



USAID
FROM THE AMERICAN PEOPLE

NEPAL SEED AND FERTILIZER PROJECT ANNUAL REPORT YEAR 2 1 OCTOBER 2017 – 30 SEPTEMBER 2018

COOPERATIVE AGREEMENT NUMBER: AID-367-IO-16-00001
NAME OF AOR: BELAY MENGISTU



This document was produced for review by the United States Agency for International Development. It was prepared by the International Maize and Wheat Improvement Center (CIMMYT). The contents of this document do not necessarily reflect the views of USAID or the United States Government.

NEPAL SEED AND FERTILIZER PROJECT
ANNUAL REPORT YEAR 2
1 OCTOBER 2017 - 30 SEPTEMBER 2018

DISCLAIMER

This report is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of CIMMYT and do not necessarily reflect the views of USAID or the United States Government.

CONTENTS

Contents	i
Figures	ii
Tables	iii
Photos	v
Abbreviations	vi
1 Introduction	1
2 Strategic Developments	3
2.1 Main Project Strategic Thrusts	3
2.2 Project Outputs	5
2.3 Project Yield Improvement Paradigm	5
3 Activity Highlights in Project Year 2	8
3.1 Technical Progress.....	8
3.2 Capacity Development Progress.....	9
3.3 Knowledge Dissemination Progress.....	10
3.4 Collaboration and Partnership Progress	11
4 Description of Progress	12
4.1 IR 2.1: Agriculture-Based Income Increased	12
4.2 IR 2.2. Small Enterprise Opportunities Expanded.....	34
4.3 IR 2.4. Economic Growth Policy and Performance Improved	45
5 Cross Cutting Activities	56
5.1 Monitoring, Evaluation and Learning.....	56
5.2 Communicating for Impact.....	57
5.3 Gender Equity and Social Inclusion	59
5.4 Project Management	60
6 Management Challenges and Responses	65
6.1 Anticipated Challenges, Risks and Mitigation Measures	65
6.2 Security.....	66
6.3 Environmental Compliance.....	66
7 Plans for 2018/2019.....	67
Annex 1: Nepal Seed and Fertilizer Project Results Framework, 2018.....	68
Annex 2: Achievement of Indicators Vs Targets.....	69
IR 2.1: Agriculture-based income increased.....	69
IR 2.2: Small enterprise opportunities expanded.....	76
IR 2.4. Economic growth policy and performance improved	80
Annex 3: Further Details of Achievements	83
Annex 4: Feed The Future Monitoring System (FTFMS) Disaggregated Data Tables	90
Annex 5: NSAF Project Indicators.....	106

FIGURES

Figure 1.1:	The NSAF project’s 26 working districts	2
Figure 2.1:	NSAF project’s achievements against targets in 2017/18 (project year 2) (Beneficiary Based Survey, 2018).....	6
Figure 2.2:	The NSAF project’s approach to scaling up and scaling out technologies to achieve planned yield targets.....	7
Figure 4.1:	Seed production plans (MT) of the four project-supported seed companies, 2018–2022.14	
Figure 4.2:	Yield of Khumal Hybrid-2 maize (demo) and BISCO-940 (local control) of varietal demonstration (MT/ha) at different parts of Salyan in 2018.....	16
Figure 4.3:	Grain yield (MT/ha) of demonstrations of lentil variety Simal conducted in the Far-West of Nepal applying best management practices	16
Figure 4.4:	Wheat grain yields from project fertilizer field trials and demonstration plots. Note: Plot 1 is government recommended practices and Plot 9 is polymer coated urea treatment.....	20
Figure 4.5:	Cauliflower curd yields in project fertilizer field trials (custom fertilizer blend is Treatment 8 and government recommendation is Treatment 11).....	20
Figure 4.6:	Tomato fruit yields in project fertilizer field trials (briquetted urea is Treatment 4 and government recommendation is Treatment 5).	20
Figure 4.7:	Soil pH map of the Tarai, 250m x 250m resolution.....	23
Figure 4.8:	The interactions and intended impacts of NSAF project-supported digital analytical systems	24
Figure 4.9:	Screenshot from QED crowd-sourcing online app showing how the maps were made.	25
Figure 4.10:	Section of first-generation QED-produced map. Blue and red rectangles are individual houses; green lines are roads.....	25
Figure 4.11:	Wheat yields from precision fertilizer application trial demos. Plot A is wheat yield from seed-cum-fertilizer drills; plot B is wheat yield from hand row planting; plot C is yield from precision fertilizer broadcasters, plot D is farmers’ practices yields.....	27
Figure 4.12:	The import and distribution of market-ready maize products in NSAF project districts	30
Figure 4.13:	Left: Trends of children malnutrition in Nepal (%). Right: Province-wise rates of stunting among preschool children (<5 years) (Source: NDHS 2016)	31
Figure 4.15:	Plantix image and diagnostics dashboard for Nepal, showing seasonal and geographic distribution of crop health data across Nepal.....	41
Figure 4.16:	Real-time data dashboard from a Spero Analytics soil moisture sensor	41
Figure 4.17:	NSAF’s seed producers financing model.....	44
Figure 4.18:	Maize production suitability areas based on climate, soil and terrain analysis.....	46
Figure 4.19:	Rice production suitability area based on climate, soil and terrain analysis	46
Figure 4.20:	Screen shot of a mock Digital Seed Catalogue being developed under the DESS.	47
Figure 5.1:	Project supported lentil, maize and rice seed packaging.....	58
Figure 5.2:	Leaflet (left) and smartphone app (right) promoting information on fertilizer top dressing timings to increase maize productivity.....	58
Figure 5.3:	Pages from best management practice extension materials for growing tomatoes and cauliflowers	58
Figure 5.4:	Sample page of the training manual for rice.....	59

Figure A3.1: Box plot of grain yield of nine zinc fortified maize varieties in Nepal85

TABLES

Table 4.1: NSAF’s strategies for promoting maize, rice, lentils and vegetable seed sector improvements.18

Table 4.2: Change in performance of seed companies after project interventions49

Table 5.1: NSAF projects contribution to gender equity and social inclusion in 2017/1860

Table 6.1: NSAF project management challenges and responses, October 2017–September 2018.....65

Table 6.2: Risks facing the NSAF project and planned mitigation measures.....66

Table A2.1: Indicator EG 3-1: Number of households benefiting directly from USG interventions69

Table A2.2: Indicator EG 3-6: Farmer’s gross margin per hectare, obtained with USG assistance70

Table A2.3: Indicator EG 3.2-2: Number of individuals who have received USG supported degree-grant in agricultural sector productivity or food security training.....70

Table A2.4: Indicator EG 3.2-17: Number of farmers and others who have applied improved technologies or management practices with USG assistance.....71

Table A2.5: Indicator G 3.2-18: Number of hectares of land under improved technologies or management practices with USG assistance.....72

Table A2.6: Indicator EG 11-6: Number of people using climate information or implementing risk-reducing actions to improve resilience to climate change as supported by USG assistance.....73

Table A2.7: Indicator Custom-1 (4.5.2-Z14): Total quantity of target value chain commodities produced by direct beneficiaries with USG assistance that is set aside for home consumption.....74

Table A2.8: Indicator STIR-10: Number of innovations supported through USG assistance.....75

Table A2.9: Indicator STIR-11 Number of innovations supported through USG assistance with demonstrated uptake by the public and/or private sector.....75

Table A2.10: Indicator EG 3.2-7: Number of technologies or management practices under research, under field testing, or made available for transfer as a result of USG assistance’75

Table A2.11: Indicator EG 3.2-20: Number of for-profit private enterprises, producers’ organizations, water user associations, women’s groups, trade and business associations and community-based organizations (CBOs) that applied improved organization-level technologies or management practices with USG assistance76

Table A2.12: Indicator EG 5.2-1: Number of firms receiving USG-funded technical assistance for improving business performance.....76

Table A2.13: Indicator EG 3.2-1: Number of individuals who have received USG supported short-term agricultural sector productivity or food security training.....77

Table A2.14: Indicator EG 3.2-4: Number of for-profit private enterprises, producer organizations, water user associations, women’s groups, trade and business associations, and CBOs receiving USG food security related organizational development assistance78

Table A2.15: Indicator EG 3-10: Yield of targeted agricultural commodities within target areas [IM-level] [MT/ha]79

Table A2.16: Indicator Youth 3: Percentage of participants in USG-assisted programs designed to increase access to productive economic resources who are youth (15-29 years) [IM-level].....79

Table A2.17: Indicator EG 3.2-3: Number of micro, small, and medium enterprises (MSMEs), including farmers, receiving agricultural-related credit as a result of USG assistance.....79

Table A2.18: Indicator GNDR-2: Percentage of female participants in USG-assisted programs designed to increase access to productive economic resources [IM-level].....80

Table A2.19: Indicator EG 3.2-19: Value of small-holder incremental sales generated with USG assistance80

Table A2.20: Indicator EG 3.2-5: Number of public-private partnerships formed as a result of USG assistance	82
Table A2.21: Indicator EG 5.2-2: Number of private sector firms that have improved management practices or technologies as a result of USG assistance.....	82
Table A3.1: Grain yield performance of the top ten single and three-way cross yellow maize hybrids tested at various locations, winter 2017/18	83
Table A3.2: Grain yield performance of top ten white maize hybrids and OPVs at various locations in winter 2017/18.....	83
Table A3.3: Grain yield performance (MT ha-1) of zinc-enriched maize varieties.....	84
Table A3.4: Grain yield performance (MT ha-1) of top ten quality protein maize hybrids (total entries = 34)	84
Table A3.5: Grain yield performance (MT ha-1) of top ten pro-vitamin A hybrids (total entries=20)....	85
Table A3.6: Analysis of public and private stakeholders on target crop variety research, seed production and distribution in Nepal (before NSAF interventions).....	86
Table A3.7: Analysis of public and private stakeholders on variety research and seed production in Nepal (after NSAF interventions)	86
Table A3.8: NSAF hybrid seed road map indicating amount of seed and area required for production and sales targets of a single cross-hybrid maize.....	87
Table A3.9: NSAF hybrid seed road map indicating the amount of seed and area needed for the production and sales targets of a single cross hybrid maize.....	88
Table A3.10: Assumptions for seed roadmap	89
Table A3.11: Projection of beneficiaries based on NSAF's hybrid maize seed road map	89
Table A5: NSAF performance indicators FY 2016– FY 2021	106

PHOTOS

Photo 4.1: NSAF team at SEAN Seed Service Centre onion demonstration in Salyan. (Credit: CIMMYT)	15
Photo 4.2: NSAF project field staff helping plant a rice varietal demonstration in Dangand field day in Kailali. (Credit: CIMMYT)	17
Photo 4.3: Farmer field day at a lentil varietal demonstration, Unique Seed Company (Credit: Darbin Joshi)	18
Photo 4.4: USAID delegation and experts interacting with seed grower group at Panchashakti Biu Company (Credit: Darbin Joshi)	18
Photo 4.5: Polymer coated urea (left) and briquetted urea (right) (Credit: David Guerena)	21
Photo 4.6: NEFEA’s president visiting a urea briquetting operation in Bangladesh (left) and visiting the Fertilizer Association of Bangladesh (Credit: Yam Gaihre)	22
Photo 4.7: The Dallakoti Group’s urea briquetting machine in operation (Credit: Sharad Rai)	22
Photo 4.8: Second generation spectrometer.	26
Photo 4.9: Initial prototype of low-cost hand-held near-infrared spectrometer (Credit: William Wu)	26
Photo 4.10: NSAF project maize trials: A. Surkhet Agricultural Research Station and private seed companies; B. Lumbini Seed Co. (Rupandehi); C. Panchashakti Biu Company (Kanchanpur) and D. Unique Seed Company (Kailali) in 2017/18 (Credits: Darbin, Gangaram, Rajendra, Laxmi)	30
Photo 4.11: Biofortified maize harvested by Pachashakti Seed Company (Credit: Darbin Joshi)	32
Photo 4.12: Soil spectroscopy trainees at soil spectroscopy diagnostic laboratory of the World Agroforestry Centre, Nairobi, Kenya (Credit: Grace Ndege)	33
Photo 4.13: NARC staff working with QED on advanced analytics for soil spectrometry. (Credit: David)	33
Photo 4.14: Participants of international training program on hybrid seed business management, Kathmandu (Credit: CIMMYT)	36
Photo 4.15: Participants of the statistical data analysis training. (Credit: Bandana Pradhan)	36
Photo 4.16: Participants in the new maize breeders training course in Kampala (Credit: CIMMYT)	37
Photo 4.17: The traditional extension approach: The project-produced best management practices brochure on maize cropping (left) and farmers practising fertilizer application techniques at an ISFM training event. (Credit: R. Gupta)	42
Photo 4.18: Participants of national lentil workshop in discussion and field visits to NGLRP and NSAF’s seed multiplication fields in Khajura, Banke (Credit: Darbin Joshi)	49
Photo 4.19: Meeting of NSAF and GATE-Nepal team with Baijanath Municipality, Banke. (Credit: CIMMYT)	55
Photo 5.1: NSAF materials and technologies displayed at the USAID SEED meeting on 25 September 2018 (Credits: David Guerena; Bandana Pradhan)	59
Photo 5.2: USAID SEED team visiting project maize hybrid and lentil variety trials, March 2018 (Credit: Darbin Joshi)	62
Photo 5.3: USAID SEED team visiting NSAF field activities, Khajura RARS, Banke (Credit: Darbin Joshi)	63

ABBREVIATIONS

4Rs	right source, right rate, right time, right place
AOR	Agreement Officer Representative
ARS	agricultural research station
BBS	Beneficiary-based Survey
BMP	best management practice
CBSP	community-based seed production
CEAPRED	Center for Environmental and Agricultural Policy Research, Extension and Development
CIMMYT	Centro Internacional de Mejoramiento de Maíz Y Trigo (International Maize and Wheat Improvement Center)
CSISA	Cereal Systems Initiative for South Asia
CTEVT	Council for Technical Education and Vocational Training
CV	coefficient of variation
D2FTF	Digital Development for Feed the Future
DAP	diammonium phosphate
DESS	Digitally Enabled Seed System
DNA	disaggregation not available
DoA	Department of Agriculture (Nepal)
DQA	data quality assessment
EG	economic growth (indicator)
FY	fiscal year
GATE	GATE-Nepal (GATE)
GESI	gender equity and social inclusion
GFSS	Global Food Security Strategy
GIS	geographic information system
GNDR	gender
ha	hectare
HH	household
HTMA	Heat Tolerant Maize for Asia
ICARDA	International Center for Agriculture Research in the Dry Areas
ICT	information and communications technology
IFDC	International Fertiliser Development Center
IITA	International Institute of Tropical Agriculture
IR	intermediate result
ISFM	integrated soil fertility management
IVR	interactive voice response
KISAN	Knowledge Based Integrated Sustainable Agriculture and Nutrition
LSD	least square difference
M&E	monitoring and evaluation
MoALD	Ministry of Agriculture and Livestock Development
MoF	Ministry of Finance
MSME	micro, small and medium-sized enterprises
MT	metric tonnes
NARC	Nepal Agricultural Research Council
NASIC	Nepal Agro Seeds and Inputs Company Pvt. Ltd
NDHS	Nepal Demographic and Health Survey
NEFEA	Nepal Fertilizer Entrepreneurs Association
NGLRP	National Grain Legume Research Programme
NGO	non-governmental organization

NMRP	National Maize Research Programme
NPC	National Planning Commission
NPR	Nepali rupees
NRRP	National Rice Research Program
NSAF	Nepal Seed and Fertilizer (project)
NTC	Nepal Telecommunications Corporation
OPV	open-pollinated variety
PAHAL	Promoting Agriculture Health and Alternative Livelihoods
PMAMP	Prime Minister Agriculture Modernization Project
PPP	public-private partnership
QED	Quantitative Engineering Design
QPM	quality protein maize
R&D	research and development
RARS	regional agricultural research station
SA	semi-annual
SABAL	Sustainable Action for Resilience and Food Security
SEAN	Seed Entrepreneurs' Association of Nepal
SEED	Social Environmental and Economic Development (office, USAID)
SMS	short message service
SOP	standard operating procedures
SQCC	Seed Quality Control Center
SSSC	SEAN Seed Service Centre
STIR	Standard Foreign Assistance Indicator
STRASA	Stress Tolerant Rice for Africa and South Asia
STRASA	Stress-Tolerant Rice for Africa and South Asia
USAID	United States Agency for International Development
USD	US dollars
USG	United States Government
VC	value chain

I INTRODUCTION

The Feed the Future Nepal Seed and Fertilizer (NSAF) project was awarded to the International Maize and Wheat Improvement Center (CIMMYT) by the United States Agency for International Development in Nepal (USAID Nepal). The project began on 1 April 2016 and will run for five years until 31 March 2021. It is designed to contribute to the goal of the US government's Global Food Security Strategy (GFSS) of inclusive and sustainable economic growth to reduce extreme poverty and GFSS Nepal Country Plan objective 2 of inclusive and sustainable agriculture led economic growth.

The project aims to strengthen the country's seed and fertilizer systems by:

- enhancing the capacity and role of public, private and community sectors in the seed and fertilizer value chains through the provision of technical and business development services;
- improving private sector access to inbred lines and research knowledge from national and international research institutions; and
- enhancing public-private partnerships and coordination by establishing a tripartite research forum and a seed and fertilizer information system at the national level.

The project is being implemented in collaboration with a number of public and private sector actors including the Nepal Agricultural Research Council (NARC), the Department of Agriculture (DoA), the International Fertilizer Development Center (IFDC), the Center for Environment and Agricultural Policy Research, Extension and Development (CEAPRED), Quantitative Engineering Design (QED), agro-input companies, and other in-country Feed the Future initiatives.

The project is working on rice, maize, lentils, onions, cauliflower, and tomatoes in the following 26 districts which comprise the 21 districts in Feed the Future's Zone of Influence and the five earthquake-affected districts from Province 3:¹

- Province 7: 6 districts – 4 hill, 2 Terai (Achham, Baitadi, Dadeldhura, Doti, Kailali and Kanchanpur)
- Province 6: 5 hills districts (Dailekh, Jajarkot, Salyan, West Rukum and Surkhet)
- Province 5: 10 districts – 6 hill, 4 Terai (Arghakhanchi, Gulmi, Palpa, Pyuthan, Rolpa, East Rukum, Kapilvastu, Banke, Bardiya and Dang)
- Province 3: 5 earthquake-affected hill districts (Sindhuli, Kavre, Makwanpur, Nuwakot and Sindhupalchowk).

The project also benefits most of Nepal's other districts by strengthening the policy environment and the nationwide value chain related to crop seed and fertilizers.

The project has 16 outcomes (see Results Framework at Annex I). Nine outcomes come under the seed value chain component (the Seed Component), which is aimed at sustainably enhancing access to elite and adapted seeds of rice, maize, lentils and high-value vegetables by systematically deploying suitable varieties, enhancing the production of quality seed of such varieties, and supplying those seeds to farming communities through efficient distribution and marketing networks. The other seven objectives come under the Fertilizer Component, which aims to sustainably catalyze the adoption of integrated soil fertility management (ISFM) practices at scale through value chain approaches that integrate innovation with market development and entrepreneurship strengthening. The outcomes are aligned with USAID's GFSS Nepal Country Plan.

¹ Note that Rukum district was split into Rukum East and Rukum West districts after the project started.

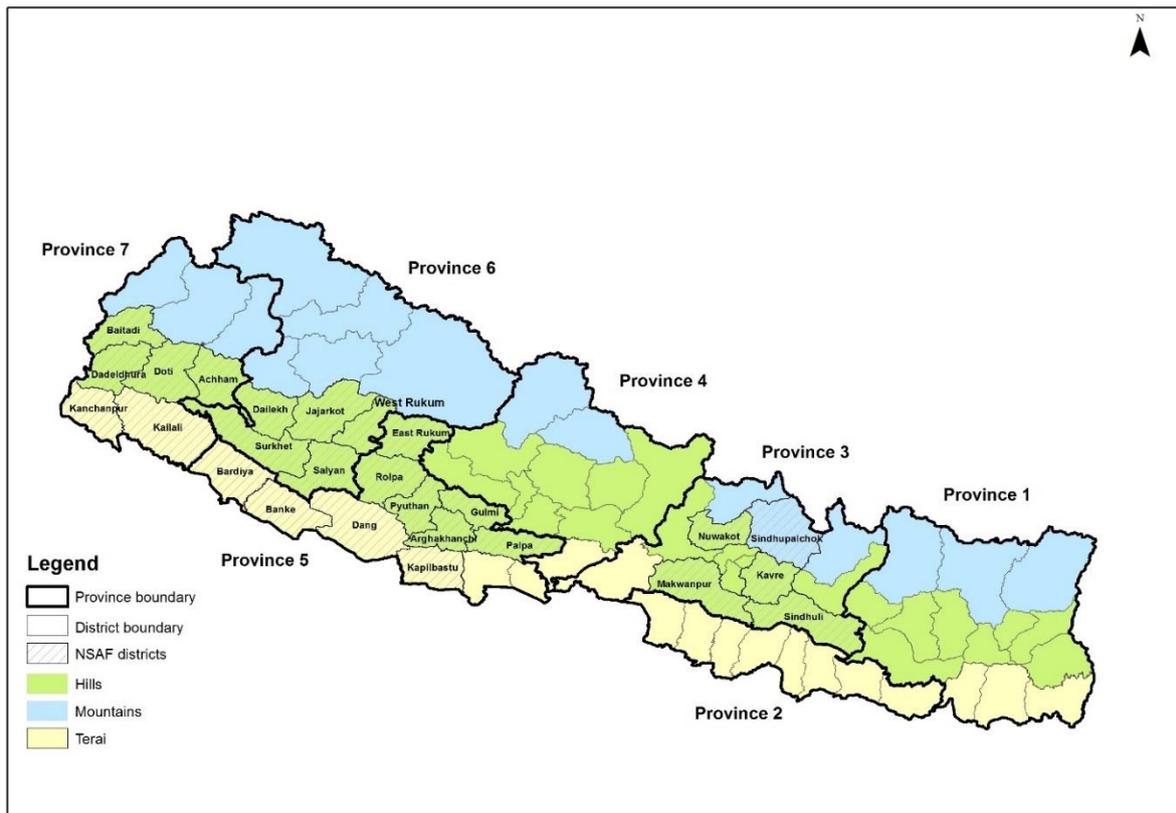


Figure I.1: The NSAF project’s 26 working districts

This report is the technical progress report for year 2 of the NSAF project, which ran from October 2017 to September 2018. This report describes the activities completed in relation to the project’s work plan and assesses progress relative to the 21 performance indicator targets (see Annex 5). It also analyses issues and problems encountered during implementation.

Following this introduction, Chapter 2 summarizes the main strategic developments in the reporting period. Chapter 3 summarizes the main technical progress while Chapter 4 is an in-depth writeup on the progress against the project’s 3 intermediate and 16 sub-intermediate results. Chapter 5 gives the progress on the cross-cutting areas including monitoring and evaluation, communication and project management. Chapters 6 and 7 describe the management issues and the planned activities for year 3 of the project (2018/19).

Annex 1 is the project’s results framework for 2017/18. Annex 2 gives details of achievement of indicators vs targets in 2017/18 and deviation narratives. Annex 3 gives further details of achievements while Annex 4 presents the Feed the Future Monitoring System disaggregated data tables. The project’s 21 indicators are listed in Annex 5.

2 STRATEGIC DEVELOPMENTS

Between October 2017 and September 2018, the project made large contributions to its core strategic areas and enhanced its strategic partnerships with the government, international agencies, and the private sector to facilitate strong seed and fertilizer systems in Nepal and for the sustainability of project investments.

2.1 Main Project Strategic Thrusts

Soil Fertility Management

Improving soils is fundamental to improving crop yields. The project promotes integrated soil fertility management (ISFM). The diverse range of soils means that a one-size-fits-all approach is inappropriate for soil fertility management in Nepal. The project's soils and fertilizer components address this complexity by combining modern data and analytical tools and robust agronomic validation trials to provide site-specific integrated fertilizer and seed product packages.

The project has aggregated georeferenced soil data and combined it with satellite imagery and advanced machine learning algorithms to create high-resolution digital soils maps for Nepal's Terai southern plains. The project is using these maps to identify unique soil domains with same or very similar soil types. It is conducting on-farm field trials within domains to evaluate and validate the yield potential and economic returns of fertilizers, seeds and agronomic practices for the target crops. It is also working with the government, designers and farmers to create high-quality agricultural extension materials, many of which have been endorsed by the government. Project outputs are enabling the government and private sector to make improved soil and fertilizer techniques more accessible for farmers.

The introduction and promotion of hybrid and open-pollinated seed varieties

About 10%–15% of the 0.9 million ha of maize grown in Nepal annually is hybrid maize. All hybrid maize seed is imported, which makes maize costly for smallholder farmers. Also, Nepal spends about \$100 million a year importing maize grain only for poultry feed. The government's seed sector-related policies (National Seed Vision 2013-25 and Agriculture Development Strategy 2015) aim for self-reliance in the production of hybrid seed and the establishment of a vibrant and competitive seed sector and commercial agriculture in Nepal. It is thus a priority to strengthen the local production of hybrid maize seed. However, the in-country development of hybrid maize products requires specialized skills that are mostly lacking in Nepal and it takes at least 6–8 years or seasons to develop suitable locally adapted products. Considering these limitations, the project is working to fast track varietal development, release and seed production by bringing in market ready pre-commercial products from international breeding hubs for adaptation testing.

The project is mentoring Nepalese public and private sectors to support and run viable and competitive businesses that sell affordable quality seeds. Once well-adapted hybrids are identified, parental lines will be accessed to reconstitute the products locally. This approach of using publicly available products from elsewhere is an effective way of delivering hybrid seeds to farmers. The approach also encourages seed companies to take a more proprietary breeding approach to lead or heavily participate in the major components of the hybrid seed system.

Introducing ICT platforms for farmers and other stakeholders

The wide access to mobile and smart phones provides great potential for reaching farmers and other agricultural stakeholders with information on improved seed and soil management technologies. In this

period, the project built on its previous work to transition from the development of information and communications technology (ICT) products to pilot-testing them for scaling out. This included comparing the impact and potential for scaling out extension programs through face-to-face meetings, radio spots, interactive voice responses (IVR), and a smartphone app. Among others, the project is working with three winners of USAID's Data Driven Farming prize (2017) on digital-based innovations.

An assessment of the scaling out potential of digital tools is underway to inform the project how to scale out its ICT agricultural extension tools. The project also supported seminars and workshops on the use of digital tools in agriculture for USAID partner projects and made good progress on developing a digital soil map and rolling out government-endorsed best management practice materials for target crops via short message service (SMS) and IVR.

The project is working with the government and the private sector to develop a Digitally Enabled Seed System (DESS) to give farmers and other users improved access to information and services. The project is facilitating the Seed Quality Control Centre (SQCC) of the Ministry of Agriculture and Livestock Development (MoALD) to streamline the collection and use of seed supply and demand data and enhance seed information collation and dissemination. The digitization of data collection and management processes is aimed at improving data management and facilitating automated data validation, smart automated formulas, and outputs to inform decision making.

Supporting improved policies

Fertilizers – The availability of fertilizers is a politically sensitive issue in Nepal. A key focus of the project is to provide objective evidence and sound technical advice to the government on the most effective means of achieving its goals and objectives on national fertilizer use. In 2017/18, the project generated evidence on fertilizer demand, supply and farmers' willingness to pay:

- At the request of the National Planning Commission (NPC), the project is supporting a review of the government's strategy for establishing a urea plant.
- The project proposed the idea of establishing a fertilizer blending plant to the NPC, Investment Board Nepal and MoALD based on the science-driven approach of domain-specific soil fertility management using interactive soil maps, which the project is producing.
- Six key stakeholders were supported to witness the production and distribution of blended fertilizer in Kenya. The government delegation has since submitted a report to MoALD's secretary highlighting the needs to i) modify the current subsidy system to encourage more balanced fertilizer application; ii) introduce an agro-ecological domain specific fertilizer subsidy strategy that accounts for the variation in soil properties and types of farmers, and iii) to establish fertilizer blending plants in Nepal.²

Hybrid seed licensing and quality standards – To encourage private sector involvement and investment in the hybrid seed business, the project is supporting the development of guidelines on hybrid product licensing and hybrid seed quality control standards. Draft guidelines have been produced on private sector involvement in hybrid seed development, seed production, collection, processing, use and promotion of quality seed. The intention is for the private sector to get exclusive licenses for released hybrid varieties and parental lines. The guidelines stipulate the terms for handing publicly developed varieties to the private sector and will call for incentivizing the sector to promote import substitution and export promotion. The project is also working with government stakeholders to develop seed quality standards for hybrid seed production and certification.

² Note that fertilizer blends are fertilizers whose composition is formulated to meet the particular nutrient needs of soils and crops.

Seed finance – Many seed businesses in Nepal lack access to appropriate finance. The project has identified the main constraints for them to access finance and brought these issues to the attention of private and public banks, MoALD and SQCC. The project is supporting evidence-based policy lobbying by developing policy recommendations and conducting policy roundtables and banker orientation meetings on the subject.

2.2 Project Outputs

Informed by the project's baseline survey and consultations with public and private collaborators, the project is working on both 'low hanging' opportunities (the refinement and promotion of existing technologies) and medium-term opportunities (developing new crop product packages) for sustainable economic gains at the farmer level. The project's market-driven activities and innovations are centered around the four action areas of ISFM, improved crop seed, ICT platforms and policy research. The related activities are already contributing to agricultural growth in the project's targets areas. Figure 2.1 shows the main project interventions, activities and progress during the reporting period.

2.3 Project Yield Improvement Paradigm

The project has developed seed and soil fertility management technologies that are ready to be scaled up and disseminated to reach Nepal's farmers, extension agents, agrovets, development projects and farmer institutions. It is investing heavily in product development and testing. These investments have already resulted in technologies that increase yields, improve the adaptability of farming systems and enhance economic efficiency. Further refinement and validation are being carried out to develop socially acceptable, environmentally sustainable and commercially viable improved varieties, better fertilizers and appropriate management techniques. The project's overall approach is to focus on demand-driven and science-led innovations and interventions that foster inclusive agricultural growth, economic development and food security. Figure 2.2 shows the project's pathway for bridging the productivity gaps in cereal crops by the end of the project in 2021.

