



Feed The Future India Triangular Training (FTF ITT)
International Training Programme on

Farm Mechanization of Small farm

for Executives of African and Asian Countries

11-25 April, 2017, ICAR-CIAE, Bhopal, Madhya Pradesh, India



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11-25 April, 2017, ICAR-CIAE, Bhopal, MP, INDIA

REPORT

BY

**Dr. K.K. Singh, Course Director
Dr. P.C. Bargale, Co-Course Director
Dr. P.S. Tiwari, Co-Course Director**



From the Desk of Director, CIAE, Bhopal

Mechanization of small farms has been a major challenge especially for developing countries. Farm mechanization is essential to sustain the interest of small farmers. However, mechanization needs to be customized to the local social-agro-economic conditions and cropping patterns. Environmental issues will become more important in future. Therefore, the importance of mechanization for successful implementation of conservation agriculture technologies is imperative. Many climate smart technologies can't be adopted without introduction of suitable mechanization. Robustness and affordability of the smart technologies is another important issue for the developing nations. Besides, smart agricultural technologies need location and crop specific fine tuning which could be achieved only through trained manpower.



This training course with emphasised on farm mechanization of small farms of African (Ghana, Kenya, Liberia, Malawi, Mozambique, Uganda) and Asian (Afghanistan, Mongolia) countries has been designed to meet these challenges. Concept of mechanization with an insight to improved tools, implements and machinery suitable for crops grown in selected African and Asian countries was the main focus of this training programme. Various types of farm machinery and technologies developed by the Indian Council of Agricultural Research (ICAR) and State Agricultural Universities (SAUs) for pre and post-harvest operations for major crops of the participating countries were covered in this course. In addition, topics like equipment operated by animal, power tiller and tractor, precision farming, conservation agriculture; horticultural crop mechanization, covered cultivation and women friendly tools, ergonomics and safety in agriculture, computer aided design (CAD), manufacturing technology of simple agricultural implements, testing of agricultural equipment, entrepreneurship through agribusiness and custom hiring of agricultural machinery for small farms, renewable energy gadgets post-harvest technology for small farms were also covered in this programme.

Major focus of the course was on the hands-on-training on manual and animal operated machinery. In this programme, lecture-cum-interaction sessions, practical's-cum-field demonstrations and visits to mechanized villages, manufacturers, relevant institutes and stakeholders was included. The presentations of country papers, identification of technologies suitable for respective countries, preparation of back at work plan by participants ensured effective follow-up action that would help in achieving the major objectives of mechanization of small farms in African and Asian Countries.

Based on feedback received from the participants, collaborative mode was highly benefited from this programme and its objectives of the programme were successfully achieved. This program was a step forward in intensifying through agricultural mechanization among India and other Asian and African countries. I look forward to further opportunity of mutual learning and cooperation with these countries in future.

With Best Wishes,

(K.K. Singh)
Director

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1. INTRODUCTION

1.1 Background

A new Agriculture Partnership between US and India to achieve Ever Green Revolution to address Global Food Security was announced during the State visit of US President Mr. Barak Obama to India in November 2010. The effort included Triangular Cooperation adapting technological advances and innovative solutions to address Food Security Challenges in Africa. This pilot stage focused on three African Countries i.e., Kenya, Liberia and Malawi with potential to expand throughout the African Continent in future.

Consequently, National Institute of Agricultural Extension Management (MANAGE), Hyderabad and National Institute of Agricultural Marketing (NIAM), Jaipur conducted 7 training programs covering 219 executives from Kenya, Liberia & Malawi. Participants Surveys were conducted in Kenya, Liberia & Malawi to assess the impact of training programs. Results were beyond expectations. Due to the success of first seven training programs, there have been considerable enthusiasms from the prospective Executives from Africa and Asia to participate in the training program.

As a result, USAID and Ministry of External Affairs (MEA), Govt. of India identified 17 additional countries and designated as Feed the Future; India Triangular Training Program which was launched on 25th July, 2016 at New Delhi. During the program period until 2020, around 1400 Agricultural professionals will be trained in Africa and Asia in phased manner. The program will conduct 32, fifteen days training courses (excluding travel period) at select Indian institutions for 25 participants in each programme.

In addition 12 Nos. ten days duration trainings (excluding travel period), in selected partner countries in Africa and Asia, for up to 50 participants per programme. Each course module will focus on themes or sub sectors in which Indian institutions of reputed or have demonstrated comparative advantage to offer such trainings and ensure that it effectively responds to the target countries' capacity gaps. This approach is designed to respond to the needs of target countries based on the Demand Analysis carried out at the beginning of this program.

Based on the demand analyzed, it was identified that Mechanization of small farms has been a major challenge for developing countries. Farm mechanization is essential to sustain the interest of small farmers. Accordingly ICAR-Central Institute of Agricultural Engineering was selected as a training institute based on the extraordinary works undertaken by the institute in the field of Farm mechanization.

ICAR-CIAE: The ICAR-Central Institute of Agricultural Engineering is a flagship institute under Indian Council of Agricultural Research to provide engineering solutions for overall prosperity and sustainability of farming systems. The institute came into existence on February 15, 1976 with a general mandate to conduct research on agricultural mechanisation, post-harvest food processing, and energy management in agriculture and build capacity of appropriate stakeholders leading to effective management of farming operations, increased productivity, conservation of resources, reduction in drudgery, prevention of losses, generation of employment and improvement in the lives of farming and allied community. The mandate is fulfilled by providing national and international leadership by means of independent and coordinated research through network of research centers established all over the country that results in developing commodity and location specific technologies needed by farmers and manufacturers. Transfer of agricultural engineering technology and education are also important activities of the institute.

