

# Agring

# Bulletin

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Newsletter of the  
ARC-Natural Resources and Engineering  
(ARC-NRE)

Agricultural Engineering campus, Silverton

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## A word from the Editor ...

Greetings to you our dear readers.

Welcome to the 15<sup>th</sup> edition of our external newsletter, *Agring Bulletin*. We take this opportunity to thank you all for reading our newsletter, which appears twice per annum. We strive to keep publishing articles with information that you will always find helpful in this era where clean energy resources and high efficiency in water use are topical.

We wish you a Merry Christmas and a prosperous 2026. Please be safe over the festive season.

Best regards  
Dr Macdex Mutema



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## Agricultural Mechanisation Practices and Implements used to promote Water Conservation – by Dr Tingmin Yu and Mr Johan van Biljon

Conservation tillage is a soil management approach aimed at preventing soil degradation and, most importantly, conserving soil moisture. It involves minimising soil disturbance and maintaining soil cover to reduce moisture loss from evaporation and runoff. By retaining plant residues from previous seasons on the soil surface, conservation tillage keeps the soil cool and moist, benefiting plant growth.



Many agricultural implements are now available as standard equipment to facilitate minimum tillage practices and other conservation agriculture (CA) techniques.

*Implements used to promote water conservation*

### Mulching Implements

Mulching implements are used to reduce evaporation by covering the soil with organic material. The layer of mulch serves as insulation, keeping moisture locked into the soil.

#### **Key implements:**

- Mulching Applicator: Evenly spreads organic mulch (e.g. straw, crop residue) across the field.
- Straw Chopper and Spreader: Cuts crop residues into smaller pieces and spreads them as mulch to cover the soil surface.

### Conservation Tillage Implements

These implements loosen the soil, enhance water infiltration, and reduce the formation of a hardpan, all while maintaining surface residues to reduce evaporation.

#### **Key implements:**

- Chisel Plough: Breaks compact soil layers while leaving crop residues on the surface.
- Subsoiler (Ripper): Breaks deep hardpans with minimal soil disturbance, improving subsoil water movement.
- Offset Disc Harrow: Loosens the topsoil and prepares seedbeds without full ploughing.
- Rotavator: Mixes crop residue into the soil and prepares it for planting with minimal disruption.

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### Contour and Land Levelling Implements

On sloped land, contouring and terracing reduce runoff and enhance infiltration. In flat areas, land levelling is essential for effective irrigation, especially flood irrigation.

#### **Key implements:**

- Contour Ridger: Creates ridges and furrows along slopes to slow runoff and improve infiltration.
- Laser Land Leveller: Provides precision land levelling for uniform water distribution and absorption.
- Scrapers and Levellers: Basic tools for manual or semi-mechanised land levelling.
- Damscoop: A simple implement used for land reshaping and levelling.

### Water Harvesting and Furrow Equipment

These implements help store and direct water towards crop root zones, improving water efficiency in rainfed and irrigated fields.

#### **Key implements:**

- Ridger or Furrow Maker: Creates furrows to channel water efficiently to crop rows.
- Happie Plough: Forms small catchment basins on grazing land to retain water and recondition pastures.
- Broad Bed and Furrow Planter: Builds raised beds and adjacent furrows that enhance drainage and infiltration in heavy soils.

### Conclusion

Water conservation through mechanised CA involves multiple practices and tools:

- Minimise tillage to reduce soil structure breakdown and moisture loss.
- Leave residues on the surface as natural mulch.
- Plant along contours to slow water runoff.
- Use land levelling for efficient irrigation water distribution.
- Avoid soil compaction by restricting heavy equipment movement, especially on wet soil.
- Create furrows, micro-ponds and ridges to trap rainwater.
- Adopt conservation implements that improve moisture retention, leading to better crop health and resilience.

By integrating appropriate mechanisation tools with good soil and water management practices, farmers can significantly enhance water conservation while ensuring sustainable agricultural productivity. ■

### Cover Crop Seeders and Planters

Designed to plant directly into residues or mulch, these planters support minimum or no-till agriculture, helping to preserve soil structure and moisture.

#### **Key implements:**

- Zero-Till Planter: Places seeds with minimal soil disturbance, maintaining moisture and residue cover.
- Direct Planter: Sows seeds among standing or fallen residues, preserving ground cover and reducing evaporation.



