



## About the bulletin

*The Bulletin of Tropical Legumes* is a quarterly publication of the Tropical Legumes III (TL III) project. The project is funded by the Bill & Melinda Gates Foundation and jointly implemented by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the International Center for Tropical Agriculture (CIAT) and the International Institute of Tropical Agriculture (IITA) in close collaboration with the national agricultural research systems (NARS) of target countries in sub-Saharan Africa and South Asia.

This quarter, we will be focusing on the progress made under Objective Six: Developing Sustainable and Impact-Oriented Legume Seed Systems for Smallholders in Sub-Saharan Africa and South Asia during Year 1 of the project implementation.

## Executive summary

In 2015-16, a total of 55 multi-stakeholder platforms were established, bringing together 368 partners from the public and private sectors. A total of 14,744 platform members were trained in various aspects including legume seed production, post-harvest handling and seed business management; 8,204 NARS partners had their skills and knowledge enhanced in areas of innovative and gender-considerate seed production and marketing across mandate crops within the target countries. A total of 16,556 tons of seed were produced, of which 16,165 tons (97.6%) were certified and quality declared seed – enabling an estimated 3.2 million farming households to get access to seed of improved legume varieties. Across countries and crops, on an average, 9.3% of seeds were marketed in small packs (1 kg, 2 kg and 5 kg). Over 30,000 copies of promotional materials (leaflets and guides) as well as 70 electronic/print media articles

with information on improved legume varieties were produced and distributed to farmers and partners. A total of 1,516 demonstrations, 134 field days and 15 agri/seed fairs were conducted for variety promotion and for training legume value chain actors. Ten labor-saving technologies/mechanization tools were identified and demonstrated; they are being used by smallholder farmers to reduce drudgery and increase legume production and quality of post-harvest products.

## Fostering innovations for sustainable production of and access to quality seed of improved legume varieties by smallholders: Experiences from Tropical Legumes III project

### Introduction

Grain legumes provide a wide range of products for human and livestock consumption and enhance agro-ecosystems' health while shortening hunger periods for millions of farming households. They are mainly grown by smallholder farmers who rely on non-mechanized farming, family labor and rudimentary technologies including unimproved varieties. Efforts have been made towards introducing new varieties to revamp legume productivity to potential levels. However, farmers' limited access to (and therefore limited use of) quality seed of improved legume varieties is a major factor contributing to persistent low yields and missed opportunities among smallholder farmers.

In countries where a demand for improved varieties has been created, low production of foundation seed remains an impediment, especially where its production is centralized. While major cereals such as hybrid maize have fairly well-structured seed production and marketing systems in place supported by the private sector, formal seed systems of legume crops remain inadequately developed. The Tropical Legumes III (TL III) project is on course towards developing sustainable and impact-oriented legume seed systems for smallholder farmers in Burkina Faso, Ethiopia, Ghana, Nigeria, Mali, Tanzania, Uganda and India.

One of the interventions undertaken by the project in achieving sustainable legume seed systems is the establishment of multi-stakeholder platforms consisting of both public and private partners. These platforms provide linkages among legume value chain actors, provide avenues for training and skills enhancement, and enhance efficiency and effectiveness in technology

development, promotion and use. It also seeks to strengthen diversified production of early-generation seed by professionalizing decentralized production and ensures that both women and men farmers have inclusive access to certified and quality declared seed.