The training programme on “Farm Mechanization for Small Farmers was announced in the month of **January, 2017** and was scheduled during **11-25 April, 2017** at **ICAR-Central Institute of Agricultural Engineering (ICAR-CIAE), Bhopal**. The announcement was received huge response from partner countries and MANAGE selected 23 executives from nine countries viz., Afghanistan, Botswana, Ghana, Kenya, Liberia, Malawi, Mongolia, Mozambique and Uganda to participate in the training Program (List of executives enclosed in Annexure II).

International Training was inaugurated at ICAR-CIAE by Mr. Vishwas Sarang, Hon'ble Minister of State (Independent Charge), Department of Co-operatives, Panchayat, Rural Development and Bhopal Gas Relief, Govt. of MP, Mr. Oliveira Amimo, Economics and Commercial Counsellor, High Commission of the Republic of Mozambique as the special guest and Mrs. V. Usha Rani IAS, Director General (MANAGE), Hyderabad as Special Guest. Dr. K.K. Singh, Director, ICAR-CIAE presided over the Inaugural session.

**Inauguration function of
Farm Mechanization for Small Farmers for executive of African and Asian countries
on 11th April, 2017 at CIAE, Bhopal, India**



**First FTF ITT Training Program on
 “Farm Mechanization for Small Farmers” for executive of African and Asian countries
 on 11th April, 2017 at ICAR-CIAE, Bhopal, India**



1.2 Objectives of the Training Programme

The role of mechanization in agriculture has increased as it enhances productivity through increased input use efficiency, timeliness of agricultural operations, reduced drudgery as well as the cost of cultivation. Mechanization interventions have been reported to increase the productivity by 15% and reduce the cost of production to the tune of 20%. The mechanization also facilitates conservation and sustainable agriculture while improving the livelihood opportunities, income and environmental sustainability. The present course was proposed considering the vital need of human resource development and capacity building for effective mechanization of small farms in African and Asian countries. The training programme was designed with following objectives:

- To introduce the concept of mechanization for different unit operations of production agriculture viz. land preparation to threshing for major cropping systems of African and Asian countries.
- To introduce and demonstrate appropriate technologies for production agriculture leading to conservation of natural resources for sustainable agriculture for different cropping systems of Afro-Asian countries.
- Field visits to the mechanized villages and interaction with local farmers and study their success stories and to relevant educational/ training institutes.
- Identify country specific technologies for mechanization for selected cropping systems of Afro-Asian countries.

1.3 Key Focus Areas of the Training Module

- The training course emphasized on farm mechanization of small farms of African and Asian countries. Concept of mechanization, an insight to improved tools, implements and machinery suitable for crops grown in selected Afro-Asian countries and developed by ICAR-CIAE and its AICRPs were mainly covered for different operations of production agriculture viz. farm planning and irrigation systems & equipment, seeding and planting, weeding and interculture, plant protection, harvesting and threshing. In addition, the animal operated, power tiller and tractor operated equipment, precision farming, conservation agriculture; horticultural crop mechanization and covered cultivation and women friendly tools were also covered.
- An exposure was provided to ergonomics and safety in agriculture machinery, Computer Aided Design (CAD) and manufacturing technology of simple agriculture implements, testing of agricultural equipment, entrepreneurship through agribusiness and custom hiring of agricultural machinery for small farms and renewable energy gadgets for small farms.
- About 30% time was devoted in lecture-cum-interaction sessions, 40% time on hands on practices cum field demonstrations of selected tools and implements, 30% time for visits to mechanized villages, manufacturers, institutes of training and testing, and other relevant stakeholders. The presentations of country papers-cum-identification of technologies suitable for respective countries was also included.

The detailed program schedule is enclosed in Annexure-I

1.4 Selection of Executives

Due to the success of Pilot programs in Kenya, Malawi and Liberia during 2013 -15, there has been considerable enthusiasm from the prospective executives from partner countries to participate in the training program. In order to select right candidates, good publicity was given in partner countries through Point of Contact (POC) in respective countries, through Indian Embassies, USAID Missions of respective countries, National Governments and previously trained Executives. The nominations were sponsored by the agriculture and allied departments of the respective countries by the due date i.e., 12th September, 2016 were scrutinized by Program Management Unit (PMU), MANAGE to select suitable Executives. The following parameters received due weightage at the time of nomination/selection of Executives:

- At least 3 years of uninterrupted service in Public or Private sector in the training theme area. Exceptional nominations require separate justification.
- Executives may be nominated representing diverse working areas viz., Planning, Administration, Teaching, Research, Extension, Agri Industry, NGO, Farmers organizations/cooperatives, Agripreneurs in Agriculture and allied fields namely Horticulture, Sericulture, Forestry, Livestock, Fisheries, Natural Resources Management, Nutrition, Agribusiness, Post-Harvest and Value Addition, Marketing etc.
- Currently involved in Feed the Future [FTF] Programs. Exceptions must be demonstrated by evidence that the participant will actively be involved in the above Program.
- At-least 50 per cent of the nominations were reserved for female professionals in selected and waitlisted category.
- Applicant shall possess physical and mental skills and abilities for successfully completing the program.
- Working knowledge of English.

