



Advancing Bio-based Agricultural Inputs in Kenya

A Roadmap Developed by a Cluster of
Kenyan Agrobiological Enterprises

EXECUTIVE SUMMARY



The Roadmap developed by Cluster of Kenyan Agrobiological Enterprises focuses on scaling sustainable, bio-based agricultural inputs including biofertilizers, biopesticides, bio-stimulants and regenerative farming inputs that support climate-smart, sustainable and productive farming practices in Kenya. It is part of the Advancing Bioeconomy Development in Kenya (ABDK) project, led by SEI with Sida support, which aims to accelerate Kenya's bioeconomy through actor mapping, cluster roadmaps, and Kenya-Sweden business partnerships.

These agrobiological enterprises produce biological fertilizers derived from decomposed organic matter, beneficial microorganisms and crop residues; botanical and microbial biopesticides as alternatives to synthetic chemicals; bio-stimulants that enhance plant growth and stress tolerance; and soil-improving inputs. These inputs strengthen soil health, reduce dependence on imported chemical fertilizers and pesticides, improve farm productivity and resilience to climate shocks, reduce environmental contamination and greenhouse gas emissions, and create rural employment and income for smallholders and processors.

The roadmap positions bio-based agricultural inputs as a critical pillar of Kenya's low-carbon, circular and inclusive bioeconomy. The cluster of Kenyan Agrobiological enterprises demonstrate viable, locally adapted solutions but face barriers in production scaling, market awareness, product certification, financing and supply-chain linkages. The roadmap sets out a shared vision of a thriving, formalized bio-input sector that equips Kenyan farmers with effective, affordable, sustainable tools to boost productivity while regenerating soils, building climate resilience and contributing to national food security and environmental sustainability goals.

1.

An Overview of the ABDK Project

The Advancing Bioeconomy Development in Kenya (ABDK) project, implemented by the Stockholm Environment Institute (SEI) with support from the Swedish International Development Cooperation Agency (Sida), aims to accelerate the industrialization, modernization and scaling of Kenya's bioeconomy while generating lessons for the broader East Africa region. The project focuses on three core interventions: mapping bioeconomy private-sector actors and agripreneurs in Kenya and Sweden, developing bioeconomy roadmaps for different Kenyan bioeconomy actor clusters, and promoting collaboration and technology exchange between Swedish and Kenyan bioeconomy practitioners.

A central component of ABDK is the co-creation of roadmaps with selected bioeconomy clusters and the use of these cluster platforms to catalyse business-to-business partnerships between Kenyan MSME bioeconomy enterprises and Swedish bioeconomy companies. Through these partnerships, the project seeks to unlock investment, technology transfer and market access for high-potential bio-based solutions.

Within this framework, the ABDK initiative supports four distinct clusters. The cluster of Kenyan Agrobiological enterprises focuses the production of bio-based agricultural inputs including biofertilizers, biopesticides, bio-stimulants and other regenerative farming inputs derived from agricultural residues, food waste, and biological processes. The roadmap for this cluster outlines priority actions to scale sustainable bio-input value chains that enhance soil health, improve farm productivity and climate resilience, reduce reliance on imported chemical inputs, and contribute to Kenya's circular bioeconomy and agricultural transformation agenda.

1.1 Bio-based Agricultural Inputs in Kenya's Emerging Bioeconomy

Bio-based agricultural inputs represent a largely untapped but high-potential pillar for Kenya's circular bioeconomy. They use agricultural residues, food processing waste, and biological processes to produce fertilizers, soil amendments and crop protection products that replace imported, expensive and environmentally damaging chemical inputs. Kenya's heavy reliance on imported synthetic fertilizers and pesticides creates substantial foreign exchange outflows, environmental pollution and climate risks, making locally-produced bio-inputs a strategic alternative.

Biofertilizers harness nitrogen-fixing bacteria, phosphate-solubilizing microorganisms and other beneficial soil microbes to improve nutrient availability and uptake. Biopesticides—botanical extracts, entomopathogenic fungi, beneficial insects and microbial agents offer targeted crop protection with minimal environmental impact. Biochar and compost improve soil structure, water retention and carbon sequestration. Bio-stimulants enhance plant growth, stress tolerance and disease resistance. Together, these inputs enable regenerative agriculture practices that restore degraded soils, build climate resilience, reduce production costs for farmers, and create economic opportunities for rural MSMEs engaged in production, packaging and distribution.