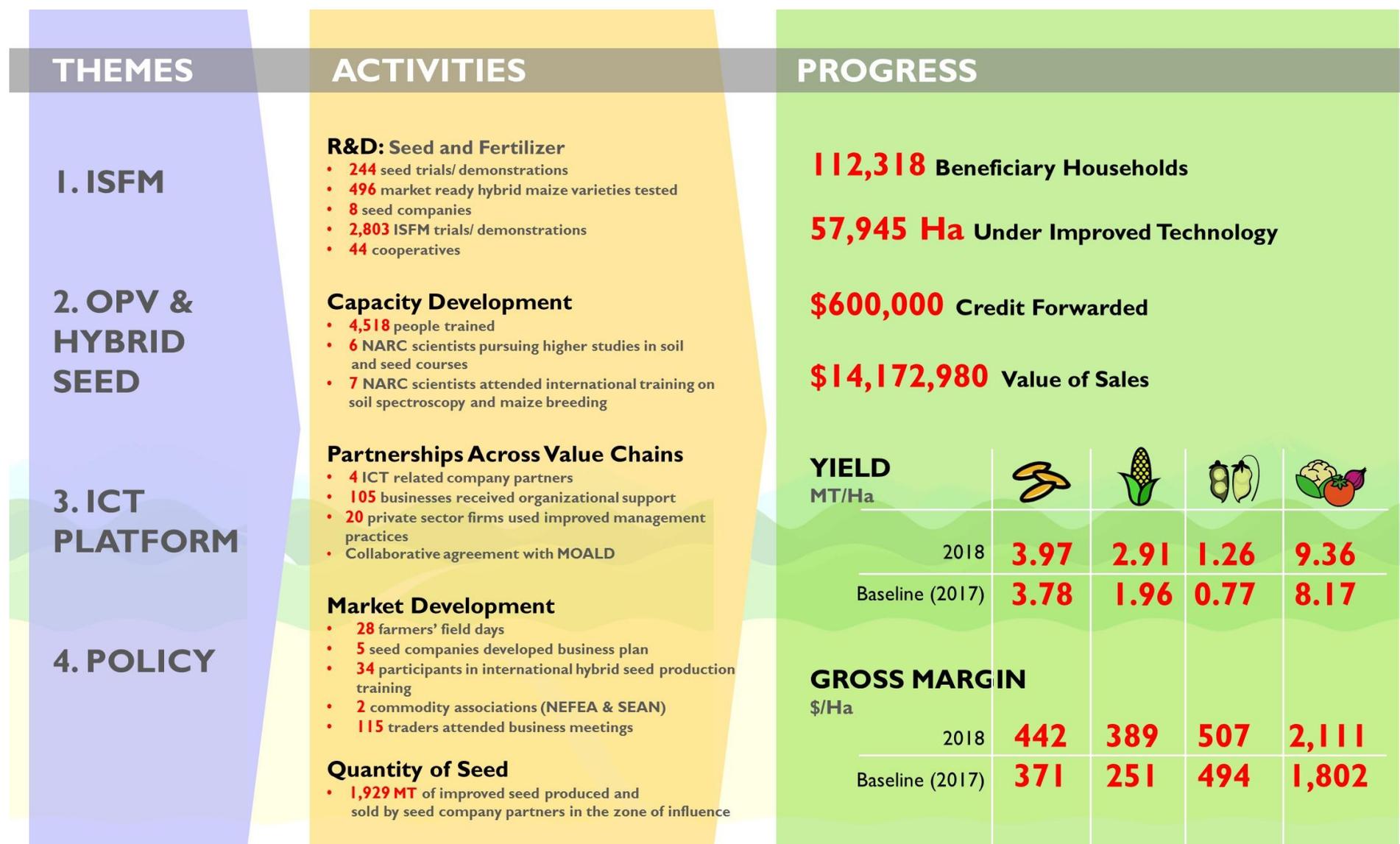


Figure 2.1: NSAF project's achievements against targets in 2017/18 (project year 2) (Beneficiary Based Survey, 2018)

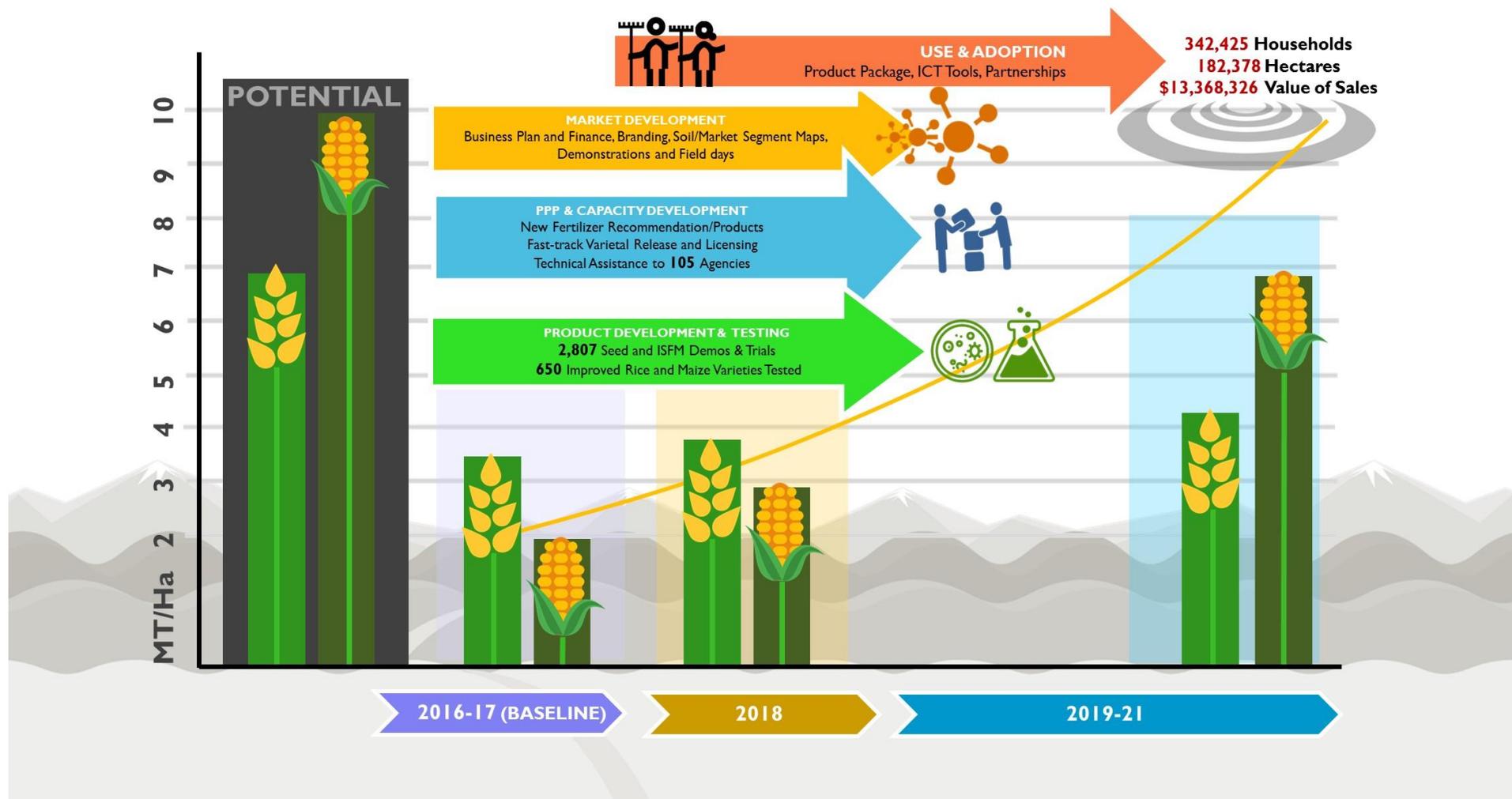


Figure 2.2: The NSAF project's approach to scaling up and scaling out technologies to achieve planned yield targets

3 ACTIVITY HIGHLIGHTS IN PROJECT YEAR 2

3.1 Technical Progress

- A total of 112,318 households (of which 51% were women-headed households) benefited from project interventions on improved agricultural technology and management practices.
- Eight seed company partners produced and sold 1,929 MT of seeds, 1,598 MT of rice, 305 MT of maize, 19 MT of lentils, 0.6 MT of cauliflowers, 5.9 MT of onions and 0.3 MT of tomatoes.
- A total of 57,945 hectares of land was covered by project interventions for improved crop varieties.
- 'Incremental sales' of \$14,172,980 of the six targeted crops were achieved by project beneficiary farmers.
- Conducted 48 rice demonstrations, 27 maize demos, 9 lentil demos; 3 onion demos (Red Creole); and 5 tomato demos (Sirjana).
- The project's maize varietal demonstrations produced 147% more yield than the local check variety (5.97 MT/ha for improved maize variety Rampur Composite and 2.42 MT/ha for local check).
- The seed yield of the Rampur Composite increased by 14% to 7.1 MT/ha after applying the project's best management practice compared to normal seed production practices.
- Seventeen types of maize trials consisting of 496 hybrids, OPVs, bio-fortified varieties and local checks were evaluated by five public and seven private sector partners. This products evaluation network is the first large-scale maize testing in Nepal involving the public and private sectors.
- The project, for the first time in Nepal, introduced 182 biofortified maize hybrids enriched with zinc, provitamin A and quality protein maize for evaluation against 9 local check varieties during 2017/18.
- As part of NSAF-HTMA collaboration in Nepal, the project tested 28 heat stress tolerant hybrids during spring 2018. Preliminary results show good selection potential of the hybrids. In addition, the project is supporting the seed production of two heat stress tolerant hybrids released in collaboration with seed company partners as part of the projects approach of leveraging its resources with other USAID projects in Nepal.
- Started evaluating winter maize hybrids to grow on rice fallow cropping systems in the Mid-Western and Far Western Terai. The highest yield of 14 MT/ha was recorded for yellow maize hybrids.
- The project supported partner seed companies for the first time to engage in the parental line increase and hybrid seed production of locally developed hybrids sourced from NMRP.
- The project validated CEAPRED's trouble-shooting module for cauliflower, onion and tomato cropping and prepared standard operating procedures (SOPs) for varietal and seed production demonstrations of cereals and vegetables. The SOPs are under validation.
- The project facilitated SQCC to develop hybrid licensing guidelines and a national seed information system. The working committee has prepared draft hybrid licensing guidelines, which now need reviewing and validating.
- The first phase of the digitally enabled seed system was validated by public and private seed sector stakeholders.
- The project established 2,134 research plots and 669 demonstration plots for its target crops;
- The analytics of the first year of the project's field trials showed the following results:
 - 42% increase in rice grain yield above farmer practices after the use of improved practices – from 4.4 to 6.3 MT/ha.

- Almost the same rice grain yields after applying polymer coated urea (grain yield: 5.9 MT/ha) and briquetted urea (grain yield: 6.0 MT/ha) compared to government fertilizer recommendations (grain yield: 6.0 MT/ha), while reducing nitrogen application by 51%.
- 95% increase in maize grain yields with improved practices above farmer practices – from 4.5 to 8.8 MT/ha.
- 32% increase in maize grain yields with improved top-dress fertilizer practices above government recommendations (from 6.9 to 9.0 MT/ha) without increasing nitrogen or fertilizer application rates.
- 25% increase in cauliflower yields with balanced fertilizer and micronutrients above government recommendations (from 32 to 40 MT/ha) without increasing nitrogen fertilizer application rates.
- 14% increase in tomato yields with briquetted urea above government recommendations (from 69 to 79 MT/ha), while reducing nitrogen fertilizer application by 25%.
- The project evaluated precision fertilizer-cum-seed broadcasters and fertilizer-cum-seed drills for wheat on the fields of 48 farmers.
- Second-generation digital maps of soil chemical properties were produced for the entire Terai region at the increased resolution of 250m x 250m.
- Household and road system maps were created for the entire Feed the Future Zone of Influence.
- A willingness to pay for chemical fertilizers study was completed in eight districts.
- A randomized control trial was conducted to evaluate the impact and adoption potential of various scaling out pathways for disseminating agricultural technologies.
- Prototype spectroscopy and yield estimation digital collection tools were made ready to test in the field.
- Established the first spectral soil laboratory in Nepal at RARS Khajura's soil laboratory.
- An innovative agricultural extension program was finalized to disseminate best management practices for growing rice, wheat, maize, tomato, and cauliflower using active learning and multimedia for scaling up through development partners, private companies and the government.
- The project worked with private-sector ICT partners Viamo and PEAT to upscale ISFM and 4Rs (right source, right rate, right time, right place) through innovative SMS, IVR and smartphone platforms.
- The Inspire Challenge project collaboration with Viamo completed a pilot-scale rollout for an IVR market access program in Surkhet. In the first two months, 524 unique sellers (75% of subscribers) and buyers (15% of subscribers) subscribed and completed 1,300 sessions.
- The project facilitated a preliminary survey of stakeholders and interacted with farmers, seed companies and agrovets to prepare for producing a digitally enabled seed system to inform farmers, agro dealers and other value chain actors about seeds, varieties and characteristics.

3.2 Capacity Development Progress

- A total of 4,581 persons including farmers, government officials, private sector actors and cooperatives were trained on 39 seed and fertilizer topics.
- Four NARC scientists were trained on soil spectroscopy in March 2018 at the Soil Spectral Diagnostics Laboratory of the World Agroforestry Center in Nairobi, Kenya.
- Five scientists from NARC, four staff from CEAPRED, two from PAANI, two from KISAN 2, three farmers, and four private industry personnel attended a training on the use of ICT and advanced analytics for agriculture in early September, 2018.
- The President of NEFEA visited Bangladesh in March 2018 hosted by the International Fertilizer Development Center to observe the manufacturing, distribution, and use of briquetted urea to

inform him about the potential of establishing a urea briquetting facility in Nepal. Subsequently, the project supported NEFEA to import a urea briquetting machine (for the first time in Nepal).

- The project hosted four members of the Government of Nepal and two private fertilizer sector personnel to participate in a fertilizer blending and policy exposure tour to Kenya. They met with IFDC, the Toyota Tshusho Fertilizer Factory, One Acre Fund, the Kenyan Ministry of Agriculture and the Alliance for Green Revolution in Africa (AGRA).
- The project and partner seed companies held 40 seed-related trainings, training 1,054 people (760 male, 294 female) from 33 different districts. Seventeen of the trainings were solely for farmers. In total, 508 farmers (316 male, 192 female) were trained from 11 districts. Partner seed companies organized 28 farmers' field days which were attended by 1,167 farmers on lentils, rice, wheat and maize.
- Supported the hands-on training of 33 public and private partner personnel on field data recording and management.
- Held awareness sessions on seed market development for 10 banks to promote the low interest rate financing of seed enterprises.

3.3 Knowledge Dissemination Progress

- The National Coordinators for NARC's maize and rice commodity programs, the Chief of SQCC and project staff attended the fourth annual Latin American Cereals Conference (LACC) in March in Mexico City. World class scientists shared advances and scientific findings on cereal technology and how the biofortification of staple crops can improve nutrition. NARC's national rice research program presented a poster on submergence tolerant rice.
- Organized a national lentil workshop in February 2018 involving more than 40 farmers, processors, customs officials and other value chain actors.
- The project held a two-day data analysis training in September 2018 for participants from the public and private sectors and the Agriculture and Forestry University on designing trials, data management and analysis.
- Two scientists from NARC's National Maize Research Program, Rampur attended a two-week international maize breeding course in Uganda in July 2018 aimed at increasing the knowledge and technical capacity of Nepalese breeders.
- The project supported NEFEA members to observe the performance of two new fertilizer products in the field – polymer-coated urea and urea deep placement. NEFEA is now partnering with the project to conduct demonstration trials of these products.
- In April 2018, the project conducted a joint field monitoring visit with government representatives from the Ministry of Finance, National Planning Commission, MoALD, SQCC, NMRP and NARC to the project's hybrid maize interventions at public and private sector research stations.
- Conducted a joint field visit between NARC's National Maize Research Programme and the project to observe the project's 2018 maize ISFM field trials and plan for the 2019 season.
- A USAID team led by the Director of the Social Environment and Economic Division visited project sites in Banke, Bardiya and Kailali.
- In April 2018, the project organized an international training workshop on hybrid seed business management at CIMMYT's offices in Kathmandu for 34 participants from Nepal and Pakistan's public and private seed sectors.

3.4 Collaboration and Partnership Progress

- In November 2017 the project signed an agreement with MoALD³ to implement project-related activities with the government agencies.
- The first project Technical Committee meeting was held in February 2018.
- The project collaborated with the government on the endorsement of the project-developed best management practices for ISFM and the 4Rs for growing wheat, maize, and rice.
- The project established a hybrid maize varietal evaluation and validation network among NARC and private seed companies across different agroecological zones to identify adaptable products.
- The project held planning meetings with NEFEA on creating best management practice training materials on rice, wheat, maize, and vegetables for NEFEA members.
- In December 2017, the project supported the Prime Minister Agriculture Modernization Project (PMAMP) hold a forum for rice sector stakeholders.
- In October 2017 the project met other USAID agriculture projects to scale-out the results of HTMA's and STRASA's maize and rice products.
- In August 2018, the Cereal Systems Initiative for South Asia (CSISA) seed scaling component was integrated with the NSAF project seed system activities.
- The project obtained 11 commercially released varieties of lentil germplasm from ICARDA's Sub-Saharan Africa Regional Program and Research Platform (Ethiopia) for evaluation by the National Grain Legumes Research Program.
- Work is underway to import seeds of tomato and onion lines from the World Vegetable Center in Taiwan to be screened for disease tolerance, performance and end user preferences.
- The project's partnerships with seed companies were reviewed and plans for FY 2017/18 agreed.
- The project partnered with Viamo ICT company to develop a mobile phone-based market facilitation and access program for value chain actors.
- The project partnered with Viamo to translate all government-endorsed BMPs into an SMS and IVR system. Viamo signed an agreement with Nepal Telecom (NTC) to provide free access to the Viamo agricultural extension (BMP) program to all 12 million NTC subscribers.
- An agreement was signed with SEAN to conduct strategic policy lobbying, market development and policy lobbying activities.
- A review and planning meeting was held in September 2018 with all seed company partners and NARC to review progress and plan 2018-19 activities.
- A M&E learning workshop, progress review and planning meeting was held with project staff in September 2018.
- The project collaborated with IFDC to assist the government to review a detailed feasibility report on establishing a urea manufacturing plant in Nepal.

³ Note that in mid-2018 the agriculture ministry changed its name from the Ministry of Agricultural, Land Management and Cooperatives (MoALMC) to the Ministry of Agriculture and Livestock Development (MoALD).

4 DESCRIPTION OF PROGRESS

4.1 IR 2.1: Agriculture-Based Income Increased

The project is working with the range of stakeholders to introduce new and improved seed and ISFM technologies aimed at improving agricultural incomes.

Under intermediate result 2.1 the project report against the following indicator:

EG 3-1: Number of households benefiting directly from USG interventions.

The project exceeded the targeted number of households to be benefited by 4% (target: 107,806 HHs; achieved: 112,318 HHs). The project is a market-led initiative meaning that beneficiaries are reached through seed companies, agrovets and local institutional (cooperatives) partners. During the reporting period, seed companies sold 1,598 metric tonnes (MT) of rice, 305.3 MT of maize, 19.1 MT of lentils and 6.8 MT of vegetable seeds in the target districts. The average area of the target crops grown by beneficiary farmers was 0.47 ha of rice, 0.25 ha of maize, 0.25 ha of lentils, and 0.07 ha of vegetables (calculated from the Beneficiary-based Survey [BBS], 2018). Based on the standard seed rate (rice: 36.5 kg/ha; maize: 20 kg/ha; lentils: 30 kg/ha; cauliflowers: 0.5 kg/ha; tomatoes: 0.2 kg/ha, onions: 10 kg/ha), the total number of beneficiary households were therefore 87,658 rice-growing households, 47,052 maize-growing HHs, 2,516 lentil-growing HHs and 42,383 vegetable-growing households.

However, some households grew more than one target crop meaning that the number needed adjusting to identify total unique beneficiary households. To do this, the total number of unique households was calculated based on findings from the BBS. This gives 110,887 beneficiary households of the seed component made up of 62,199 rice, 32,645 maize: 535 lentil, 1,680 tomato, 8,517 cauliflower and 5,312 onion growing households. During the reporting period, an additional 1,431 households benefited from adopting project-promoted ISFM technologies and practices. Thus, the total number of project beneficiary households in 2017/18 comes to 112,318. The detailed progress and deviation narrative is presented in Table A2. of Annex 2.1.

Sub-IR 2.1.1: Agricultural productivity increased

Under sub-intermediate result 2.1.1 the project reports against the following eight indicators:

EG 3-6: Farmers' gross margins per hectare, obtained with USG assistance

Beneficiary farmers' gross margins were calculated from the BBS. The gross margin for growing rice was \$443 per hectare (ha) (14% more than the targeted \$389/ha), for growing maize was \$389/ha (47% more than the targeted \$264.5/ha), for growing lentils was \$507/ha (2% less than the targeted \$517/ha), and for growing vegetables was \$2,111/ha (13% more than the targeted \$1,865.6/ha). The detailed progress and deviation narrative is presented in Table A2.2 of Annex 2.

EG 3.2-2: Number of individuals who have received USG supported degree-granting agricultural sector productivity or food security training

The project planned to support two NARC researchers to take PhDs in soil science and one women researcher to take a master's degree in crop breeding at Nepal's Agriculture and Forestry University. However, only the two PhD candidates were selected and began studies. The detailed progress and deviation narrative is presented in Table A2.3 of Annex 2.

EG 3.2-17: Number of farmers and others who have applied improved technologies or management practices with USG assistance

During the reporting period, 112,318 farmers and 145 other value chain actors applied improved technology or management practices in project target districts against the target of 106,505, thus exceeding the target by 5%. Among them, 110,887 unique farmers purchased improved seed and 1,431 unique farmers applied project-promoted ISFM technologies or practices. The detailed progress and deviation narrative is presented in Table A2.4 of Annex 2.

EG 3.2-18: Number of hectares of land under improved technologies or management practices with USG assistance.

During the reporting period, the project contributed to bringing 57,945 hectares of land under improved technology against the targeted 60,722 hectares, comprising 56,547 hectares under improved seeds and 1,398 hectares under ISFM practices. The detailed progress and deviation narrative is presented in Table A2.5 of Annex 2.

EG 11-6: Number of people using climate information or implementing risk-reducing actions to improve resilience to climate change as supported by USG assistance.

The project is monitoring the major climate risk reducing parameters of the application of risk reduction mechanisms and use of climate information. Based on the BBS survey findings 18,135 persons used climate risk-related information and implementing risk-reducing actions against the targeted 18,128 farmers (16.14% of beneficiary farmers). The detailed progress and deviation narrative is presented in Table A2.6 of Annex 2.

4.5.2 –Z14 (NSAF Custom-1): Total quantity of target value chain commodities produced by direct beneficiaries with USG assistance that is set aside for home consumption.

Beneficiary households set aside 81,076 MT of project target crops for home consumption in the reporting period (extrapolated from the BBS). They had on average set aside 1 MT of rice, 0.48 MT of maize; 0.09 MT of lentils, 0.12 MT of cauliflowers, 0.04 MT of tomatoes and 0.10 MT onions for home consumption. This represents a 41% underachievement of the targeted 137,774 MT set aside. The detailed progress and deviation narrative is presented in Table A2.7 of Annex 2.

STIR-10: Number of innovations supported through USG assistance.

The project supported 17 innovations comprising 11 seed-related innovations and 6 fertilizer-related innovations. The seed innovations included:

- the production of standard operating procedures (SOPs) for varietal demonstrations, a prototype for the national seed information system and ICT tools for varietal tracking; and
- introducing quality protein maize, provitamin A and zinc enriched maize hybrids; innovative methods for seed sector financing and an alpha-lattice design for evaluating multi-location trials and hybrid seed production technology.

The ISFM innovations supported in the fertilizer component were the development of Plantix, Viamo, training module for rice, wheat and maize and the overall ISFM training module. Note that this is a new indicator and so no target was set for 2017/18. The detailed progress and deviation narrative is presented in Table A2.8 of Annex 2.

STIR-11 Number of innovations supported through USG assistance with demonstrated uptake by the public and/or private sector.

During the reporting period, 10 project-supported innovations were taken up by private and public sector partners comprising four ISFM related innovations (training modules on wheat, rice, maize and ISFM module on fertilizer application). The others were related to seeds (SOPs for varietal seed

production demos, alpha-lattice design for evaluating multi-location trials, technical modules on hybrid maize seed production and customized financial products). Note that this is also a new indicator and so no target was set for 2017/18. The detailed progress and deviation narrative is presented in Table A2.9 of Annex 2.

Outcome 2.1.1.1: Crop area and yield gains enhanced through rapid diffusion and application of improved varieties

Highlights

- Four seed companies supported to estimate seed production and develop market for new seed varieties.
- Eight seed company partners and CEAPRED carried out 152 varietal demonstrations, including 44 on rice, 40 on maize, 30 on lentils, 8 on cauliflowers, 7 on onions and 23 on tomatoes. Similarly, 92 seed production demonstrations, including 48 rice, 27 maize, 9 lentil, 3 onion and 5 tomato.
- Seven farmer field days on lentils (4), rice (1) and maize (2) were conducted by five seed companies.

Technical progress:

Seed production

During this reporting period, the project facilitated four seed companies to develop their business plans in order to promote the large-scale commercialization of improved varieties of seeds. Considering only open pollinated varieties (OPVs), the four partner companies now plan to produce the following amounts of seeds in the next five years: 13,161 MT (43.4%) of rice seeds, 15,151 MT (50%) of wheat seeds, 1,770 MT (5.9%) of maize seeds, 161 MT (0.5%) of lentil seeds and 50 MT (0.2%) of vegetable seeds (Figure 4.1).

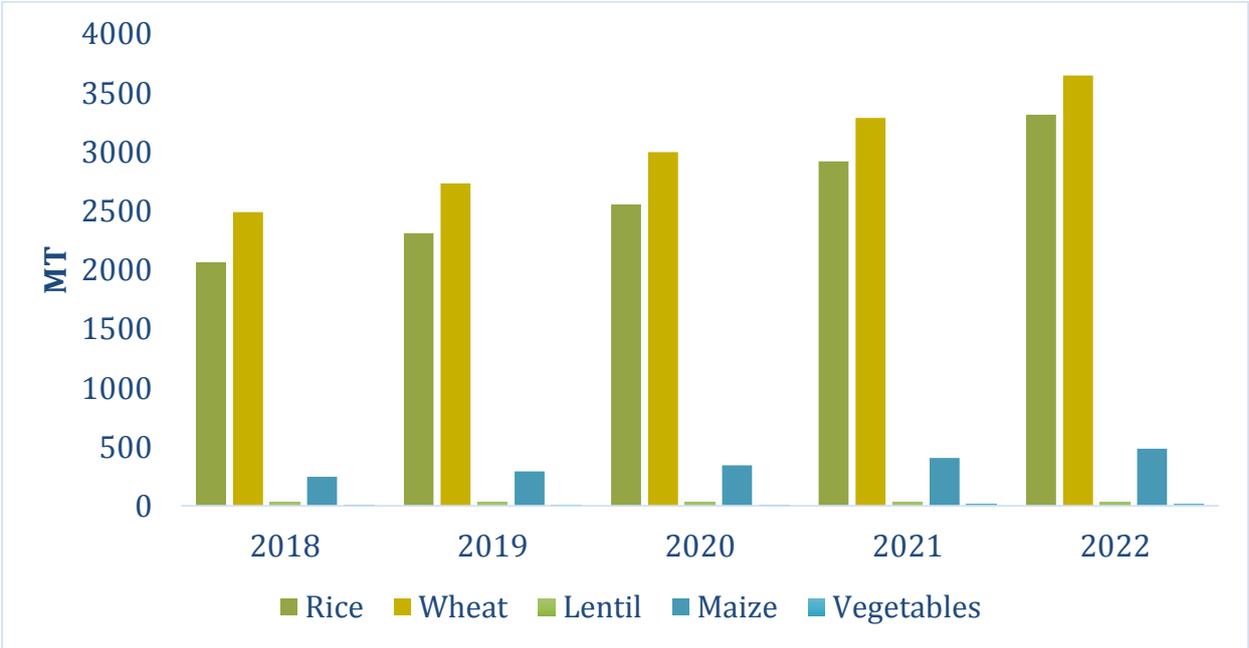


Figure 4.1: Seed production plans (MT) of the four project-supported seed companies, 2018–2022

The four companies are diversifying their product portfolios and increasing the share of newly released rice varieties (i.e. released after 2010) with, for example, the share of new rice varieties in their 2018 seed production planned to double from the current 23.8% (392 MT) to 46.7% (920 MT) by 2022.

The project also regularly facilitated and followed up with the National Rice Research Programme (NRRP) and the National Grain Legume Research Programme (NGLRP) on the production of promising

lines and foundation seeds of rice and lentils. The project also facilitated NARC's Horticultural Research Department (HRD) to produce vegetable crop seeds.

In 2017/18, NRRP and NGLRP produced about 0.58 MT of rice and 0.21 MT of lentil source seeds for trials, demonstration and seed production. Similarly, CEAPRED, in consultation with the Horticultural Research Department and Lumle Regional Agricultural Research Station, had produced 23 kg of cauliflower and tomato seed for off-season vegetable production.

Varietal demonstrations

The rate of adoption and diffusion of the many recently released new crop varieties is very low in Nepal, with most farmers growing crop varieties that were released more than 25 years ago. This points to the need to enhance adoption pathways to encourage farmers to use new varieties.

During the reporting period the project carried out 152 varietal demonstrations of newly released and pipeline varieties of rice (44), maize (40), lentils (30), cauliflowers (8), onions (7) and tomatoes (23) in collaboration with public (NARC), CEAPRED and private partners (see example at Photo 4.1). It also developed guidelines on how to carry out demonstrations where newly released varieties are compared with an existing variety. This approach (which is mostly followed by the project's seed company partners) helps farmers to evaluate and simultaneously adopt new varieties and best crop management practices.



Photo 4.1: NSAF team at SEAN Seed Service Centre onion demonstration in Salyan. (Credit: CIMMYT)

The detailed achievements of the crop demonstrations during the reporting periods were as follows:

- NARC's Surkhet Agricultural Research Station demonstrated five released and pre-released rice varieties (DRR-44 [Hardinath-3], DRR-42, Sukhadhan-4, Sukhadhan-6 and Hardinath-1) in different areas of Surkhet. The on-farm demonstration results showed that Hardinath-3 (DRR-44) produced the highest grain yield (4.8 MT/ha) as well as being liked by farmers not only due to its high yield but also to early ripening, good grain type, no lodging and no disease and insect infestations.
- A maize varietal demonstration of Khumal Hybrid-2 (demo) and BISCO-940 (local check) was conducted by SSSC in different parts of Salyan district. The average yield of Khumal Hybrid-2 was 8.70 MT/ha and of BISCO-940 was 8.67 MT/ha. This suggests that locally developed hybrids can give equal or better yields than imported hybrids provided they are well managed. This is another

indication to involve the project’s seed company partners and others in hybrid seed production and popularizing indigenous hybrids (Figure 4.2).

- Among the eight lentil varieties including the local check demonstrated by seed companies, Simal gave the highest yield (2.23 MT/ha), which was from the Unique Seed Company demonstration at Kailali. This yield was 142% above the yield of the local check variety and almost 100% above the national average (currently 1.1 MT/ha). See yield data in Figure 4.3.

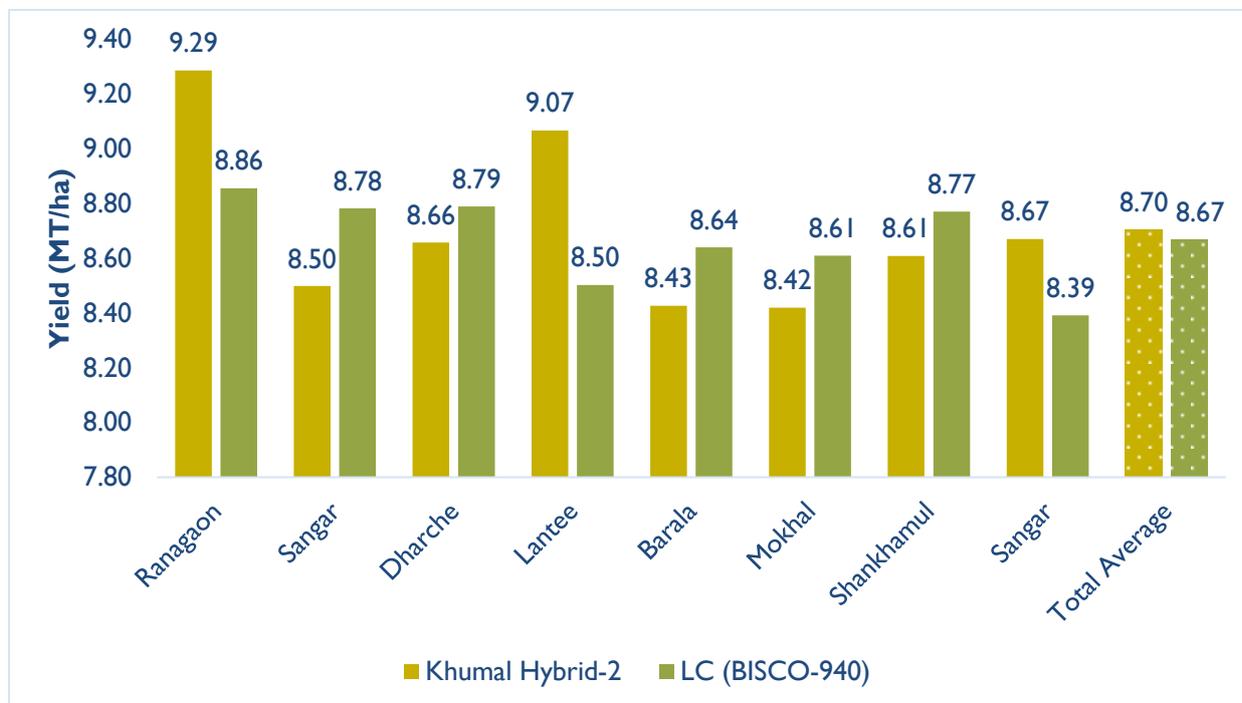


Figure 4.2: Yield of Khumal Hybrid-2 maize (demo) and BISCO-940 (local control) of varietal demonstration (MT/ha) at different parts of Salyan in 2018.