1.5 Profile of Executives

Twenty three executives from nine countries (2each from Afghanistan, Ghana, Liberia, Mozambique and 3 each from Botswana, Kenya, Malawi, Mongolia and Uganda) have attended and successfully completed the programme. The selected executives belonged to diverse working areas viz., Agriculture and Rural Development Officers, Agricultural Economists, Agricultural Extension officers namely Livestock, Fisheries, Nutrition and Agribusiness etc. representing public, universities and private organizations in partner countries. Out of 23 executives, a good number of 05 women executives participated in the training program.

Complete list of Executives is enclosed at Annexure-II.

2. METHODOLOGY

2.1 Training Methodology

The training program was participatory in nature, which was included lectures, panel discussions, group discussions, case studies and field visits. Each participant was expected to contribute ideas and take part in group activities thereon forming small groups to undertake various tasks allotted under the training. Although, experiential learning methodology was effectively incorporated in the program, however the participants were expected to emulate learnings through group interaction, field visits and interactions with domain experts. A Back at Work Plan was in-built to ensure the transformation of learning into action at their workplace. The effectiveness of the training is proposed to be monitored after conducting Pre & Post Tests to understand the impact of the training on the knowledge of the participants. A learner-centred approach was followed to orient the participants on implementation of Farm machineries in the small farms. Methodology adopted for the program was as follows:

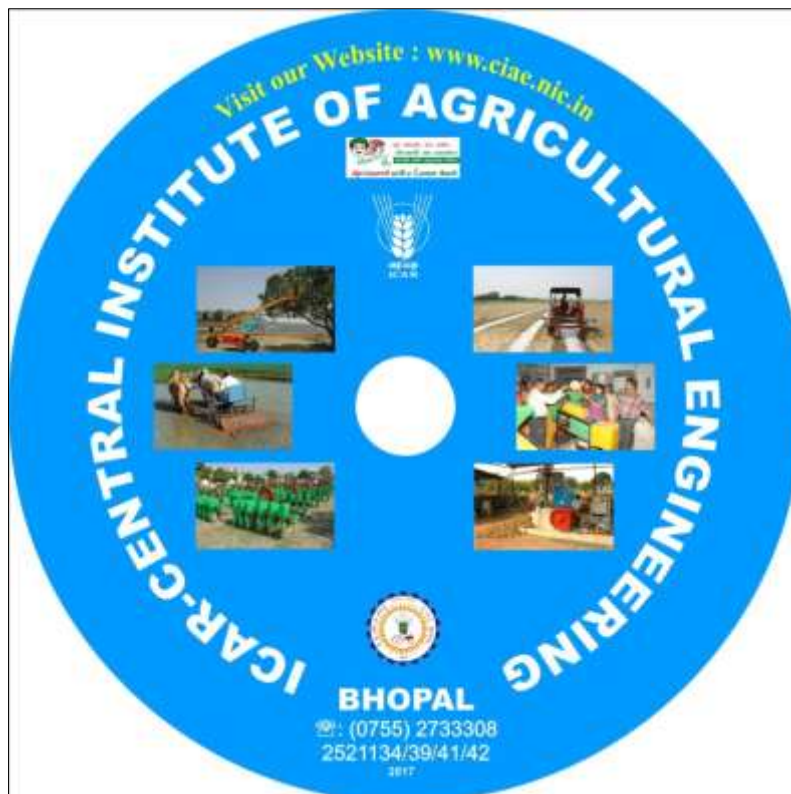
- ❖ Participatory approach
- ❖ Participants expected to contribute ideas and work in groups
- ❖ Experiential learning methodology (Cross learning, field experiences)
- ❖ Lectures, group discussions, panel discussions and field visits to premier agricultural research, agricultural implements manufacturing and testing institutions in and around Bhopal.
- ❖ Interactions with innovative farmers and Agri-entrepreneurs
- ❖ Special lectures/interactions with eminent personalities from the field were invited
- ❖ Participants were made to present “Back-at-Work-Plans”
- ❖ Regular feedback on the program were collected.

2.2 Study Material

- ❖ Study materials, prepared by Course Director of ICAR-CIAE, Bhopal on all the major themes were provided to the executives. The soft copies of all the presentations made during the sessions were also provided to the executives at the end of the course. More than 150 of photographs of lectures, field visits and other important activities of program were also provided to the Executives. The executives had full access to ICAR-CIAE Library which is having thousands of books, periodicals and online journals in the area of farm mechanization.
- ❖ In order to increase access to information and share knowledge on continuous basis, Wi-Fi as well as desk tops with Internet facility were provided during the entire course period.



