SEMI-ANNUAL REPORT 2016-2017

Cereal Systems Initiative for South Asia in Nepal: Agronomy & Seed Systems Scaling and Mechanization & Irrigation

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Cereal Systems Initiative for South Asia in Nepal Agronomy & Seed Systems Scaling and Mechanization & Irrigation

Semi-Annual Report
April 2017

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International Maize and Wheat Improvement Center (CIMMYT)

Period covered: October 1, 2016 to March 31, 2017

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Grant Summary Information

Project Name: Cereal Systems Initiative for South Asia in Nepal
USAID India funded: CSISA-Nepal Mechanization & Irrigation
USAID Washington funded: CSISA-Nepal Agronomy & Seed Systems Scaling

Prime Grantee Name: International Maize and Wheat Improvement Center (CIMMYT)

USAID India Grant Amount: $1,000,000
CSISA-Nepal Mechanization & Irrigation Project Duration (in months): 27
CSISA-Nepal Mechanization & Irrigation Project End Date: September 30, 2017

USAID Washington Grant Amount: $3,000,000 for CSISA-NP Scaling
Agronomy & Seed Systems Scaling Project Duration (in months): 48
Agronomy & Seed Systems Scaling Project End Date: September 30, 2018

Report Period: October 1, 2016 to March 31, 2017
Report Due: April 30, 2017
Has this project been granted a no-cost extension? CSISA-NP Mechanization and Irrigation has been granted a no-cost extension to September 30, 2017.

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Acronyms and Abbreviations

Acronym	Full Name
2WT	Two-wheel tractor
4WT	Four-wheel tractor
CIMMYT	International Maize and Wheat Improvement Center
CSISA	Cereal Systems Initiative for South Asia
DADO	District Agriculture Development Offices
DOA	Department of Agriculture
FtF	Feed the Future
KISAN	Knowledge-based Integrated Sustainable Agriculture and Nutrition
MOAD	Ministry of Agricultural Development
NAMEA	Nepal Agricultural Machinery Entrepreneurs' Association
NARC	Nepal Agricultural Research Council
NGLRP	National Grain Legume Research Program
NSAF	Nepal Seed and Fertilizer project
ODK	Open Data Kit
PMAMP	Prime Minister's Agriculture Modernization Project
SEAN	Seed Entrepreneurs' Association of Nepal
SQCC	Seed Quality Control Center
USAID	United States Agency for International Development
ZT	Zero tillage

CSISA-Nepal Agronomy & Seed Systems Scaling

AND

CSISA-Nepal Mechanization & Irrigation

Context

Cereal and pulse yields in Nepal fall well below regional averages and present rates of increase won't meet long-term domestic requirements. Factors that contribute to poor staple crop performance in Nepal include scarce farm labor, poor knowledge of best agricultural management practices, insufficient irrigation and mechanization, and farmers' inability to take risks and invest in new technologies. Also, innovative applied research has long been under-funded and research benefits have rarely reached farmers.

On the mechanization side, many sustainable intensification technologies are machinery-based and require specialized equipment that is not commercially available for small- and medium-scale farmers in Nepal. The only way to achieve widespread access to scale-appropriate machinery among smallholders is by encouraging the emergence of mechanized service provision models and the market-based supply and repair chains required to support them. Private sector importers, dealers, traders and agents need to ensure farmers' access to scale-appropriate machinery in rural areas, and the government needs to have the capacity to evaluate technology.

Nepal's Mid and Far West development regions are most acutely affected by these constraints as these regions have the highest poverty and receive the lowest investment by the private sector. As a result, the Cereal Systems Initiative for South Asia (CSISA) works in Nepal's Terai plains and mid-hills where the scope for improving farmers' lives through agriculture is greatest.

Approach

CSISA works with partners who can help to rapidly and broadly increase the adoption of sustainable intensification technologies at scale. CSISA's partners include Feed the Future's Knowledge-based Integrated Sustainable Agriculture and Nutrition (KISAN) project, government agencies, farmers' groups, service providers, agro-dealers, seed enterprises and other private sector companies.

In CSISA-Nepal Agronomy & Seed Systems Scaling, the project aims to address constraints by (1) strengthening seed systems so farmers have timely access to improved varieties and hybrids for pulses, wheat and maize; (2) targeting geographic niches and identifying management practices that enable cropping system intensification through the cultivation of lentil and mungbean; (3) recommending best management practices for wheat, including scale-appropriate mechanization technologies that help farmers plant early and avoid terminal heat; and (4) facilitating market development for small-scale technologies that enable precise nutrient management. In CSISA-Nepal Mechanization and Irrigation, the project (5) supports the expansion of the private sector for sustainable intensification technologies into the Mid and Far West, including the availability of 'spares and repairs,' and expanding the number of service providers so that farmers in rural areas can gain affordable access to new technologies.

Theory of Change and Linkages with the U.S. Global Food Security Strategy

In addition to aligning with their own internal work plans, CSISA-Nepal Scaling and CSISA-Nepal Mechanization and Irrigation contribute to the U.S. Global Food Security Results Framework through multiple channels. Activities undertaken by CSISA-Nepal Scaling and CSISA-Nepal Mechanization to contribute to **Objective 1: inclusive and sustainable agriculture-led growth**, include (1) supporting seed systems that stock registered maize hybrids, expanding businesses for wheat and pulses, and enhancing coordination among seed system actors; (2) helping the government and private sector promote low-risk opportunity crops such as mungbean; (3) formulating domain-specific

recommendations for early wheat establishment and better-bet agronomy for wheat; (4) devising soil fertility management strategies for wheat, lentil and maize, and facilitating broad-scale awareness of the benefits of judicious fertilizer application; and finally, (5) facilitating irrigation expansion, land aggregation, new business opportunities for scale-appropriate mechanization, advancing attachment design for two-wheel tractors and mini-tillers, and building markets for importers and manufacturers of agricultural machinery.

To support Objective 2: strengthened resilience among people and systems, CSISA's activities include (1) targeting production and disseminating innovative agronomy information to reduce the risk of lentil failure and to promote mungbean; (2) facilitating early wheat establishment; (3) commercializing technologies for precision nutrient management; (4) expanding irrigation, advancing two-wheel tractor attachment design, improving capacity for machinery evaluation among national agriculture research and extension systems, strengthening training facilities for machinery repair, and supporting market development for importers and manufacturers of agricultural machinery.

CSISA's work on pulses such as lentil and mungbean, and on seed systems for maize hybrids contribute to **Objective 3: A well-nourished population, especially women and girls.**

As is clear from the above entries, some of CSISA's activities contribute to multiple Objectives, which is also denoted in the headers and sub-headers in the report as appropriate.

FY17 Indicators of Progress

During the reporting period, CSISA-Nepal Scaling facilitated 17,604 farmers to apply new technologies and/or management practices on 8,234 hectares. The project trained 383 individuals on various short-term agricultural courses. The project provided support to 231 private enterprises on organizational development and provided technical assistance to 542 agriculture-related firms (including service providers) on their business performance improvement.

CSISA-Nepal Mechanization and Irrigation facilitated 1,665 farmers to adopt new technologies and/or management practices on 1,290 hectares. The project provided technical assistance to 107 agriculture-related firms (including service providers) on their business performance improvement. After a long testing period and performance verification, the project made available five new agricultural mechanization technologies, namely an inexpensive solar irrigation system, inexpensive well-boring technology, precision fertilizer broadcasters, self-propelled reapers, and minitiller reaper attachments. Additional details about CSISA's indicator numbers for the reporting period can be found in Annex 3.

Major Activities and Accomplishments

CSISA-NEPAL AGRONOMY & SEED SYSTEMS SCALING

- **Wheat**
    - Wheat productivity growth in the Terai is constrained primarily by the farmers' practice of sowing wheat in late November or early December, which leaves the crop to mature (i.e., go through the grain-filling stage) in March, when temperatures can exceed 35^0 C. CSISA has communicated the importance of early seeding on wheat through printed agronomy 'tips' and radio jingles in the Feed the Future districts. Preliminary survey evidence suggests that **1,870 farmers have adopted early wheat establishment**. Since social marketing campaigns were deployed to mainstream this message, the actual number is likely much larger and geo-spatial analysis is underway to characterize planting pattern changes at the landscape scale.
- **Lentil**

- Even though lentil remains a priority value chain for Feed the Future in Nepal, the increasing occurrence of winter rains has made lentil production an uncertain and unprofitable enterprise due to severe fungal disease pressure. To facilitate a common approach among research and extension partners that has hindered adoption of sensible management practices to cope with these threats, CSISA convened experts from the National Grain Legume Research Program, Plant Protection Directorate of Department of Agriculture, and private partners to **consolidate the validated knowledge and experience in managing *stemphylium* disease for lentil**. Consensus management recommendations endorsed by convening partners were disseminated through FM radio spots and the distribution of disease management tips through District Agriculture Development Offices (DADOs), KISAN and the network of agricultural retailers in the Feed the Future zone.

