



**Power for Food
Partnership**
Renewable, Regenerative, Resilient.

From Regenerative Agricultural Practices for Improved Livelihoods and Markets) (REALMS) to the Power for Food Partnership (P4FP)

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Building on Evidence, Learning, and Innovation

Power for Food Partnership | September 2026
Developed by CoELIB, Egerton University



1. Background

Smallholder farmers and agribusinesses across East Africa face growing challenges, including declining soil health, erratic weather, and limited access to reliable energy. These challenges threaten food security, rural livelihoods, and the health of ecosystems.

In many African countries, agri-food and energy systems operate in silos. The Power for Food Partnership (P4FP) is changing this by bringing regenerative agriculture (RA) and the productive use of renewable energy (PURE) together as powerful, interconnected approaches. When these two systems work in harmony, progress in one unlocks impact in the other.

P4FP research builds on valuable evidence and practical learning generated through the earlier Regenerative Agricultural Practices for Improved Livelihoods and Markets (REALMS) project [2020-2024] funded by the IKEA Foundation and implemented by SNV.

REALMS provided an important opportunity to test regenerative agriculture (RA) practices under farmer-managed conditions and to understand both their potential and some of the practical considerations associated with their application.

P4FP therefore represents a progression from testing whether selected RA technologies work to

understanding how they work within a broader soil-water-plant system, under what conditions they perform best, and how the resulting evidence can be translated into practical recommendations for farmers and scaling partners.

REALMS established an important foundation, and P4FP is using that foundation to investigate a more integrated RA-PURE nexus, bringing together soil fertility management, renewable-energy-enabled irrigation, soil moisture, soil chemistry, soil biology, crop productivity, and farmer economics.



REALMS



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2. What We Learned from REALMS

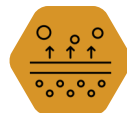


2.1 Organic fertilizers can support productive crop production

The REALMS trials demonstrated that the organic fertilizers evaluated could support good crop production and, in some cases, achieve crop performance comparable to that of conventional inorganic fertilizers.

Positive changes were also observed in selected soil chemical properties following organic fertilizer application. However, the changes were relatively small over the two seasons of observation, while in others, it was not noticeable. This was an important learning point rather than an unexpected result. Organic fertilizers generally release nutrients progressively, while some of their effects on soil organic matter and other soil properties can accumulate over time.

The two seasons, therefore, provided useful evidence of initial response, but also highlighted the value of longer-term observation when assessing regenerative soil-management technologies. This lesson has informed the way we think about evidence generation under Power for Food. Immediate crop response is important, but persistence and cumulative soil effects are equally important for understanding the full value of RA.



2.2 Soil moisture emerged as an important part of the fertilizer response

An interesting observation from REALMS was that bean germination was higher in plots receiving organic fertilizers compared with those receiving inorganic fertilizers. This was associated with better moisture retention in soils receiving organic amendments.

This observation generated an important question. If organic fertility management influences the ability of soil to retain water, then fertilizer and water should not necessarily be studied as completely separate components of crop production.

REALMS was primarily designed to investigate RA practices and was not structured to experimentally separate and quantify the interaction between fertility management, soil moisture, and water availability.



2.3 Erratic rainfall demonstrated the importance of reliable water management

REALMS was implemented under farmer-field conditions and was therefore exposed to normal production risks. Erratic rainfall contributed to crop stress and losses in some trials, necessitating REALMS support for three solar-powered irrigation systems. This experience

demonstrated that regenerative soil management alone cannot fully address production risk where water availability becomes severely limiting.

P4FP takes this learning further by incorporating solar-powered supplemental irrigation as an experimental factor, rather than simply as a response to water shortage. This allows the research to investigate whether and how regenerative fertility management and renewable-energy-enabled irrigation complement one another in influencing soil conditions and crop productivity. It therefore provides an important transition from testing RA practices to understanding the RA-PURE nexus.



2.4 Practical fertilizer recommendations need greater standardisation

REALMS highlighted the need for clear, measurable, and farmer-friendly fertilizer application recommendations. For some loose organic fertilizers, guidance was approximately 1-litre container per 4-metre planting furrow. Although practical, this made it difficult to determine the actual quantity applied per plant and to translate the recommendation accurately into application rates per acre or hectare.