Training Course Manual



CIAE technologies DVD

2.3 Resource Persons

- ❖ Besides ICAR-CIAE faculty members, resource persons were invited from reputed public and private institutions across the country. The list of organizations that contributed resource persons to the program is as follows:
 - Dr. Gyandera Singh, Ex-Assistant Director General (ADG), Engineering, ICAR, New Delhi
 - Dr. RP Kachru, Ex-Assistant Director General (ADG), Process-Engineering, ICAR, New Delhi
 - Dr. LP Gite, Ex-PC, Ergonomics & Safety in Agriculture (ESA), ICAR-CIAE, Bhopal
 - Director, Central Farm Machinery & Tractor Training Institute, (CFMTTI), Budhni
 - Director of Agricultural Engineering, Govt. of MP, Bhopal
 - Dr. Surendra Singh, Ex-PC, AICRP on FIM & Technical Advisor, Agricultural Machinery Manufacturers Association (AMMA-India)
 - ICAR-Indian Institute of Soybean Research (IISR), Indore
 - ITC e-Chaupal, Vidisha, MP
 - TMTL – TAFE Motors and Tractors Limited, Bhopal

2.4 Field Visits

The executives were exposed to various field visits i.e. Central Farm Machinery & Tractor Training Institute, (CFMTTI), Budhni, ITC e-chaupal, Vidisha, TMTL – TAFE Motors and Tractors Limited, Bhopal, *Kachibarkhera-village* etc., to interact with the innovative, agriprenuer farmers and experts in specific areas and exposed them with live examples and success stories.



Visit to farmers village-Kachibarkhera



Visit to Central Farm Machinery & Tractor Training Institute, Tractor Nagar (CFMTTI), Budhni



Visit to Farmers Field at Kachibarkhera



Visit to Biomass Briquetting Plant



Field Visit

2.5 Visit to Places of Historical and Cultural importance

Executives were taken to places of various historical and cultural importances such as Sanchi, ITC e-chaupal, Lake View, ShauryaSmarak, DB City MALL etc. Sanchi is a Buddhist complex, famous for its Great Stupa, on a hilltop at Sanchi Town in Raisen District of the state of Madhya Pradesh, India. The Great Stupa at Sanchi is one of the oldest stone structure in India and world heritage.



At World Heritage – Sanchi Stupa



At Tropic of Cencer



Visit to ITC, e-Choupal, Vidisha for exposure of Electronic Business & Marketing of Farm Produce

2.6 Interaction with Dignitaries/ Experts

Executives had the opportunity to interact with subject matter experts during panel discussions, interactions with Policy Makers, Scientists, Extension Practitioners, Farmers and Cooperatives. Besides, had the opportunity to interact with key officials from USAID, India.



Interaction with Dr. Surendra Singh, Ex-PC, AICRP on FIM & Technical Advisor, Agricultural Machinery Manufacturers Association (AMMA-India)



Dr. Gyandera Singh, Ex-Assistant Director General (ADG), Engineering, ICAR, New Delhi

2.7 Cultural Evening - Culture for Global Harmony

A Cultural Evening was organized on 22.04.2017 evening with the intension to expose Indian culture to partner countries, at the same time each country executives were encouraged to present their cultural heritage to other partner countries including India. Organising committee of ICAR-CIAE informed all executives well in advance about cultural evening and facilitated them with required items and preparation at ICAR-CIAE. Cultural Evening - Culture for Global Harmony went well in the presence of Dr. P. Chandra Shekara, Director, PMU, MANAGE and Dr. K.K. Singh, Director, ICAR-CIAE, Bhopal.





2.8 Collective action and participatory learning

All the executives were divided in to several-groups to enhance learning in small groups throughout the training program including field/ Institutional visits and prepare for cultural programme. The groups were given responsibility for learning from interactions, collection of literature, photographs, contact details, use of library and identify useful technology to their respective countries. The group also participated and managed cultural programme successfully.

2.9 Life Membership to Professional Bodies and Journals

All the executives were made International Members for Professional Society of life members of INDIAN SOCIETY OF AGRICULTURAL ENGINEERS (ISAE) journals of “Agricultural Engineering Today” and “Journal for Agricultural Engineering”. As life members, they will receive Journal time to time.

2.10 Back-At-Work-Plans

The present programme aimed at hands-on-training on advance machineries for small farms and human resource development and capacity building for effective mechanization of small farms. Hence, the expected outcome is a professional commitment by each Executive to try new initiatives learnt during the training programmes at their work place after the training programme. In the backdrop of orientation, inputs, interactions, study material and experiences received during the program, the executives prepared and presented individual “Back-at-work-plans” which would help operationalize the relevant concepts learned during the program in their respective countries. Back at work -plan also trace the connectivity between Indian experience and back home extension issues. Details of individual Back-at-work-plans are given at Annexure-III

3. TRAINING EVALUATION

3.1 Evaluation of Technical Sessions

Feedback of Executives was collected on all technical sessions taken by resources persons, and field visits on a scale of 0 to 10 i.e. '1 being the least and 10 being highest. In addition, their suggestions on other areas such as boarding and lodging were obtained in order to bring necessary changes. The executives expressed their satisfaction level by rating the program on an average score of 9.22 on a 10 point continuum indicating the overall impression on the programme was excellent. The feedback received from executives are tabulated and given at Annexure-IV.

3.2 Pre and Post-Training Test

Pre & Post Training Test were conducted for the Executives at the beginning and at the end of the training respectively. Twenty five thematic questions on Public Private Partnership in Agricultural Extension Management with a maximum of 25 marks were administered for pre and post-training test and obtained answers of the executives to assess their change of knowledge levels and effectiveness of the training programme. The average score of executives in the pre-training test was 10.83 (43.32%) whereas the average score of post-training was 18.43 (73.72%).

Thus, it is found that the level of knowledge of executives was increase by 30.40 percent after the training programme. Details of pre and post-training test are given at Annexure-V.