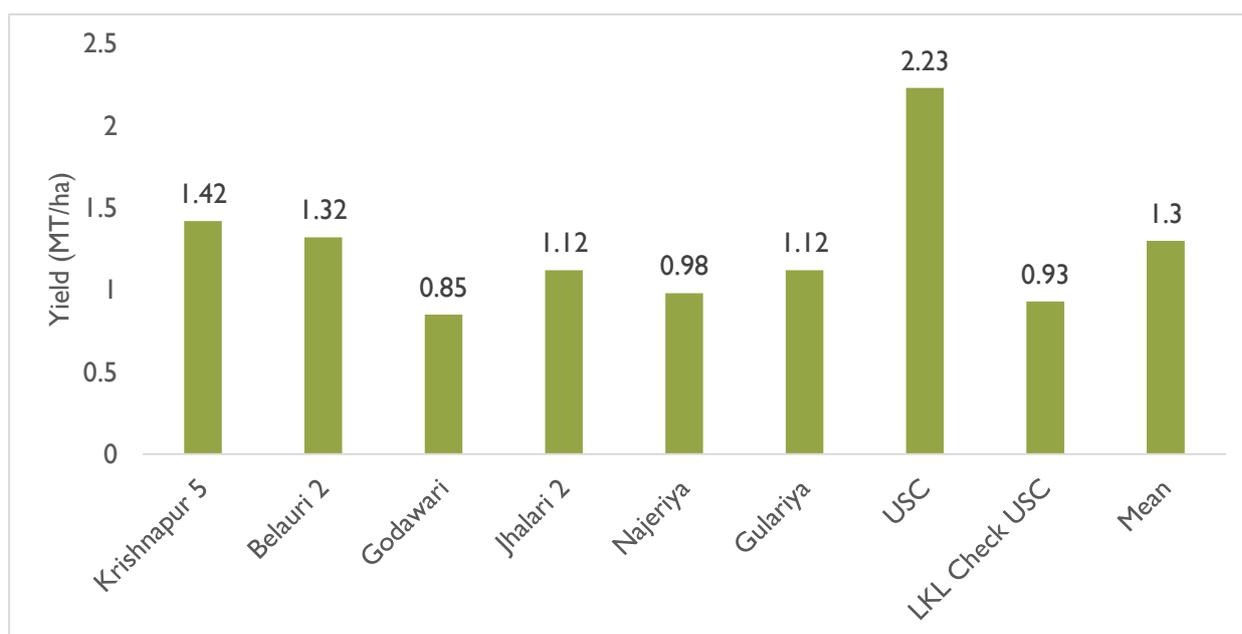


Figure 4.3: Grain yield (MT/ha) of demonstrations of lentil variety Simal conducted in the Far-West of Nepal applying best management practices

Seed production demonstrations

The project developed standard operating procedures (SOPs) that specify recommended fertilizer doses, spacings and seed rates for producing seeds of target crops. These practices were then applied by eight seed company partners and CEAPRED to carry out 92 seed production demonstrations. These demonstrated seed yields and seed quality gains to seed growers towards increasing the quantity and quality of seeds produced by seed companies:

- 48 rice demos (Hardinath-3, Bahuguni-1 and 2, Chaite-5, Radha 4, Ceihrang sub-1, Sawa sub-1, Ramdhan, Sawa Masuli sub-1, Sukhkha Dhan-6, Khumal-8, Khumal-10, Sukhkha-3, Sabitri and Khumal-4);
- 27 maize demos (Rampur Composite, Arun-2, Rampur Hybrid-10, Arun-3 and Arun-4);
- 9 lentil demos (varieties: Simal, Khajura Musuro 1 and 2, Simal, Shikhar, Maheshwor Bharati);
- 3 onion demos (Red Creole); and
- 5 tomato demos (Sirjana).

See scenes from demonstration sites in Photo 4.2.



Photo 4.2: NSAF project field staff helping plant a rice varietal demonstration in Dangand field day in Kailali. (Credit: CIMMYT)

Farmer field days

Farmers’ field days are held to promote innovations (see example in Photo 4.3). Showing farmers’ groups successful varietal and seed production demonstrations motivates them to replace old varieties with new ones. During the reporting period the project supported the holding of seven field days by five seed company partners as a nudge tool for the adoption of new varieties and agronomic practices by farmers. A total of 306 farmers attended these days (205 men, 101 women). The farmers observed the demo crops, ranked their preferred varieties and discussed why they were interested in some and not others. These events also enabled the seed companies to enhance their visibility with clientele.



Photo 4.3: Farmer field day at a lenti varietal demonstration, Unique Seed Company (Credit: Darbin Joshi)



Photo 4.4: USAID delegation and experts interacting with seed grower group at Panchashakti Biu Company (Credit: Darbin Joshi)

Crop Strategies

The project is taking a systematic approach to guide the diffusion of project-supported crop-wise technologies for its target crops (Table 4.1).

Table 4.1: NSAF’s strategies for promoting maize, rice, lentils and vegetable seed sector improvements

Crops	Strategies
Rice strategy	<ol style="list-style-type: none"> 1. Seed scale up of recently released climate resilient rice varieties in partnership with public and private institutions. 2. Engage in the pre-release popularization and demonstration of new high-yielding rice hybrids and OPVs accessed from local and/or international sources. 3. Enhance linkages among seed companies, farmers and rice millers for demand creation for consumers’ preferred rice varieties such as medium-fine rice. 4. Collaborate with public and private partners for the production of early generation seeds of rice to ensure the availability of quality source seeds for successive seed multiplication. 5. Engage with value chain actors at different levels to enhance synergies and cement collaborations to increase rice production, productivity and use in Nepal. 6. Support seed extension and market promotion using various channels. 7. Build the capacity of stakeholders across the rice value chain.
Maize strategy	<ol style="list-style-type: none"> 1. Promote the production and distribution of recently released or registered hybrids and OPV seeds in the NSAF target districts for rapid diffusion and adoption. 2. Introduce market-ready maize hybrids with diverse genetic backgrounds and product profiles from international breeding hubs for evaluation and validation in the different maize-growing agroecologies in project target areas. 3. Introduce and evaluate biofortified maize products for human and poultry use. 4. Introduce and promote climate resilient maize products, especially heat stress resilient ones. 5. Foster private sector-led and owned hybrid maize products development and marketing in line with the National Seed Vision. 6. Establish a public-private maize varieties evaluation and validation network to fast track the

Crops	Strategies
	<p>deployment and seed scale up of new varieties.</p> <ol style="list-style-type: none"> 7. Engage with maize value chain actors in Nepal at different levels to enhance synergies and cement collaborations to increase maize production, productivity and utilization in Nepal. 8. Support private seed companies to have a competitive and viable hybrid maize seed business through business mentorship, product promotion and branding. 9. Support SQCC and NARC to develop and introduce hybrid product licensing guidelines and seed production certification and quality standards. 10. Support seed extension and market promotion using various channels. 11. Build the capacity of stakeholders across the maize value chain.
Lentils strategy	<ol style="list-style-type: none"> 1. Fast track seed production of recently released high yielding and climate resilient (including early maturing and waterlogging tolerant) lentil varieties in partnership with public and private institutions. 2. Introduce, evaluate and promote lentil germplasms with tolerance to biotic stresses (including Stemphylium blight, root rot and wilt diseases). 3. Explore appropriate sources of lentil germplasm globally that have high breeding and economic potential in Nepal. 4. Improve agronomic and crop husbandry practices to enhance farm-level lentil productivity. 5. Engage with value chain actors in Nepal at different levels to enhance synergies and to cement collaborations to increase lentil production, productivity and utilization. 6. Support seed extension and the market promotion of lentils using various channels. 7. Build the capacity of relevant stakeholders across the lentils value chain.
Vegetables strategy	<ol style="list-style-type: none"> 1. Introduce high yielding compact head cauliflower, hardy and thick fleshed varieties of tomato, and long shelf life varieties of onion. 2. Promote ISFM practices to increase vegetable yields. 3. Facilitate access to source seeds through NARC and its Vegetable Development Directorate, as well as the official process of registration and release of varieties. 4. Link agrovets and farmers and provide ICT based agro-advisory services. 5. Facilitate market-orientated production and linkages between contract producers and traders. 6. Facilitate links with local governments (e.g., agriculture units), local and district level vegetable traders, insurance companies and financial institutions. 7. Support the seed extension and market promotion of vegetables using various channels. 8. Build the capacity of stakeholders across the vegetables value chain.

Outcome 2.1.1.2: Site-specific integrated soil fertility management technologies used by stakeholders

Highlights:

- Project staff completed analyzing the first season of fertilizer field trials, which showed large yield increases associated with several improved practices.
- The project established 2,134 research plots and 669 demonstration plots.
- The project evaluated the new fertilizer technologies of polymer coated urea on rice and wheat; briquetted urea on rice, maize, and tomatoes; and custom fertilizer blends on all crops. Nepal Fertilizer Entrepreneurs Association (NEFEA) members and government officials were shown these trials. NEFEA members were taken to Bangladesh to observe briquetted urea production.
- NSAF facilitated NEFEA to import a urea briquetting machine for the first time into Nepal. NEFEA is now commercially producing briquetted urea in Birgunj.
- Second-generation digital soil maps were produced of the major soil chemical properties for the entire Tarai region. These maps can be accessed at: <https://nsafmap.github.io/index.htm>
- Household and road system maps were created for the entire Feed the Future Zone of Influence.

Technical progress

Results of fertilizer field trials

The completion in by project staff of the analysis of the second year of the project's fertilizer field trials identified the following fertilizer technologies and management practices that significantly increase crop yields and fertilizer use efficiency:

- A 60% increase in wheat grain yield using polymer coated urea (4.5 MT/ha) above the government recommended practice (2.8 MT/ha) (Figure 4.4).
- A 15% increase in cauliflower curd yield with custom fertilizer blends (38 MT/ha) over government recommendations (33 MT/ha) (Figure 4.5).
- A 13% increase in fruit yield in tomatoes (71 MT/ha) over government fertilizer recommendations (68 MT/ha) with briquetted urea, but with a 25% reduction in the application of nitrogen fertilizer (Figure 4.6).

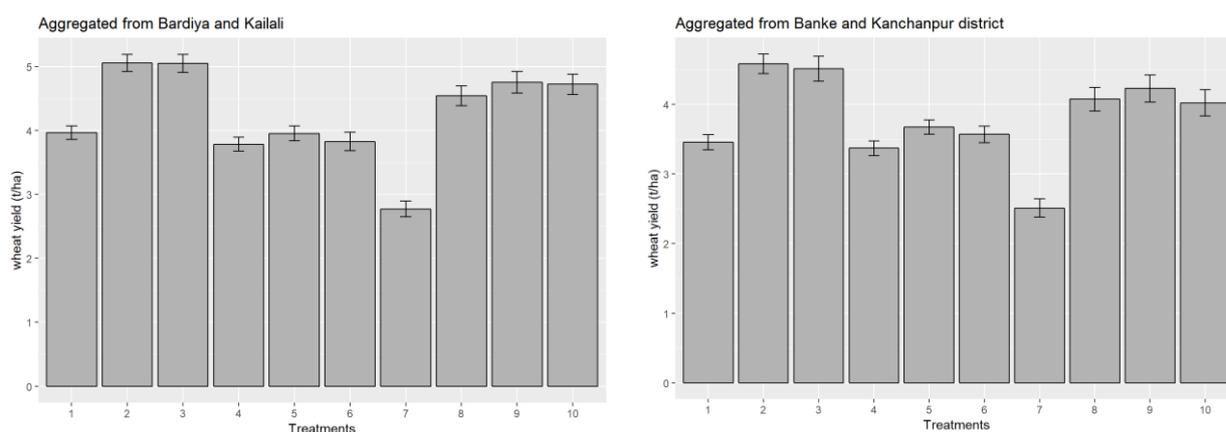


Figure 4.4: Wheat grain yields from project fertilizer field trials and demonstration plots. Note: Plot 1 is government recommended practices and Plot 9 is polymer coated urea treatment.

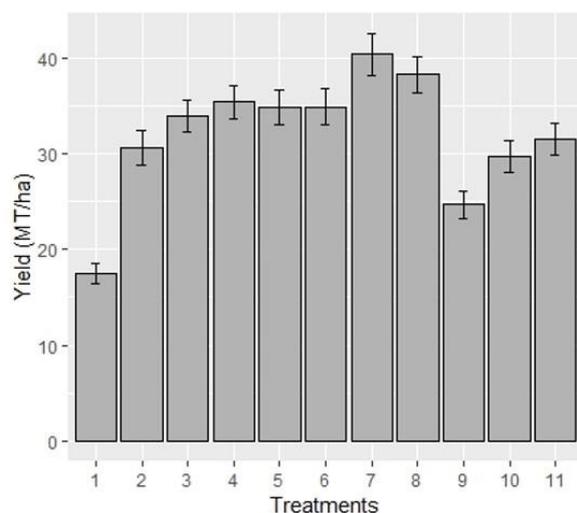


Figure 4.5: Cauliflower curd yields in project fertilizer field trials (custom fertilizer blend is Treatment 8 and government recommendation is Treatment 11)

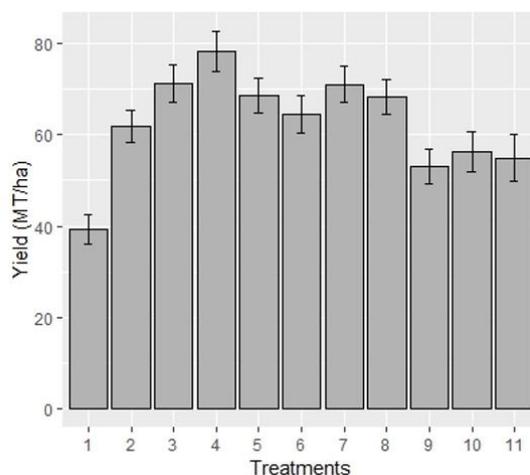


Figure 4.6: Tomato fruit yields in project fertilizer field trials (briquetted urea is Treatment 4 and government recommendation is Treatment 5).

Demonstration plots and technologies

In this reporting period the project:

- established 693 cauliflower, 385 tomato and 297 onion research plots with farmers on their fields;
- established 192 demonstration and 480 research plots for wheat; and
- evaluated precision fertilizer and seed broadcasters and drills for wheat on 48 farmers' fields.

The project identified potential management techniques, custom-blended basal fertilizers and alternative top-dress fertilizer recommendations from these field trials. All these technologies demonstrated significant yield increases and production efficiencies. The private industry and government have shown strong interest in developing these fertilizer technologies into new business opportunities (private industry) or integrated into holistic fertilizer policy changes (government).

New fertilizer technologies

For the first time in Nepal, the project evaluated the two new fertilizer technologies, polymer coated urea and briquetted urea in rice. Both types of fertilizer (Photo 4.5) maintained rice grain yields while reducing nitrogen application by 51%. In addition, when briquetted urea was evaluated with tomatoes, it increased fruit yields by 13%, with a 25% reduction in the amount of nitrogen fertilizer applied.

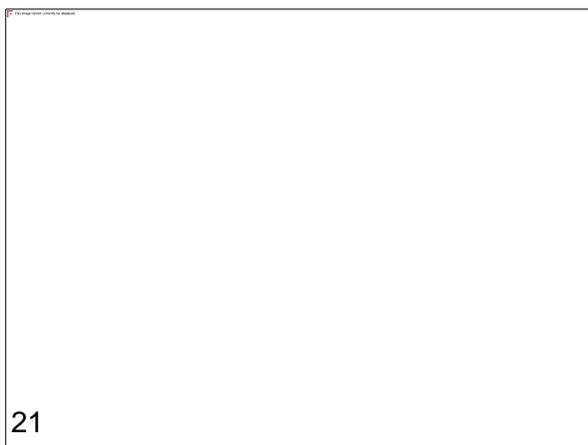
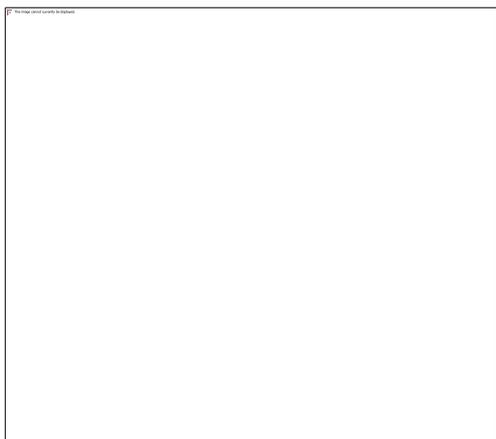
The project found an excellent response of custom blended fertilizer products in tomatoes and cauliflowers. In cauliflowers, the custom blended fertilizers increased curd yields by 24% and in tomatoes by 6% above DoA recommendations.



Photo 4.5: Polymer coated urea (left) and briquetted urea (right) (Credit: David Guereña)

Facilitating the introduction of new fertilizers

NEFEA members visited the project-supported fertilizer trial and demonstration sites and showed great interest in the potential of polymer-coated urea and briquetted urea. In support of this the project supported the president of NEFEA to travel to Bangladesh to tour International Fertilizer Development



Center-supported briquetted urea manufacturing facilities and farms using briquetted urea (Photo 4.6).

Photo 4.6: NEFEA's president visiting a urea briquetting operation in Bangladesh (left) and visiting the Fertilizer Association of Bangladesh (Credit: Yam Gaihre)

Following this visit, Chandra Kanta Dallakoti (NEFEA's President and a private fertilizer importer) imported a urea briquetting machine from Bangladesh and installed it in his factory in Birgunj (Photo 4.7). This machine is now fully in operation. Mr. Dallakoti sees the horticultural producers that he works with in Nepal as a viable market for briquetted urea. Project trials have also corroborated strong yield response in tomatoes with briquetted urea. Mr. Dallakoti is now commercializing this product for



horticultural farmers.

Photo 4.7: The Dallakoti Group's urea briquetting machine in operation (Credit: Sharad Rai)

Best management practices

The project finalized producing best management practice (BMP) materials for its six target crops, including lecture materials, activity materials, field guides, and other physical learning aids. All the materials have been field-tested with farmers, agro dealers, government extension specialists and cooperatives. By the end of September 2018, the rice, maize and ISFM materials had been endorsed by the government with the rest under review.

Digital soil maps

This reporting period saw advances in the production of the digital soil maps. The project originally intended to produce these maps just for the Feed the Future Zone of Influence area. The acquisition of additional data assets from MoALD's National Land Use Project (NLUP) enabled the production of digital soil maps for Nepal's entire Tarai region (Figure 4.7). The project also used new satellite imagery for the maps that enabled the resolution to be increased from 1 km x 1 km to 250m x 250m pixels. It is planned to map the whole country by the end of 2018. In the second half of FY 2017/18 the project has updated the web portal to make it more user friendly and interactive. When loaded on to a smartphone, the map can retrieve the soil properties information from the user's exact location if the

user is within areas with data coverage. The web portal for the soil map is at: <https://nsafmap.github.io/index.htm>

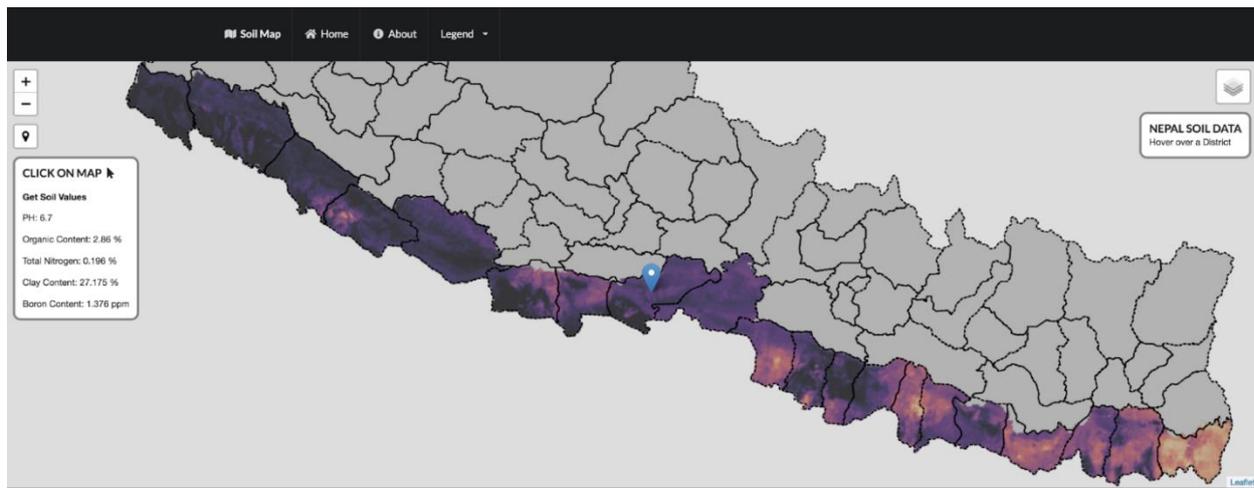


Figure 4.7: Soil pH map of the Tarai, 250m x 250m resolution

Application of the digital maps

Digital analytical systems (soil, agroecological zone, and demographic maps) provide the foundation to synergize the linkages between the many disparate components of agriculture in Nepal. The current version of the maps allows the integration of advanced analytics and satellite data to better understand Nepal's complex physical and demographic landscape (Figure 4.8). This greater understanding will enhance the capacity of national agricultural research programs to conduct trials that are better matched to farmers' needs. The maps provide an outlet for data generated by enhanced regional laboratories (spectroscopy). Unified under one framework, the analytical systems enable accurate and real-time business intelligence to seed and fertilizer companies to understand markets for products and the need for financial support from banks to develop, market, and scale-out through local agro-retailers. Simultaneously, the government is provided with the same information, which allows them to better match policy with the needs of farmers and the capacity of local private companies to act. The analytical outputs are also transformed into locally tailored agricultural extension programs to better inform farmers of what are the most effective inputs (seeds and fertilizers) and management practices. Finally, all of the individual components merge to make available to farmers the most effective product packages (fertilizers, seeds, and management practices) for them to choose from.

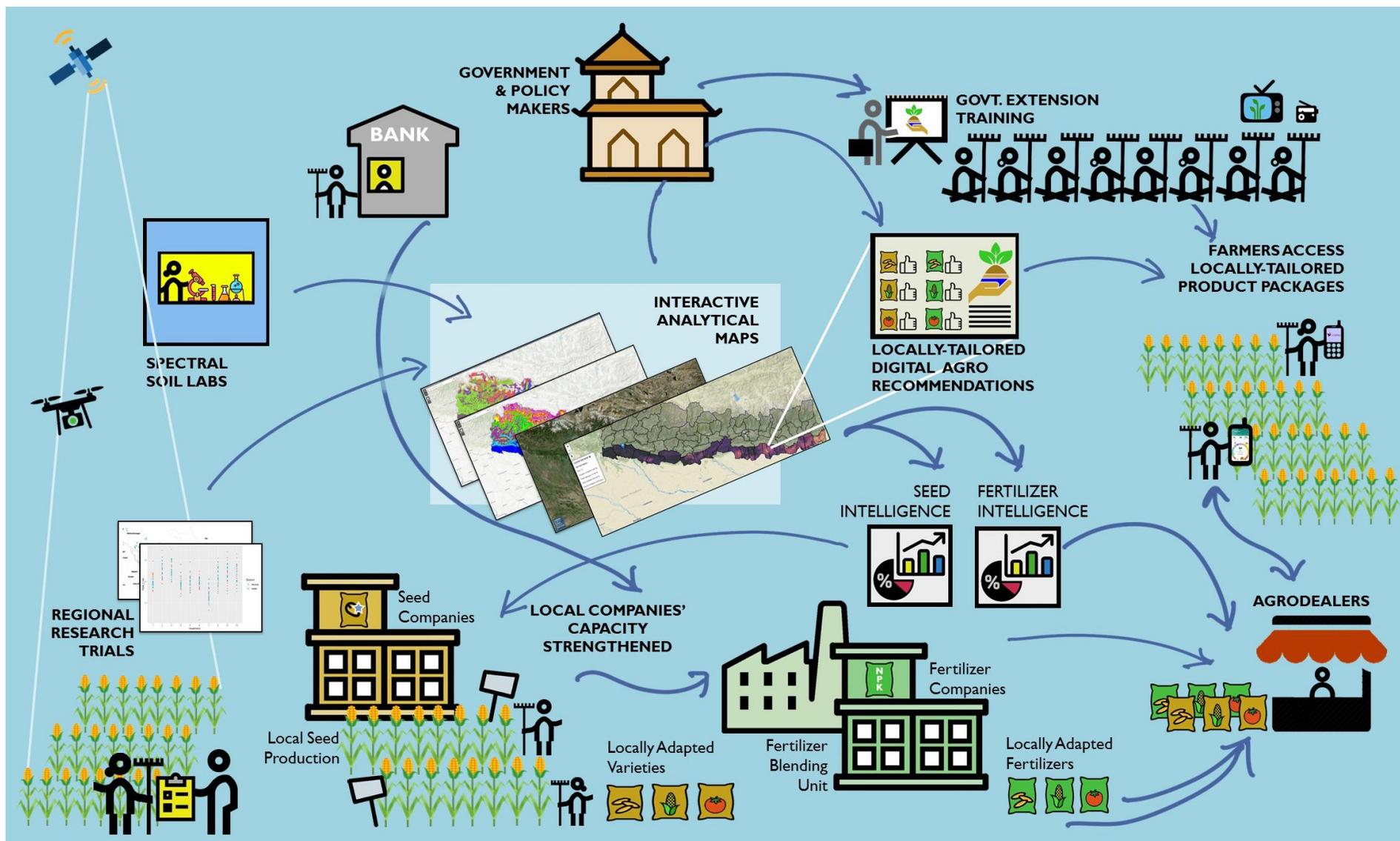


Figure 4.8: The interactions and intended impacts of NSAF project-supported digital analytical systems

Digital data collection tools

In its first year the project signed a sub-agreement with the QED IT company to produce integrated digital data collection systems for the project and its partners. During 2017/18, QED finished one round of household and road network mapping using cutting-edge techniques of combining crowd-sourcing with artificial intelligence to automatically produce maps from satellite imagery (see Figures 4.9 and 4.10). The maps help to identify where project interventions could have the best return on investment.

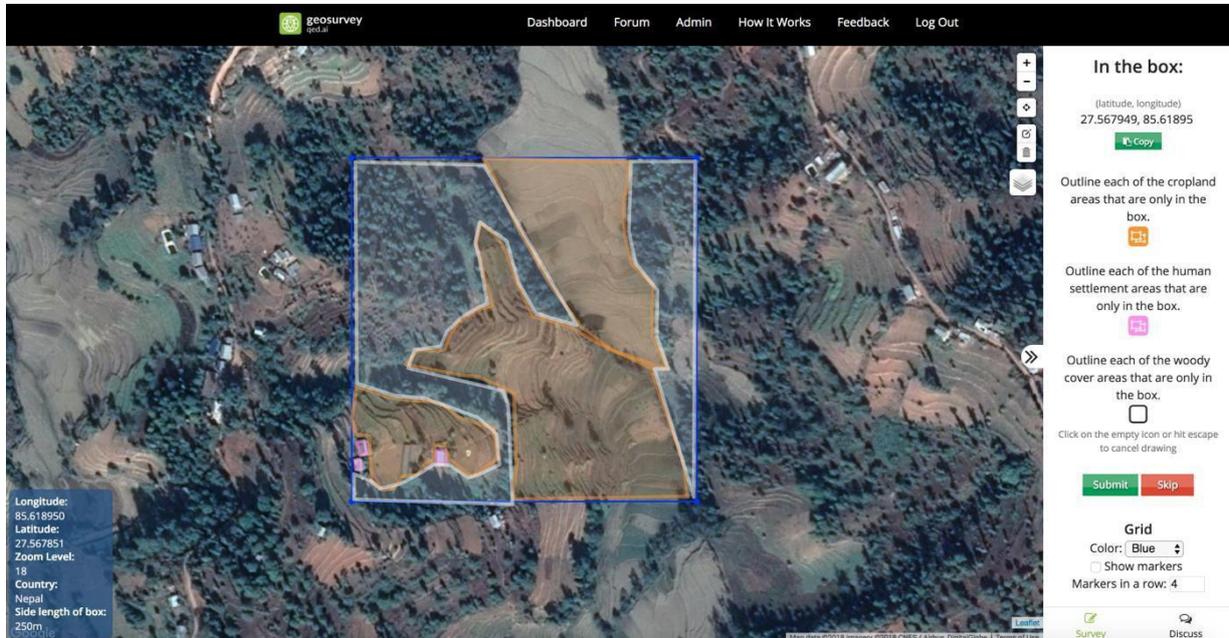


Figure 4.9: Screenshot from QED crowd-sourcing online app showing how the maps were made.

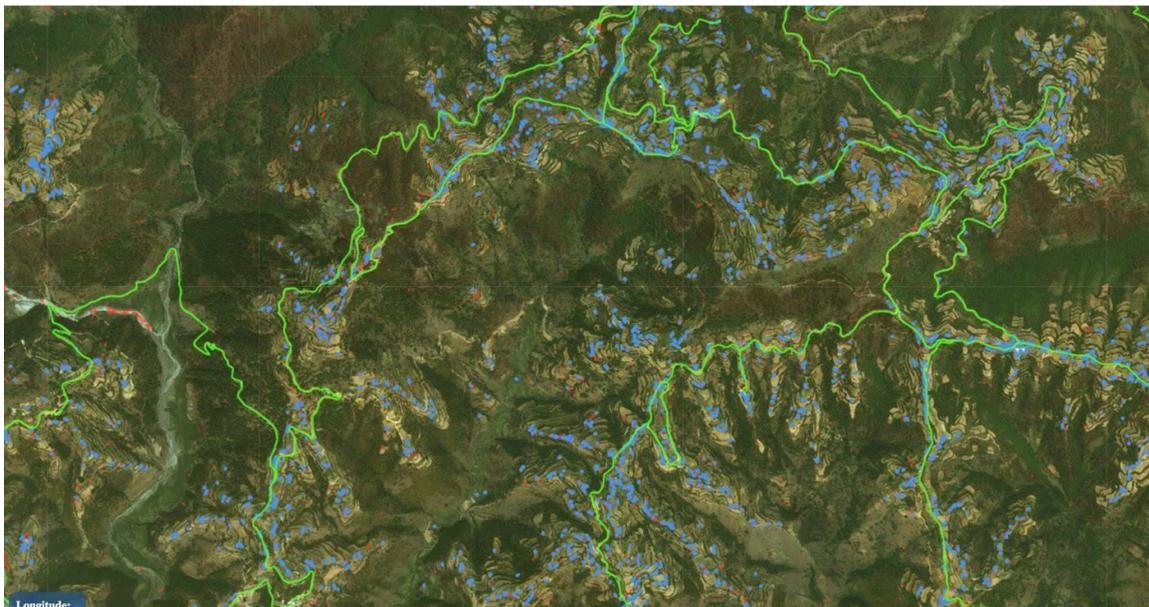


Figure 4.10: Section of first-generation QED-produced map. Blue and red rectangles are individual houses; green lines are roads.

The project also fully integrated QED's digital data collection, storage, and management tools into its field activities, including every step of data collection processes from field surveys to crop yield

measurements. By using the QED digital data collection tools across its data collection processes, all the project's data is now housed in a well-curated accessible database.

The project also collaborated with QED on developing a low-cost hand-held spectrometer to measure plant and soil properties in the field (Photos 4.8 and 4.9), with field testing starting in April 2018. QED also developed the fertilizer component's database of results, including visualization software for public consumption.

In the second half of FY 2017/18 the project continued to work on the spectrometer with QED. The project now has an updated second-generation version that is being tested and deployed with CIMMYT, CEAPRED, and NARC staff. The project is calibrating the spectrometer to field conditions to be able to deploy it at scale to provide government, private sector, and development partners with a low-cost accurate tool to detect and collect data on plant pests and diseases, nutrient deficiencies, plant-water status for irrigation scheduling and quality control for seeds and fertilizers. The new model runs on any smartphone. QED developed new software that is free to download on any Android device, which greatly simplifies the use and functionality of the device.



Photo 4.8: Second generation spectrometer.