A bioeconomy approach to agricultural inputs means converting biological resources and waste into valuable economic assets not byproducts through innovation, quality assurance and coordinated value chains. This links sustainable biomass management, local production, farmer training and supportive policies so Kenya can build integrated bio-input supply systems that improve farm productivity and environmental sustainability while generating rural incomes and green jobs.

The Kenyan Biobased Agricultural Inputs Cluster Roadmap



2.1 Cluster Vision

A certified, market-trusted, locally-driven bio-input sector that provides Kenyan farmers with effective, affordable, and accessible biofertilizers, biopesticides, and regenerative farming inputs, supporting sustainable intensification, soil health, climate resilience and improved productivity while creating dignified livelihoods for rural MSMEs and contributing to national food security and environmental sustainability goals.

Cluster 2 members and enterprises are listed in the annex.

2.2 Scaling Opportunities for Cluster Enterprises (MSMEs)

Micro, Small and Medium Enterprises (MSMEs) in Kenya's bio-based agricultural inputs sector have transformative potential to scale innovation, improve farmer livelihoods, and secure national food security. The following five domains highlight concrete, high-impact scaling opportunities, each elaborated with actionable details for implementation:

Markets



- **County-Level Hubs:** Set up dedicated agrobiologicals supply and demonstration centers in Nairobi, Kiambu, Nakuru, and Machakos as anchor points for warehousing, last-mile logistics, training, and market piloting.
- **EAC Regional Corridors:** Work with trade facilitation programs and border county governments to remove non-tariff barriers, standardize certification, and create fast-track lanes for agrobiological products into Uganda, Tanzania, Rwanda, and beyond.
- **Targeted Export Channels:** Identify and partner with export aggregators, certified organic produce exporters, and global buyers (such as EU retailers and organic supply chains). Use traceability and eco-labeling to build trust for these markets.
- **Market Segmentation:** Customize agrobiological products and packaging (e.g., small sachets for smallholders, bulk for plantations/institutions) to penetrate different buyer groups, including women/youth farmer segments.
- **Domestic Awareness:** Leverage county fairs, farmers' exhibitions, and NGO extension networks to rapidly build awareness for regenerative inputs in new markets, including county government procurement.

Go-to-Market Strategies for Agrobiologicals



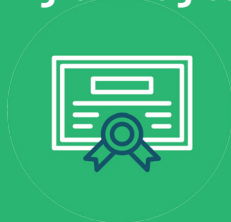
- **Cooperative Marketing:** Formalize or support existing MSME marketing consortia for collective market research, pooled production for large tenders, and joint branding initiatives ('Kenya Green Inputs' mark).
- **Distribution with Agro-dealers:** Expand training and incentives for agro-dealers to stock cluster brands, ensure correct storage and education of clients, and offer in-season promotions that drive product trial.
- **Institutional Procurement:** Proactively target school feeding programs, public hospital food supply chains, Ministry of Agriculture distribution budgets, and NGOs running social safety nets. Bundle offers with training or implementation support to boost government uptake.
- **Digital Platforms:** Develop e-commerce portals and integrate with mobile-money for smallholder transactions. Use digital extension (farmers' SMS alerts, WhatsApp groups, YouTube demos) for product education, technical support, and feedback collection.

Technology & Innovation



- **Improved Strains/Formulations:** Co-develop new agrobiological product lines with research centers (KALRO, Universities, ICIPE, CABI), focusing on microbial strains matched to local soils/crops, pests, and climate challenges (drought, acidity, salinity).
- **Controlled-Release Technologies:** Invest in encapsulation, slow/nano release carriers, and liquid suspension systems to optimize efficacy of agrobiologicals and match farmer needs for fewer reapplications and reduced labor.
- **On-Farm Trials:** Roll out living labs and demonstration plots in partnership with lead farmers, coops, and county extension services. Collect field performance data to build local evidence, support regulatory approval, and market credibility.
- **GMP-lite Protocols:** Implement standardized, cost-effective good manufacturing practices that can be realistically adopted by MSMEs, ensuring both product quality and affordability.
- **Affordable QC Labs:** Develop mobile (county-based or cluster-run) quality analysis labs for agrobiologicals efficacy with KEBS/KIRDI accreditation. Use bulk testing, batch certification, and subsidized access to enable even smaller producers to meet standards.

