

IITA Soil Health Technologies

IITA currently deploys various technologies to support soil fertility, biological nitrogen fixation, and sustainable nutrient management. They include, but are not limited to, specialty fertilizers, inoculants like NoduMax, organic fertilizers, biopesticides, and circular bio-economy solutions such as black soldier fly larvae systems.

7 TECHNOLOGIES | CREATED ON OCT 14, 2025 BY TAAT PROFILING TEAM | LAST UPDATED DEC 10, 2025


TECHNOLOGIES IN THIS TOOLKIT

- **Specialty blended fertilizers for root and tuber crops**
- **Specialty Fertilizers and Local Blending for Banana and Plantain**
- **Seed Inoculation with Rhizobia**
- **NoduMax**: Inoculant for Soybeans
- **BSFF**: Organic fertilizer for soil improvement
- **Beauveria Biopesticide**: Based on the entomopathogenic fungus...
- **EcoCycle Larvae System**: Black Soldier Fly Larvae (BSFL) proteins f...

https://taat.africa/oyh

Specialty blended fertilizers for root and tuber crops

Special fertilizer for root and tuber crops

Specialty Blended Fertilizers for Root and Tuber Crops" are custom fertilizers that provide essential nutrients to address soil deficiencies in Sub-Saharan Africa. They are designed for sweet potato and cassava farming, promoting efficient nutrient use, root growth, and overall crop health.

International Institute of Tropical Agriculture (IITA)
Paul Woomer

This technology is TAAT1 validated.

6·6 Scaling readiness: idea maturity 6/9; level of use 6/9

Inclusion assessment 3

Climate impact 7

Problem

- **Soil Issues**: Many soils in Sub-Saharan Africa lack essential nutrients and suffer from low fertility, limiting the production of crops like sweet potato and cassava.
- **Insufficient Crop Resilience**: Crops like sweet potato and cassava are vulnerable to drought, pests, diseases, and stress, impacting their quality and yield.

Solution

- **Balanced Nutrient Supply and Crop-Specific Formulas**: These fertilizers provide essential nutrients to address soil deficiencies in Sub-Saharan Africa and are tailored to meet the specific needs of crops like sweet potato and cassava.
- **Enhanced Crop Health and Yield**: The right nutrient formula enhances crop productivity, quality, and resilience, helping them resist drought, pests, diseases, and stress.

Key points to design your project

This fertilizer technology aids several Sustainable Development Goals (SDGs) and aligns with key government project priorities like food security and climate action. It can potentially empower women in farming and has a positive climate impact.

To implement this technology:

- Identify potential partners among fertilizer manufacturers,
- Launch an awareness campaign, and organize training programs,
- Collaborate with the manufacturer for product development and distribution,
- Set up demonstration plots, establish a feedback mechanism,
- Regularly monitor and evaluate the impact.

16 to 26 ton per hectare
sweetpotato yield increase

IP
Open source / open access

Technology from

ProPAS

Commodities

Sweet Potato, Cassava

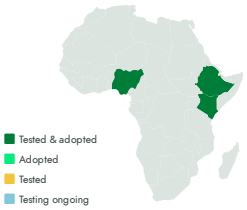
Sustainable Development Goals

8 DECENT WORK AND ECONOMIC GROWTH

Categories

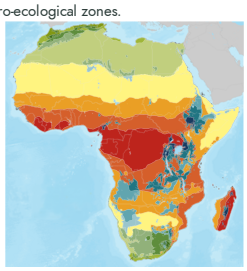
Production, Inputs, Fertilizer

Tested/adopted in



Where it can be used

This technology can be used in the colored agro-ecological zones.



Target groups

Farmers

Specialty Fertilizers and Local Blending for Banana and Plantain

Fertilize for Success: Banana & Plantain Boost

The technology of Specialty Fertilizers and Local Blending for Banana and Plantain involves creating tailored fertilizer blends to enhance banana and plantain yield in Sub-Saharan Africa. It adapts to soil characteristics, improves crop resilience, and increases productivity and nutritional value. It's a cost-effective solution for farmers.

International Institute of Tropical Agriculture (IITA)
Godfrey Taulya

This technology is TAAT1 validated.

8·9 Scaling readiness: idea maturity 8/9; level of use 9/9

Inclusion assessment 4

Climate impact 7

Problem

- **Nutrient Deficiency**: Poor soil nutrients lead to low crop yields.
- **Environmental Stresses**: Crops are vulnerable to drought, pests, and diseases.
- **Climate Change**: Drought due to climate change affects crop health and productivity.