Photo 4.9: Initial prototype of low-cost hand-held near-infrared spectrometer (Credit: William Wu)

Outcome 2.1.1.3: Efficient and cost-effective fertilizer application technologies commercialized by private sector

Highlights

- The project conducted demonstration trials on the use of seed-cum-fertilizer drills for growing wheat and precision broadcast fertilizer spreaders to assess demand potential.

Technical progress:

During this period, the project drew from previous Cereal Systems Initiative for South Asia (CSISA) activities to run demonstration trials for fertilizer-cum-seed drills and precision fertilizer broadcasters in wheat. The purpose was to evaluate existing fertilizer application technologies to judge their quality and to assess farmer acceptance of them and yield responses.

The use of the precision fertilizer broadcasters was found to increase wheat yields by between 0.5 and 1 MT/ha (a 14–33% yield increase) above yields from 'farmer practice' yields in the four districts where the demos were carried out (Figure 4.11), representing a potential increase in income of between NPR 11,000 and NPR 22,000 per hectare. Given the one-time investment of only about NPR 5,000 for buying the broadcasters, the increased yields should pay back in one season. The greatest marginal

increase in yields came from the use of the fertilizer-cum-seed drills. Yields from the drills were between 1–2 MT/ha (66–80%) above standard farmer practices. However, the quality of drills and spreaders was found to be inconsistent. Farmers are responsive to quality applicators and the use of such applicators increases grain production. The project is now assessing the various fertilizer applicator suppliers and import chains to draft business development plans for the private sector to sell such technologies. Building and strengthening the value chains for fertilizer-cum-seed drills and precision broadcasters will be the principal activity for this component in project year three.

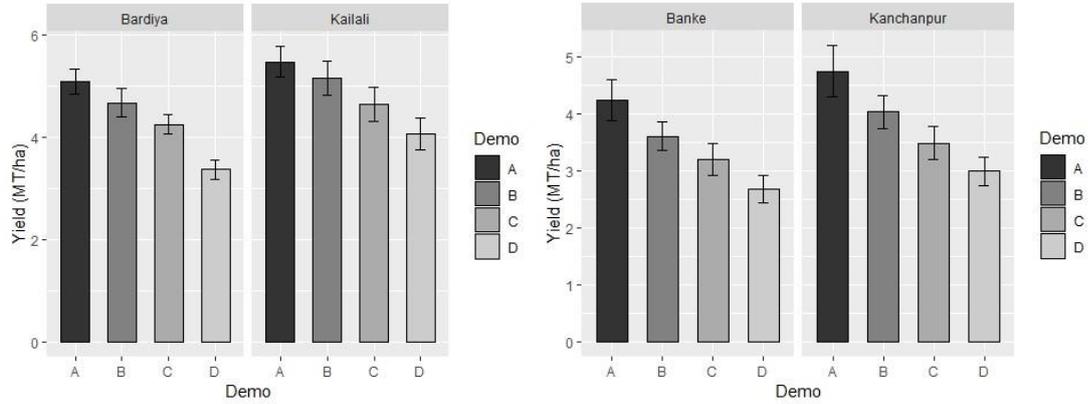


Figure 4.1 I: Wheat yields from precision fertilizer application trial demos. Plot A is wheat yield from seed-cum-fertilizer drills; plot B is wheat yield from hand row planting; plot C is yield from precision fertilizer broadcasters, plot D is farmers’ practices yields.

Sub-IR 2.1.2: Value chains strengthened

The project reports against the following indicators under this sub-intermediate result:

EG 3.2-7: Number of technologies or management practices under research, under field testing, or made available for transfer as a result of USG assistance

During the reporting period, the project made the following progress across the three phases that are referred to in the indicator:

Phase 1 (being researched): The project conducted research on 506 technologies against the targeted 470 technologies. Research was conducted on 437 trials of maize crop varieties consisting of 196 winter trials, 159 spring trials, 30 heat-tolerant maize trials (HTMA); 20 pro vitamin A and 32 intermediate population trials for screening traits related to productivity and resistance to biotic and abiotic stress. It also conducted 69 different fertilizer treatment trials for wheat, maize and rice in farmers’ fields comprising 40 winter season trials (10 wheat, 9 onion, 10 tomato, 11 cauliflower) and 29 summer season trials (9 maize, 9 rice and 11 tomato).

Phase 2 (under field testing): A total of 69 trials and demos of project crop varieties were carried out on productivity and resistance to biotic and abiotic stresses at multiple locations. Sixty trials of technologies and management practices related to seed that were under field testing were completed including:

- multi location trials - 3 for maize, 3 for lentils, 4 for rice, 3 BMP and 1 business plan; and
- 13 rice varietal, 19 maize, 8 seed production, 5 tomato, 1 financial model and 9 fertilizer related BMP demonstrations (3 each for rice, maize and wheat).

Phase 3 (made available for transfer): 13 ISFM related technologies were made available for transfer comprising 4 technologies or practices per crop for rice, maize and wheat and one related to the use of the Plantix app.

The detailed progress and deviation narrative is presented in Table A2.10 of Annex 2.

EG 3.2-20: Number of for-profit private enterprises, producers' organizations, water users' associations, women's groups, trade and business associations and community-based organizations (CBOs) that applied improved organization-level technologies or management practices with USG assistance.

During the reporting period, 93 organizations applied improved technologies or management practices against the target of 91 comprising 20 for-profit private enterprises (seed companies), 27 producer organizations (seed producer groups), 44 community-based organizations (agricultural cooperatives) and 2 business membership organizations (SEAN and NEFEA).

Private seed companies applied new technologies and management practices including business plans and conducting trials and demos. Producer organizations applied seed production technologies including maintaining isolation distances by roguing and layout design and standard operating procedures. The 44 agricultural cooperative partners conducted trials and demos in Banke, Bardiya, Dang, Surkhet, Kailali, Kavre, Palpa, Doti and Kanchanpur districts. The detailed progress and deviation narrative is presented in Table A2.11 of Annex 2.

Outcome 2.1.2.1: Seed value chains strengthened by the introduction, evaluation and validation of new and market-ready hybrid and open pollinated variety products

Highlights:

- A Technical Working Committee was formed under NARC's objective of promoting public-private partnerships, to prepare guidelines for hybrid seed production, hybrid variety licensing and fast track variety release and registration. The committee held meetings and field visits to get inputs for the preparation of the hybrid seed production and licensing guidelines.
- 305 market-ready hybrids and OPVs consisting of heat stress tolerant and different maturity groups, were sourced from international maize breeding hubs and planted for adaptation testing by NARC and private seed companies. The hybrids are now undergoing multi-location trials run by seven seed companies.
- A team of experts from NARC/NMRP, SQCC, MoALD, Ministry of Finance, the National Planning Commission, SEAN and others made a week-long visit to the project's field maize variety evaluation and validation activities.

Technical progress

Technical working group

The project is collaborating with NARC and the private sector to develop the working modality for promoting public-private partnerships for hybrid licensing and seed production. On 26 January 2018, a follow up meeting was held involving HRD, SQCC, CEAPRED, NMRP and the NSAF team. The meeting agreed to form a technical working committee to design and prepare guidelines on hybrid seed production quality standards, the licensing of hybrids and OPVs from NARC to local seed companies, and fast track variety release and registration of cereals and vegetable varieties. The project's experts are members of this technical committee and it has the role of facilitating the exchange of information and sharing local and global experiences in hybrid parent licensing, hybrid seed production and other subjects. The committee started by meeting stakeholders and reviewing existing policies. The initial draft Nepali version of the guidelines has been prepared and reviewed by key stakeholders. After incorporating local and international experiences, the guidelines will be forwarded to concerned government bodies for validation and endorsement.

Joint monitoring of NSAF's maize field activities

In collaboration with NARC's National Maize Research Program the project is introducing and testing diverse maize products and building the capacity and supporting public and private seed partners. These interventions are improving the capacity of local seed partners to meet the growing demand for quality seed towards Nepal becoming self-reliant in hybrid maize seed. To monitor and evaluate these interventions, a team of experts visited and assessed related project activities in five districts in April 2018. The team comprised representatives from Province 3's Ministry of Agriculture, Ministry of Finance, MoALD, National Planning Commission, SQCC, DoA's Crop Development Directorate and Soil Management Directorate, NARC's National Maize Research Program, Soil Science Division and Agri-Botany Division, PMAMP, SEAN, NSAF and USAID.

The project oriented the team about its hybrid, OPVs and bio-fortified maize trials with public (NARC) and private sector partners. The team subsequently evaluated the performance of the maize trials at partners sites and reviewed project implementation and efficiency.

The team expressed its satisfaction about introducing diverse maize germplasm and on engaging local seed companies in variety testing, which is a new intervention in Nepal. They suggested that the companies should narrow down selection and focus on the 2–3 most promising varieties for approval.

Testing new varieties of market-ready maize

In winter, summer and Autumn 2017/18 the project supported the testing of new market-ready hybrid and open pollinated varieties of maize in Nepal in partnership with NARC and local seed companies (Photo 4.10). 305 maize hybrids and OPVs from CIMMYT Zimbabwe, Mexico, India and Colombia were tested of which 30 were heat stress tolerant and 275 were normal varieties. The check varieties were from Nepal:

- In winter 2017, NASIC, Lumbini Seed Co. (LSC), Unique Seed Co. (USC), ARS-Surkhet, GATE-Nepal, National Maize Research Program (NMRP), RARS-Khajura and Panchashakti tested 153 maize hybrids and OPVs.
- In summer 2018, SSSC, Gorkha Seed, Unique Seed, Panchashakti Seed, ARS-Surkhet, RARS-Khajura, GATE-Nepal, Lumbini and CIMMYT tested 277 maize hybrids.
- In Autumn 2018, RARS-Doti tested 32 maize OPVs.
- During the winter maize trials, the highest yield was recorded from the yellow maize hybrids at the Kajura RARS (14 MT/ha) and 10.18 MT/ha from the white hybrids from NMRP Rampur station. The highest yield of 7.9 MT/ha was harvested from the white OPV trials evaluated by NASIC seed company at Dang. The local check varieties yielded less than the top ten hybrids showing the huge potential of introduced hybrids for future commercialization in Nepal (see Tables A3.1 and A3.2 for details).

Figure 4.12 shows how the project has reached out to seven international breeding hubs in different continents to bring market-ready products to Nepal and project target districts.

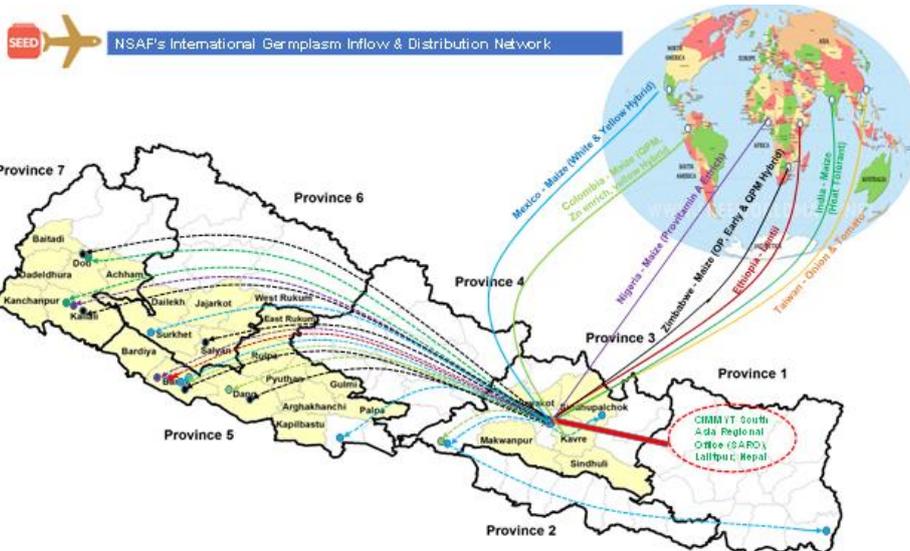


Figure 4.12: The import and distribution of market-ready maize products in NSAF project districts



Photo 4.10: NSAF project maize trials: A. Surkhet Agricultural Research Station and private seed companies; B. Lumbini Seed Co. (Rupandehi); C. Panchashakti Biu Company (Kanchanpur) and D. Unique Seed Company (Kailali) in 2017/18 (Credits: Darbin, Gangaram, Rajendra, Laxmi)

Outcome 2.1.2.2: Seed companies include biofortified crop varieties in their business portfolio

Highlights:

- 191 market-ready biofortified maize varieties, including 148 pro-vitamin A, 34 quality protein maize (QPM) and 9 zinc enriched hybrid varieties were tested for the first time in Nepal in 2017/18.

Technical progress

Attaining food and nutritional security is a priority of the Government of Nepal to increase availability and access to nutritious foods. Biofortification and the breeding of more micronutrient dense staple crops is a cost effective, accessible and affordable option to sustainably improve nutrition compared to nutritional diversification, industrial fortification and pharmaceutical supplementation. Studies show that maize varieties enriched with provitamin A, kernel zinc and QPM contributes to reduce malnutrition in communities where maize is a dietary staple and often a sole source of energy.

The latest figures (2016) show that 36% of under five-year-olds in Nepal are stunted (height-for-age), one in four are wasted (weight-for-height) and a tenth are underweight (weight-for-age) (Figure 4.13). The malnutrition rates vary by province and between the mountains and the Terai. The rate of stunting is highest in the mountains (47%) while wasting and underweight is highest in the Terai (12% and 33% respectively). Province 6 has the highest number of stunted children (55%) (Figure 4.12) Also, nearly a third of pre-school children are affected by sub-clinical vitamin A deficiency.

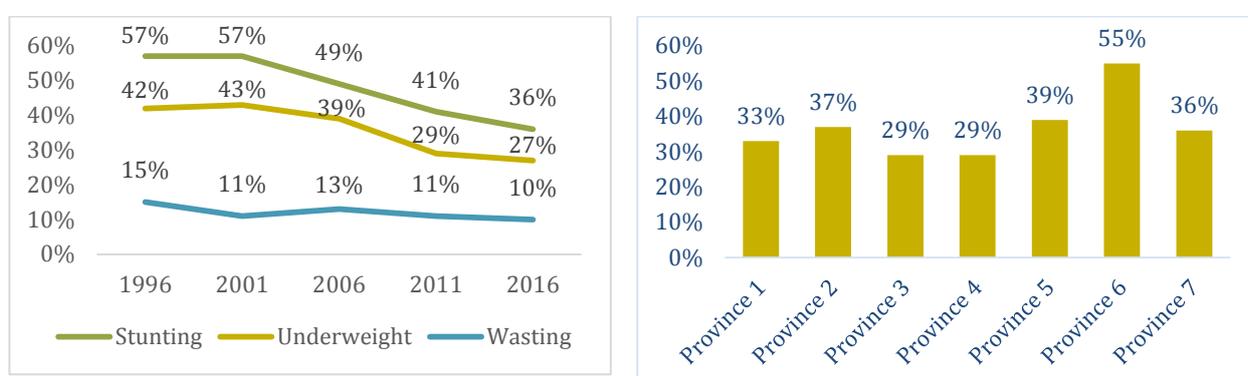


Figure 4.13: Left: Trends of children malnutrition in Nepal (%). Right: Province-wise rates of stunting among preschool children (<5 years) (Source: NDHS 2016)

To increase the availability of and access to more nutritious foods in the Feed the Future districts, in 2017/18 the project received 191 market ready hybrids of bio-fortified maize from CIMMYT and IITA for adaptability testing including 148 pro-vitamin A, 34 yellow quality protein maize and 9 zinc-enriched hybrids, which were compared with local checks primarily for grain yield advantage. The project also conducted adaptation trials of 60 advanced white kernel QPM hybrids at NARC's Agri Botany Division. The grain yield performance indicates the potential of these biofortified hybrids for large scale cultivation in Nepal (see Tables A3.3, A3.4 and A3.5 for details).

- The top performing zinc enriched maize yielded almost 11 MT/ha at GATE Nepal which was at par with the normal hybrid check (number 9). However, there was a 39% and 58% yield advantage of the top performing zinc maize above the normal check at Jhapa and Khajura research stations (Table A3.3).⁴ The performance of the hybrids at the different sites is also depicted in a boxplot to show the maximum and minimum grain yield range of the hybrids at the respective testing sites (Figure A3.1).
- The QPM hybrids were at par with the normal hybrid maize check at the Lumbini Seed Company site, but performed better than the check at NMRP Rampur (8.29 MT/ha) and at the Unique Seed Company site in Dhangadhi (11 MT/ha) (Table A3.4).
- Provitamin A hybrid number 14 was the highest yielder at two seed company sites with the highest yield of 9.28 MT/ha at the Unique Seed Company site.

The project intends for at least two bio-fortified hybrids to be identified by public and private seed

⁴ Note that Jhapa is not in the project's area; data from the trials in that area provided useful information on the performance of nutritionally enhanced maize.

company partners for further testing and registration in Nepal in 2019.



Photo 4.11: Biofortified maize harvested by Pachashakti Seed Company (Credit: Darbin Joshi)

Outcome 2.1.2.3: The National Agricultural Research and Extension System (NARES) develops and deploys ISFM technologies

Highlights:

- Project staff and NARC and MoALD decision-makers met to discuss the first year of project field activities.
- Four NARC scientists were supported to attend an advanced soil spectroscopy methods workshop in Nairobi, Kenya.
- The first spectral soil lab was established in the NARC soil lab in RARS Khajura.
- Five project partners attended a week-long workshop on digital data collection and advanced analytics (machine learning) in agriculture in CIMMYT's office in Kathmandu from 9–13 September 2018.

Technical progress

Review of achievements: On 6 March 2018 the project met high level project stakeholders to review the outputs from the first year's field activities of the project's fertilizer component. The chiefs of NARC's Soil Science Division and PMAMP's maize, rice, and wheat super-zones, and the chief of Khajura Regional Agricultural Research Station participated in the meeting. They critically reviewed technical progress, implications for the coming season of field activities and developed an action plan to secure government endorsement of the new fertilizer technologies and recommended management practices.

Soil spectroscopy workshop: In mid-March 2018, the project supported four NARC scientists to attend a week-long hands-on soil spectroscopy training workshop at the soil spectroscopy diagnostic laboratory of the World Agroforestry Centre (see Photo 4.12). The participants received practical and theoretical instruction on digitizing soil data management and using advanced spectral methods to convert soil information into fertilizer recommendations. This workshop supplemented the scientists' attendance at the April 2017 digital soil mapping workshop in Kathmandu and strengthens NARC's capacity to use soil spectroscopy and digital soil mapping to convert soil data into usable, up-to-date and domain-specific ISFM technologies.



Photo 4.12: Soil spectroscopy trainees at soil spectroscopy diagnostic laboratory of the World Agroforestry Centre, Nairobi, Kenya (Credit: Grace Ndege)

Digital data collection tools and machine learning workshop: In mid-September the project's collaborating ICT partner QED, held a week-long workshop on the use of digital field data collection tools developed through the project (Photo 4.13). This workshop included hands-on training modules on the use of machine learning tools to analyze geospatial agricultural data. Participants from NARC, KISAN 2, PAANI, CEAPRAD, and private industry participated.

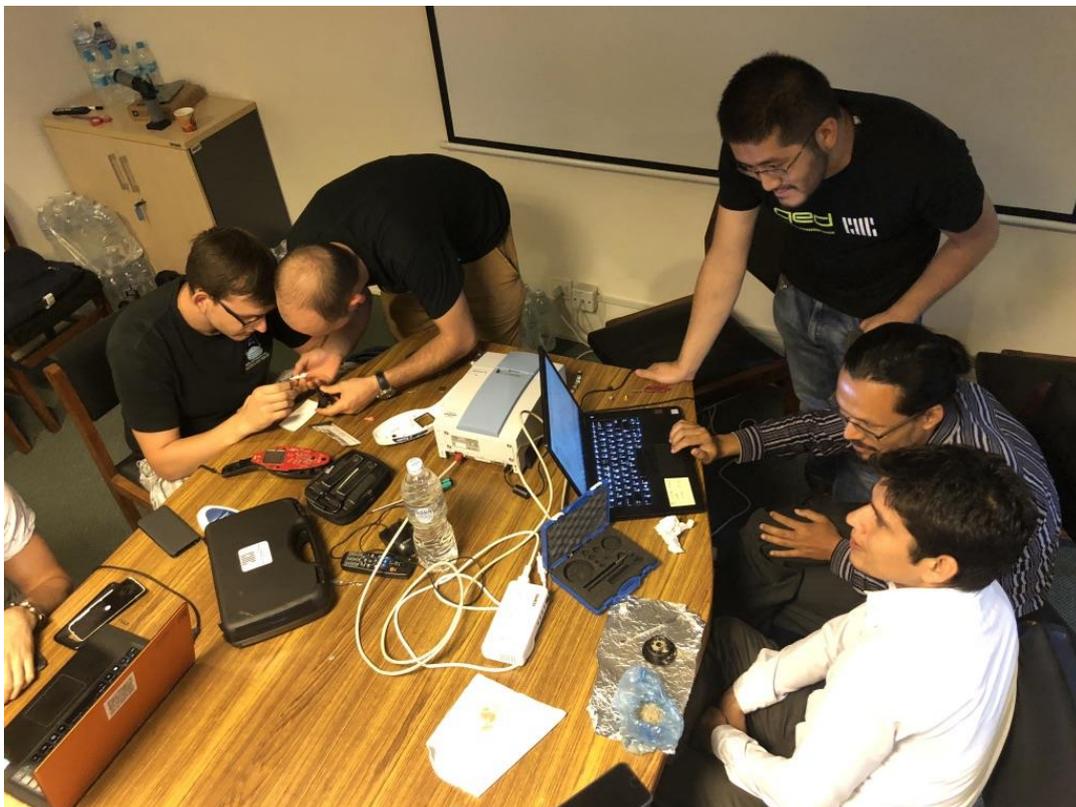


Photo 4.13: NARC staff working with QED on advanced analytics for soil spectrometry. (Credit: David)

4.2 IR 2.2. Small Enterprise Opportunities Expanded

The project is implementing training programs to expand business opportunities for stakeholders across the agriculture value chain of the target crops. It is also supporting the development of standard operating procedures for seed value chain actors, strengthening the entrepreneurial skills of private sector enterprises and working to improve the access of seed companies and fertilizer entrepreneurs to financial and business services.

The project reports against the following indicator for the achievement of intermediate result 2.2:

EG 5.2-1: Number of firms receiving USG-funded technical assistance for improving business performance

The project assisted 62 private sector firms (8 seed companies and 54 fertilizer importers or traders), against the targeted 58 firms by assisting them to improve their business performance. Technical assistance was provided to train fertilizer importers on NEFEA's vision and mission, BMPs on rice and maize, and access to financing from Laxmi Laghubitta. Technical inputs were made to increase the application by seed companies of good seed business practices, marketing, branding and accounting. The detailed progress and deviation narrative is presented in Table A2.12 of Annex 2.

Sub-IR 2.2.1: Entrepreneurial skills strengthened

The project reports against the following four indicators for sub-intermediate result 2.2.1.

EG 3.2-1: Number of individuals who have received USG supported short-term agricultural sector productivity or food security training.

The project trained 4,518 persons (51% men, 49% women) against the target of 4,729 persons in 20 different agricultural sector productivity and food security topics. These events trained 3,753 farmers (2,041 women, 1,712 men), 229 government personnel (188 men, 41 women), 416 private sector personnel (353 men, 63 women) and 120 civil society personnel (58 women, 62 men). The detailed progress and deviation narrative is presented in Table A2.13 of Annex 2.

EG 3.2-4: 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

The project provided institutional strengthening assistance, such as field demonstrations, seed production, business planning, access to finance and organizational management, to 105 organizations against the targeted 103. Forty-four cooperatives, 32 seed and fertilizer related companies, 27 seed production groups and 2 associations (SEAN and NeFEA) were reached. The detailed progress and deviation narrative is presented in Table A2.14 of Annex 2.

EG 3-10: Yield of targeted agricultural commodities within target areas [IM-level] [MT/ha].

During the reporting period yields in the project area were 3.97 MT/ha for rice, 2.91 MT/ha for maize, 1.26 MT/ha for lentils, 8.81 MT/ha for cauliflowers, 9.97 MT/ha for tomatoes, and 7.82 MT/ha for onions. The targeted yield of rice was met while the targeted yields of maize, lentils, onions and cauliflowers were exceeded by 41%, 56%, 6% and 68% respectively. The yield target for tomatoes was underachieved by 25%. The detailed progress and deviation narrative is presented in Table A2.15 of Annex 2. Note: this is a new indicator and so no target was set for 2017/18.

Youth 3: Percentage of participants in USG-assisted programs designed to increase access to productive economic resources who are youth (15-29 years) [IM-level].

Thirty percent of project beneficiaries using seed and fertilizer technologies were aged 15–29 years old. Note this is a new indicator and so no target was set for 2017/18. The progress is presented in Table A2.16 of Annex 2.

Outcome 2.2.1.1: Seed companies and producers adopt good seed business practices

Highlights:

- Developed standard operating procedures for conducting varietal and seed production demonstrations for target crops.
- Organized a statistics training on experimental field design, data capture and analysis.
- Supported a short-term training for two NARC scientists on maize breeding in Uganda.
- Supporting post graduate studies for two NARC scientists.
- Consulted with the two concerned major academic institutes on developing their seed science and technology curricula.

Technical progress

Review of standard operating procedures

The project supported the development of standard operating procedures for varietal and seed production demonstrations of rice, maize, lentil, cauliflower, onion and tomatoes to facilitate the dissemination of project supported technologies. This was done in consultation with the SQCC, NARC's Entomology Division, NARC's Plant Pathology Division, the concerned commodity program and DoA's Directorate of Agricultural Extension (DAE) and Plant Protection Directorate (PPD).

- The draft standard operating procedures on conducting seed and varietal demonstrations of rice, maize, lentil, and vegetables (cauliflowers, onions and tomatoes) were prepared. The rice and lentils SOPs have been reviewed by the NRRP and NGLRP program coordinators and the maize SOP is under review by the NMRP coordinator.
- The SOP for conducting seed and varietal demonstrations of vegetables was prepared and discussed with CEAPRED and NARC's Horticulture Research Division. A pre-validation meeting was held on 29 March 2018 at the Horticulture Research Division attended by government and private sector representatives (SQCC, DoA's Vegetable Development Division and Soil Management Directorate, NARC's Department of Agricultural Extension, Policy and Planning Division and Soil Science Division, SEAN and CEAPRED).
- All the SOPs will be validated and made available to users by March 2019.

Hybrid business management training

NSAF and SEAN jointly organized an International Training Workshop on Seed Business Management in Kathmandu from 23–25 April 2018. The main purpose was to enhance the capacity of seed stakeholders on new hybrid maize testing and deployment, business and marketing plan development, and to improve seed companies' skills in the hybrid seed business.

The training focused on increasing the technical, financial and market management capacities of senior managers and conveying the requirements of a competitive seed business using case studies from Africa and Asia. A total of 324 participants (29 male and 3 female) including 7 participants from Pakistan (6 from private seed companies and 1 from CIMMYT, supported by a USAID project in Pakistan), attended the workshop and shared their experiences. This training event led to seed company partners

improving their capacity to plan their hybrid seed development strategies, which manifested from their research and development endeavors that are featured elsewhere in this report.



Photo 4.14: Participants of international training program on hybrid seed business management, Kathmandu (Credit: CIMMYT)

Training on experimental designs and statistical data analysis

The project and CIMMYT's Biometrics and Statistics Unit ran a two-day training course on statistical data analysis of multi-environment trials, experimental designs and data interpretation in Kathmandu, from 29–30 September 2018 to enhance capacity for testing new products and to increase the knowledge of crop research among young scientists. Twenty-seven participants from eight public research centers, seven private seed companies, the Agricultural and Forestry University and project field staff participated. The course was tailored for junior researchers who work on data compilation and analysis to enable them to generate information from trials. It was particularly useful for private company researchers who are only just starting to evaluate multi-location trials.

The course addressed the benefits and limitations of different experimental designs, how to reduce errors and increase breeding efficiency and practical exercises on alpha lattice designs, data analysis and interpretation. The participants were introduced to the functions of META-R and GER software developed by CIMMYT. Participants downloaded this software for their use.



Photo 4.15: Participants of the statistical data analysis training. (Credit: Bandana Pradhan)

New seed breeders training

The project supported two young maize breeders from NMRP to participate in a 16–27 July 2018 new maize breeders training course organized by CIMMYT and IITA in Kampala, Uganda to enhance NARC’s capacity on product development and early generation seed production.

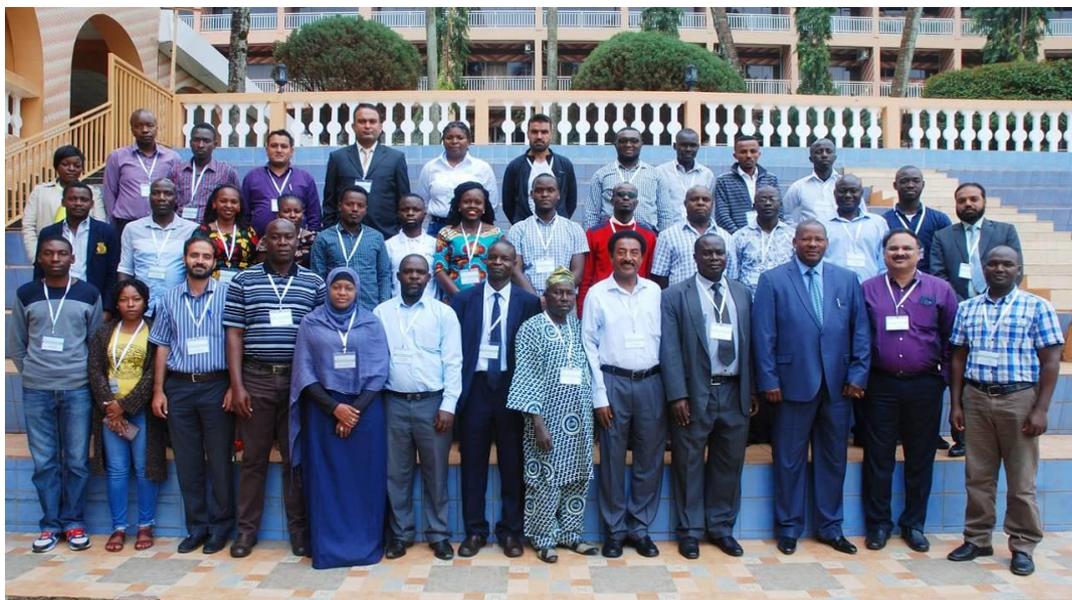


Photo 4.16: Participants in the new maize breeders training course in Kampala (Credit: CIMMYT)

Capacity building of NARC scientists (MSc and PhD)

NARC staff have limited capacity on ISFM and hybrid seed development. In 2017/18 the project supported two NARC staff to take PhDs on soil science. Once trained, these scientists are expected to strengthen the research and analytical capabilities of NARC’s Soil Science Division to implement the various laboratory and field-based technologies promoted by the project.

Meeting with CTEVT and AFU on curricula development

The project is supporting and providing technical guidance to develop and revise curricula for short-term certificate and diploma courses, as per industry requirements, and to build the capacity of Nepal’s universities and colleges. Two significant developments during the reporting period is highlighted below:

- The Director of the Course Curriculum Development Division of the Council for Technical Education and Vocational Training informed the project that they were willing to accordingly review the existing diploma course during their curriculum reviews as per suggestions provided by a project-supported committee.
- The chairperson of the Department of Agronomy of the Agriculture and Forestry University (AFU) informed that they were willing to revise their curricula based on the demand of the national seed industry. In addition, as AFU is going to establish a Seed Science and Technology Department, it needs to develop a new curriculum for a Seed Science and Technology course. The project is working with MoALD, CTEVT and AFU on a concept note to move forward these issues.

Outcome 2.2.1.2: Seed companies develop product lines through varietal research and development (R&D) activities

Highlights:

- NSAF is taking a systematic approach to hybrid product testing, parental line increase and seed scaling up by private seed companies. The approach is encapsulated in the project’s seed production and marketing strategy.

- The project reached out to international breeding hubs and germplasm centers to access 11 lentil varieties from ICARDA's Sub-Saharan office in Ethiopia. They will be further tested in 2018/19 to identify and screen well-adapted varieties.
- NSAF is also processing the introduction of seven tomato and two onion lines from the World Vegetable Center to be tested for adaptation and breeding value.