Certification Pathways for Agrobiologicals



- **KEBS/Regulatory Streamlining:** Advocate for single-window digital submission for cluster-specific approvals. Develop templates, checklists, and support helplines for MSMEs.
- **Organic/Eco-labelling:** Support cluster members to access organic and eco-certifications through mentorship, cost-sharing for audits, and bundled technical/emergency compliance services.
- **Progressive Certification:** Introduce a stepwise system from basic local registration to export/compliance certifications, so that MSMEs can incrementally access wider markets as they build capacity.
- **Mutual EAC Recognition:** Engage with EAC secretariat/policy makers for cluster-wide mutual product recognition, saving costs when trading across borders.
- **Certification Clinics:** Organize quarterly 'certification clinics' where government/standards experts provide direct guidance and group enrolment for batch approvals, reducing MSME navigation burden.

Financing and Investment for R&D, innovation and commercialization of agbiologicals



- **Working Capital Lines:** Collaborate with banks, SACCOs, and fintech lenders to design credit lines and overdrafts tied to purchase orders and seasonal production cycles.
- **Asset Finance:** Structure affordable leasing, asset-backed loans, or public-private funding (matching grants, concessional credit) for MSMEs to scale capacity in production, cold storage, and distribution.
- **R&D, Blended & Climate Funds:** Secure grant funding from international SME innovation challenge funds, green funds, or local R&D calls (KEPSA, SEI, Ministry of Trade) for priority R&D and field validation.
- **Tax Incentives:** Lobby for 0% VAT and duty-free importation of manufacturing equipment, packaging, and key reagents for certified biobased input producers. Advocate for direct subsidies tied to volume, efficacy, and verified environmental benefit.
- **Consumer Finance:** Develop partnerships with microfinance, government e-voucher schemes (like e-subsidy programs), and input dealers to offer installment purchase, layaway, or in-kind repayment models that make inputs affordable for smallholders.

2.2. SWOT Analysis



Strengths

- Rich natural resources and diverse agro-ecologies supporting local sourcing of agbiologicals feedstocks and product relevance
- Stable political environment with growing policy interest in innovation, sustainability, and climate-smart agriculture
- High innovation potential with locally adapted, low-cost, people-centered bioinput solutions designed for smallholder contexts
- Strong community engagement, youth entrepreneurship, and farmer-led innovation driving adoption feedback and co-design
- Health-focused value chain narrative: from sustainable soils, healthy crops, better yields to improved consumer and farmer health
- Growing readiness for market expansion, with significant East African and global demand for organic, regenerative products



Weaknesses

- Fragmented policy landscape with overlapping mandates and weak enforcement across multiple agencies (KEBS, NEMA, KFS)
- Limited investment in research, on-farm trials, production infrastructure, quality assurance labs, and machinery access by both government and private sector
- Inconsistent bio-input performance, contamination risks, short shelf life, and quality variability due to inadequate process controls
- Gaps in marketing, branding, business professionalization, and skilled labor in microbiology, bioprocess engineering, and regulatory compliance
- Absence of clear national standards and standardization for biological inputs; limited guidance on safety, shelf life, and efficacy
- Low demand due to poor farmer awareness, limited market access, weak customer trust, and confusion with low-quality counterfeit products
- Financial constraints: limited capital for production equipment, cold chains, and working capital; shrinking farmer purchasing power in drought-affected areas
- Oversaturated market with too many small, uncoordinated producers; insufficient product differentiation and quality assurance



Opportunities

- Rising demand for certified organic products, new market frontiers (EU, regional exports), and diversification potential across crops and livestock
- Access to environmental funding, green bonds, climate finance grants, and flexible financing mechanisms
- Capacity-building opportunities through trainings, demonstrations (living labs), education campaigns, and youth enterprise programs linked to green jobs
- Technological advancements in fermentation, controlled-release formulations, digital tools, and production efficiency creating competitive advantage
- Regional bioeconomy strategies and commitments (EAC Regional Bioeconomy Strategy) creating policy momentum and financing windows