Solution

- **Nutrient Supply**: Provides balanced nutrients, improving crop growth and yield.
- **Crop Resilience**: Strengthens crop resilience to environmental stresses.
- **Climate Adaptability**: Helps crops withstand impacts of climate change.

Key points to design your project

The Specialty Fertilizers and Local Blending for Banana and Plantain technology contributes to several Sustainable Development Goals (SDGs) by improving crop yields, promoting gender equality, and having a positive impact on the climate. It enhances productivity and resilience of crops, contributing to zero hunger and economic growth.

To implement this technology:

- Identify potential partners
- Launch an awareness campaign and training programs,
- Develop the right blends of fertilizer and leverage the manufacturer's distribution network,
- Set up demonstration plots,
- Establish a feedback mechanism, and regularly monitor and evaluate the impact of the technology.

6 ton/ha
yield increase

IP
Open source / open access

Technology from

ProPAS

Commodities

Bananas & plantains

Sustainable Development Goals

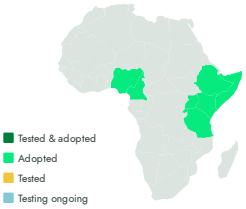
Categories

Production, Inputs, Fertilizer

Best used with

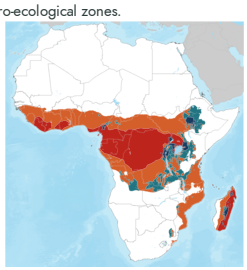
Improved Varieties of Plantain for Tropical Lowlands, Improved Varieties of Banana for the African Highlands
See all 2 technologies online

Tested/adopted in



Where it can be used

This technology can be used in the colored agro-ecological zones.



Target groups

Seed Inoculation with Rhizobia

Boosting Crops, Nourishing Communities

The "two-step" procedure of seed inoculation that results in effective coverage with elite rhizobial (Source: the N2Africa Project)

Seed inoculation with elite rhizobium strains boosts legume yields by addressing nitrogen limitations through Biological Nitrogen Fixation (BNF). This cost-effective practice enhances crop production on small-scale farms in Africa, reducing reliance on expensive fertilizers, promoting environmental sustainability, and ensuring food, nutrition, and income security for farmers.

International Institute of Tropical Agriculture (IITA)
David Ojo

This technology is TAAT1 validated.

7·7 Scaling readiness: idea maturity 7/9; level of use 7/9

Inclusion assessment 4

Climate impact 7

Problem

- **Nitrogen Deficiency**: Soils often lack sufficient nitrogen for plant growth.
- **Incompatible Rhizobia**: Newly introduced legume species may not be compatible with local rhizobia, leading to low yields.
- **Soil Health**: Maintaining soil fertility and health is a constant challenge.
- **Plant Diseases**: Farmers constantly battle against diseases that can devastate crops.
- **Sustainability**: Balancing economic viability with environmental sustainability is a major concern.

Solution

- **Biological Nitrogen Fixation**: Rhizobia address nitrogen deficiency.
- **Specific Strain Introduction**: Inoculation ensures the presence of the needed rhizobia.
- **Rhizobia Population Boost**: Inoculation guarantees optimal nodulation and nitrogen fixation.
- **Sustainable Farming**: Rhizobia promote sustainable agriculture.
- **Stress-Tolerant Strains Introduction**: Inoculation mitigates effects of stress on nitrogen-fixing symbiosis.

Key points to design your project

Rhizobia inoculant technology is a win-win for Africa:

It boosts food security (SDG 2), increases legume yields mean more food and income for farmers, especially women (SDG 5). Climate-smart agriculture (SDG 13), less reliance on chemical fertilizers reduces emissions.

To integrate this tech in your project, consider:

- Partnering with experts for training and quality control.
- Selecting suitable legumes and effective, adaptable rhizobia strains.
- Ensuring cost-effectiveness and proper distribution with storage and quality checks.
- Educating farmers and monitoring project success.

IP

Unknown

Technology from

ProPAS

Commodities

Soybean, Common bean

Sustainable Development Goals

Categories

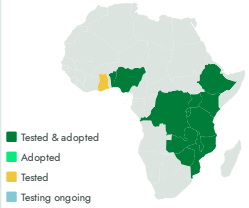
Production, Inputs, Inoculant

Best used with

Climbing Bean with High Yield and N Fixation, Biofortified Beans for Improved Nutrition, Specialty Fertilizer Blends for Common Bean

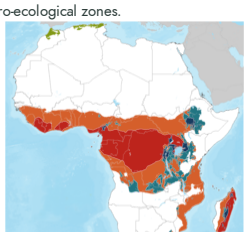
See all 3 technologies online

Tested/adopted in



Where it can be used

This technology can be used in the colored agro-ecological zones.



