SOIL FERTILITY AND PLANT NUTRITION SYMPOSIUM

THEME: SCIENCE, SOIL AND SUCCESS

FERTASA
Fertilizer Association of Southern Africa

MULTIFUNCTIONALITY

CSIR, PRETORIA
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Department:
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REPUBLIC OF SOUTH AFRICA

2030 NDP

STAY SAFE
PROTECT SOUTH AFRICA
TOGETHER WE CAN BEAT THE CORONAVIRUS

MULTIFUNCTIONALITY

- Having more than one function; useful for more than one task or purpose.
- Capability of a **material**, **system**, or **process** to serve multiple functions or purposes simultaneously.






First Generation
Second Generation
Third Generation
Fourth Generation
Fifth Generation








MULTIFUNCTIONAL AGRICULTURE
(MFA)

MULTIFUNCTIONAL AGRICULTURE (MFA)

- **MFA** is a significant idea in scientific and policy discussions regarding the future of agriculture and rural development.

- **MFA** indicates that agricultural practices, in addition to food production, can serve various additional purposes including addressing :

  - **Environmental:**
    - Soil, water, climate and biodiversity
  - **Economic:**
    - Promote market and trade policies that benefit the producers.
    - Increase access to financial services and products.
  - **Social issues:**
    - Maintenance of cultural traditions, health, Gender

SOIL MULTIFUNCTIONALITY

- Soil plays an essential role in:
    - Ecosystem functioning
    - Nutrient cycling
    - Biomass production-supplies nutrients
    - Climate regulation
    - Carbon storage
    - Supporting biodiversity-food production




MULTIFUNCTIONAL FERTILIZERS

MULTIFUNCTIONAL FERTILIZER

Multifunctionality of a substance means the ability of a substance to perform a number of functions, allowing for selection and justification of the mode of action in a particular formulation.



Biostimulant means any substance or micro-organism or combination thereof when applied to seed, plants, soil, or the rhizosphere will stimulate natural processes to benefit nutrient uptake, nutrient use efficiency, tolerance to **abiotic stress**, and crop quality.



IMPORTANCE OF MULTIFUNCTIONAL FERTILIZERS

- Improve nutrient uptake
- Enhance crop yield and quality (optimal nutrition)
- Reduce environmental impacts (run off, leaching)

CARTEGORIES OF BIOSTIMULANTS

CARTEGORY	MODE OF ACTION	PRIMARY SOURCES
Nitrogen-fixing	Convert atmospheric nitrogen into a plant-usable	*Rhizobium, Azotobacter, Azospirillum*
Phosphate-solubilizing	Release insoluble soil phosphorus into a form plants can absorb	*Bacillus, Pseudomonas*
Phosphate-mobilizing (mycorrhizae)	Root development and improve phosphorus uptake and other nutrients	*Arbuscular mycorrhizae*
Beneficial Fungi	Enhanced root surface area, nutrient/water uptake	*Mycorrhizae Trichoderma*

CARTEGORIES OF BIOSTIMULANTS

CARTEGORY	MODE OF ACTION	PRIMARY SOURCES
Humic and fulvic Substances	Improve soil CEC & structure, nutrient uptake	Leonardite, peat
Seaweed Plant extracts	Plant growth and root development	*Ascophyllum Nodosum*
Protein Hydrolysates	Source of bioavailable Nitrogen	Animal/plant by-products Source

GAPS IN TERMS OF MULTIFUCTIONAL FERTILIZERS

- **Innovative research and development:** is required to advance the use of novel fertilizers.
- **Knowledge and data gaps:** for better understanding of agronomic and environmental implications.
- **Bio-circular Economies**: Focus on developing and validating technologies to address environmental challenges.
- **Restrictive Legislative Framework**: limit registration of novel products.
- **Lack of enforcement capacity**: Government can struggle to oversee quality control.