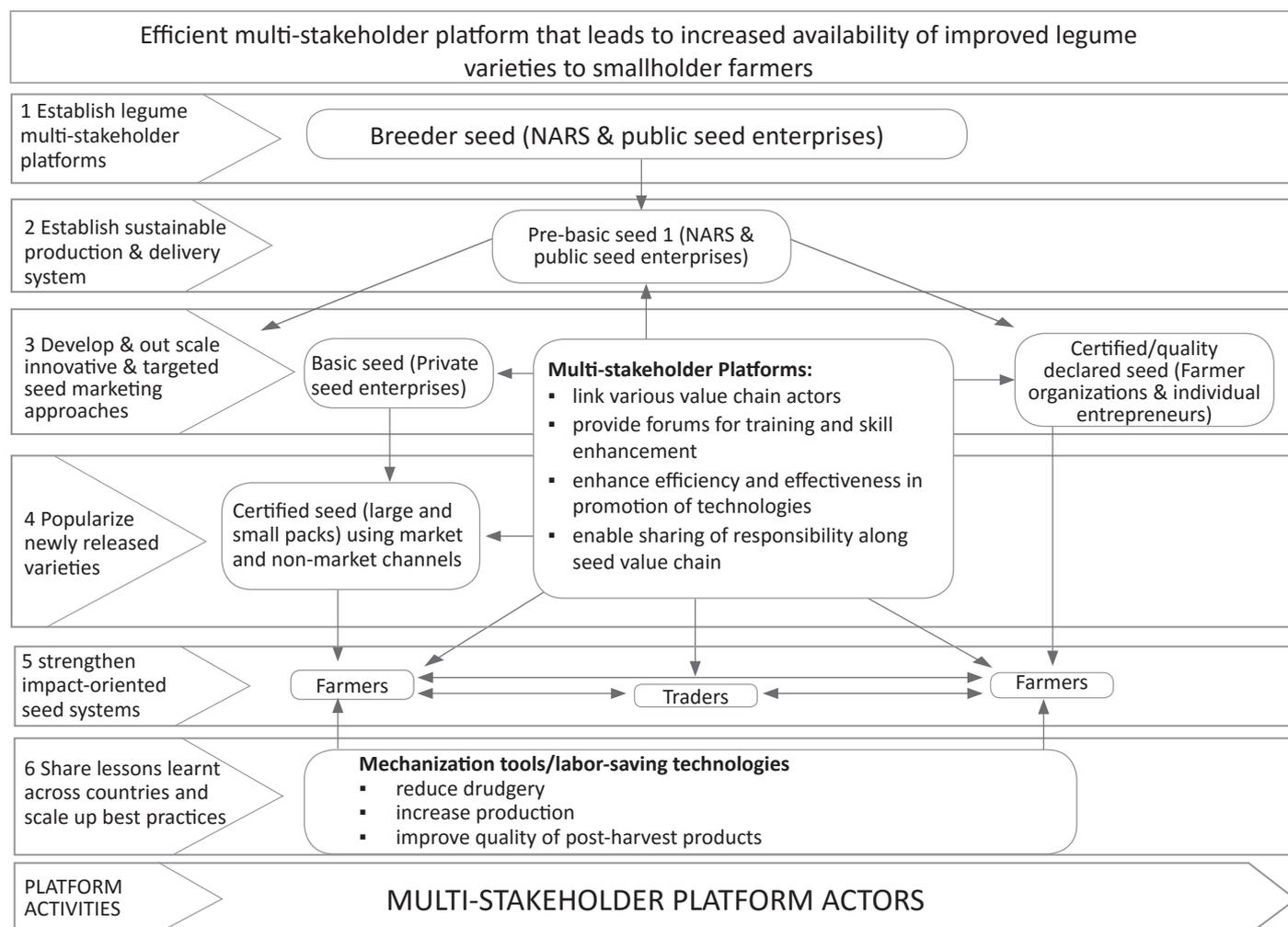
### Seed systems approach and process

The seed systems approach focuses on the establishment and utilization of multi-stakeholder platforms (MSP). The basic principle of MSP is to bring together actors along the legume value chains for continuous interactions and learning. The members/actors are drawn from both the public and private sectors including public research institutions, seed producers, farmer associations, extension agents, seed certifying agencies, seed companies, agro dealers, individual farmers, non-governmental organizations, faith-based organizations and service providers. Interactions within the MSP are motivated by common interest while the actors/partners' roles and responsibilities are clearly defined. This ensures that seed and non-seed technologies are developed and disseminated to appropriate actors for the benefit of smallholder farmers. This is achieved through creating synergies for diagnosing problems (strengths,

weaknesses, opportunities and threats) within existing legume seed systems, exploring opportunities and investigating solutions. The common interest that is developed in this manner promotes a sustainable legume seed system which is able to respond to the needs of the legume value chain actors, thus increasing productivity among smallholder farmers.

