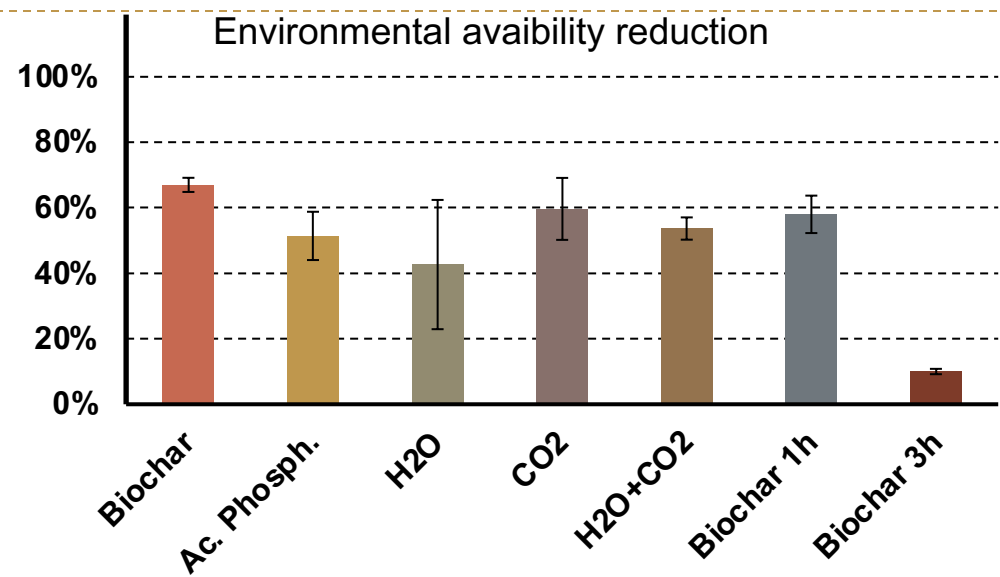


Commercial ACs

Precursors $\xrightarrow{\text{Pyrolysis Activation}}$



Background



CLD concentration in liver

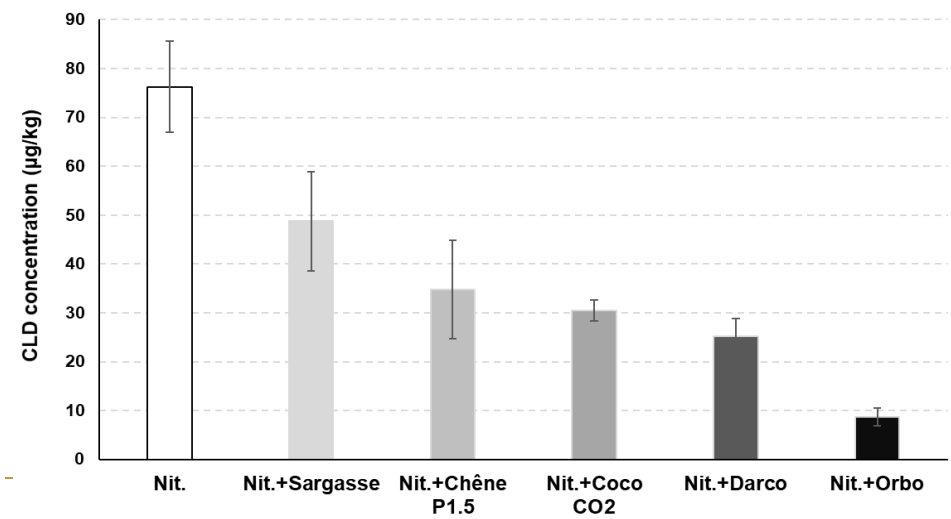


Fig. Concentrations of CLD in liver (µg of CLD per kg of DM).

Objectives

- ▶ Optimize the production of biochar BC and activated carbon AC from sargassum at laboratory and industrial scale using the solar microwave process (**SMO®**) of NST



- ▶ Characterize raw sargassum and carbon materials produced
- ▶ Assess the sequestration ability of the produced BC/AC with the aim to avoid organochlorine pesticides transfer either to vegetables entering the food chain or food producing animals at laboratory
- ▶ amend organochlorine pesticides contaminated areas, in close relation with garden owners (JAFA program), with the best BC/AC candidates
- ▶ Evaluate from an economic point of the view the macroeconomic impact since the territorial issues have to be faced. Evaluate the driving effect of a biochar/activated carbon sector (including collection activity) on the rest of the economy

Research questions addressed

- ▶ Properties of AC and biochar and synthesis method for producing at laboratory scale efficient material for pesticide sequestration
- ▶ Production method at industrial scale of optimized AC and BC with the solar micro-wave, **SMO®** process of NST
- ▶ Quality the sargassum precursor and of carbon materials produced
- ▶ Impact of these materials on plants, soil macro-fauna, and microorganisms?
- ▶ How to amend the soil for optimizing pesticide sequestration?
- ▶ What is the economic impact of the setting up of this new sector - driving effect?