NoduMax: Inoculant for Soybeans

Advanced Soybean Inoculation Solution for Sustainable Agriculture

This technology is a solid inoculant, which contains the industry-standard strain USDA 110 and includes a gum Arabic adhesive and user instructions. It is packed in 100 g packets sufficient for 10 to 15 kg soybean seed.

International Institute of Tropical Agriculture (IITA)
David Ojo

This technology is TAAT1 validated.

7·7 Scaling readiness: idea maturity 7/9; level of use 7/9

Inclusion assessment 4

Climate impact 7

Problem

- Poor Root Nodulation and Low Biological Nitrogen Fixation (BNF) in Soybeans
- Lack of Quality Inoculant in the Market
- Limited Access to Affordable Inoculants in African Countries
- Complex Application Procedures
- Lack of Protein Sufficiency and Soil Fertility in Soybean Production
- Clumping in Alternative Inoculation Methods

Solution

- Promotes biological nitrogen fixation, reducing the need for expensive nitrogen fertilizers.
- Ensures the presence of symbiotic rhizobium bacteria, optimizing root nodulation for improved nutrient absorption.
- Enhances BNF, thereby boosting soil fertility and reducing reliance on synthetic fertilizers.
- Promotes natural nutrient cycling in the soil, contributing to sustainable agricultural practices.

Key points to design your project

- Implementation steps for the technology include assessing product quantities, considering delivery costs, and engaging trainers for installation support.
- Communication support, such as flyers, videos, and radio broadcasts, should be developed to promote the technology.
- For improved maize variety optimization, companion planting with resistant soybean varieties and proper nutrient fertilization is recommended.
- Collaboration with agricultural development institutes and agro-dealers facilitates successful technology implementation.

150,000 USD	**120,000 USD**	**IP**
To build the NoduMax factory	To equip the NoduMax factory	Unknown

Technology from

ProPAS

Commodities

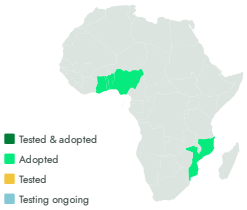
Soybean

Sustainable Development Goals

Categories

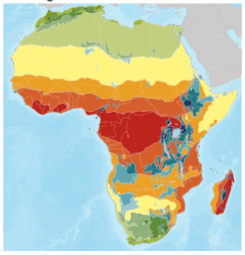
Inputs, Inoculant

Tested/adopted in



Where it can be used

This technology can be used in the colored agro-ecological zones.



Target groups

Farmers

BSFF: Organic fertilizer for soil improvement

Low cost fertilizer for healthy and profitable agriculture for African farmers.

Frass is a nutrient-rich compost produced from black soldier fly larvae (BSFL) treatment of biodegradable waste. Commercially, it consists of BSFL faeces, substrate residues, exoskeletons, and a microbial population aiding fermentation.

International Institute of Tropical Agriculture (IITA)
Dr Rousseau DJOUAKA

This technology is validated.

8·7 Scaling readiness: idea maturity 8/9; level of use 7/9

Inclusion assessment 4

Climate impact 7

Problem

- Africa faces a lack of organic waste management solutions, leading to severe environmental threats.
- Soil fertility in smallholder farms is declining due to nutrient imbalances, where more nutrients are extracted than replenished, worsening food security.

Solution

- BSFF technology converts organic waste into nutrient-rich compost, reducing environmental contamination and improving soil fertility.
- It promotes sustainable agricultural practices by enhancing soil health.

Key points to design your project

To integrate the BSFF technology into your project:

- **Educate Farmers**: Raise awareness among farmers about the benefits of using BSFF fertilizer for improving crop yields and soil health.
- **Promote Accessibility**: Ensure equitable access to BSFF products and financial support for local suppliers and smallholder farmers.
- **Calculate Fertilizer Needs**: Determine the required quantities of BSFF fertilizer, considering a recommended application rate of 10 tons per hectare for poor soils.