3.3 Evaluation

Executives rated the overall training program with a score of 9.22 on 10 point continuum i.e. Excellent.

3.4 Post-Training Monitoring

Post-training impact evaluation in respective countries by Program Management Unit (PMU) is an integral part of the programme. PMU will be regularly in touch with executives through emails to monitor the progress of their "Back-at-Work-Plans" and it will help the effective monitoring and impact evaluation which is one of the important aspects of Program Monitoring & Evaluation (M & E).

4. Valedictory, Media coverage and Feedback

4.1. Valedictory

The Valedictory function of Feed The Future India Triangular Training (FTF ITT) Training Programme on “Farm Mechanization of Small farm” at ICAR-CIAE, Bhopal was conducted on April 25, 2017 in presence of Shri Gauri Shankar Bisen, Hon’ble Minister for Farmers Welfare and Agriculture, Govt. of Madhya Pradesh. He congratulated all the participants and the institute for conducting such an important training in an area that relates to livelihood of millions of people across the globe. He emphasized that use of appropriate machinery helps in higher productivity, lower cost of cultivation, lower drudgery and ensures balanced use of inputs/ chemicals thus ensuring higher profits to farmers without harming the environment.

Dr. KK Singh, Director, CIAE assured continued support to the participating countries in future too. He urged all participants to continue ties with India in general and ICAR-CIAE, Bhopal in particular for knowledge and technology development and dissemination.

Dr. Chandrasekhar, Director, MANAGE, Hyderabad informed about the initiative – of hand holding of technology deprived nations – that was initiated with 3 countries, now offers help in different areas to 17 countries of Asia and Africa. He informed that ICAR-CIAE, Bhopal was selected for providing this prestigious training after thorough review of the gaps identified in the sector of agriculture for the concerned countries.



Executives receiving certificate from Shri Gauri Shankar Bisen, Hon’ble Minister for Farmers Welfare and Agriculture, Govt. of Madhya Pradesh



Executives with Shri Gauri Shankar Bisen, Hon'ble Minister for Farmers Welfare and Agriculture, Govt. of Madhya Pradesh, Executives with the dignitaries, Dr. P. Chandra Shekara, Director, PMU, MANAGE, Dr. K.K. Singh, Director, ICAR-CIAE, Bhopal



Executives receiving the Memento from Dr. K.K. Singh, Director, ICAR-CIAE, Bhopal

4.2 Media coverage

There was wide coverage given by Print and Electronic Media some of the clipping of media coverage are enclosed in Annexure VI.

4.3 Feedback from executives

The feedback were received from all the executive participant on all technical sessions taken by resources persons, and field visits. They expressed that the programme was excellent. The feedback received are mentioned in Annexure-IV.

ANNEXURE I – PROGRAMME SCHEDULE



Feed The Future India Triangular Training (FTF ITT) Programme on Farm Mechanization for Small farmers

For Extension Practitioners of African and Asian Countries

April 11-25, 2017

Venue: ICAR-Central Institute of Agricultural Engineering Bhopal, India

Participating countries		
African [7]	Botswana (3), Ghana (2), Kenya (3), Liberia (2), Malawi (3), Mozambique (2), Uganda (3)	
Asian Countries (2)	Afghanistan (2), Mongolia (3)	
Course Director	• Dr KK Singh, Director, ICAR-CIAE, Bhopal, India	
Co-Directors	• Dr PC Bargale Head, Technology Transfer Division, ICAR-CIAE, Bhopal, India • Dr PS Tiwari, Head, Agricultural Mechanization Division, ICAR-CIAE, Bhopal	
Training - Schedule		
Day-1: 11/04/2017 (Tuesday)		
0930 - 1000 HRS	Registration	ER MB Tamkankar, Sci (SS) ErSweeti Kumari, Scientist
1000 - 1100 HRS	Ice Breaking – Discussion on the proposed programme, content, suggestions, field visits, lodging and boarding etc.	DR PC Bargale Co-Course Director Dr PS Tiwari, Co-Course Director
1115 - 1145 HRS	Interaction with participants on respective country report vis-à-vis course content.	Dr AC Saxena, Pr. Sci. Dr K P Singh, Sr Sci., AMD
1230 – 1330 HRS	Lunch Break at Hotel Lake View Ashok	
1430 – 1630 HRS	Inaugural Function	As per enclosed Programme
1630 – 1730 HRS	Visit to Technology Display Hall	Dr PC Bargale / Dr AC Saxena
Day-2: 12/04/2017 (Wednesday)		
0930 - 1100 HRS	Planning and land development for small farms	Dr Ramadhar Singh, PS, IDED
1115 – 1300 HRS	Strategies for promotion of small farm mechanization in African & Asian Countries	Dr.Surendra Singh, Ex-PC, AICRP on FIM
1400 -1530 HRS	Over view of CIAE & Campus visit	Dr PC Bargale / Dr AC Saxena, PS
1545 – 1730 HRS	Mechanization of millets production and its primary processing	Dr. KP Singh, Sr Scientist
Day-3: 13/04/2017 (Thursday)		
0930 - 1100 HRS	Mechanization of maize and sorghum cultivation	Dr B. M. Nandede, Scientist
1115 – 1300 HRS	Agricultural Machinery Manufacturing – Sector in India & its potential for African & Asian countries	Dr.Surendra Singh Ex-PC, AICRP on FIM
1400 -1530 HRS	Mechanization of pulse and oilseed production	Dr P. S. Tiwari, Head, AMD
1545 – 1730 HRS	Calibration, Operation & Repair Maintenance of Seed Drills and Planters	Dr NS Chandel, Scientist
Day-4: 14/04/2017 (Friday) Holiday – Good Friday		
0730 – 1400 HRS	Visit to ITC, e-Choupal, Vidisha& manufacturers of farm machinery, interaction with small farmers – Dr. NS Chandel, Er MB Tamhankar, Dr Chetan Sawant, Dr AP Magar	
Day-5: 15/04/2017 (Saturday)		
0930 - 1100 HRS	Animal operated farm machinery	Dr. M. Din, PC, UAE
1115 – 1300 HRS	Farm Machinery for small farms in African & Asian countries	Dr.Gyanendra Singh, Ex-ADG [Engg], ICAR,
1400 -1530 HRS	Practical / Demonstration of tools and machinery related to millet, maize, rice, wheat and sorghum production system	Dr. KP Singh, Sr. Scientist, Dr Manoj Kumar (FMP), Sci. Er MPS Chouhan, Sh. SC Malviya
1545 – 1730 HRS	Energy Gadgets for small farms	Dr. KC Pandey, PC EAAL.
Day-6: 16/04/2017 (Sunday): Local Educational Visit & Homework and Reading		