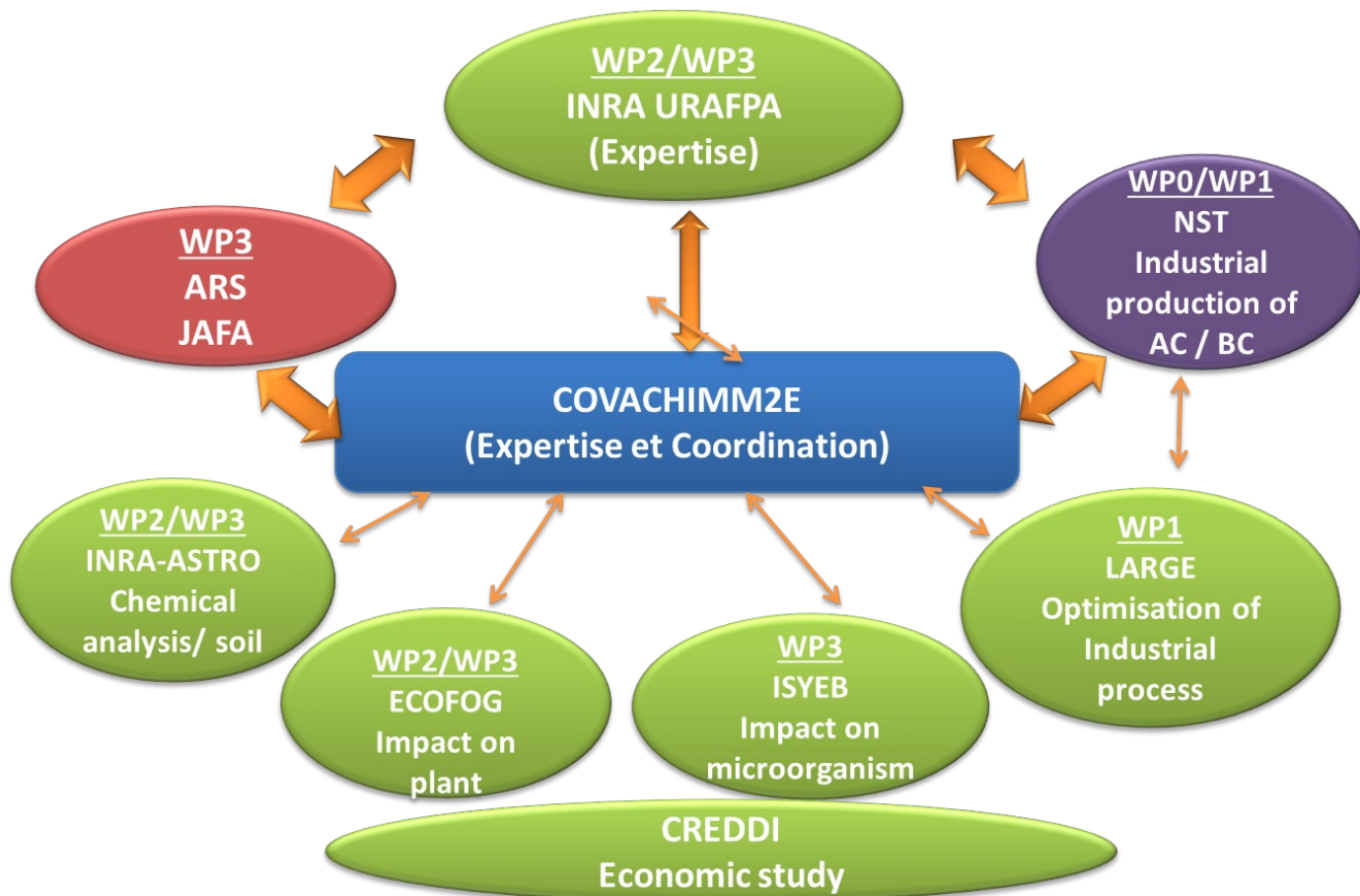
Management of the project

■ Proposants

■ Partenaires Développement

■ Partenaires académiques

■ Partenaires techniques



WP0 - Coordination

COVACHIMM2E / URAFFA

WP0.1. Coordination of meetings between partners
Kick-off, mid-term, final meetings

