



The building blocks for biofertiliser and biopesticides policymaking in Africa

About AATF

The African Agricultural Technology Foundation (AATF) is a not-for-profit organisation that facilitates and promotes public/private partnerships for the access and delivery of appropriate agricultural technologies with potential to increase the productivity of smallholder farmers in Sub-Saharan Africa. For more information visit www.aatf-africa.org.

About IITA/COMPRO II

COMPRO II is an acronym of the project Institutionalizations of Quality Assurance mechanisms and Dissemination of Top Quality Commercial products to increase crop yields and improve food security of smallholder farmers in Sub-Saharan Africa. COMPRO II is a five year project supported by the Bill & Melinda Gates Foundation and is coordinated by the International Institute of Tropical Agriculture (IITA) working closely with a number of partner agencies and national regulatory authorities in six countries namely; Ethiopia, Ghana, Kenya, Nigeria, Uganda and Tanzania.

AATF is responsible for implementing Objective 3 of the project, which focuses on the establishment and institutionalisation of quality control and regulatory mechanisms.

Introduction

The use of biofertilizers and biopesticides has potential benefits to agriculture, the environment and public health, including improvement of soil fertility, enhancement of growth in plants, protection against pest damage and reduced environmental degradation. Biofertilisers, also known as microbial inoculants, are artificially multiplied cultures of certain living organisms that can improve soil fertility and therefore crop productivity. The benefits of for instance legume inoculants in improving soil fertility have been known since ancient times, and specifically their role in nitrogen fixation. However, it is only recently that the commercial exploitation of such biological processes and practice has gained interest especially in Africa compared to other places in the world. Biopesticides are a type of biological pest control product in which the sole or principal component is a microorganism that can function as a pesticide.

Currently, research on use of biofertilisers in several crops is ongoing in Africa. These include for sorghum in Ethiopia, Kenya and Zimbabwe; for cowpea in Cameroon; for groundnut and bambara groundnut in Madagascar; for rice in Rwanda; and for unspecified work in Burkina Faso, Cote d'Ivoire, the Democratic Republic of the Congo, Kenya, Rwanda and Senegal. The UNESCO Microbiological Resources Centre (MIRCEN) project at the University of Nairobi, Kenya has, since 1981, developed a *Rhizobium* inoculant known as *BIOFIX*, which is the main inoculant currently available on the local market and therefore used by farmers(1).

Research and use of biopesticides is also relatively new in Africa. Some examples of such work include efforts under the United Kingdom's Department for International Development's Research into Use (DFID RIU) Programme to fast track the first registration of biological pest control agents (BCA) products in Ghana. In Tanzania, the Food and Agriculture Organisation (FAO) used Green Muscle, a biopesticide to contain the outbreak of locusts and earmarked, Malawi and Mozambique for additional deployment. The biopesticide has since been used in Madagascar, Niger, Senegal and Sudan. Other examples include the use of *Beauveria bassiana*, to control Diamondback Moth (DBM) pest on cabbage in Benin and the use of Neem based pesticides to control the bollworm on cotton.

Notably, however, most smallholder farming systems in Sub-Saharan Africa (SSA) have led to soil degradation due to excessive soil mining without recapitalisation. The soils are characterised by nutrient depletion and loss of organic matter. In some cases, the soils lack most or all of the 13 essential nutrients(2) required for healthy plant growth. Pest damage is also one of the key constraints facing agricultural crop and animal production. Although the levels of conventional fertilisers and pesticides use in Africa remain the lowest in the world due to several factors including cost, the use of bio inputs is gaining attention as a potential solution to the improvement of soil fertility and agricultural productivity owing to their cost-effective and environmentally-friendly nature. Although in practice, benefits vary from one product to another, some of the benefits associated with the use of these products are listed on Table 1 below.

Table 1. Benefits of using biofertilisers and biopesticides

Biofertiliser benefits	Biopesticides benefits
<ul style="list-style-type: none"> • Environment friendly • Improved availability of phosphorous for plant uptake • Improved biological nitrogen fixation • Activation of soil biology • Restoration of soil fertility • Protection against abiotic stress • Improve biological nitrogen fixation • Stimulation of plant growth 	<ul style="list-style-type: none"> • Reduced need of chemical pesticides • Low persistence and residual effect, mostly biodegradable and self-perpetuating • Delayed knockdown effect • Easy to handle and carrier based • Less prone to resistance and pest resurgence • Effect on beneficial flora less harmful on beneficial micro-organisms • Mostly host specific • Protection against selected soil-borne diseases.

The benefits vary from a product to another. Not each bio-fertilizer/bio-pesticide cumulates all the benefits.

As such the bioproducts have immense benefits in crop and environmental protection and could considerably reduce the requirements for conventional products. However, even with the numerous benefits associated with biofertilisers and biopesticides, governments have to make

a conscious effort to ensure that farmers have access to quality, safe, efficacious and affordable products if they are to increase agricultural productivity and therefore food security. It is to this end, that this policy brief outlines the key elements that should be considered when developing policies and related regulations for biofertilisers and biopesticides. This brief therefore specifically, outlines the necessary building blocks of a functional framework that will facilitate the production, testing, monitoring, evaluation, distribution and use of these products in a country.

