

# Fertilizer Quality Assessment in the Myanmar Dry Zone

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# Geographic Scope

***Divisions:***

**Magway**

**Mandalay**

***Townships:***

Pakokku, Yesagyo

Manghlaing, Myingyan,  
Nahtogyi, Taungtha

## Sampling

List of 144 registered fertilizer dealers (provided by the Department of Agriculture)



Random sample of 33 dealers  
\*Few wholesalers \*Many retailers



82 fertilizer samples:  
*granulated, liquid, powder*





Wholesaler



Small Retailer



# Methodology

## NUTRIENT CONTENT VERIFICATION

$$\text{Shortage}_{(\text{nutrient})} = \text{Nutrient Content}_{(\text{lab})} - \text{Nutrient Content}_{(\text{label})}$$

### Nutrient Shortage Out of Compliance (OOC)

If  $\text{Shortage}_{(\text{nutrient})} < \text{Tolerance Limit (TL)}$

#### Magnitude of Shortage OOC

##### FREQUENCY

*Cumulative  
frequency of OOC  
cases*

##### SEVERITY

*Weighted  
average of  
values < TL*

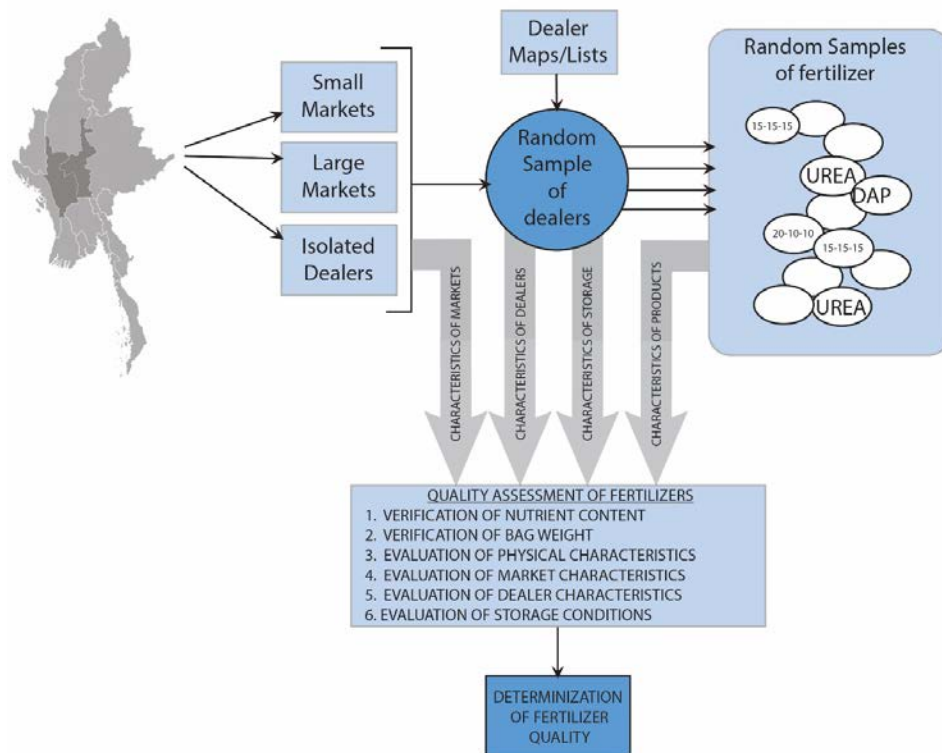
#### TL for Macronutrient Content

##### India

0.5% ( $\leq 15\%$ )  
0.6% (15-20%)  
0.7% ( $\geq 21\%$ )

