Annual Progress Report – 2009 - Summary Information

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Project Title: **Enhancing grain legumes' productivity, and production and the incomes of poor farmers in drought-prone areas of sub-Saharan Africa and South Asia**

Organization Name: **International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Institute of Tropical Agriculture (IITA), International Center for Tropical Agriculture (CIAT)**

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Has this project been granted a no-cost extension? *If yes, indicate extension date in parentheses*

Geographic Location(s) of project: South Asia and Sub-Saharan Africa

Report Prepared by: Cynthia Bantilan **Date Submitted:** *15/10/2009*

Annual Progress Report – 2009: Executive summary

Objective 1 addresses the need to target crop breeding and delivery mechanisms to enhance the project's impacts on the livelihoods of the poor in sub-Saharan Africa (SSA) and South Asia (SA). This is achieved by assessing the role and potential uptake and impacts of improved legume varieties, providing feedback for determining breeder's research priorities, and establishing a baseline and framework that will enable future project monitoring and evaluation.

Methodology used to achieve the desired targets

- Socioeconomic tools, sampling methods, farm-level baseline survey tools for variety traits preferences (designed for PVS implementation by breeders in Objectives 2-7) and survey instruments adapted and harmonized;
- Regional situation and outlook analyses;
- Market surveys and value chains analyses implemented covering key market players throughout the legume crop value chain;
- Analysis of constraints and uptake pathways to draw out valuable lessons and develop mechanisms that can be used to increase adoption and impacts NARS scientists' capacity development for baseline data collection, data entry, analysis and report writing;
- Coordination meetings (virtual and actual) involving scientists from Asia, Eastern and Southern Africa (ESA) and Western and Central Africa (WCA).

Partnerships

The project is implemented in partnership with scientists in ICRISAT (Asia, ESA and WCA regions), IITA, CIAT, TSBF-CIAT and NARS from India, Ethiopia, Kenya, Malawi, Mozambique, Tanzania, Mali, Niger, and Nigeria, and that are involved in legume improvement research especially groundnut, chickpea, pigeonpea, cowpea, common bean and soybean ICRISAT is partnering with 32 NARs partners in Asia, WCA and ESA regions for the three legume crops (groundnut, chickpea and pigeonpea). IITA has nine partners from NARS for undertaking its research activities on cowpea and soybean; CIAT has 30 partners for research on common bean in SSA.

Key findings

Situation and outlook

Reports highlighting the production, trade, consumption and utilization trends of groundnut, chickpea, pigeonpea, cowpea, common bean, and soybean at global, regional and country levels are ready for the publication. The facts and trends highlighted in these reports would provide valuable direction to researchers working on these crops, research managers, stakeholders along the value chain, and finally policy makers in improving the overall efficiency of these crops to meet the demands of end users and their producers.

Highlights of baseline studies for targeted legumes in SSA and SA

The key findings for the baseline studies across all regions for the targeted legume crops are analyzed and synthesized with focus on the following aspects:
Ruling varieties; Baseline adoption; baseline yield/current yield gap; preferences across the value chain; gender issues; marketed surplus

Varieties grown by farmers: The baseline survey results and the qualitative assessments through discussions with key informants and Focus Group Meetings clearly indicate the continued dominance of certain varieties that were introduced in the target locations several decades ago. A listing of all the 'ruling varieties' as they are called henceforth, by crop and

region is presented below. This observation calls for an investigation of the reasons for the low uptake of the improved, high-yielding varieties resulting from the collaborative research by IARCs and NARS.

Baseline adoption: The baseline reports summarize the historical development and adoption of both local and improved varieties of the targeted legume crops in SSA and SA. The highlights are given in the full report.

Baseline yield/ current yield gap: In the traditional farming systems in which much of the tropical legumes are grown by small scale farmers with little or no input, the yields are in general low.**.** Significant yield variation across farmers were observed both for local and improved varieties in irrigated and rainfed conditions.

Preferences across the value chain: The preferred traits by the different actors and players along the value chain were documented as part of the baseline surveys. While farmers are interested in high yields and economic gains, the processors and traders were also keen on the quality standards like uniformity in size, grain size, cleanliness and healthy grains. Consumers, on the other hand, had preferences for taste, cooking quality and time and keeping quality.

The question then that needs to be addressed is how we match the mandate and preferences of the researchers with those of the farmers right upto the consumers. What are the implications of these findings to the researchers, and to policy makers? This has to be understood in order to establish a feedback mechanism in place.

Gender issues:
An analysis of the baseline data relevant to gender issues provides important feedback for breeders and policy makers. Two examples featured in the report are:

- In West Africa, cowpea provides a source of cash income for women farmers who make and sell snacks from cowpea. Most of the green pod marketing from this nutritious legume is handled by women. In many African countries, women harvest and sell directly to consumer on roadsides, because pod prices are higher than dry grain prices. The role of gender appears to be important in grain retail trade in Africa;
- In Ethiopia, common bean production and marketing is dominated by men. Males dominate the implementation of almost all management practices except hand weeding and harvesting the crop where both genders participate. Men contribute about three times as much labour as women in the production of common bean. They are also responsible for the bulk sale of white pea beans as assemblers and rural wholesalers. Men constituted about 87 percent of bean traders in Ethiopia. On the other hand, women sell small quantities as retailers in markets.

Major lessons learnt and vision for second phase

- Based on the observations made in the cowpea trials, the number of lines that farmers can evaluate efficiently at a time (under PVS) is limited to no more than twenty. As the number of lines to be evaluated increased, it was observed that errors crept into farmers' assessments. The farmers' abilities to make judgments in variety selection were less accurate as the number of varieties increased. This observation should be considered in future conduct of the study;

- Gap analysis identified the following factors constraining research, innovation, production and utilization. This type of information can be used for a better monitoring and evaluation design and mechanism;
- Lack of synergy among the different stakeholders along the value chain is emerging as a prime stumbling block for successful dissemination and uptake of technologies. Critical analysis of institutional arrangements and policies to more effectively promote the TL II crops may be considered under the innovations systems learning framework.

Milestones completed so far

- Baseline socioeconomic data collection from stratified farm household samples in selected target locations completed
- Regional situation and outlook reports for targeted legumes in targeted regions including a report of importance of legumes in livelihoods of poor in drought-prone areas, including implications for breeding and seed systems, based on analysis of the baseline data. Participatory M&E and impact assessment frameworks designed with proper controls (i.e. with and without the interventions)
- NARS partners (>30) trained through on the job training and field research: groundnut, chickpea, pigeonpea, cowpea, beans and soybeans. Also writeshops were organized to facilitating the sharing of issues faced during data entry, validation and preliminary analysis.

Deviation from proposal: None

Measurable outputs and outcomes: Situation and outlook reports, baseline study reports.

Knowledge generation: Baseline data base including varieties grown by farmers, baseline adoption and yield levels and preferences along the value chain.

Activities that cannot be completed in grant period: None

Management updates: Project partner in Asia, Dr V R Kiresur joined ICRISAT and Dr. GN Kulkarni was appointed in 2008-2009 for chickpea research in Karnataka.

Changes: No major changes that have had an impact on the project in the reporting period.

Risks: Transactions

- The US dollar has devalued, fuel costs have risen sharply and inflation is much higher than expected (>3%) across the countries since the commencement of the project.
- Francophone and Lusophone countries' scientists prefer that their graduate students study at English speaking universities. The implication of this is that costs of training the students have increased far beyond the amounts proposed in the project's budget. This is especially true in WCA.
- Seed exchange between scientists in different countries could be a problem due to plant quarantine regulations. This is more so in SSA.

Annual Progress Report – 2009: Narrative

Objective 1: Targeting crop breeding and seed delivery efforts to enhance the impact of the livelihoods of the poor in drought-prone regions of sub-Saharan Africa and South Asia

Background

General introduction

The aim of this project is to enhance the productivity of selected legume crops (bean, chickpea, cowpea, groundnut, pigeonpea and soybean) in drought-prone areas of sub-Saharan Africa and South Asia, principally through the use of improved crop cultivars. The project has seven objectives; five of them are crop-specific (Objectives 2 to 6), and two are related to socioeconomics and seed policy (Objectives 1 and 7) which are cross-cutting the five crop-specific objectives.

This report documents the progress of work in Asia and sub-Saharan Africa, under objective 1 of the project, for the period October 2008 to November 2009. Objective 1 addresses the need to target crop breeding and delivery mechanisms to enhance the project's impacts on the livelihoods of the poor in sub-Saharan Africa and South Asia. This is achieved by assessing the role and early uptake of improved legume cultivars, providing feedback for determining breeder's research priorities, and establishing a baseline and framework that will enable future project monitoring and evaluation.

The important activities during this period included: 1) Situation and outlook analysis of the six target legume crops in nine countries (i.e. Ethiopia, India, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, and Tanzania); 2) Baseline household surveys in the target regions for the target legume crops 3) Market surveys in all the target locations, and 4) capacity building. This report will give the progress on each activity and highlight the major findings so far.

Intended targets to be achieved

The project's targeting and impact strategy employs the commodity chain approach and is strongly oriented towards the full range of clients. It is supported by farm-level baseline surveys and the feedback provided by participatory diagnosis of constraints. The elements of this approach include the following: (i) analysis of constraints to identify potential intervention strategies in the context of holistic value chain approaches – with research supported by situation and outlook analysis, baseline surveys and active participation of stakeholders along the value chain; and (ii) analysis of early uptake pathways to draw out valuable lessons and develop mechanisms that can be used to increase adoption and impacts.

Methodology used to achieve the desired targets

Technical aspects

- Socioeconomic tools, sampling methods and survey instruments adapted and harmonized
- NARS scientist's capacity development for baseline data collection, data entry, analysis and report writing
- Standardized survey tool on end-users' trait preferences designed for PVS implementation by the breeders in Objectives 2-7

- Exchange of experiences on survey tools for variety traits preferences, value chains analysis and market opportunities for targeted legume crops in target countries
- Market surveys implemented covering key market players throughout the legume crop value chain – data collection and data entry
- Regional situation and outlook analysis
- Follow-up country level project meetings in India, Kenya, Malawi, Nigeria and Niger where roles and responsibilities of project partners were clarified and workplans of all scientists were developed and reviewed
- Implementation of the PVS, evaluation of early adoption, and targeting for up scaling have commenced and even advanced with respect to common beans in ESA.
- Coordination meetings (virtual and actual) involving scientists from Asia, ESA and WCA conducted during the year

Partnerships
The project is being implemented in partnership with scientists in ICRISAT (Asia, ESA and WCA regions), IITA, CIAT, TSBF-CIAT and NARS from Ethiopia, India, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, and Tanzania that are involved in legume improvement research especially groundnut, chickpea, pigeonpea, soybean, cowpea and beans (Figure 1). In addition, farmers and other stakeholders in the targeted legume crops are involved in the selection of breeding lines with drought tolerance and other desirable attributes especially those that are attractive to end users.

