DIVERSIFYING REVENUE IN RURAL AFRICA THROUGH CIRCULAR, SUSTAINABLE AND REPLICABLE BIOBASED SOLUTIONS AND BUSINESS MODELS

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Project identity

Work Programme	**CE-SFS-36-2020 "Diversifying revenue in Africa through bio-based solutions"**
Type	**Research and Innovation Action (RIA)**
Duration	**48 months (1 Jun 2021 - 31 May 2025)**
Funding Authority	**European Research Executive Agency**
Budget / EC contribution	**≈ 9 M€**
Coordinator	**CENTRE DE COOPERATION INTERNATIONALE EN RECHERCHE AGRONOMIQUE POUR LE DEVELOPPEMENT - C.I.R.A.D.**
Partners	**25 partners (12 different countries)**

Consortium & Countries

25 partners

12 countries (5 from Africa, 7 from Europe)

Context and rationale

African agri-food systems can contribute towards Africa's food and nutritional security, by combating poverty and enhancing food security, while driving inclusive and sustainable rural development.

Current Status:

- ❑ **Africa will need to feed 1.2 billion people by 2030 and over 2 billion by 2050**
- ❑ **Undernourishment is still on the rise, affecting almost 20% of Africa's population.**

Problems faced:

African agri-food systems need to become:

- **more resilient to economic and environmental risks,**
- **more sustainable to conserve, restore and enhance the biodiversity and natural resources that constitute an essential heritage for the rural communities that live off them.**

Main Aim

Bio4Africa supports the deployment of the bioeconomy in rural Africa by developing bio-based solutions and value chains with a circular approach to drive the cascading use of local resources and diversify the income of farmers

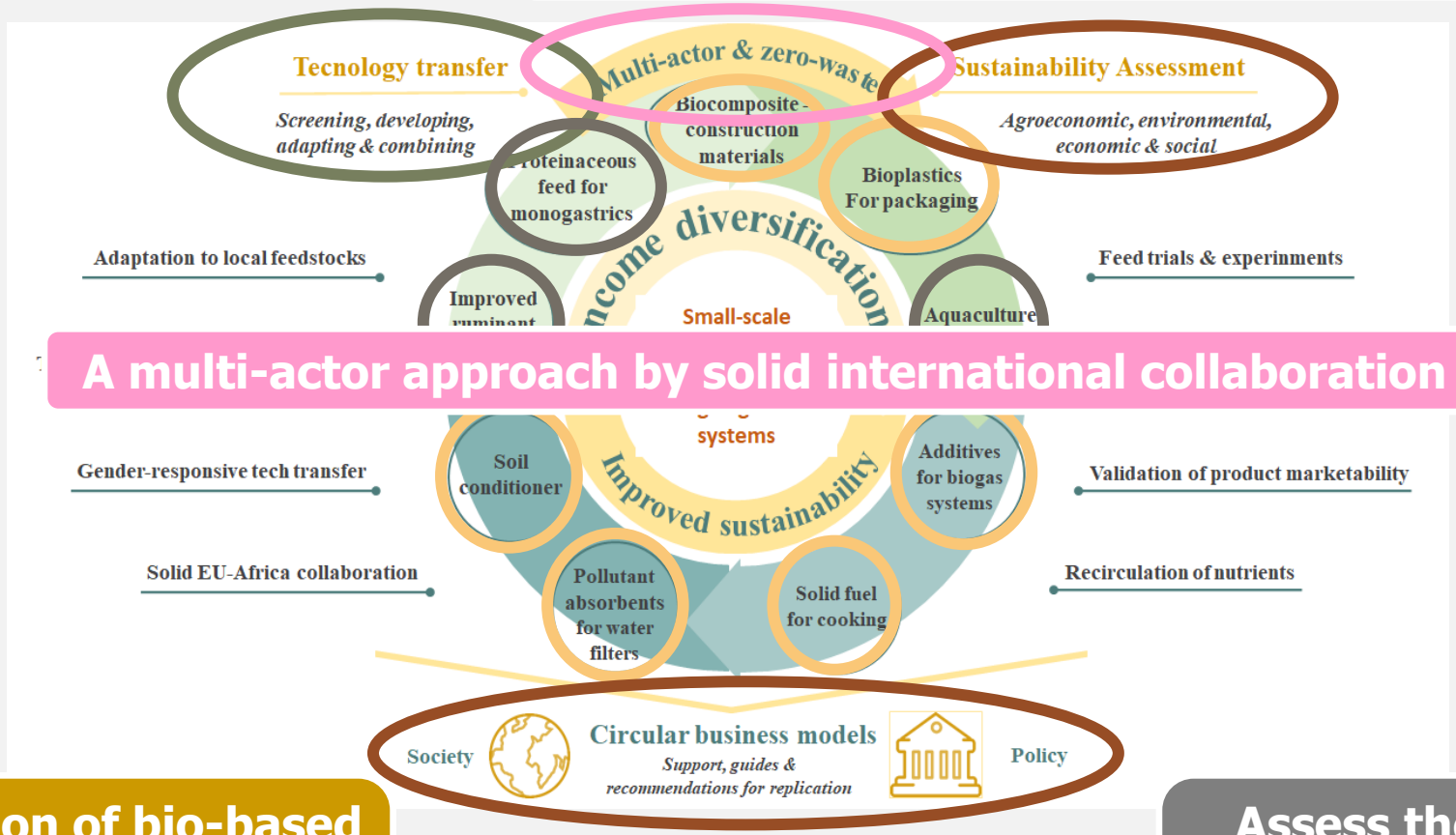
Bio4Africa aims to:

- ✓ ***Transfer simple, small-scale and robust bio-based technologies adapted to local biomass, needs and contexts***
- ✓ ***Empower farmers to sustainably produce a variety of higher value bio-based products and energy***
- ✓ ***Set up 4 pilot cases with over 8 testing sites in Uganda, Ghana, Senegal and Ivory Coast***
- ✓ ***Offer to farmers and farmer groups the opportunity to test them in real productive conditions.***

Overall concept

Processing local fresh green biomass to improve feed products and soil fertility

Valorising agricultural waste via biochar, bio-composites and bioplastics with value-added applications



A multi-actor approach by solid international collaboration

Testing and validation of bio-based solutions in representative real productive conditions

Assess the potential of our solutions via circular and inclusive business models

The Bio4Africa pilot cases

Uganda

- ✓ Small-scale green biorefinery
  - Proteins for feed animals
- ✓ HTC
  - Biochar for soil amendment
- ✓ Briquetting
  - Briquettes for solid fuel

Ghana

- ✓ Small-scale green biorefinery
  - Proteins for feed animals
- ✓ Pyrolysis
  - Biochar for soil amendment
- ✓ Pelletizing
  - Pellets for feed animals

Côte d'Ivoire

- ✓ Pyrolysis
  - Biochar + Adsorbent
- ✓ Biocomposites production
- ✓ Pelletizing
  - Pellets for animals feed

Senegal

- ✓ Pyrolysis
  - Biochar for soil amendment + solid fuel + additive for biogaz
- ✓ HTC
  - Biochar for soil amendment
- ✓ Briquetting (raw and biochar)
- ✓ Biocomposites production

Kenya

- ✓ Analyze the needs and local contexts
- ✓ Screening of technologies to be transferred
- ✓ Replication potential

Biomass selection and characterization

Characterize the locally available feedstock in terms of physico-chemical properties relevant for the technologies

CERTIFICATE OF ANALYSIS

Celignis Analytical

Customer #	Order #	Order Status	Report #	Date of Report
761	1707	Analysis Partially Completed	1707-CCPD	28th January 2022

Report for: BIO4AFRICA Consortium

Summary of Lignocellulosic Data (% Dry Matter)

Sample	Total Sugars	Glucan	Xylan	Mannan	Uronic Acids	Acetyl	Klason Lignin	Acid Soluble Lignin	Extractives	Starch	Ash
Cashew nut shells-Senegal-Sep 2021	15.81	11.58	4.37	1.10	4.66		15.10	2.43	52.44		1.64
Corn Stalks-Senegal-2021	53.56	36.46	13.58	0.22	0.68		17.41	2.39	12.27	0.73	4.09
Millet stalks-Senegal-Sep 2021	57.38	39.13	14.67	0.23	1.55		22.76	1.44	7.01	0.08	2.62
Palm nut shells-Senegal-Sep 2021	32.79	14.00	15.87		2.27		47.59	2.19	4.28	0.02	2.42
Peanut Shells-Senegal-Sep 2021	44.86	30.42	10.15	0.25	2.35		33.54	1.19	4.26	0.26	2.52
Rice husks-Senegal-Sep 2021	37.35	24.96	9.33	0.14	0.40		18.77	1.59	10.48	4.76	20.68
Typha-Senegal-Sep 2021	42.63	29.08	9.08	0.34	2.42		22.18	2.07	11.31	0.08	9.09

