

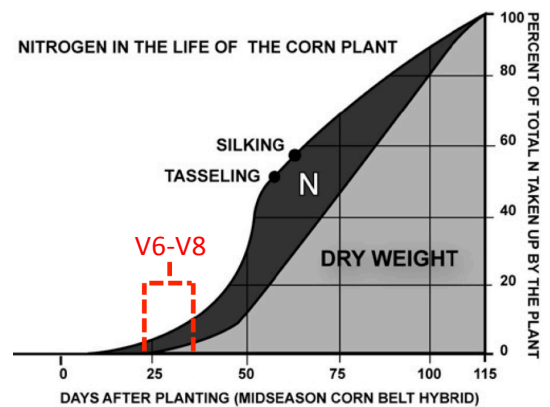
# Maize Fertilizer Timing – Long Rain Season, Kenya (2015)

Farmers First

PHASE:	Research Station	50 – 500 farmers	1,000 – 20,000 farmers	Full Scale
--------	------------------	------------------	------------------------	------------

## Introduction

Maize is the most important grain in Kenya and one of the most important crops throughout eastern and southern Africa. Maize is a heavy nitrogen (N) feeder, with up to 100 kilograms (kg) of N required to produce good yields. However, maize plants require relatively little N when small, and greater amounts of N midway through the season. If N fertilization is not in synchrony with plant N-demand, this can result in poor fertilizer use efficiency and reduce return on investment for farmers. It is common for farmers in Sub-Saharan Africa to apply N fertilizer based on plant height (e.g., knee-height or waist-height). Many organizations across Africa promote this methodology, including One Acre Fund. However, plant height may not be a good proxy for plant N demand. Much research has shown that plant N demand is more correlated to the number of leaves on the developing plants. Simple changes in this methodology may have implications for millions maize farmers across Africa. In 2015, One Acre Fund trialed plant morphology-based fertilizer timing trainings with smallholder farmers in Kenya.



Adapted from Perdue, 2009.

**26%** Maize yield increase with improved fertilizer timing

**\$303** Increased farmer profit

**60** Nitrogen use efficiency with the control (kg grain/kg N fertilizer)

**76** Nitrogen use efficiency with the improved methods (kg grain/kg N fertilizer)

## Context and Trial Rationale

- Fertilizer is one of the most expensive agricultural inputs for smallholder farmers in Africa.
- Current height-based fertilizer timing methodologies commonly used in Africa are not aligned with global best management practices for fertilizers.
- Improving fertilizer use efficiency by changing when fertilizer is applied from height-based methodologies to one based on plant development stages (number of leaves) may lead to greater yields and farmer profit.

## Major Intervention Trials

**Field Assessment:** Trials were conducted on farmer fields in the long rain season of 2015 in western Kenya. Two agro-ecological sites were used, one suited for long-maturity maize and the other suited for medium-maturity maize. The trial design was as follows:

## Maize Fertilizer Timing – Long Rain Season, Kenya (2015)

Farmers First

### Trial Treatments:

- Long-maturity area (Namaanga, Kenya)
  - 1) **Control:** Kenya Seed Hybrid 614; 123.5 kg/ha DAP at planting; 61.75 kg/ha CAN applied at knee-height; 61.75 kg/ha CAN applied at shoulder-height.
  - 2) **Treatment:** Kenya Seed Hybrid 614; 123.5 kg/ha DAP at planting; 61.75 kg/ha CAN applied at V6; 61.75 kg/ha CAN applied at V10.
- Medium-maturity area (Samoya, Kenya)
  - 1) **Control:** Seed Co Duma; 123.5 kg/ha DAP at planting; 61.75 kg/ha CAN applied at knee height; 61.75 kg/ha CAN applied at shoulder-height.
  - 2) **Treatment:** Seed Co Duma; 123.5 kg/ha DAP at planting; 61.75 kg/ha CAN applied at V6; 61.75 kg/ha CAN applied at V10.

### A. Trial Results

Agro-ecological zone		Yield* (t/ha)	Profit (USD/ha)	Profit change (% relative to control)	N use efficiency (% relative to control)
Medium maturity	Control	3.4	\$998	N/A	N/A
	Treatment	4.3	\$1,301	30	27
Late maturity	Control	8.1	\$2,593	N/A	N/A
	Treatment	8.7	\$2,784	7	7

\*Differences between all control and treatment yields are significant,  $P < 0.0001$

### B. Adoption: *Medium*

- Despite an attempt at training simplicity, many farmers found accurate execution of the leaf-count method challenging. This was particularly true for older or less educated farmers.

### C. Operability at Scale: *Medium*

- For effective execution of the leaf-count method at scale, thousands of One Acre Fund field officers will need to be trained on this methodology. While many aspects of this method are relatively simple, it still represents a major shift from common practices that have been used for many generations.

### Next Steps

In 2016, One Acre Fund will:

- Run a larger and more geographically distributed field trial that focuses on adoption/compliance assessment.
- Repeat the leaf-count method trial in conjunction with other fertilizer factors. These include reducing the number of top dress fertilizer applications from one to two, and switching from CAN to urea.