Identification and Documentation of Best Practices

‘Identification and Documentation of Best Practices, Barriers, Enablers, Gaps and Innovations in Regenerative Agriculture and the Productive Use of Renewable Energy (RA–PURE)’

FARMGAIN – WIZARTS, MAY 2026

[Presenters: Sarah Mayanja PhD]

Introduction

RA: includes a set of farm and land management practices, principles, and processes that restore and rebuild ecosystems' health, resilience, and biodiversity.

PURE: activities that involve the utilization of energy (both electric, and non-electric energy in the forms of heat, or mechanical energy) that enables productivity, income generation and improved livelihood conditions.

Introduction

RA + PURE:

Transforms farming by restoring eco systems while utilizing clean energy (solar, biogas, wind) to power operations like irrigation, cold storage, and processing

Study Objectives:

To identify, validate and document RA-PURE best practices, barriers, enablers and gaps in the integration of RA-PURE among small holder farmers

To generate knowledge products and evidence-based recommendations that promote learning, replication, scaling and policy engagement.

Specific Objectives

Identify farmer-led and community-driven RA–PURE best practices from twelve (12) districts for scaling up and Replicability;

Identify the barriers and enablers for the adoption of RA-PURE products & practices.

Specific Objectives

Produce compelling visual and documented knowledge products.

Facilitate knowledge exchange; sharing the documented practices stakeholders (farmers, member organizations and wider stakeholders to inspire replication).

Key Research Questions

Replicability	What RA–PURE replicable practices currently exist among smallholder farmers?
Benefits	What measurable economic and productivity benefits do these practices provide?
Scalability	Which practices demonstrate the strongest business case for scaling/Replicability?
Enablers	What factors enable or limit adoption (especially cost and returns)?
Standardization	How can these practices be standardised and promoted across districts?

Justification

There is limited documented evidence on existing RA-PURE practical solutions and how they can be effectively integrated at smallholder farmer level in Uganda

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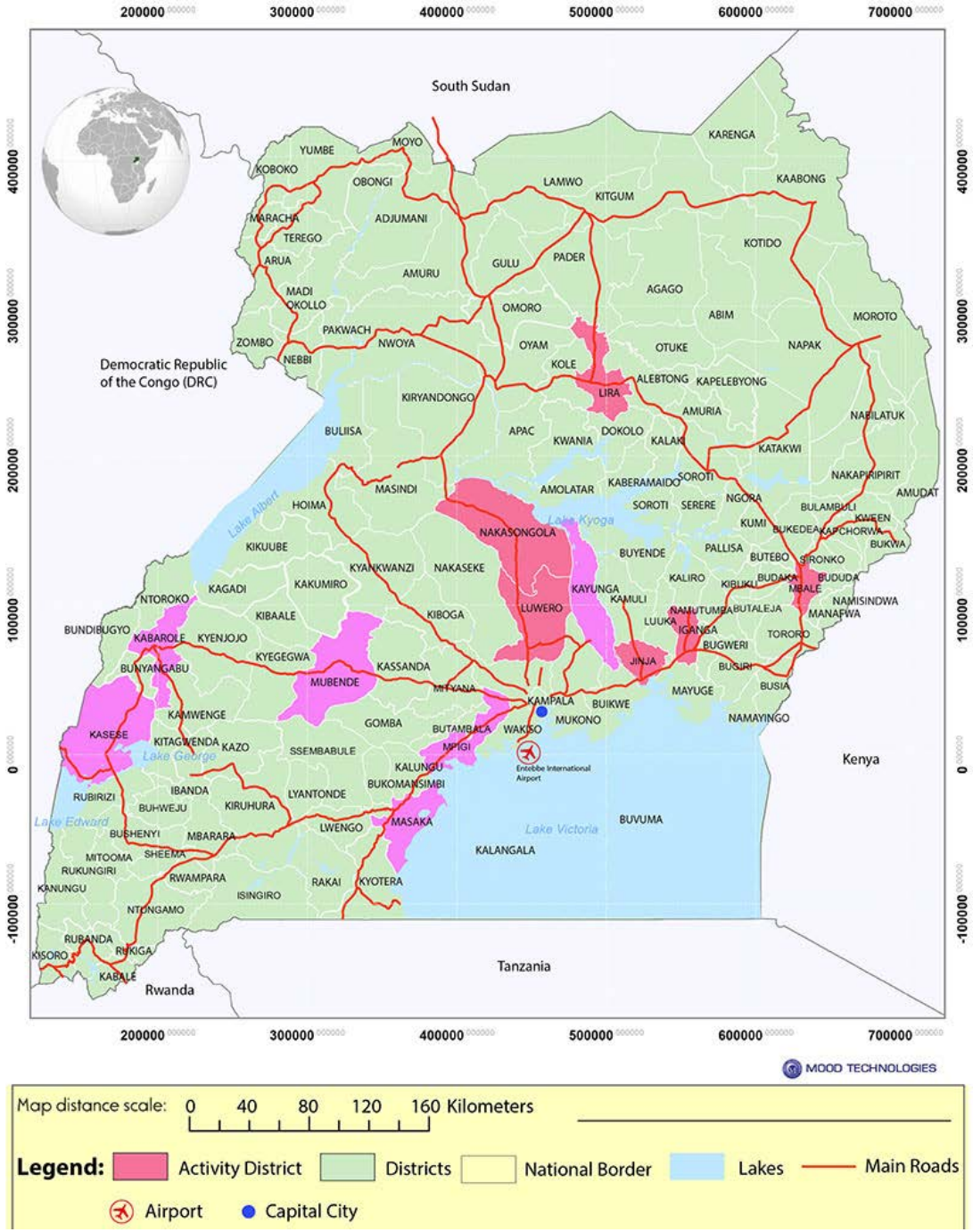
Particularly in ways that are economically viable, replicable and scalable.