The platform members are empowered to access quality legume seeds, and trained in innovative dissemination approaches, seed production and business anagement. This ultimately contributes to improved welfare of the smallholder farmers, food and nutrition security and increased incomes.

During Year 1 (2015-2016), a total of 55 MSPs were established/strengthened across the four legumes targeted (see Table 1). MSP changes are tracked through documentation of the number of MSPs formed, number of MSP members trained, and types of trainings offered. A total of 125 training sessions and short courses were conducted for 14,744 platform members across target countries and crops. The areas of training included quality seed production, group dynamics, seed business management, good agronomic practices, post-harvest handling and seed dressing.



**Table 1. Multi-stakeholder platforms established.**

Country	Number of MSPs				Total
	Common bean	Groundnut	Chickpea	Cowpea	
Ethiopia	2	-	3	-	5
Tanzania	10	1	-	-	11
Uganda	3	1	-	-	4
Burkina Faso	-	3	-	8	11
Ghana	-	5	-	5	10
Nigeria	-	7	-	3	10
India	-	-	4	-	4
<b>Total</b>	<b>15</b>	<b>17</b>	<b>7</b>	<b>16</b>	<b>55</b>



Picture 1. Ethiopian bean multi-stakeholder platform meeting at the Ethiopian Institute of Agricultural Research, Addis Ababa, Ethiopia on 18-19 February 2016.

### Sustainable production and delivery of various seed classes

A wide range of partners was engaged in seed production and dissemination of chickpea, common bean, cowpea and groundnut across target countries. An integrated system was adopted where various actors were engaged in producing different seed classes. In 2015-16, a total of 389 partners, including public seed enterprises, seed companies, individual seed entrepreneurs, farmer organizations and non-governmental organizations (NGOs) were involved in seed production and marketing across the participating countries and focus crops (see Chart 1 & Table 2 below).

A total of 16,572.06 tons of three seed classes (basic seed, certified and quality declared/truthfully labeled seed) was produced across target legumes/countries and delivered. In most of the target countries, the NARS produced breeder seed and made it available to the private sector (seed companies, individual seed

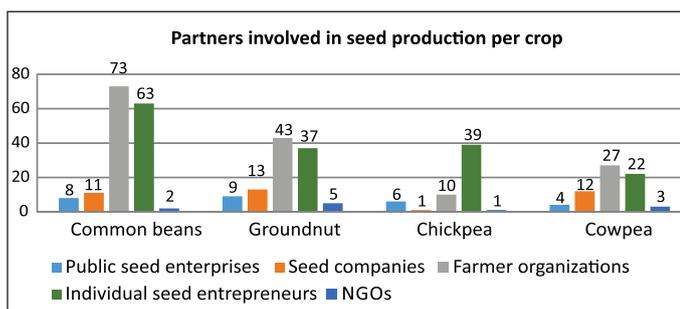


Chart 1. Categories and number of partners engaged in TL III project per crop during 2015-2016.

entrepreneurs and farmer groups) for production of basic and ultimately certified/quality declared seed (QDS) as shown in the Tables 3 and 4 below:

**Table 2. Categories and number of partners engaged in TL III project per country during 2015-2016.**

Country	Type and number of partners					Total
	Public seed enterprises	Seed companies	Individual seed entrepreneurs	Farmer organizations	NGOs	
Ethiopia	7	3	15	26	-	51
Tanzania	5	5	68	60	2	140
Uganda	3	9	30	16	1	59
Burkina Faso	2	6	12	10	6	36
Ghana	2	6	11	1	-	20
Mali	1	2	2	2	-	7
Nigeria	5	6	15	25	1	52
India	2	-	18	3	1	24
<b>Total</b>	<b>27</b>	<b>37</b>	<b>171</b>	<b>143</b>	<b>11</b>	<b>389</b>