ICRISAT is partnering with 32 NARs partners in Asia, WCA and ESA regions for the three legume crops namely groundnut, chickpea and pigeonpea. IITA has 9 partners from NARS for undertaking its research activities on cowpea and soybean; CIAT has 30 partners for research on common bean in SSA. A complete listing of all the NARS partners from the 9 countries is provided in the First Annual Progress Report of the project.

Achievements during year 2
Regional situation and outlook report are drafted for peer review. In all regions, baseline socioeconomic database from stratified farm household samples in selected target locations were established, baseline survey reports for legumes are harmonized with the NARS partners to develop synthesis reports. Analysis of market surveys implemented covering key market players throughout the legume crop value chain.

Findings

Progress to date: The important milestones/outputs achieved during the reporting period are:

- Regional situation and outlook reports for chickpea (India, Ethiopia), pigeonpea and groundnut (India and Malawi), groundnut and soybean in WCA, soybean, common bean (Kenya, Ethiopia, Malawi and Tanzania) and cowpea have been completed using secondary information and drafted for peer review.
- Development and harmonization of survey methodologies and instruments across regions for the PVS preference survey
- Baseline socioeconomic database from stratified farm household samples in selected target locations under construction for retrieval from the project website.
- Analysis of the data for the baseline and market surveys for all target crops. The draft reports are under progress. Reports based on preliminary analysis of baseline survey data
- The socio-economic baseline surveys covering the farming communities (community & individual household interviews) were completed.

- The baseline survey reports for 5 target countries - chickpea in India and Ethiopia; and pigeonpea and groundnut in India, Malawi and Tanzania; beans in Kenya and Ethiopia and soybean in Kenya and Tanzania. Reports are completed for peer review, initial feedback to breeders and project partners. These will be harmonized with the NARS partners to develop synthesis reports for year 3.
- Analysis of market surveys implemented covering key market players throughout the legume crop value chain.
- Write-shop organized in ICRISAT to build capacity of the NARS partners in this effort.
- Coordination and capacity building for NARS partners including regional partners workshops and training has been undertaken intensively. Local partners were trained in methods for survey design, sampling and good practices in administering survey instruments.

Key findings

1. Situation and outlook

Groundnut, chickpea and pigeonpea in Asia: Two reports highlighting the production, trade, consumption and utilization trends of groundnut, chickpea and pigeonpea at three levels – global, regional and country level- are ready for the publication process. Future prospects of these crops under varying scenarios of yield and income growth in selected countries of Asia are addressed based on model runs using the IMPACT-WATER model. The facts and trends highlighted in these reports would provide valuable direction to researchers working on these crops, research managers, stakeholders along the value chain, and finally policy makers in improving the overall efficiency of these crops to meet the demands of end users and their producers. Some of the findings from the situation and outlook analysis are:

Groundnut:

- Production of groundnut is largely concentrated in Asia (67% of global production in 2006) and Africa (26% of global production in 2006).
- Groundnut is traded as mainly as shelled groundnut, groundnut oil and groundnut cake (groundnut in shell is traded in very small quantities). Groundnut trade (shelled equivalent) has declined from 5% of total oil crops exports in 1970 to less than 1 percent in 2005. Trade in groundnut oil and cake has suffered owing to the aflatoxin
- Globally the prices of both shelled groundnut, and groundnut oil have been declining in real terms.
- IMPACT WATER runs indicate that 25% increase in yield growth would increase production significantly in India but would have limited global impacts.

Chickpea:

- The main growing countries for chickpea are India, Turkey, Pakistan, Iran and Canada which together account for 87% of the global production.
- Canada and Australia are the two most important exporters of chickpea accounting for 28% of the world exports; and India is the largest importer of chickpea accounting for nearly 30% of imports.
- Real prices of chickpeas have been decreasing at the rate of -1.79% during 1960-2005 but have increases since 2006 onwards
- Based on the runs of IMPACT-WATER model a 25% increases in yield growth rate in India has significant global impacts on production and prices in 2020 compared to the baseline business as usual scenario. But India would continue to be a net importer.

Pigeonpea:

- Production of pigeon pea is concentrated entirely in the developing countries with Asia accounting for 90% of area and production of the crop. There has been an increase in the recent years of the area under pigeonpea in Africa and this region has registered a growth in production of 3.08% per annum in 1990-2006.
- There have been dynamic changes in pigeonpea area across districts with center of pigeonpea production shifting from SAT temperate to semi arid tropics of India and is reflected by the increase in relative share of Maharashtra from 18% in 1970 to 31% in 2004, while that of Uttar Pradesh has declined from 36% to 18%.
- Like for chickpea the IMPACT –WaTER model runs indicate that yield increases in India would increase global production while reducing prices. But India would continue to be a net importer.

The implications from the above analysis and findings are presented in Box 1 as key messages from the reports.

Box 1. Key messages from the situation and outlook reports on groundnut, chickpea and pigeonpea in Asia.

- The performance of groundnut production in India- which accounts for a quarter of the Asia's groundnut production has been lackluster, remaining relatively stagnant with an annual rate of just 0.2 percent during 1981-2007. This sluggish growth in production is due to a combined effect of rapid increase in imports of edible oils at declining tariff rates, and consecutive droughts in major producing states.

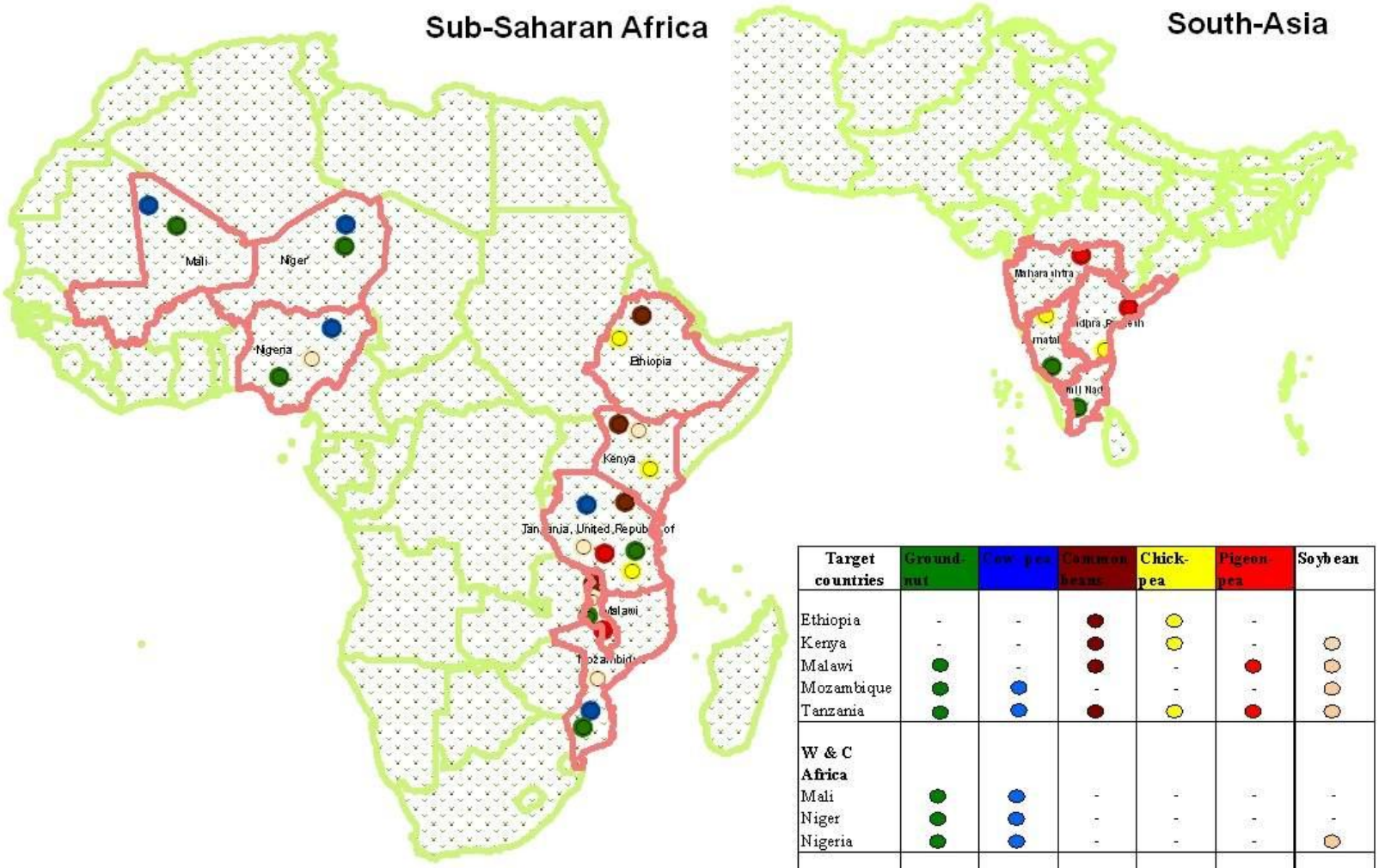
- Area trends reveal that the landscape of chickpea production is changing and is gradually shifting from semi-arid temperate to semi-arid tropics in central and southern India and can be attributed to availability of short duration and fusarium wilt resistant cultivars. This implies that chickpea can be grown successfully under varying environments provided varieties and production technologies suited to different agro-climatic conditions are available.

- Growth in pigeonpea area in India in the period 1980 to 1995 and the shift from the semi-arid temperate regions to the semi-arid tropic regions can be attributed to availability of short-to-medium duration wilt-resistant varieties.

- In the low rainfall semi-arid areas, frequent drought, and in the high-rainfall areas, water-logging cause considerable loss to pigeonpea production. Pigeonpea yields in India have been stagnant but highly erratic in the period 1980 to 2007 owing to shifts to harsher climates, and the over-dependence on residual moisture.

- The lack of availability of improved seeds/varieties to farmers is another major limiting factor to legumes production. Public sector seed supply is limited and private sector is not active in seed production and multiplication. As a consequence, farmers are highly dependent on saved seeds. There is also a general lack of information on new and appropriate varieties.

Figure 1. Study locations for targeting crop breeding efforts for the six legume crops.