##### European Union

1.1%







**Training the inspectors**



**Sampling fertilizer bags**



**Quantifying granule degradation**



**Samples collected from  
a small retailer**



**Collecting data with smartphones**

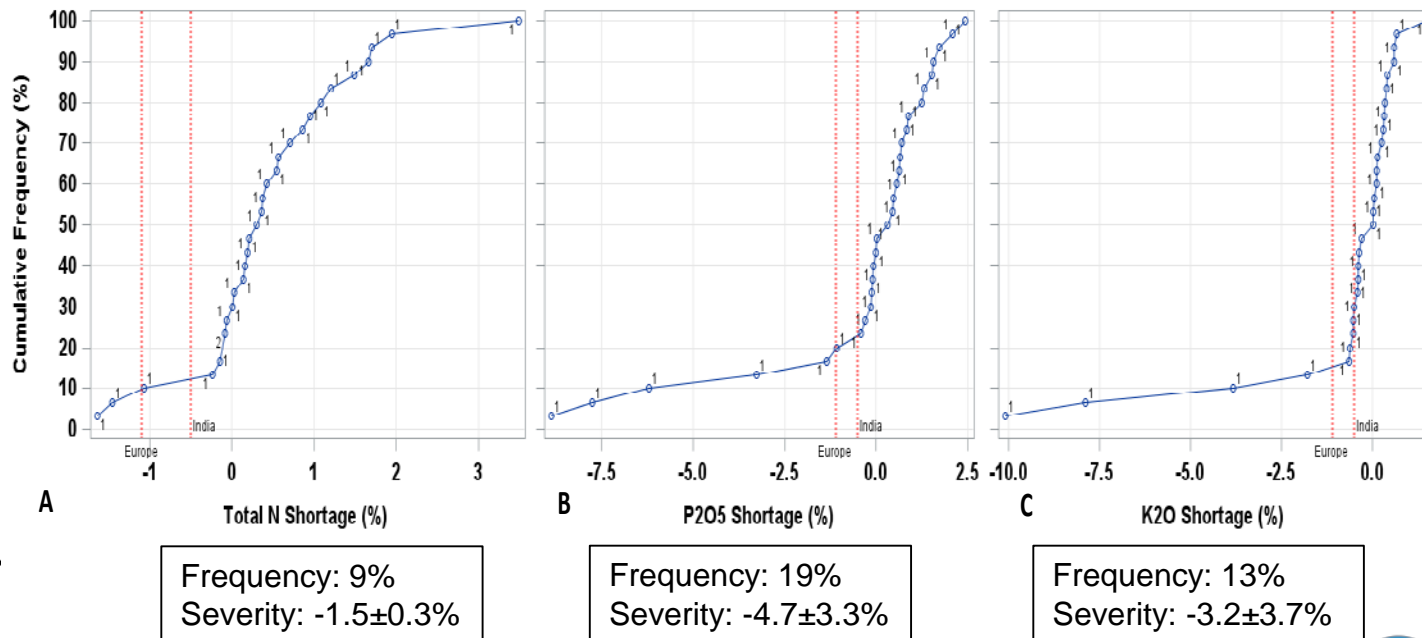


# Results

## Macronutrient Content in Main Fertilizers

The most commonly traded fertilizers in the Myanmar Dry Zone are NPK 15:15:15, NPK 10:10:5, NPK 15:7:8, NPK 16:16:8, and NPK 13:13:21. Urea sampling was reduced to a minimum.