- **Mungbean**
  - CSISA's efforts to promote mungbean through market facilitation, technical advice, and public–private partnerships helped increase the area under the crop significantly during the reporting period. Mungbean seeding started in March 2017 and we estimate that **more than 2,800 hectares have been planted this year**. Prior to CSISA's efforts, this low risk and high return pulse crop was not cultivated at scale in the Feed the Future zone.
  - Increasing mungbean cultivation has the potential to improve nutritional outcomes, particularly for women and children who are disproportionately protein deficient. Survey data from 2016 show that almost all farmers who are new cultivators of mungbean keep a portion of the crop, retaining **an average of 36% of the protein-rich pulse for household consumption**.
- **Fertilizer Productivity**
  - For the past two years, CSISA has worked with manufacturers, importers and local traders to establish markets for precision fertilizer spreaders – a low-cost technology common in the US for lawn and horticultural applications but not available in Nepal prior to CSISA's efforts. As a result, demand is increasing; **more than 1,500 precision spreaders have been sold** through traders across the Terai since July 2016. This technology increases nitrogen use efficiency and profitability by approximately 10% in rice and wheat crops, while reducing labor requirements for fertilizer application by half.
  - Fertilizer use in Nepal is unbalanced, and CSISA's survey data show that the most productive cereal farmers apply recommended rates of potash (potassium fertilizer) and the least productive farmers apply little or none of this essential nutrient. Through simple agronomic 'tips' shared through development partners and state extension, CSISA's has encouraged farmers to apply potassium fertilizer, **and this message is resonating with famers with 1,047 households applying potassium at sufficient rates for wheat for the first time.**
- **Seed Systems**
  - CSISA's on-farm research in the mid-hills of Nepal conclusively demonstrates that the simple step of planting maize hybrids instead of open-pollinated varieties can increase grain yields by 50% with no other changes in management. Despite these advantages, no hybrids were registered for cultivation in the Feed the Future zone and very few farmers were growing them before 2015. After helping the National Maize Research Program formally register four adapted hybrids for cultivation in the Feed the Future zone, CSISA has intensively worked with private sector partners to bring these hybrids to market while building awareness among famers of the benefits of cultivating

hybrids. As a result of these efforts, **80 tons of hybrid seed has been stocked by NIMBUS (private sector input supplier) with retailers across the Feed the Future zone for the 2017 season – enough seed to plant over 3,600 hectares.**

- **Seed sales by our most growth-oriented seed company partners have increased by more than 90% since the inception of CSISA-Scaling,** with an expansion of 1,032 tons from 2016 to 2017. Approximately half of the increase in sales is for wheat, suggesting a **year-on-year increase of 4,300 hectares planted to newer wheat varieties with quality seed** in the winter 2016–17.

CSISA-NEPAL MECHANIZATION AND IRRIGATION

- **Mechanization and Market Development**
    - **Increasing number, diversity and competition among suppliers and models of seed drills:** At the start of the CSISA-Nepal Mechanization and Irrigation project there were no four-wheel tractor seed drill importers. Currently, Nepalese farmers can select from four suppliers, of which three are from India. One of these new four-wheel tractor seed drill agents in Nepal, BTL, has recently imported 15 mini tiller seeders and two two-wheel tractor seeders from one of the Rajkot-based manufacturers.
    - **Significant increase in reaper sales:** A second year-on-year steep increase in reaper sales has occurred during the reporting period, from just over 700 to nearly 1,200 reapers.
    - **Design Sprint:** CSISA conducted three Design Sprints in India with Khedut Agro, National Agro and Dharti Agro in April 2017 to facilitate the modification or redesign of two-wheel tractor seed drills and increase their applicability for Nepal. In May, the companies will send their new prototypes to Nepal for testing by CSISA and the Nepal Agriculture Research Council.
    - **Machinery Testing and Training Facilities:** A high-level NARC delegation visited the proposed site for the National Agro Machinery Testing facility in March 2017 (including Crops Director and Finance Director), further increasing institutional support for the planned center. On the Department of Agriculture (DOA) side, the National Training Center launch was delayed due to the appointment of a new Director General. CSISA remains hopeful that the agreement with DOA will be signed in the first fortnight of May 2017 with trainings starting immediately.

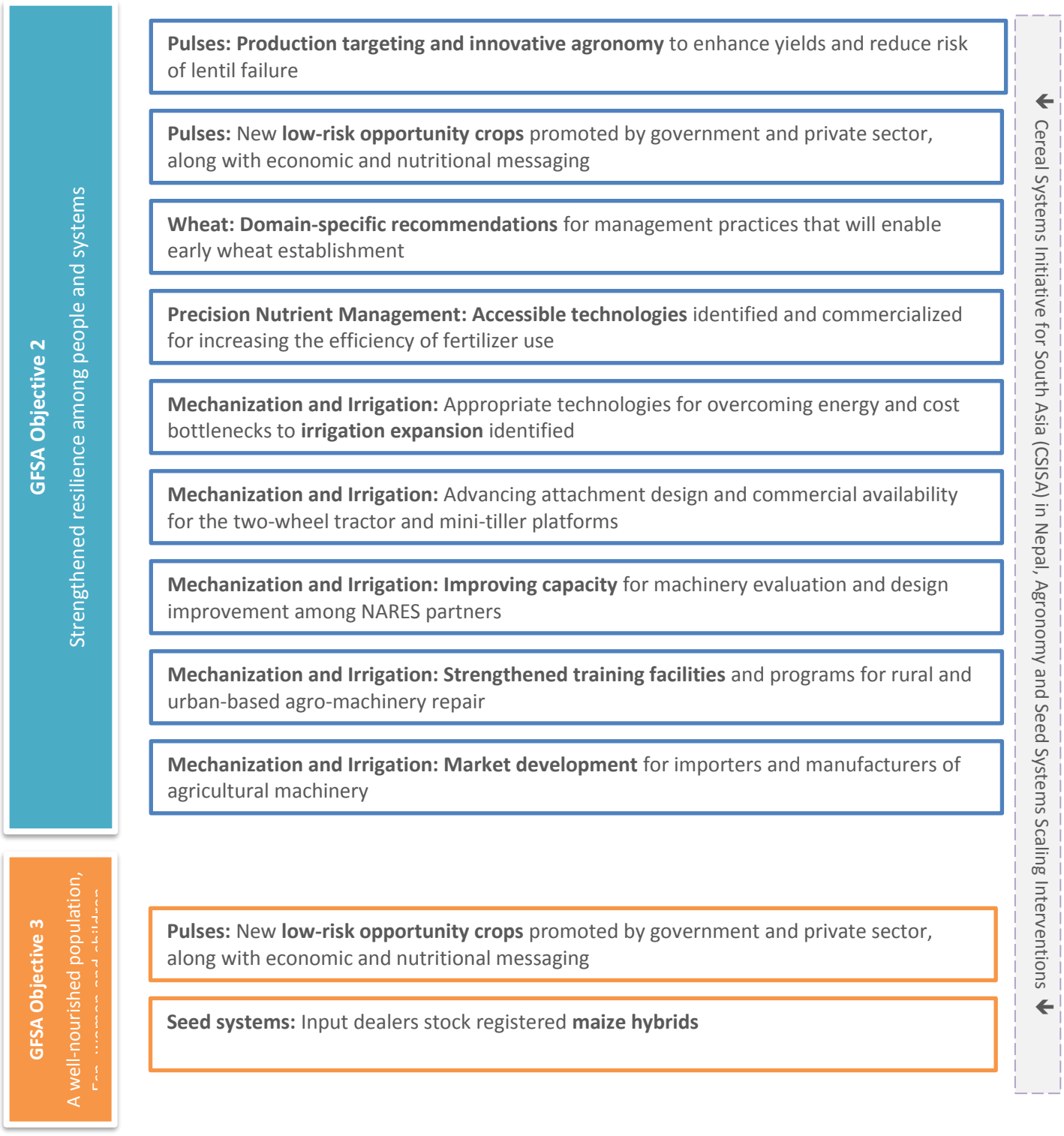
CSISA-Nepal and the U.S. Global Food Security Strategy Results Framework

Global Food Security Act Goal: Sustainably reduce global hunger, malnutrition, and poverty

GFSA Objective 1
Inclusive and sustainable agricultural-led economic growth

- **Seed systems:** Input dealers stock registered **maize hybrids**
- **Seed systems:** Private seed companies expand businesses for **wheat and pulses**
- **Seed systems:** Strategic investments & **enhanced coordination** among seed system actors
- **Pulses:** New **low-risk opportunity crops** promoted by government and private sector, along with economic and nutritional messaging
- **Wheat: Domain-specific recommendations** for management practices that will enable early wheat establishment
- **Wheat: Social marketing** approaches utilized to 'get the word out' on better-bet agronomy for wheat
- **Precision Nutrient Management:** Domain- and situation-specific **soil fertility management strategies** developed for wheat, lentil and maize
- **Precision Nutrient Management: Broad-scale awareness** of the yield and economic benefits of judicious fertilizer application
- **Mechanization and Irrigation:** Appropriate technologies for overcoming energy and cost bottlenecks to **irrigation expansion** identified
- **Mechanization and Irrigation:** Identification of physical and operational models of **land aggregation** to permit inclusive access to innovative mechanization technologies
- **Mechanization and Irrigation: New business opportunities** for laser land leveling, zero tillage, & mechanized harvesting defined with expected returns for all value chain actors
- **Mechanization and Irrigation: Advancing attachment design** and commercial availability for the two-wheel tractor and mini-tiller platforms
- **Mechanization and Irrigation: Market development** for importers and manufacturers of agricultural machinery

← Cereal Systems Initiative for South Asia (CSISA) in Nepal, Agronomy and Seed Systems Scaling Interventions ←



CSISA-Nepal activities also map against the following Intermediate Results:

- **IR 1:** Strengthened inclusive agriculture systems that are productive and profitable
- **IR 2:** Strengthened and expanded access to markets and trade
- **IR 3:** Increased employment and entrepreneurship
- **IR 4:** Increased sustainable productivity, particularly through climate-smart approaches
- **IR 7:** Increased consumption of nutritious and safe diets

As well as these Cross-Cutting Intermediate Results:

- **CC IR 3:** Increased gender equality and female empowerment
- **CC IR 4:** Increased youth empowerment and livelihoods

Objective 1: Inclusive and sustainable agricultural-led growth

Seed Systems

CSISA aims to develop robust seed systems for cereals and legumes by enhancing the technical and business management capacities of seed enterprises to make them technically stronger, market oriented, professionally organized, and strategically linked with various actors along the value chain.