WP0.2. Steering committee with stakeholders

WP0.3. Coordination of the publication process, reports writing



WPI. - Collection and characterization of Sargassum - Biochars and activated carbon production and characterization

NST/ COVACHIMM2E/ASTRO/ECOFOG

WPI.1. Collection and characterization of Sargassum

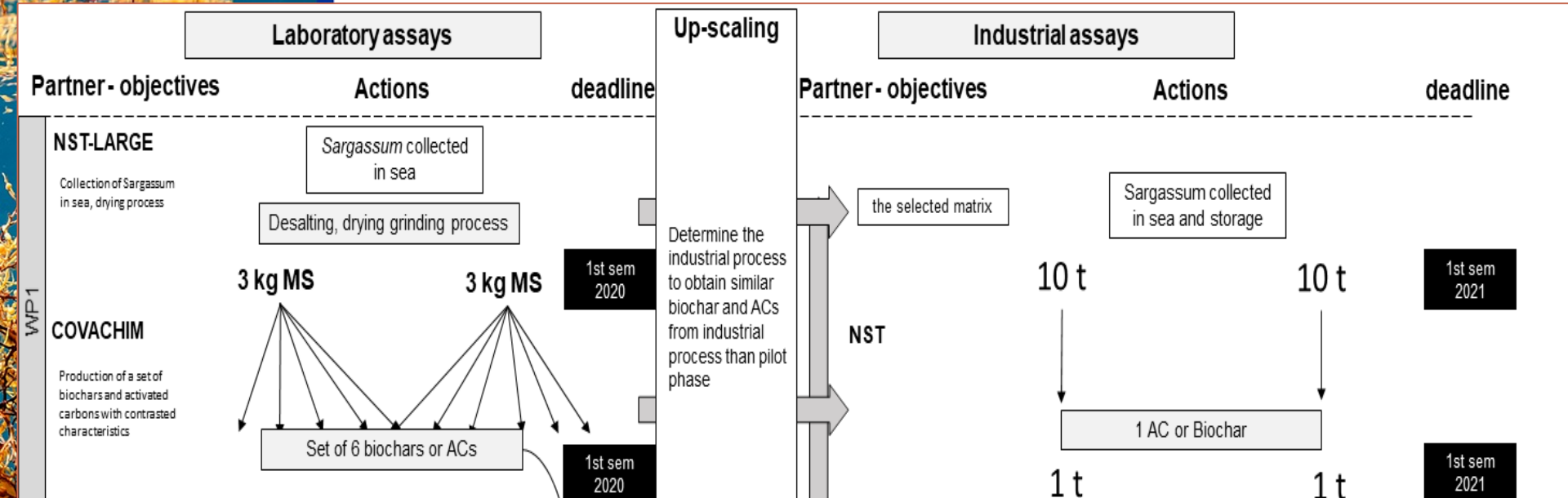
WPI.2. Biochars and activated carbon production and characterization

WPI.3. Industrial production of the most promising media

WPI.4. Innocuity assessment and treatment of the Sargassum as precursor and of carbon materials

WPI : Collection and characterization of Sargassum - Biochars and activated carbon production	COVACHIMM2E NST					
I.1 Collection		NST			NST	
I.2 Characterization		COVACHIMM2E		ASTRO		
I.3 Production of 6 different biochars and Acs	COVACHIMM2E		COVACHIMM2E			
I.4 Industrial production of the most promising media				NST		





WP2 - Pesticide residues sequestration by Sargassum biochars and activated carbons and innocuity assessment on soil microbiota, plant and animal

COVACHIMM2E / URAFPA / ASTRO / ECOFOG

WP2.1. Environmental availability assays

WP2.2. *In vivo* validation : Relative Bioavailability assays

WP2.3. Effect of AC and BC on the pesticides transfert between soil to plant and innocuity



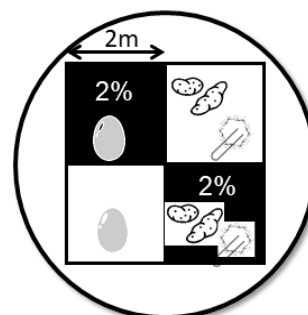
WP3 : In situ demonstration of pesticide residues sequestration ensuring safety of food products