What we wanted to learn:

How farmers are already integrating energy solutions into agriculture

Which practices deliver measurable economic returns (cost savings, income generation)

What makes these practices scalable, sustainable and investment ready



Methodology: 1st Cluster

Qualitative study with three types of tools

Six districts with 110 respondents

(Jinja, Iganga, Mbale, Lira, Nakasongola, Luweero)

STUDY EVENT	MALE RESPONDENTS	FEMALE RESPONDENTS	TOTAL
KII (DAOs)	4	2	6
KII (MOs)	5	1	6
FGDs	45	40	85
IDI (innovators)	12	1	13
Total	66	44	110

Methodology: 2nd Study Cluster

Mpigi, Masaka, Kasese, Kabarole, Mubende, Kayunga

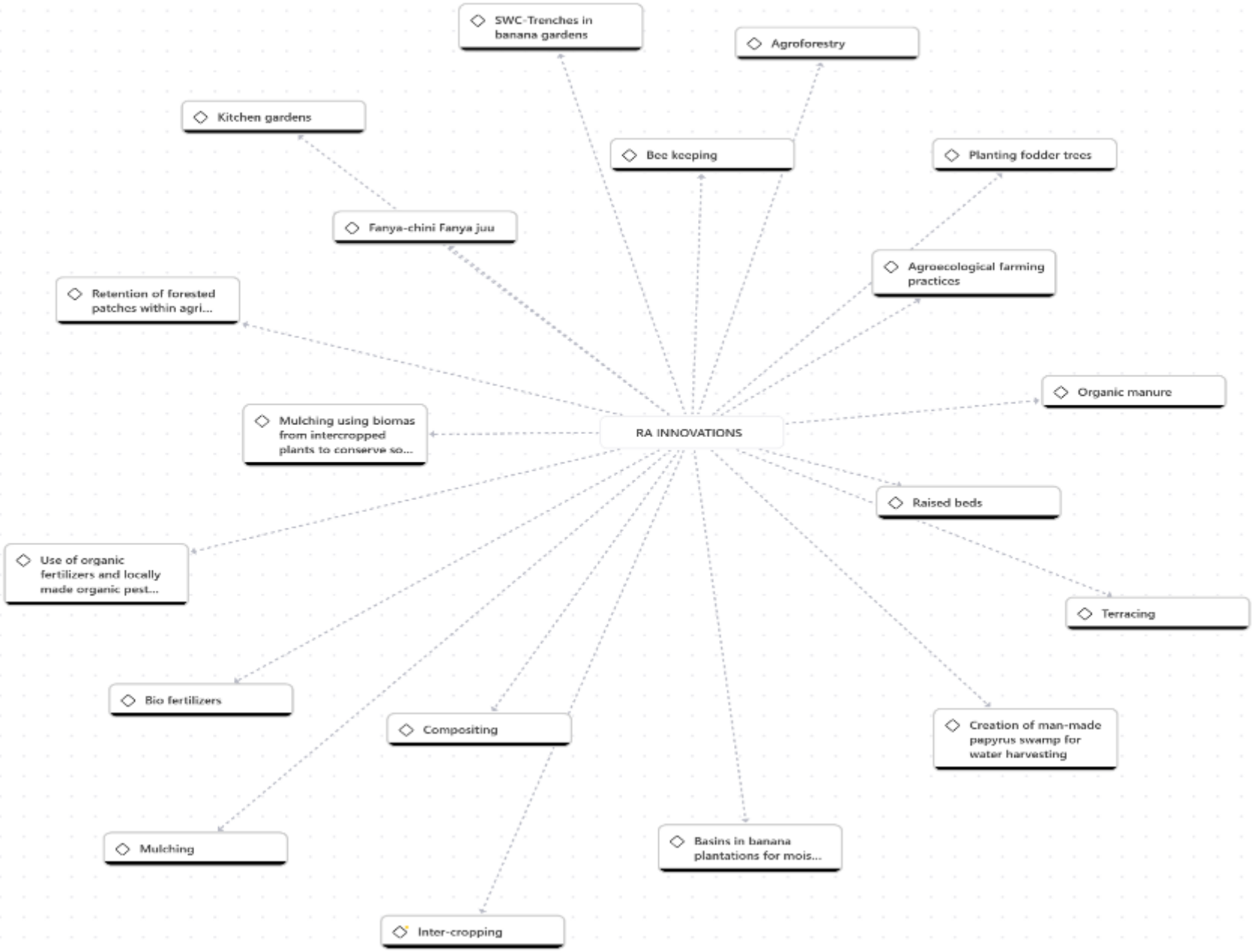
- A structured, case-based assessment approach
- Six districts with 257 respondents
- Identified, mapped existing and functional 257 RA–PURE; shortlisted 16; assessed 19 practices; validated 5 best practices with direct observation, photo/video evidence with demonstrated economic viability and replicability

Stage	Description	Number	District Distribution
Mapping	RA–PURE farmers identified	**257**	Mpigi (42), Masaka (67), Kasese (28), Kabarole (49), Mubende (53), Kayunga (18)
Shortlist	Farmers with practices	**16**	Kabarole (3), Kasese (2), Mubende (3), Mpigi (5), Kayunga (2), Masaka (1)
Practices	Practices assessed	**19**	≥1 per farmer
Final	Best practices	**5**	Across 5 Districts

STUDY FINDINGS:

RA:

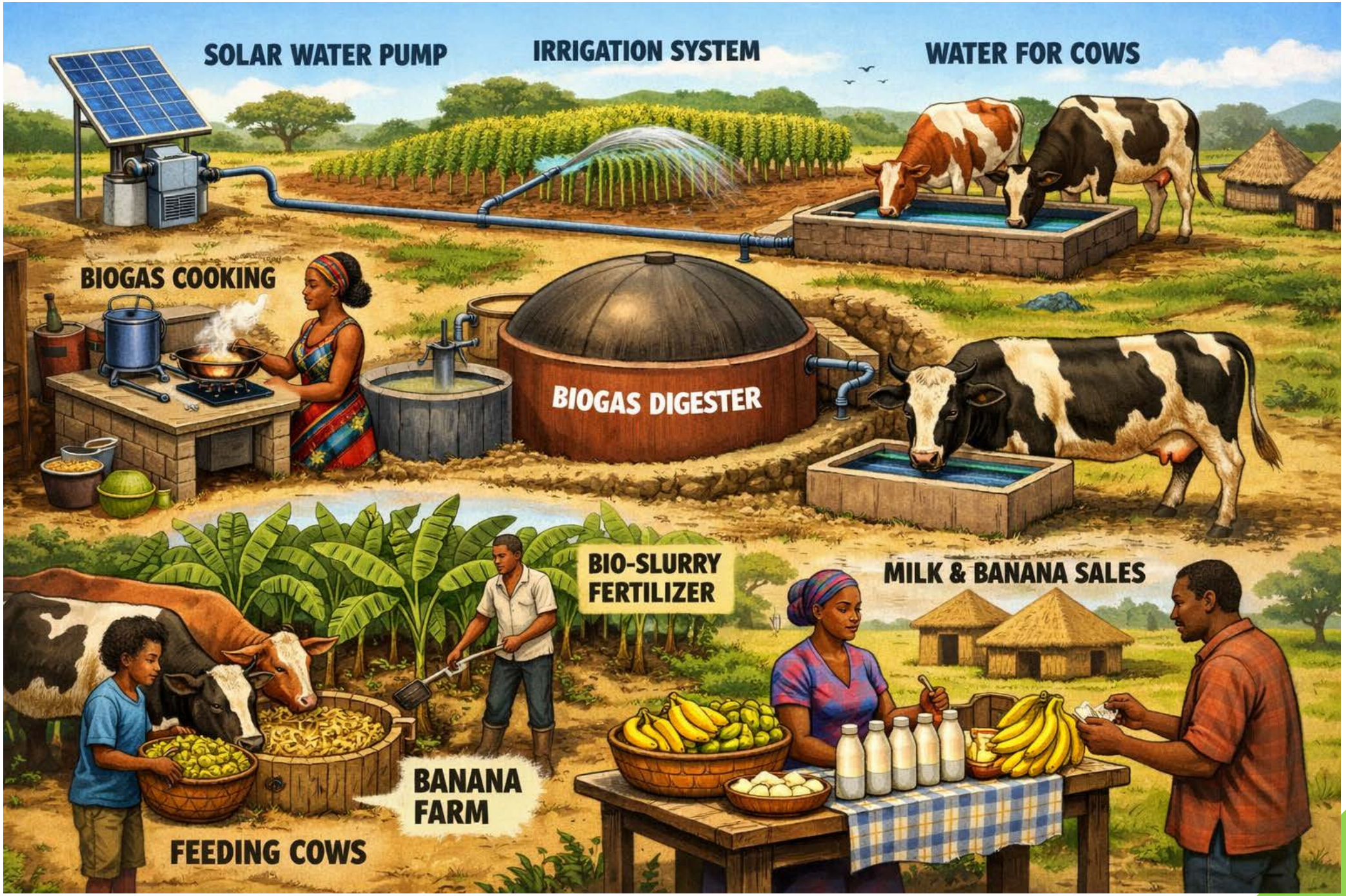
PRACTICE
TECHNOLOGY
INNOVATION



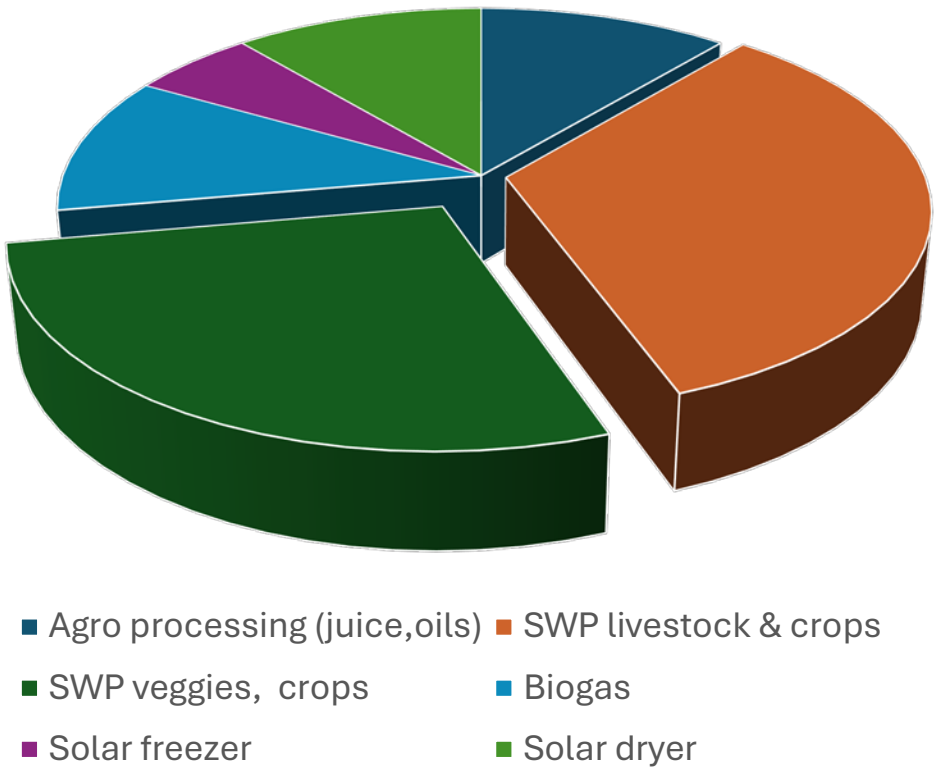
PURE INNOVATIONS PRACTICED

- Solar dryer
- Solar miling
- Solar irrigation
- Cold storage
- Solar incubator
- Biogas