Input dealers stock registered maize hybrids

Despite the yield and profitability advantages achievable with hybrids (>50%), very few famers in the mid-hills cultivate them in the Feed the Future (FtF) zone and the government had not registered (i.e., 'sanctioned') hybrids for cultivation in the FtF zone due primarily to an absence of field data to validate performance. After working with the National Maize Research Program (part of the National Agriculture Research Council) to register four promising hybrids in 2015, CSISA has focused on market development efforts with private sector partners to increase awareness among farmers and seed availability through retailors. CSISA organized market development meetings between NIMBUS, which is an exclusive importer of Bioseed's hybrid maize seed into Nepal, and dealer networks in Banke, Bardiya, Kailali and Dang districts during the reporting period. Two-hundred five input dealers attended. During the meetings, dealers expressed a desire to stock more hybrid seed in 2017 based on favorable farmer responses in 2016. As a result of this request, **NIMBUS has supplied 80 tons of seed – enough to plant approximately 4,000 hectares in the upcoming season.** These numbers will be confirmed and conveyed in the annual report.

Private seed companies expand businesses for wheat and pulses

Since 2014, CSISA has provided mentoring support to emerging Nepali seed companies for business planning, technical guidance, and market development.

Company-led market development: To generate demand among farmers, four of the top-performing and proactive companies (GATE Nepal, New Shreeram, Unique and Lumbini) mentored by CSISA conducted 120 demonstrations of newly released (Banganga, BL 971, Sworgadwari) and pipeline (Munal, Cyakhura, BL 4341) wheat varieties that have not yet been adopted at scale by Nepali farmers. The seed companies estimated that about 12,000 households visited these demonstrations during the growing season, and many of them have requested seed for next year's wheat season after seeing their superior performance in the field.

Technical advances: Following CSISA's technical training, the aforementioned companies have started maintenance breeding for wheat from 2016 to enhance the quality of source seed used for truthfully labeled seed production. Building markets in regions like Nepal where farmers do not regularly purchase seed is a challenge. Maintenance breeding helps maintain seed quality and therefore develop trust among farmers that they are purchasing a reliable product that is worth their investment. The varieties undergoing maintenance breeding are recently released varieties, pipeline varieties, and one newly introduced variety called Borlaug 100. Borlaug 100 was introduced by CIMMYT from Mexico in 2016 in coordination with the National Wheat Research Program in response to the emerging threat of wheat blast in South Asia. In addition to resilience traits, four of the newer wheat varieties prioritized for the Nepal market are comparatively rich in iron and zinc.

Financing for growth: A core component of CSISA's mentoring efforts for companies has been the creation of business plans that are based on a vision for growth that is specific to each company. Having a convincing business plan is an important component of securing financing to drive expansion, and the companies supported by CSISA have tapped into loan grant programs funded by the International Fund for Agricultural Development, and 'Raising Income of Small and Medium Farmers Project,' funded by the Asian Development Bank. These sources of capital have allowed the

seed companies to expand their facilities to include seed storage buildings, processing plants and laboratories. CSISA is also working to facilitate commercial lending between the companies and banks that are backed by USAID's Development Credit Authority as part of the Nepal Seed and Fertilizer (NSAF) program that is also implemented by CIMMYT with support from USAID-Nepal.

Linkages to policy innovations and development programs: At the invitation of our government partners, CSISA participated the 'Seed Vision Review,' 'Regional Seed Balance Sheet Development,' and 'Orientation for Zone and Super Zone Leaders under Prime Minister Agriculture Modernization Project (PMAMP)'. In these platforms, CSISA shared information about opportunities for scaling new wheat and legume varieties, as well as descriptions of inclusive business models for reaching relatively poor farmers. Since the PMAMP is envisioned as a 10-year and $100 m investment, strategic coordination with this program is a top priority for CSISA.

CSISA helped strengthen the Seed Entrepreneurs' Association of Nepal (SEAN) and National Seed Producer Association through refinement of their vision for engagement with the government and through the types of services provided to members. Consequently, the associations jointly requested the government to review existing subsidies that are structured in a manner that do not specifically facilitate the development of markets for new varieties. In response, the Ministry of Agricultural Development formed a three-member committee comprising SEAN, Seed Quality Control Center (SQCC) and District Agriculture Development Offices to make recommendations for potential seed subsidy revision. Encouragingly, the subsidy for NL 297, a 35-year-old wheat variety, was removed at the request of CSISA and SQCC.

Accelerating seed sales: The rapid expansion of seed sold to farmers by our private sector partners is strong evidence that CSISA is significantly contributing to the emergence of strong, sustainable, and market-oriented seed systems in Nepal. Since the base year of 2014, prior to the inception of CSISA-scaling, **aggregate seed sales by our partners have increased by more than 90%** with an expansion of 1,032 tons by our four most ambitious companies from 2016 to 2017 (see inset). Approximately **half of the increase in sales are for wheat, suggesting a year-on-year increase of 4,300 hectares planted to newer wheat varieties with quality seed in 2017**.

PRIVATE SECTOR SEED SALES FOR THE FOUR MOST GROWTH-ORIENTED NEPALI COMPANIES BEING MENTORED BY CSISA THROUGH BUSINESS PLANNING, TECHNICAL, AND MARKET DEVELOPMENT ASSISTANCE. APPROXIMATELY HALF OF NEW SALES ARE FOR MODERN VARIETIES OF WHEAT.

Encouraging signs of growth have also occurred in the market for mungbean seed. GATE Nepal sold about 10 tons of mungbean seed for the 2017 season, and through contract arrangements with farmer groups and cooperatives, expects to double this figure to 20 tons in 2018.

New low-risk opportunity crops promoted by government and private sector, along with economic and nutritional messaging (also serves Obj 2 and Obj 3)

As a short-duration crop that can be cultivated during the hot 'summer' period before the arrival of monsoon rains, mungbean can be cultivated without displacing existing crops while generating significant economic, nutritional and soil health benefits. To raise awareness of these benefits, CSISA convened 20 community-level meetings (involving 1,000 participants in December 2016) and two

regional-level meetings (with 100 participants in January 2017) in areas where new output market opportunities for mungbean are strong. Mungbean information was also broadcast in February 2017 from the Ujyalo radio network through 75 stations.

CSISA data indicated that these activities led to increased demand by farmers for seed in this reporting period. At the end of March, seed stocked in five retailors in Kailali District was 3 t, which is three times more than the stock held at the same time in 2016. Considering farmers' demand for mungbean, several DADOs in the FtF zone have included mungbean in their 'pocket' program and supported farmers for seed (50 to 100% subsidy) and technical trainings, with the latter done in coordination with CSISA.

Additional information about mungbean can be found under Objective 3.

Domain-specific recommendations for management practices that will enable early wheat establishment

Wheat productivity growth in the Terai is constrained primarily by the farmers' practice of sowing wheat in late November or early December, which leaves the crop to mature (i.e., go through the grain-filling stage) in March, when temperatures can exceed 35^0 C. In many cases, farmers delay wheat sowing simply because they do not understand the consequences of later planting.

In other cases, other causes of planting delays such as poorly drained fields or late-established rice pose a more serious challenge. Wheat sowing delays occur most commonly in lowland areas where farmers need to wait until the field dries out enough for ploughing. Wheat seeding on lowlands using conventional practices (several ploughings before seeding) not only increases production costs but also reduces yield due to delays in seeding. CSISA's efforts to raise awareness about the benefits of zero tillage (ZT) and surface seeding technology for wheat can facilitate timely sowing while reducing crop establishment costs. In collaboration with seed drill traders, The Habi (for four-wheel tractors) and Dahit (for two-wheel tractors) and seed drill service providers, CSISA has been running awareness-raising campaigns for ZT wheat technology in FtF zone. The fruits of these efforts are now accruing with **private sector sales of ZT drills exceeding 150 units from a base of zero when CSISA-Scaling started programming at the end of 2015.**

EARLY-ESTABLISHED WHEAT SOWN BY A ZERO TILLAGE SEED DRILL IN THE TERAI.

In very wet areas where field access does not permit early sowing by tractor-based machinery, CSISA is highlighting the advantages of surface seeding of wheat with hand-held precision broadcasting tools. Since more than 1,500 of these spreaders have been sold through private sector partners in the FtF zone, the viability of this approach is increasing in poorly-drained areas.