IP

National phase application

Commodities

Tomato, Pepper, Onions

Sustainable Development Goals

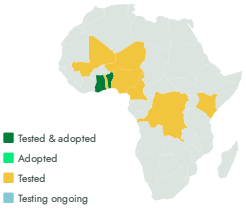
Categories

Production, Inputs, Fertilizer

Best used with

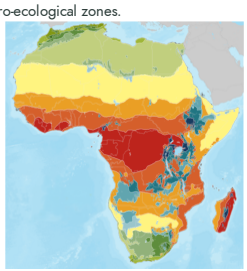
Black Soldier Fly Larvae (BSFL) proteins for low cost feeds
See all 1 technologies online

Tested/adopted in



Where it can be used

This technology can be used in the colored agro-ecological zones.



Target groups

Farmers

Beauveria Biopesticide: Based on the entomopathogenic fungus Beauveria bassiana

A Sustainable, Profitable Solution for Diamondback Moth and Beyond!

This biopesticide utilizes *Beauveria bassiana*, an entomopathogenic fungus, specifically isolate Bb11, to control pests like the cabbage moth (*Plutella xylostella*). The fungus produces conidia spores that attach to the insect's cuticle, germinate, and penetrate internal tissues, leading to the insect's death. It is a natural, eco-friendly alternative to chemical pesticides, safe for humans, animals, and beneficial insects, and is effective in Integrated Pest Management (IPM) systems for sustainable crop protection.

This technology is **not yet validated**.

6·3 Scaling readiness: idea maturity 6/9; level of use 3/9

Inclusion assessment

Climate impact 7

Problem

- Smallholder farmers face major crop losses due to pests like fall armyworm, aphids, and whiteflies.
- Overuse of chemical pesticides has led to pest resistance, reducing effectiveness.
- Synthetic pesticides pose risks to human health, pollinators, and ecosystems.
- Affordable and eco-friendly alternatives are limited or inaccessible to farmers.
- Climate change is worsening pest outbreaks and expanding their range.

Solution

- Uses the natural fungus *Beauveria bassiana* to biologically control harmful insect pests.
- Effectively targets pests like fall armyworm, aphids, whiteflies, and borers without harming beneficial insects.
- Reduces dependence on chemical pesticides, lowering environmental and health risks.
- Can be integrated into climate-smart and organic farming practices.
- Supports sustainable pest management and preserves biodiversity.
- Suitable for smallholder use—safe, affordable, and easy to apply.

Key points to design your project

Beauveria bassiana (Bb11) is a locally validated, eco-friendly biopesticide that effectively controls pests like diamondback moths, fall armyworms, and aphids. It reduces reliance on chemical pesticides, supports food security, and preserves biodiversity.

To integrate Bb11 into government programs:

1. **Estimate needs** by crop and pest pressure.
2. **Verify local availability** or plan for import.
3. **Train farmers and extension agents** on application.
4. **Raise awareness** through educational materials.
5. **Promote IPM strategies** for long-term effectiveness.
6. **Collaborate with partners** for broad adoption.

20 USD/day	**50** USD/ha	**20** USD/day
Additional workforce required	Location cost for specialized tools	Cost associated with training

International Institute of Tropical Agriculture (IITA)
Manuele Tamo

Commodities

Sustainable Development Goals

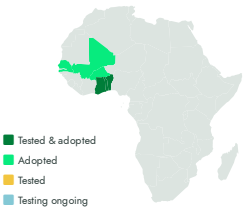
12 RESPONSIBLE CONSUMPTION AND PRODUCTION

15 LIFE ON LAND

Categories

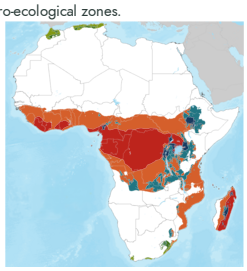
Production, Inputs, Pesticide, Biocontrol

Tested/adopted in



Where it can be used

This technology can be used in the colored agro-ecological zones.



Target groups

Farmers, Researcher center

EcoCycle Larvae System: Black Soldier Fly Larvae (BSFL) proteins for low cost feeds

BSFL proteins for sustainable local fish and chicken feed production

International Institute of Tropical Agriculture (IITA)
Rousseau Djouaka

BSFL composting is a biological method that uses Black Soldier Fly larvae to break down organic waste like food scraps and manure. The process produces nutrient-rich larvae for animal feed and a compost by-product called frass.

This technology is validated.

8·9 Scaling readiness: idea maturity 8/9; level of use 9/9

Inclusion assessment 4

Climate impact 7

Problem

- Fish and poultry farming in sub-Saharan Africa face inconsistent and unreliable year-round feed supplies.
- The feed prices significantly increase production costs, making it difficult for fish farmers to sustain operations.
- 30-40% of food and organic is wasted, resulting in to negative environmental impacts, such as pollution and resource depletion.