Target countries	Ground-nut	Cow pea	Common beans	Chick-pea	Pigeon-pea	Soybean
Ethiopia	-	-	●	○	-	
Kenya	-	-	●	○	-	○
Malawi	●	-	●	-	●	○
Mozambique	●	●	-	-	-	○
Tanzania	●	●	●	○	●	○
W & C Africa						
Mali	●	●	-	-	-	-
Niger	●	●	-	-	-	-
Nigeria	●	●	-	-	-	○
South Asia						
India	●	-	-	○	●	

Groundnut, chickpea and pigeonpea in ESA: The situation and outlook assessments have been completed for all the three legume crops in selected countries: chickpea (Ethiopia), groundnut and pigeonpea (Malawi). These country sub-sector assessments have been already published in the TL-II website for a wider use. The reports are expected to feed into regional situation and outlook reports that would outline the current production conditions, key socioeconomic and technological constraints and key interventions for unlocking the potential of the targeted legumes in the region. Some highlights from the reports include:

Groundnut:

- The future outlooks for groundnuts in Malawi seem promising; however, there are a number of constraints that negatively impact on the development of the groundnut sub-sector. The analysis has revealed weaknesses in the current seed systems as well as in the enforcement of quality standards.
- Although the volumes of groundnut exports remain lower than the levels seen in the late 1980s, the review has shown that Malawi maintains a comparative advantage in groundnut production and competitiveness in exports suggesting that there is scope for increasing groundnut exports once the required quality standards are adhered to
- The findings suggest the need for faster productivity enhancement, strengthening seed delivery systems to reach more farmers and the development of existing value chains and alternate markets.

Chickpea:

- In terms of the projected area and production trends over the 20–year horizon for which the projections are made, the results suggests that chickpea area and production in Ethiopia will show significant growth in the coming years
- Chickpea trends suggest that there is a need to design a more flexible and sustainable seed systems that meet the needs of the resource poor farmers. This requires policy makers to open up the seed sector and encourage and assist private seed companies and community seed producer associations by improving access to agri-business development services and empowering cooperatives and village agro-dealers.

Pigeonpea:

- For pigeonpea in Malawi, historical trends show a rise in harvested area, yield and production.
- The outlook analysis based on production and exports simulations shows that area, production as well as domestic demand will continue to rise
- However, analysis for future outlook in pigeonpea reveal structural weaknesses in the current seed systems as well as in the enforcement of quality standards. The findings suggest the need for faster productivity enhancement, strengthening seed delivery systems to reach more farmers and the development of existing value chains and alternate markets.

Groundnut in WCA. During the last 4 decades, West Africa has lost its world groundnut production and export shares. Groundnut production shares declined from 23% to 15% whereas export shares decreased from 55% to 20%. China, the leading producer, has significantly

increased its shares from 11% to 41%. Argentina, the leading oil exporter, has more than doubled its world share from 12% to 29%. In addition, imports from other oil seeds have significantly increased in West Africa. Soybean and palm oil imports have more than doubled. However, since 1984, groundnut production in West Africa has been increasing by about 6% annually mainly due to area expansion. Senegal and Nigeria remain among the largest world groundnut producers. Groundnut still remains a major source of employment, income and foreign exchange in many West African countries. Therefore there is a need to reassess market prospects and highlights opportunities for West Africa to regain to its market shares.
The competitiveness of West African groundnut in the domestic, regional and international markets has been limited by the low productivity, aflatoxin regulations, and stricter grades and standards. Relative prices of groundnut oils are higher in the international markets making these products less competitive compared to oil palms, cotton oil and others oil fruits. There are market niches for confectionary groundnut. Access to this market would require knowledge of market requirements. To regain its competitiveness, groundnut productivity and production has to increase significantly, technologies to reduce aflatoxin contamination have to be promoted and grades and standards satisfied.

Cowpea and soybean in SSA: Regional situation and outlook reports for cowpea and soybean in Sub-Saharan Africa are drafted for review. In addition to the production and productivity trends, the report also documents technological, institutional, and infrastructure issues affecting the production and marketing of the cowpeas and soybeans and presents short and medium-term outlook for cowpea and soybean in sub-Saharan Africa. Some highlights from the reports include

Cowpea:

- Cowpea grain production in Nigeria increased by over 400% from 1961 to 1995 and about 107% increase from 1998 to 2000
- Productivity levels remained very low, typically less than 500 kg/ha. In Tanzania, for over nearly a decade (1995-2004), yields were in general below 500 kg/ha.

Soybean:

- The area sown to soybean in Africa was on average 1, 16 million ha in 2005. African countries with the largest area of production were Nigeria (601,000 ha), South Africa (150,000 ha), Uganda (144,000 ha), Malawi (68,000 ha), and Zimbabwe (61,000 ha). Other countries with sizeable areas are Rwanda (42,160 ha), DRC (30,000 ha), and Zambia (15,000 ha).
- The analysis of area, production and productivity trends incline to suggest that soybean has not been given as much attention as the two other tropical legumes (beans and cowpeas) in sub-Saharan Africa. The reasons of such apparent little interest on this crop may be a subject for investigation.

Common bean in ESA: The situation and outlook analysis for common bean in four countries (Kenya, Ethiopia, Malawi and Tanzania) of Eastern and Southern Africa was done using secondary information and the report shows a situation characterized by big opportunities as well as challenges for development of the common bean in the region. This report is completed and submitted to the objective coordinator. Some highlights from the report include:

- The FAO data has shown that common bean production has been increasing as a result of population growth and non-industrial led urbanization growth, but this growth came from area expansion. Common bean is generally a short season crop, giving two bean harvests per year in most countries. However, production constraints are a key challenge that should be addressed, especially in the technology development and seed systems.
- While most biotic and abiotic stresses have been previously managed through breeding, climate change is anticipated to cause new outbreaks in pests and diseases that require a vibrant research sector to counteract such changes. Drought is currently the most important constraint in some countries like Kenya and the adaptation of varieties to drought is urgent.
- There are trade opportunities for both export within the region and outside. Kenya and Malawi show a huge potential for import market that can be tapped by their neighbors, particularly Tanzania, Uganda and the great lakes region. The challenge to fully exploit this market, however, is presented by high transaction costs associated with very small volumes of production scattered among very small producers within each country and poor road infrastructure. Only Ethiopia has been successful in the international market because of its location advantage and low cost of production relative to its competitors (i.e. China and Canada) but improving and retaining the quality of grains at farm level remains a challenge for exporters.
- There is need for research to find innovations in reducing transaction costs and increase market access by farmers to encourage further production growth. Dissemination of information and training farmers on standard measures in specific markets is also important for enhancing market access.
- The ability to meet these challenges will require increases in the investment of research and capacity building in the region, which is currently low though it has relatively improved compared to previous periods. Public –private partnerships will be critical in the success of improving seed availability to farmers.
- Market imperfections in the seed market present a scenario of slow diffusion and adoption common bean varieties in the region There is need to invest efforts in advocacy for policy change to facilitate quick delivery of new varieties desirable on the market to farmers.

Highlights of baseline studies for targeted legumes in Asia and Sub Saharan Africa

The socio-economic baseline surveys for the target legume crops covered the farming communities (community & individual household interviews) and markets. Traders included actors along the value chain ((i.e. small collectors, big collectors, retailers, wholesalers, exporter/processors and consumers). Exploration of data using simple statistical techniques such as frequencies and means has been completed. The next step in analysis is the application of econometric models to examine relationships and causal factors for the uptake of legume crops in the target regions.

Findings presented in this report are based on the descriptive analysis (As an example the descriptive summary of results for common bean is presented in Box 2).

Box 2. Descriptive summary of results from the baseline surveys on common beans in ESA

Based on the livelihood framework, the study results have confirmed that farmers are generally poor with farm sizes that are small ranging from an average of 0.85 ha in Dale, southern region to an average of 2.81 ha in Adama. The stocks of livestock are valued at about US$ 490 per household in Eastern Kenya and US$ 980 per household in Ethiopia and majority of the decision makers are generally of low levels of education particularly in Ethiopia. Stocks of financial assets, in form of cash deposits are rare and even those who use it; the amounts obtained are too small to be considered important. Household in Eastern Kenya also have low access to social capital embedded in formal and informal organizations while those in Ethiopia are constrained by poor communication technology (only 30 percent have phones) and road network. In terms of income sources, household in the study area can be categorized into four main livelihood groups as: 1) crops, livestock and off farm activities (22.6), 2) crops and livestock (14.5 percent), 3) crops only (12.9 percent) and 4) crops and off farm activities (50.0 percent) in Eastern Kenya. Similarly, the four livelihood groups occur in Ethiopian sampled villages, but off farm activities are of less importance, contributing income to only 20 percent of households in the central Rift valley and about 27 percent in the SNNPR. The four livelihood groups in Ethiopia are distributed as: crops, livestock and off farm activities (9.2 percent), crops and livestock (27.3 percent), crops only (49.1 percent) and crops and off farm activities (13.9 percent).

Drought is the most important constraint limiting livelihood improvements in the study areas in Kenya and Ethiopia. Most of the results support the widely agreed on findings in the literature that the negative effect of drought at household level is substantial. On average, farmers consider the loss in agricultural production due to drought to be greater than 40 percent in Eastern Kenya and 30 percent in Ethiopia. Farmers use various *ex-ante and ex post* strategies in coping with drought, including diversifying productive activities, changing crop establishment methods, adjusting inputs use, and so on. Discussion with communities in Eastern Kenya indicated shifts in coping strategies: e.g livestock is reducing in importance while off farm income and remittances are gaining popularity. It would be worth exploring in further details on how different farm households adopt different drought coping strategies, and why, so as to design policy interventions to help farmers with different resource endowments in better coping with adverse events.

The study results have demonstrated that common bean productivity is important in the study areas. The crop contributes about 55 percent of the household cash income in the central Rift valley, 16 percent of cash income among the sampled households in SNNPR of Ethiopia; and ranks second in terms of food security after maize in Eastern Kenya. This is evidence that improving common bean production and productivity has social benefits but requires understanding the current production constraints and social context in which it is produced.

The crop is managed jointly by the family members on most farms primarily using family labour. Although men and women work jointly to produce common beans, women in Eastern Kenya are more heavily involved in the production chain than men, spending almost twice as many hours of work as men. On the other hand, male labour dominates common bean production (about 60 percent of labour) in Ethiopia. Important activities where a significant proportion of labour is spent include: land preparation, planting, weeding and harvest. These activities account for over 80 percent of labour allocated to common bean. With the recent expansions of area under common bean in the central Rift valley, labour has become a constraint on many farms which implies that development interventions that utilize family labour in these areas could be adopted slowly or reduce common bean yield.

The key findings for the baseline studies across all regions for the targeted legume crops are analyzed and synthesized with focus on the following aspects:

- Varieties grown by farmers
- Baseline adoption
- Baseline yield/ current yield gap
- Preferences across the value chain
- Gender issues
- Top constraints
- Marketed surplus

Table 1 presents a snapshot view of the key findings from the baseline surveys along the aspects mentioned above. The implications of these for future research are also detailed in the sections that follow.

