Improving pulses productivity and rural livelihood of smallholder farmers in the Bale highlands of Ethiopia through their integration in the crop-livestock production systems

Report from an ‘early win’ project

Geletu Bejiga, Seid Kemal, Z. Bishaw, Tadele Tadesse, Tamiru Meleta, Bekele Diriba, Bullo Tulu, Furgassa Bedada, Shiv Kumar, F. Maalouf, M. Imtiaz

Produced by
International Center for Agricultural Research in the Dry Areas,
Ethiopian Institute of Agricultural Research, Oromia Agricultural Research Institute

Published by
International Livestock Research Institute

October 1, 2012
www.africa-rising.net
The Africa Research In Sustainable Intensification for the Next Generation (Africa RISING) program comprises three research-for-development projects supported by the United States Agency for International Development as part of the U.S. government’s Feed the Future initiative.

Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads an associated project on monitoring, evaluation and impact assessment.
Purpose, objectives, planned outputs

The major objectives of this project were:

- to demonstrate high yielding and disease resistant food legume crops (faba bean, kabuli chickpea, field pea and lentil) varieties with good seed color and size that were released by both federal and regional research institutes. This includes improved crop management and production system developed for bale highland.
- to augment seed supply and other production inputs such as fertilizers and chemicals that are useful to control insect pests
- to access production inputs such as quality seeds as a key to narrow the yield gap between traditional and potential production by building the capacity of development agents, extension workers and farmers through intensive training on the food legume production technologies:
- to build the capacity of all stakeholders including zonal and district administration to create awareness and support to agricultural development by involving them at all levels of planning in agricultural development.
- Create awareness of the importance of food legumes in the farming systems through intensive training of all stakeholders.

Background

The International Center for Agricultural Research in the Dry Areas (ICARDA) and the Ethiopian Institute of Agricultural Research (EIAR) have jointly worked over three decades to generate suitable technologies in food legumes through support of SAREC, the Netherlands government and IFAD and released over 20 varieties of faba bean, 26 varieties of field pea, 12 varieties of lentil and 4 varieties of Kabuli chickpea selected from both introduction and Ethiopian local germplasm or crosses of ICARDA and local. Only some of these varieties reached in the hands of farmers that could access to research centers. The remaining varieties were shelved and hence the investment and efforts made by research to develop varieties remained non-productive. This is mainly due to lack of demonstration, popularization and limited capacity of the national seed system to multiply and disseminate the varieties to the target environments. Another general constraint affecting pulses production in Ethiopia is the lack of effective links between research, extension, education and farmers. As whole the existing national breeding and seed multiplication capacity is not sufficient to address the critical seed shortages for new varieties at the national level. The fastest and cheapest is the farmers’ participatory seed production
that can adequately supply the needs of small holder farmers at affordable price at their own communities.

Therefore, this project targets to train development agents (DAs), extension workers and farmers in technologies that are available to enhance production of food legumes in the Bale highland and demonstrate the impact of technologies and effectiveness of farmers participatory seed multiplication in technology dissemination. The project focuses mainly on technology demonstration, popularization and provision of seeds of improved varieties and simultaneously multiplies and disseminate to the farmers in both Genna (April-July) and Bonna (July-December) seasons. Interestingly, Bale highland is a unique that has two crop seasons in a year with almost equal rainfall distribution. Hence, the use of these two seasons in a year provides an opportunity to use double cropping of food legumes and cereals or cereals and food legumes to improve the overall productivity of the farming systems.

Partners

The major partners in this project were the Ethiopian Institute of Agricultural Research (EIAR), Oromia Regional Agricultural Research Institute (Sinana Agricultural Research Center), Bale Zonal Administration and Agricultural Office, administration and agricultural offices of five districts, Development Agents and Farm Africa and farmers. EIAR provided the required seeds of nationally released varieties of faba bean, field pea, chickpea and lentil and enabled the project to be implemented as planned. Researchers from Holeta, Debre Zeit and Kulumsa provided technical support during planning and also training of extension workers, development agents and others. OARI management facilitated and coordinated between ICARDA and Sinana Research center and other partners. The role of OARI’s Crop Research Directorate was key for the success of this project. The implementation of the project at ground level was done by Pulses and Socio-economic teams of Sinana Agricultural Research Center, Farm Africa, Development Agents and farmers. ICARDA’s overall project coordinator was fully involved in planning, organizing meetings, coordinating all partners and stakeholders including zonal administration and others that have relevance with this project at different levels. ICARDA’s Director General approved and pre-financed the project to catch the season.

