Fertilizer Quality Assessment in Markets of Kenya

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Objectives of the Fertilizer Quality Assessment Conducted in May 2016

- Evaluate fertilizer quality in the following aspects:
  - Verification of crop nutrient content using the "**truth-in-labeling**" principle.
  - Bag weight verification.
  - Fertilizer tests for contamination with Cd.
  - Fertilizer Physical properties assessment.
  - Identification of factors explaining fertilizer quality issues.

- Produce a fertilizer quality diagnostic from the markets across the country to be used as a baseline to:
  - Identify, quantify and classify quality problems in the country
  - Identify explanations for the fertilizer quality problems
  - Propose corrective measures needed through improvements in the Kenya Fertilizer Quality Regulatory System and the fertilizer value chain.

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Methodology

Random Sample of Dealers

Sampling of Fertilizers

- Chemical Analysis
- Physical Analysis
- Bag Weight

Value Chain Characteristics Data Collection

- Market
- Dealers
- Storage & Management

Problems

Nutrient Shortage, Heavy Metal Presence, Weight Shortage, Granule Degradation, Granule Segregation, Impurities, Presence of Fillers, High Moisture, Caking

Factors Explaining Quality Problems

- **Primary factors**: fertilizer characteristics
- **Secondary factors**: regulatory system, value chain characteristics
- **Aggregation or interaction of above factors**

Origin of Problems

Manufacture – Management – Adulteration

Combinations of the above categories

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RESULTS

Dealer/Fertilizer Sampling

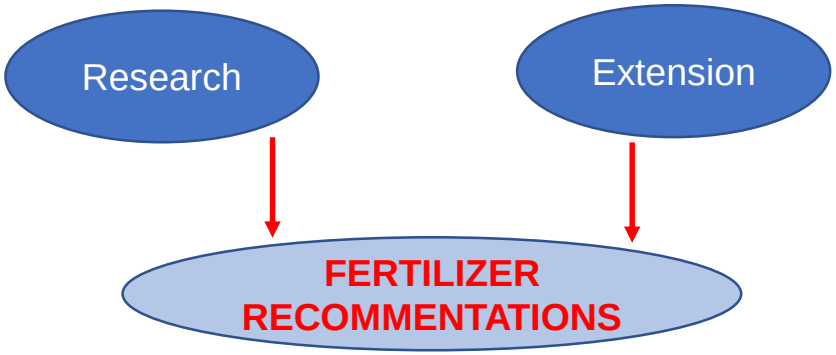
185 Agro-Dealers Sampled

585 Fertilizer Samples Collected

Urea, DAP, CAN, 23-23-0, 17-17-17 make up for 94% of Sampling

Low Product Variability in Market

Urgent Need of:



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RESULTS

Frequency and Severity of Nutrient Shortages Out of Compliance

		Total N			P_2O_5		K_2O	
TYPE	FERTILIZER	n Samples	% ooc[1]	Shortage Mean (%)[2]	% ooc[1]	Shortage Mean (%)[2]	% ooc[1]	Shortage Mean (%)[2]
GRANULATED	DAP 18 46 0	215	3.7	-1.5	12	-1.3	.	.
	CAN 26 0 0	62	14.5	-2.2	.	.	.	.
	NPK 23-23-0	34	11.8	-2.9	23	-4.6	.	.
	UREA	31	0.0	0.0	.	.	.	.
	NPK 17-17-17	22	31.8	-3.3	8	-3.3	64	-2.4
	NPK 10 26 10 Blend	9	0	0	1	-2.4	22	-2.8

[1] Out of Compliance. [2] Tolerance Limit is 1.1%

Segregation of KCl particles

Nutrient Shortage Severity in Crystal and Liquid Fertilizers Relative to Granulated

		Shortage Means (%)		
Fertilizer Type	n Samples	Total N	P_2O_5	K_2O
GRANULATED	384	-2.5	-4.9	-3.0
CRYSTAL	32	-5.8	-10.8	-3.2
LIQUID	30	-11.2	-13.4	-12.4

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RESULTS

Physical Properties

Granule Degradation & Caking

% fines > 10% (DAP, 17-17-17, 23-23-0)

% dust > 5% (CAN, DAP)

Medium to High Caking > 5% (CAN, DAP, 23-23-0, urea)

Explained by manual and individual bag handling

Inappropriate storage conditions

RESULTS

Fertilizer Adulteration

- No evidence of adulteration was found in 50 kg of granulated fertilizers or in open bags sampled across Kenya.
- Adulteration in subsidized fertilizers has been reported. At the time of sampling no fertilizer was available in NCPB stores.
- New sampling of NCPB stores is a must. Difficulties to do unannounced inspections:
  - It's unpredictable when the products reach the NCPB stores
  - After the subsidized fertilizers reach the NCPB they are sold out in few hours/days

RESULTS

Contributing Factors to Physical Properties Degradation

Manual handling of individual bags → Degradation of Granule Integrity
Production of Fines and Dust

Storage facilities don't reduce relative humidity (65%)
Non-impermeable bags (5%)
Torn Bags (14%)
Loose Bag Seams (15%)
Insufficient or no Pallets Use (45%)
Bag Stacks higher than 20 layers (10%)

→ Moist fertilizer (> 1.5% water)
Granule degradation
Caking

RESULTS

Consequences of Physical Properties Degradation

- Granule degradation
- Granule segregation

→ Non homogeneous distribution of nutrients in fertilizer bags.

→ Uneven nutrient distribution in crop fields

Explanation of Nutrient Shortages Out of Compliance

The most likely explanation of the severe and frequent nutrient shortages identified is deficient manufacture of imported and locally produced fertilizers

Bag Weight

The chances of finding an intentionally underweight bag are

33%-10kg bags, 23%-25kg bags, and 14%-50kg bags

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RESULTS

Cadmium in Fertilizers

- **Three DAP samples with high Cd content: 12.5, 11.8, and 6.2 mg Cd kg^{-1} P_2O_5.**

Lower than Kenya TL 13.9 and EU TL 20 mg Cd kg^{-1} P_2O_5 but still concerning, habitual analysis should be implemented

Value Chain Characteristics effect on Fertilizer Quality

Higher frequencies of non-compliant nutrient content were found in

- Rural markets compared to urban markets
- Small retailers that sell only to smallholder farmers compared to dealers that sell to all type of farmers and fertilizer retailers

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Conclusions and Recommendations

Kenya's regulatory system requires important improvements

- Review and improve legal and administrative documents
- Develop a mechanism for self-financial support (inspection & registration fees)
- Establishment of a plural technical committee for deciding issues such as:
  - Secondary & micronutrient regulation / Fertilizer label rules
  - Heavy metal tolerance limits
  - Dealer/product registration provisions
- Establishment of permanent inspections along the value chain
- Enhance the analytical capability of labs
- Active interaction with private sector

Potential Funds Sources for Upgrading of Regulatory System

USAID Kenya mission, AGRA, IFC/World Bank Group

IFDC offers the Ministry of Agriculture support in the preparation of proposals for the seek of funds needed for the improvements of the Kenya Fertilizer Quality Regulatory System

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