Varieties grown by farmers: The baseline survey results and the qualitative assessments through discussions with key informants and Focus Group Meetings clearly indicate the continued dominance of certain varieties that were introduced in the target locations a few decades ago. A listing of all the 'ruling varieties' as they are called, by crop and region is presented below.

Crop	**Ruling varieties**	
	Asia	**Sub-Saharan Africa**
Groundnut	TMV-2; Co2; VRI2; Malai POL2 and TMV7	ESA- Chalimbana; CG7 WCA - 55-437, 47-10 and 28-206
Chickpea	Annigeri *(desi)*; JG-11; Kabuli	ESA- local (desi); shasho; ejere
Pigeonpea	Asha , Maruthi	ESA- local; Mthawajuni
Cowpea	-	ESA: IT-18 WCA: IT97K-818-35, IT95M-1072-57, C94-23-2 , IT 89DE-58-6, KVx542-119, CZ11-94-5C ,CZ11-94-32, IAR-1696, HTR and TN 27-80
Soybean	-	ESA:Ocepara-4; 747/6/8; TGx 1805-8E; Songea
Common bean		Mexican 142 and Red wolita (Ethiopia) GLPx92 (locally referred to as mwetamania/Katumbuka or Katinga, Kenya)

From the information presented above, it can be discerned that in majority of the cases the ruling varieties continue to be local varieties or the improved varieties introduced some 2-3 decades ago. Taking the case of pigeon pea in India as an example, baseline survey results reveal that Maruthi, Asha and Ganesh are the common pigeon pea varieties grown in the study villages of Maharashtra. These varieties were introduced about 5 to 20 years back and have spread from farmer to farmer through informal seed chains. Similarly, in the case of groundnut in the state of

Tamil Nadu, India, the ruling variety TMV-2 is an old variety released more than 4 decades ago. The latest varieties and hybrids have been observed to have very slow uptake among farmers. A similar trend is observed in the case of common beans in ESA. Varieties (i.e. Mexican 142 and Red wolita) released in early 1970s still dominate the area allocated to common bean in Ethiopia; Mexican 142 occupy 50 percent of area allocated to common bean in the central rift valley while Red wolita accounts for about 70 percent of area under common bean in sampled farms in Southern region. In Kenya, GLPx92 (locally referred to as mwetamania/Katumbuka or Katinga) is the most common variety in both occurrence and area share occupied, grown by about 87 percent of farmers and allocated 48 percent of the common bean area. Farmer evaluation of the variety attributes reveal that the improved varieties of 1990s (i.e Awash one, Awash melka) provided farmers with little incentive to switch from Mexican 142 to new varieties. They were either inferior to Mexican 142 in important market traits (e.g Awash melka) or not significantly different (e.g Awash one). Mexican 142 outperforms most varieties except Argene (also referred to as AR04GY released in 2005) in terms of colour preferred by the market though it scores lower than Argene, Awash melka in terms of yield. So far GLPx92 outperforms all varieties in the communities in terms of drought tolerance as perceived by the sampled farmers.

This observation calls for an investigation of the reasons for the low uptake of the improved, high-yielding varieties resulting from the collaborative research by IARCs and NARS. An initial set of results is shown below as an example.

In ESA, at the time of the baseline study for common bean, there were virtually no specialized seed producers in the study areas. Majority of farmers keep their own seed (about 10 percent of their harvest) and supply to other farmers 3-6 percent of their harvest as seed through sale or as gifts. Seed companies, government parastatals (such as research organizations, NGOs) and seed stockists constitute the formal seed sources while the informal off farm seed sources are mainly the local markets (such as open air markets, grain stores and supermarkets) and social networks. The bulk of seed accessed from off farm seed sources in Eastern Kenya and SNNPR come from informal sources is purchased from the open air market in Ethiopia and grain stores in Eastern Kenya. The price of seed in the informal seed markets was about 1-1.5 dollars per kg in Eastern Kenya and 0.3-0.7dollars/kg in Ethiopia. Seed exchanges between farmers in form of gifts or free of charge are rare and so is seed credit, though 16 percent of farmers in the central rift valley access it. The low participation of extension in dissemination of information on new varieties and the high price of seed are some of the constraints slowing down the adoption of new varieties; for example, the study found that about 47 percent of farmers knew KATB1, a new varieties and 32 percent of those who knew had not tried on their farm because they lack access to seed or even when it is available, it is expensive for them to buy. In drought prone areas, the risk of crop failure is high and the price of new varieties needs to be attractive for farmers to bear the risk. It was also observed that the extension systems serve as an important source of information on new varieties in Ethiopia at the time they adopted a new variety. The study shows that increased effort to disseminate improved common bean varieties through a partnership between NARS, NGOs, government extension and IARC (CIAT) initiated in Ethiopia in 2003 (Rubyogo et al., 2009) has accelerated adoption of newly improved varieties (released since 1990). All improved varieties released since 1990 occupied about 43 % of the total land under beans in the central rift valley at the time of the survey, which is up from 38 % in 2007. Contrary to this, in Eastern Kenya, extension plays a minor role in disseminating new

varieties, only 3.4 % of farmers obtained information on new varieties and one % of farmers obtained seed directly from extension before they adopted the varieties they currently grow.

In Niger, household survey results show that the variety 55-437 introduced more than 40 years ago is being used by more than 74% of surveyed households. However, it was found that an estimated 12% of households are using one of the newly introduced varieties RRB (other new varieties recently introduced include J11, Fleur 11 and ICG 9346). There are significant differences between project and non-project sites as about 16% of households were using RRB in project sites against 4% in non-project sites. In Nigeria, household survey results showed that the variety 55-437 introduced more than 40 years ago was still being used by about 72% of surveyed households. About 23% of the farmers reported using at least one newly introduced variety (SAMNUT21, SAMNUT 22 and SAMNUT 23). Similarly, in Mali, the baseline household surveys were undertaken in 4 sites of the Kolokani and Kayes in Mali. A total of 166 households were interviewed of which 111 farmers in the project sites and 55 households in the control sites. Results from the survey indicate that the ruling variety 47-10 is being grown by about 41% of surveyed farmers and that 43% of the surveyed farmers are using at least one newly introduced variety (JL 24, Fleur 11, ICGV 86124, ICGV 86015, ICG(FDRS)4).

Table 1. Summary of key findings from the baseline surveys, all crops, all regions.

Variables	Groundnut	Chickpea	Pigeonpea	Cowpea	Soybean	Common beans
Varieties grown by farmers	Asia: TMV-2, Co2, POL2 and TMV7; Malawi: Chalimbana, CG 7, Manipintar, Chalimbana 2005 WCA: 55-437, 47-10 and 28-206	Asia: Desi: Annigeri, JG-11 Kabuli: KAK-1 & 2 Ethiopia: Desi: Local, Marye, Worku, Kabuli: Arerti, Shasho, Ejere	Aaia: Asha Malawi: Mthawa June, Local, ICEAP 040 (Kachangu), ICPL 9145 (Sauma)	ESA: IT-18 WCA: IT97K-818-35, IT95M-1072-57, C94-23-2 , IT 89DE-58-6, KVx542-119, CZ11-94-5C ,CZ11-94-32, IAR-1696, HTR and TN 27-80	ESA:Ocepara-4 747/6/8, TGx 1805-8E Songea	Mexican 142 and Red wolita (Ethiopia) GLPx92 (locally referred to as mwetamania/ Katumbuka or Katinga, Kenya)
Baseline Adoption	Ruling varieties: Asia: TMV2–64-100%;	Ruling varieties: Asia: Annigeri: 70 - 90%;JG-11 <30%, Ethiopia: Local Desi: 54.5%, shasho (21%), ejere (11.9%) and arerti (10%)	Ruling varieties: Asia: Asha: 60%	Ruling varieties: ESA: IT-18: > 50% Mozambique <40% in Malawi	Ruling varieties: ESA 33%-Ocepara-4 Malawi. 10%-Other varieties like 427/5/7&747/6/8. 30%-Storm in Mozambique.	20 % percent of farmers in eastern Kenya were growing KATB1 Awash 1 and Awash melka each occupied 10 percent of bean area in the central rift valley
Baseline yield (BY) / current yield (CY) gap	BY- Rainfed- 706 kg/h, Irrigated- 933 kg/h; Yield gap: 494-617 kg/h Malawi: Yield: 610 kg/ha Niger: average yield is 537 kg/ha, yield gap of about 463 kg/ha Nigeria: yields estimated to 850 kg/ha Mali: yield levels about 676 kg/ha, with a yield gap of about 424 kg/ha.	Asia: KA: Rainfed: 1541 kg / ha; Irrigated: 1946 kg/ha AP: BY: 780 kg/ha CY: 1312 kg/ha Ethiopia Local : 2236 kg/ha Areti : 2710 kg/ha	Baseline yield: 350-385 Potential Yield: 700-800 Malawi: 389 kg/ha	ESA Yield differences improved: 760 kg/ha local varieties: 575 kg/ha in Mozambique. WCA: Nigeria, Niger & Mali Average yield: 500 -600 kg/ha Potential yield: 1500kg-2000kg/ha	ESA Significant yield variation across farmers, with coefficients of variation ranging from 39% (747/6/8) to 56% (Ocepara-4).	Eastern Kenya - 0.54tons Ethiopia – 1 ton/ha Yield gap – 50%
Preferred traits	Bigger grain size, , high yield, resistance to drought, disease and pests, more shelling and high oil content, color, better taste and high keeping quality	Higher yield, Bigger grain size, resistance to pests and diseases, drought resistance and fodder quantity	High yield, suitability to rainfed situation, pest and disease resistance and bigger grain size	ESA: High yield, larger grain size, short cycle(drought escape) WCA: Nigeria, Niger & Mali Yield potential, pest/disease resistance, performance under poor	ESA: Higher grain yield, larger grain size, short cycle, drought tolerant type of varieties with short cycle, high yielding varieties, early maturity and pest and disease resistance.	Eastern Kenya: Drought tolerant, high yielding, red/red mottled colour, large size, good flavour, fast cooking and red colour Central Rift valley of