Achievements

This project made significant impact in revolutionizing pulses industry in the Bale highlands by making known the technologies to the administration, agricultural officers, extension workers, development agents and farmers through inception workshop, demonstration, popularization, multiplication (with farmers) and dissemination of improved technologies at the time when pulses’ prices went high and farmers ‘demand for improved seeds was very critical. This project has been implemented in two seasons and achievements have been reported as follow:
Season 1 (April-July 2012)

Three hundred seventy (370) farmers participated during the April-July season of 2012. The challenge was that the project approved late and it was difficult to reach and organize farmers to implement the project in April-July. However, Sinana Agricultural Research Center’s team was organized and aggressively worked with the help of DAs and able to provide seeds to 370 farmers in a very short time to catch the season. Field days were organized at different villages and districts and these have created high demand for seeds of improved varieties for the following season.

The two chickpea varieties were planted late and not yet threshed. However, the mean yields of faba bean, field pea and lentil in the Gena season (April-July) were 3.75 ton, 3.3 ton and 2.5 ton as shown in fig1. The yields were higher by 147%, 161% and 139% in faba bean, field pea and lentil respectively as compared to the national average seed yields 1.52, 1.26 and 1.05 tons of these crops in 2010/11(fig1). These are tremendous increase at zonal and regional level if the whole area of land planted to these crops were covered by these improved varieties. For instance, when the whole area of land planted to faba bean, field pea and lentil in Bale zone was estimated more than half million quintals could have been harvested as compared to less than three hundred quintals actually harvested (Table1). Because of the excellent performance of these varieties during April-July season, the demand for seeds of these varieties in particular of that faba bean was extremely high for July-December planting which could not be fulfilled by EIAR and Sinana Agricultural Research Center. In the following 2013 seasons, most of the woredas will be expected to meet part of their demands.

![Figure 1: National average yield of two seasons and yield of improved varieties in Bale](image)
Table 1: Estimated production of pulses in Bale Zone based on the national average and yields obtained from improved technologies

<table>
<thead>
<tr>
<th>Crop</th>
<th>Area</th>
<th>National average yield (quintal)</th>
<th>Estimated production in Bale zone (based on National average)</th>
<th>Estimated production of Bale zone based on improved technologies</th>
<th>Estimated % increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faba bean</td>
<td>8,795</td>
<td>15.20</td>
<td>133,684</td>
<td>329,812.5</td>
<td>146.7</td>
</tr>
<tr>
<td>Field pea</td>
<td>5,571</td>
<td>12.60</td>
<td>70,194.6</td>
<td>183,843</td>
<td>162</td>
</tr>
<tr>
<td>Lentil</td>
<td>937</td>
<td>10.47</td>
<td>9,810.4</td>
<td>23,425</td>
<td>139</td>
</tr>
<tr>
<td>Total</td>
<td>15,303</td>
<td></td>
<td>213,689</td>
<td>537,080.5</td>
<td></td>
</tr>
</tbody>
</table>

Season 2 (July-December 2012)
Due to increased request for the seeds of improved varieties, we planned to involve about 2500 farmers in the July-December crop season using an area of 32m x 32m/farmer which is commonly used as standard in Bale. However, because we only focused to work with two peasant associations in each woreda (district) and crop rotation plan of some farmers did not match with our plan, the number of farmers was reduced to 1167. However, the amount of seeds for distribution and area of land were not reduced since some farmers provided with more seeds to plant as high as one hectare. Reaching over one thousand farmers in one season is a great achievement for the project and this will be considered as one of the models that ICARDA leads in farmers’ participatory seed multiplication. From our experience in the “Rapid Deployment of High Yielding and Rust Resistant Wheat Varieties For Achieving Food Security in Ethiopia” the fastest seed distribution is through farmer-to-farmer seed distribution system.
We will include adoption and impact study in the following 4-years project proposal to assess its impact food legume production and livelihoods of the poor farmers. Total number of farmers participated in the project implementation in the July-December, 2012 is given in Table 2.