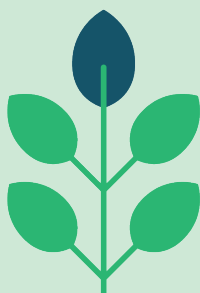


Threats

- Safety and quality concerns affecting consumer and farmer trust; a few bad products can undermine the entire sector's credibility
- Certification barriers (KEBS, export standards) and regulatory hurdles that delay or block market entry for small producers
- Climate risks, such as droughts, erratic rainfall, and flooding that affect both feedstock availability and farmer purchasing power, threatening demand and supply
- Market pressures from cheap, heavily subsidized imports of synthetic fertilizers and pesticides competing against bio-inputs
- Dominance of large multinational agrochemical companies and their distribution networks; weak smallholder bargaining power and market access

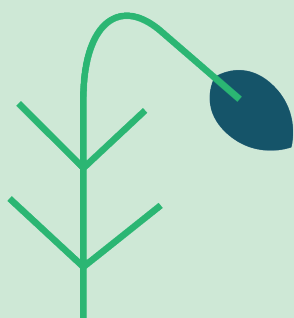
2.4 Key Opportunities for Expansion

- **Market access and regional scale up**
 - » **Go-to-market strategy:** Identifying and utilizing effective distribution channels, such as agro-dealers and brokers, and provide necessary information for effective market access.
 - » **Policy intervention:** Advocating for government support, such as subsidies for bio-products or incentivized bundling with inorganic fertilizers, to create a level playing field.
 - » **Regional movement:** Establishing clear, simplified, and efficient means to transport bio-products across the wider East African region (EA).
 - » **Technology & Innovation:** Securing research and development (R&D) grants to advance the research that informs new technologies and product development.
- **Regulatory Compliance and Certification**
 - » **Standardization & clarity:** streamlining the certification process by establishing clear, non-ambiguous standards for each bio-product (e.g., through KEBS).
 - » **Institutional partnerships:** connecting MSMEs with reliable institutions that can partner with them for product testing and quality standards verification.
 - » **Peer Support:** encouraging MSMEs to join relevant associations to gain mentorship and shared experience regarding quality and compliance processes.
 - » **Process Efficiency:** addressing the issue of lengthy processes for quality testing to speed up market entry.
- **Finance and Capacity Building**
 - » **Scaling finance:** securing financing mechanisms dedicated to both increasing production capacity and ensuring effective access and scaling of products to clients (e.g., working capital for distribution).
 - » **Capacity investment:** obtaining financing specifically targeted at capacity building and technical support to enhance operational efficiency and product quality within the MSMEs.



2.5 Key Barriers for Growth

- **Insufficient government support and market incentives:** The absence of dedicated government subsidies or supportive policies creates an unfair market disadvantage. This includes the failure to implement mandatory or incentivized accompaniment policies (e.g., bundling of organic and inorganic inputs) that would drive demand and an increased market share for bio-products.
- **Complex and fragmented regulatory landscape:** Policy fragmentation, where multiple, uncoordinated institutions oversee the sector, leads to severe cost implications for MSMEs. This barrier requires the centralization and harmonization of regulatory bodies to streamline compliance and reduce bureaucratic complexity.
- **Low end-user awareness and education:** A lack of awareness regarding the proven benefits and correct application of bio-products among end-user farmers limits product adoption. This results in slow demand growth and poor market penetration for bioeconomy innovations.



2.6. Creating an enabling environment for increased production and use of agbiologicals

The cluster of Kenyan Agrobiological enterprises aspire to operate as modern, quality-certified bioinput producers and distributors that consistently supply high-performing, affordable products trusted by farmers across Kenya and key regional markets. They continuously develop and field-validate new biofertilizers, biopesticides, and health-oriented inputs that support widespread adoption of resilient, diversified, soil-health-focused farming systems. A strong skills and knowledge ecosystem streamlined and well-aligned regulation, and reliable access to working capital and blended finance enable agrobiological MSMEs to grow, while Kenyan bio-inputs gain recognition locally and regionally for health, efficacy, sustainability, and innovation.