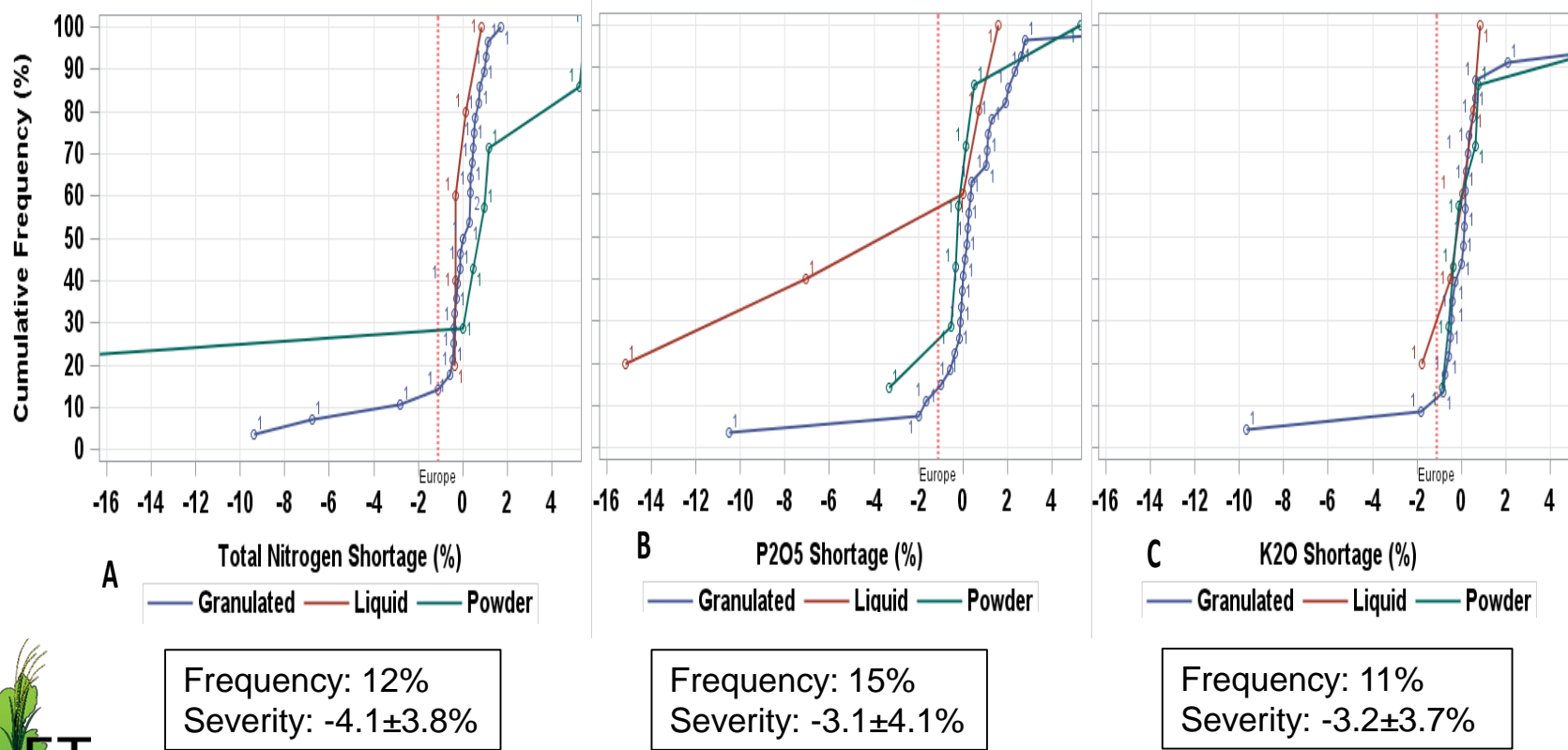
*Cumulative frequency distribution of macronutrient shortages for the combination of highly traded fertilizers*



# Results

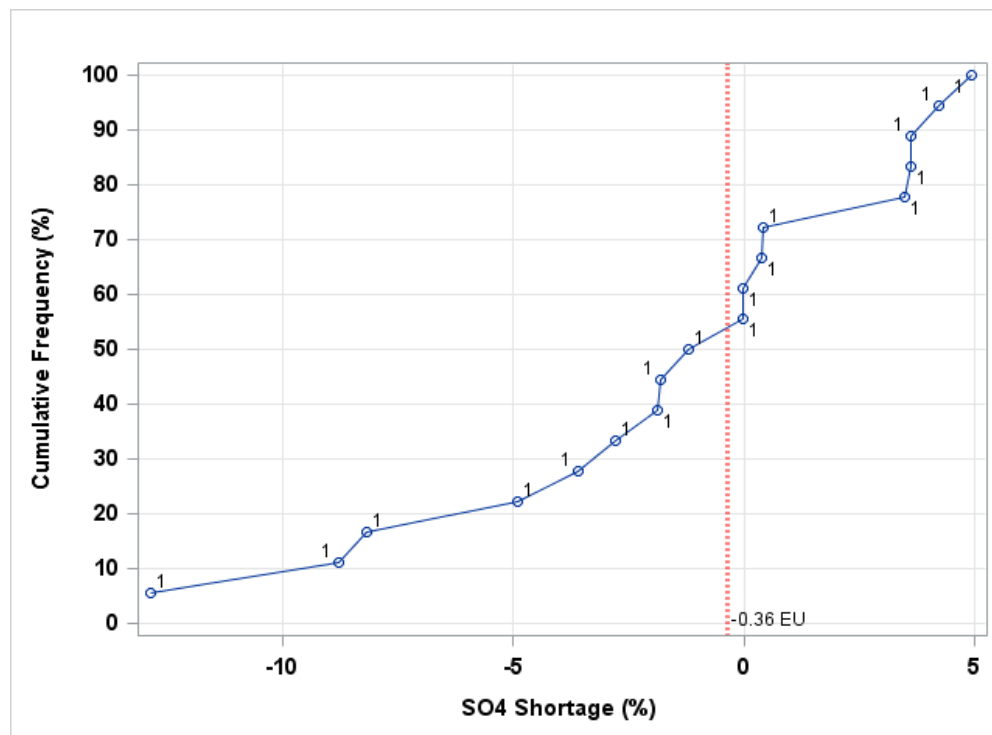
## Macronutrient Content in Less Important Fertilizers