**Table 3. Quantity and classes of seed produced across countries per crop during 2015-2016.**

Crop	Quantity (tons) and classes of seed produced		
	Basic seed	Certified/QDS	Total
Common beans	157.53	11,964.07	12,121.60
Groundnut	56.24	501.85	558.09
Chickpea	88.17	2,428.20	2,516.37
Cowpea	105.60	1,270.40	1,376.00
<b>Total</b>	<b>407.54</b>	<b>16,164.52</b>	<b>16,572.06</b>

**Table 3. Quantity and classes of seed produced across countries per crop during 2015-2016.**

Country	Quantity (tons) and classes of seed produced		
	Basic seed	Certified/QDS/TLS	Total
Ethiopia	140.20	4,630.70	4,770.90
Tanzania	95.58	698.70	794.28
Uganda	14.25	8,883.37	8,897.62
Burkina Faso	36.10	267.60	303.70
Ghana	21.20	132.20	153.40
Mali	33.64	293.35	326.99
Nigeria	50.90	871.10	922.00
India	15.67	387.50	403.17
<b>Total</b>	<b>407.54</b>	<b>16,164.52</b>	<b>16,572.06</b>

### Innovative and targeted seed marketing

Innovative seed marketing approaches were adopted for fast and efficient seed marketing, giving consideration to farmers' preferences and purchase capacities. Sale of seed in small, pocket-friendly packs proved a handy strategy for wider impact. This strategy is not only convenient, it enhances affordable access to seed by farmers. It is also an affordable means of testing new



Picture 2. Transparent packets help farmers to appreciate the contents.



Picture 3. Farmers receiving small packs of bean seed during multi-stakeholder meeting in Missenyi district, Tanzania.

varieties with farmers while increasing the diversity of legume varieties accessed. Moreover, the approach offers opportunities for private companies to expand their seed business to remote, poor and hard-to-reach women farmers.

The small packs (1–5 kg) approach was extensively used to enhance wider and more affordable access to seed of improved legume varieties. For example, in Ethiopia, 688 25-kg small packs of chickpea seed were sold each at 17 birr/kg (approx. USD .8/kg) to farmers by private seed companies and producers. (Chickpea-growing land holdings here are typically up to ¼ ha. Given a seed rate of 100-120 kg/ha, 25-kg packs are considered small packs on a commercial scale. Also, 2-kg packs are not feasible on a commercial scale due to increased packaging costs. They are, however, used for promotional purposes.) Further, 1,040 2-kg small packs were directly distributed to farmers for free by project implementing centers.

On an average, 25%, 10% and 15% of common bean seed produced in Ethiopia, Tanzania and Uganda respectively were sold in small packs to farmers and seed producers. In Nigeria, 15% of groundnut seed produced were marketed in small packs, while in Mali and Nigeria, 16% and 6% of cowpea seed produced were marketed in small packs, respectively. In India, a total of

387.5 tons of improved certified chickpea varieties was supplied in small packs to farmers in Hamirpur (154 t), Banda (164.5 t) and Chitrakoot (69.0 t).

## Enhanced popularization of new/improved legume varieties

### Production of promotional materials

Creation and distribution of awareness materials about improved varieties were implemented across target countries and crops. Over 30,000 promotional materials (leaflets and guides/bulletins) with information on legume production, field and pest/disease management, post-harvest management and seed business management were produced and disseminated to farmers and partners in target countries (see Chart 2 and Table 5 below).

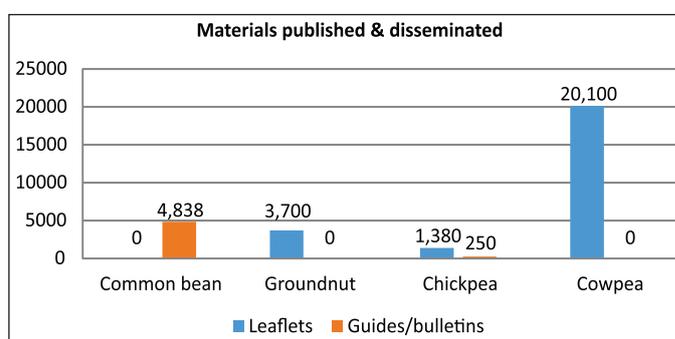


Chart 2. Promotional materials produced and disseminated per crop during 2015-2016.