Variables	Groundnut	Chickpea	Pigeonpea	Cowpea	Soybean	Common beans
				rainfall, superior storage pest resistance, grain size, yield stability, drought escape		Ethiopia: Earliness, High yielding, white colour and oval shape, small seed, unbroken grains
Top constraints	Low yield, high disease incidence, high pest and small pod size, low seed replacement rate, ruling varieties are 3 decades old , drought caused more than 66% loss in area and yield	Low yield, high pest incidence, small grain size, low market price, low recovery/shelling percentage, high disease incidence and long crop duration.	Asia: long duration, low yield, poor taste, high disease incidence and unattractive color and small grain size,	Poor access to improved seed, lack of seed market and low purchasing power WCA: Erratic rainfall, low soil fertility and degraded fragile soils, pest and diseases, poor input market	ESA Lack of knowledge on improved varieties	Kenya and Ethiopia drought; pests and diseases; shortage of land and seed related problems (i.e. lack of high yielding seed varieties), low availability of good quality seed and high price of seed
Marketed surplus	Varied between 77 % (Marginal) to 83 % (Large)	85% of the total output produced was sold in the market.	95% percent of the grain was sold in regulated market	WCA: Nigeria, Niger & Mali 80% of the total output produced was sold in the market.	95% of the total output produced was sold in the market.	Ethiopia - 76 percent of the harvest marketed as grain and 3 percent sold as seed. Total marketable surplus is about 60 percent in the southern region of Ethiopia. In eastern Kenya, common bean is primarily a subsistence crop and only 12 percent of the harvested is market in a short rains (with more reliable rains) and reduces to about 4 percent in long rains (with less reliable rains)
Gender issues	• Women participate in almost all activities with respect to crop production; women are more heavily involved in the production chain than men. • Participating in farm activities to the extent of 40% by women • Marketing activities carried out by men • Joint decisions on crop production, marriage and education of children • Men take decisions on economic matters • Women mostly owned livestock, implements and household maintenance • Limited or non-participation of women in mother baby trial • Poor access and ownership to resources by women					

Baseline adoption: The baseline reports summarize the historical development and adoption of both local and improved varieties of the targeted legume crops in south Asia and SSA. Some highlights from these reports by crop are:

- The baseline adoption of groundnut varieties in ESA namely Chalimbana is found to be the highest. Results indicate that though Chalimbana is the most widely known variety (84%) followed by CG7 (53%) and manipintar (11%), only 69% have ever grown the variety and only 43% grew this in 2007/08. In India, the baseline adoption level for TMV -2 is reported to be 64-100%. In West Africa, 74% of households grow the variety 55-437, and 12% the variety RRB in Niger. In Nigeria, 72% of farmers grow the variety 55-437 and 23% reported using at least one newly introduced variety (SAMNUT21, SAMNUT 22 and SAMNUT 23. In Mali, 41% of the surveyed farmers used 47-10 and 43% of the surveyed farmers are using at least one newly introduced variety (JL 24, Fleur 11, ICGV 86124, ICGV 86015, ICG (FDRS)4).
- The baseline adoption level for desi Annigeri, a chickpea variety is about 90%, followed by COG-2 (33%) and JG-11 (30%). This covers the two most important chickpea growing states in India namely Andhra Pradesh and Karnataka. Annigeri is the major and the most popular (oldest) cultivar among the farmers in both the states. In Ethiopia, the proportion of chickpea farmers who planted improved desi during 2007 is less than 3% while about 76% planted the local desi. About 54.5% of the chickpea area is allocated to local desi followed by shasho (21%) and ejere (11.9%).
- Asha, the most popular pigeonpea variety in south Asia records an adoption level ranging from 58-64%. In ESA, 71% of the farmers know the local pigeonpea but only 57% have ever grown it and only 31% grew the crop in 2007/08 season. For Mthawajuni variety, 53% knew the crop, while 44% actually grew it in 2007/08. Overall the sample adoption rate of improved pigeonpea variety in Malawi is about 10%. However, if the technology would have been universally known within the population, the potential adoption rate would be higher (about 45%).
- In Malawi, one third of farmers have adopted the soybean variety Ocepara-4. Other varieties include 427/5/7and 747/6/8 with an adoption rate of 10%. In Mozambique, nearly 30% of the sample farmers use the soybean variety Storm. Improved varieties like Santa Rosa and Solitaire are less adopted.
- More than 50% of the households in Mozambique have adopted the cowpea variety IT-18.
- For common beans in Kenya, it was observed that about 20 percent of farmers in eastern Kenya were growing KATB1. There was however no adoption of KATB9 and KATX56. In Ethiopia, improved varieties were dominating but some occupied very small area share. Awash 1 and Awash melka each occupied 10 percent of bean area in the central rift valley and Awash 1 occupied 8 percent of area in Southern region. ARO4GY occupied 12 percent in the central Rift valley and was not observed in the southern region. For seed production, there were no specialized seed producers among the small scale farmers and seed production was only by registered seed companies.

An important observation in Kenya and Ethiopia at the time the study on common beans was undertaken was that records showed Kenyan and Ethiopian governments had released a number of common bean varieties since 1970s and 2000s. The primary data gathered under this study and other secondary sources indicate that research derived varieties have been widely adopted

and over 90 percent of area under common bean in the sampled areas in Ethiopia is under research derived varieties grown by 92 percent of the sampled households in the central rift valley and 84 percent of sampled households in SNNPR. Although the number of varieties released in these countries since 1970s is enormous (23 in Ethiopia and over 15 in Kenya), yield loss due to rainfall failure is still substantial. For example, in the study areas of Eastern Kenya, all varieties loss up to 70 percent yield when there is rainfall failure. This is evidence that farmers in Eastern Kenya lack access to drought tolerant varieties. In addition to meeting the farmers' desirable variety characteristics, promotional efforts are needed to accelerate technology diffusion.

Baseline yield/ current yield gap: In the traditional farming systems in which much of the tropical legumes are grown by small scale farmers with little or no input, the yields are in general low**..** Significant yield variation across farmers were observed both for local and improved varieties in irrigated and rainfed conditions. For instance, while cowpea grain production in Nigeria increased by over 400% from 1961 to 1995 and about 107% increase in grain production from 1998 to 2000- productivity levels remained very low, typically less than 500 kg/ha.

In Eastern Kenya common beans yield is about 0.54tons/ha in the main season (short rains) and it can be 0.23 tons/hectare during long rains. In Ethiopia bean yield was captured only during meher (the main season) and it was estimated at 1 ton/ha. It is high on farms managed by well educated decision makers, those that use fertilizers and high value farm implements. This implies that there is a potential to improve yield in Ethiopia even by disseminating the existing technologies to farms where it is low. Interventions with appropriate agronomic practices, adoption of fertilizers and provision of adequate extension have the potential to unlock the yield potential on some farms in this countryOnly 30 percent of farmers in SNNPR and 10 percent in Eastern Kenya obtain yield above one ton/ha. On the other hand, productivity is higher in the central rift valley with almost 50 percent of the households obtaining over one ton/ha and only a few 20 percent) below 0.51 tons/ha. 90 percent of farms in Eastern Kenya obtain yield below 0.51 ton/ha, implying that farmers suffer yield losses in the same way and improving the crop productivity in this area may require an introduction of a new technologies (in form of new varieties and/or farming methods) that are superior to the existing one in addressing the current production constraints. Yields in Eastern Kenya and Ethiopia is constrained by environment stresses such as: 1) drought, 2) pests and diseases, and low input farming methods that have resulted into declined soil fertility as well as land shortage. Drought can affect common bean production in three different ways: 1) Rainfall failure in any season causes substantial yield loss (for example, it is estimated at about 70 percent yield loss in eastern Kenya), 2) Unreliable rains in March-May cause reduction in area allocated to common bean by about 30 percent in eastern Kenya and majority of farmers in Ethiopia do not allocate any land to the crop. 3) It forces farmers to depend on low-input and low-risk technologies, leaving them unable to adopt new technologies such as fertilizers that would allow them to derive maximum gains during favorable seasons and less able to recover quickly after disasters. Although farmers in Ethiopia have started applying fertilizers to common bean, the quantities are often too small and insignificant to yield increases. Poor soil fertility in drought prone areas is also an important constraint limiting agricultural productivity growth. Soil fertility is further exacerbated by poor farming methods such continuous cultivation of the same piece of land with low soil amendments, bare soils, poor water conversation techniques. Labour, seed and land are the main inputs currently used to

produce common bean. Labor is used to implement agronomic practices that contribute directly to yield and those that reduce yield loss.

In Niger, there are still significant yield gaps. The average yield estimated from the survey is 537 kg/ha against a gap of about 463 kg/ha obtained on farmers' fields under normal input use. In Nigeria, yields were estimated to 850 kg/ha whereas the optimal yield obtained under farmers' conductions were estimated at 1500 kg/ha groundnut. In Mali, yield levels were found very low estimated to about 676 kg/ha, with a yield gap of about 424 kg/ha. Similar information on baseline yield and current yield gap is presented in table 1 for all crops by region.

Preferences across the value chain: The preferred traits by the different actors and players along the value chain was documented as part of the baseline surveys (table 2). Box 3 presents in summary, the most preferred traits by the different actors for all crops. While farmers are interested in high yields and economic gains, the processors and traders were also keen on the quality standards like uniformity in size, grain size, maturity with the right weight, cleanliness and healthy grains. The consumers on the other hand had preferences for taste, cooking quality and time and keeping quality.

Results also show that traders would be hesitant to purchase a variety new on the market if they do not know it. Like farmers, traders also have constraints accessing information on the supply side.

The question then that needs to be addressed is how we match the mandate and preferences of the researchers with those of the farmers right upto the consumers. What are the implications of these findings to the researchers, and to policy makers? This has to be understood in order to establish a feedback mechanism in place.

Box 3. Summary of preferred traits by the different actors along the value chain

Farmers	: Higher yields and economic returns, drought tolerance and short duration, pest and disease resistance
Commission agents /traders	: Bigger grain size, quality standards (cleanliness, uniformity in size, no pest and disease), taste and shelling percentage
Processors	: Bigger grain size, color and appearance, unbroken grains and quality standards
Retailers	: Taste, appearance and cleanliness
Consumers	: Cleanliness, less cooking time, taste, high keeping quality

Marketed surplus: The marketed surplus **v**aries from 77% to 95 % depending on the crop and the region where it is grown. For example, for pigeonpea in Andhra Pradesh it was found that the

average grain output obtained in adopted and control situations were 425.56 kg and 135.56 kg per year per household respectively for Abhaya variety. The proportion of grain output sold in adopted and control villages were 402 (95%) and 125 kgs (92%) per year per household respectively. The proportion of consumed grain was 11 and 8 kgs only. Similar trend was observed in all the varieties. For Asha variety, 95 percent of the grain was sold while only 3-4 per cent was retained for home consumption.

The marketed surplus for kabuli chickpea in Ethiopia is about 293.7 kg which is higher than desi types (217 kg) and overall chickpea is the fourth in terms of quantity sold in markets. About 74% of the chickpea marketed surplus is sold in the main market which is about 5-10 km from the farm. Urban grain traders are the first major buyers of chickpea in all the three districts followed by rural traders and rural assemblers.