Technical progress

Hybrid maize seed scaling strategy

The project is working to fast track varietal development, release and seed production by bringing in market ready pre-commercial products from international breeding hubs for adaptation testing. See Tables A3.6 and A3.7 for the scenarios before and after project interventions and the role of public and private stakeholders on hybrid product development and deployment in relation to NSAF target crops.

Based on international good practices and national priorities, the project is taking the following four-phase strategy for supporting the development of hybrid maize seed in Nepal:

1. **Research and innovation:** Supporting private seed companies to test market-ready products from international breeding hubs. This involves building companies' capacity to carry out this work.
2. **Demonstration and validation:** Supporting public and private partners to demonstrate and popularize hybrid seed varieties to create awareness among farmers and other stakeholders about their potential. This involves developing best agronomic management practices and supporting product promotion and packaging.
3. **Marketing and promotion:** Mentoring seed companies to develop their businesses and promoting hybrid seed through various media. This involves supporting seed companies to design and brand seed packaging and to access credit.
4. **Use and adoption:** The final stage supported by the project is to link seed companies with government stakeholder bodies to support wide dissemination and the use of the new hybrids.

A key part of stages 3 and 4 is multiplying the hybrid seeds as explained in Box 4.1.

Box 4.1: The steps of hybrid seed multiplication

- 0.25 Mt of basic (foundation-2) female line seed and 0.1 MT of basic (foundation-2) male seeds are needed by the end 2018 to produce 22 MT of single cross hybrid from 11 ha of land by 2019.
- To have 500 MT of hybrid seeds to sell in 2021, partners need to produce 6.3 MT of the female line and 2.6 Mt of the male line of foundation (basic) seed by 2020, which can be produced from 4.2 ha and 1.7 ha of land respectively.
- To reach this target, seed breeders need 2.6 kg of female and 1.1 kg of male seed by end 2018, which can produce 140 kg of female and 58 kg of male pre-basic (foundation-1) seed by 2019 (Table A3.9)

Notes: The calculation assumes seed reserves and a row ratio of 3 female to 1 male row during planting (Table A3.10). Table A3.11 shows the projected number of beneficiaries and area covered by hybrid maize to the end of the project and beyond. Table A3.9 also shows the minimum quantities and areas of breeders and foundation seed needed to reach the certified seed production goals of single cross hybrid in the following year.

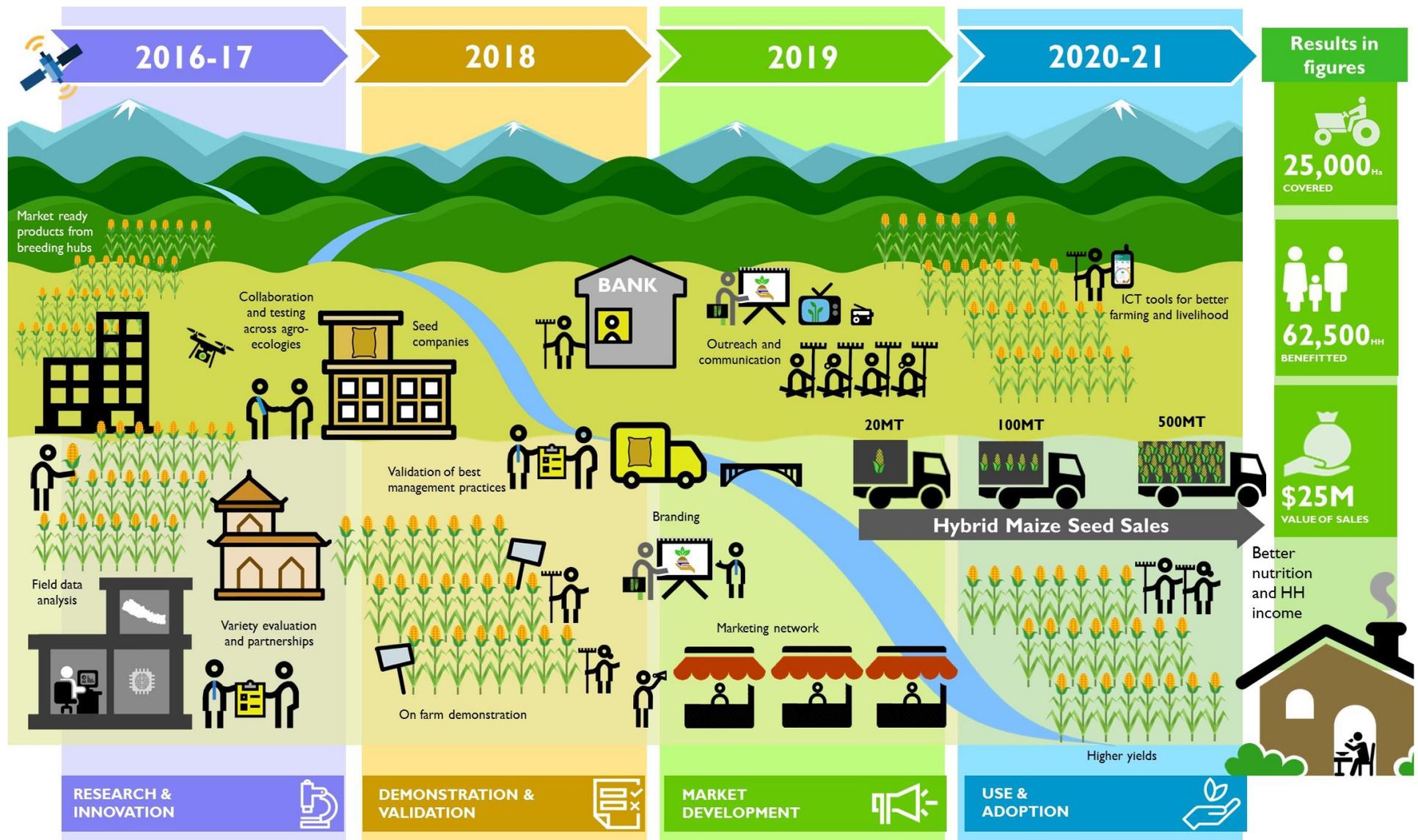


Figure 4.14: The NSAF project's approach to scaling up and scaling out hybrid maize seed

New lentil varieties and lines of tomato and onion

The project facilitated the import of 11 commercially released lentil varieties from ICARDA's Sub-Saharan regional office in Ethiopia. The varieties were handed over to NGLRP and are under field testing and screening for adaptation and other yield attributable traits. The adoption of these varieties will enrich lentil genetic diversity in Nepal and will be used for either direct release or with a combination of locally adapted germplasm.

The project also supported the import of seven tomato and two onion lines from the World Vegetable Center. The lines will be tested by both public and private partners for their suitability and breeding value.

Outcome 2.2.1.3: ISFM practices and the 4Rs of fertilizer management in key agricultural commodities up scaled by stakeholders

Highlights:

- The project worked with private-sector ICT partners to scale up ISFM and the 4Rs (right source, right rate, right time, right place) through innovative SMS, IVR, and smartphone platforms.
- The project collaborated with the government to gain official endorsement of the project-developed best management practices for ISFM and the 4Rs for wheat, maize and rice.
- An agricultural extension program was finalized on best management practices for rice, wheat, and maize. These extension programs have begun to be scaled up through development partners, private companies and the government.

Technical progress

Digital technologies: During this period, the project partnered with three private ICT companies to integrate the outputs from the project's field research on ISFM and the 4Rs (i.e. best management practices) into innovative phone-based digital extension platforms:

- **Viamo** – The project worked with Viamo Ltd (formally VotoMobile) i) to translate the agronomic recommendations from its field research into a series of SMS and IVR-based agricultural extension messages on maize fertilizer timing, and ii) to set up an ICT-based market information program for value chain actors. Within the first few months over 700 farmers and buyers enrolled in the program and there appears to be good demand for a digital crop farmer-buyer exchange.
- **PEAT** – The project is working with PEAT Ltd. to adapt the Plantix plant doctor smartphone app to Nepal's agroecological zones, calendar and language. The app allows users to submit photos of infected plants and receive pest, disease, or nutrient deficiency diagnosis and recommendation. The calibration and the development of the crop calendar has been launched for rice and tomatoes. The project is finalizing the development of the crop calendars for maize and wheat.
- **Spero** – The project collaborated with Spero Analytics Ltd to field test their low-cost soil moisture sensors for informing irrigation scheduling by installing them across the Feed the Future Zone of Influence (Figures 4.15 and 4.16). The end product will support irrigation scheduling and other agro- environmental decisions.

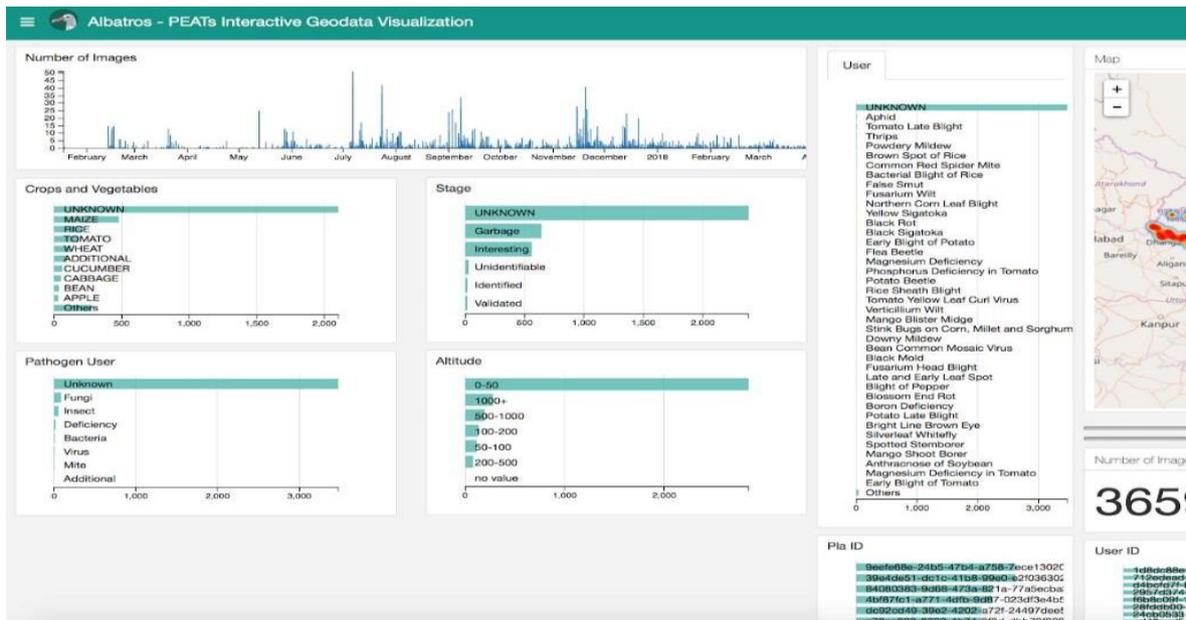


Figure 4.15: Plantix image and diagnostics dashboard for Nepal, showing seasonal and geographic distribution of crop health data across Nepal

All three partners companies won prizes for their work in in the reporting period. The project collaborated with Viamo on a competitive application to the Inspire Challenge Program of the Big Data platform within the Consultative Group on International Agricultural Research (CGIAR). The successful application was awarded US\$100,000 in co-financing to enable Viamo to collaborate with the project to develop an ICT-based market engagement program. PEAT and Spero were winners of the USAID Data Driven Farming prize in 2017 for digital-based innovations in agriculture.

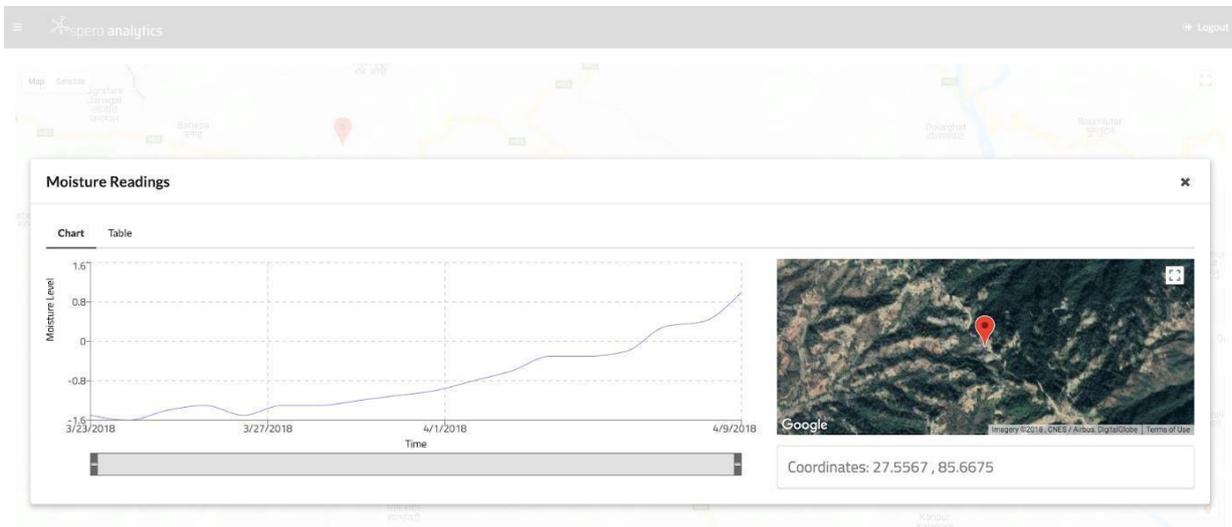


Figure 4.16: Real-time data dashboard from a Spero Analytics soil moisture sensor

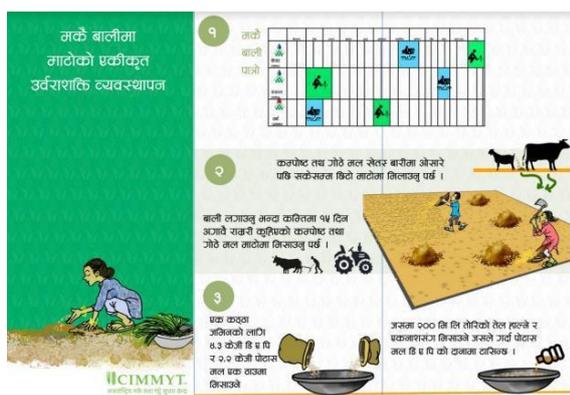


Photo 4.17: The traditional extension approach: The project-produced best management practices brochure on maize cropping (left) and farmers practising fertilizer application techniques at an ISFM training event. (Credit: R. Gupta)

Innovative agricultural extension materials: The project developed innovative agricultural extension materials and programs to disseminate the best management practices for maize, wheat, rice, tomato and cauliflower. The project finalized pictorial guides on government-endorsed best agronomic practices for maize and rice and produced games and other instructional aids. In 2018/19, the practices will be scaled up through the ICT and traditional extension channels that are being developed by the project.

Sub-IR 2.2.2: Access to financial and business services increased

Under sub-intermediate result 2.2.2, the project reports on the following two indicators:

EG 3.2-3: Number of micro, small, and medium enterprises (MSMEs), including farmers, receiving agricultural-related credit as a result of USG assistance.

The project works with private banks to facilitate financing mechanisms for seed companies. Ninety seed growers (all men) received loans from seed companies for seed production against the target of 91 seed growers (90 women and 1 joint men–women). The detailed progress and deviation narrative is presented in Table A2.17 of Annex 2.

GNDR-2: Percentage of female participants in USG-assisted programs designed to increase access to productive economic resources [IM-level].

For this indicator the project counts the number of female beneficiaries accessing credit from various sources for investing in agriculture-related activities. Based on the results from the BBS, 26% of project area female-headed households accessed credit, which when extrapolated to total project beneficiary households amounts to 14,978 HHs. Note: this was a new indicator so no target was set for 2017/18. The detailed progress and deviation narrative is presented in Table A2.18 of Annex 2.

Outcome 2.2.2.1: Seed companies' business plans are financed by banks and financial institutions (BFIs) and access to business services is increased

Highlights

- Supported seven seed companies to prepare business plans.
- Facilitated links between seed partners and financial institutions.
- Innovative seed production finance model piloted with seed companies and banks
- Seed financing policy review conducted to provide evidence-based policy guidelines to the government.

Technical progress

Business plans: The project facilitated seven seed company partners to prepare five-year business plans. This included carrying out strengths, weaknesses, opportunities, threats (SWOT) and competition analyses, market segment assessments, product portfolio positioning, and the development of marketing, production and financial plans. The Unique Seed Company, Gate Nepal, Panchashakti Biu Company and Lumbini Seed Company have developed their five-year business plans. The preparation of these plans gives the companies the opportunity to reflect on the health of their businesses and identify improvement measures.

Links to finance: The project organized 10 individual meetings with 7 commercial banks (Nepal Bangladesh Bank, Everest Bank, Nepal SBI Bank, Laxmi Bank, Muktinath Bank, Global IME Bank and Century Bank) to highlight opportunities for seed value chain financing and modalities for piloting a low interest rate scheme for seed growers and companies. The project also organized field trips for four commercial banks (Laxmi, Bangladesh, Global IME and SBI) and two insurance companies (United and Everest) that increased their understanding of seed growers and seed companies' financial needs. The financial institutions also examined companies' assets, interacted with contract growers, discussed the modality for agriculture insurance for the sector, and learnt about the companies' ongoing activities. This has led to six seed company partners starting discussions with banks to access low interest rate loans.

Two seed companies have subsequently entered into financing agreements with Laxmi Bank and the Nepal Bangladesh Bank respectively and were in final stage of loan disbursement at the end of this reporting period. The total proposed loan sizes for these companies is \$300,000 for each company. About 60% of the proposed loan is for purchasing or upgrading the fixed assets such as land (for R&D activities) and purchasing or upgrading their seed processing and storage structures.

Two other seed companies are negotiating with Everest Bank and Nepal SBI Bank for loans. Due to their locations in metro and sub-metropolitan cities these companies are ineligible for low interest loans. They have approached the Nepal Rastra Bank through their mayors for waiving this restriction on the grounds that they serve rural populations. The results are awaited. In other districts the waiver has been granted and the project expects to receive a favorable decision for the above two companies by December 2018.

Under the project's subsidized agricultural lending program, the project facilitated a seed growers' lending model following a tripartite arrangement with Laxmi Bank, Panchashakti Seed Company and their seed growers in Kailali and Kanchanpur from the 2018 rice summer season. Figure 4.17 shows the project's bank financing model. The role of seed growers is to i) use seed from the company, ii) use best management practices as recommended by the company and the project. The seed company is responsible for:

- training seed growers;
- providing quality source seed to growers;
- monitoring seed production plots at least three times per season;
- arranging visits from SQCC to monitor field standards;
- guaranteeing to buy grown seeds as per their agreement with seed growers; and
- collecting seed from seed growers by paying a 10-15% higher price than the grain price of that commodity in the market.

The role of Laxmi Bank is to i) develop loan products by participating in seed grower meetings, ii) facilitating seed growers' to open their bank accounts; iii) establishing links with seed insurance schemes, and iv) disbursing loans and payment settlement in coordination with seed companies.

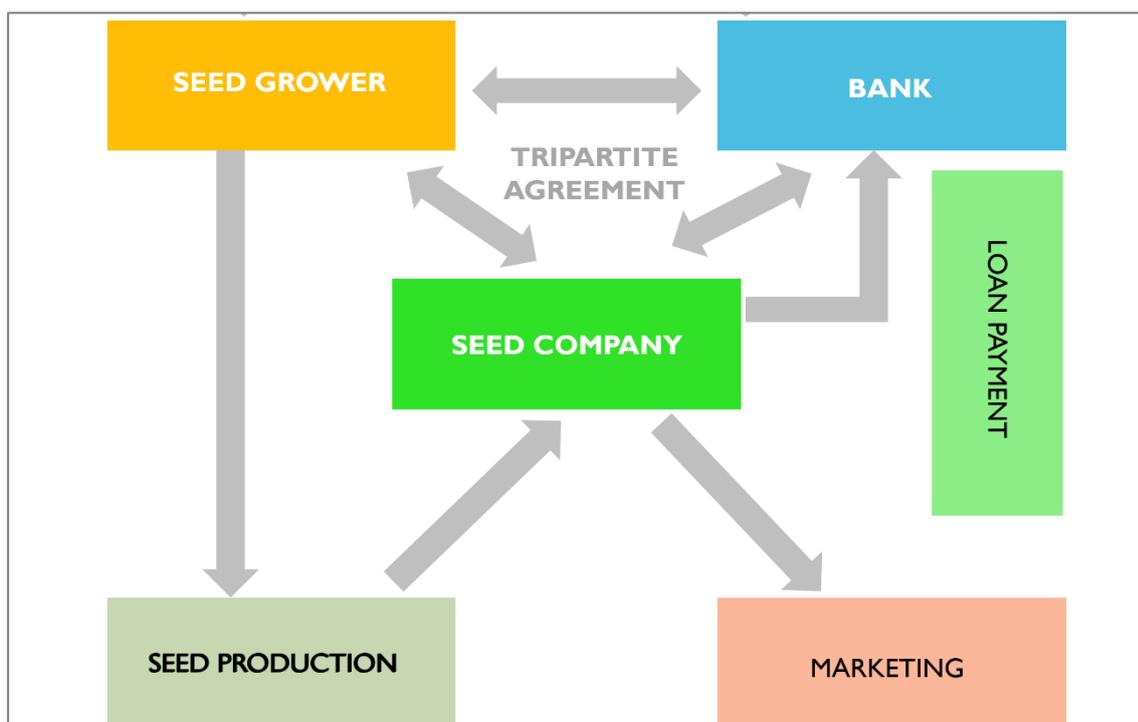


Figure 4.17: NSAF's seed producers financing model

During the process 50 seed growers have opened bank accounts with Laxmi Bank. Opening a bank account is an important milestone to increase access to finance in farming communities because then bankers start offering different loan products to farmers such as machinery and dairy loans at lower interest rates. Seven farmers took loans of \$4,200 at 8% interest rate for rice seed production – of Radha 4 variety on 10 ha of land. This interest rate is less than the rate normally charged by cooperatives that range between 16%–18%. This process has the potential to save large costs in seed production, improve quality and the recovery of seeds for seed companies and provides much needed working capital for seed companies to increase quality seed production. It is planned that loans will be next provided for wheat farmers and other crops in subsequent seasons. The pilot with rice has boosted the confidence of banks, seed companies and producers and an increase is expected in the number of farmers obtaining such loans.

Considering farmers' interests and potential benefits, the Laxmi Bank has proposed a branchless banking scheme in Bhajani municipality of Kailali district where Panchashakti Seed Producers are located. For this the leader of a local cooperative was proposed as a local agent and the request has been forwarded to the Nepal Rastra Bank for approval. More such innovative schemes are needed for commercial banks to extend banking services in the rural areas through modern tools such as branchless banking and mobile banking schemes.

The project is assessing the status, challenges and opportunities in seed business financing based on reviews, field visits and interactions with stakeholders including farmers, cooperatives, farmer groups, commercial banks, projects, scientists and technicians. An evidence-based policy paper will be prepared by the project for sharing with MoALD, MoF and other stakeholders in collaboration with KISAN 2 for reducing barriers to access finance for seed production.

Outcome 2.2.2.2: Fertilizer entrepreneur's access to financial and business services increased with introduction of new ISFM technologies and services

Highlights

- The project is supporting NEFEA to develop a business plan for selling and producing briquetted and polymer-coated urea in Nepal.

Technical progress

The 2017/18's research demonstrated the potential of briquetted urea and polymer-coated urea and led to NEFEA becoming interested in commercializing these two fertilizer products in Nepal. However, as this would represent a new financial risk for NEFEA's members the project's business development specialists are working with NEFEA to develop a cost-benefit analysis and a business assessment on the two new products.

4.3 IR 2.4. Economic Growth Policy and Performance Improved

The project is working to improve Nepal's economic growth policy and performance by increasing the supply of and the demand for quality seeds and fertilizers and by improving private sector service delivery.

Sub-IR 2.4.1: Increased access to markets

EG 3.2-19: Value of small-holder incremental sales generated with USG assistance

The BBS recorded \$14,172,980 (target: \$1,450,425) of incremental sales of the six project crops by project area farmers comprising \$14,068,467 of incremental sales of cereals (maize and rice) (target: \$428,162), \$26,670 of incremental sales of lentils (target: \$5,619) and \$77,842 incremental sales of vegetables (target: \$1,016,644). The detailed progress and deviation narrative is presented in Table A2.19 of Annex 2.

Outcome 2.4.1.1: Volume of quality seed sold by public and private sectors increased

Highlights:

- Mapped crop production and market segments for maize, rice and vegetables.
- Conducted the validation of a digitally enabled seed information system.
- Preparations made to study the impact of seed subsidies on farming practices.
- The project supported PMAMP's Rice Sector Working Group.
- The project and the National Grain Legume Research Programme organized a national workshop on lentils in February 2018 to identify challenges and opportunities in the lentil value chain.
- The project conducted seed trader meetings to promote seed sales.
- The project supported its partner seed companies to produce and sell 1,929 tons of seeds of the project's target crops.

Technical progress

Mapping crop production and market segments

The project progressed on identifying agroecological data-based seed production and market domains in the Terai and Midhills to delineate market segments and assist companies with product positioning. The approach uses climatic, soil and terrain information to delineate suitable domains using GIS extrapolation and multivariate geographic clustering.

The project identified suitable maize and rice production zones and seasons based on growing-degree days, length of growing period and other agro-climatic information (see Figures 4.18 and 4.19). Currently the project is linking these findings with seed companies to enhance their market development activities for hybrid maize and rice. The project will next validate the findings and develop maps with location specific information to assist seed companies to select suitable maize and rice varieties and target markets.

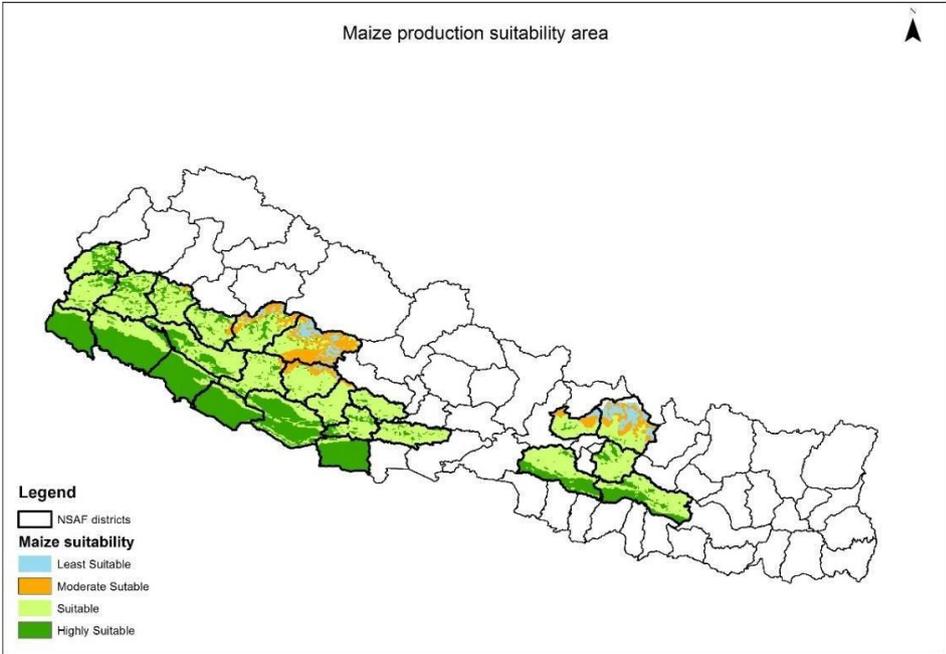


Figure 4.18: Maize production suitability areas based on climate, soil and terrain analysis

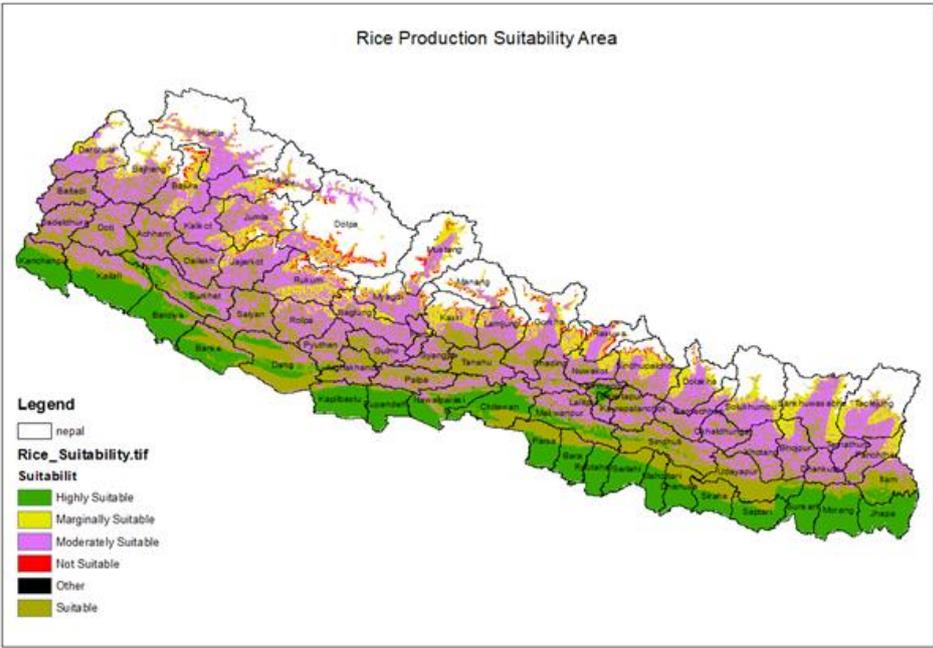


Figure 4.19: Rice production suitability area based on climate, soil and terrain analysis

Digitally enabled seed information system

The project initiated the production of a digitally enabled Seed System (DESS), which will be an interactive and dynamic national database on different categories of seeds based on original source and

other factors. International consultants supported by the USAID D2FTF project conducted a preliminary needs assessment for the proposed system in consultation with SQCC and seed value chain actors.

The DESS automates the current paper-based seed balance sheet used by SQCC and other seed stakeholders. The finalized DESS will enable stakeholders to share their seed demands, sources and availability. The system will aggregate demand and supply figures in real time and generate reports on the country’s seed demand and availability, which otherwise used to take at least 2–3 months. It will also have an interactive and dynamic seed catalogue with up-to-date information on plant varieties released and registered in Nepal.

In August 2018 the digital architecture and the model for the digital enabled seed system (DESS) were presented to national stakeholders at a validation workshop in Kathmandu. To follow up, the project has been in touch with the SQCC to initiate the recruitment of a consultant to develop the model. The SQCC has shown a keen interest and has agreed to co-finance the DESS. These activities will be taken up in a phased way and the DESS should be functional in 2019. Figure 4.20 shows a mock screen of a digital seed catalogue where users can have a live chat window to send requests from their mobile phones.

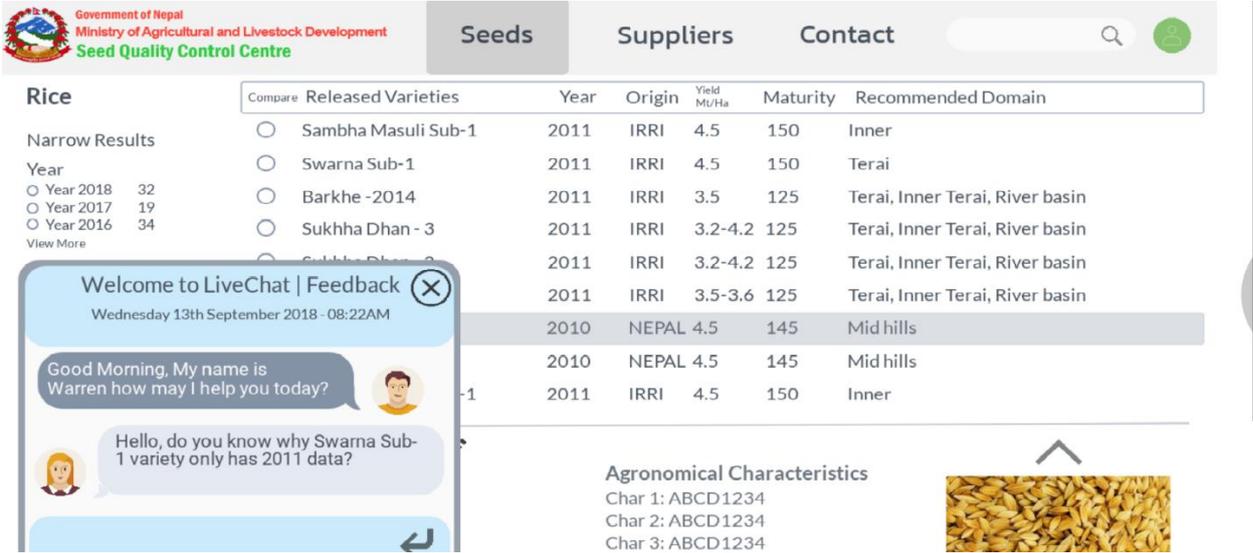


Figure 4.20: Screen shot of a mock Digital Seed Catalogue being developed under the DESS.