Table 5. Promotional materials produced and disseminated per country during 2015-2016.

Country	Type and number of materials		Total
	Leaflets	Guides/Bulletins	
Ethiopia	550	2,000	2,550
Tanzania	1,500	1,338	2,838
Uganda	1,200	1,500	2,700
Burkina Faso	100	-	100
Ghana	1,000	-	1,000
Nigeria	20,000	-	20,000
India	830	250	1,080
Total	25,180	5,088	30,268

### Promotional events

Totally, 1,685 promotional events, including 1,536 demonstrations, 134 field days and 15 agri/seed fairs, were conducted to create awareness on improved legume varieties and for community training on legume production (see Table 6 and Chart 3). These events were attended by 35,627 participants, with an average of 42% being females (see Table 7).

### TV/Radio programs

Knowledge about new legume varieties and their seed sources was disseminated through 70 TV/radio programs and one print item. The print item gave information on beans in Tanzania. (See Chart 4 and Picture 5 below.)



Picture 4. Farmers in East Belessa woreda (district) of North Gondar Zone, Ethiopia participating in chickpea field day organized for farmers' training and observational learning.

Table 6. Promotional events organized per crop during 2015-2016.

Crop	Type and number of events			Total
	Demonstrations	Field days	Agri/seed fairs	
Common bean	176	15	6	197
Groundnut	233	91	6	330
Chickpea	979	11	2	992
Cowpea	148	17	1	166
Total	1,536	134	15	1,685

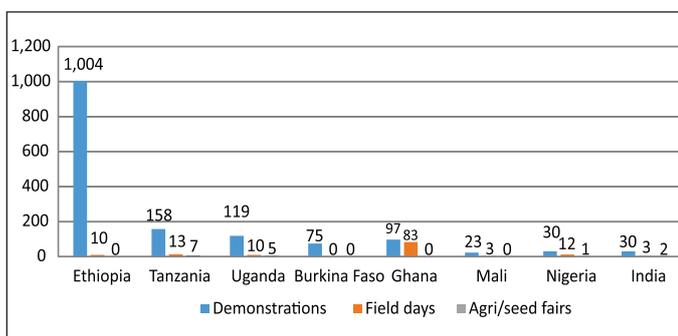


Chart 3. Promotional events organized per country during 2015-2016.

Table 7. Participants attending promotional events per country during 2015-2016.

Country	Number of participants		Total
	Males	Females	
Ethiopia	2,314	550	2,864
Tanzania	6,478	7,829	14,307
Uganda	4,200	2,900	7,100
Burkina Faso	630	870	1,500
Ghana	1,870	1,482	3,352
Mali	23	4	27
Nigeria	3,318	894	4,212
India	1,825	440	2,265
Total	20,658	14,969	35,627

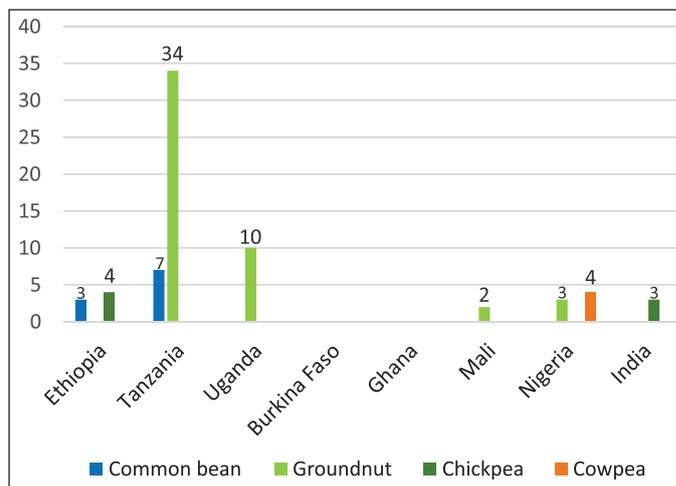


Chart 4. TV/Radio programs broadcast per country per crop.