Social marketing approaches utilized to get the word out on better-bet agronomy for wheat

To address the knowledge gaps that prevent many farmers from sowing on time, key messages have been communicated through printed tips and radio jingle programs across the FtF districts in the Terai in coordination with, and with the the endorsement of, the Department of Agriculture. CSISA's preliminary data shows that these **efforts have facilitated 1,870 farmers to adopt early wheat establishment on 839 ha**. This is significantly higher than the previous year, when 407 farmers adopted ZT on 35 ha. Both estimations are based on ground reconnaissance, and likely underestimate changes in planting practices. CSISA is using remote sensing tools to more fully characterize changes in planting dates and revised numbers will be shared in the annual report.

Wheat survey 2017

To capture changes in management practices and to estimate benefits of adoption, a crop cut and production practice survey is currently ongoing in the field. CSISA has implemented several interventions through social marketing approaches, including radio jingling on the importance of early wheat sowing, increasing the number of irrigations during wheat production and the importance of planting longer duration varieties. The current survey will be instrumental in capturing the changes in management practices associated with these campaigns and inform our scaling strategy in 2017–18.

Rather than using political boundaries, we used remote sensing data to develop a representative sampling scheme that captures gradients in wheat productivity levels at the landscape scale. The survey was deployed in Open Data Kit (ODK) and is fully automated from the point of collection. The details of the crop cuts and survey will be presented in the annual report.

Domain- and situation specific soil fertility management strategies developed for wheat, lentil and maize

A household survey conducted for rice and wheat in the FtF zone showed under-fertilization and imbalanced application are major reasons for low crop productivity in Nepal. On average, farmers apply nitrogen and phosphorus fertilizer at rates less than 50% of the national recommendations and only 13% of farmers apply potassium.

One of reasons that farmers do not follow recommendations is that confidence in them is generally low. Recommendations are applied across broad areas of the country without considering soil and management influences on economically optimum application rates or farmer preferences for investment in soil enhancement. To characterize fertilizer responses with respect to seeding time, variety and irrigation levels across major soil gradients, CSISA Is combining on-farm and on-station research in coordination with the new USAID-Nepal funded NSAF (Nepal Seed and Fertilizer, $15 m from 2016–2021) project, an initiative with a focus that spans the applied science-to-development continuum, inclusive of market facilitation efforts to expand private sector-led fertilizer sales. **NSAF was designed by CSISA staff during 2016 to capitalize on the evidence, insights, and momentum created by CSISA programming in Nepal** and is intended **to catalyze the adoption of precision nutrient management practices by more than 50,000 households**. This is a prime example of the leverage created by CSISA through other programming **and is fully aligned with USAID-Nepal's priorities for the FtF zone.**

Broad-scale awareness of the yield and economic benefits of judicious fertilizer application

In coordination with the NSAF project, research findings have been communicated through simple agronomy tips and radio jingles while leveraging government extension channels as well as those of development partners such as KISAN. Communicating the importance of fertilizer management through co-operatives is the most effective pathway as they also supply fertilizer to farmers in their command area. CSISA has developed posters about the importance of fertilizer and placed them in the co-operatives. Partially because of CSISA's efforts, demand for potassium fertilizer has increased and co-operatives have started to stock it. Also, farmers have started to split the fertilizer application instead of applying a single dose, as the split application of urea fertilizer increases the fertilizer use efficiency. **During the reporting period, early estimates suggest that 1,047 farmers have applied better management practices (balance fertilizer with split application) for wheat. This number is likely much larger, and will be confirmed through targeted surveys among cooperatives and other early adopters.**

Objective 2: Strengthened resilience among people and systems

Production targeting and innovative agronomy to enhance yields and reduce risk of lentil failure

Lentil performance is highly dependent on weather, especially rainfall. About 62% of lentil-growing farmers in the FtF zone suffer economic loss from lentil cultivation. In this context, CSISA continues to conduct evaluations of drought- and waterlogging-tolerant germplasm and alternative crop establishment methods (for example bed planting, which allows excess water to drain out after rains, and furrow irrigation, which helps crops cope with dry spells) that minimize the risk of failure. CSISA has determined that mechanized seeding also increases lentil productivity while reducing production costs. By mobilizing existing seed drills and employing technical support from CSISA, during this season farmers covered more than 70 ha area through mechanized lentil seeding especially in Banke, Bardiya and Kailali. Farmers have reported that line seeded lentil produced 30–35% higher yields mainly due to uniform crop establishment, banding of the DAP fertilizer and greater opportunities for weed management. Under line seeding labor requirements for intercultural operations and harvesting were reduced. 2016–17 was a good year for lentil production due to favorable weather, and no large-scale biotic and abiotic stresses were observed. Nevertheless, risk and uncertainty continue to limit farmer's interest in intensification through higher levels of investment.

Can better genetics reduce risks to lentil cultivation?

CSISA has been collaborating with the Agronomy Division of NARC, National Grain Legume Research Program (NGLRP), and ICARDA to evaluate 100 lentil genotypes from the Mediterranean region for drought and high moisture resistance since 2015–16. Among the genotypes tested in 2015–16, five lines were observed to be resistant to drought in a year without winter rainfall. Out of those five lines, three lines performed outstanding in a normal year, 2016–17. To determine the broader adaptability of those three lines, on-farm evaluations will be carried out in collaboration with seed companies to move these lines towards registration and commercialization.

Minimizing stemphylium disease in lentil

The occurrence of *stemphylium* in wet winters is a major cause of lentil failure. CSISA collaborated with NGLRP, DOA and other stakeholders to organize a consultation meeting on *stemphylium* disease management strategies in lentil covering the status of disease incidence and severity, empirical findings on management techniques and deployment strategies for extension recommendations. NGLRP has already identified a few better-bet management practices for the disease, but the information has not reached farmers. In collaboration with NGLRP, DOA and related stakeholders, CSISA developed *stemphylium* management guidelines and has disseminated it through DADOs, seed companies, KISAN's network and co-operatives so that farmers can respond proactively if conditions favor the disease. Similarly, in collaboration with respective DADOs, CSISA developed a radio jingle on *stemphylium* management

GUIDELINES FOR *STEMPHYLIUM* MANAGEMENT IN LENTIL, DEVELOPED IN COORDINATION WITH THE NATIONAL GRAIN LEGUME PROGRAM

and has aired it through local radio FM stations in local languages before the lentil flowering season, which is the critical stage for the disease appearance.

Accessible technologies identified and commercialized for increasing the efficiency of fertilizer use

In Nepal, fertilizer application rates are far below that national recommendation, yet application technologies for fertilizer are imprecise and commonly result in significant reductions in crop yield with low fertilizer use efficiency compared to what can be obtained through better management. The manually operated precision spreader is a low-cost method for increasing fertilizer use efficiency and maintaining uniform crop establishment. In collaboration with public and private partners, CSISA has been facilitating demonstrations and evaluations of the spreader in farmers' fields. In the Nepal context, precision spreading of urea at top-dress increases crop yields and nitrogen use efficiency by 7–10% with 50% reduction in application time and labor. CSISA has worked with manufacturers, importers and local traders for the market development of the spreader. As a result, demand is increasing; **since July 2016 more than 1,500 spreaders have been sold through traders across the Terai**. After seeing a high level of farmer acceptance of the technology and having identified a low-cost regional manufacturer, District Agriculture Development Offices have included the spreader in their subsidy programs and sold the equipment to the farmers at a 50% cost-share. Numbers of farmers using the technology are now being estimated through targeted surveys.

Note: For more information about CSISA activities that contribute to Objective 2 of the Global Food Security Results Framework, please refer to these activities under Objective 1 above:

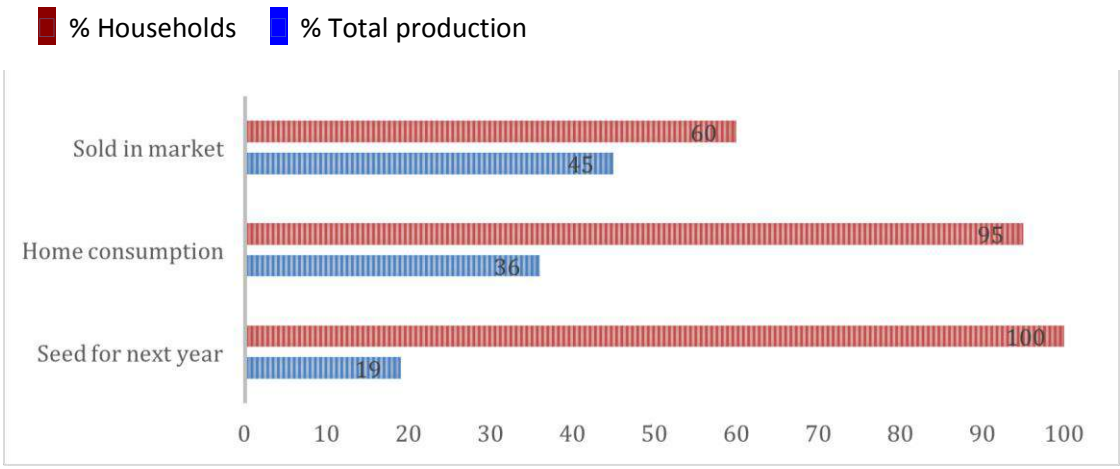
- New low-risk opportunity crops promoted by government and private sector, along with economic and nutritional messaging
- Domain-specific recommendations for management practices that will enable early wheat establishment

Objective 3: A well-nourished population, especially women and children

New low-risk opportunity crops promoted by government and private sector, along with economic and nutritional messaging (also reported in Objective 1)

WOMEN FARMERS IN KANCHANPUR DISTRICT SHOWCASE THEIR MUNGBEAN HARVEST

Mungbean is a short-duration crop that is high in protein and essential nutrients including manganese, potassium, magnesium, folate, copper, zinc and various B vitamins. CSISA's efforts to facilitate the adoption of mungbean as a third crop within existing cropping systems provides extra income while also improving household nutrition if some fraction of the crop is retained for consumption. A survey carried out in Banke, Bardiya, Kailali and Kanchanpur Districts (n = 173) in 2016 characterized the average area, productivity, and end-uses of mungbean for farmers who have begun to cultivate the crop with support from CSISA. Nearly all households (95%) retained mungbean for home consumption, representing 36% of total production.