Seed subsidy study

The government provides subsidies to farmers to buy cereal and other crop seeds. The project, in consultation with SQCC, DoA’s Crop Development Directorate and SEAN developed a plan to study the impact of seed subsidies on farmers’ adoption of improved varieties and related yields and incomes. The methodology is under discussion and farmers who obtained subsidized seed in 2012–2016 have been made available by the National Seed Company (NSC) for a few districts. The households that received subsidized seed will be compared with those who did not to assess the impact of the subsidies. The study is designed to inform the government’s seed subsidy policies and programs.

PMAMP Rice Sector Working Group

The project is collaborating with PMAMP to strengthen the program’s Rice Sector Working Group. The project supported the organization of a forum on 14 December 2017 for rice sector stakeholders to review rice cropping knowledge and practices and identify research and development priorities. The 52 participants from the national rice research program, regional agriculture stations, seed companies, PMAMP, millers, farmers, CIMMYT, the International Rice Research Institute, SQCC, and the former

Crop Development Directorate recommended the promotion of the following rice varieties for particular geographical niches:

- Sukhadhan 1-6 and Hardinath 3 for drought prone areas in the main season;
- Swarna Sub-1, Sambha Mansuli sub-1 and Ciherang sub-1 for submergence areas;
- Bahugunidhan-1 and 2 Ciherang sub-1 for drought and submergence tolerance; and
- the Lalka Basmati and Sugandhitdhan-1 fine and aromatic rice varieties.

Project seed company partners are working on these varieties for market development and delivery to farmers.

National lentil workshop

The project, in collaboration with the National Grain Legume Research Programme (NGLRP), organized a national workshop on lentil productivity and profitability on 20–21 February 2018 in Nepalgunj (see Photo 4.18). The workshop was the first of its kind involving all value chain actors and major lentil stakeholders. The participants reviewed crop genetics, seed production and crop husbandry technologies. They discussed market forces and how to unlock the export potential and profitability of lentils. The forum enabled farmers, millers, exporters, customs officers, researchers and seed companies to share experiences, lessons and challenges and develop a road map. Participants also visited NGLRP, Khajura to see the seed production of 11 lentil varieties. The workshop formed a working group to follow up on workshop decisions to improve the competitiveness of lentil value chains covering related research and development, seed production, market development and enabling policy framework issues. The workshop proceedings are being prepared to communicate the recommendations and should be completed by December 2018.

NSAF conducted traders meeting to promote seed sales

To develop marketing mechanisms for lentil and vegetable seeds, project seed companies (Panchashakti, Unique, Gate Nepal and SEAN Seed Service Centre) organized four meetings between traders and seed companies in their market segments (Kailali, Kanchanpur, Bardiya and Salyan districts), altogether convening 115 local traders. During the meetings, the companies identified traders' demands for lentil and vegetable seeds and agreed on plans and logistics to deliver the demanded seeds. This kind of initiative is new and aims to increase the seed sales of Nepalese seed companies and subsequently to diffuse new varieties to farmers' fields.



Photo 4.18: Participants of national lentil workshop in discussion and field visits to NGLRP and NSAF's seed multiplication fields in Khajura, Banke (Credit: Darbin Joshi)

Seed sold

During the reporting period the project's eight seed company partners sold 1,929 MT of target crop seed comprising MT 1,597 of rice seed, 305 MT of maize seed, 19.1 MT of lentil seed, 0.59 MT of cauliflower seed, 5.92 MT of onion seed and 0.3 MT of tomato seed.

The project's analysis of the factors influencing the performance of the project's seed company partners are presented in Table 4.2, which shows changes from project baseline to September 2018 situation.

Table 4.2: Change in performance of seed companies after project interventions

Success factors	Indicators	Baseline (2016)	Performance as of September 2018
Technically equipped	R&D facility	Lacked R&D facilities	<ul style="list-style-type: none"> Seven out of eight partner seed companies purchased or leased land for R&D purposes Two companies started maintenance breeding of rice and wheat
	Qualified technical human resource	Limited or lack of technical manpower	<ul style="list-style-type: none"> Two companies hired MSc agriculture level breeders and seven have at least BSc agriculture level staff. Seed companies' technical staff trained on seed production, business management and data analysis.
	Internal quality control system	Weak seed quality control mechanisms	Seed companies have started buying seed from contract growers only if: <ul style="list-style-type: none"> source seed is supplied by the company; seed production sites are monitored by companies' staff during rouging and raw seed is supplied in company-supplied bags.
	Laboratory facilities	No seed testing laboratory facilities at seed companies	<ul style="list-style-type: none"> Three companies have established seed laboratories in their own buildings through public private partnership approach, though they are yet to be

Success factors	Indicators	Baseline (2016)	Performance as of September 2018
			operationalized.
	Development of company's own varieties	Seed companies relied 100% on NARC varieties	<ul style="list-style-type: none"> Seed companies have started multiplying parental lines of hybrid maize released by NARC. Two seed companies are in the process of taking breeder seed production licenses from SQCC. Five seed companies are conducting trials on market ready hybrid maize products.
Professionally organized	Availability of business development and market intelligence plans	Lack of business development plan	<ul style="list-style-type: none"> Four seed companies have developed five-year business development and market intelligence plans.
	Clear organogram and institutional management	Lack of organizational organograms	<ul style="list-style-type: none"> Four companies have developed or revised their organograms and added marketing offices Two have arranged budgets for internal auditing.
	Pricing policies and incentive structures for seed growers	Inefficient pricing strategies	<ul style="list-style-type: none"> Seed companies have started calculating seed prices based on their costs and expected profits. It has been useful for selling seed earlier than competitors.
Market-oriented	Market research and promotion	Lack of market research and promotional activities	<ul style="list-style-type: none"> Four companies carried out traders' meeting in their market segments All partner seed companies started carrying out demonstration partially supported or at own cost.
	Appropriate packaging and branding	Poor packaging and branding	<ul style="list-style-type: none"> One company has printed different packets at its own cost with technical support from NSAF. Another three are in process of doing this.
Strategically linked	Links with government institutions	Poor participation in policy meetings	<ul style="list-style-type: none"> Through SEAN, all partner seed companies have started participating in local, regional and national policy meetings. Four seed companies have received hybrid lines from NARC for testing One seed company received government subsidy for source seed production
	Links with financial institutions	Lack of access to low interest rate loans	<ul style="list-style-type: none"> Two seed companies are in final stage of receiving subsidized loan from private banks of \$300,000 each One company has pilot seed grower lending in partnership with Laxmi Bank.
	Links with development projects	Poor links with development projects	<ul style="list-style-type: none"> Using their business development plan, two seed companies have leveraged finance.

Outcome 2.4.1.2: Fertilizer demand, welfare outcome, and market characterization studies improve public and private investment

Highlight:

The provision of fertilizer is a politically sensitive issue in Nepal. The project therefore works with MoALD on multiple fronts on this issues across the following activities:

- Reviewed a feasibility study for setting up a urea fertilizer plant in Nepal.

- Completed a willingness to pay study on chemical fertilizers and preliminary policy draft shared with MoALD focal person.
- Policy exposure visits held for key stakeholders involved in fertilizer import, distribution and policy-making.
- Educated NEFEA members on the 4Rs of soil nutrient management for fertilizer policy lobbying.
- Held policy dialogues, interactions and presentations with government and private sector representatives.

Technical progress

Review of feasibility of a urea plant

Nepal imports and distributes chemical fertilizers to farmers at subsidized rates with these subsidies consuming a large proportion of each year's agriculture development budget. The main issues around the distribution of fertilizer including the demand-supply gap, inconsistent quality of fertilizer, timeliness of fertilizer delivery and lack of private sector participation. Based on this, the government envisions setting up an ammonia urea complex. The Office of the Investment Board of Nepal funded the carrying out of a feasibility study and the report was submitted to the government in June 2017.

After discussions with the National Planning Commission (NPC), the NPC requested the project to analyze the assumptions made in the study. The project then requested IFDC to review the study, which found the study to be sound and thorough. However, there were major problems with the financial feasibility of the required investment including the lack of a concrete export plan of the surplus, and the cost, and availability (though a pipeline from India) of the natural gas required to produce ammonia and carbon dioxide for urea production. A detailed review report was prepared and presented to the government on 14 June 2018.



Review of the Detailed Feasibility Study for Setting Up a Urea Fertilizer Plant in Nepal

Prepared for
International Maize and Wheat Improvement Center (CIMMYT)
Nepal

April 2018



Willingness to pay for chemical fertilizer study

A nationally representative study to assess farmers' willingness to pay for chemical fertilizers (focusing on urea and DAP) was carried out using the Becker-DeGroot-Marshak (BDM) auction method. The study was designed together with IFPRI/CISSA in consultation with MoALD and NEFEA officials to provide evidence for potential fertilizer sector policy reform for more efficient fertilizer distribution. The preliminary findings have been shared with the MoALD focal person.

The preliminary results indicate: the following:

- The percentage of respondents reported facing a shortage of fertilizer supply in the last one year is higher in Hill region (26%) than in the Terai (14%).
- Farmers are very sensitive to fertilizer subsidies. The majority were reluctant to state bids in fertilizer auctions higher than the current subsidized retail price. However, farmers have a greater valuation for guaranteed availability when they are purchasing from agro-vets or have higher expenses on transportation.

In this regard, the government could adopt an agro-ecological domain-specific fertilizer subsidy strategy that accounts for variation in soil properties and the typology of farmers based on their economic resource endowment, willingness to pay and spatial location. This would be similar to the voucher system proposed in the Agriculture Development Strategy (ADS).

Policy exposure visits for fertilizer importation, distribution and policy stakeholders

With the interactive digital soil map of the Terai region completed and that for hilly regions under preparation, private and public the stakeholders have started showing interest to have access to blended fertilizers in Nepal. With such interest an exposure visit was organized to Kenya for a delegation of six key stakeholders to witness the production and distribution of blended fertilizers. The delegation included government officials from MoALD, Ministry of Finance, and the Investment Board of Nepal; the president of NEFEA and one private sector representative from NIMBUS. The delegation has prepared a draft trip report, which has been submitted to MoALD's secretary with recommendations for promoting blended fertilizers, by importing it in the short-term and by establishing blending plants in the medium term.

Educating NEFEA members on the 4Rs of soil nutrient management principles for fertilizer policy lobbying

The NEFEA executive committee members (including the president) have visited a few counties (Morocco, Bangladesh, and Kenya) to better understand fertilizer business options (including new blends of fertilizers). NEFEA members have been involved in field testing to witness the impact of the use of new blends of fertilizers including polymer coated, sulphur coated and briquetted urea as well as appropriate fertilizer management practices based on the 4R principles. In addition, NEFEA members have been trained as trainers on soil fertility management. As a result, NEFEA members have started to think of innovative business opportunities around new blends of fertilizers and are lobbying MoALD to register a few fertilizer blends that are not used commercially in Nepal. When registered these new blends can be legally imported and distributed in the country.

Policy dialogue, interaction and presentations with government officials and private sector

The project's fertilizer component activities have made the project an important partner for government and the private sector to discuss how to tackle issues around chemical fertilizer importation, distribution, and subsidies. Two important interactions in this reporting period were:

- the April 2018 meeting at the National Planning Commission where the project presented the review of the feasibility of urea plant establishment to government stakeholders; and
- the October 2018 presentation by project and MoALD representatives on the importance of blended fertilizers and fertilizer subsidy restructuring options while presenting the Kenya visit report.

The latter presentation was attended by the minister, secretary and other MoALD officials and an NPC member. The presentation was followed by a brainstorming session on ways to address the issues around fertilizer importation, distribution, subsidies, and spatial disparities in soil properties and the benefit of blended fertilizers to improve agricultural productivity. The following main points were recommended by the project:

- Restructuring the current subsidy to encourage more balanced fertilizer application. This includes allocating part of the urea subsidy to DAP and importing fertilizers blended with micronutrients in the short term to distribute in areas where soils are deficient (based on soil maps and testing).
- The potential for domain-specific fertilizer subsidies (based on the extent of shortages, willingness to pay for certain provision and transportation costs) and farmer typology (based on economic resource endowment and nutrient needs of their farms) through the use of subsidy vouchers of different values rather than the current uniform subsidy. This is to some extent consistent with findings from the project's above willingness to pay study.
- In the medium term, to establish fertilizer blending plants as per the soil properties in different agro-ecological domains.

At the end of this meeting, MoALD’s secretary proposed that a small task group should continue this work and come up with a potential fertilizer policy and distribution recommendations. The project has offered to provide an advisory role and provide relevant research evidence to the task group.

Fertilizer information system

Project staff held initial scoping meetings with the Microsoft Innovation Center and QED on the development of a fertilizer information system for Nepal. Figure 4.21 shows such a system that QED has already worked on.

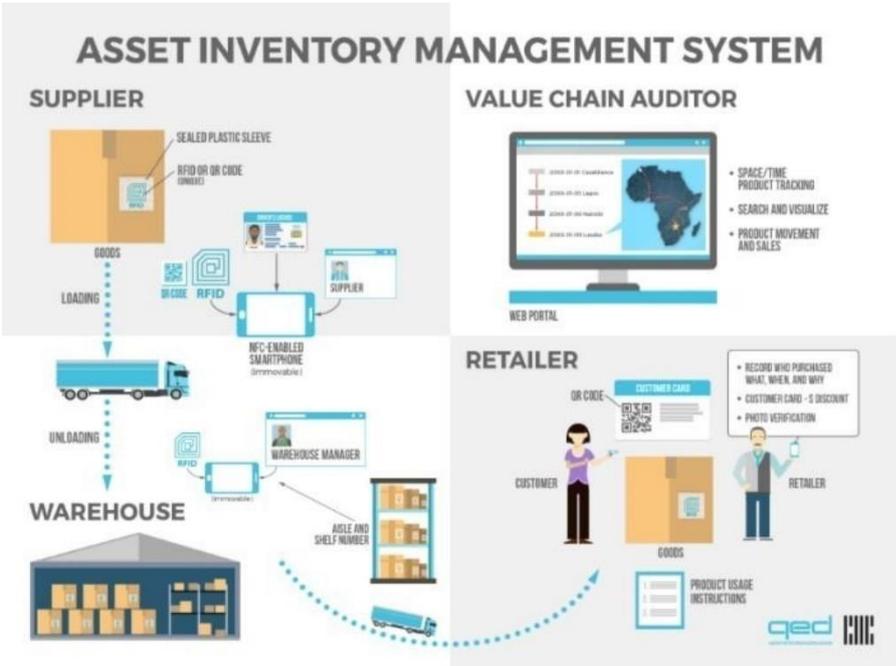


Figure 4.21: Diagram of a fertilizer information system previously developed by QED in Africa

Sub-IR 2.4.2: Private sector service delivery improved

Under sub-intermediate result 2.4.2, the project reports on the following indicator:

EG 3.2-5: Number of public-private partnerships formed as a result of USG assistance.

The target was for the project to support five public-private partnerships between government organizations (between NARC/SQCC) and private seed companies to promote new varieties of maize using inbred lines from CIMMYT. The target was met as NARC provided inbred lines of hybrid maize to five seed companies for strengthening hybrid seed production. The detailed progress and deviation narrative is presented in Table A2.20 of Annex 2.

EG 5.2-2: Number of private sector firms that have improved management practices or technologies as a result of USG assistance.

During the reporting period, the project provided improved management practices in human resource development, seed production technologies and seed business expansion to 20 private sector (seed companies and fertilizer dealers) to exactly meet the target. The detailed progress and deviation narrative is presented in Table A2.21 of Annex 2.

Outcome 2.4.2.1: SEAN lobbies Government of Nepal for effective seed policy implementation

Highlights:

- Technical support on maize hybrid seed development provided to SEAN.
- SEAN became a member of technical working committee to develop hybrid seed production and licensing guidelines under the public-private partnership arrangement with NARC, SQCC and the project.

Technical progress

Support for SEAN: Improving the capacity of SEAN is a must to enable it to influence the seed policy environment and practices. In January 2018 the project held discussions with executive members to identify joint activities and a partnership agreement was signed in August 2018. SEAN is also a member of SQCC's public-private partnership committee and hybrid licensing technical working committee. The project supports the association on seed-related technical matters and on its communication materials including its Seed Bulletins and supported it to hold its annual general meeting on 10 March 2018.

SEAN works closely with the project's seed market development team to map out the demand and supply of seeds in various project district market segments. The district chapters of SEAN are working with local governments to raise awareness about the production and availability of quality seeds. The project also participated in the seed policy discussions that SEAN organized together with the KUBK project in June 2018.

SEAN also facilitates the conducting of studies on the seed value chain of target crops; on building the capacity of its members and seed traders; on updating its website, on holding strategic meetings with seed stakeholders; lobbying for variety registration, domain expansion, subsidy policy, and insurance and disseminating seed technology information to local governments.

Outcome 2.4.2.2: Local government service delivery improved

Highlights:

- Engagement with local governments discussed with project's Technical Committee.

Technical progress

A 28 February 2018 meeting of the project's Technical Committee recommended that the project identify ways of engaging with the new local governments. The project has subsequently engaged with local governments by inviting them to various training events and field days. This interaction is happening via the seed company partners and by project staff located in the various districts.

As per the recommendation of the joint Steering Committee, the project is collaborating with USAID's KISAN 2, SABAL and PAHAL projects to develop a joint framework for engaging with local governments.

In addition, the project and GATE-Nepal organized a visit with the Chairperson of Baijanath Municipality, the Chairpersons of wards 5 and 6, and the Agriculture Section of Kolahpur Municipality, Banke on 8 August 2018. The project and GATE team briefed them about their work. The major achievements of this meeting were as follows:

- The project-GATE team was the first team who officially visited this local government to discuss about seed and agricultural related issues.
- The local government is very keen to introduce new varieties and produce and distribute quality seed to local farmers.
- A collaboration between the municipality, GATE Nepal and the project would be highly welcomed especially on varietal testing, seed production and distribution, seed planning, capacity development of farmers and technical people, and the use of local funds for demonstrations, seed production and capacity development.



Photo 4.19: Meeting of NSAF and GATE-Nepal team with Baijanath Municipality, Banke. (Credit: CIMMYT)

The major achievements of a meeting with the officials of the Agricultural Section of Kohalpur Municipality, Banke were as follows:

- Their key concern was having access to quality seed of high yielding varieties to boost crop yields.
- They have been receiving seed from GATE-Nepal and expecting to continue collaboration with GATE-Nepal in seed production and distribution.
- They requested training on quality seed production and management, which the project proposed could be managed by GATE-Nepal.
- The municipality's budget could be used to share quality seed production and distribution costs.

These two meetings indicate that there is good potential for the project to collaborate with local government where project field staff and partner seed companies can work together to support local governments. In addition, SEAN's district level coordination committees can play an important role promoting new varieties.

5 CROSS CUTTING ACTIVITIES

A number of important activities cut across the project's seed and fertilizer components – monitoring, evaluation and learning; communication and outreach, gender equity and social inclusion and project management.

5.1 Monitoring, Evaluation and Learning

The project's revised M&E plan (September 2017) has 16 performance indicators. To comply with the latest Global Food Security Strategy (GFSS) guidelines, the project added the following four new performance indicators starting from this reporting period:

- GFSS-12: Yield of targeted agricultural commodities within target area (MT/ha).
- GNDR-2: Percentage of female participants in USG-assisted programs designed to increase access to productive economic resources.
- STIR-10: Number of innovations supported through USG assistance.
- STIR-11: Number of innovations supported through USG assistance with demonstrated uptake by the public and/or private sectors.
- Youth 3: Percentage of participants in USG-assisted programs designed to increase access to productive economic resources who are youth (15-29 years) [IM-level].

This means that the project now has 21 performance indicators of which 7 are to be reported on semi-annually and 14 annually. The final Feed the Future Monitoring System (FTFMS) for the project indicators covered during this reporting period and the list of indicators are provided in Annexes 4 and 5.

The project's main M&E activities in the second year of the project were as follows:

- On 5 December 2017, presented the preliminary findings of the project's baseline survey to the USAID Agriculture M&E Group meeting.
- On 21 December 2017, an assessment of the project's M&E processes and capacity was conducted by USAID's Monitoring, Evaluation and Learning Project. The assessment used the Monitoring, Evaluation and Learning Wheel tool and recommended that the project i) prepare an M&E and learning plan and a data collection and management plan with sub-awardees, ii) conduct data quality assessments at sub-awardee level, iii) limit the annual project report to a maximum of 45 pages (excluding annexes), and iv) encourage project M&E and non-M&E staff who are involved in data collection and reporting to attend knowledge management trainings. In addition, on 18 September 2018, the project technical team took part in a half day knowledge management workshop in Nepalgunj.
- On 18 January 2018, a data quality assessment (DQA) field verification and findings sharing and debriefing meeting was held with USAID's M&E team. The assessment focused on two performance indicators (EG 3.2-4 on organizations supported and EG 11-6 on number of people using climate information). The project has adopted the measures recommended by USAID's DQA report by standardizing seed data collection, the verification (beyond email records) and documentation process, and by updating the performance indicator reference sheet (PIRS) to reflect specific data sources, assumptions and calculations used to calculate indicator values.
- On 30 January 2018, project M&E staff participated in a meeting of USAID's Agriculture M&E Group.
- From 21–22 February 2018, project M&E staff took part in a knowledge management and learning training and from 5–6 March 2018 in a learning summit organized by USAID's Monitoring,

Evaluation and Learning Project. These events helped the M&E team better understand USAID's knowledge management framework for generating, capturing, applying and sharing knowledge that results from project interventions. The knowledge gained was shared with other project technical staff who are involved in planning and reporting on project activities.

- On 23 February 2018, a project team participated in the SEED partners meeting where the USAID SEED team presented the findings from its portfolio review of USAID supported agriculture projects in Nepal. The team learned from other projects' experiences.
- In August and September 2018, a Beneficiary Based Survey (BBS) was carried out to enable reporting against the annual indicators for 2018. This included a survey of 737 randomly selected households from 30 randomly selected clusters in 10 of the project's 26 target districts. The clusters included agro-vets (for seed component beneficiaries) and cooperatives (for fertilizer component beneficiaries).

In addition, in 2017/18 M&E staff:

- shared USAID's data quality assessment recommendations and the findings of the Monitoring, Evaluation and Learning Project's capacity assessment with project staff;
- carried out regular technical backstopping of the project field team on M&E indicator changes and related reporting requirements;
- oriented seed company and project personnel on the updated tools to collect data on seed sales, technologies and best management practice use and adoption; and
- carried out the regular monitoring of seed production and varietal demos, fertilizer trials and demos and farmers field trials.

5.2 Communicating for Impact

The following were the main achievements in 2017/18 on communicating with users to heighten the impact of project supported initiatives and interventions:

- The project supported its seed company partners' marketing efforts through radio broadcasts and brand building. To promote their brands, the project helped companies design attractive packaging for maize, rice and lentil seeds packets (see Figure 5.1). The packages have a guide to increase crop productivity and standard truthful label on their back covers.
- A radio jingle promoting lentil varieties sold by the seed companies was broadcast 360 times across three local radio stations in September 2018. Two jingles on effective plantation and fertilizer application methods on rice were broadcast nationwide in the popular radio news program, *Kaiyakaran*, from mid-June to mid-July 2018.
- Informative tools, including a pictorial flip file, radio jingles, a leaflet and an interactive smartphone app (see Figure 5.2) were developed to conduct a randomized control trial to compare the effectiveness of various agricultural extension programs for farmers. These tools provided targeted messages around top dress fertilizer application at two critical stages of leaf formation that should increase maize yields. 740 radio spots were broadcasted on four local radio stations in Surkhet, Palpa, Dang and Kavre districts in May, June and July 2018. IVR calls were also sent to farmers as reminders to tune into the designated radio stations to avail more information on maize productivity.
- The project developed extension materials on best management practices (BMP) for tomato and cauliflower including a flip file, game cards and plant nutrient deficiency posters (Figure 5.3) and a training manual on ISFM and rice BMP was designed to provide practical guidance for intermediary trainers to deliver trainings (Figure 5.4).

- The project helped design a brochure, signboard and administrative materials (letterhead, envelope and visiting card) for NEFEA for its consistent branding.
- Program specific communication materials were designed and disseminated to stakeholders at national level workshops, trainings and meetings. An array of materials and project technologies were displayed at an innovative marketplace organized by USAID (see Photo 5.1).



Figure 5.1: Project supported lentil, maize and rice seed packaging



Figure 5.2: Leaflet (left) and smartphone app (right) promoting information on fertilizer top dressing timings to increase maize productivity

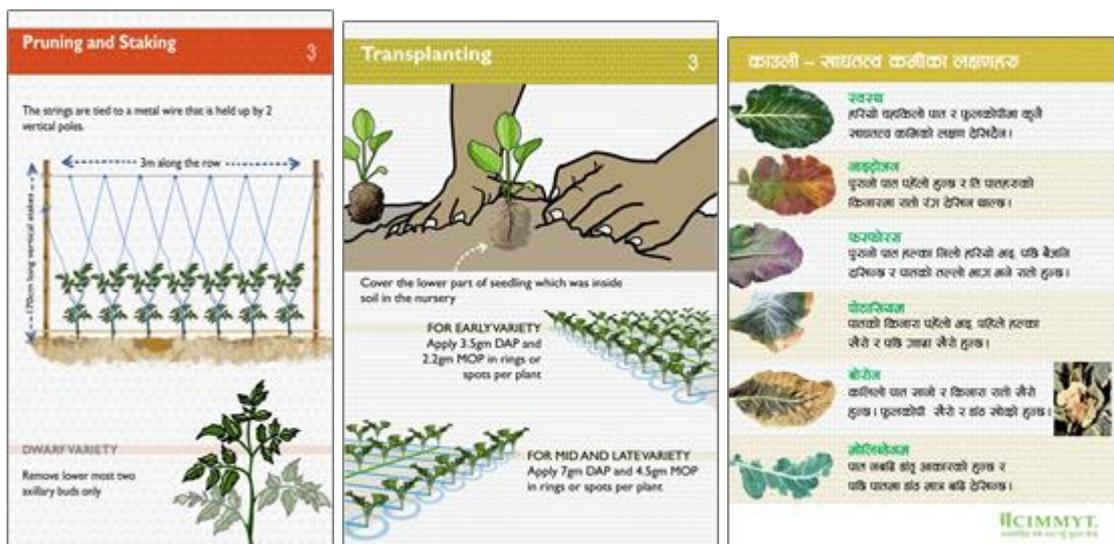


Figure 5.3: Pages from best management practice extension materials for growing tomatoes and cauliflowers

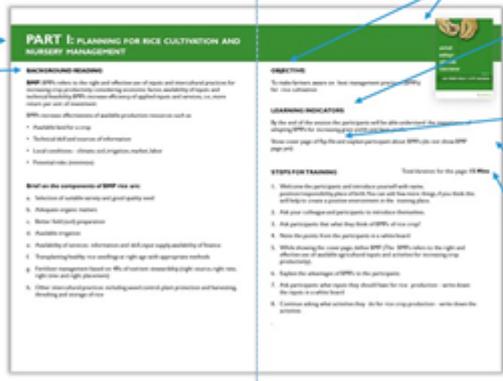
HOW DOES THIS MANUAL WORK?

The manual is designed in such a way that you can have it open in front of you while running a training and it will guide you through each step as you move forward. The manual is laid out in such a fashion that when you flip the pages of flipfile, all you need to do is flip the page of the manual to see the instructions for that specific page of Flipfile, and that step of training.

ON THE PAGE ON YOUR LEFT HAND

You will see the subject on the top, this is also the subject of the flipfile page that you will train in.

Below this, we have provided you with the 'Background Reading'. This is slightly more detailed information regarding the subject matter that you must know, in case further questions are asked by the participants. We suggest you read up the left hand side pages of the training manual carefully a day before holding the workshop.



ON THE PAGE ON YOUR RIGHT HAND,

we have given you all the steps that you need to follow, while a specific page of the flipfile is being trained from.

- At the top right corner of the page, you will see a small picture and number of the flipfile page that is currently being trained from.
- You will find the objective of the training of the specific page of the flipfile.
- In 'Learning Indicators' you will see – what should you look for to find if the participants have understood the subject addressed in the flipfile page.
- You will see the steps that you need to follow to accomplish the training for the specific FlipFile page.
- An indicator of suggested duration of training of current flipfile page.
- At the right edge of the page you will sometimes see an icon. This icon is a quick reminder of the objects that you need to use at that step of the training. These important steps are marked with light blue box underneath.

Figure 5.4: Sample page of the training manual for rice



Photo 5.1: NSAF materials and technologies displayed at the USAID SEED meeting on 25 September 2018 (Credits: David Guarena; Bandana Pradhan)

5.3 Gender Equity and Social Inclusion

The project is working to ensure that women; disadvantaged castes, ethnic and religious minorities access and use the improved seed and integrated soil fertility management technologies the project is

promoting. This is done by promoting participatory technology evaluation, inclusive capacity building programs, using mass media for information dissemination, and designing market development activities to ensure that women and disadvantaged group needs, preferences and constraints are addressed. To measure how far the project’s technologies and capacity building activities reach women and disadvantaged groups, the results of relevant indicators are disaggregated by gender and ethnic and caste groups and tracked accordingly. The projects contribution to gender equity and social inclusion (GESI) is summarized in Table 5.1.

Table 5.1: NSAF projects contribution to gender equity and social inclusion in 2017/18

Area	Details
Outreach to beneficiaries	<ul style="list-style-type: none"> • Project mapping, assessment studies and beneficiary-based surveys disaggregate data including by male and female and by relatively advantaged and disadvantaged groups. • 51% (59,404) of project beneficiaries were women. • 62,547 (55%) of total beneficiary households were Dalit, Janajati (ethnic group), Newar or Muslim categories and others purchased improved varieties of seeds and applied integrated soil fertility management practices during the reporting period. • 57,619 women farmers (51% of total beneficiaries) applied improved varieties and soil fertility management during the reporting period. • The project is using mobile apps, which have been pilot tested with Dalit and Janajati, households in several project districts to ensure that project technologies reach all beneficiaries irrespective of caste, class, ethnicity and gender. • The project is piloting a financial lending package with 200 Janajati men and women seed producers in Kailali to use seed and IFSM packages to improve crop productivity.
Capacity development	<ul style="list-style-type: none"> • 51% (2,326 persons) of all people trained during the reporting period were women. • 55% (2,487 persons) of all people trained were Dalits, Janajatis, Newars or Muslims. • 52% of the project trials and demonstrations were managed by Dalits and Janajatis. • Of the total 44 community volunteers engaged by the project, 68% (30 volunteers) were women.

5.4 Project Management

The project takes a science-driven, holistic and integrated approach to the development of smallholder agriculture. To enable this approach, the project works in close partnership with the government, the private sector and the development sector (other USAID projects) to scale out project-promoted technologies.

Collaboration with the government

NARC – The project’s research for development activities are being implemented in collaboration with NARC’s maize, rice, and horticulture commodity programs and its Soil Science Division. NARC is testing market-ready maize products and researching pipeline varieties of rice, lentils and tomatoes for release and commercialization. The project has helped build the capacity of scientists from NARC’s Soil Science Division on soil spectrometry and is processing the purchase of soil spectrometry equipment. NARC scientists are engaged in various forums such as the seed sector’s public-private partnership committee, in validating project trial results, and in the project’s technical and steering committees.