The findings for common beans in ESA reveal that at farm level, common bean is a commercial crop in the central Rift valley of Ethiopia, with 76 percent of the harvest marketed as grain and 3 percent sold as seed. Total marketable surplus is about 60 percent in the southern region of Ethiopia. In eastern Kenya, common bean is primarily a subsistence crop and only 12 percent of the harvested is market in a short rains (with more reliable rains) and reduces to about 4 percent in long rains (with less reliable rains).

For groundnut in WCA, it was observed that in Niger, households sell about 759 kg of groundnut pod account to about 76% of the total production. In Mali, households sell about 376 kg of groundnut pod account to about 74% of the total production. In Nigeria, Households sell about 954 kg of groundnut pod account to about 64% of the total production.

Table 2. Preferred traits among the value chain

Crop	Farmer	Commission agents / Traders	Processors	Retailers	Consumer
Groundnut	Higher yield, drought, pest and disease resistance, more oil content, better taste and keeping quality, palatability and storability of fodder, higher price, bigger grain size for marketing	Bigger grain size, More oil content, pest and disease free, more shelling percentage, Uniformity of seed and shape	Higher oil content, Bigger grain size cleanliness, Higher shelling percentage,	Bigger grain size, cleanliness , taste	Bigger grain size, taste, clean oil color
Chickpea	Higher yield, short duration, high demand fetching higher price, drought and, pest resistance	Bigger grain size, cleanliness, pest and disease free, clean grain and high recovery on shelling	Bigger grain size, Uniformity, cleanliness, color (Brown), bright yellow dhal color, pest and disease free	Cleanliness, bigger grain size, taste, pest and disease free	Bigger grain size, cleanliness, less cooking time, Better taste, high keeping quality
Pigeonpea	Higher yield, pest and disease resistance, bigger grain size, drought resistance , better taste, short duration and high keeping quality	Bigger grain size., cleanliness, better taste, pest and disease free	Cleanliness Pest and disease free uniformity , bigger grain size	Cleanliness, bigger grain size, taste, pest and disease free.	Better taste, size, cleanliness
Cowpea	Higher grain yield, larger grain size, short cycle, drought tolerant type of varieties with short cycle, early maturity and pest and disease resistance.	Taste characteristics, grain size, color (White, Red/brown), eye colour (Black, Brown/grey)	Taste characteristics, grain size, color (White, Red/brown), eye colour (Black, Brown/grey)	Large grains	Price, large grains, cooking time and water uptake for whole beans, as well as taste, texture, and appearance of dishes prepared from ground
Soybean	Higher grain yield, larger grain size and earliness of maturity and appearance				
Common bean	Kenya - Drought tolerant, high yielding, red/red mottled colour, large size, Ethiopia - Earliness,high yielding, white colour and oval shape, upright growth habit, small seed	Kenya - Bigger size, red and uniform colour, low price Ethiopia- Sparkling white colour, round shaped., small seed	NA Unbroken grains, pure white and medium sized seed.		Kenya - Good flavour, fast cooking and red colour

Constraints: The most important constraints faced by farmers across all targeted crops and regions are low yield and incidence of pest and disease. In a situation where most of the farmers rely on their own farm-saved, recycled seeds, the lack of effective improved seed supply continues to be a critical constraint, and this is a especially binding constraint in sub-Saharan Africa. The crop specific constraints observed by region are:

Crop	Constraints	
	South Asia	**SSA**
Groundnut	low yield high disease and pest incidence small pod size low seed replacement rate frequent droughts	lack of access to good quality seed seed availability loss of seed due to drought low oil content late maturity low market value low yield
Chickpea	low yield high pest and disease incidence small grain size low market price, low recovery/shelling percentage long crop duration.	lack of access to seed fear of theft during green stage lack of cash to buy seed lack of access to credit shortage of land for cultivation
Pigeonpea	Long duration, low yield poor taste high disease incidence unattractive color. small grain size susceptibility to storage pests	lack of awareness of improved varieties low yield lack of cash to buy seed lack of access to credit
Cowpea	-	poor access to improved seed poor access to credit lack of seed market low purchasing power Erratic rainfall low soil fertility, degraded fragile soils, pests, diseases, weeds and viruses poor access to inputs poor input market
Soybean	-	No recognizable difference between seed and grain. lack of access to credit
Common beans		drought; pests and diseases; shortage of land and seed related problems (i.e. lack of high yielding seed varieties), low availability of good quality seed and high price of seed

Seed availability is emerging as a binding constraint in the spread of new varieties. For example, at the time of the baseline study for common beans it was observed, there were

virtually no specialized seed producers in the study areas apart from seed companies. Majority of farmers keep their own seed (about 10 percent of their harvest) and supply to other farmers 3-6 percent of their harvest as seed through sale or as gifts. Seed companies, government parastatals (such as research organizations, NGOs) and seed stockists constitute the formal seed sources while the informal off farm seed sources are mainly the local markets (such as open air markets, grain stores and supermarkets) and social networks. The bulk of seed accessed from off farm seed sources in Eastern Kenya and SNNPR come from informal sources, purchased from the open air market in Ethiopia and grain stores in Eastern Kenya. Constraints to accessing seed from off farm seed sources include in their order of importance: high prices, non availability of required variety, lack of credit facilitates to access seed. The price of seed in the informal seed markets was about 1-1.5 dollars per kg in Eastern Kenya and 0.3-0.7dollars/kg in Ethiopia. About 38 percent of farmers in Eastern Kenya are likely not get varieties they require at planting time while it is about 15 percent in Ethiopia. Also in Ethiopia, the general seed quality is also an important constraint on seed supply side.

In WCA, in Niger the major constraints to planting varieties during the 2007/08 season were listed as unavailability of seed (42%), loss due to drought (24%) and low oil content (18%). Few farmers cited the lack of funds to purchase seed (4%), lack of information on crop management of alternative varieties (4%), or low yield (8%). In Nigeria, seed was reported to be poorly accessible for farmers who were exposed to the technology but could not test these varieties. In addition, for farmers who adopted these technologies, access and availability of seed was reported to the major constraints. The major constraints to planting alternative varieties during the 2007/08 season were listed as unavailability of seed (39%), late maturity (13%), the low market value (13%), low yield (8%) and loss due to drought (2.80%). Likewise in Mali, the major constraints to uptake of varieties remain the availability to seed of alternative varieties. In effect, it is estimated that about 34% of farmers claimed that the major constraints is seed availability, followed by drought, low yield, etc

In terms of agronomic practices and their use, it was observed that farmers use agronomic practices that maximize available soil water, especially during critical growth stages of the crop. Common agronomic management practices include: selection of variety traits and relative maturity, dry planting, plant densities, weed management, terraces to harvest water, etc.,. Lower plant densities can delay the onset of drought during dry periods, whereas timely weed removal can eliminate weed competition for available soil water, especially during late vegetative and reproductive development of the crop. Other practices that are important but less popular are: crop rotation and land fallow. Crop rotations, land fallow and fertilizer application improve soil health, which promotes root growth and allows the crop to deplete soil water from the deeper soil depths during periods of limited precipitation.

Access to information and information systems in also an important constraint if not available or easily accessible. Direct contact with public extension, mass media and social network constitute the important information systems available for farmers. The study found social networks and mass media to be important information systems used by farmers in Eastern Kenya; about 50 percent of the farmers in Eastern Kenya frequently get their extension message from social network while 35 percent use mass media for the same. Direct contact with public extension is less accessible in Eastern Kenya, used by only 8.4 percent of the farmers for their frequent extension messages. It is however, an important source of information in Ethiopia where it was a source of information to 49 percent of the farmers in the central Rift valley and 43 percent of the farmers in SNNP at the time they adopted the varieties they currently grow. Social networks are also important used by 32 percent of

farmers in the central rift valley and 38 percent of farmers in SNNP. There are also information centres specializing in market information in some parts of Kenya like Thika but such a centre was not observed in Eastern province nor in the sampled areas of Ethiopia.

Such is the case for all target crops in both Asia and SSA.

Gender issues: There is strong evidence from the literature (IFPRI, 2005) that women play a predominant role in household food security. Gender disaggregated analysis increasingly show evidence that, in the context of diversity in the production patterns, incorporating gender-related concerns makes a difference in achieving higher levels of efficiency and socioeconomic welfare. Given the crucial role women play in food production and provisioning, efforts to increase women's productivity and share of benefits are vital. Results from different studies reveal that making women more productive and hence more effective income earners, enhances their status and security in the family as well as in the community

It is therefore imperative that we identify the constraints to women's full participation in agriculture as well as document the impacts of agricultural innovations on women. This project is gender inclusive and aims to address the specific constraints that women and men face in agriculture, and thereby identify strategies to overcome these constraints and stimulate gender-equitable change processes.

The baseline surveys capture a full understanding of household production including (1) who does what activities, (2) who has access to what resources, and control over what resources and (3) who makes what decisions regarding household production. This information is gathered through a careful sampling scheme that includes both men and women farmers and laborers in the surveys. For instance, in ESA, the surveys for chickpea, groundnut and pigeonpea includes 22% of sample households headed by women. 50% of the respondents were also women. 16% of sample soybean grower's households were headed by women. Ultimately, it is envisioned that the project activities contribute, long-term, to the significant involvement of women and their empowerment both at the farm, household and community level.

An analysis of the baseline data relevant to gender issues provides important feedback for breeders and policy makers. Some of the findings are:

- In West Africa, cowpea provides a source of cash income for women farmers who make and sell snack foods from this nutritious legume (Okike, I., 2000). Most of the cowpea green pod marketing is handled by women; in many African countries, woman harvest and sell direct to consumer on roadsides, because pod prices are higher than dry grain prices. The role of gender appears to be important in grain retail trade in Africa.
- In Nigeria, men particularly value the income and food benefits, while women emphasize home cooking and consumption and the feeding of small ruminants. Women use storage technologies, particularly solar heaters, because they often do not have access to storage insecticides. A rapid appraisal survey of adoption of cowpea varieties and storage techniques carried out in 1996 indicated that both men and women use the improved varieties and the metal drum for grain storage.
- A comparison of the binding constraints in chickpea cultivars expressed by women with those of men in the selected households revealed that the top four constraints remain same between men and women across districts and regions in general, namely,

low yield, high pest incidence, small grain size and low market price. However, for women, long duration is a more severe constraint than low recovery/shelling percentage. Likewise poor color and susceptibility to storage pest were more important than poor fodder quality which was perceived as important by men.