END-USES OF MUNGBEAN AMONG EMERGING PRODUCERS SUPPORTED BY CSISA. NEARLY ALL HOUSEHOLDS (95%) RETAIN SOME OF THIS NUTRITIOUS CROP FOR DIRECT CONSUMPTION.

The Nepal government has a large program to promote Daincha (*Sesbania rostrata)* as a green manure crop in rice-based systems across the Terai, subsidizing on cost involved on seed and irrigation. Seeing the benefits of mungbean cultivation under CSISA's programming, the Government of Nepal has also included mungbean as a green manure crop in their program for 2017.

Note: For more information about CSISA activities that contribute to Objective 3 of the Global Food Security Results Framework, please refer to these activities under Objective 1 above:

- Seed systems: Input dealers stock registered maize hybrids

Upcoming activities and events for April–September 2017

A video documentary on new high yielding and stress-tolerant wheat varieties is in production with *Krishi TV,* a new Nepali television station focused exclusively on agriculture. The wheat crop cut and household survey will wrap up in May and data analysis should be completed in June. Key findings will be shared with concerned stakeholders, and utilized in refining next year's scaling strategies. Data collected from seed company-led participatory varietal selection and frontline demonstrations will be used to support the registration of new varieties. As part of the Government of Nepal's PMAMP for agricultural modernization, CSISA will help convene a 'National Wheat Forum' and 'National Maize Forum', which will serve to stimulate critical discussions, priority setting, collaborative modalities across the applied research to development continuum.

For mungbean, CSISA will continue to facilitate contractual arrangements between growers and traders, and identify remaining weaknesses in the value chains that are essentially for driving the area expansion of this low-risk pulse alternative to lentil.

CSISA will continue to help strengthen the Nepal's seed industry through business mentoring and technical back-stopping, and is merging these efforts with those of the NSAF (USAID-Nepal funded) project.

Development, commercialization, and adoption of scale-appropriate and energy-efficient mechanization and irrigation technologies

Past agricultural development efforts in South Asia have primarily focused on increasing the spread of large tractors and implements for intensive tillage. CSISA's goal is to provide technologies that increase the efficiency of inputs and reduce energy consumption and costs through the spread of scale-appropriate agriculture machinery and attachments. While good inroads are being made (and are detailed below) the challenge remains how to expand the service economy and aligned value chains to expand access of these machines to smallholders in Nepal.

CSISA-Nepal Mechanization and Irrigation aims to increase access by Nepalese smallholders to scale-appropriate innovations and, wherever possible, help orient the efforts of Indian manufacturers and exporters toward these markets. Nepal's import market for agro-machinery from India is already substantial, but is mainly focused on four-wheel tractors, estimated to be worth $57 m per annum. CSISA has facilitated business connections between Nepal importers and Indian exporters. For example, during the reporting period two large exporters of Indian seed drills (Khedut Agro and Dharti Agro) have established agents in Nepal. Connections have also been brokered with two additional smaller Indian manufacturers of hand tools and open drum threshers.

CSISA efforts to strength the private sector in India and Nepal are inclusive of building their capacity to organize (e.g., Nepal Agricultural Machinery Entrepreneurs Association), strengthening supply chains, and helping them better understand the potential market for emerging scale-appropriate technologies. The project also builds the public sectors' capacity for testing and evaluating machinery, as well as facilitating the spread of scale-appropriate machinery through training of service providers.

Objective 1: Inclusive and sustainable agricultural-led growth

Appropriate technologies for overcoming energy and cost bottlenecks to irrigation expansion identified

The Mid and Far West regions of Nepal lag behind Central and Eastern Nepal in irrigation and groundwater development. CSISA has identified a few technologies that can help overcome current bottlenecks in regions where irrigation is sparse.

Solar pumps for irrigation are currently a top priority for governments and development partners across South Asia due to low operating costs that addresses the energy-water nexus, and well as low carbon emissions. Nevertheless, market- based spread of available pumps is almost non-existent for field crop applications due to the high purchase costs. CSISA is addressing this challenge by seeking ways to reduce the cost of solar pumps. The **'Sasto Solar Sichai'** design that includes low-cost motors is now being tested by two private businesses, Gham Power and Sunbreeze Solar, in Nepal. The price of solar panels is also dropping from US$ 1/watt a year ago to US$ 0.55/watt at present, which will further advance overall cost reductions. After testing by private sector partners is completed, a market feasibility study will be conducted to establishment the business case for these lower-cost pumps.

In the last six months, work by CSISA has proceeded on the development of a low cost (>US$ 400) shallow tube well **two-wheel tractor drilling rig attachment** that allows for much faster drilling of shallow tube wells using a two-wheel tractor as power source. One manufacturing workshop from Kanchenpur District has approached CSISA to build a two-wheel tractor drilling rig to sell in the Far West. CSISA will closely cooperate with the workshop in manufacturing and training of any potential buyer.

Another new irrigation technology has recently presented an opportunity for CSISA to get new irrigation technologies to hill-based minitiller farmers. CSISA has determined that for an investment of US$ 100, the 9,000 minitiller owners in the hills of Nepal could turn their minitiller into an irrigation pump set. Rather than investing US$ 250–300 for a separate engine and pump, farmers can invest US$ 100 and use their minitiller to power a 2-inch water pump. Four importers, advised by CSISA through the Earthquake Recovery Support Program, have recently begun offering 2-inch pumps as an attachment to be coupled with their minitiller. These pumps are large enough to provide irrigation not only to high value crops but also field crops like rice, maize and wheat. SKT has imported 50 pieces in the last six months, while BTL and AMC both have approximately 20 pcs in stock. Shrestha Agro reports that over 300 2-inch pumps will arrive in April–May 2017.

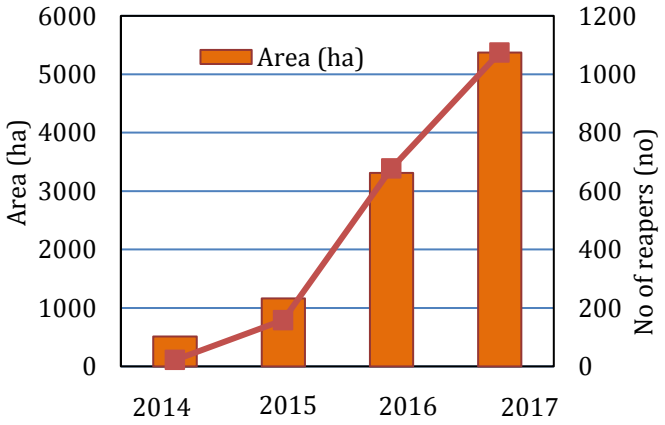
New mechanized business opportunities defined with expected returns for all value chain actors

Market development for importers and manufacturers of agricultural machinery

In the Mid and Far West Terai, CSISA introduced the reaper in 2014 in collaboration with machinery suppliers. The number of reapers and the area under reaper harvesting have significantly increased from a base near zero, due to increasing awareness about the economic benefits of using reapers as well as building the business case for the technology to service providers. As of January 2017, **1,070 reapers have been sold by our private sector partners, harvesting more than 5,500 hectares on an annual basis** (*indictor numbers split between CSISA III and CSISA-Scaling*). In collaboration with reaper suppliers, CSISA has been working for the capacity development of service providers and facilitating repair and maintenance services, as well as increasing the local availability of spare parts. The introduction and commercialization of reapers has created new business opportunities for machinery retailers and service providers in the FtF zone, particularly among returning migrants who are seeking employment opportunities beyond the farm.

A primary reason for the swift spread of reapers thus far is that many Nepali farmers and service providers who are already owners of two-wheel tractors have a strong entrepreneurial spirit. As they already understand the costs, risks, and returns of owning agricultural machinery they can quickly see a strong business case for the reaper.

Another reason reaper harvesting has spread quickly was that CSISA and the importers were encouraged by CSISA to order and stock additional reapers rather than waiting for orders to accrue. This approach ensured that would-be customers could see and test a reaper at the retail level before committing to purchase. CSISA and the importers encouraged and backstopped (providing advice and even used reapers for demos) profit-motivated sales agents in the FtF zone to conduct their own independent farmer field days.



REAPER SALES AND AREA REACHED BY THE TECHNOLOGY IN THE TERAI DISTRICTS OF THE FTF ZONE. PRIOR TO CSISA'S EFFORTS TO INTRODUCE AND ESTABLISH MARKETS FOR THIS TECHNOLOGY IN 2014, REAPERS WERE NOT COMMERCIALLY AVAILABLE IN THE FTF ZONE.

