Case Study of Conservation Agriculture (CA) on Maize crop SNNPR, Ethiopia

Introduction

With the financial and technical support from **Irish Aid**, SOS Sahel Ethiopia (NGO) has been engaged in promoting Climate Smart Agriculture practices and technologies to transform smallholder agriculture to increase productivity while at the same time adapting to climate change and reducing GHG emissions in seven woredas of SNNPR and Oromia Regions of Ethiopia. The project has introduced conservation agriculture and sustainable crop intensification on 66.5 ha of land owned by 490 smallholder farm families during 2015 *Meher* production season, which is the principle annual crop growing season in Ethiopia.

The project plans to expand Climate Smart Agricultural practices on 1000 ha of land owned by 3000 households by 2017 and ultimately create 19 climate smart villages, along with food & nutrition security, value chain development and natural resources conservation initiatives. The implementation modality of the project is influencing farming households' ability to adapt by creating access to weather information, training and inputs, technologies & planting materials).

The potential drivers of agricultural change promoted by the project are adopting improved crop varieties, increasing appropriate fertilizer use, investing in improved land management practices, plant multipurpose and fruit trees and changing the timing of agricultural activities. This case study focuses on Conservation Agriculture (CA)[1] which, which has a proven potential to improve crop yields, while improving the long-term environmental and financial sustainability of smallholder farming.

Data for these case studies were collected through interview with the individual in cases and by observation throughout the growing stages of the crop on both CAP and conventionally managed plots of land. The farmers themselves using their own comparison methods did major analysis.

Jemal Musa, Bati Legano Kebele, Meskan woreda

Ato Jemal Musa (55 years old) is one of the project clients living in Bati Legano Kebele, Meskanworeda, Gurage Zone of SNNPR, Ethiopia. With his wife Asegedech, he has four children and earns his living from 1 ha of farmland he owns with his family.

[1]**Conservation Agriculture** (CA) is a set of soil managemer soil's structure, composition and natural biodiversity.

Before the project considered him as one of the target clients and provides him a tailored made training and support package, he has no information about conservation agriculture and has never tried it.
In March 2015, he participated in a training organized by the project on conservation agriculture. Then, he decided to try and has been practicing minimum tillage on 1/8 ha.

He said that, 'even though I got adequate awareness on the advantage of conservation agriculture during the training, I was not that much convinced about its effectiveness. But I decided to give it a try on12.5% of my farmland. The pressure from fellow farmers of our village was so immense, thinking I am abandoning farming on 1/8 of ha land. Withstanding the pressure I sowed maize on the trial plot using the minimum tillage technique. Apart from the training the project supported me in improved maize seed with full package and follow up advisory services.

The project staff visited Jemal's farm three months later during harvest time. Jemal compared conservation agriculture with conventional farming during the same growing season, which was affected by a shortage of rain. At this stage Jemal made the following observations:

- At sowing stage the land allotted for conservation agriculture had adequate moisture compared to repeatedly cultivated land exposed to sun, wind and water erosions.
- Soil in areas where he has practiced conservation agriculture was protected well from wind and water erosions compared to conventionally plowed land.
- At latter stage conservation agriculture farm plot required him more labor for weeding than the conventional farm. However, the money he saved[2]form not plowing the conservation agriculture farm five to six times compensated the cost of additional labor required for weeding.
- In the middle of the maize growth stage he was also supplied with Haricot bean seed by the project to intercrop with the maize on conservation agriculture farm, but due to wrong time of sowing he lost it. Nonetheless he believes the intercropping practice helped to improve soil fertility.
- At growing stage, wilted maize plants were observed on conventional farmland, while conservation agriculture farm was colorful and not us such affected with the rain shortage (see the picture maize at growth stage).
- He also observed that vegetative performance (especially stalk thickness, height and color) are significantly different between the two maize farms. The crop on conventionally managed land wilted quickly while the one on the conservation

[2]Up to 200 Birr per one time plowing which sum up to 1200 Birr for six times plowing 1/8 of hector

agriculture practice plot remained green for extended time, which enhanced proper maturity and adequate grain filling.