Table on Enablers, Lead Institutions, and Policy Actions

ISSUE	INSTITUTIONS	POLICY ACTIONS
Fragmented policy and regulatory landscape	NACOSTI, KEBS, KRA, Ministry of Agriculture, County Governments	• Develop a cohesive national regulatory framework for bio-inputs and sustainable products; • Define roles and harmonize standards across agencies; • Create a single-window interface (digital platform) for registration and compliance; • Establish clear pathways for bio-input certification separate from synthetic pesticides; • Embed bio-inputs explicitly into agricultural policy and climate strategy
Subsidies and Incentives	Ministry of Trade and Industry, Ministry of Agriculture, Financial Institutions, Treasury	• Targeted VAT relief and import duty exemptions on critical bio-input production equipment, laboratory reagents, and packaging; outcome-based subsidies for verified performance (e.g., yield improvement); • Green credit lines with preferential interest rates; tax holidays for new bio-input startups; government procurement preferences for certified bio-inputs in public institutions
Research and field trials	KALRO, KEFRI, Universities, KIRDI	• Multi-year, multi-location field trials using shared protocols; coordinated research calls with public data access; • Intellectual property and technology-transfer pathways that balance SME interests with public benefit; • Funding for MSMEs to participate in on-farm trials and living labs; support for farmer-scientist partnerships
Working capital and production finance	Development Banks, Treasury, Microfinance Institutions, SACCOs, DFIs	• Credit guarantees and first-loss instruments; inventory financing tied to verified quality; supplier financing and milestone-based grants for certification and quality control upgrades; • Equipment leasing and asset-backed loans using production facilities as collateral; • Affordable consumer financing for farmer purchase of bio-inputs
Quality control and standards	KEBS, KIRDI, Universities, NEMA	• Affordable tiered certification and batch testing services; • Rapid quality control toolkits and mobile labs; pre-certification clinics and diagnostic support; • Harmonized shelf-life validation and safety assessment procedures; • Support for participatory standard-setting involving MSMEs; capacity building for regulators on biological product testing

Market access and aggregation	Trade Associations, County Governments, KEPSA, NGAAF	• Cooperative marketing platforms and collective branding; • Pooled logistics and shared warehouses/depots in key counties; County procurement preferences for certified bio-products; digital marketplaces and B2B platforms; • Support for export corridors (EAC, EU, regional partners); integration of bio-inputs into school feeding and government nutrition programs
Lack of farmer awareness	County Departments of Agriculture, KEBS, NGOs, KEPSA, Extension Services	• National awareness campaigns on bio-input benefits, standards, and labels; • Consumer education on safety, efficacy, and application; • Farmer field schools and demonstration plots; engagement of community extension agents and farmer organizations as trusted educators; • Re-training of extension agents to promote bio-inputs alongside conventional methods
Knowledge-sharing and innovation platforms	KEBS, KIRDI, Universities, KEPSA	• Establish physical and digital hubs for sharing standard operating procedures, • Training materials, quality assurance data, and incident reporting; • Annual industry forum and cluster meetings; online repository for field trial results and success stories; • Mentoring networks connecting experienced and emerging producers; webinars and virtual learning communities
Skills and labor shortages	Universities, TVETs, NGOs, KEPSA, Industry Association	• Modular curricula for bioprocessing, quality control, agronomy, and business management; apprenticeship and internship programs; • Engineer fellowship placements in MSMEs; continuous professional development and certification programs for sector technicians; • Youth incubation and enterprise development support
Climate resilience and vulnerability	Ministry of Environment, County Governments, NEMA	• Resilience grants and climate-risk insurance pilots tied to adoption of best practices; water harvesting and irrigation support for feedstock production; • Support for drought-tolerant feedstocks and alternative production pathways; • Integration of bio-input scaling into county climate action plans; S • Support for circular economy approaches using biowaste as feedstock

2.7. Milestones: 2030 and 2040

By 2030 (mid-term)

- Majority certification compliance achieved ; 70% of cluster enterprises certified by KEBS with streamlined compliance
- Robust regional market presence established; Products available in 15+ counties, recognized brands across Kenya and East Africa, 10+ institutional buyers, operational exports to 3+ EAC countries
- Functioning knowledge-sharing and quality control platforms; Regional hubs in 4 zones (Nairobi, Western, Eastern, Southern) for training and standards; multi-institution field trials published; annual conference and online repository established
- Commercial partnerships for distribution secured; Up to 5 B2B partnerships (regional/ international) for co-development and export; joint ventures driving tech transfer
- Strong Kenyan agrobiological production sector ; 2,000 direct jobs + 5,000 indirect jobs; 40%+ women/youth employment; 20% annual MSME revenue growth
- Improved farm productivity and sustainability; 500,000+ farmers adopting bio-inputs; 25%+ soil organic matter, 15-25%+ yields, 80%+ farmer satisfaction; reduced fertilizer imports.