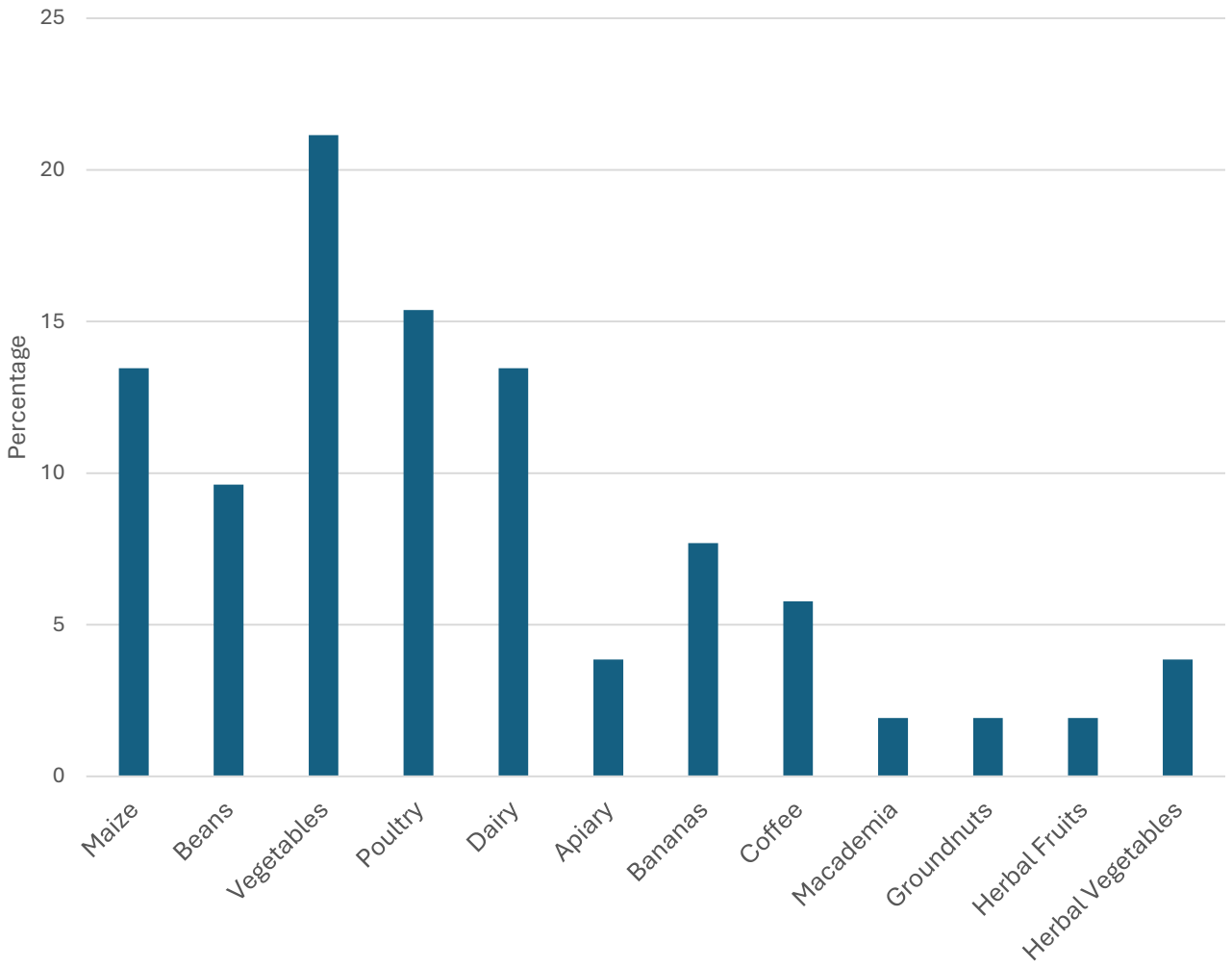
RA-PURE NEXUS



RA-PURE best practices



RA-PURE practices



RA-PURE associated value chains

DEEP-DIVE:

- PELUM INNOVATORS (RA-PURE best practices) PROFILE FOR REGENERATIVE AGRICULTURE AND PURE, UGANDA, 2026 | MOOD TECHNOLOGIES.

Solar-based poultry brooding, (lighting & incubation)

Case I in Lubyayi Mixed Family Farm, Masaka

1. **Solar-powered heating** + lighting during first 4 weeks of brooding; reduces dependence on charcoal and grid electricity.

2. **Economic baseline:** UGX 6,000/day (charcoal+electricity) × 28 days = UGX 168,000 per 5,000-chick batch previously spent.

Solar-based poultry brooding, (lighting & incubation)

Case I in Lubyayi Mixed Family Farm, Masaka

3. **Why it works:** energy embedded at a critical biological stage → stable conditions, better management, predictable production.

4. **Scaling needs:** correct sizing, durable heating devices, maintenance skills and extension support.

Case II in Nakasongola and Iganga districts

- Farmers use solar lights to extend feeding hours for local chicken; use solar incubators to hatch chicks notably by women's groups

- Renewable energy improves poultry productivity; manure supports soil fertility/composting in RA systems; quick-return enterprise supports household welfare.

Case II in Nakasongola and Iganga districts

- Evidenced with Nakasongola women who reported productivity increase in local chicken linked to longer feeding time with solar lighting; Iganga groups reported solar incubator use.

- This technology presents low barrier-to-entry practice supporting women/youth inclusion and measurable productivity outcomes.

Biogas-powered latrine at Nature and Creativity for Future Generations Farm by *Mr. Solomon Kwagala the farm Manager*

- Energy Efficiency and Cost Reduction
- Supplies approximately 40% of the centre's night-time security lighting needs, reducing reliance on solar lighting alone
- When combined with the livestock-based biogas system, reduces dependence on purchased cooking fuels by approximately 70%
- Enhances reliability of energy supply for institutional operations and training activities

Hybrid Biogas Integration for Nutrient Recycling and Energy Provision at NCFG Demonstration Farm in Mpigi District