These differences in observed crop quality were reflected in differences in yield difference between the two plots after harvest. Jemal made the following observations on the yield difference of the two practices at harvest stage:

i) No maize stalk observed without maize cob in conservation agriculture farm, while common in conventional farm
ii) The maize cob harvested from the conservation agriculture plot was longer than that from the conventional farming plot,
iii) The tough cob left after maize threshed has thinner in case of harvest from Conservation Agriculture Farm (CAF),
iv) The maize seed count around the diameter of cob was two more in case harvest from CAF,
v) Total count per individual cob has 200 maize counts more in case of harvest from CAF.
vi)

These pictures illustrate the comparing methods Jemal used.

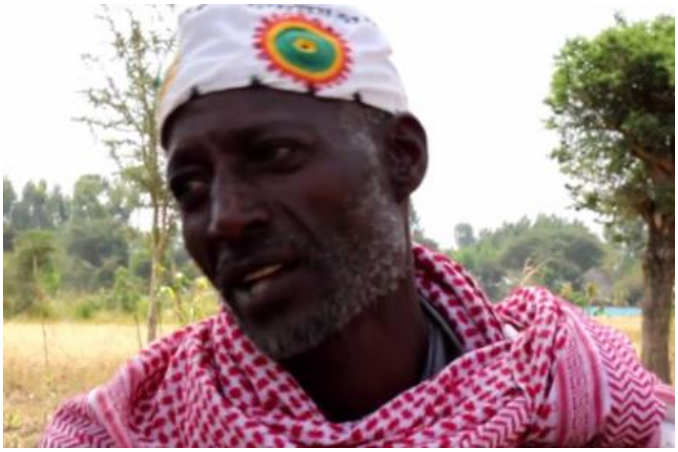
To confirm Jemal's comparison, which easily interpreted to yield and soil management practices difference between CAF and conventional farm (CF), the project staff conducted post-harvest yield estimation using sampling method[3] and reached on 2.1 quintals yield more harvest from CAF[4]. Other early signs observed CAF compared to CF includes: less soil loss, soil fertility and soil structure are maintained and rainfall is managed to avoid excessive runoff in case of CAF.

[3] (i) Two Samples were taken from 0.125ha of land per farmer (for both CAF and CF), (ii) Samples were taken from one square meter area and (iii) The samples were shelled / trashed and measured with scale.

[4] 8 .0 quintals harvest from 0.125 ha of CAF and 5.9 quintals from CF

Jemal Musa, Bati Legano Kebele, Meskan woreda

61years old, owns 1.5 lands and is also one of the project client engaged in CAF. Contrasting to Jemal, Awol allocated very small unproductive plot of land 5MXSM ($25M^2$) to tryout CAF because he was frightened to practice technique he never tried before. At later stage Awolregretted not allotting land to CAF when he observed the difference compared to CF harvest. When the project visited Awol he reported advantages of saving his time and oxen power after adopting conservation agriculture.



Awol made the following observations about his experience with conservation agriculture: 'Initially I became enthusiastic about fast germination and its vegetative growth of maize planted through conservation agriculture compared to conventional farmland. It attracted me to closely observe and l gave more attention to agronomic practices. Though the farmers in our village were challenged by shortage of rainfall and crop failure, the maize I planted on conservation agriculture farmland was not as affected as that on conventional farms of maize adjacent to it. The maize planted on conservation agriculture farmland was green, vigorous and less vulnerable to shocks from rain shortages. Based on this season's result I decided to increase the plot size to ½ hector to practice conservation agriculture during the next production season.'

Pictures: Awol and his son comparing the yield difference between maize cobs harvested from plots under CAF and CF.

Awol's observations on maize stalk, cob length, tough cob left after maize threshing and seed count matched those of Jemal. In addition to Jemal's comparing methods, Awol added counting number row in cob harvested from CAF and CF and he noticed one row more in case of cob harvested from CAF[5].

Sani Shumolo, Bati Legano Kebele, Meskan woreda

The project also collected the views of non-project client residence in the same village as Jemal and Awol. Sani Shumolo, a neighboring farmer, observed the difference in vegetative growth of maize in his conventional farm compared to Jemal's and Awol's conservation agriculture farms, he approached them and requested them to give him a maize cob and compared with his own harvest and witnessed his harvest was less by 250 maize count per cob. After he confirmed the yield difference he contacted SOS Sahel Ethiopia project filed coordinator to consider him as a project client, so that he will practice conservation agriculture in the coming *Meher* season.

[5]Number of rows of cob harvested from CAF became 19, while from CF 18