*Cumulative frequency distribution of macronutrient shortages for the combination of less commonly traded fertilizers*



# Results

## Secondary and Micronutrient Content in Sampled Fertilizers



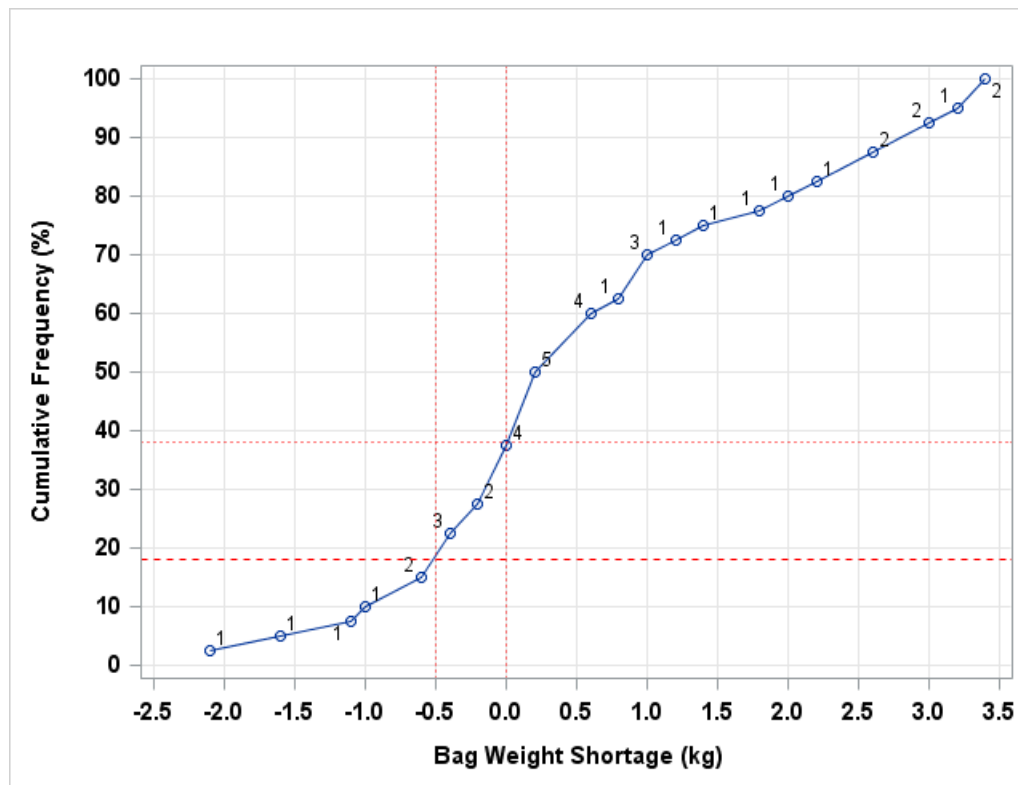
Nutrient	Tolerance Limit (EU)	Shortage Values
CaO	-0.55	-6.08844
		-0.77074
		-0.12237
		-0.10652
MgO	-0.65	-0.02422
		2.672846
Fe	-0.01	-0.39673
		-0.00206
		0.006241
		0.113257
Zn	-0.0076	0.00033
		0.008212
		0.161847