MoALD – In November 2017, the project signed a collaborative agreement with MoALD to implement activities with SQCC, the Crop Development Directorate, the Soil Management Directorate and other government institutions. This agreement is facilitating the integration of project activities

within MoALD and should facilitate the more rapid deployment of technologies. Several follow up meetings have been held on planning the public-private partnership approach, Nepal's fertilizer manufacturing policy, the willingness-to-pay studies, the endorsement and validation of project technologies and the development of the Digitally Enabled Seed System (DESS).

The project's Technical Committee was established under the collaborative agreement and first met on 28 February 2018 chaired by DoA's Director General to introduce the project to committee members. The committee praised the project's efforts and recommended the validation of project-promoted technologies.

Joint Steering Committee – The Joint National Steering Committee (JNSC) for USAID's four agriculture-related projects in Nepal (NSAF, KISAN 2, PAHAL, and SABAL) was held on 5 March 2018 chaired by MoALD secretary Dr. Suroj Pokhrel and attended by 36 members and stakeholder representatives. The participants were from MoALD, the Ministry of Finance (MoF), the National Planning Commission, NARC, DoA, the Department of Livestock Services, the Department of Food Technology and Quality Control, SQCC, the National Farmers' Commission, USAID and its agriculture projects. The committee recommended that the four projects prepare a joint framework to align with all tiers of the government and to periodically submit progress reports to MoALD and MoF as per their collaborative agreements.

Participation in Mega Maize Programme Meeting – The project participated in the Mega Maize planning meeting organized by DoA's Crop Development Directorate on 11–12 March 2018 in Nawalparasi. The discussions focused on developing a mechanism to deliver new maize varieties to farmers and harmonizing seed subsidies so as not to distort private sector markets. The major recommendation was to link the government's seed subsidy program to new maize varieties to accelerate the dissemination of new varieties without distorting market chains.

Private sector, cooperative and NGO partnerships – The project works closely with the private sector. Sub-grant agreements have been entered into with eight seed companies based on their strategic business needs. The project's fertilizer component is conducting domain-specific fertilizer trials in partnership with 44 agricultural cooperatives. In addition, it is developing and strengthening the Nepal Fertilizer Entrepreneurs Association (NEFEA) and partnering with ICT firms to develop and introduce digital innovations for agricultural development (see more on this in Chapter 2). The project also partners with CEAPRED for research and development on vegetables seeds and the International Fertilizer Development Center for the fertilizer component.

Teamwork – The project recently adopted the web-based project management application 'Teamwork' to place the project team's tasks in one place for the more efficient and effective delivery of its activities.

Coordination with other USAID projects

HTMA, STRASA and CSISA – A 17 October 2017 coordination meeting between the USAID supported Heat Stress Tolerant Maize (HTMA) project, the Stress-Tolerant Rice for Africa and South Asia (STRASA) project and the project (NSAF) was held at CIMMYT's office in the Kathmandu Valley to build synergies and collaboration for maize and rice sub-sector development in Nepal. It was agreed to give the NSAF project access to high yielding climate resilient maize varieties developed by HTMA and rice varieties developed by STRASA to develop a seed scaling pathway. From August 2018, CSISA's seed scaling component has been integrated with NSAF. This will align the CSISA activities with the USAID Nepal Mission's priorities for seed market development work in Nepal.

SEED field visit – The project organized a field visit to Banke, Bardiya and Kailali districts on 7–9 March 2018 for a USAID team led by the Director of USAID’s Social Environmental and Economic Development (SEED) office. The team visited the project’s cauliflower and wheat trials with two cooperatives that are developing domain-specific nutrient management recommendations and economic optimization from variable rates of nutrient addition. The team also visited Panchashakti, Unique and GATE-Nepal seed companies to see location-specific best performing varieties of lentils, the parental line maintenance of locally released hybrid maize varieties and the testing of hybrid maize products. The team also observed market-ready hybrid maize trials and the breeder seed production of recently released lentil varieties at Khajura Regional Agricultural Research Station, Banke (Photo 5.2).

The USAID SEED team provided valuable guidance to the project on better integrating the activities of the project’s seed and fertilizer component, popularizing the use of digital tools and scaling out results to farmers fields. The project has included these recommendations in its plans for subsequent periods.



Photo 5.2: USAID SEED team visiting project maize hybrid and lentil variety trials, March 2018 (Credit: Darbin Joshi)

Joint USAID projects field visit: USAID’s SEED office facilitated field visits by its project partners in Nepal to each other’s sites for cross-learning and to encourage collaboration. The NSAF project identified collaboration mechanisms with the KISAN 2, PAHAL and SABAL projects. Several meetings were held with KISAN 2 to identify common intervention areas in the input and output markets of the project’s target crops, especially maize and rice.



Photo 5.3: USAID SEED team visiting NSAF field activities, Khajura RARS, Banke (Credit: Darbin Joshi)

The project subsequently collaborated on the following areas:

- It held discussions with KISAN 2 about strengthening the supply of quality Hardinath 3 and Ciherang Sub 1 rice seeds in upcoming seasons.
- It shared training materials on ISFM with KISAN 2 and conducted training of trainers on IFSM for 22 KISAN 2 staff.
- It planned to research the use of polymer-coated urea in KISAN 2 farmers' rice fields to further validate its potential to increase yields.

Sub-grants

During FY 2017/18, the project entered into sub-agreements with government and non-government organizations, seven private seed companies, the International Fertilizer Development Center and one international ICT company QED.

- **NARC:** As the lead research center for agricultural development in Nepal, NARC is responsible for the project's germplasm sourcing, seed supplies and trial monitoring components. NARC also conducts multi-locational on-station and on-farm varietal trials, and on-farm demonstrations of new technologies. Under this sub-agreement, in 2017/18, NARC sent two scientists to study PhD degree in soil science (focusing on integrated soil fertility management) at the Agriculture and Forestry University, Chitwan, Nepal.
- **CEAPRED:** With its expertise in developing Nepal's vegetable crop and seed value chain, the project tasked CEAPRED to source improved, pre-commercial and released hybrid and open pollinated varieties of tomatoes, onions and cauliflowers; to conduct on-farm demonstrations; to produce improved seeds through farmer groups and to provide agro-advisory services for farmers on improved vegetable production.
- **Seed companies:** The project entered into agreements with eight Nepalese seed companies in June 2018 to conduct varietal trials and seed production demonstrations, seed production, maize trials and parent line maintenance and multiplication, and to conduct farmer training and field days and promotional campaigns. These companies are tasked to participate in market development activities and prepare business plans to improve their businesses. The companies are Global Agri-

Tech Nepal (GATE), Gorkha Seed & Agro Traders, Hariyali Samudayik Biu (Hariyali Community Seed) Company, Lumbini Seed Company, Panchashakti Biu Company, SEAN Seed Service Center, Unique Seed Company and Nepal Agro-seeds and Inputs Company Pvt. Ltd. (NASIC).

- **QED:** QED works to create integrated digital data collection systems for the project and its partners (NARC and DoA). The aim is more efficient programming and to update the capacity of NARC scientists to collect data to improve the quality and quantity of their work. QED is also supporting and facilitating the mapping of project target areas, the development and use of integrated digital data collection tools, creating a platform to connect farming communities with agro-input markets and training and developing the capacity of project partners and other Feed the Future development organizations on the use of digital data collection tools.

Status of finances

Since its inception in April 2016, until September 2018 the project spent \$4,851,113 out of the total budget of \$15 million. Of the total obligated funds of \$7,230,874 up to December 2018, the project has spent 67% leaving a balance of \$2,379,761 remaining to cover expenditure to March 2019. The expenditure statement for the period July-September 2018 has been sent to USAID for review and replenishment.

6 Management Challenges and Responses

6.1 Anticipated Challenges, Risks and Mitigation Measures

The main management challenges faced by the project during this reporting period and the mitigating measures employed are detailed in Table 6.1. Table 6.2 summarizes the external risks to the project and the mitigation measures put in place.

Table 6.1: NSAF project management challenges and responses, October 2017–September 2018

Challenges	Impact on the project	Mitigation measures
Farmers lack information on new varieties of crops and integrated soil management practices	Incremental sales, gross margins and yields do not reach targets and result in low seed replacement rates.	<p>Hold large-scale demonstrations.</p> <p>Develop ICT approaches for scaling up ISFM information.</p> <p>Organize farmers' field days.</p> <p>Share information on varieties via farmer-friendly media like FM radio.</p> <p>Improve seed distribution channels (agrovets, cooperatives, seed companies).</p>
Insufficient skills and awareness among seed company staff and sub-grantees on hybrid seed management technologies	The project's hybrid seed deployment and scaling out strategies will be difficult to achieve without a strong private sector.	<p>Deploy project breeders to proactively pursue hybrid varietal testing, parental line seed production, hybrid seed production and training on good seed business management practices.</p> <p>Provide hands-on training to project partners on field related technical issues.</p>
Subsidized seeds and fertilizer	The subsidies distort markets and disincentivize the private sector to scale up their businesses.	<p>Lobby DoA and MoALD to reconsider the subsidy on old seed varieties and to include the private sector in the subsidy chain along with the parastatal organization.</p> <p>Pilot innovative ideas such as vouchers for seed and fertilizer distribution; importing fertilizer blends and registering new fertilizer products such as polymer coated urea and briquetted urea.</p>
The frequent transfer of government staff	It can take a long time to make progress on planned activities if decision makers and focal people change.	Develop good working relations with multiple specialists and officers within department, engage with the newly appointed officials in the local and provincial governments.
Falling demand for lentil seeds	Low varietal adoption rates and the low interest of farmers to use improved management practices make it difficult for the project to meet its targets for the number of hectares under improved lentil varieties.	<p>Evaluate and popularize new lentil varieties that are resilient to biotic and abiotic stresses.</p> <p>Ensure linkages between lentil processors and importers.</p> <p>Release and commercialize varieties that are favored by the private sector.</p> <p>Large scale dissemination and awareness creation on lentil management practices to farmers.</p> <p>Introduce new stress-tolerant varieties of lentils for testing and release.</p>

Table 6.2: Risks facing the NSAF project and planned mitigation measures

Anticipated challenges	Potential implementation impacts	Mitigation measures
Earthquakes, floods and other natural disasters	Disrupt crop cycles and services in rural areas Hinders access to project sites Delays training schedules and project activities Staff endangerment.	The project's emergency preparedness plan had been updated and a security focal person identified. Food, tents, lanterns and other supplies are stockpiled in the office for staff. Staff lists and a WhatsApp group have been created.
Weather-related challenges such as delayed or reduced monsoons	Disrupt crop cycles and the ability to plant Delay training schedules Reduce household gross margins.	Focus on promoting ISFM principles to build resilience into systems. Evaluate drought stress tolerant varieties for target crops and promote early maturing varieties in moisture stress-prone areas. Promote multi-year, multi-site programs to diffuse the risks from one bad season.
Change in the structure of the Ministry of Agriculture	The changeover to a federal system of governance is leading to changes in the structure of the ministry and its entities at all levels. These changes are affecting the project's work with nodal agencies, on the governments' seed subsidy strategy and the lack of an organized extension system.	Maintain regular collaboration with MoALD. Develop a framework with other USAID projects to engage with the different tiers of the government. Through partners, engage with the newly elected local and provincial governments on project updates and planning.

6.2 Security

The project team works under the overall corporate governance of CIMMYT and takes security issues very seriously. In consultation with CIMMYT's Mexico-based Risk Management Unit, the CIMMYT Country Representative is responsible for all security issues with authority delegated to the Finance and Administration Manager in the Nepal office as security focal person. The manager reviews and monitors security issues in country and in the project's working areas in collaboration with the CIMMYT regional and hub offices and national, regional and local institutions. CIMMYT identity cards have been issued to all staff to solicit assistance in case of emergencies. Security-related communications are made to all staff as per need. USAID, through its Agreement Officer Representative (AOR), shares relevant security guidelines with CIMMYT, and necessary risk reduction strategies such as removing branding on project offices and sites have been undertaken as an interim measure.

6.3 Environmental Compliance

Project staff and partners continued to reinforce the importance of safe environment practices and of using seeds and fertilizers that are approved by the Government of Nepal. The project does not deal with genetically modified organisms. Seed varieties appropriate for specific agroecological conditions are being promoted and best practices on the use and application of fertilizers and ISFM practices are being applied. The project's Pesticide Evaluation Report and Safe Use Action Plan (PERSUAP) has been approved and is being strictly followed by staff and partners.

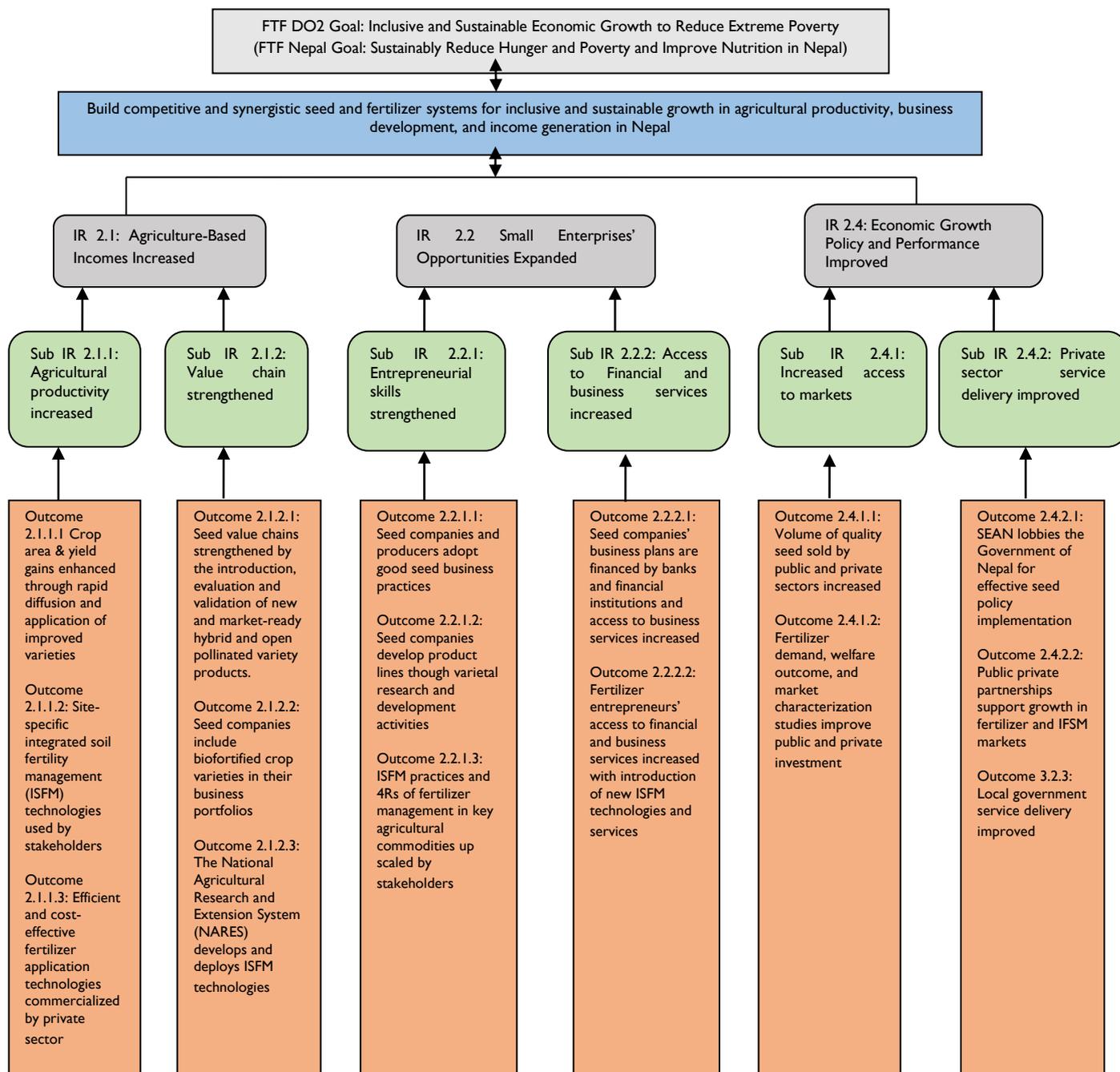
7 PLANS FOR 2018/2019

The project will continue to follow its roadmap for planning and implementation in year 3. It will articulate its strategies on scaling out innovations, developing markets for seed and IFSM technologies, supporting seed companies to implement their business plans, evaluating the performance of the maize hybrids, developing roadmaps for their release and commercialization, facilitating the project's mid-term evaluation and developing partnerships with other related USAID projects.

The following are highlights of the project's updated plan:

- Develop and implement a strategy for up-scaling projects innovations.
- Research with NARC and seed companies on promoting new varieties of rice, maize, lentil and vegetables.
- Finalize licensing guidelines for hybrid maize.
- Release and register new hybrid maize varieties.
- Promote seed production, parental line multiplication and market development for existing and new maize hybrids.
- Work with NARC, the International Center for Agricultural Research in the Dry Areas (ICARDA) and seed companies on promoting new lentil products.
- Work with IFDC to further strengthen the concept of blended fertilizer manufacture in Nepal.
- Commercialize ISFM technologies with the Nepal Fertilizer Entrepreneurs Association.
- Promote IFSM training packages among USAID projects and the private sector.
- Pilot upgrading project crop value chains through bank financing and digital platforms.
- The validation and refinement of fertilizer recommendations for maize and rice.
- Continue to lobby with MoALD for a fertilizer policy that encourages private sector participation.
- Produce the annual plan and budget for October 2019 to September 2020 (Year 4).
- Prepare semi-annual and annual reports
- Work with USAID to conduct the mid-term evaluation and data quality assessment.

ANNEX I: NEPAL SEED AND FERTILIZER PROJECT RESULTS FRAMEWORK, 2018



ANNEX 2: ACHIEVEMENT OF INDICATORS VS TARGETS

IR 2.1: Agriculture-based income increased

Table A2.1: Indicator EG 3-1: Number of households benefiting directly from USG interventions

Disaggregates	FY 2018 target (HH)	FY 2018 actual (HH)	Percentage of target
Overall	107,806	112,318	4
Rural	32,342	38,405	19
Urban/peri-urban	75,464	73,913	-2
Caste/ethnicity			
Brahmin and Chhetri		16,848	
Dalit		4,493	
Janajati		83,115	
Newar		5,616	
Muslim		2,246	
Other			
New/continuing			
New	17,914	22,426	25
Continuing	89,892	89,892	0

Deviation narrative for indicator EG 3-1: The number of households benefiting from the project was exceeded by 4% with a 25% increase in the number of new beneficiaries. The seed company market development activities resulted in more farmers receiving seed varieties in the rural areas, which resulted in an increase of 19% in the number of beneficiaries. This entailed no extra resource burden on the project as the seed companies promoted the technologies on their own.

Sub-IR 2.1.1: Agricultural productivity increased

Table A2.2: Indicator EG 3-6: Farmer's gross margin per hectare, obtained with USG assistance

Disaggregates	FY 2018 target (USD/ha)	FY 2018 actual (USD/ha)	Percentage of target
Rice	389.46	443	14
Maize	264.53	389	47
Lentil	517.18	507	-2
Vegetable	1,865.58	2,111	13

Deviation narrative for indicator EG 3-6: The gross margins for rice, maize and vegetables increased by 14%, 47%, and 13% respectively. The gain in the gross margin in maize was due to increased yields from hybrid maize, and the more efficient use of inputs by project beneficiaries promoted by the project. The project needs to consider the commercialization trends in maize crop while setting gross margin targets in subsequent years. The increase in the gross margin for rice was due to increased productivity due to the use of quality seeds and favorable weather conditions. The increase in the gross margin of vegetables was mainly due to favorable market prices.

Table A2.3: Indicator EG 3.2-2: Number of individuals who have received USG supported degree-grant in agricultural sector productivity or food security training

Disaggregates	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2018–Sep 2018)		Annual (FY 2018)	
	Target	Actual	Target	Actual	Target	Actual
Sex			3	2	3	2
Male			2	2	2	2
Female			1	0	1	0
New/continuing						
New			3	2	3	2
Continuing			4	4	4	4

Deviation narrative for indicator EG 3.2-2: The deviation of 33% in the number of individuals receiving degree granting training is due to the unavailability of an eligible women candidates to pursue a master's level courses on crop breeding. As per the requirements of NARC, candidates must have at least three years of continued service to be eligible for higher education fellowships and no such women candidate was forthcoming for the master's course. The project aims to fulfill this target in its year 3.

Table A2.4: Indicator EG 3.2-17: Number of farmers and others who have applied improved technologies or management practices with USG assistance

Disaggregates	FY 2018 target	FY 2018 actual	Percentage of target
Overall	106,656	112,318	5
Producer	106,506	112,318	5
Sex	106,506	112,318	5
Male	50,058	54,699	9
Female	56,448	57,619	2
Technology type			
Crop genetics	106,506	110,887	4
Soil related fertility and conservation	800	1,431	79
Commodity			
Maize	54,600	47,619	-13
Lentil	2,404	2,516	5
Rice	97,551	88,522	-9
Vegetable	42,000	42,383	1
Other	150	145	-3
Sex	150	145	-3
Male	135	125	-7
Female	15	20	33
Caste/ethnicity			
Brahmin and Chhetri		16,848	
Dalit		4,493	
Janajati		83,115	
Newar		5,616	
Muslim		2,246	
Other			

Deviation narrative for indicator EG 3.2-17: The achievement of this indicator's target is within the acceptable limit of deviation. However, the targets under number of farmers applying soil fertility technologies deviated by +79%. This was mainly due to the low targets that were set based on 2017

results. In 2018 many cooperative members improved their practices in terms of timing, amount, and right type of fertilizer application. As the project moves into its scaling up phase this is an important lesson to set more optimistic and higher targets for ISFM technologies.

For the 'others' (traders, agrovets etc.) category the number of males applying technologies decreased by 25% as a number of government officers being frequently transferred and private sector partners who sell soil fertility management products not having the capacity to develop the markets for ISFM products. This calls for more focused training programs. The number of female participants increased by 140% mainly due to the use of the technologies by women cooperative members after attending the training programs and field days.

With regard to the commodity focus, the number of maize producers who applied improved technologies declined by 13% mainly due to the shortfall in seed availability in hill areas. In FY 2018/19 the project will develop inclusive seed market linkages to avoid such shortfalls.

Table A2.5: Indicator G 3.2-18: Number of hectares of land under improved technologies or management practices with USG assistance

Disaggregates	FY 2018 target (ha)	FY 2018 actual (ha)	Percentage of target
Overall	60,722	57,945	-5
Technology type			
Crop genetics	59,222	56,547	-5
Soil related fertility and conservation	1,500	1,398	-7
Sex	60,722	57,945	-5
Male	25,321	28,226	11
Female	21,253	29,719	40
Joint	13,541	0	-100
Association applied			
DNA	607	0	-100
Commodity			
Maize	13,650	11,621.95	-15
Lentil	625	631.57	1
Rice	41,947	41,199.29	-2
Vegetable	3,000	3,093.95	3
DNA			

Deviation narrative for indicator EG 3.2-18: The target for this indicator fell short by 5%. The number of hectares under improved technologies managed by women increased by 40% against the target largely because women cooperative members used IFSM technologies on their farms. The BBS found hardly any joint management of land by men and women and hence there was a 100% deficit in the joint management sub-category target.

Table A2.6: Indicator EG 11-6: Number of people using climate information or implementing risk-reducing actions to improve resilience to climate change as supported by USG assistance

Disaggregates	FY 2018 target	FY 2018 actual	Percentage of target
Sex	18,128	18,135	0
Male	9,970	12,352	24
Female	8,158	5,783	-29
Other			

Deviation narrative for Indicator EG 11-6: The number of people using climate information overachieved by 24% from the target for men and underachieved by 29% for women. This is attributable to the fact that men have more say in deciding the use of plant genetic resources that are stress tolerant and mostly grow these in their fields. In FY 2018/19 the project will take steps such as focused messaging to reach more women to influence their decision making on purchasing stress-tolerant seeds and other risk reduction actions.

Table A2.7: Indicator Custom-I (4.5.2-Z14): Total quantity of target value chain commodities produced by direct beneficiaries with USG assistance that is set aside for home consumption

Disaggregates	FY 2018 target	FY 2018 actual	Percentage of target
Overall	137,774.7	81,076	-41
Total volume of consumption (MT)	137,774.7	81,076	-41
Total number of direct beneficiaries		112,318	
Maize			
Total volume of consumption (MT)		15,817	
Total number of direct beneficiaries		33,212	
Pulses			
Total volume of consumption (MT)		49	
Total number of beneficiaries		535	
Rice			
Total volume of consumption (MT)		63,589	
Total number of direct beneficiaries		63,063	
Cauliflower			
Total volume of consumption (MT)		988	
Total number of direct beneficiaries		9,517	
Tomato			
Total volume of consumption (MT)		79	
Total number of direct beneficiaries		1,680	
Onion			
Total volume of consumption (MT)		555	
Total number of direct beneficiaries		5,312	
Vegetables			
Total volume of consumption (MT)		1,621	
Total number of direct beneficiaries		15,508	

Deviation narrative for indicator Custom-I: The BBS found a 41% underachievement of the target for the quantity of crops set aside for home consumption. This can be attributed to the increased sale of products by beneficiary farmers as reflected in the increased gross margins and the significant increased value of sales for project crops compared to the baseline values.

Table A2.8: Indicator STIR-10: Number of innovations supported through USG assistance

Disaggregates	FY 2018 target	FY 2018 actual	Percentage of target
Overall	17	17	0

Table A2.9: Indicator STIR-11 Number of innovations supported through USG assistance with demonstrated uptake by the public and/or private sector

Disaggregates	FY 2018 target	FY 2018 actual	Percentage of target
Overall	10	10	0

Sub-IR 2.1.2: Value chains strengthened

Table A2.10: Indicator EG 3.2-7: Number of technologies or management practices under research, under field testing, or made available for transfer as a result of USG assistance'

Disaggregates	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2018–Sep 2018)		Annual (FY 2018)	
	Target	Actual	Target	Actual	Target	Actual
Phase 1: Number of new technologies or management practices under research as a result of USG assistance	380	395	90	111	470	506
Phase 2: Number of new technologies or management practices under field testing as a result of USG assistance	16	17	48	52	64	69
Phase 3: Number of new technologies or management practices made available for transfer as a result of USG assistance	4	4	9	9	13	13

Deviation narrative for indicator EG 3.2-7: There was a deviation of 23% in the SA2 target of market ready maize hybrids. This is due to the inclusion of heat tolerant maize varieties introduced by the Heat Tolerant Maize Project (HTMA) in Nepal. Since, the seed companies were conducting trials of several hybrid maize lines, these additional heat tolerant lines were also included for increasing the scope of products that may be available for future commercialization in Nepal.

Table A2.11: Indicator EG 3.2-20: Number of for-profit private enterprises, producers' organizations, water user associations, women's groups, trade and business associations and community-based organizations (CBOs) that applied improved organization-level technologies or management practices with USG assistance

Disaggregates	FY 2018 target	FY 2018 actual	Percentage of target
Type of organization	91	93	2
For-profit private enterprises	20	20	0
Producers' organizations	25	27	8
Trade and business associations	2	2	0
Community-based organizations	44	44	0

IR 2.2: Small enterprise opportunities expanded

Table A2.12: Indicator EG 5.2-1: Number of firms receiving USG-funded technical assistance for improving business performance

Disaggregates	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2018–Sep 2018)		Annual (FY 2018)	
	Target	Actual	Target	Actual	Target	Actual
Type of firm	19	20	39	42	58	62
Formal firms	19	20	39	42	58	62
Informal firms						
Duration						
New	12	11	35	38	47	49
Continuing	7	9	4	4	11	13

Deviation narrative for indicator EG 5.2-1: A deviation in the number of continuing private firms observed in SA 1 (achieved 9 against targeted 7) is due to the continuation of two firms (Dallakoti Group and Laxmi Laghubitta) during the reporting period. The work with Laxmi Laghubitta on designing a financial loan package for purchasing fertilizer and seeds was continued throughout the wheat season in 2017. The partnership with the Dallakoti Group was continued as it is a key private sector partner to import and increase the availability of fertilizer blends in Nepal.

Sub-IR 2.2.1: Entrepreneurial skills strengthened

Table A2.13: Indicator EG 3.2-1: Number of individuals who have received USG supported short-term agricultural sector productivity or food security training

Disaggregates	SAI (Oct 2017–Mar 2018)		SA2 (Apr–Sep 2018)		Annual (FY 2018)	
	Target	Actual	Target	Actual	Target	Actual
Total	1,413	1,420	3,316	3,098	4,729	4,518
Type of individuals						
Producers (farmers)	1,068	1,139	2,894	2,614	3,962	3,753
People in government	91	98	136	131	227	229
People in private sector firms	209	135	210	281	419	416
People in civil society	45	48	76	72	121	120
Gender						
Male	771	729	1,632	1,586	2,403	2,315
Female	642	691	1,684	1,512	2,326	2,203
Caste and ethnicity						
Brahmin-Chhetri		1,116		786		1,902
Dalit		106		83		189
Janajati		966		1,278		2,244
Muslim		2		8		10
Newar		24		20		44
Other		32		97		129
Age group						
Youth (15-29 years)		547		615		1,162
Adults (30+years)		1,381		1,557		2,938
Disaggregation not available		318		100		418

Deviation narrative for indicator EG 3.2-1: There was an overall 5% underachievement of this target. A deviation in the number of people in private sector firm's trained (35% underachievement) was observed in SAI. This was due to the following reasons:

- Some seed company and NEFEA personnel participated in more than one training event. This reduced the number counted as the project only counts individual unique participants in the period with no double counting.

- The postponing of the seed business management training in March due to trainer unavailability.
- A planned training on access to credit for farmers was not held due to low demand from farmers for the loan and voucher-based fertilizer and seed purchase package initiated with Laxmi Laghubitta in 2016/17.

The latter issue showed that that access to credit for growing cereal crop is not a priority for farmers. The project has therefore decided to widen the package of loans to include vegetable farming.

Table A2.14: Indicator EG 3.2-4: Number of for-profit private enterprises, producer organizations, water user associations, women's groups, trade and business associations, and CBOs receiving USG food security related organizational development assistance

Disaggregates	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2018–Sep 2018)		Annual (FY 2018)	
	Target	Actual	Target	Actual	Target	Actual
Type of organization	91	93	12	12	103	105
For profit private enterprises	20	20	12	12	23	32
Producers' organizations	25	27			25	27
Trade and business associations	2	2			2	2
Community-based organizations	44	44			44	44
New or continuing						
New	25	30	12	10	37	40
Continuing	66	63	0	2	66	65

Deviation narrative for indicator EG 3.2-4: Overall there was no deviation in the achievement of the targets. However, there was a 20% overachievement of the number of new organizations receiving support in SA 1. This happened because seed company partners engaged with nine new seed producer groups because of the increased demand for newly released varieties of rice, especially Hardinath and Sukha-3.

Table A2.15: Indicator EG 3-10: Yield of targeted agricultural commodities within target areas [IM-level] [MT/ha]

Disaggregates	FY 2018 target (MT/ha)	FY 2018 actual (MT/ha)	Percentage of target
Rice		3.97	0
Maize		2.91	41
Lentil		1.26	56
Cauliflower		8.81	6
Onion		7.82	68
Tomato		9.97	-25

Table A2.16: Indicator Youth 3: Percentage of participants in USG-assisted programs designed to increase access to productive economic resources who are youth (15-29 years) [IM-level].

Disaggregates	FY 2017/18 target	FY 2017/18 Actual
Overall	–	30

Sub-IR 2.2.2: Access to financial and business services increased

Table A2.17: Indicator EG 3.2-3: Number of micro, small, and medium enterprises (MSMEs), including farmers, receiving agricultural-related credit as a result of USG assistance.

Disaggregates	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
	Target	Actual	Target	Actual	Target	Actual
Size of MSME			91	90	91	90
Micro (1-10 employees)			91	90	91	90
Small (11-50 employees)						
Medium (51-100 employees)						
Disaggregates not available						
Sex of owner/producer						
Male			0	90	0	90
Female			90	0	90	0
Joint			1	0	1	0
Disaggregates Not Available						

Deviation narrative for indicator EG 3.2-3: This target was met but the sex-wise target changed from women to men. The bank loan scheme set up by the fertilizer component with Laxmi Laghubitta was targeted at women farmers, but failed to pick up due to low demand for credit for IFSM products for cereal crops. This was reported in SA I. The scheme was subsequently abandoned. To meet this target established under this indicator the seed component facilitated access to credit as per the seed production contract between producers and seed companies. Since most seed producer farmers were men, as most women farmers do not have title to land, the numbers shifted to men farmers. The nature of the lending planned was for women; but the change in activity to seed production meant that the sex-specific target could not be met.