Solution

- Using BSFL to decompose organic waste provides a sustainable way to waste and reduce environmental harm.
- BSFL technology produces nutrient-rich larvae that can be used as a low-cost feed for fish and poultry.
- Encouraging the adoption of BSFL technology supports a circular economy model that fosters long-term economic stability and environmental protection.

Key points to design your project

Black Soldier Fly Larvae (BSFL) Composting Technology enables sustainable waste management in sub-Saharan Africa by converting organic waste into affordable, nutrient-rich livestock feed. Implementing this technology involves setting up waste collection systems, BSFL rearing facilities, and marketing feed. with initial costs ranging from 1,000 to 2,400 USD. Key project partners may include waste management organizations and government agencies, and training is essential for effective management of BSFL systems.

IP

Unknown

Commodities

Fish

Sustainable Development Goals

Categories

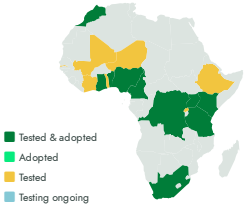
Pre-production, Inputs, Animal healthcare

Best used with

Fast Growing and Hybrid African Catfish, Cage Systems for Fish farming, Tank Systems for Fish farming, Organic fertilizer for soil improvement

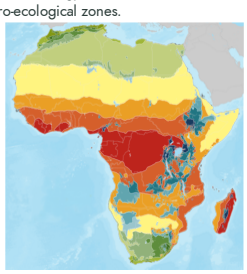
See all 4 technologies online

Tested/adopted in



Where it can be used

This technology can be used in the colored agro-ecological zones.



Target groups

AFRICAN DEVELOPMENT BANK GROUP
GROUPE DE LA BANQUE AFRICAINE DE DÉVELOPPEMENT

Technologies for African Agricultural Transformation

IITA Soil Health Technologies

https://taat.africa/oyh

ABOUT US

TAAT

TAAT, Technologies for African Agricultural Transformation, is an African Development Bank initiative to boost agricultural productivity by rapidly rolling out proven technologies to more than 40 million smallholder farmers.

TAAT aims to double crop, livestock, and fish productivity by 2025 by engaging both public and private sectors to expand access to productivity-increasing technologies across the continent.TAAT advises African government who receive funding from international financial institutions such as the African Development Bank to help them integrate the best agricultural technologies in their development projects. TAAT also offers technical assistance for the integration of these technologies, when needed.

TAAT Technologies

TAAT definition of agricultural technologies is very broad: they include improved varieties, inputs, equipment, agricultural infrastructure, practices and agricultural policies. In short, any solution to an agricultural constraint. TAAT technologies have been developed by a wide variety of organizations: the CGIAR, other international research institutions, national research organizations, or the private sector.

TAAT Clearinghouse

Within TAAT, the Clearinghouse has the remit to select, profile and validate agricultural technologies, and showcase them in online catalogs to support the advisory role that the Clearinghouse offers to governments and the private sector. The Clearinghouse strives to be an 'honest broker' of technologies through its selection, profiling, validation and advice.

TAAT e-catalogs

The e-catalogs are designed to be used by decision-makers within governments, private sector companies or development organizations. They facilitate the search for appropriate solutions that are adapted to local conditions and requirements, and provide all necessary information, presented in jargon-free and easy to analyze technology profiles. Once a decision-maker has selected a technology of interest, the e-catalogs facilitate their direct contact with those who can help them implement the technology, whether they are a research group or a private company.

TAAT Technology Toolkits

Technology toolkits are hand-picked selections of technologies from the TAAT e-catalogs. We offer some curated toolkits for specific cases, and registered users can create their own toolkits, showcasing their selection of technologies. Toolkits can be used online and shared as links, as mini e-catalogs, they can also be downloaded, saved, shared or printed as collections of technology pitches in PDF format (pitches are one-page summaries of technology profiles, available for all technologies on the e-catalogs).

AFRICAN DEVELOPMENT BANK GROUP
GROUPE DE LA BANQUE AFRICAINE DE DÉVELOPPEMENT

Technologies for African Agricultural Transformation

CONTACT

Chrys Akem – TAAT Program Coordinator: +234 8169020531
Dr Solomon Gizaw – Head, TAAT Clearinghouse: +251 900461992
taat-africa@cgiar.org | https://e-catalogs.taat-africa.org

TAAT is funded by the African Development Bank, the TAAT Clearinghouse is co-funded by the Bill and Melinda Gates Foundation and the African Development Bank.