*Furrow planter in action*

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# Turning Wastewater into Gold: ARC researchers' Biohydrogen quest for Sustainable Agro-Processing

– by Ms Zikhona Buyeye and Ms Primrose Magama

South Africa's agro-processing sector is a booming industry comprising large-scale, well-established companies and a growing number of small-scale enterprises. It is a very diverse industry, spanning meat, fish, fruit, vegetable, grain, sugar and milk processing, as well as alcoholic and non-alcoholic beverage production. Agro-processing also includes tanneries and the paper and pulp industries. As a result, wastewater produced by the sector is varied in nature, depending on factors such as the source, type and level of processing activities. Regardless of this variation, the composition of agro-processing wastewater can make its treatment difficult and costly to manage. Insufficiently treated wastewater can negatively impact the environment, threatening the quality of human and animal life.

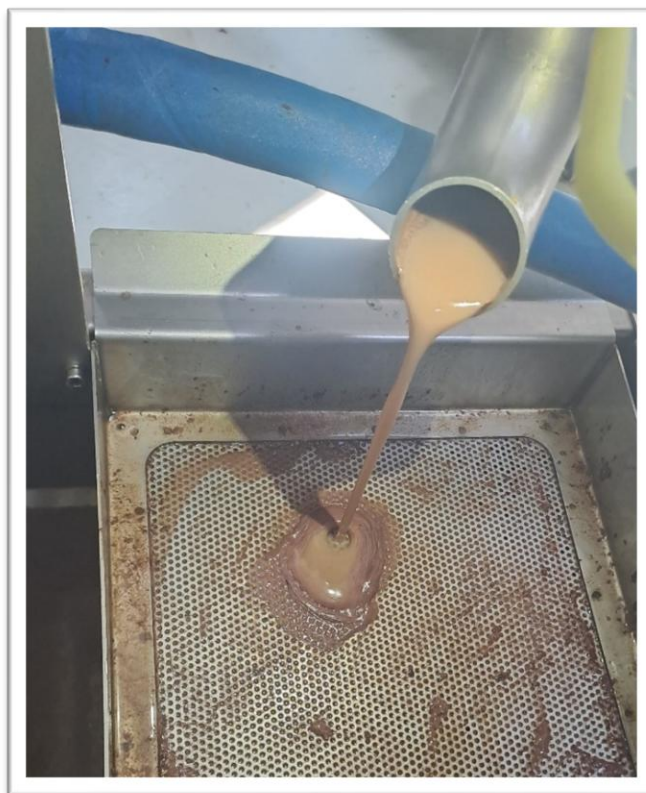
Furthermore, conventional treatment methods do not harness the valuable resources contained in wastewater, resulting in a missed opportunity for wastewater valorisation. To seize this opportunity and contribute towards circularity in the agricultural space, the Renewable Energy unit at the Agricultural Engineering campus of ARC-NRE is currently undertaking research into the production of biohydrogen using dark fermentation. The Water Research Commission-funded project aims to demonstrate and evaluate the application of microbial biorefineries to produce biohydrogen and other value-added bio-products from agro-industrial wastewaters. The study looks to support the enhancement of sustainability and circularity in agro-processing by extracting valuable commodities in wastewater and producing cleaner effluent water that can potentially be reused before final disposal.

Agro-processing wastewater is liquid waste (effluent) that is generated when agricultural raw materials are processed into finished and semi-finished products. Depending on the processing activities, agro-processing wastewater typically contains a varying combination of high levels of organic matter, excessive nutrients, high concentrations of suspended and dissolved solids, bacteria, sugars, salts, fats and oils, detergents, and other constituents that complicate its handling and treatment.

Proper treatment of agro-processing wastewater is essential to prevent environmental pollution and to ensure compliance with regulatory requirements.

Typically, treatment of agro-processing wastewater is achieved in four stages, depending on the wastewater composition. These stages, namely preliminary, primary, secondary and tertiary treatment, are done to improve final effluent quality. High quality treated wastewater is, at times, reused in processing facilities for landscape irrigation, toilet flushing, cleaning and other non-potable uses. Wastewater reuse can reduce the facilities' freshwater intake, which is particularly valuable in South Africa considering the country's water scarcity challenges.

Preliminary study results show that while most agro-processing companies apply secondary treatment, very few companies are extracting resources from their wastewater. Tertiary treatment is limited with sparse cases of on-site water reuse. There is therefore a missed opportunity for resource recovery or on-site water reuse.