Table 2: Total number of farmers participated in technology demonstration and scaling up in July-December cropping season of 2012

<table>
<thead>
<tr>
<th>Crop</th>
<th>Numbers of farmers participated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faba bean</td>
<td>299</td>
</tr>
<tr>
<td>Field pea</td>
<td>494</td>
</tr>
<tr>
<td>Lentil</td>
<td>188</td>
</tr>
<tr>
<td>Chickpea</td>
<td>186</td>
</tr>
<tr>
<td>Male and Female</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>85</td>
</tr>
<tr>
<td>Male</td>
<td>1082</td>
</tr>
<tr>
<td>Total</td>
<td>1167</td>
</tr>
</tbody>
</table>
Nurseries/trials
ICARDA in collaboration with EIAR national food legume research coordination centers organized trials using germplasm received from ICARDA and already passed through the national Quarantine Unit. These were organized and supplied to Sinana Agricultural Research Center which is currently in the field.

Study of straws
Since Africa RISING focuses on the integration of crop–livestock, we are interested to run the quality analysis of the straws of different varieties of the major four food legume crops. However, since quick win is for a short period and crops are in the fields, this did not allow us to do as we desire to include in to our data to have complete picture of integration. Probably, we will accrue the budget to cover cost of this analysis.

Deviation in deliverables
The project targeted to reach 500 farmers but reached a total of 1537 farmers which accounts for 207% more achievement. Moreover, this project made administration, agricultural experts of zonal and woreda (district) and development agents aware of the availability of improved technologies. The impact of this project could be considered as breakthrough for Africa Rising in Ethiopia to promote and demonstrate to policy makers and donors. Administrators’, agricultural officers, development agents and farmers are the major beneficiaries from the project.

Locations/sites where activities took place
The activities were implemented in five woredas (districts) in the Bale highland involving two peasant associations /woreda.

Support Required from AFRICA RISING
The basic foundation has been well established and the project has already taken off at faster rate to make Africa Rising contribution to be realized by the communities and administration at different levels. We believe that the recognition given to this project is the reflection of its success in making impact on the livelihoods of the poor resource farmers. Continued support to strengthening the development agents and training of farmers accompanied by provision of improved seeds will bring great change in the production of food legumes and improve human and livestock nutrition. If Africa Rising wishes to report an impact at the end of its five years project life, this should be scaled up in other regions.
Scalability

The technologies are well taken and can be easily scaled up in any districts by

1. Fast tracking available (shelved) technologies which will make an impact in very short time.
2. Experience gained to strengthening capacity of researchers in technology generation by provision but requires some additional facilities.
3. Experiences gained from projects to Improve the capacity of DAs, extension and farmers to take up the technologies.

Lessons learned

The team that have been involved have very good experiences in working with farmers since we implement the USAID supported wheat seed project in the same zone with Sinana Agricultural Research Center. These experiences have been brought forward to implement this quick win of food legume project in the same zone. The new lesson learned in this project was that integration of legumes and cereals will improve the quality of seeds produced as the rotation system introduced by this project reduces the mixture of the varieties we had in the mono-culture cropping system. We also come to learn that legume-cereal rotation will greatly reduces weed population, particularly wild oats that severely affects wheat production in Bale highland.

Acknowledgements

This project was participatory by its nature and involved many participants who contributed to its success directly and indirectly. ICARDA staffs members who were not physically in Ethiopia, but helped from writing the project proposal to project implementation are highly acknowledged. The names mentioned in the partners part are only those who were directly involved in the organization of seeds, farmers and field days. Therefore, we acknowledge all those thousands worked in the success of this project.