More recent engagement with small and medium enterprises (SMEs) indicates that farmers are commonly advised to apply approximately a handful per planting hill. While simpler, a handful varies among individuals and fertilizer products. To improve consistency, P4FP weighed the recommended handfuls, which were approximately 48-50 g, and adopted a standardized application rate of 50 g per planting hill for the relevant loose fertilizers. This improves experimental consistency and enables application requirements and costs to be calculated according to crop spacing and plant population.

The next step is to translate these standardized rates back into simple, farmer-friendly measures. One potential innovation is to work with SMEs to develop product-specific calibrated cups or scoops supplied with their fertilizers. Since fertilizers differ in bulk density and recommended application rates, each measure would need to be calibrated for the specific product, including smaller measures for granulated fertilizers (30 g). This could provide farmers and extension personnel with recommendations that are scientifically reproducible, easy to apply, and readily convertible to quantities and costs per acre or hectare.



2.5 Farmer participation adds value to research and learning

REALMS confirmed the importance of conducting participatory research with farmers. Establishing trials on farmers' fields enabled farmers to observe technologies directly, contribute practical knowledge, and participate in the learning process.

This approach has been retained under P4FP. The mother trials are being established on farmers' farms and linked with host farmers, farmer field schools, SMEs, extension, and other agricultural actors.

The intention is to move beyond temporary experimental sites towards living laboratories where research, demonstration, farmer learning, and technology adaptation can continue around the mother trials.

3. How Power for Food Builds on and Goes Beyond REALMS



3.1 From testing RA to understanding the RA-PURE nexus

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3.2 A common test crop strengthens comparison across environments

REALMS involved several test crops. This was useful for demonstrating RA technologies across different cropping systems, but it limited the opportunity to evaluate the response of the same crop and comparable fertility treatments across different soil and ecological environments.

P4FP has therefore selected Giant Black Nightshade (*Managu*) as a common test crop across the seven trial counties. Using one crop provides a stronger basis for comparing productivity and soil responses across contrasting environments. Differences observed among counties can consequently be interpreted in relation to

differences in baseline soil conditions, water regime, and locally relevant fertilizer technologies rather than being confounded by using several different crops.



3.3 Baseline assessment is informing the research

P4FP began with baseline work that helped identify priority crops, existing practices, and locally available technologies. This information has influenced the design and location of the field interventions. For example, bioslurry is being evaluated in areas where it is already more commonly produced and accessible. This responds directly to a lesson from REALMS, where transporting some locally produced inputs over considerable distances reduced the practicality of eventual farmer recommendations.

Similarly, the RA fertilizer technologies allocated to individual counties are selected with consideration of whether the products are available within that county or in a neighbouring county. It's premised on the fact that a technology should not only perform agronomically, but farmers should also have a realistic pathway to accessing it.

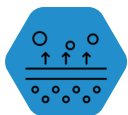


3.4 From soil chemistry to a more complete understanding of soil health

REALMS assessed selected soil chemical properties and generated useful evidence of changes associated with RA interventions. However, soil chemistry represents only one component of soil health.

Soil organisms play an important role in decomposition, nutrient cycling, and organic matter transformations, while their abundance and community composition are themselves influenced by soil moisture, organic inputs, and soil chemical conditions. P4FP, therefore, extends the assessment to include soil biological properties alongside soil chemical properties.

In simple terms, the research is investigating how RA inputs and water management influence the soil environment, how the soil environment influences nutrient cycling and crop growth, and how these processes ultimately affect productivity.



3.5 Soil moisture becomes an experimental variable

The moisture-retention observations made during REALMS become a testable scientific question under P4FP. The current research incorporates irrigated and non-irrigated treatments and provides for weekly monitoring of soil moisture and selected soil indicators during crop development.

This is important because baseline and end-line measurements tell us what changed, whereas measurements during crop growth can help explain when and potentially why the treatments began to differ. The addition of PURE, therefore, represents considerably more than providing irrigation to prevent crop failure. It allows water availability itself to become part of the scientific investigation.



3.6 Greater emphasis on locally reproducible technologies

P4FP is also expanding learning beyond commercial RA fertilizer products. Farmers who are already producing compost using more standardized methods have been identified and engaged. Some of these composting approaches produce enriched compost within relatively short periods and provide practical examples that other

farmers can observe and learn from.