Picture 5. Daily newspaper advertisement/documentary on beans (Nipashe, 8 January 2016) – Tanzania.

## Enhanced multi-Legume impact-oriented seed systems

### Capacity building

It focuses on building the capacities of partners/actors along the seed value chain of target legumes so as to expand and sustain the project outcomes/outputs. Training Of Trainers (TOTs) workshops were organized particularly to train NARS, seed producers and development partners, so that they, in turn, would train other value chain actors. So far, a total of 2,477 NARS, seed producers and development partners have had their skills and knowledge enhanced. In Ethiopia, 58 partners were trained on chickpea seed



Picture 6. Group discussion during farmers training in Kagera, Tanzania.

production and marketing. TL III, in collaboration with NGOs (Self Help Africa, SNV, World vision), also trained 110 common bean seed producers and members of farmers' associations in Ethiopia. A total of 2,309 community trainers (Tanzania: 162, Uganda: 2,147) gained skills in common bean production and marketing. In Nigeria, 5,727 partners (4,278 males; 1,449 females) learned about cowpea seed production and business management.

### Documentation of lessons learned

Useful lessons learned about seed systems were documented and shared with policy makers, development partners and seed sector actors/associations for better decision making. For example:

- i. During the chickpea and bean innovation platform meetings and the Joint Pan-African Grain Legume and World Cowpea Conference in Livingstone, Zambia, experiences from the Pluralistic Chickpea Seed System approach in Ethiopia and the Ethiopian impact-oriented bean seed system and technology were documented and shared.
- ii. During the same meetings and conference, experiences from public-private partnership in the bean system in Uganda were also documented and shared.
- iii. A poster on capacity building of farmer groups, as a way to promote good quality seed production and to accelerate adoption of improved bean varieties in Northern Tanzania, was also shared during the above conference in Zambia.
- iv. In Nigeria, a documentary on groundnut production was produced and distributed to stakeholders and development partners.
- v. Experiences and lessons learnt from the Pluralistic Cowpea Seed System approach was documented and shared with the stakeholders in Burkina Faso, Ghana, Mali and Nigeria.

### Designing of business models

Six labor-saving technologies/mechanization tools have been identified, demonstrated and are now being used by smallholder farmers to reduce drudgery and increase production/quality of post-harvest products. In Ghana, a new groundnut sheller was tested, while in Tanzania, a groundnut planter was tested and adopted by smallholders to increase production and quality of post-harvest products. In addition, the bean program at ARI-Uyole in Tanzania identified and acquired Ox-Ripper and Ripper attachments. In Uganda, a sister organization involved with making agricultural machinery has been engaged to partner with NARO to make labor-saving machinery to accompany the technologies developed.

In Malawi, ICRISAT partnered with Compatible Technology International (CTI), Minnesota, and the engineering section of the Department of Agriculture Research services (DARS) to design and adapt harvest/

post-harvest equipment for lifting, stripping and shelling groundnuts. The lifter registered a capacity of being four times faster than hand hoe lifting; the stripper was three times better compared to hand stripping, and the sheller registered a shelling capacity 18 times higher than that obtained by hand shelling. The sheller was further modified to a multi-variety sheller which can shell more than one groundnut variety i.e. groundnuts of different kernel sizes. These developments through TL II are currently being promoted in TL III in Tanzania and Uganda.



Picture 7. Labor-saving groundnut lifter being used for harvesting groundnuts in Tanzania.



Picture 8. Labor-saving groundnut stripper and various versions of groundnut sheller being used for post-harvest handling of groundnuts in Tanzania.