By 2040 (long-term)

- International market integration accomplished; achieved through sustained exports to EU and other high-value markets, with Kenya recognized as the regional quality leader for bio inputs.
- Cluster wide climate smart production implemented; with 100% of enterprises adopting climate smart manufacturing (water and energy efficiency, waste valorization), maintaining a low carbon footprint, and delivering measurable GHG emission reductions.
- Mature innovation pipeline established ; A defined share of revenue is reinvested in R&D, new bio input products are regularly launched, and long term research partnerships are embedded, positioning Kenya as the regional leader in bio input innovation.
- Embedded policy frameworks operational and promotive National bioeconomy and agricultural input policies explicitly support and incentivize bio inputs; county procurement is implemented; MSME compliance burden is reduced by around 50%; and a competitive tax and incentive architecture is in place.
- Strong consumer and farmer trust across all markets ; Bioinputs secure 15-20% domestic market share, farmer choice is driven by proven quality and performance, the "Made in Kenya" label carries premium value, and low income farmers can access agrobiological products through suitable financing schemes.
- Regional innovation hub status fully established ; Kenya functions as an East African center of excellence for bio input innovation, training, and knowledge exchange, with growing intra regional trade, influence in EAC/AU policy processes, and Kenyan expertise and technology exported across the region.



List of members and enterprises

	NAME	ORGANIZATION
1	Jemima Ogola	OKIMAK
2	Laura Mutisya	Econasi
3	James Kapombe	Cocogrow
4	George Muturi	Comfort Worms &Insects
5	Thuranira Thiane	Mazao Organics
6	Christopher Mbabu	Big Organics & Naturals
7	Gilbert Mato	Rangelands Reseeding
8	John Ndungu	Planet worms
9	Dr. Allan Mweke	Mount Kenya University
10	Mbula Mwendwa	Avalanche Organic farm
11	Richard Mwangi	Organic Field
12	Godfrey Norl	Ineight Group Ltd
13	Adrian Komelleh	Ineight Group Ltd

ABBREVIATION / ACRONYM LIST

ABDK	Advancing Bioeconomy Development in Kenya
AATF	African Agricultural Technology Foundation
AU	African Union
B2B	Business-to-Business
CABI	Centre for Agriculture and Biosciences International
DFI	Development Finance Institution
EAC	East African Community
EU	European Union
GHG	Greenhouse Gas
GMP	Good Manufacturing Practices
ICIPE	International Centre of Insect Physiology and Ecology
IITA	International Institute of Tropical Agriculture
KALRO	Kenya Agricultural and Livestock Research Organization
KAM	Kenya Association of Manufacturers
KEBS	Kenya Bureau of Standards
KEFRI	Kenya Forestry Research Institute
KEPSA	Kenya Private Sector Alliance
KFS	Kenya Forest Service
KIRDI	Kenya Industrial Research and Development Institute
KNCCI	Kenya National Chamber of Commerce and Industry
KRA	Kenya Revenue Authority
MRV	Monitoring, Reporting and Verification
MSME	Micro, Small and Medium Enterprise
NACOSTI	National Commission for Science, Technology and Innovation
NDC	Nationally Determined Contribution
NEMA	National Environment Management Authority
NGO	Non-Governmental Organization
NGAAF	National Government Affirmative Action Fund
R&D	Research and Development
SACCO	Savings and Credit Cooperative Organization
SEI	Stockholm Environment Institute
Sida	Swedish International Development Cooperation Agency
SME	Small and Medium Enterprise
SWOT	Strengths, Weaknesses, Opportunities, Threats
TVET	Technical and Vocational Education and Training
VAT	Value Added Tax