*Greasy effluent at one of the food processing facilities participating in the ARC study*

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Conventional treatment practices perceive waste and wastewater as challenges to be addressed rather than opportunities to be exploited. However, changing environmental conditions and depleting natural resources are leading to a global paradigm shift in waste perception. Concepts like the circular economy model promote finding value in waste, thus minimising waste and maximising resource recovery while reducing reliance on raw materials.

In line with global trends, where there is movement (albeit slow) towards resource recovery from waste and wastewater, ARC researchers are exploring waste valorisation for the local agro-industry. Ironically, the very characteristics that make agro-processing wastewater difficult to treat are what make it a promising resource for recovery. The high organic matter and nutrients contained in agro-processing wastewater can be extracted and processed into valuable commodities.

Nutrients, water and energy are recovered from agro-processing wastewater through both proven and emerging technologies globally. Two of the most commonly recovered nutrients from agro-processing wastewater are nitrogen and phosphorus, which can be extracted through various methods including chemical, biological and physical processes. Once recovered, these nutrients can be used as fertilizers. Water, in varying degrees of cleanness, can also be recovered from wastewater. Ideally, potable water should be recovered for reuse; however, water that is clean enough for other reuse purposes is sufficient.

The goal of resource recovery is the overall reduction of reliance on raw resources. Energy generation from waste and wastewater is a fast-growing field. The recovery of energy from waste is pertinent considering that fossil fuel-derived energy is the primary driver of climate change. An added advantage of waste-derived energy over other types of renewable energy is the resultant reduction of waste through its generation.

A well-established process of energy recovery from waste is the anaerobic digestion of organic matter to produce biogas and a nutrient-rich digestate as a byproduct. Biogas digesters are growing in popularity because of their reduction in organic waste, feedstock diversity, and production of biomethane which can be used directly or upgraded to generate electricity. Furthermore, biogas digesters are suitable for different locales due to their diverse nature, varying from simple, household-level brick and mortar digesters to complex, industrial-scale digesters. Adoption of this technology is gaining traction in South Africa, where the energy space stands to benefit greatly from waste-derived energy considering the country's energy and waste handling woes.



*Sample of wastewater collected from one of the study participants*

Although still in its infancy, the production of hydrogen from waste – i.e. biohydrogen – can also play a critical role in the country's efforts towards energy security, waste reduction, and transitioning to a green economy. Biohydrogen can be produced from various renewable sources such as food waste, agricultural waste, wastewater, and other types of biomass. Hydrogen has high energy content per unit of mass, it burns clean and only produces water as a byproduct. This makes biohydrogen an even more attractive renewable energy source. Unfortunately, biohydrogen production is still limited to lab-scale research because of challenges associated with scaling up. Some of these limitations include process stability challenges, low yield, storage and transportation issues, as well as the cost of production.

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Nonetheless, continued research into addressing the aforementioned challenges and optimising biohydrogen production is vital to support the development of a green economy. Hence the ARC is undertaking research to help address some of the challenges. A crucial aspect of this study is the participation of different stakeholders in the agro-processing sector, including industrial enterprises, treatment facilities, regulators, suppliers, academia and environmental NGOs. In addition to wastewater information, stakeholder participation can provide perspective into the opportunities and challenges of implementing circular wastewater treatment in the agro-processing sector, ensuring that the research is insightful.



Image by Wirestock on Freepic

There is a major opportunity cost associated with the conventional perspective of waste management. Simply treating waste and wastewater for disposal fails to capitalise on the valuable resources that are contained therein. The agro-processing sector, in particular, stands to make a considerable contribution to resource recovery and waste management due to the nutrient- and organic matter-rich nature of the industry's wastewater. Agro-processing effluent is not just a problem to solve; it is an opportunity to seize. With the right support, technologies like biogas and biohydrogen could transform South Africa's waste into a vital part of its clean energy future. But turning this vision into reality will need more than just innovative ideas; it will take action from industry, researchers and policymakers.