# Results

## Bag Weight Verification



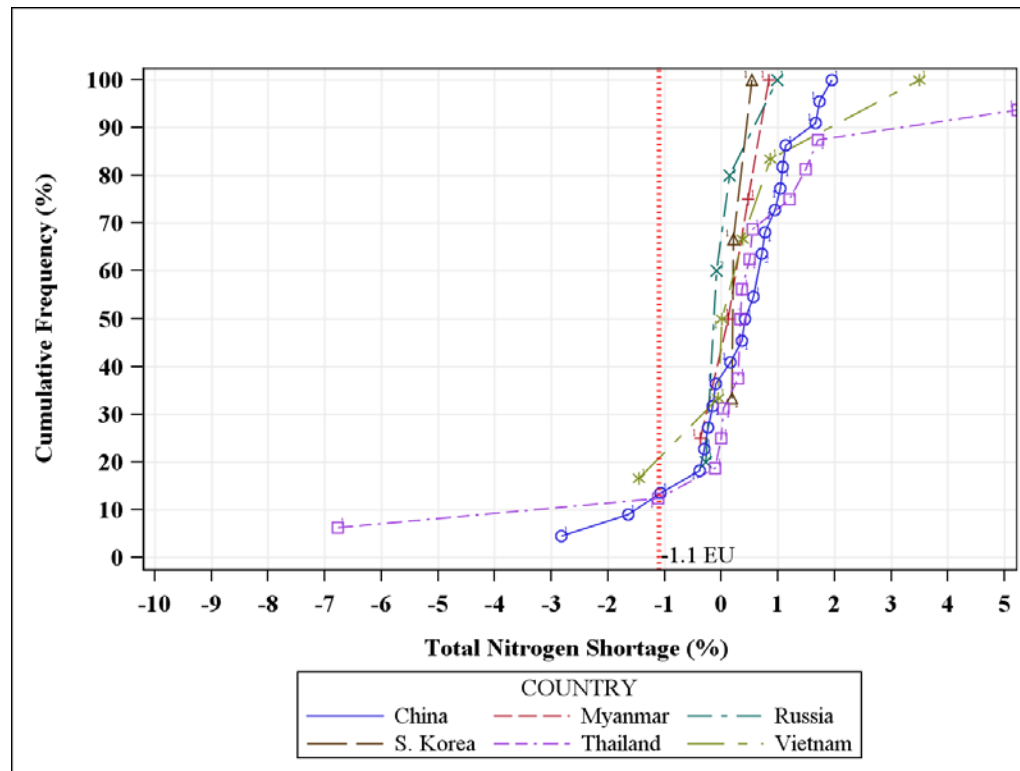
Bag Weight Shortage TL  
is 1% of declared weight