## Conclusions

Diversification of seed sources by linking formal and informal seed systems is a fundamental tool to enhance seed access by the smallholder farmers. However, there is still room to improve, particularly in the production, monitoring, marketing and sale of improved legume seed varieties.

Regular meetings, monitoring and evaluation of the methods by the multi-stakeholder platforms were essential and made the functioning of the platforms a reality, while involvement of diverse stakeholders with similar interests enhanced effectiveness of the platforms. The platforms also proved to be efficient and effective in technology promotion.

Sensitization and training of farmers and extension staff on Quality Declared Seed (QDS) production, improved agronomic practices and mechanization/labor-saving tools were critical in influencing farmers' decision to adopt appropriate farm inputs.

## Welcome to our colleagues for their new roles and responsibilities in the Tropical Legumes project.

We would like to update you on some changes in responsibilities of our colleagues related to our TL III project.

(1) **Dr Emmanuel Monyo:** After serving ICRISAT for 29 years in different capacities in Zimbabwe, Malawi and Kenya, and being part of the Tropical Legumes project for eight years (initially as Collaborating Scientist and then as Coordinator for TL II for four years and Coordinator for TL III for the last one year), Dr Emmanuel Monyo has completed his term with ICRISAT and TL III on 31 December 2016. Dr Monyo has made outstanding contribution initially in pearl millet breeding at ICRISAT Zimbabwe for 16 years and then in groundnut breeding at ICRISAT Malawi for eight years. Several improved varieties have been released in different countries from the lines developed by Dr Monyo and his colleagues. While working as the Coordinator for TL II and TL III, he has helped us in developing a strong network with participating partner institutes including CGIAR centers, NARS, the private sector as well as the Bill and Melinda Gates Foundation. He played a very important role in developing the TL III proposal also. On behalf of the ICRISAT leadership and also Team TL III we congratulate Dr Monyo for all his achievements, hard work and dedication to serve the agricultural community in Africa.

As we would like to continue to receive his contribution and harness his knowledge and expertise, Dr Monyo has accepted a consultancy assignment with us for one year (1 January 2017 – 31 December 2017). Therefore, he will be around and will be contributing to TL III, especially project improvement plans for accelerating genetic gains in NARS program, developing digital seed road map, etc.

(2) **Dr Chris Ojiewo:** We are pleased to share that Dr Chris Ojiewo has been appointed as the new TL III Project Coordinator and Leader for Seed Systems Theme

under Research Program - Genetic Gains at ICRISAT. For the final weeks of December 2016, his duties had overlapped with taking over of TL III responsibilities from Dr Emmanuel Monyo. From 1 January 2017, Chris has taken full charge of the TL III project and will be interacting with you all in his new role as the Project Coordinator.

Dr Ojiewo is not new to the TL III team as we all have been working with him (in his role as Chickpea Breeder from ICRISAT Ethiopia) for the last several years on the project activities for the TL III (and earlier in TL II) project. Dr Ojiewo brings his vast experience in breeding, genetics and seed systems to the project. He has been serving ICRISAT for about five years and before that he served the World Vegetable Center in Tanzania for about five years.

Dr Ojiewo is a young, very enthusiastic and dynamic scientist. We're sure that he will be an asset to the TL III project. We look forward to working with Dr Ojiewo for the TL III project activities and Seed Systems Theme.

(3) **Dr Asnake Fikre:** We are happy to share that Dr Asnake Fikre has joined us as Regional Chickpea Breeder at ICRISAT Ethiopia. He is now responsible for contributing to TL III project activities, particularly on chickpea breeding and seed systems in Ethiopia. We all have been working with Dr Fikre for the last several years during his tenure as Director of Crops Research at the Ethiopian Institute of Agricultural Research. He and his team made significant contributions to the TL III project on chickpea and common bean in Ethiopia. We are very pleased to have Dr Fikre, who has extensive experience of more than 13 years in legumes breeding, genetics and seed systems, on board.

Let's congratulate all the three colleagues for their new roles and wish them all the best for their new responsibilities.

### For TL III updates follow:

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