Day-7: 17/04/2017 (Monday)		
0930 - 1100 HRS	Status of small farm mechanization in Asia and Africa	Dr CR Mehta, PC, FIM
1115 – 1300 HRS	Ergonomics & Safety in agriculture and women friendly technologies	Dr. L. P. Gite, Ex-PC, ESA Er. Sweeti Kumari , Scientist
1400 -1530 HRS	Economics and energetics of agricultural machinery	Dr. RS Singh, Pr. Sci.
1545 – 1730 HRS	Covered Cultivation Technologies for small Farmers	Dr. K.V.R. Rao, Pr. Sci,
Day-8: 18/04/2017 (Tuesday)		
0730 HRS : Visit to Central Farm Machinery Training & Testing Institute & (CFMT&TI), Budni&Eicher Tractors, Mandideep – Dr NS Chandel, Er MB Tamhankar, Dr AshutoshPandirwar, PP Ambalkar,		
Day-9: 19/04/2017 (Wednesday)		
0930 - 1100 HRS	Farm machinery management for small farms	Dr C R Mehta, PC, FIM
1115 – 1300 HRS	Strategies for promotion of post-harvest technologies and value addition in African and Asian countries.	Dr RP Kachru, Ex-ADG (Process Engg), ICAR
1400 - 1530 HRS	Farm Machinery for Precision Agriculture	Dr. P.S. Tiwari, Head AMD Dr BB Gaikwad, Scientist
1545 – 1730 HRS	Farm Machinery for Conservation Agriculture	Dr. R.C. Singh, Head, AEP
Day-10: 20/04/2017 (Thursday)		
0930 - 1100 HRS	Mechanization of tuber & plantation crops	Dr. SJK Annamalai, Head, RC
1115 – 1300 HRS	Technologies for post-harvest & value addition for small farms	Dr.NachikatKotwaliwale Head, APPD
1400 -1530 HRS	Mechanization package for dry land agriculture	Dr. DV Singh, Sr Sci., IISR, Indore
1545 – 1730 HRS	Practical – Design of Farm Machinery using CAD	Dr. K.P. SinghSr Sci., Dr Manoj Kumar, Sci.
Day-11: 21/04/2017 (Friday)		
0930 - 1100 HRS	Mechanization of rice cultivation	Dr. SJK Annamalai,Head, RC
1115 – 1300 HRS	Pressurized irrigation system including micro irrigation	Dr CK Saxena, Sr. Sci.
1400 -1530 HRS	Testing of Agricultural Machinery	Dr KN Agarwal, PC, EAAI
1545 – 1730 HRS	Manufacturing of Agricultural Machinery & Fabrication on Small Tools	Dr. A.C. Saxena, PS and Dr.Dushyant Singh, SS & I/c PPC
Day-12: 22/04/2017 (Saturday)		
0900 - 1100 HRS	Visit to a CIAE adopted village <i>Kachhibarkheda</i> to demonstrate impact of CIAE intervention for mechanization – interaction with farmers	Dr RS Singh, Pr. Sci. ER. DK Diwedi, CTO.
1115 – 1300 HRS	Small farm mechanization through custom hiring of Agricultural Machinery - Case studies	Dr. U.R. Badegaonkar, Pr. Sci. & I/c KVK
1400 -1530 HRS	Mechanization of orchard production for small farms	Dr. BB Gaikwad, Scientist
1545 – 1730 HRS	Mechanization of vegetable production for small farms	Dr. AP Magar, Scientist
Day-13: 23/04/2017 (Sunday)-		
Homework and Reading – Preparing for Country Report and Back at work Plan		
Day-14: 24/04/2017 (Monday)		
0930 - 1100 HRS	Processing opportunities, post-harvest technology and value addition	Dr. K.K. Singh, Director, ICAR-CIAE
1115 – 1300 HRS	Practical on soybean processing & utilization	Dr. (Mrs.) S. S Deshpande, PS
1400 -1530 HRS	Back at Work Plan	Dr KK Singh, Director, Chairman
1545 – 1730 HRS	Feedback of the programme	Dr PS Tiwari, Head, AMD Dr PC Bargale, Head TTD Dr AC Saxena, PS, TTD Dr K P Singh, Sr. Sci., AMD
Day-15: 25/04/2017 (Tuesday)		
0930 - 1100 HRS	Valedictory Function	