- Both men and women in Eastern Kenya work jointly to produce common beans but, women are more heavily involved in the production chain than men. Women take the lead in crop selection, variety selection, seed sowing, storage and seed selection, while they work with men to clean the fields, apply organic manure, hand weed, harvest the crop, transport and thresh it. Apart from joint production, there is no common bean production activity, which is largely dominated by men. Children also play a minor role in the common bean production in Eastern Kenya. Over all, women in Eastern Kenya contribute almost twice as much labour as men. Women are also activity engaged in the marketing of common beans. About fifty percent of the traders in Kenyan markets were women.
- In Ethiopia, common bean production and marketing is dominated by men. Males dominate the implementation of almost all management practices except hand weeding and harvesting the crop where both male and females participate. They contribute about three times as much labour as women in the production of common beans. Men are also responsible for the bulk sale of white pea beans as assemblers and rural wholesalers. Men constituted about 87 percent of bean traders in Ethiopia. On the other hand women sell small quantities as retailers in markets.
- In Niger, where women are involved in groundnut production, they are given the poorest land, can only plant smaller area than men (0.96 ha for women against 2.30 ha for men), but are more efficient at managing their plots. In effect, the average yield in women plots is estimated to about 734 kg/ha against 410 kg/ha for men. There were no difference found in the access to inputs such as fertilizers, pesticides and insecticides but access to agricultural equipment was limited because men have to finish plowing their land before women have access to equipment.

Some gender-related dimensions that have emerged from the baseline surveys are illustrated in box 4.

Box 4. Gender related dimensions for targeted legume technologies (common across all regions except the last one which is specific to common beans)

Labor and time allocation:

- Women are engaged in almost all activities with respect to crop production including seed sowing, weeding, harvesting, cleaning, seed selection and storage and household activities
- More than 40% of time on farm activities by women
- Marketing activities are mostly carried out by men

Decision making

- Women play a dominant role in decision making with respect to education of children, household nutrition, marriage and health of family members
- Men take decisions on economic matters
- Joint decisions on migration, and crop production
- Where men migrate to urban areas for livelihood, women are responsible for household and crop production and involved in all decisions

Access to resources and control over resources by women

- Poor access and ownership to resources
- Limited access to utilization of resources
- Livestock and small implements owned mostly by women
- Control over income is by men

Capacity building and participation in project activities

- Limited or non-participation of women in mother baby trials

Sources of information

- Non-formal sources (relatives, friends and neighbors) constitute the single most important source of information to the farm women on government programmes and development activities.

- Direct contact with public extension, mass media and social network constitute the important information systems available for farmers. The study found social networks and mass media to be important information systems used by farmers in Eastern Kenya

The PVS tool developed in objective 1 was used to assess end users preferred traits in objectives 2-7. This joint economist-breeder interaction advanced in Kenya for common beans and highlights are presented below.

Preferred traits among farmers in Kenya

- High yielding. Good yield in terms of number of pods and seeds per pod was the most important criterion, mentioned by both men and women farmers. Varieties that received the highest vote had 12-14 pods among the large seeded and 27-34 among small seeded. The number of seeds per pod ranged from 3-4 seeds per pod among the large seeded and 5-7 among the small seeded.
- Growth habit: Another criterion that strongly came from the discussion was the growth habit of the variety. Varieties with erect stem were strongly preferred to those that had twinning habits or weak stems.

- Earliness: Earliness enables the plant to escape drought but also men liked it because it saves from buying food during transition period.
- Seed colour and size: Colours that looked like the varieties currently grown were most preferred. These were the red mottled, dark red and sprinkled red (GLP1004). According to women farmers beans with these colours are marketable, taste good and add good colour to the food when cooked. Among the red mottled, large seeds with oval sides was preferred to small/medium or flat seeds. Uniformity of seed colour was also an important criterion. Sparkling colour was preferred to pale colouring, which farmers associated with poor maturing of the line.

Negative traits: Morphological features that led to a rejection of any line were: climbing habits, small seeds, black colour and late maturity. Light seed, implied poor marketability. Lines that shade off leaves early were also rejected because according to farmers, the characteristic makes the variety put on few pods. Late maturing was associated with low drought tolerance (farmers comment: it requires more rainfall) while climbers are considered unsuitable for intercropping.

Monitoring the signs of early adoption so far has been done through reports on the general monitoring and evaluation of project objectives. These reports indicate that varieties being promoted under objective 8 in Kenya and Ethiopia have been readily accepted. In Kenya, three varieties (i.e. KATB1, KATB9 and KATX56) were promoted under objective 8 and two varieties (ie. KATB1 and KATX56) have attracted farmers because of earliness, palatability and high yielding. Some farmers in medium potential areas, who started growing these varieties on 0.5 acres of land, have now expanded to 2 acres as these varieties sell at Ksh. 20 higher than the local varieties. Other farmers have expanding their area per year by increasing cropping seasons on the same piece of land from two to four in a year. However, yield shows high variability across farms ranging from 4kg/1kg planted to 20/1 kg planted. Factors that explain the variability in yield will be explored in a formal survey organized for January 2010.

Under the leadership of CIAT GIS expert, targeting for up-scaling: reaching vulnerable groups and mapping of impact target domains commenced. A number of activities were accomplished on the targeting for up scaling to reach more vulnerable groups and mapping of broader impact target domains. For all countries targeted, available information will be mapped using GIS spatial analysis and shared with the breeders. A number of activities are planned to accomplish targeting for up-scaling but this is conditioned by the continuing availability and commitment of the GIS experts identified in each region. For common beans, homologue drought environments for beans in eastern and southern Africa using expert knowledge on terminal and mid-season (intermittent) droughts were also created. A project proposal submitted and accepted on mapping legume seed suppliers in Kenya as add-on project to TL2. Aflatoxin is a significant issue that needs to be tackled in the future if one has to significantly develop the groundnut market. Aflatoxin has significantly reduced trade and affects health of the rural poor who depends on groundnut for their livelihood.

Farmer and market preferred traits reflecting gender dimensions in WCA
An evaluation of the farmers' preference for different groundnut varieties' characteristics using a random utility-based choice experiment and ordered probit analyses was undertaken in WCA. Data were collected through a structured panelist survey administered at 6 project sites in the Dosso region in Western Niger, 6 project sites in Northern Nigeria and 4 project sites in Mali.

In Niger, the preference survey was conducted in the villages- project sites Doula, Guidan Gaba, Koma Beri, Tanda and Wassangou. Six varieties were used mainly RRB, J11, Fleur 11, ICG9346, TS32-1 and 55-437 as a check. A total 114 panelists participated at harvest of which 25% were women. In Nigeria, 155 panelists all men participated in the Jigawa, Kano and Katsina states and six varieties were used in the test mainly SAMNUT21, SAMNUT22, SAMNUT 23, ICIAR19AT, ICIAR6AT and ICIAR7B. In Mali, A total of 74 panelists were involved in the regions of Koulikoro and Kolokani of which 60% of women. Six varieties were also used in the test including ICG 86124, ICG(FDRS)4, Fleur 11, JL 24, etc…

Preferences were estimated for various plant and seed traits from various varieties. In Niger, results showed that the resistance to diseases, green color of leaves, and high number of pods, bec, reddish grain color, and pod yields were the major characteristics preferred by farmers. In Mali, early maturity, high number of pods, the large sized pods, pod filling, pod yields, reticulation and strangulation were the main traits sought by farmers. In Nigeria, high plant vigor, early maturity, type of port, number of pods, high sized pods, high pod yield and high haulm yield were found to be the most significant characteristics sought by panelists.
There were however no differences based on gender in Mali and Niger or other socio-economic characteristics such as age, ethnic group, level of education and wealth. These characteristics should be accounted for when designing or selecting groundnut varieties likely to be preferred by groundnut farmers. The results have bearing in research priority settings.

Coordination and training workshops enhancing effectiveness

- Several national staff in the target countries have been trained in survey design and sampling methods. The survey instruments and modules have been shared with partners and are being adapted for other studies.
- Harmonized work plans and approaches were developed for baseline studies and situation and outlook assessments.
- In addition to the series of three training workshops focusing of survey design and instruments, sampling, social analysis (including the conduct of focus group meetings and key informant interviews) held in the first year of the project, two write-shops were held at ICRISAT, Patancheru from November 3-7, 2008 and 24-30 August 2009 to facilitate the sharing of issues faced during data entry, validation and preliminary analysis.
- In ESA, in the first two years of the project 29 NARS scientists (25 men, 4 women) have been trained on qualitative and quantities methods of socio-economic research for common beans. These scientists were from the Melkassa agricultural Research Center, IPMS, an NGO partnering with Awassa agricultural Research center and CIAT in seed systems and PVS activities; government extension offices in the study areas of Ethiopia and KARI-Katumani and KARI-Kiisi.
- One socio economist in KARI was involved in data analysis and four were trained in market surveys. One was trained in data management.
- Continuous on the job training of NARS scientists

Major lessons learnt and vision for second phase

What would you do differently from your original plan?

- There is an ardent need to identify a viable approach or enhance the existing PVS approach to spread the improved technologies to users. This will help in popularizing the new technologies developed by IARCs-NARS collaborative effort. For example, besides the ruling varieties of pigeonpea - Maruthi and Asha in Asia -, other promising varieties like Vipula, ICPH-2671 and PKV-Trom Tur can be popularized by producing and distributing their seeds through appropriate seed system channels identified in Objective 7 of the TL II project.
- Need to emphasize the value chain approach. The integration between inputs and product markets during the 1980s with the state marketing boards was broken. The challenge is how to re-create these conditions with the private sector? Critical analysis of institutional arrangements and policies to more effectively promote sustainable arrangements is important.
- There is a need to look at the groundnut issues along the value chain. During all meetings with partners, the issue keeps coming up because of the past integration between inputs and product markets during the 1980s with the state marketing boards. The challenge is how to re-create those conditions with the private sector?
- Aflatoxin is a significant issue that needs to tackled in the future if one has to significantly develop the groundnut market. Aflatoxin has significantly reduced trade and affects health of the rural poor who depends on groundnut for their livelihood.
- Based on the observations made in the cowpea trials, the number of lines that farmers can evaluate efficiently at a time (under PVS) is limited to no more than twenty. As the number of lines to be evaluated increased, it was observed that errors crept into farmers assessments. The farmers' abilities to make judgments in variety selection were less accurate as number of varieties increased. This observation should be considered in future conduct of the study.
- Gap analysis identified the following factors constraining research, innovation, production and utilization. This type of information can be used for a better monitoring and evaluation design and mechanism.
    - *Misinformation or lack of information on improved technologies or traits of targeted crops.* Some farmers are misinformed or have no information about improved varieties and other improved crop management technologies and practices. Farmers who work directly with research institutes and extension agents have the good information on technologies and have access to improved varieties and seeds through participation in on-farm trials and farm visits. The relevant information sharing from trained farmers to other farmers is limited by many factors or barriers including educational, cultural, socio-economical, policies, and institutional (e.g. farmers' level of education, number and type of training programs participated in, regular contact with extension agents and/or scientists). Addressing this gap calls for a seamless interaction between researchers (breeders, social scientists, other biophysical scientists), farmers and other stakeholders along the whole value chain.