Thus far, the total investment by farmers in this technology is around US$ 642,000 (avg. US$ 600/piece.) Calculating out the market area for reapers, this number represents nearly 25% of the total wheat area, which has been reached in a 2-year period.

CSISA conducted the below exercise to help clarify the market for scale-appropriate machinery better, taking into consideration the number of farmers who could use the machinery and services given agro-ecological conditions, relevant crops and the installed capacity of complementary agricultural machinery, such as diesel engines and two-wheel tractors. The table considers a time period of five years and four products – two-wheel tractor reapers, two-wheel tractor seeders, four-wheel tractor seeders and precision fertilizer and seed spreaders.

We use the smaller crop area of wheat (and then estimate that only 30% of the potential wheat area will be covered under CSISA-facilitated machinery). This seems justified as reapers have already covered 20–25% of the wheat area in three target districts in two years' time[1].

Table 1: Potential Reaper Market Size in the FtF and other Zones. [2]

	Area Far-West Terai (Wheat 67,000 ha)	**Area Mid- West Terai (wheat 33,000 ha)**	**Area West Terai (wheat 68,000 ha)**	**Area East Terai (wheat 74,000 ha)**	**Total Number of Machinery Sold**	**Total Market Investment**
# of Reapers	Area x .3 / 10 ha per reaper= 2,000 reapers	Area x .3 / 10 ha per reaper= 990 Reapers	Area x .3 / 10 ha per reaper= 2,000 reapers	Area x .3 / 10 ha per reaper = 2,220 reapers	**7,210 2WT reapers**	**@ 600 US$ / pc = US$ 4.3 M**
# of 4WT Seeders	Area x .3 / 30 ha seeder= 670	Area x .3 / 30 ha seeder= 330	Area x .3 / 30 ha seeder= 680	Area x .3 / 30 ha seeder= 740	**2,400 4WT Seeders**	**@ 1000 USD / pc = US$ 2.4 M**
# of 2WT seeders	Area x .3 / 30 ha / seeder= 670	Area x .3 / 30 ha / seeder= 330	Area x .3 / 30 ha / seeder= 680	Area x .3 / 30 ha / seeder= 740	**2,400 2WT seeders**	**@ 700 US$ / pc = US$ 1.7 M**
# of Spreaders	Area x .5 / 5 ha / spreader= 6,700	Area x .5 / 5 ha / spreader= 3,300	Area x .5 / 5 ha / spreader= 6,800	Area x .5 / 5 ha / spreader= 7,400	**24,200 spreaders**	**@ 35 US$ / pc= US$ 850,000**
					TOTAL SALES	**US$ 9.25 M**

The numbers are impressive particularly as we have left out the Central Development Region and parts of eastern Development Terai Region. If we had scaled the numbers to include the much larger rice area the 'potential' totals of reapers sold would nearly double. In other case studies the potential market size has been a critical issue, potentially because the potential size was considered to be too small for suppliers (and governments, donors and projects) to see the technology as profitable. More analysis needs to be done but this data, paired with the current sales data of reapers, is soon to be shared with all stakeholders' and especially importers, and should be useful for them to see and understand the market outlook better and inspire them in redoubling their efforts in investing and marketing of the above machinery.

[1] From early studies we know that the largest combined harvester area in Nepal has nearly reached saturation of only 25–30% of area covered so again 25% area for reapers, alongside combine harvesters seems justified.

[2] Area data from the Nepal SBS National Sample Census of Agriculture Nepal 2011/12. We pull in Eastern Development region as importers report that the first sales of reapers occurred there (30 pc).

Collaborative Design Sprint - Advancing attachment design and commercial availability for the two-wheel tractor and mini-tiller platforms

Over nearly three weeks in February and March, CSISA conducted a series of three to five day 'Design Sprint' workshops in India that helped manufacturers of two-wheel tractor seed drills and planters modify their machinery designs to better suit the needs of small-scale farmers, including in Nepal's hill and Terai ecologies. This was done because despite two decades of internationally- and nationally-funded projects around the world, farmers (two-wheel tractor owners) have not adopted any existing model of seeder-planters on a wide scale.

PRIVATE SECTOR MACHINERY MANUFACTURERS IN LUDHIANA, INDIA, INSPECT AN INNOVATIVE SEED DRILL PROTOTYPE DEVELOPED DURING THE DESIGN SPRINT.

During a the Design Sprints, CSISA provided seed drill manufacturers with technical feedback on their current designs and facilitated discussions about existing market offerings. The three groups considered various incremental changes to their existing models, as well as entirely new designs that would be more relevant for, and commercially attractive to, small-scale two-wheel tractor owners, farmers and service providers. As of writing, two new models of two-wheel tractor seeders are being produced from Rajkot with the third Ludhiana model expected by the end of April. All models will be tested in Nepal with feedback provided to the manufacturers. The improved models will be test marketed in Nepal, India and Bangladesh.

Objective 2: Strengthened resilience among people and systems

Improving capacity for machinery evaluation and design improvement among NARES and NAMEA partners in Nepal

Strengthened training facilities and programs for rural and urban-based agro-machinery repair.

The development of these two facilities is the most complicated, time consuming and ambitious task within the CSISA-NP Mechanization and Irrigation portfolio. CIMMYT's close historical relationship with NARC has made the process for getting approvals for site selection fairly smooth, and the procurement has begun and master plan for the center has been completed. A senior NARC delegation, led by the Crops Director, visited the proposed site in Nawalpur in March and gave its nod of approval to complete establish the NARC-led testing center. Two trips have been undertaken by NARC senior engineers to India in December and in March to visit relevant manufacturers of machinery testing equipment to ensure that the testing equipment selected is correct.

Strategic planning for the co-located mechanization training center is also completed with the design process led by Senior Agricultural Engineer and Director of Agricultural Engineering Directorate, Madhusudan Basnyat. The Director General of the Department of Agriculture has recently changed, and final approval to move ahead with the finished plan has been promised by the DG within the first half of May.

Upcoming activities and events for April–September 2017

In the final six months of the program CSISA will concentrate on the following:

- Signing of DOA agreement for the training center and quick start the procurement of the training aides. Backstop the testing activities by NARC that will begin shortly.
- Continue with the NARC procurement and begin on facility upgradation at the selected research farm. Backstop the training activities that are due to begin shortly.
- For reapers:
    - Focus on marketing and demonstration support in the districts where sales have lagged.
    - Conduct the remaining agricultural mechanic trainings for reaper in the Mid West.
- After nearly two years of little interest shown, there is growing interest among several district-level Department of Irrigation and Department of Fisheries offices for getting axial flow pumps into small-scale lift irrigation schemes and to individual fish farmers. CSISA will distribute remaining axial flow pumps to capitalize on this wave of interest.
- Continue to encourage the private sector to market the other new irrigation technologies, such as the solar pump and tube well boring rig.
- With NAMEA operating independently now, CSISA will help to organize and train (on machinery and marketing) district-level sales agents.
- Plan for a one-day, high-level, end-of-project workshop with the government and NAMEA partners.

Engagement with Missions, FTF partners and project sub-contractors

USAID Missions

In Nepal, CSISA has engaged with the Nepal mission in the following core areas in FY17:

- Provided technical advice and support to the KISAN project (USAID-Nepal's flagship FtF program) on staple crop management.
- Shared technical insights into challenges and opportunities confronting the sustainable intensification of staple crop systems in Nepal that (we believe) have informed the development of the forthcoming KISAN II project solicitation.
- Led the formulation of the new 'Nepal Seed and Fertilizer' (NSAF) project funded by USAID-Nepal ($15 m, 2016–2021) and deeply collaborated on issues of complementary interest, including precision nutrient management and business mentoring for seed companies.
- Suggested the formation of the 'M&E Working Group of Agriculture Partners,' which was subsequently convened by USAID Nepal. CSISA participates in group meetings and provides feedback on various M&E and FTFMS Indicator issues. CSISA also presented a technical session on 'incremental sales analysis' during the working group meeting on Feb 23, 2017.
- Aided the USAID Integrating Gender and Nutrition within Agricultural Extension Services project in investigating the gendered impacts of scale-appropriate mechanization in the mid-hills.

FTF partners

In Nepal, the KISAN project, part of USAID's global Feed the Future initiative, is a $20 m five-year program working to advance food security objectives by increasing agricultural productivity. KISAN works collaboratively with CSISA by utilizing technical and extension materials and advice to improve the uptake of better-bet sustainable agriculture production and post-harvest practices and technologies for targeted cereals. KISAN has a reach of hundreds of thousands of farmers, who have been exposed to CSISA information, materials, and technologies through this partnership.

During the reporting period, CSISA and KISAN have:

- Produced accessible guides for **better bet agronomy for rice and maize** – information that is generally not available to smallholders**.** KISAN has reproduced these guides with their own resources and they provide the backbone of their technical training programs for maize and rice, the two core staple crop value chains for the project. In 2016, 60,205 **farmers have received the rice tips and 69,923 farmers have received the maize tips in the 20 FtF districts** through the KISAN network.
- Developed a factsheet on *Stemphylium* management for lentil and provided training to technicians from DADOs, KISAN, seed companies and some key farmers in different districts with the objective to disseminate the information to additional farmers.

