

**Integrated assessment of the determinants of the maize yield gap in Sub-Saharan Africa:  
towards farm innovation and enabling policies (IMAGINE)**

**Bringing CSA practices to scale: assessing their contributions to narrow nutrient and yield  
gaps (Crop Nutrient Gap)**

**First exploratory experiments of promising nutrient management variants –  
On Farm Demonstration Trials in Ethiopia (D1936)**

**Report on Farmers' Field Day and Visits by CIMMYT Staff**

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## 1. Farmers' Field Day

### Introduction

A farmers' field day was held on Sunday, 18 September 2016 on the IMAGINE and Crop Nutrient Gap on-farm demonstration trials at Oda Anshura Kebele, Adami Tulu Jido Kombolcha district. The aim of the field day was to allow farmers observe the various treatments in the demonstration trials, understand their effects and compare and contrast them. The treatments were composed from two maize varieties, two fertilizer rates, one moisture conservation practice and farmer's practice (Table-1). The demonstration plots are replicated on four farmers' fields.

Table 1: Treatments of demonstration plots at Adami Tulu Jido Kombolcha

No.	Treatment
1	BH540+ no fertilizer
2	BH540+recommended plant population and fertilizer rates
3	BH540+ recommended plant population and fertilizer rates +Tie ridge
4	MH140+no fertilizer
5	MH140+ recommended plant population and fertilizer rates
6	MH140+ recommended plant population and fertilizer rates +Tie ridge
7	BH540+Farmerpractice
8	MH140+Farmer practice

The particular time for the field day was chosen deliberately to be at the end of the grain filling stage when the plants are near to maturity but still green so that farmers could evaluate treatment effects in all respects. Accidental incidence of shorter rainfall duration in this season (compared to normal season) has helped farmers evaluate the varieties for resistance or resilience to drought condition.

### Participants

Forty farmers were invited to attend the field day. These included household heads from all age groups and gender; elders, youth and women were among them. In addition, head of the agricultural extension department of the district, Mr. Amano Dalu, and chairman of the kebele were invited as guests. Though only forty farmers were invited, some other interested farmers from the surrounding area have also joined the field visits.

## Field day activities

The whole farmers' group was divided into two groups of 20 farmers each. This was done to make sure that everyone was able to make the necessary observation and effectively participate in the discussions. Each of the group was allowed to visit two fields close by each other. Before the field visits, brief introduction was provided in local language on the aims of the demonstration and the treatments contained. The farmers were then allowed to visit all the treatments and interact and discuss with each other with the help of the facilitators. After observing two fields, discussions were made with each group. The group discussions focused on the main observations on the treatments, new things learned, farmers' choices, and whether they are interested to try any of the treatments on their own fields. Farmers were also asked to reflect on what is limiting maize production in their locality. To get a deeper insight on their views, individual discussions were also made with few farmers including women. Snacks and soft drinks were served during the discussions.



Figure 1: Women farmers discussing with each other while visiting the demonstration fields

## Farmers' observations and feedback

### Group - I

Group one, composed of 20 farmers, visited Desiso Hirpho and Husena Guto's demonstration field. The farmers have visited each treatment one by one with the help of the facilitators and provided feedback during discussion on what they have observed.

"Maize in plots treated with tied ridge, recommended management and fertilizer rate are in a better stand than the ones without for both varieties" said one farmer who took the first chance to speak. He further

explained that raw planting with regular spacing between plants is a good practice. He also added he would prefer MH 140, the new variety, to BH 540 as it appears at the time of the field day.

A second farmer who shared the views of the first farmer took a different stand on the varieties. He said “BH 540 commonly bears two cobs per plant while MH 140 mostly bears one cob but is very good in terms of grain filling” and added he would think BH 540 would be better. He further explained that they have known and cultivated BH 540 already for several years and are happy with it. In addition he said plants in the plots with tied ridge are better because they appear greener and in a good stand. He also explained that he observed variation between the fertilized and unfertilized plot saying “plants in the fertilized plots appear greener and bear better cobs while the cobs in the unfertilized plots are half empty”.



*Figure 2: Group one farmers have gathered to discuss after visiting two maize field*

Other farmers have also explained what they have observed though mostly spoke of the relative comparison of the varieties. One of them explained that MH 140 fills grain fully up to the tip of the cob while BH 540 leaves some empty space at the tip. Another woman farmer supported that idea explaining she has also observed that. Others have also added that cobs from BH 540 have thicker sheath and appear to be bigger in size compared to MH 140 however cobs from MH 140 have thinner sheath and appear to bear more grain. In a different aspect, another farmer explained that MH 140 seems to have matured earlier than BH540 and has somehow escaped the effect of a shorter rain duration in this season. Some other farmers have also mentioned that BH 540 appears to have been affected more by disease compared to MH 140. The farmers have also observed effect of the tied ridges. They said that soil in the plots with tied ridge are still wet compared to plots without tied ridge.

Apart from that, one of the farmers reflected on his observation that there is variation in treatment effects between the two farmers' fields. He said both varieties are good even without fertilizer on Desiso's field compared to Husena's. Further explaining he said "plots applied with fertilizer are somehow better than the ones without but the ones without are not bad on Desiso's field while they are stunt and appear yellow on Huseina's field" referring to the effect of soil fertility variations between the two fields. Desiso's field is relatively fertile because it was converted to crop land only few years back compared to other farmers' fields which have been under production for decades.