Dried biogas slurry & cow dung as poultry feed additive

1. Implemented at Njeru Guest Farm, Kyaninga, Rwengaju Sub-county, Kabarole District

2. Operates as a mixed production and learning farm focused on lowering recurrent feed input costs in poultry production

3. Composting bioslurry + on-farm biomas into organic manure enterprise

Dried biogas slurry & cow dung as poultry feed additive

4. Blend slurry with tithonia + calliandra residues; heap/cover and compost ~45 days to produce stable compost.

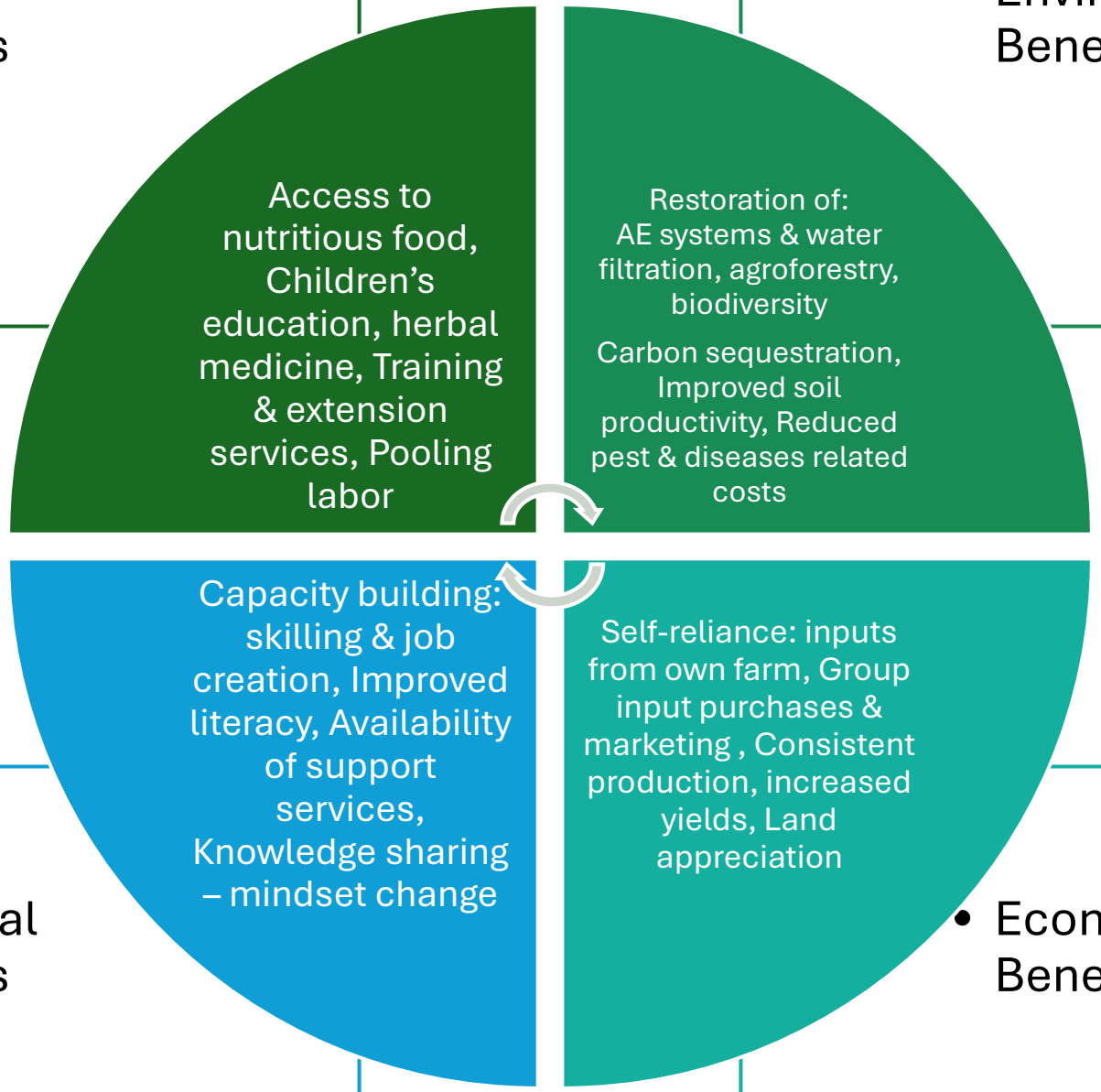
5. Income pathway: ~15 bags/3 months, 50kg @ UGX 45,000 → ~UGX 675,000 per quarter from compost sales.

Using biogas slurry to enhance plankton in fishponds in Kayunga

- Controlled application of fresh slurry and dried slurry in porous sacks to stimulate plankton (natural fish feed)
- Average 50% fish feed cost reduction; up to 80% when well managed; desilting sediments used on crops → ~15% maize yield increase reported
- Livestock waste → biogas → slurry → ponds → fish → sediments → crops

- Social Benefits

- Environmental Benefits



- Technical Benefits

- Economic Benefits

Costs and Benefits

Social economic costs Time poverty GBV Loss of earnings	**Environmental costs** Opportunity costs Yield-environment trade off Seasonal changes
Technical costs Machinery & equipment are costly Trouble shooting Costly to invest in own technical expertise	**Women & Youth: Benefits:** H_2O for production and home Income from sale of produce Skills & knowledge : combine ITK Increased participation in groups

GAPS

- Comprehension of RA-PURE nexus
- Alternate uses of RE
- Inclusive financing models
- Women & youth engagement in RA-PURE
- BDS services

Barriers

Limited access to productive resources

High start-up costs

Lack of service providers

Poor quality equipment and tools.