URAFPA ARS-IREPS INRA ECOFOG ISYEB



Soil Type A	Soil Type B
Selection of 3 distinct garden locations of this soil type	Selection of 3 distinct garden locations of this soil type
- Garden A.1	- Garden B.1
- Garden A.2	- Garden B.2
- Garden A.3	- Garden B.3

6 tested gardens of 2 soil types from Guadeloupe (JAFA program – ARS/IREPS)



Scheme of an experimental garden

Sub-areas of 4m² amended or not by 2% of the most promising matrix. 2 assays performed :

- (1) laying hens and
- (2) transfer to vegetable with environmental availability assay



Soil Type A	Soil Type B
Selection of 3 distinct garden locations of this soil type	Selection of 3 distinct garden locations of this soil type
- Garden A.1	- Garden B.1
- Garden A.2	- Garden B.2
- Garden A.3	- Garden B.3

6 tested gardens of 2 soil types from Martinique (JAFA program – ARS/IREPS)





- WP3.1 Identification of contaminated sites
- WP3.2. Sampling of contaminated soils
- WP3.3. Preparation of amended soils
- WP3.4 in vivo validation of sequestration
- WP3.5. Innocuity assessment on plants and microorganisms

WP3 :Assessment of innocuity and efficiency of biochars and Acs	ARS IREPS, URAFPA, INRA, ECOFOG										
	3.1 Identification of contaminated sites	ARS - IREPS		ARS-IREPS							
	3.2 Sampling of contaminated soils		ARS - IREPS								
	3.3 Preparation of amended soils			ARS			ARS				
	3.4 in vitro assessmbent of sequestration				URAFPA			URAFPA			
	3.4 in vivo validation of sequestration					URAFPA			URAFPA		
	3.5 innocuity assessment on soil plants and microbiota				ECOFOG	ASTRO				ISYEB	

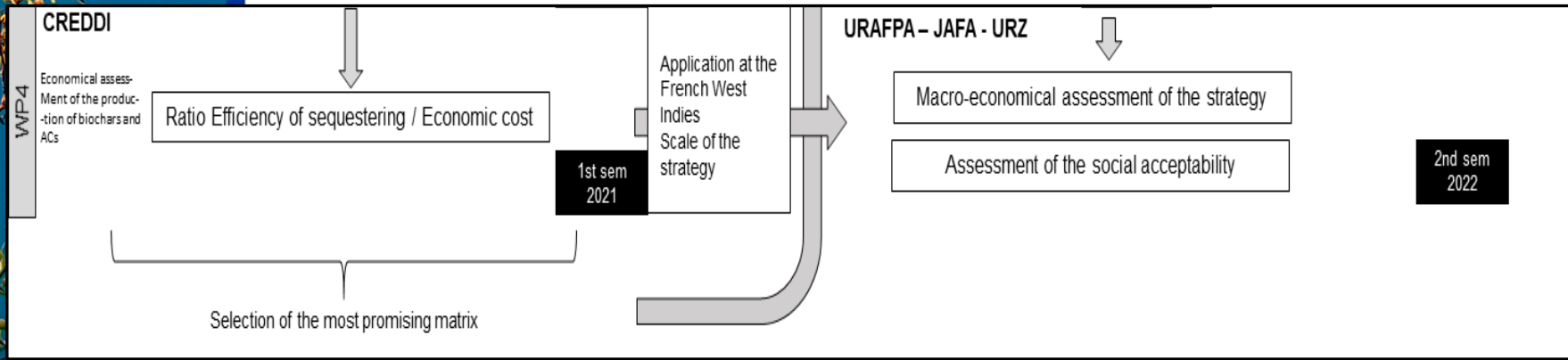
WP4 : Macroeconomical impact of the selected amendment strategy

CREDDI

WP4.1 Assessment of the social acceptability and the associated costs

WP4.2. Production of discontinuous supplies

WP4.3. Impact analysis of the use of activated carbon





Results expected

Process for producing BC and AC for pesticides sequestration at industrial scale

Impact of AC and BC amendment on soil biodiversity

Sequestration of pesticide on poultry for reducing amount of pesticide in eggs

Procedure for soil amendment for reducing pesticide bioavailability and to improve food safety



Added value/dissemination/perspective for development

Added value

Implementation of a new economic sector

Technico-economic analysis of carbon production

Creation of new jobs

Dissemination

Design and development of the project visual identity,
Communications to scientific, technical, environmental, general public.

Project results after the end of the project to persons and organisations that could best make use of them

Perspective of development

Carbon materials for other applications



THANK YOU FOR YOUR ATTENTION