*Ms Zikhona Buyeye is a junior researcher in the Renewable Energy unit at the Agricultural Engineering campus of ARC-NRE. She is passionate about the advancement of renewable energy and sustainable agricultural practices. If you are a stakeholder in agro-processing or wastewater management, or an agro-processor interested in participating in the current biohydrogen research study, please e-mail [BuyeyeZ@arc.agric.za](mailto:BuyeyeZ@arc.agric.za) or [MagamaP@arc.agric.za](mailto:MagamaP@arc.agric.za) for further information. Participation in the study is strictly confidential. ■*



A manhole at one of the study participants' wastewater treatment facilities

# Stakeholder Engagement Workshops in Mpumalanga on CA Implements and Mechanisation

– by Dr Tingmin Yu and Mr Johan van Biljon

A team from the ARC-NRE Agricultural Engineering Mechanisation unit held two Stakeholder Engagement Workshops on conservation agriculture (CA) implements and mechanisation at Sheepmoor and Maganagobuswa CPA in Mpumalanga on 8 and 9 July 2025 respectively. The workshops were organised in collaboration with the Department of Agriculture (DoA) and Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (MPDARDLEA) with the aim of introducing the DoA-funded CA mechanisation project to stakeholders and beneficiary farmer groups in the area. A smallholder farmers CA mechanisation requirements questionnaire survey for benchmarking study was also carried out during these workshops, which were attended by a total of 103 participants/stakeholders. ■



Workshop at Sheepmoor

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## New Publication

### Processing of Health Foods

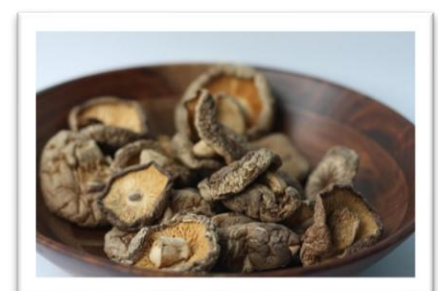
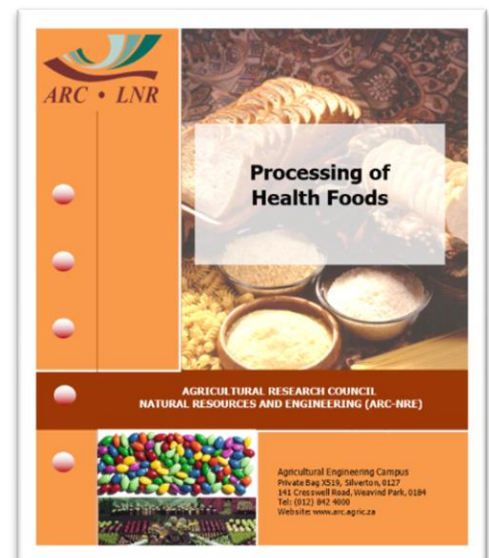
Authored by Ms Theresa Siebert

Published: October 2025

Health foods can be defined as any natural food which is popularly believed to promote or sustain good health. Healthy eating can be defined as eating a variety of foods which supply the nutrients required to maintain good health, supply the human body with energy and leave the consumer feeling satisfied and content. Necessary nutrients include protein, carbohydrates, fat, water, vitamins and minerals.

However, not all fresh foods are obtainable everywhere or available all year round, hence the need for agro-processing. Without the aid of food processing we would not have the convenience of the large variety of food products available in supermarkets and speciality food outlets.

This publication focusses on the methods used in the processing of health foods and includes information on the following: banana flakes; sun-dried bananas; dried strawberries; carrot juice; fresh-market cucumber; dehydrated garlic products and roasted garlic puree; dehydrated onion products and onion oil; canned salmon; the processing of salmon steaks; canning of sardines, clams, shrimp and tuna; and dehydrated mushrooms, as well as fried-dried and frozen mushrooms. ■



A collection of dehydrated mushrooms, including truffles

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# The significance of Packaging and Waste Management – Upcycling and Sustainability

– by Ms Theresa Siebert

## The Influence and Importance of Packaging on our Daily Lives

The term 'packaging' encompasses many disciplines and functions. Packaging is used to enclose or protect products for distribution, storage, sale and use. The term also refers to the designing, evaluation and production of various types of packaging.

In a sense, packaging is fully integrated into our daily lives with numerous benefits:

- Packaging provides physical protection against mechanical shock, vibration and temperature.
- It gives barrier protection against oxygen, water vapour and dust.
- It provides containment and agglomeration where small items can be combined into one package for ease of transport or storage. Similarly, liquids, powders and granular materials need containment.
- Packaging is mostly responsible for the transfer of information regarding, but not limited to, the use of the packaged item, transport, storage, tracking and tracing of items to users, distributors or consumers.
- It is one of the most important and efficient tools available to marketers to influence and encourage prospective buyers to purchase a certain item.
- Through innovative design, packaging can reduce the risk of pilfering, tampering and theft. Packages may be made with tamper resistant seals and tamper evident features, and can also include authentication seals and security printing to indicate that the package and its contents are not counterfeit.
- Packaging can be designed to include convenience features to aid in the handling, stacking, display, opening, reclosing and dispensing of the contents.
- Controlled usage is possible through single serving or single dosage packaging.