Appendix 1 – Key Staff

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Appendix 2 – Project subcontractors and key partners

NEPAL				
PARTNER	**PARTNERSHIP OBJECTIVE**	**ALIGNMENT WITH THEMES**	**LEVERAGING OPPORTUNITY**	**STATUS OF PARTNERSHIP**
Government of Nepal				
Ministry of Agricultural Development	Technical guidance for GoN investments in agricultural development	All	New Agriculture Development Strategy approved by GoN in Fall of 2015. CSISA acts as a technical partner to shape the loan and investment programs associated with ADS, which may exceed $100 m USD.	Active and sanctioned by CIMMYT's host country agreement
Nepal Agricultural Research Council (NARC)	Strategic and applied research on SI technologies	Innovation towards impact	NARC is responsible for providing the science basis of all state recommendations; their endorsement and ownership of emerging sustainable intensification technologies is essential.	Active and long-standing
Department of Agriculture (DoA)	Front line extension and support to farmers, service providers, and private	Achieving impact at scale	DoA has staff at the district level across Nepal and considerable budgets to support programming; CSISA assist in improving the quality of extension messaging	Active and long-standing

	sector		and works to deepen linkages to private sector.	
Nepali private sector				
Machinery importers (BTL, SK Traders, Dhahal, etc.)	Introduction and market development for scale-appropriate machinery	Achieving impact at scale	Rapid expansion of investment in scale-appropriate machinery and support for emerging service provision markets.	Active and long-standing
NIMBUS	Introduction and market development for new crop varieties and hybrids	Achieving impact at scale	Registration and market development for hybrids in the Feed the Future zone from a base of zero in 2015.	Active since 2015
NGO				
NAMEA	Trade association formed with the help of CIMMYT to create an enabling environment and policy dialogue for scale-appropriate mechanization in Nepal	Systemic change towards impact	Important voice for private sector with GoN as the Agriculture Development Strategy support programs take shape.	Active since 2014
SEAN	Trade association strengthened with the help of CSISA to create an enabling environment and policy dialogue for seed system strengthening / SMEs in Nepal	Systemic change towards impact	Important voice for private sector with GoN as the ADS support programs take shape.	Active and long-standing
Universities				
University of Illinois	Strategic research and landscape diagnostics to uncover patterns of spatial variability in crop performance and the contributing factors for yields gaps in Nepal cereal	Innovation towards impact	Collaboration with advanced research institution increases the quality of science conducted in Nepal; national partners learn new research methods and contribute to the formulation of new research questions.	Active

	crops			
University of Nebraska	Opportunities for agronomic practices to conserve water, reduce risk, and enhance yields in maize-based systems in the hills of Nepal	Innovation towards impact	Collaboration with advanced research institution increases the quality of science conducted in Nepal; national partners learn new research methods and contribute to the formulation of new research questions.	Active
Wageningen University	Role of livestock and value chains in farmer willingness to invest in maize intensification	Innovation towards impact	Collaboration with advanced research institution increases the quality of science conducted in Nepal; national partners learn new research methods and contribute to the formulation of new research questions.	Active
Projects				
Knowledge-based Integrated Sustainable Agriculture and Nutrition (KISAN)	Strategic partnership to co-support on the large scale deployment of extension information and technologies	Achieving impact at scale	The KISAN project, part of USAID's global Feed the Future (FTF) initiative, is a US$ 20 million five-year program working to advance food security objectives by increasing agricultural productivity. KISAN works collaboratively with CSISA by utilizing technical and extension materials, and advice, to Improve the uptake of better-bet sustainable agriculture production and post-harvest practices and technologies for targeted cereals. KISAN has a reach of hundreds of thousands of farmers, who have been exposed to CSISA information, materials, and technologies through this partnership.	Active for 3+
Kisankalagi Unnat Biubijan Karyakram (KUB), also known as Improved Seed for Farmers	Scale out improved wheat varieties in Nepal's hill regions	Achieving Impact at Scale	MoAD has implemented this project in six western and mid-western hill districts using funds from International Fund for Agriculture Development. The focus is on capacity building of farmers' groups and cooperatives for the production of cereal and vegetable seed, and to strengthen their linkages with private seed companies. CSISA serves as a technical partner to provide trainings of trainers.	Active

Appendix 3. Indicator Numbers Covering October 2016 through March 2017

CSISA-Nepal Agronomy & Seed Systems Scaling

Indicator / Disaggregation	2017 Comment	2017 Deviation Narrative	2017	
			Target	Actual
EG.3.2-1: (4.5.2-7) Number of individuals who have received USG-supported short-term agricultural sector productivity or food security training (RAA) (WOG)				
Type of individual			500	383
Producers	This number counts producer trainees who attended trainings on better-bet crop production and management practices.	Deviation will be achieved during April-Sept, 2017	310	240
People in government	This number counts training participants representing government offices, mainly District Agriculture Development Offices, staff of Agricultural Service Centers, including NARS	Deviation will be achieved during April-Sept, 2017	100	70
People in private sector firms	This number counts training participants from private seed companies, agricultural input suppliers (agrovets) and cooperatives, as well as local service providers of agro machineries.	Deviation will be achieved during April-Sept, 2017	50	39
People in civil society	This number counts training participants representing local level non-governmental organizations and community-based organizations.	Deviation will be achieved during April-Sept, 2017	40	34
Disaggregates Not Available				
Sex				
Male				
Female				
Disaggregates Not Available	CSISA focused training on ToT approach so the participants attending training representing their respective groups or organization are counted as dis-integrates not available category.	Deviation will be achieved during April-Sept, 2017.	500	383

Indicator / Disaggregation	2017 Comment	2017 Deviation Narrative	2017	
			Target	Actual
EG.3.2-4: (4.5.2-11) Number of for-profit private enterprises, producers organizations, water users associations, women's groups, trade and business associations, and community based organizations (CBOs) receiving USG food security related organizational development assistance (RAA) (WOG)				
Type of organization			410	231
For-profit private enterprises	This number counts the number of private enterprises such as agri. Inputs suppliers (agro-vets), business associations, seed companies, cooperatives, community based organizations received organizational development assistance.	Deviation will be achieved during April-Sept, 2017	200	109
Producers organizations	This number captures the number of agri. producer groups received organizational development assistance from the CSISA.	Deviation will be achieved during April-Sept, 2017	135	83
Water users associations				
Women's groups	This number captures the number of women groups received organizational development assistance from the CSISA.	Deviation will be achieved during April-Sept, 2017	50	27
Trade and business associations	This number captures the trade & business organizations those are involved in trading of improved and hybrid seeds of cereal crops and other agri. inputs and received organizational development assistance from the CSISA.	Deviation will be achieved during April-Sept, 2017	25	12
Community-based organizations				
Disaggregates Not Available				
New/Continuing			410	231
New	This number counts the private enterprises receiving assistance from the CSISA for the first time during reporting period on organizational development assistance.	Deviation will be achieved during April-Sept, 2017	135	65
Continuing	This number counts the private enterprises receiving organizational development assistance last year, and continue this year, as well.	Deviation will be achieved during April-Sept, 2017	275	166
Disaggregates Not Available				

Indicator / Disaggregation	2017 Comment	2017 Deviation Narrative	2017	
			Target	Actual
EG.3.2-17: (4.5.2-5) Number of farmers and others who have applied improved technologies or management practices with USG assistance (RAA) (WOG)				
Producers			30,400	17,604
Sex				
Male	This number counts male farmers applying improved agri. technologies such as cultivation of new crop varieties, adoption of various cultural practices, soil fertility management activities, supplement irrigation, water management and postharvest activities.	Deviation will be achieved during April-Sept, 2017	21,280	10,828
Female	This number counts female farmers applying improved agri. technologies such as cultivation of new crop varieties, adoption of various cultural practices, soil fertility management activities, supplement irrigation, water management and postharvest activities.	Deviation will be achieved during April-Sept, 2017	9,120	6,776
Disaggregates Not Available				
Technology type	The actual number counts cumulative technology adopters adopting various improved technologies.		30,400	19,901
crop genetics	This number counts farmers adopting improved crop varieties of maize, wheat, lentil and mungbean.	Deviation will be achieved during April-Sept, 2017	15,000	9,183
cultural practices	This number counts farmers adopting improved agri-technologies and management practices such as seed drill, weed management, crop intensification, relay cropping etc.	Deviation will be achieved during April-Sept, 2017	5,700	4,290
livestock management				
wild fishing technique/gear				
aquaculture management				
pest management				
disease management				
soil-related fertility and conservation	This number counts farmers adopting soil related fertility management activities such as use of precision fertilizer spreader, fertilizer management etc.	Deviation will be achieved during April-Sept, 2017	4,000	2,129
irrigation	This number counts farmers practicing supplement	Deviation will be achieved during April-Sept, 2017	1,400	1,168

	irrigation for wheat and maize (winter & spring)			
water management (non-irrigation)	This number counts farmers adopting laser land leveler and seeding time of wheat and maize (winter & spring) for water management	Deviation will be achieved during April-Sept, 2017	2,800	1,996
climate mitigation or adaptation				
marketing and distribution				
post-harvest - handling and storage	This number counts farmer using reaper to harvest wheat.	Deviation will be achieved during April-Sept, 2017	1,500	1,135
value-added processing				
other				
total w/one or more improved technology (Not Applicable)				
Disaggregates Not Available				
Commodity **NEW**			30,400	19,901
Maize		This number captures cumulative number of farmers involved in adopting various improved technologies on maize.		2,745
Wheat		This number captures cumulative number of farmers involved in adopting various improved technologies on wheat.		12,862
Disaggregates Not Available		This number captures cumulative number of farmers involved in adopting various improved technologies on lentil and mungbean.		4,294