    - *Research - Farmers Dichotomy.* It is useful to examine the seeming dichotomy between researchers' objectives and priorities and farmer's needs, constraints and resource endowments. Closing the gap will lead to a significant adoption of promising new technologies.

- Lack of synergy among the different stakeholders are emerging as a prime stumbling block for successful dissemination and uptake of technologies. Critical analysis of institutional arrangements and policies to more effectively promote the TL-II crops may be considered under the innovations systems and learning framework.

- Farmers have limited resources and need strong support to tackle the binding constraints such as access to quality seeds and other inputs, and access to credit. In addition, reliable product markets and marketing channels are essential for uptake of new improved technologies. To facilitate this, research organizations like ICRISAT, IITA, CIAT and NARS researchers can document the social network architecture in the target regions. This information can be used by policy makers and other stakeholders to bring about collective action and also identify focal/nodal points (people and institutions) for channeling and introducing new interventions. This will also help in enhancing the bargaining power of farmers in selling their produce and improve their access to important agriculture support services such as credit. The access to credit services and the likely increase in income that may be associated with high farmers' bargaining power would also enhance the farmers' ability to use improved seeds.

- Constraints to production and marketing and trait preferences as perceived by the end users are not fully factored into the cultivar development process. These should be considered in matching research priorities and development efforts.

- Formal and informal linkages among the key stakeholders in legume production and innovation process are absent in some target regions. Where linkages exist, there are fragile and weak. It is important that this information is fed back to policy makers who can formulate incentives to strengthen and develop strong linkages.

- *Limited government support to agricultural research and extension.* The international research community focuses more on breeding and genetic diversity. Government agencies should provide enhanced complementary support for dissemination of research products. Cowpea research and development in SSA is an example that illustrates the above imbalance.

- To the question: "Would you consider including more countries (or paring down the current ones)? ", the team prefers to stay focused on the identified target countries, and monitor the uptake process from these targeted intervention points. Even within countries, there is need for better targeting.

Publications - prepared for peer review and release through website

Results from the socioeconomic baseline studies have so far been disseminated in different fora. Preliminary results are presented in workshops organized by the of TL2 project, and other workshops like the one organized in collaboration with the Pan African Bean research alliance held in Lilongwe, Malawi, February 2009. The following is the list if publications which are under peer review and earmarked for publication:

Annual Report

- MCS Bantilan, P Parthasarathy Rao, KPC Rao, VR Kiresur, B Shiferaw, J Ndjeunga, Solomon Asfaw, Ousmane Coulibaly, A.D. Alene, Jonas Chianu, Enid Katungi, Andy Farrow, H. Tefera, S. Boahen, T. Abdoulaye, V. Manyong, D. Chikoye, D. Sanogo; GD Nageswara Rao, R Padmaja, GV Anupama, K Kavitha, B Shraavya, E Jagdeesh, and NARS partners in Ethiopia, India, Kenya, Malawi, Mali, Mozambique, Niger, Nigeria, and Tanzania. 2009. Enhancing grain legumes' productivity, and production and the incomes of poor farmers in drought-prone areas of sub-Saharan Africa and South Asia. Patancheru, 502324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics

Regional situation and outlook reports

- Parthasarathy RP, Birthal PS, Bhagavatula S and Bantilan MCS. 2009. Chickpea and pigeonpea economies in Asia: Facts, trends & outlook. Patancheru, 502324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics
- Birthal PS, Parthasarathy RP, Nigam SN, Bantilan MCS and Bhagavatula S . 2009. Groundnut and soybean economies of Asia: Facts, trends & outlook. Patancheru, 502324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics
- Simtowe F, Shiferaw B, Kassie M, Monyo E, Mkahala C, Madzonga O, Abate T and Muricho G.2009. Assessment of the current situation and future outlooks for the groundnut sub-sector in Malawi. Nairobi and Lilongwe: International Crops Research Institute for the Semi-Arid Tropics.
- Kassie M, Shiferaw B, Asfaw S, Abate T, Muricho G, Ferede S, Eshete M and Assefa K. 2009. Current situation and future outlooks of the chickpea sub-sector in Ethiopia. Nairobi, PO Box 39063. Kenya: International Crops Research Institute for the Semi-Arid Tropics and Ethiopian Institute of Agricultural Research, Deber Zeit Agricultural Research Center, Debre Zeit, Ethiopia.
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- E.Katungi, A. Farrow, J.Chianu, L.Sperling and S.Beebe. 2009. Common bean in Eastern and Southern Africa: a situation and outlook analysis.
- Chianu Jonas N, Vanlauwe B, Mahasi, JM, Katungi E, Akech C, Mairura FS, Chianu Justina N, and Sanginga N. 2009. Soybean Situation and Outlook Report for Kenya and Tanzania.

Papers submitted for journal publication

- Enid Katungi et al. Determinants of variety demand and trade-offs among common bean growers in Eastern Kenya. Submitted to the African Journal of Agriculture and Resource economics. Under review process

- Enid Katungi et al. Market participation and adoption of intensive common bean production technology in the post economic reform of Ethiopia. Draft paper for submission to accredited journal after peer review
- Chianu J N, Ohiokpehai O, Vanlauwe B, Adesina A, De Groote H, and Sanginga N. 2009. Promoting a Versatile but yet Minor Crop:Soybean in the Farming Systems of Kenya. Journal of Sustainable Development in Africa. 10(4): 324-344.
- Chianu J.N., E. Wale and E.M. Nkonya. 2009. Global Soybean Marketing and Trade: A Situation and Outlook Analysis. Chapter 20 of Book titled "Soybean: Botany, Production and Uses"

Research Reports

- Kiresur VR, GN Kulkarni, MCS Bantilan and VS Kulkarni. 2009. Adoption of Chickpea Cultivars in Karnataka: Pattern, Trends and Constraints. Research Report
- Kiresur VR, G.N.Kulkarni and V.S.Kulkarni. 2009. Baseline assessment of chickpea for Karnataka State in India. Research report. International Crops Research Institute for the Semi-Arid Tropics.
- Ndjeunga J, Bantilan MCS, Cisse MY, Zarafi A, Ahmed B. 2009. Baseline assessment of groundnut breeding and seed delivery efforts to enhance the impact on the livelihoods of the poor in drought-prone regions of sub-Saharan Africa. Research report. BP 12404, Niamey, Niger: International Crops Research Institute for the Semi-Arid Tropics. Mali: Regional Agricultural Research Centre of Sotuba,I, Niger and Institute for Agricultural research
- Asfaw S and Shiferaw B, 2009. Baseline assessment of groundnut, chickpea and pigeonpea for Eastern and Southern Africa. Draft research report.
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- Coulibaly O, Alene AD, Abdoulaye T, Chianu JN, Manyong V, C Aitchedji C, Fatokun C, Kamara A,. Boukar O, Tefera H, and Boahen S. 2009. Baseline assessment of cowpea breeding and seed delivery efforts to enhance poverty impacts in sub-Saharan Africa. Research report.
- Coulibaly O, Alene AD, Abdoulaye T, Chianu JN, Manyong V, Aitchedji C, Fatokun C, Kamara A, Boukar O, Tefera H, Boahen S, Odendo M, Manyama A. 2009. Baseline assessment of soybean breeding and seed delivery efforts to enhance poverty impacts in sub-Saharan Africa. Research report.
- Chianu Jonas et al. 2009. Baseline Progress Report for Kenya and Tanzania.

Databases

- ICRISAT, IITA, CIAT with NARS. 2009. Macro-level database for situation and outlook analysis for chickpea, pigeonpea, groundnut, soybean, common bean and cowpea
- ICRISAT, IITA, CIAT with NARS. 2009. Baseline household surveys database for chickpea, pigeonpea, groundnut, soybean, common bean and cowpea
- ICRISAT, IITA, CIAT with NARS. 2009. Market surveys database for chickpea, pigeonpea, groundnut, soybean, common bean and cowpea

Summary Reports

- Kiresur VR, Bantilan MCS, Parthasarathy RP, Rao GDN, Padmaja R, Anupama KV, Suhasini K and Kulkarni GN. 2009. Chickpea breeding and seed delivery efforts to enhance the impact on the livelihoods of the poor in drought-prone areas of South Asia-

Insights from baseline studies. Summary report. Patancheru, 502324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics. Acharya NG Ranga Agricultural University (ANGRAU), Andhra Pradesh, India . University of Agricultural Sciences, Dharwad, Karnataka, India.

- Parthasarathy RP, Bantilan MCS, Rao YM, Rao GDN, Padmaja RSAT, Karunakaran K Lokesha H and Gracy CP. 2009. Baseline insights on groundnut breeding and seed delivery efforts to enhance the impact on the livelihoods of the poor in drought-prone regions of south Asia.2009. Summary Report. Patancheru, 502324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics.
- Rao KPC, Parthasarathy RP, Bantilan MCS, Chopde VK, Padmaja R, Kavitha K, Deshmukh RG, Marawar SS and Sunandini GP.2009. Baseline insights on pigeonpea breeding and seed delivery efforts to enhance the impact on the livelihoods of the poor in drought-prone areas of South Asia. Draft research report. Patancheru, 502324, Andhra Pradesh, India: International Crops Research Institute for the Semi-Arid Tropics; Acharya NG Ranga Agricultural University (ANGRAU), Andhra Pradesh, India; Dr Punjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India

Posters

- Targeting impact in face of climate change in drought prone areas: A case of Eastern Kenya. Poster presentation at the CIAT annual knowledge sharing week, 16-22 May, 2009, Cali, Colombia.
- Enhancing grain legumes' productivity, and production and the incomes of poor farmers in drought-prone areas of sub-Saharan Africa and South Asia. Global poster presented at the Second Annual Planning and Review Meeting, Bamako, Mali, 16-20 November 2009.
- Enhancing Chickpea Productivity, Production and the incomes of the poor farmers in Drought-Prone Areas of Andhra Pradesh and Karnataka, India. Regional poster presented at the Partnerships day session, Dec 5 2009, ICRISAT Patancheru.
- Enhancing Groundnut Productivity, Production and the incomes of the poor farmers in Drought-Prone Areas of Chitradurga district of Karnataka, India. Poster draft
- Enhancing Groundnut Production, Productivity and the Incomes of Poor Farmers in Drought-Prone Areas of Raichur district in Karnataka, India. Poster draft
- Enhancing Pigeonpea productivity and production and the income of the poor farmers in Drought-Prone Areas of Maharastra, India. Poster draft

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