6 bags, or 18% of the bags,  
were out of compliance



# Results

## Comparison of Fertilizers' Country of Origin

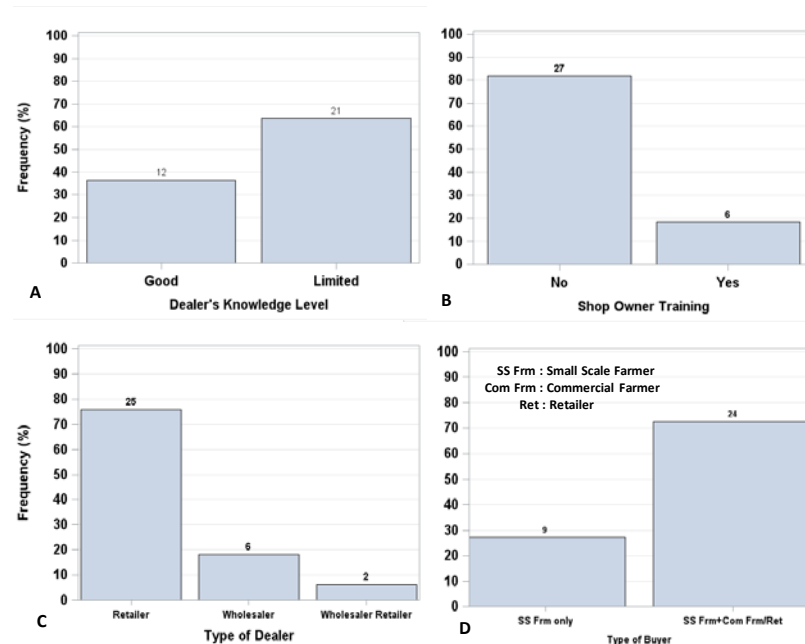
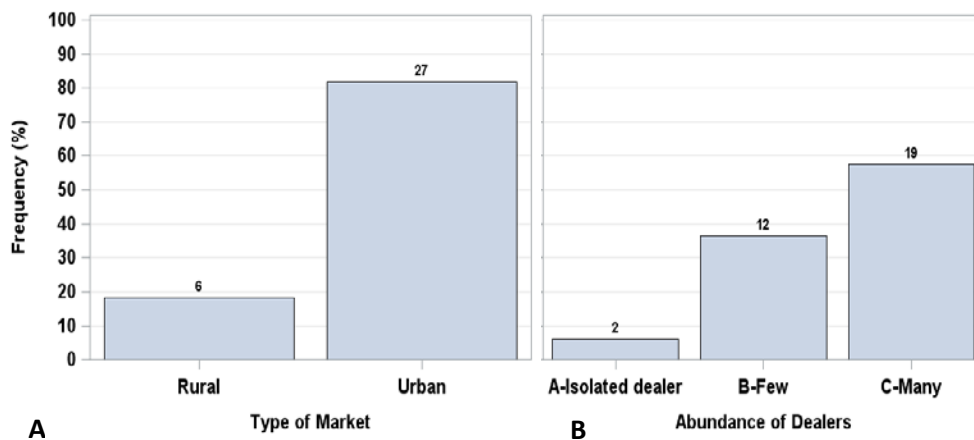


China and Thailand had three and two samples, respectively, OOC but this is not enough evidence to believe that the imported products from these two countries are worse than those from other countries.



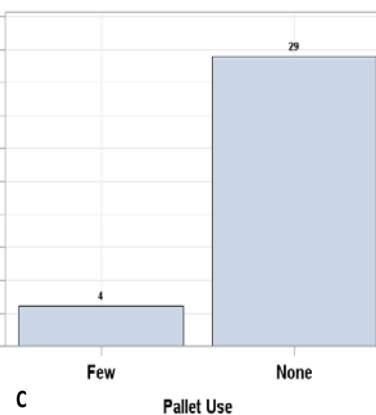
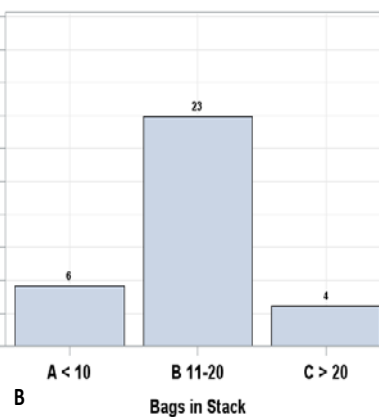
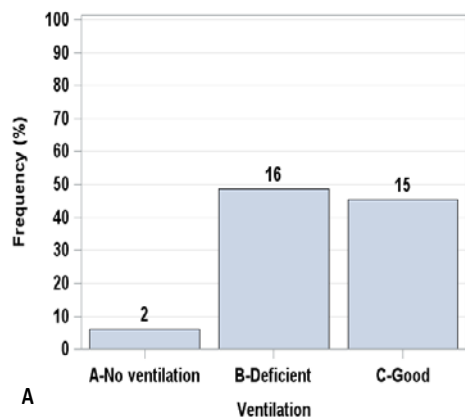
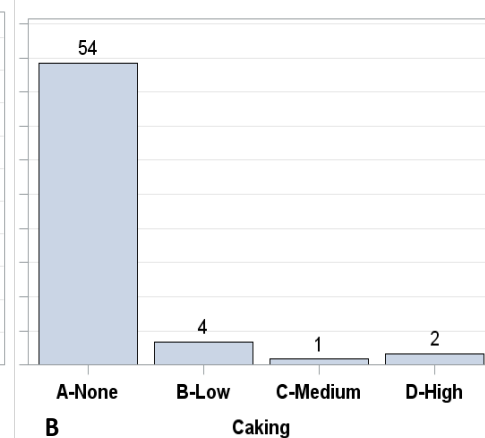
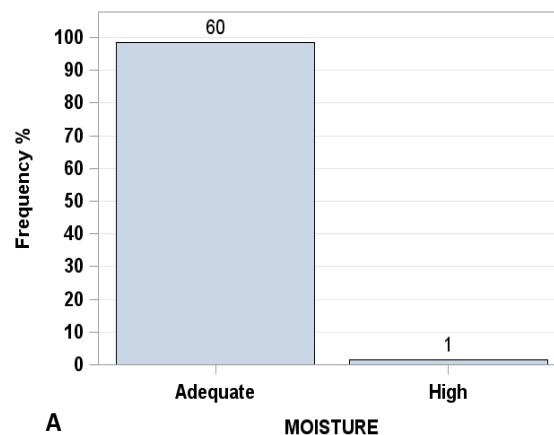
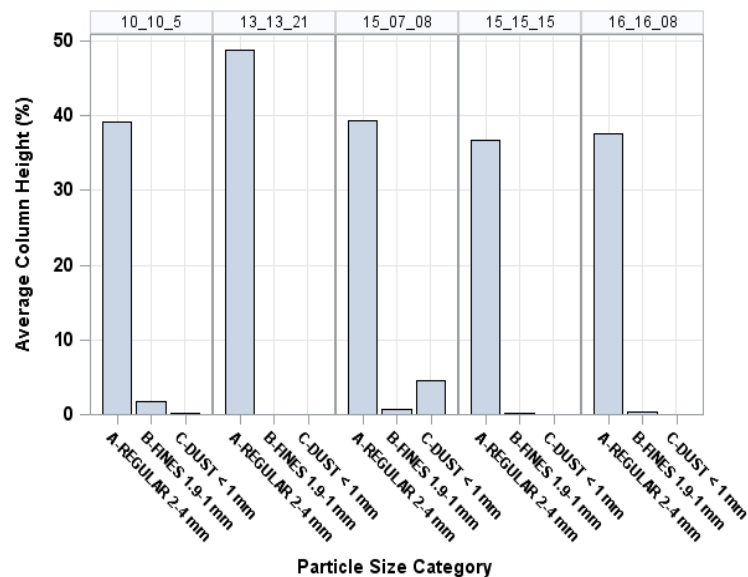
# Results