FERTILIZER GROUP 3

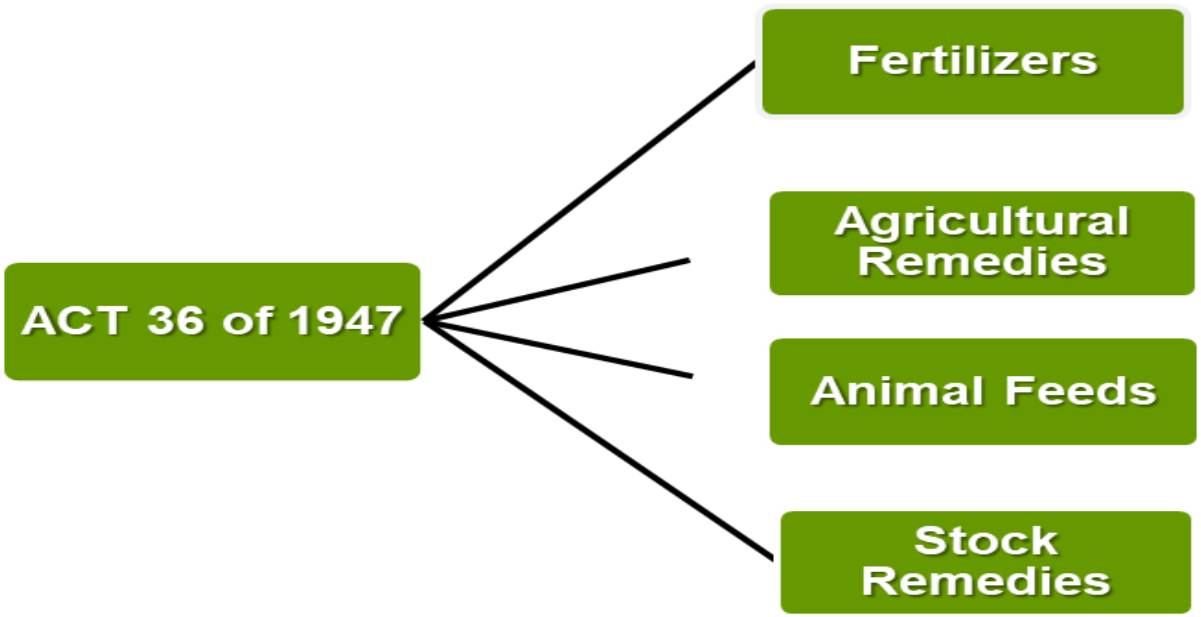
- Natural or synthetic substance or organisms that improves plants growth or yield or the soil physical, chemical or biological properties.

FERTILIZER GROUP 3

- **Increasing propagation of the use of:**
  - Novel natural
  - Synthetic inorganic, organic
  - Living organisms
- **Products in crop production**
- **It has become necessary to provide guidelines for their registration under ACT 36 OF 1947**



REGULATION OF GROUP 3 FERTILIZERS



FERTILIZERS GROUP 3

Products registered as Fertilizers Group 3:

- Biofertilizers
- Fulvic, Humic and Amino acids
- Seaweeds and other products of plant origin
- Products of animal origin
- Water absorbent products (soil conditioners)



FERTILIZER GROUP 3

Biofertilizers
Fungi:*Mycorrhizae*,
Bacteria: *Bacillus*

- **Species name**
- **Gene sequencing**
- **Colony Forming units (CFU) Counts -** number of microbial colony able to grow on the growth medium per ml of the product
- **Spore count -** determine the amount of spores present in the product expressed as spores per ml
- **Shelf life**
- **Product purity-** contamination levels
- Potentially harmful elements (Table 12)
- Efficacy trials
- Proof of non-phytotoxicity
- **Import permit from DoA:** Plant Health Directorate

FERTILIZER GROUP 3

Seaweed and other products of plant origin	• Scientific name of the product • Country of origin • Processing method • Certificate of analysis • Potentially harmful elements • Efficacy trials • Proof of non-phytotoxicity
Products of animal origin (fish hydrolysate)	• Proof of sterilization (Directorate Animal Health)

FERTILIZER GROUP 3

Fulvic, Humic and Amino Acids	• Origin (source) • Solubility • Alkalinity or acidity (pH) • Carbon content • Ash content • Moisture content • Certificate of analysis • Potentially harmful elements • Proof of non-phytotoxicity
Water absorbent products (Soil Conditioners)	• Description of the product • Proof of efficacy in water retention /improvement of WHC • Release of water to plants • Biodegradable • Certificate of analysis • Potentially harmful elements • Proof of non-phytotoxicity

EFFICACY TRIALS

- Scientific capabilities of the organisation/individual conducting the trial.
- Investigator: registered with the South African Council for Natural Scientific Professions (SACNASP)
- Efficacy of the product
- Proof of non-Phytotoxicity: That the product has no harmful or detrimental effect on the soil or plants.

TRIAL REPORT

- Descriptive title
- Literature review
- Materials and methods
  - Objective
  - Trial location
  - Crops
  - Treatments
  - Control
  - Replicates

TRIAL REPORT

- Trial design
- Parameters measured
- Statistical analysis
- **Results and discussions**
  - Tabular or graphic presentation
  - Statistical interpretations
- **Conclusion and recommendation**
  - Reach logical, scientific conclusions
  - Methods of application and application rate

REQUIREMENTS FOR REGISTRATION

- **Service request form**
- **Proof of payment**
- **Cover letter**
- **Application form**
- **Label (GHS compliant)**
- Documents supporting **GHS** must be submitted (classification rationale, GHS declaration, GHS-compliant label, and the SDS containing GHS details).



REQUIREMENTS FOR REGISTRATION

- **Certificate of Analysis (COA) should be provided for chemical composition, active ingredient/s, Quality control analysis, Potentially Harmful Elements (PHE)**
- **COA from an independent accredited laboratory**
  - ISO 17025, SANAS certified
  - GLP
  - AgriLASA
  - DoA recognized laboratory

CHALLENGES

- Applications that could not be concluded due to their constituents or the nature of the products:

  - Inclusion of multifunctional products
  - Inclusions of Group 3 products (Group 1 and 2)
  - Applications that are pending migration to Group 3
  - **The above also affects the renewal process**



CONCLUSION

- **Definitions of Biostimulants and Biofertilizers**
- **Current Regulatory framework**
  - Review
  - Amend
  - Align
  - Harmonize

Thank you