Enablers

Donor partnerships and government programs,

Access to financing,

Capacity building and

Remunerative markets.

Enabling policies (Irrigation policy, Nutritional policy, Environmental policies [NEMA])

STRENGTHS, WEAKNESSES AND SUPPORT REQUIRED

RA-PURE INNOVATION	STRENGTHS	WEAKNESSES	SUPPORT REQUIRED
Micro-solar irrigation for crops	Off-season crop production Low operation costs Access to extension services Reliability of energy and water Can engage in off farm IGA (e.g. making briquettes) Scalability of production area	Low operational skills-set for maintenance & technical issues Depletion of underground water sources Lack of knowledge of crop water requirements Limited access to remunerative markets	**advanced training in PURE equipment operation** **-training in crop agronomy with emphasis on crop nutrition** **-water quality monitoring** **-access to niche markets e.g. organic markets**

AREAS FOR FURTHER RESEARCH

- What is the payback period and return on investment (ROI) for each practice?
- Comparative analysis of performance and returns at different scales (small, medium and large scale)?
- What standards are needed to support market confidence in by-products?

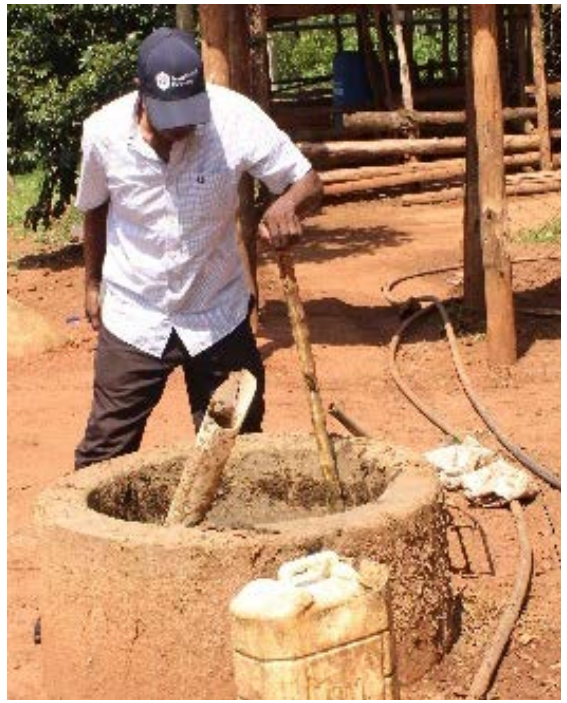
How findings will inform implementation:

- Strengthen technical training to improve system efficiency and returns.
- Promote high-performing practices with clear business value.
- Support various alternative solutions for integration across farm enterprises and learning centres to increase profitability

What we will be doing differently

- Shift from identification → validation, optimisation, and scaling of viable business models
- Promote investment in farmer enterprise development and learning centres
- Explore financing mechanisms to overcome upfront cost barriers
- Strengthen market linkages and certification systems

What we will be doing differently



- Strengthening farmer institutions for RA-PURE knowledge transfer
- Collective RA-PURE applications (community based solar irrigation schemes for production of RA products)
- Inclusive financing models involving credit institutions, public and private partners
- Establishment of niche markets for RA-PURE products.

To conclude

<u>Strategies to promote RA-PURE</u>

- Strengthening farmer institutions for RA-PURE knowledge transfer
- Collective RA-PURE applications (e.g. community based solar irrigation schemes for production of RA products)
- Inclusive financing models involving credit institutions, public and private partners;
- Establishment of niche markets for RA-PURE products.

Conclusion

Farmer-led innovations are not only working — they are economically viable

Integration of agriculture and energy improves efficiency, productivity, and profitability

With validation and support, these practices present a strong, scalable business case for smallholder farmers

DEEP-DIVE:

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