## Value Chain Characteristics with Potential Effect on Fertilizer Quality



# Results

## Physical Properties and Storage Conditions



# Results

## Relationships Between Value Chain Characteristics and Fertilizer Quality

Effect	DF	Wald Chi-Sq	Pr > ChiSq	Odds Ratio Label	Odds Ratio Estimate	0.95 CI	
OWNER TRAINING	1	0.064	0.801				
BUSINESS STATUS	2	1.588	0.452				
TYPE OF BUYER	1	3.604	0.058	Buyers: SS Frm only vs SS Frm+Com Frm/Ret	4.831	0.95	24.564
OWNER KNOWLEDGE	1	2.513	0.113				





# Conclusions

- **The relative low OOC shortage severities of the macronutrients for all types of fertilizers sampled indicate that the fertilizer nutrient content problems in the Dry Zone are not as dramatic as reported anecdotally but still require corrective measures.**
- **Without evidence of adulteration and very mild granule degradation, the nutrient shortages likely originate in the manufacture of the imported products. There is a need to implement pre-export verification and control in the points of entry to Myanmar.**
- **Macronutrient shortages do not show differences among countries of origin.**



# Conclusions

- Despite storage conditions with poor ventilation, inability to reduce relative humidity and temperature with respect to outside conditions, and the manual and individual handling of bags, the fertilizer's physical properties were found to be good thanks to the good quality of bags used which protect the products from moisture absorption, granule degradation, and high caking levels.
- The 12% caking found is mainly attributed to high bag stacks and no use of pallets.
- Lists provided by DoA did not include informal-nonregistered dealers. Probably we would have found more frequent and severe quality problems if we had informal dealers in the sample.
- Incoming studies will make sure representation of informal dealers in the dealer's sample.
- The ultimate objective of fertilizer quality assessments in Myanmar must be the collection of information to support the development of a fertilizer quality regulatory system (FQRS).



# Conclusions

- **The establishment of a culture of good fertilizer quality in Myanmar depends on harmonizing the FQRS with regulatory systems of neighbor countries and implement it.**