## Group - II

Group two farmers visited Gamado Jula and Aliyi Farda's demonstration fields. These fields are older agricultural lands that have been cultivated for decades, mainly with maize, and therefore are lower in fertility compared to the previous fields. Hence, there was quite visible differences between the fertilized and unfertilized plots which drew much of the farmers' attention.

One of the group two farmers said "we have seen two different varieties, with and without fertilizer, with and without tied ridge and a farmer's practice. In my opinion, both varieties have performed well with fertilizer. However on the unfertilized plots, MH 140 performed better than BH 540 but only on Aliyi's field. On the other hand, both varieties have shown better performance on the plots with tied ridge because the plots with the tied ridge contained moisture. Regarding the management, the farmer managed plots have relatively undermined crop performance".

Another farmer has reflected his observation by comparing the two varieties on the two different fields. He said "On Aliyi's field BH 540 is better than MH 140 when fertilizer is applied while MH 140 is better than BH 540 when fertilizer is not applied. In addition, BH 540 was also better with tied ridge. On the other hand, without fertilizer both varieties have failed similarly on Gemedo's field which I couldn't understand why". Following, other farmers have responded altogether saying that it is because of the lower fertility status of Gemedo's field.

In relation to soil fertility an older farmer said both varieties are good but producing maize on both fields without fertilizer is unthinkable because these fields have been continuously cultivated with maize for many years that the fertility status has gone down as such. He also added his opinion that practicing intercropping with haricot bean would be helpful.

Other farmers have also commented. One of them said the plots with recommended management are better than the ones with farmer's practice and asked a question on how to effectively distribute fertilizer for each plant in the field without any loss.

In the end, Desiso Hirpho, one of the farmers who hosted the demonstration trials, come up with a sort of concluding comments. He said that the plants didn't develop fully in to maturity because the rain stopped before the expected time making it difficult to conclude one variety is better than the other. However he said BH 540 commonly bears two cobs per plant while MH 140 mostly bears one cob but is very good in

terms of grain filling. Regarding the planting methods, he said it would save them seed and space if they plant in rows with regular spacing between plants like in the recommended management plots.



Figure 3: Facilitators discussing with group two farmers after field visits

During the general discussions, some other important issues were also raised to the farmers by facilitators. These included the type and amount of fertilizer people commonly apply, and their view of what factors limit maize production in the locality.

According to the farmers, commonly applied fertilizers are NPS/DAP and Urea. They said the maximum rates that farmers apply are 100kg NPS and 50kg Urea for 0.75 ha of land while the minimum amount is zero explaining that there are some farmers who do not even apply any fertilizer at all (The maximum urea that they apply is about a third of what is applied in the plots with recommended management). However, one farmer mentioned that producing maize without fertilizer (especially Urea) on fields like that of Gemedo and Aliyi, which are exploited by maize mono-cropping for decades, is unthinkable.

To the limiting factors, they said the major constraint of maize production in the area are limited access to inputs (because of limited financial capacity) and drought occurrence. One farmer also mentioned that the farmers' fertilizer application method (broadcasting) is not efficient because it causes fertilizer to fall where it is not needed.

### Outcome of the field day

As reflected in the group discussions and individual interviews, the field demonstration enabled the farmers to learn new things; a new optional variety (MH 140), row planting with regular spacing between plants, and

tied ridge as a moisture conservation practice. In addition, farmers have witnessed the relative advantage of the new variety over the old one and the difference between the introduced management practice and farmers' practices.

Though the variation in yield was not known at the time of the visit, farmers have observed that the new variety (MH140) is good in terms of grain filling, early maturing, and drought and disease resistance. In addition, they have practically witnessed that tied ridge conserved moisture which they said would make significant difference especially in drought condition like theirs. They were also able to examine each management option to choose a better one. Some of the farmers have shown interested to try some of the treatments on their field though they said they would need some technical support.

## 2. Field Visit by CIMMYT Staff

Prior to the farmers' field day, another field visit was made by CIMMYT staffs on two of the four IMAGINE demonstration trials. The participants have come from various projects including IMAGINE, TAMASA,... At the start, Dr. Kindie Tesfaye, CIMMYT scientist and leader of the IMAGINE project in Ethiopia has welcomed the participants and provided a brief introduction on the project and the aim for establishing the on farm demonstration plots. In his introduction he explained that the IMAGINE project was initiated as a follow-up of the Global Yield Gap and Water Productivity Atlas (GYGA) project. He further explained that IMAGINE aims to identify the determinants of the maize yield gap in Sub – Saharan Africa. As part of this project activity, he explained that the demonstration trials were established to see how much yield gap can be closed using the best available varieties under a recommended management practice in comparison to the farmers' practices.



Figure 1: Group photo after visiting Aliyi Farda's maize field

During the field visit, the participants had the opportunity to interact with the hosting farmers and ask some questions. One of the visitors asked Aliyi Farda, a farmer hosting the first field visit, which of the plots he would choose. Aliyi responded that he would choose the plot that was planted with MH 140 with a recommended management practice and a tied ridge despite the fact that the next plot planted with BH 540 with similar management practice appeared to be more vigorous. When asked why, he explained "look at the cobs of the MH 140. It has already finished filling grains while the BH 540 is still developing. Given the rain has now stopped before the normal time, the BH 540 might not be able to normally develop to maturity". His impressive explanation earned him a gracious applause from some of the visitors.





Figure 2: Field visits by scientists from CIMMYT and national and international partners

In the end, questions and answers were made regarding various issues including how much gap is expected to be closed with the improved management practices and on how to incorporate economic aspects on the final results.