Tea & Lunch Break

Tea-Breaks F/N 1100 - 1115 HRS &A/N 1530 – 1545 HRS

Lunch 1300 - 1400 HRS

ANNEXURE II – LIST OF EXECUTIVES







Feed The Future India Triangular Training (FTF ITT) International Training Programme on “Farm Mechanization for Small Farmers”

**11-25 April, 2017 at ICAR- Central Institute of Agricultural Engineering (ICAR-CIAE),
Bhopal, Madhya Pradesh, India**







“For Executives of African & Asian Countries”

List of Participants

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ANNEXURE III –BACK TO WORK PLAN

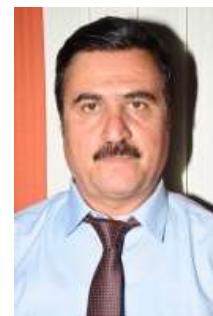
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Activity	<ul style="list-style-type: none"> • Introduce and aware new technologies to Farmers, some Machinery Manufacture, Agriculture Investors and Agriculture Companies and Medium and Small Enterprises, my vision is to establish a Department in DADs Company, New Technology Consultancy Section (NTCS) • Women Empowerment that technologies and machineries which is simple for women, and I want to work with ARDEP (Afghanistan rural Development Enterprises Program) in west part of Afghanistan.
Problem	<ul style="list-style-type: none"> • Lack of Awareness in the section of Machinery and new agriculture technologies • Harvesting and process have some problems, and Value Chain high cost of agricultural machineries • Lack of familiar to new technologies in Cultivation, Harvesting & Processing in rural Area. • The Women income is very low in rural area.
Indian Experience	<ul style="list-style-type: none"> • Herat City has large number of small and marginal farmers. Rice and Wheat, saffron, grape, grain Crops. All field operation are done by conventional methods. In this training, number of machineries and equipment's were shown for crop production and post-harvest technologies for these crops. • Number of technologies for women for crop production and value addition were also shown which can be useful for empowerment of women and providing income source to women. It is my privilege and proud for your Experiences and Innovation that you work in CIAE, I am interested to transfer some technology that you design for Cultivation, Harvesting and Value addition Technologies that is simple and useful for Women and generate his Income.
Place	Herat City
Target Group	Farmers, women in Rural Area, Agriculture Investors Enterprises
Duration	For 1 Years (1 May 2017-31-May 2018)
Expected end result	<ul style="list-style-type: none"> • Aware and inform the investors, Farmers, SME etc. • Increase farmers income due to mechanization • Increase in employment opportunity to Expected to • Introduce New Technologies and Machinery for 30 Agriculture Company, 200 Farmers and 50 Investors in mentioned Section • Increase the Production Productivity of Agriculture Investors
Other Information	Crop Processing and Value Addition Technologies Suitable for Women: Groundnut Decorticator, Double Screen Grain Cleaner with sack holder, Multi Purposed Tray Dryer, Vegetable Dryer, Motherized Soybean

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Activity	<ul style="list-style-type: none"> Promote agricultural mechanization policy and strategies for small farmers based on training Introduce mechanization package for dry land wheat cultivation Promotion of custom hiring of agricultural machineries and technologies
Problem	<ul style="list-style-type: none"> Lack of awareness among the farmers regarding advance technologies Poor economic condition of farmers High cost of agricultural machineries Lack of credit facilities for the farmers especially in case of agricultural machineries More framers don't have access to dry land mechanization and machinery Scarcity of water for irrigation
Indian Experience	<ul style="list-style-type: none"> Afghanistan has large number of small and marginal farmers like India. Rice and Wheat are major crops of Afghanistan. All field operation are done by conventional methods. In this training, number of machineries and equipment's were shown for crop production and post-harvest technologies for these crops. These machineries can be introduced in Afghanistan. India is operating custom hiring services to the farmers for agricultural machineries which can be introduced in Afghanistan for small and marginal farmers. Number of technologies for women for crop production and value addition were also shown which can be useful for empowerment of women and providing income source to women.
Place	Provinces of Afghanistan like- Samangan, Kundoz, Takhar, Faryab, Balkha
Target Group	Policy makers, Small and marginal farmers, Agricultural machinery manufacturers, Agriculture cooperatives, NGO's
Duration	September, 2017 - August, 2020 (3 years)
Expected end result	<ul style="list-style-type: none"> Increase in wheat production and productivity of the country Increase in farmers income due to mechanization Increase in employment opportunity to youths when demand of agricultural machinery will rise leads to expansion of agricultural machinery industry Establishment of custom hiring centres will also provide employment and source of income

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Activity	TUBULAR MAIZE SHELLER
Problem	<ul style="list-style-type: none"> • Small farmers use sticks for shelling dry maize kernels from cobs. • High degree of shelling losses occurs • Time consuming
Indian Experience	<ul style="list-style-type: none"> • CIAE invented a portable and user friendly maize sheller • Small farmers are able to thresh maize without much drudgery
Place	<ul style="list-style-type: none"> • Botswana
Target Group	<ul style="list-style-type: none"> • Maize producers
Duration	<ul style="list-style-type: none"> • August – October 2017
Expected end result	<ul style="list-style-type: none"> • Reduction in shelling cost • Timeliness of shelling will be realized • Increase in output capacity • Reduction in drudgery
Other Information	<ul style="list-style-type: none"> • Maize is one of the major crops grown in Botswana • Government assists maize producers with land preparation, weeding and planting up to five hectares for free. • Does not assist in post-harvest • For demonstration purposes will need about 200 to distribute across the country in every extension area.