This is important for scaling because not every farmer will necessarily purchase a commercial organic fertilizer. The project can therefore generate learning around both commercially available RA technologies and regenerative practices that farmers can reproduce using locally available resources.



3.7 From experimental plots towards living laboratories

A further value addition is the deliberate connection between the mother trials and a living-lab approach. The mother trials provide the controlled evidence-generation platform. Around them, host farmers, farmer field schools, SMEs, extension personnel, and other agricultural actors can observe technologies, discuss results, and contribute practical knowledge. This is envisaged to transition research evidence to demonstration, learning, adaptation, and wider uptake.

The living-lab component is particularly important for continuity. The value of the sites does not necessarily end when the final experimental measurements are collected; they can continue supporting farmer learning, technology demonstration, and interaction between farmers, researchers, SMEs, and extension actors.

4. Incorporating Learning on Biological Pest Management

REALMS also provided useful preliminary evidence on biological crop protection. Locally made biopesticides were evaluated against synthetic pesticides in one county and over one season, with encouraging performance.

Where crop protection is required in the current mother trials, priority can therefore be given to appropriate biopesticide approaches, helping to maintain consistency with the regenerative-agriculture principles being evaluated.

5. Mulching as an Additional RA-PURE Learning Opportunity

Mulching has emerged as another important opportunity for strengthening the current research. A Master's study undertaken alongside REALMS compared mulched and unmulched treatments and generated encouraging results. Mulched treatments showed favourable changes in several measured soil properties across the two seasons, including pH, nitrogen, carbon, phosphorus, and potassium.

The relevance to P4FP is particularly strong because mulch sits at the intersection of regenerative soil

management and water conservation. It can reduce direct soil-water loss, modify soil temperature, and contribute organic material while potentially influencing the effectiveness and frequency of supplemental irrigation.

Mulching can complement regenerative fertility management and solar-powered irrigation to further improve soil conditions, crop productivity, and water-use efficiency.



5.1 Proposed incorporation into the existing experiment

The current trial has three fertility regimes and two water regimes. Rather than establishing an entirely separate experiment, each existing experimental subplot could be divided into two sections, one mulched and one unmulched.

This would produce a 3*2*2 factorial treatment structure, with mulch introduced as a split-subplot factor. Across the seven counties, the existing 126 experimental units would consequently become 252 experimental sub-subplots for crop and post-treatment measurements.

This will allow for assessment of the individual and combined effects of fertilizer, irrigation, and mulch. Of particular interest would be whether mulch modifies the crop response to irrigation and whether some fertilizer–

mulch combinations perform differently under irrigated and non-irrigated conditions, alongside effects on chemical properties.



5.2 Implications for soil analysis and implementation

The baseline samples have already been collected from the original 126 experimental units before the mulch treatment is imposed. These provide the common pre-treatment reference.

At the end-line, however, the mulched and unmulched sections would have experienced different management and would therefore need to be sampled separately if the effect of mulch on soil chemical and biological properties is to be assessed. The soil-sampling requirement and analysis would increase and would therefore be:

Baseline: 126 samples

End-line: 252 samples (if assessed once, and double if twice)

There would also be additional requirements for field measurements, labour, plot management, and sourcing and transporting sufficiently uniform mulch material across the seven counties. These implications would need to be considered so that the incorporation of mulch strengthens the quality of the core RA–PURE research.

6. Overall Value Add

REALMS established that selected regenerative fertility technologies can support crop production and positively influence soil properties. It also generated practical learning about moisture retention, rainfall risk, fertilizer application, farmer participation, locally available technologies, biopesticides, and the need for sufficient time to observe some soil responses.

P4FP takes those findings as its starting point as it integrates;

1. Regenerative fertility management with solar-powered irrigation,
2. Uses a common crop across seven contrasting environments,
3. Incorporates soil biological as well as chemical indicators,
4. Explicitly examines soil moisture,
5. Improves the standardization of fertilizer application,
6. Considers local accessibility of technologies,
7. Strengthens learning from farmer-produced inputs,
8. Connects the experimental work to living laboratories for demonstration and continued learning.

The potential addition of mulching extends this progression further by examining whether a regenerative moisture-conservation practice can complement both RA fertility management and renewable-energy-enabled irrigation.



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Developed by CoELIB, Egerton University
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