Table A2.18: Indicator GNDR-2: Percentage of female participants in USG-assisted programs designed to increase access to productive economic resources [IM-level]

Disaggregates	FY 2018 target	FY 2018 actual	Percentage of target
Overall		26	-51

IR 2.4. Economic growth policy and performance improved

Sub-IR 2.4.1: Increased access to markets

Table A2.19: Indicator EG 3.2-19: Value of small-holder incremental sales generated with USG assistance

Disaggregates	FY 2018 target	FY 2018 actual	Percentage of target
Overall	1,450,425	14,172,980	877
Total adjusted baseline sales contributing (USD)	18,923,995	6,452,290	
Total baseline sales (USD)	12,166,959	12,166,959	
Total reporting year sales (USD)	1,966,5748	20,625,270	
Total volume of sales (MT)	72,854		
Total number of direct beneficiaries	196,555	100,215	
Maize	67,308	4,129,721	6035
Adjusted baseline sales (USD)	806,291	482,076	
Baseline sales (USD)	891,247	891,247	
Reporting year sales (USD)	873,600	4,611,798	
Volume of sales (MT)	3,155		
Number of direct beneficiaries	54,600	26,645	

Disaggregates	FY 2018 target	FY 2018 actual	Percentage of target
Pulses	5,619.	26,670	375
Adjusted baseline sales (USD)	162,311	482,076	
Baseline sales (USD)	1,602,248	1,602,248	
Reporting year sales (USD)	167,930	62,792	
Volume of sales (MT)	227.8		
Number of direct beneficiaries	2,404	535	
Rice	360,853	9,938,746	2,654
Adjusted baseline sales (USD)	7,973,365	5,083,775	
Baseline sales (USD)	5,112,628	5,112,628	
Reporting year sales (USD)	8,334,218	15,022,521	
Volume of sales (MT)	39,967		
Number of direct beneficiaries	97,551	62,198	
Vegetables	1,016,644	77,842	-92
Adjusted baseline sales (USD)	7,383,355	850,317	
Baseline sales (USD)	4,557,991	4,557,991	
Reporting year sales (USD)	8,400,000	928,159	
Volume of sales (MT)	26,000		
Number of direct beneficiaries	42000	4,837	

Deviation narrative for indicator EG 3.2-19: The value of incremental sales calculated from the BBS recorded a value of \$14,172,980 which is an 877% increment compared to the target of \$1,450,425. It is assumed that the target was too low as the sales of crops are increasing as evident from indicators custom 1 and EG 3.6. It will be necessary to revise the target for this indicator for subsequent years.

Sub-IR 2.4.2: Private sector service delivery improved

Table A2.20: Indicator EG 3.2-5: Number of public-private partnerships formed as a result of USG assistance

Disaggregates	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
	Target	Actual	Target	Actual	Target	Actual
Partnership focus			5	5	5	5
Agricultural production			5	5	5	5
Agricultural post-harvest transformation						
Nutrition						
Multi-focus						

Table A2.21: Indicator EG 5.2-2: Number of private sector firms that have improved management practices or technologies as a result of USG assistance

Disaggregates	FY 2018 target	FY 2018 actual	Percentage of target
Type of firm	20	20	0
Formal firms*	20	20	0
Informal firms			
Duration			
New	11	11	0
Continuing	9	9	0

ANNEX 3: FURTHER DETAILS OF ACHIEVEMENTS

Table A3.1: Grain yield performance of the top ten single and three-way cross yellow maize hybrids tested at various locations, winter 2017/18

RARS-Khajura (n=18)		GATE Nepal Seed Co. (n=12)		Panchasakhti Seed Co. (n=12)		UNIQUE Seed Co. (n=16)		Khajura RARS (n=16)	
Hybrid no.	MT/ha	Hybrid no.	MT/ha	Hybrid no.	MT/ha	Hybrid no.	MT/ha	Hybrid no.	MT/ha
9	14.15	9	7.97	5	9.73	5	9.25	14	9.95
12	12.62	3	7.93	3	9.63	6	9.09	16	9.86
15	12.48	11	7.49	4	9.04	14	8.87	13	9.42
14	11.78	8	7.28	2	8.29	10	8.78	3	9.31
3	11.50	1	7.25	9	8.16	2	8.72	4	9.21
1	11.43	10	7.20	6	8.10	15	8.54	11	8.55
4	11.05	5	6.91	11	7.91	4	8.37	6	8.48
5	11.03	7	6.50	10	7.73	11	8.30	9	8.29
11	10.71	4	6.30	7	7.31	3	7.92	10	8.23
10	10.50	2	6.30	1	7.15	8	7.88	15	8.23
Min.	8.30	Min.	4.62	Min.	1.05	Min.	5.11	Min.	7.30
Max.	14.15	Max.	7.97	Max.	9.73	Max.	9.25	Max.	9.95
LSD	2.54	LSD	1.95	LSD	2.55	LSD	1.21	LSD	3.02
CV	11.19	CV	15.06	CV	18.59	CV	8.64	CV	20.00

Table A3.2: Grain yield performance of top ten white maize hybrids and OPVs at various locations in winter 2017/18

NMRP, Rampur (n=21)		NASIC, Dang (n=50)		NASIC, Dang (n=36)	
Hybrid no.	MT/ha	Hybrid no.	T/ha	OPV no.	MT/ha
7	10.18	41	8.51	29	7.92
1	9.38	43	8.33	6	7.54
8	9.14	7	8.32	28	7.14
17	8.85	28	8.12	15	6.86
18	8.74	4	8.06	33	6.78
21	8.46	32	8.04	18	6.73
16	8.20	50	8.01	17	6.71
9	8.06	42	7.97	3	6.70
4	8.02	48	7.91	9	6.67
19	7.78	6	7.91	7	6.64
Min	5.90	Min	4.38	Min	3.63
Max	10.18	Max	8.51	Max	7.92
LSD	2.46	LSD	2.27	LSD	2.30
CV	14.43	CV	20.60	CV	23.95

Table A3.3: Grain yield performance (MT ha-1) of zinc-enriched maize varieties

Rank	Locations					
	GATE Nepal, Banke		Jhapa		RARS-Kajura	
	Hybrids	Yield	Hybrids	Yield	Hybrids	Yield
1	4	10.90	3	6.80	1	7.28
2	9	10.24	1	5.95	2	5.56
3	1	9.98	2	4.45	3	5.37
4	6	9.88	5	4.35	8	5.03
5	3	9.23	7	4.18	6	4.25
6	2	8.93	9	4.12	7	4.10
7	8	8.71	8	4.10	4	3.69
8	5	8.33	6	3.92	5	3.39
9	7	7.51	4	3.85	9	3.06
Mean	9.30		4.63		4.63	
Maximum	10.90		6.80		7.28	
Minimum	7.51		3.85		3.06	
LSD_{0.05}	3.77		1.38		2.61	
CV %	16.00		13.00		22.00	
P	ns		*		*	

Table A3.4: Grain yield performance (MT ha-1) of top ten quality protein maize hybrids (total entries = 34)

Rank	Locations					
	Lumbini Seeds		NMRP-Rampur		Unique Seed Co.	
	Hybrids	Yield	Hybrids	Yield	Hybrids	Yield
1	34	14.00	29	8.29	31	11.03
2	18	12.56	16	8.11	27	10.94
3	24	12.51	34	8.04	21	10.48
4	16	12.24	22	8.02	16	10.07
5	6	12.17	31	7.88	32	9.44
6	3	12.14	17	7.27	23	8.81
7	28	11.81	28	7.03	3	8.78
8	30	11.77	5	6.99	28	8.75
9	23	11.72	27	6.91	29	8.58
10	20	11.68	21	6.77	22	8.49
Mean	10.72		5.55		7.25	
Maximum	14.41		8.29		11.03	
Minimum	7.93		2.91		1.83	
LSD 0.05	3.32		2.47		3.97	
CV %	15.22		21.83		26.96	
p	ns		***		*	

Table A3.5: Grain yield performance (MT ha⁻¹) of top ten pro-vitamin A hybrids (total entries=20)

Ranks	Locations			
	Panchasakhti Seed Co.		Unique Seed Co.	
	Hybrid	Yield	Hybrid	Yield
1	14	6.55	14	9.28
2	20	6.34	7	9.09
3	16	5.57	17	7.17
4	18	5.17	4	6.73
5	13	5.14	9	6.56
6	6	5.13	2	6.48
7	19	5.07	10	6.47
8	10	5.04	16	6.39
9	17	4.96	8	6.18
10	4	4.60	11	6.18
Mean	4.72		6.32	
Maximum	6.55		9.28	
Minimum	3.63		4.36	
LSD 0.05	1.93		4.23	
CV %	19.50		31.97	
p	ns		ns	

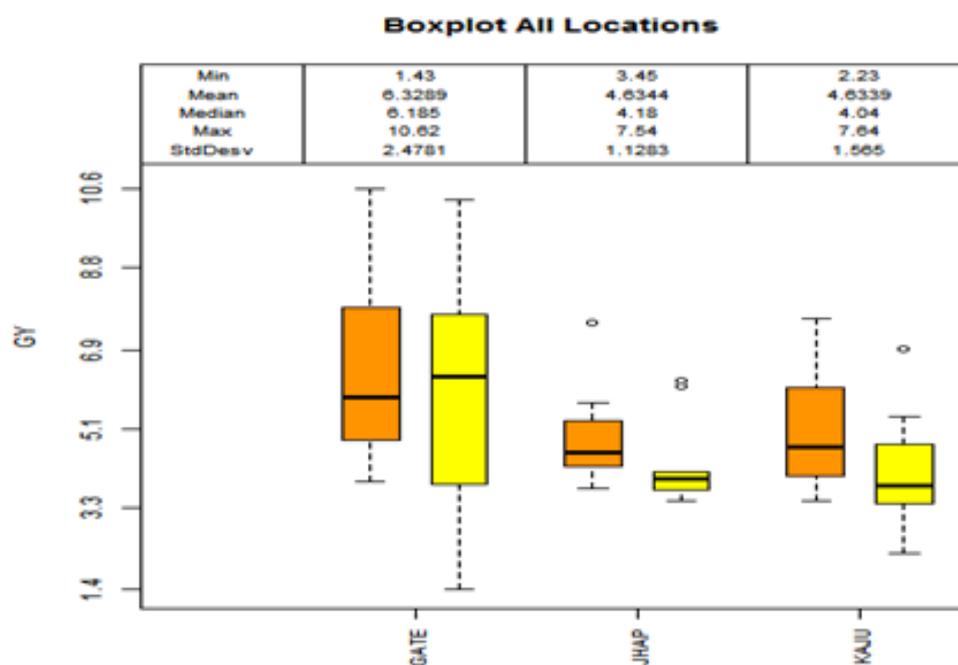


Figure A3.1: Box plot of grain yield of nine zinc fortified maize varieties in Nepal

Table A3.6: Analysis of public and private stakeholders on target crop variety research, seed production and distribution in Nepal (before NSAF interventions)

Subjects	Maize		Rice		Lentils	Vegetables (Onions, tomatoes, cauliflowers)	
	Hybrid	OPVs	Hybrid	OPVs		Hybrid	OPVs
Variety research and development	Public	Public	Public	Public	Public	Public	Public
Breeder seed production and maintenance	Public	Public	Public	Public	Public	Public	Public
Foundation seed production	NA	Public and cooperatives	NA	Public and cooperatives	Public and cooperatives	NA	Public
Certified and improved seed production	NA	Private, cooperatives and CBSP	NA	Private and cooperatives	Private and cooperatives	NA	Private and cooperatives
Marketing and distribution	Private	Private, cooperatives and CBSP	Private	Private, cooperatives and CBSP	Private, cooperatives and CBSP	Private	Private, cooperatives and CBSP

Table A3.7: Analysis of public and private stakeholders on variety research and seed production in Nepal (after NSAF interventions)

Seed system components	Maize		Rice		Lentils	Vegetables (Onions, tomatoes, cauliflowers)	
	Hybrid	OPVs	Hybrid	OPVs		Hybrid	OPVs
Variety research & development	Public and private	Public and private	Public and private	Public and private	Public	Public and private	Public and private
Breeder seed production and maintenance	Public and private	Public and private	Public and private	Public and private	Public and private	Public and private	Public and private
Foundation seed production	Private	Public and private	Public and private	Private	Public and private	Public and private	Public and private
Certified/improved seed production	Private	Private, cooperatives and CBSP	Private	Private and cooperatives	Private and cooperatives	Private	Private and cooperatives
Marketing and distribution	Private	Private, cooperatives and CBSP	Private	Private, Cooperative and CBSP	Private, Cooperatives and CBSP	Private	Private, cooperatives and CBSP

Table A3.8: NSAF hybrid seed road map indicating amount of seed and area required for production and sales targets of a single cross-hybrid maize

Certified Seed	RH-SC	Sales target	2018	2019	2020	2021	2022
			10 MT	20 MT	100 MT	500 MT	1,000 MT
	Production	11 MT	22 MT	111 MT	556 MT	1,111 MT	
	Area required	6 ha	11 ha	56 ha	278 ha	556 ha	
Foundation seed-2 (Basic seed)	RMLXX (Female)	Production	0.25 MT	1.3 MT	6.3 MT	12.6 MT	
		Area required	0.2 ha	0.8 ha	4.2 ha	8.4 ha	
	RML XY (Male)	Production	0.10 MT	0.5 MT	2.6 MT	5.2 MT	
		Area required	0.1 ha	0.3 ha	1.7 ha	3.5 ha	
Foundation seed-1 (Pre-basic seed)	RMLXX (Female)	Production	28 kg	140 kg	280 kg		
		Area required	0.019 ha	0.093 ha	0.187 ha		
	RML XY (Male)	Production	12 kg	58 kg	115 kg		
		Area required	0.008 ha	0.038 ha	0.077 ha		
Breeder seed	RMLXX (Female)	Production	2.6 kg	5.2 kg			
		Area required	26 m ²	52 m ²			
	RML XY (Male)	Production	1.1 kg	2.1 kg			
		Area required	11 m ²	21 m ²			

Table A3.9: NSAF hybrid seed road map indicating the amount of seed and area needed for the production and sales targets of a single cross hybrid maize

See classes			2018	2019	2020	2021	2022
Certified seed	Single cross hybrid	Sales target	10 MT	20 MT	100 MT	500 MT	1,000 MT
		Production	11 MT	22 MT	111 MT	556 MT	1,111 MT
		Area required	6 ha	11 ha	56 ha	278 ha	556 ha
Foundation-Seed-2 (Basic Seed)	RMLXX (Female)	Production	0.25 MT	1.3 MT	6.3 MT	12.6 MT	
		Area required	0.2 ha	0.8 ha	4.2 ha	8.4 ha	
	RML XY (Male)	Production	0.10 MT	0.5 MT	2.6 MT	5.2 MT	
		Area required	0.1 ha	0.3 ha	1.7 ha	3.5 ha	
Foundation-Seed-1 (Pre Basic Seed)	RMLXX (Female)	Production	28 kg	140 kg	280 kg		
		Area required	0.019 ha	0.093 ha	0.187 ha		
	RML XY (Male)	Production	12 kg	58 kg	115 kg		
		Area required	0.008 ha	0.038 ha	0.077 ha		
Breeder seed	RMLXX (Female)	Production	2.6 kg	5.2 kg			
		Area required	26 m2	52 m2			
	RML XY (Male)	Production	1.1 kg	2.1 kg			
		Area required	11 m2	21 m2			

Table A3.10: Assumptions for seed roadmap

Assumptions	Certified	Basic	Pre-basic	Breeders
Reserve Factor	10%	25%	25%	10%
Seed Rates	kg/ha	kg/ha	kg/ha	kg/ha
Female	17			
Male	7			
Sole crop		25	25	25
Seed Yields	MT/ha	MT/ha	MT/ha	MT/ha
Female alone		1.5	1.5	1
Male alone		1.5	1.5	1
A/B (SX Hybrid)	2			

Table A3.11: Projection of beneficiaries based on NSAF's hybrid maize seed road map

	Certified seed produced (MT)	Seed rate (kg/ha)	Maize area per HH (in ha)	Average HH size	No. ha (estimate)	Total production (MT) based on 5 MT/ha average yield	Value of sales (USD) based on \$200/MT	No. HHs benefited (estimate)	Total people benefitted
2019	20	20	0.4	5	1,000	5,000	\$1,000,000	2,500	12,500
2020	100	20	0.4	5	5,000	25,000	\$5,000,000	12,500	62,500
2021	500	20	0.4	5	25,000	125,000	\$25,000,000	62,500	312,500
2022	1,000	20	0.4	5	50,000	250,000	\$50,000,000	125,000	625,000
Total	1,620				81,000	405,000	\$81,000,000	202,500	1,012,500

ANNEX 4: FEED THE FUTURE MONITORING SYSTEM (FTFMS) DISAGGREGATED DATA TABLES

Data for FTFMS reporting as of 31 October 2018	
Current selection:	
Operating unit:	Nepal
Implementing mechanism:	Nepal Seed and Fertilizer (NSAF) project
Data status:	Annual (October 2017–September 2018)
Indicator types:	Outputs and outcomes

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
Nepal Seed and Fertilizer Project (NSAF)								
EG.3-1: (4.5.2-13) Number of households benefiting directly from USG interventions								
Total:	2016	0					107,806	112,318
New/continuing:	2016	0						
New	2016	0					17,914	22,426
Continuing		0					89,892	89,892
Disaggregates not available (DNA)		0						
Location:	2016	0						
Rural	2016	0					32,342	38,405
Urban/peri-urban		0					75,464	73,913
DNA								
EG.3-6, -7, -8: (4.5-16,17,18) Farmer's gross margin per hectare, per animal, or per cage obtained with USG assistance*								
Maize	2017						264.53	389
Male	2017							370.23
Female	2017							439.67
Joint	2017							
Association-applied	2017							

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
DNA	2017							
Number of direct beneficiaries:								118
Male								70
Female								48
Joint								
Association-applied								
DNA								
Hectares planted (for crops):								38.87
Male								24.74
Female								14.13
Joint								
Association-applied								
DNA								
Total production (MT):								110.67
Male								79.05
Female								31.62
Joint								
Association-applied								
DNA								
Value of sales (USD):								16,270.91
Male								11,674.18
Female								4,596.72
Joint								
Association-applied								
DNA								

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
Quantity of sales (MT):								63.1
Male								47.8
Female								15.4
Joint								
Association-applied								
DNA								
Purchased input costs (USD):								
Male								
Female								
Joint								
Association-applied								
DNA								
Pulses	2017						517.18	506.63
Male	2017							539.83
Female	2017							359.05
Joint	2017							
Association-applied	2017							
DNA	2017							
Number of direct beneficiaries								76
Male								58
Female								18
Joint								
Association-applied								
DNA								
Hectares planted (for crops)								20.8

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
Male								16.8
Female								4.0
Joint								
Association-applied								
DNA								
Total production (MT)								27.0
Male								22.7
Female								4.3
Joint								
Association-applied								
DNA								
Value of sales (USD)								8,920.0
Male								7,865.0
Female								1,055.0
Joint								
Association-applied								
DNA								
Quantity of sales (MT)								19.5
Male								16.9
Female								2.5
Joint								
Association-applied								
DNA								
Purchased input costs (USD)								1,821.9
Male								1,489.7
Female								332.2
Joint								

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
Association-applied								
DNA								
Rice	2017						389.46	442.87
Male	2017							439.90
Female	2017							469.13
Joint	2017							
Association-applied	2017							
DNA	2017							
Number of direct beneficiaries								147
Male								115
Female								31
Joint								
Association-applied								
DNA								
Hectares planted (for crops)								93.2
Male								82.6
Female								10.6
Joint								
Association-applied								
DNA								
Total production (MT)								375.5
Male								330.6
Female								44.9
Joint								
Association-applied								
DNA								

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
Value of sales (USD)								35,263.4
Male								31,097.5
Female								4,165.9
Joint								
Association-applied								
DNA								
Quantity of sales (MT)								190.9
Male								169.6
Female								21.4
Joint								
Association-applied								
DNA								
Purchased input costs (USD)								28,066.6
Male								24,282.0
Female								3,784.7
Joint								
Association-applied								
DNA								
Vegetables	2017						1,865.58	2,111.49
Male	2017							2,204.69
Female	2017							1,783.32
Joint	2017							
Association-applied	2017							
DNA	2017							
Number of direct beneficiaries								142
Male								105

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
Female								37
Joint								
Association-applied								
DNA								
Hectares planted (for crops)								11.6
Male								9.0
Female								2.6
Joint								
Association-applied								
DNA								
Total production (MT)								115.8
Male								96.2
Female								19.6
Joint								
Association-applied								
DNA								
Value of sales (USD)								27,248.4
Male								22,923.8
Female								4,324.5
Joint								
Association-applied								
DNA								
Quantity of sales (MT)								91.0
Male								76.6
Female								14.4
Joint								
Association-applied								

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
DNA								
Purchased input costs (USD)								10,199.4
Male								8,865.5
Female								1,334.0
Joint								
Association-applied								
DNA								
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								
Total:	2016	0	1413	1420	3,316	3,098	4,729	4,518
Type of Individuals	2016	0						
Producers	2016	0	1,068	1,139	2,894	2,614	3,962	3,753
Male	2016	0					1,743	1,712
Female	2016	0					2,219	2,041
DNA								
People in government	2016	0	91	98	136	131	227	229
Male	2016	0					193	188
Female	2016	0					34	41
DNA								
People in private sector firms	2016	0	209	135	210	281	419	416
Male	2016	0					399	353
Female	2016	0					20	63
DNA								
People in civil society	2016	0	45	48	76	72	121	120
Male	2016	0					68	62
Female	2016	0					53	58

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
DNA								
EG.3.2-2: (4.5.2-6) Number of individuals who have received USG supported degree-granting agricultural sector productivity or food security training								
Sex	2016	0	0	0	3	2	3	2
Male	2016	0			2	2	2	2
Female	2016	0			1	0	1	0
DNA								
New/continuing	2016	0						
New	2016	0			3	2	3	2
Continuing	2016				4	4	4	4
DNA								
EG.3.2-3: (4.5.2-30) Number of micro, small, and medium enterprises (MSMEs), including farmers, receiving agricultural-related credit as a result of USG assistance								
	2016	0	0	0	91	90	91	90
Size of MSME	2016	0						
Micro (1-10 employees)	2016	0			91	90	91	90
Small (11-50 employees)	2016	0						
Medium (51-100 employees)	2016	0						
DNA								
Sex of owner/producer	2016	0						
Male					0	90	0	90
Female					90	0	90	0
Joint					1	0	1	0
n/a								
DNA	2016	0						

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	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								
Type of organization	2016	0	91	93	12	12	103	105
For-profit private enterprises	2016	0	20	20	12	12	32	32
Producers organizations	2016	0	25	27	0	0	25	27
Trade and business associations	2016	0	2	2	0	0	2	2
Community-based organizations (CBOs)	2016	0	44	44	0	0	44	44
DNA								
New/continuing	2016	0						
New	2016	0	25	30	12	10	37	40
Continuing			66	63	0	2	66	65
DNA								
EG.3.2-5: (4.5.2-12) Number of public-private partnerships formed as a result of USG assistance								
Total:	2016	0	0	0	5	5	5	5
Partnership focus	2016	0			5	5	5	5
Agricultural production	2016	0			5	5	5	5
Agricultural post-harvest transformation								
Nutrition								
Multi-focus								
DNA								
EG.3.2-7: (4.5.2-39) Number of technologies or management practices under research, under field testing, or made available for transfer as a result of USG assistance								
Number of new technologies or	2015	0	380	395	90	111	470	506

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
management practices under research as a result of USG assistance								
Number of new technologies or management practices under field testing as a result of USG assistance	2015	0	16	17	48	52	64	69
Number of new technologies or management practices made available for transfer as a result of USG assistance	2016	0	4	4	9	9	13	13
EG.3.2-17: (4.5.2-5) Number of farmers and others who have applied improved technologies or management practices with USG assistance*								
Total:	2016	0					106,656	112,318
Producers	2016	0					106,506	112,318
Sex	2016	0					106,506	112,318
Male	2016	0					50,058	54,699
Female	2016	0					56,448	57,619
DNA								
Technology type	2016	0						
crop genetics	2016	0					106,506	110,887
soil-related fertility and conservation	2016	0					800	1,431
climate mitigation								
climate adaptation								
Commodity	2016	0						
Maize	2016	0					54,600	47,619
Pulses	2016	0					2,404	2,516
Rice	2016	0					97,551	88,522

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
Vegetables	2016	0					42,000	42,383
Others	2016	0					150	145
Sex	2016	0					150	145
Male	2016	0					135	125
Female	2016	0					15	20
DNA								
Technology type	2016	0						
Crop genetics	2016	0						
Soil-related fertility and conservation								
Climate mitigation								
Climate adaptation								
Commodity	2016	0						
Maize	2016	0						
Pulses	2016	0						
Rice	2016	0						
Vegetables								
DNA or other								
EG.3.2-18: (4.5.2-2) Number of hectares of land under improved technologies or management practices with USG assistance*								
Total:	2016	0					60,722	57,945
Technology type	2016	0						
Crop genetics	2016	0					59,222	56,547
Soil-related fertility and conservation	2016	0					1,500	1,398
Climate mitigation								
Other								
DNA								

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
Sex	2016	0					60,722	57,945
Male	2016	0					25,321	28,226
Female	2016	0					21,253	29,719
Joint							13,541	0
Association-applied								
DNA							607	0
Commodity								
Maize	2016	0.00					13,650	11,621
Pulses	2016	0.00					625	631.57
Rice	2016	0.00					41,947	41,199.29
Vegetables	2016	0.00					3,000	3,093.95
DNA or other	2016	0.00						
EG.3.2-19: (4.5.2-23) Value of small-holder incremental sales generated with USG assistance*								
Total	2017						1,450,425	14,172,980
Total adjusted baseline sales							18,923,995	6,452,290
Total baseline sales							12,166,959	12,166,959
Total reporting year sales							19,665,748	20,625,270
Total volume of sales (MT)							72,854	
Total number of direct beneficiaries							196,555	100,215
Maize							67,308	4,129,721
Adjusted baseline sales							806,291	482,076
Baseline sales							891,247	891,247
Reporting year sales							873,600	4,611,798
Volume of sales							3,155	

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
(MT)								
Number of direct beneficiaries							54,600	32,645
Pulses							5,619	26,670
Adjusted baseline sales							162,311	482,076
Baseline sales							1,602,248	1,602,248
Reporting year sales							167,930	62,792
Volume of sales (MT)							227.8	
Number of direct beneficiaries							2,404	535
Rice							360,853	9,938,746
Adjusted baseline sales							7,973,365	5,083,775
Baseline sales							5,112,628	5,112,628
Reporting year sales							8,334,218	15,022,521
Volume of sales (MT)							39,967	
Number of direct beneficiaries							97,551	62,198
Vegetables							1,016,644	77,842
Adjusted baseline sales							7,383,355	850,317
Baseline sales							4,557,991	4,557,992
Reporting year sales							8,400,000	928,159
Volume of sales (MT)							26,000	
Number of direct beneficiaries							42,000	4,837

EG.3.2-20: (4.5.2-42) Number of for-profit private enterprises, producers organizations, water users associations, women's groups, trade and business associations and community-based organizations

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
(CBOs) that applied improved organization-level technologies or management practices with USG assistance								
Total:	2016	0					91	93
Type of organization	2016	0					91	93
For-profit private enterprises	2016	0					20	20
Producers organizations	2016	0					25	27
Trade and business associations	2016	0					2	2
Community-based organizations (CBOs)	2016	0					44	44
DNA								
EG.5.2-1: Number of firms receiving USG-funded technical assistance for improving business performance								
Total	2016	0	19	20	39	42	58	62
Type of firm	2016	0	19	20	39	42	58	62
Formal	2016	0	19	20	39	42	58	62
Informal	2016	0						
DNA								
Duration	2016	0						
New	2016		12	11	35	38	47	49
Continuing	2016	0	7	9	4	4	11	13
DNA								
EG.5.2-2: Number of private sector firms that have improved management practices or technologies as a result of USG assistance								
Total	2016	0						
Type of firm	2016	0					20	20
Formal	2016	0					20	20
Informal	2016	0						

Indicator/ disaggregation	Baseline year	Baseline value	SA1 (Oct 2017–Mar 2018)		SA2 (Apr 2017–Sep 2018)		Annual (FY 2018)	
			Target	Actual	Target	Actual	Target	Actual
DNA								
Duration	2016	0						
New	2016						11	11
Continuing	2016	0					9	9
EG.II-6: Number of people using climate information or implementing risk-reducing actions to improve resilience to climate change as supported by USG assistance*								
		0					18,128	18,135
Male	Baseline	0					9,970	12,352
Female	Baseline	0					8,158	5,783
DNA	Baseline	0						

Note: * Baseline survey of August 2017 has been used to establish baseline values for 2017.

ANNEX 5: NSAF PROJECT INDICATORS

The following are the NSAF project’s 21 indicators and the related economic indicator codes and numbers. These relate to USAID’s standardized program structure (SPS) location and its Nepal Performance Management Plan (PMP). The indicators are grouped according to NSAF’s Result Framework.

Table A5: NSAF performance indicators FY 2016– FY 2021

Indicator no.	Indicator
DO2	Inclusive and sustainable economic growth to reduce extreme poverty
GOAL	Build competitive and synergistic seed and fertilizer value chains for inclusive and sustainable growth in agricultural productivity, business development, and income generation in Nepal
IR 2.1	Agriculture-based incomes increased
EG 3-1	Number of households benefiting directly from United States Government (USG) assistance under Feed the Future
Sub-IR 2.1.1	Agricultural productivity increased
EG 3.6	Farmers’ gross margins per hectare obtained through USG assistance (RAA)
EG 3.2-2	Number of individuals who have received USG-supported degree-granting agricultural sector productivity or food security training
EG 3.2-17	Number of farmers and others who have applied improved technologies or management practices with USG assistance
EG 3.2-18	Number of hectares of land under improved technologies or management practices with USG assistance
EG 3.3-11 (NS Custom 1)	Total quantity of targeted value chain commodities produced by direct beneficiaries with USG assistance that is set aside for home consumption
EG 11-6	Number of people using climate information or implementing risk-reducing actions to improve resilience to climate change as supported by USG assistance
STIR-10	Number of innovations supported through USG assistance
STIR-11	Number of innovations supported through USG assistance with demonstrated uptake by the public and/or private sector
Sub-IR 2.1.2	Value chain strengthened
EG 3.2-7	Number of technologies or management practices under research, under field testing, or made available for transfer as a result of USG assistance
EG 3.2-20	Number of for-profit private enterprises, producers organizations, water users associations, women’s groups, trade and business associations and community-based organizations (CBOs) that applied improved organization-level technologies or management practices with USG assistance
IR 2.2	Small enterprise opportunities expanded
EG 5.2-1	Number of firms receiving USG-funded technical assistance for improving business performance
Sub IR 2.2.1	Entrepreneurial skills strengthened
EG 3.2-1	Number of individuals who have received USG supported short-term agricultural sector productivity or food security training
EG 3.2-4	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
EG 3-10	Yield of targeted agricultural commodities within target areas [IM-level] [MT/ha]
Youth 3	Percentage of participants in USG-assisted programs designed to increase access to productive economic resources who are youth (15-29 years) [IM-level].
4.5.2 –Z14 (Custom-1)	Total quantity of target value chain commodities produced by direct beneficiaries with USG assistance that is set aside for home consumption.
Sub IR 2.2.2	Access to financial and business services expanded

Indicator no.	Indicator
EG 3.2-3	Number of micro, small, and medium enterprises (MSMEs), including farmers, receiving agricultural-related credit as a result of USG assistance
GNDR-2	Percentage of female participants in USG-assisted programs designed to increase access to productive economic resources [IM-level]
IR 2.4	Economic growth policy and performance improved
Sub IR 2.4.1	Increased access to markets
EG 3.2-19	Value of small-holder incremental sales generated with USG assistance
Sub IR 2.4.2	Private sector service delivery improved
EG 3.2-5	Number of public-private partnerships formed as a result of USG assistance
EG 5.2-2	Number of private sector firms that have improved management practices or technologies as a result of USG assistance