- Data can also be viewed online at www.celignis.com/output/analytical_customer_list.php?order=1707

Lab Manager Signature:

ANALYSIS NOT YET COMPLETED

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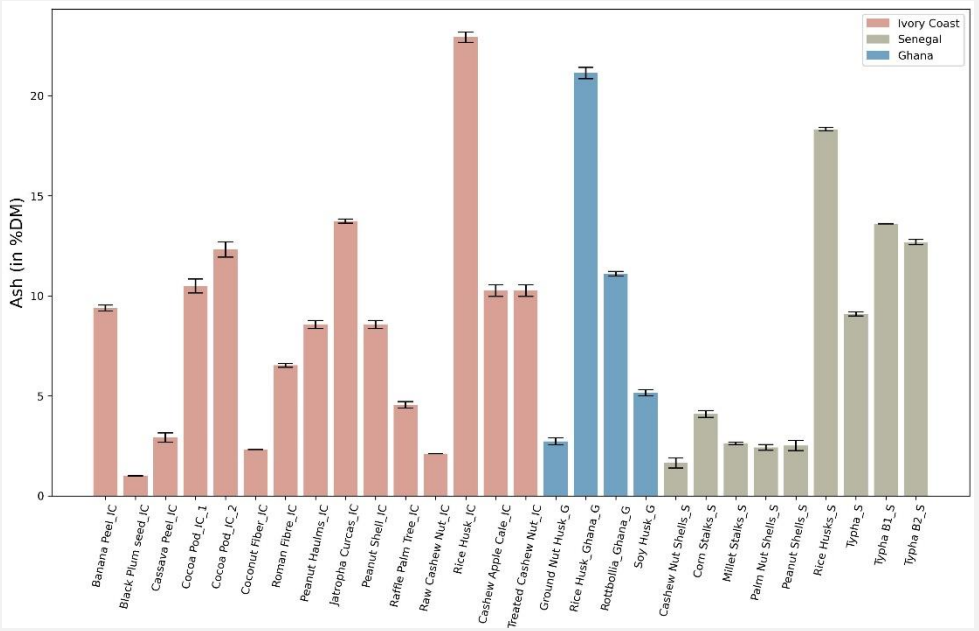

- **Around 30 samples characterized (30 physico-chemical properties each)**

Biomass selection and characterization

Select, collect and supply the most promising samples for tests in the different technologies in lab/pilot units in Europe

Technology	Grassa (T2.3)	Pyrolysis (T2.4)	HTC (T2.5)	Briquetting (T2.6)	Pelletizing (T2.6)	Bioplastic/ biocomposites (T2.7)
Biomass amount needed for WP2 tests in Europe	Not tested in Europe	100 kg dry	Around 20 kg wet	100 kg dry	100 kg dry	100 kg dry
Côte d'Ivoire	Not tested	Palm seed shells Cashew nut shells	Not tested	Not tested	Palm seed shells Cashew nut shells Biochar from T2.4	Cocoa pods Palm stalks
Ghana	Done in T2.3	Groundnut husk Rice husk Corn stover	Not tested	Not tested	Press cake from T2.3	Not tested
Senegal	Not tested	Typha Peanut shells Cashew hulls Rice h Millet	Typha Water hyacinth Cashew apples	Biochar from T2.4	Not tested	Typha Rice husk
Uganda	Done in T2.3	Not t				

- **9 biomass samples selected, collected and delivered to Europe**
- **Biomass samples dried and ground to be ready for conversion tests**