Indicator / Disaggregation	2016 Comment	2016 Deviation Narrative	2017	
			Target	Actual
EG.3.2-18: (4.5.2-2) Number of hectares of land under improved technologies or management practices with USG assistance (RAA) (WOG)				
Technology type			12,800	8,234
crop genetics	This category captures area under improved crop varieties of maize, wheat, lentil and mungbean.	Deviation will be achieved during April-Sept, 2017	7,500	3,854
cultural practices	This category captures area under improved agri-technologies and management practices such as seed drill, weed management, crop intensification, relay cropping etc.	Deviation will be achieved during April-Sept, 2017	2,200	1,792
pest management				
disease management				
soil-related fertility and conservation	This category captures area under soil fertility and management practices such as use of precision fertilizer spreader, and fertilizer management activities.	Deviation will be achieved during April-Sept, 2017	1,000	844
irrigation	This number captures farmers practicing supplement irrigation for wheat and maize (winter & spring).	Deviation will be achieved during April-Sept, 2017	700	594
water management (non-irrigation)	This number captures area under efficient water management practices such as laser land leveler and seeding time of wheat and maize (winter & spring).	Deviation will be achieved during April-Sept, 2017	1,400	918
climate mitigation or adaptation				
Other (Post harvest)	Actual number captures area covered by reaper on wheat harvesting.	Deviation will be achieved during April-Sept, 2017		233
total w/one or more improved technology				
Disaggregates Not Available				
Sex			12,800	8,234
Male	This number captures area operated by male farmers under improved agri. technologies such as new crop varieties, cultural practices, soil fertility, irrigation, water management and postharvest.	Deviation will be achieved during April-Sept, 2017	7,680	4,502
Female	This number captures area operated by female farmers under improved agri. technologies such as new crop varieties, cultural practices, soil fertility,	Deviation will be achieved during April-Sept, 2017	1,920	1,486

	irrigation, water management and postharvest.			
Joint	This number (ha) captures the area under improved technologies such as new crop varieties, cultural practices, soil fertility, irrigation, water management and postharvest by a joint decision of male and female member.	Deviation will be achieved during April-Sept, 2017	2,560	1,810
Association-applied	This number captures the area under improved technologies such as new crop varieties, cultural practices, soil fertility, irrigation, water management and postharvest handling etc. by a decision of group or association members.	Deviation will be achieved during April-Sept, 2017	640	437
Disaggregates Not Available				
Commodity **NEW**			12,800	8,234
Maize grain		This number captures cumulative area (ha) under various improved technologies adopted by beneficiary farmers on maize.		1,370
Wheat		This number captures cumulative area (ha) under various improved technologies adopted by beneficiary farmers on wheat.		5,504
Disaggregates Not Available		This number captures cumulative area (ha) under various improved technologies adopted by beneficiary farmers on lentil and mungbean.		1,361

Indicator / Disaggregation	2017 Comment	2017 Deviation Narrative	2017	
			Target	Actual
EG.5.2-1: Number of firms receiving USG-funded technical assistance for improving business performance (O)				
Type of Firm			710	542
Formal	This number counts the formal firms (registered in public organization) received technical assistance for their business performance improvement.	Target in this category seems low as compared to annual. Most of agricultural firms are legally registered so high chances of getting formal firms.	10	55
Informal	This number counts the informal firms (not registered in public organization) received technical assistance for their business performance improvement.	Deviation will be achieved during April-Sept, 2017	700	487
Disaggregates Not Available				
Duration				
New	This number counts the firms those received technical assistance from the CSISA for the first time during reporting period to improve their business performance.	Deviation will be achieved during April-Sept, 2017	710	542
Continuing				
Disaggregates Not Available				

CSISA-Nepal Mechanization and Irrigation

Indicator / Disaggregation	2017 Comment	2017 Deviation Narrative	2017	
			Target	Actual
4.5.2(39): Number of technologies or management practices in one of the following phases of development: (Phase I/II/III)				
Phase 1 Number of new technologies or management practices under research as a result of USG assistance				
Phase 2 Number of new technologies or management practices under field testing as a result of USG assistance				
Phase 3 Number of new technologies or management practices made available for transfer as a result of USG assistance	This number counts new technologies or management practices available for farmers.	No deviation. All planned five technologies such as solar irrigation, cheap boring, fertilizer broadcaster, self-propelled reaper, minitiller reaper are available for transfer.	5	5
Disaggregates Not Available				

Indicator / Disaggregation	2017 Comment	2017 Deviation Narrative	2017	
			Target	Actual
EG.3.2-17: (4.5.2-5) Number of farmers and others who have applied improved technologies or management practices with USG assistance (RAA) (WOG)				
Producers			2,000	1,665
Sex				
Male	This number counts male farmers applying improved agro-technologies such as adoption of various cultural practices, soil-related fertility conservation, water management and postharvest activities.	Deviation will be achieved during April-Sept, 2017	350	316
Female	This number counts female farmers applying improved agro-technologies such as adoption of various cultural practices, soil-related fertility conservation, water management and postharvest activities.	Deviation will be achieved during April-Sept, 2017	150	140
Disaggregates Not Available	This number counts the farmers, not identifiable by sex, applying improved agro-technologies such as adoption of various cultural practices, soil-related fertility conservation, water management and postharvest activities.	Deviation will be achieved during April-Sept, 2017	1,500	1,209
Technology type	The actual number counts cumulative technology adopters adopting various improved technologies.		2,000	1,726
crop genetics				
cultural practices	This number counts farmers adopting improved agro-technologies and management practices such as seed drill and crop intensification activities under cultural practices.	Deviation will be achieved during April-Sept, 2017	225	153
livestock management				
wild fishing technique/gear				
aquaculture management				
pest management				
disease management				
soil-related fertility and conservation	This number counts farmers adopting soil-related fertility conservation practices such as use of precision fertilizer spreader, and adoption of fertilizer management activities.	Deviation will be achieved during April-Sept, 2017	125	70

	irrigation				
	water management (non-irrigation)	This number counts farmers adopting laser land leveler for agricultural land development to increase water use efficiency.	Deviation will be achieved during April-Sept, 2017	75	48
	climate mitigation or adaptation				
	marketing and distribution				
	post-harvest - handling and storage	This number counts the farmers harvesting wheat crop by reaper.	Deviation will be achieved during April-Sept, 2017	1,575	1,455
	value-added processing				
	other				
	total w/one or more improved technology (Not Applicable) (NA)				
	Disaggregates Not Available				

Indicator / Disaggregation	2016 Comment	2016 Deviation Narrative	2017	
			Target	Actual
EG.3.2-18: (4.5.2-2) Number of hectares of land under improved technologies or management practices with USG assistance (RAA) (WOG)				
Technology type			2000	1290
crop genetics				
cultural practices	This number captures area under improved agro-technologies and management practices such seed drill and crop intensification activities under cultural practices.	Deviation will be achieved during April-Sept, 2017	60	53
pest management				
disease management				
soil-related fertility and conservation	This number captures area under soil-related fertility conservation practices such as use of precision fertilizer spreader, and adoption of fertilizer management activities.	Deviation will be achieved during April-Sept, 2017	30	22
irrigation				
water management (non-irrigation)	This number captures area developed by laser land leveler to increase water use efficiency.	Deviation will be achieved during April-Sept, 2017	30	27
climate mitigation or adaptation				
Other (Post harvest)	This number captures wheat area harvested by reaper.	Deviation will be achieved during April-Sept, 2017	1,880	1,189
total w/one or more improved technology				
Disaggregates Not Available				
Sex				
Male	This number captures area operated by male farmers under improved agro-technologies such as adoption of various cultural practices, soil-related fertility conservation, water management and postharvest activities.	Deviation will be achieved during April-Sept, 2017	70	59
Female	This number captures area operated by female farmers under improved agro-technologies such as adoption of various cultural practices, soil-related fertility conservation, water management and	Deviation will be achieved during April-Sept, 2017	25	16

	postharvest activities.			
Joint				
Association-applied	This number captures the area under improved technologies such adoption of various cultural practices, soil-related fertility conservation, water management and postharvest activities by a decision of a group or association members.	Deviation will be achieved during April-Sept, 2017	25	16
Disaggregates Not Available			1,880	1,189

Indicator / Disaggregation	2017 Comment	2017 Deviation Narrative	2017	
			Target	Actual
EG.5.2-1: Number of firms receiving USG-funded technical assistance for improving business performance (O)				
Type of Firm			300	107
Formal	This number counts the formal firms (registered in public organization) receiving technical assistance for firm's business performance improvement.	Deviation will be achieved during April-Sept, 2017	25	16
Informal	This number counts the informal firms (not registered in public organization) receiving technical assistance for firm's business performance improvement.	Deviation will be achieved during April-Sept, 2017	275	89
Disaggregates Not Available				
Duration				
New	This number counts the firms receiving technical assistance from the CSISA for the first time during reporting period to improve firm's business performance.	Deviation will be achieved during April-Sept, 2017	100	44
Continuing	This number counts the firms receiving technical assistance from the CSISA to improve firm's business performance during last reporting period and continued in this period, as well.	Deviation will be achieved during April-Sept, 2017	200	63
Disaggregates Not Available				