*Plastic bag polluting a river*

## Negative Impact of Plastic and Polystyrene Waste

Plastic is inexpensive and durable, which is both a strength and a weakness. Plastic pollution has a negative, unfavourable effect on lands, waterways and oceans, impacting both man and beast through entanglement, ingestion and chemical exposure.

Pollution-causing plastics fall into three main size-based categories: micro-plastics, meso-plastics and macro-plastics. The various sizes of plastic pollutants may also be divided into primary or secondary. Primary plastics are in their original form and include items such as bottle caps. Secondary plastics result from the degradation of primary plastics.

Macro-debris is larger than 20 mm in size. Micro-plastics are between 2 and 5 mm in size, with mega- and macro-debris both being reduced to micro-debris through degradation.

Micro-plastics are easily released into the environment because of their small size and often end up in marine environments after being washed down to the sea by streams and rivers.

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The ease with which plastic pollutants spread is due to factors such as the concentration of human population, trade routes, coastline geography, wind and ocean currents, with devastating effects:

- **Land:** Landfills and other concentrated areas of plastic debris may contain many different types of plastic waste. Some plastics, although biodegradable by certain types of microorganisms, are dangerous in that the breakdown process of these plastics releases methane gas into the atmosphere. Methane is a very powerful greenhouse gas that contributes significantly to global warming. Chlorinated plastic waste releases harmful chemicals into the surrounding soil as it degrades. These chemicals in turn have the potential to seep into the groundwater and other surrounding water sources.
- **Ocean:** The largest percentage of litter around and in the ocean is made up of plastic products. It has been estimated that 5 trillion pieces of plastic waste are afloat at sea. These plastics are toxic to marine life, with the toxins released by the degrading plastics ranging from diethylhexyl phthalate, lead and cadmium to mercury. Throughout the food chain, plankton, fish and ultimately humans ingest these toxic carcinogens and chemicals.
- **Effects on Animals:** Entanglement in plastic waste is responsible for the deaths of countless marine animals such as fish, sea turtles, seals and sea birds. Sea turtles are especially vulnerable as some species consume jellyfish and often mistake plastic bags for their natural prey. Similarly, whales are susceptible to swallowing large amounts of plastic waste. Plastic pollutants do not only affect aquatic animals, but also birds which often mistake trash for prey. Ingested pollutants can obstruct and damage the animal's digestive system, often leading to malnutrition, starvation and death.

Similar issues arise with the use of polystyrene. Polystyrene is not biodegradable and can remain in the environment for hundreds of years and is impervious to photolysis. It simply breaks down into smaller and smaller pieces rather than disappearing, posing a significant threat to wildlife and the ecosystem.

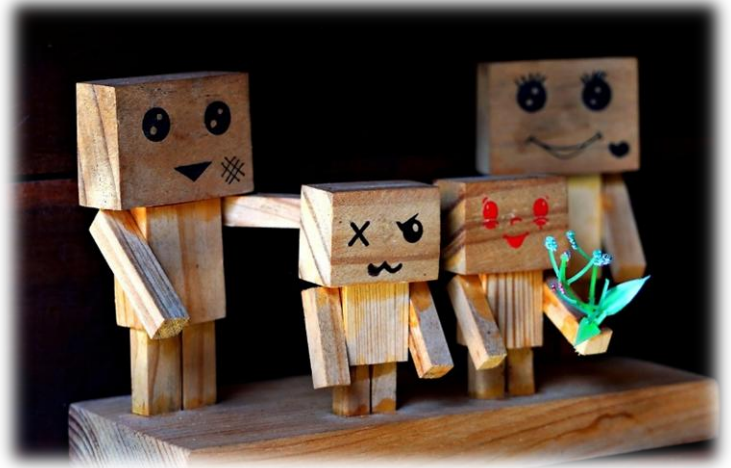
## **Alternatives through Agriculture – Sustainability, Reuse and Upcycling**

Packaging need not be an evil that we must learn to live without. Agricultural resources such as wood, paper (from wood) and cotton offer effective, viable, renewable and sustainable alternatives that are gentle on the environment and have uses beyond those for which they were originally intended:

- For the environment to stay healthy we will need to promote sustainable practices within our industries, and sustainable packaging forms an important part of this practice. Paper-based packaging solutions, including bags, boxes, corrugated paper trays, etc. are completely renewable, bio-degradable and recyclable. Although trees need time to grow to a usable height, they can be replanted and so renewed. With careful planning this is a resource we will never be short of, which in turn means that the supply of paper and paper-based products is renewed as quickly as it is depleted. Another important factor to take note of here is that paper can be recycled, meaning that trees do not actually need to be replanted at the same rate as they are cut down. Litter, however, will always remain, no matter how intensive the recycling efforts are. Paper packaging breaks down completely in the environment and decomposes back into the earth. Even in the home environment, paper packaging can be added to compost heaps by the avid gardener and so add benefit to the garden and home-grown crops.
- Because of its wide array of uses and benefits, wooden packaging (crates or cases) is one of the most popular types of packaging and is deemed to be the best storage and packaging material for many products. Wooden crates and cases are extremely durable and can therefore be reused many times. Wooden packaging has an array of benefits including that it is insect and corrosion free, stackable for efficient storage and shipping, and moisture proof. Wooden crates or cases are easily disposed of and recycled and so leave no harmful residue in the environment. They also have a second life once they are no longer fit for use as packaging materials. There is a lively market for items in the woodworking and art fields where used wooden packaging materials are upcycled for furniture, household ornaments or incorporated in artwork and sculptures.

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- Cotton offers a unique combination of characteristics for packaging, storage and display of goods. It is free from toxic chemicals and dyes, which means the packaging will not trigger allergic reactions in consumers. Cotton is a moderately strong fibre that is durable and does not stress easily. It is able to absorb approximately 27 times its own weight in water and is available in a variety of thicknesses for manufacturing different types of packaging. Cotton is extremely breathable and allows for air circulation and moisture evaporation. This characteristic makes cotton bags ideal for storing fruits and vegetables and for wrapping baked goods. Cotton is durable and easy to sew which makes it the optimal choice for producing long lasting canvas reusable grocery bags, which when eventually discarded are biodegradable.



Artwork made from old wooden packing cases



Cotton field

## Final Thoughts

While it is unlikely that we will be able to do away with plastic packaging anytime soon, along with all the conveniences we experience because of efficient packaging and packaging materials, we as consumers, designers and producers also have a responsibility towards the environment to ensure that we manage packaging waste effectively. To this end, we must find a way of mitigating the negative impact of some packaging materials and of incorporating more environmentally friendly options. It is time we turned to agriculture for renewable answers to our packaging needs so that we may live in harmony with our planet and protect the Earth and its resources by steering towards biodegradable materials with the potential for reuse and upcycling by the consumer. ■

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# Harnessing the Sun: Mobile Solar Trailers for Resilient Farming

– by Ms Zikhona Buyeye, Mr Erence Manyako, Ms Primrose Magama and Dr Idan Chiyanzu

The Agricultural Research Council's Natural Resources and Engineering division is continuously exploring and promoting sustainable technologies to enhance climate resilience and support smallholder farmers. For many small-scale and emerging farmers, especially in remote areas or where the electricity supply is unreliable, powering water pumps remains a significant challenge.

Mobile solar power trailers present an innovative, off-grid solution to this enduring problem. Support from the Department of Agriculture's LandCare Programme, which focusses on the sustainable management and rehabilitation of natural resources, drives implementation of technologies like the mobile solar trailer. These trailers align with LandCare's core objectives by enabling off-grid, solar-powered water abstraction for irrigation and livestock without degrading the environment.

By replacing diesel-powered pumps, mobile solar trailers eliminate greenhouse gas emissions, noise pollution and soil contamination from fuel spills, contributing to cleaner air and healthier ecosystems.

## What is a mobile solar trailer?

A mobile solar trailer is a compact, towable unit that integrates solar panels, energy storage, pumping equipment and water delivery into a single system. These units are designed to be rugged and easily movable around a farm. A typical unit, as illustrated below, features a single-axle trailer equipped with multiple solar panels (e.g. four 200W panels for a 1.2kW system), a submersible pump, a controller, batteries for energy storage, and connected water pipes. Their key advantage is quick on-site setup, requiring no complex installation or connection to the national grid.