TECHNOLOGIES & PRODUCTS INTRODUCED BY BIO4AFRICA - SO WHAT ? -

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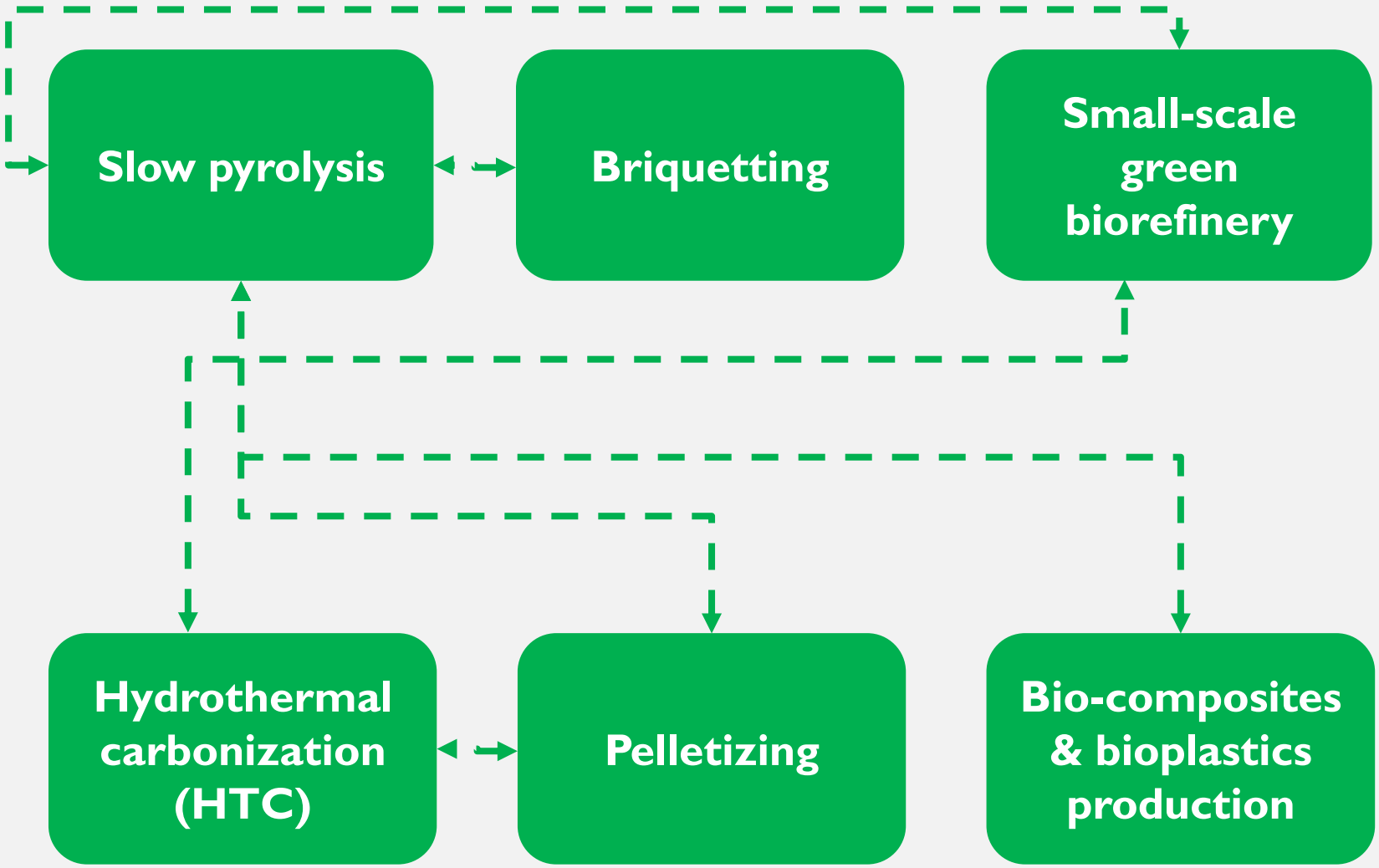
The technologies



BIO4Africa – turning farm waste into revenue for African farmers

https://www.youtube.com/watch?v=t9QA-GHmQmo&t=140s

https://www.youtube.com/watch?v=W4ecSFjpc8s

https://www.youtube.com/watch?v=vYbmTFwkPXE

https://www.youtube.com/watch?v=wTWe1YXJt3w

https://www.youtube.com/watch?v=YC_bLLt40Bo

https://www.youtube.com/watch?v=jgmjCptf3wo

https://www.youtube.com/watch?v=Oo_3WcJ95SE

BIO4AFRICA

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www.BIO4Africa.eu