Safety, efficacy and security as a key priorities

The overall commitment of every country is to ensure that any agricultural technological innovation contributes to the attainment of food security. Entwined with this goal is the assurance of human, animal, plant, and environmental safety. Thus, while chemical inputs have raised agricultural productivity levels elsewhere, this has not happened in most African countries and there is therefore need to seek other alternatives that are safe and sustainable.

One such effort is to facilitate the production and sale of quality biofertilisers and biopesticides by putting in place a framework that will ensure safety by filtering out the influx and production of fake and substandard products. In addition, it is worth noting that these products contain living microorganisms and therefore may also represent the challenge of ensuring their quality and biosafety overtime. Effective regulation and quality control all along the value chain can help overcome problems associated with poor product quality, performance and loss of user confidence.

Every country should, therefore, strive to have a policy or guideline on promotion of biofertilisers and biopesticides and by extension with efficacy, safety and quality as key concerns. In order to provide an enabling environment for development and use of biopesticides and biofertilisers, six countries, namely, Ghana, Kenya, Uganda, Tanzania, Ethiopia, and Nigeria held country specific consultations and agreed on key areas of regulatory control. These are outlined below.

Administrative requirements

Generally in Africa, most countries lack registration and management systems for biofertilisers and biopesticides. The quality of products is largely inconsistent and therefore related rules and regulations need to be established for manufacturers to follow so as to reduce the amounts of substandard and fraudulent products.

Ideally, such products are regulated by government so as to protect human, animal, plant and environmental health and the consumers against fraud; and to ensure their efficacy for the intended purpose when used as directed. An institution should be entrusted with overseeing the regulation of the production, testing, distribution, use and monitoring of biofertilisers. This is also aimed at maintaining international quality and safety standards that facilitate trade. The primary responsibilities of the institution are to:

- Ensure the performance (efficacy), quality, safety (human, animal, plant and environment), and proper labeling;
- Monitor and inspect the production, testing, distribution and use of biofertilisers; and
- Develop and implement procedures for registration including registration checklists (requirements; application forms, associated fees, length of approval process, etc); safety and quality determination, efficacy and labeling.

Safety and quality requirements

This requirement provides a framework by which the safety and quality of all biofertilisers and biopesticides produced, distributed and used is assured. To ensure this, a guideline may be developed for safety and quality assessment. The whole process aims at attesting to the safety of the product (and its ingredients) to humans (workers and bystanders), terrestrial and aquatic organisms (including the target plants) and the environment when the product is used according to instructions. In addition, specifications should be provided for physical and chemical properties in quantitative terms for maintaining quality, including moisture content, particle size and the permissible limits of undesirable constituents as well as specifications for quality checks of samples.

Currently in most parts of SSA, many new products are available in the market and may be promoted as biopesticides, bioinoculants, phytostimulants, biostimulants, phytoprotectants, biofertilisers, bioactivators or even soil enhancers but information on their safety mechanisms are not fully understood by the users or regulators.

Efficacy requirements

This set of requirements is aimed at demonstrating as much as possible, the extent of the effectiveness of the products as per the claims on the label with scientifically-valid data. It should provide general information on the biopesticides or biofertiliser. In the case of biopesticides, the pest biology, type and extent of the damage and economics of the pest or disease problem; crops/sites which are affected by the pest; geographic distribution of the pest problem; performance data to support proposed label claims; proposed rate, use conditions and control claims; pest management in the specific crop; and a summary of currently available pest management tools for proposed use. In general both categories of products will require provision of specifications on the number of trials, respective locations, representative crops, and laboratory and field data among others. Countries therefore need to outline full efficacy requirements for biofertilisers before and during use in the respective jurisdictions. Here, observance of quality assurance, adoption of quality certification is recommended.

Labeling requirements

Although considered part of the registration guidelines, these requirements are aimed at ensuring that product labels have correct information regarding the mark or brand or name corresponding to the composition and utility of the product. This includes aspects of lingua, units of measure, lettering, product name, registration numbers, directions for use, and expiry dates among others.

Key recommendations

Biofertilizers will improve nutrient availability (e.g., nitrogen fixation from the atmosphere or improved P availability,) or increased water use.

Conversely biopesticides improve resistance or control of biotic stress (e.g., control of soil borne diseases). Thus countries can promote their use as evident in the national consultations by:

- Devising and adopting simple and need-based regulatory systems for biofertilisers and biopesticides;
- Establishing a quality control system for the production of inoculants and their application in the field, to ensure and explore the benefits of plant microorganism symbiosis;
- Increasing investment in research and development on biofertilizers and biopesticides; and
- Surveillance of the trends in regulatory mechanisms in regions and establishment and sharing of a database of registered biofertilizers and biopesticides for mutual recognition.

Reference

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Notes

1. Food and Agriculture Organisation. 2005. *Status of research and application of crop biotechnologies in developing countries*. Rome: FAO
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