*A mobile solar power trailer that can be towed around the farm for water abstraction*

## Applications on the farm

The primary application of mobile solar trailers is to provide a self-sufficient electricity supply for:

- **Borehole Irrigation:** They can directly power submersible pumps to draw water from boreholes for irrigating crops or backyard gardens, a function crucial for maintaining food production during dry spells.
- **Livestock Watering:** Ensuring animals have consistent access to clean water is vital for their health and productivity. The trailers can be moved to different watering points across a farm.
- **Supplemental Water Supply:** They can serve as a critical backup during power outages or in areas where mains electricity is unavailable, supporting both household and agricultural water needs.

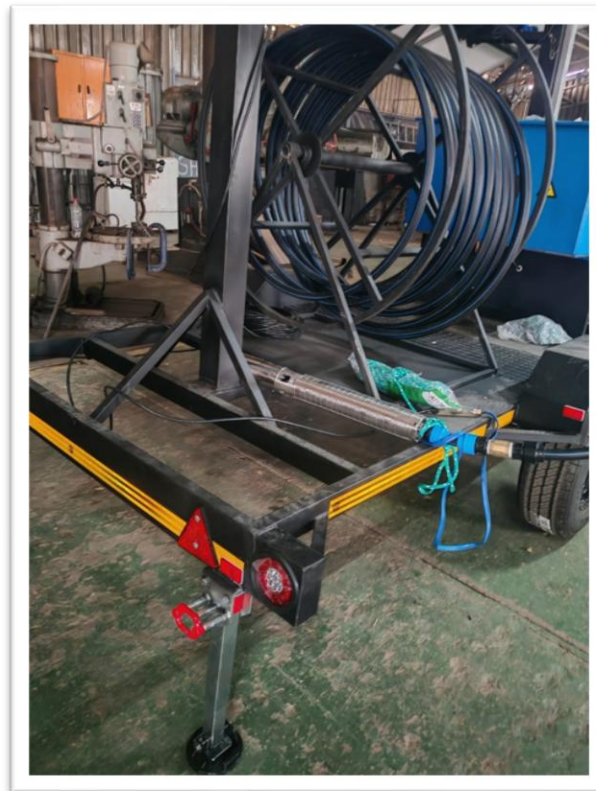
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### Why this is particularly useful for small-scale farmers?

Challenges such as water shortages highlight the vulnerability of small-scale operations. Mobile solar trailers address several of their specific constraints:

- **Energy independence:** They eliminate reliance on the unstable national grid or expensive diesel generators, providing energy security.
- **Affordability in the long-term:** After the initial investment, the operating costs are near-zero as the fuel is sunlight. This protects farmers from volatile diesel and electricity prices.
- **Low maintenance and operational simplicity:** Designed for durability with minimal moving parts, these systems require less technical expertise to operate than maintaining a diesel generator.
- **Flexibility and mobility:** The trailer can be hitched to a vehicle and moved to where water is needed most, making it a versatile asset for different plots or community shared-use models.



*A mobile solar trailer is equipped with everything required for water pumping to ensure convenience and easy movement around the farm*

### Advantages and Considerations

#### Advantages:

- **Clean and Renewable:** Uses solar energy, reducing the carbon footprint and air pollution.
- **Quiet and Safe:** Operates silently with no fire risk from fuel storage.
- **Promotes Water Security:** Enables farmers to access groundwater reliably, a key adaptation to climate variability.
- **Scalable:** Systems can be designed for different needs, from a 500W system for smaller tasks to 1.2kW for more demanding continuous operation.

#### Important Considerations:

- **Initial Capital Cost:** The upfront cost for the trailer, solar panels, batteries and pump can be a barrier, necessitating supportive financing or grant mechanisms.
- **Weather Dependence:** Pumping capacity is reduced during cloudy or rainy periods, requiring sufficient battery storage for continuity.
- **Maintenance Awareness:** While low maintenance, components like batteries have a finite lifespan and need eventual replacement. Users require basic training on system care.
- **Anti-theft Security:** As with any valuable farm asset, securing the panels and equipment is necessary.

Technologies like the mobile solar trailer are not standalone solutions but part of a broader integrated system. By providing clean power for water access, mobile solar trailers can directly contribute to enhanced agricultural productivity, improved livestock management and greater household resilience in the face of climate and economic pressures. ■

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# Strengthening Women and Youth in the Gambia through Postharvest and Agro-Processing Training

– by Ms Manoshi Mothapo and Dr Siphon Sibanda

The village of Jenoi in the Gambia's Lower River Region hosted an intensive capacity building programme from 11-14 November 2025, aimed at empowering women and youth in vegetable and fruit postharvest management and agro-processing. The training was led by a team from the ARC-NRE Agricultural Engineering Mechanisation unit and emphasised the crucial role of postharvest technologies in reducing losses, improving food quality, and creating income generating opportunities.

The training was conducted under Work Package 2 of the *Enhanced Vegetable Production and Processing for Rural Women and Youth in the Gambia* project, funded by the India, Brazil and South Africa Facility for Poverty and Hunger Alleviation (IBSA Fund) via the Food and Agriculture Organization of the United Nations (FAO). In a region where horticulture is a key livelihood activity, strengthening skills in postharvest handling, processing and value adding is essential for enhancing food security, reducing waste and fostering long-term economic development.

Postharvest losses in the Gambia remain high due to poor handling, limited processing capacity and inadequate storage. Women and youth form the backbone of local vegetable production and marketing, and as such are particularly affected by these challenges. The training responded to these gaps by equipping participants with skills needed to reduce losses and increase the value of their produce through improved handling and processing techniques. A total of 30 farmers attended the training course.



*Participants during the training*

## **Outcomes of the training**

The main outcome was improved knowledge and practical understanding of postharvest handling techniques among participants. Food safety, hygiene, and product quality standards were also emphasised, which are increasingly crucial for accessing both rural and urban markets. Farmers were introduced to Good Handling Practices (GHP), Good Manufacturing Practices (GMP), and basic cleaning and sanitation requirements. They gained a clearer understanding of proper maturity indices, cold-chain management, hygiene practices, sorting, grading, drying, fermenting and packaging of vegetables and fruits. Participants also developed skills in producing value-added products such as tomato sauce, chili paste, dried onions and cabbage pickles, which can be sold at local markets for higher returns.

Another key outcome was the enhanced collaboration between farmers, extension officers and development partners. By bringing these actors together, the training strengthened agricultural support networks in the Lower River Region of the Gambia. Extension officers gained deeper insights into the challenges faced by local producers and acquired new teaching materials including posters, manuals and processing guides for use in future community outreach. This interaction promoted long-term sustainability as trained officers can continue mentoring farmers after the project's completion, ensuring continuity of skills and reinforcement of good practices.

## **Benefits to Women and Youth**

The training provided women and youth with practical tools to transform perishable produce into stable, marketable products, offering important income buffers against fluctuating fresh produce prices. Through the introduction of value adding, participants gained the ability to diversify their livelihood activities and reduce vulnerability to market gluts and seasonal shortages. They also benefitted from training in food safety, hygiene and product quality standards. This knowledge strengthened their ability to produce goods suitable for informal and emerging formal markets. Many youth participants reported feeling newly empowered to establish micro-enterprises in dried vegetable snacks, bottled sauces and powdered spices. In addition to technical skills, the training also built confidence, leadership and problem solving abilities, helping women and youth overcome barriers such as limited access to tools, restricted mobility, and lack of prior training opportunities.

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## Sustainability

The capacity building programme highlighted the importance of supporting farmer groups to establish village-level processing units that can serve as hubs for continued production. Such units will allow farmers to collectively access processing equipment, adhere to consistent quality standards, and scale production beyond household level.

Another priority area for sustainability is improving access to basic equipment and packaging materials. Starter kits including knives, trays, jars and drying racks will enable trained participants to immediately apply the skills learned. Furthermore, access to targeted financial support, such as grants or micro-loans, will be critical for establishing micro-enterprises and procuring the necessary equipment.

Strengthening market linkages with cooperatives, aggregators and local retailers will help sustain demand for processed products.

Refresher training every 6 months is recommended to reinforce good practices, troubleshoot challenges, introduce new technologies, and maintain momentum among women and youth groups eager to apply their skills.

The capacity building activities conducted in Jenoi represent a significant investment in rural livelihoods and the transformation of local agrifood systems. By equipping women and youth with critical postharvest and processing skills, the programme directly contributes to reduced food loss, increased household income, improved nutrition, and strengthened rural entrepreneurship. As participants begin applying these techniques within their communities, the long-term impact is expected to extend beyond individual households – supporting the growth of small processing enterprises and enhancing the resilience of the horticulture sector across the Lower River Region and the Gambia as a whole. ■


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*Introduction and welcoming of participants*



*The ARC team with participants and representatives from the FAO, National Agricultural Research Institute (NARI) and Food Technology Sciences of the Department of Agriculture in the Gambia*



**Wishing you and your family health, happiness, peace and prosperity this holiday season and in the coming New Year. May the magic of Christmas fill your heart all year long.**