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Activity	INCREASE OF GROUNDNUT PRODUCTION IN BOTSWANA
Problem	<ul style="list-style-type: none"> • Groundnut is one of the cash crops in Botswana, they have higher selling market price and however, the groundnut producing farmers are experiencing losses in terms of damaged nuts, time and labor during post-harvest processes. • These have led to high importation of groundnuts from neighboring countries. • All groundnut producing farmers use manual labor for shelling
Indian Experience	<ul style="list-style-type: none"> • Indians have developed a groundnut sheller suitable for small farmers
Place	<ul style="list-style-type: none"> • Groundnuts are mostly planted in the central, north east and west of the country. So the groundnut sheller will be availed at these districts
Target Group	<ul style="list-style-type: none"> • Most growers of groundnuts are dry-land farmers
Duration	The sheller is needed from June 2017 – January 2018
Expected end result	After the supply and training on how to use the groundnut Sheller, the number of farmers growing groundnuts will increase since the losses will be reduced.
Other Information	The country will need 45 groundnut decorticator for the three (3) districts mentioned above. The 3 districts have 9 Agricultural Service Centers (ASC's) and each ASC will need 5 groundnut shellers.

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Activity	Reduction in cost and drudgery of transplanting vegetables
Problem	<ul style="list-style-type: none"> • Horticultural farmers use manual labor for transplanting of seedlings from seedbeds which is expensive and time consuming therefore leading to reduction of profits • Botswana imports 80% of the fruit and vegetable demand
Indian Experience	<ul style="list-style-type: none"> • Development of vegetable transplanter that is suitable for their conditions • To be guided in developing a vegetable transplanter suitable for our conditions
Place	<ul style="list-style-type: none"> • Botswana
Target Group	<ul style="list-style-type: none"> • Fruits and Vegetables producers
Duration	The sheller is needed from June 2017 – January 2018
Expected end result	<ul style="list-style-type: none"> • Growth in horticulture production • Reduction on cost and drudgery
Other Information	<ul style="list-style-type: none"> • The country has 10 districts and 15 agricultural service centres (ASC), so will need 3 per ASC (45)for hire to horticultural farmers • Currently there is a program in place to promote horticultural production

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Activity	Women Friendly Technologies for Cultivation of Maize, Groundnut and Rice for Empowering Rural Woman
Problem	<ul style="list-style-type: none"> • In central Gonja District of Ghana 90% of the agricultural production comes from small scale farmers and about 45% farmers are rural women • Women constitute the largest percentage of the work force in the agricultural sector, but do not have access to agricultural production resources such as mechanization • Due to lack of mechanization and women friendly machines, women are mostly using manually operated tools (cutlass and hoe) • Due to scarcity of labour, farmers broadcast legumes and cereals such as groundnuts, soybeans , maize, which always results into low yield • In fact the drudgery level for the women farmers in the district is very high and they work in injury prone hazardous situations
Indian Experience	Participation in this training programme has enhanced my knowledge in mechanized agriculture, especially women friendly machines such as rice seeder, dibblers, dry land and wet land weeders, groundnut strippers, groundnut decorticators, etc. I was amazed to know how women using women friendly tools and equipment can work easily with reduced drudgery and improved crop yield.
Place	My activities are to be carried out in Central Gonja district in the northern region, Ghana
Target Group	Rural women and small scale farmers
Duration	May 2017-April 2020
Expected end result	<ul style="list-style-type: none"> • Improved capacity of woman workers by at least 25% by the use of women friendly machines in Central Gonja district • Women will be happy with less drudgery by the implementation of Back to county plan • Women will save their time with use of machines and use this time in some other productive activities • Women farmers income will increase by increasing production and productivity of the crops
Other Information	Hence the choice of the topic for successful implementation, I will humbly request the Indian government and USAID through the management of CIAE to help me get the women friendly machines to make my desire to empower women in the Central Gonja district come through.

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Activity	<ul style="list-style-type: none"> • Training and education of vegetable and maize grower framers. • Most farmers in my municipality are vegetables growers.
Problem	<ul style="list-style-type: none"> • Poor irrigation facility for vegetables and maize growing area • High cost of farm equipment • Low level of farm mechanization in vegetable cultivations • Non availability of small tools and gender friendly farm tools and equipment's
Indian Experience	<ul style="list-style-type: none"> • Drip irrigation is most suitable for vegetable and maize growers because it drops water per plants compared to flood and sprinkler. • Heavy equipment become a problem on farm land since farmers cultivate on small farms (0.5 -1.5 acre) So introduction of low cost, small and gender friendly tools on farm necessary. • Introduction of power tillers operated vegetable transplants
Place	<ul style="list-style-type: none"> • Ga East Municipal, Greater Accra, Ghana, West Africa
Target Group	<ul style="list-style-type: none"> • 300 progressive vegetable and maize growers
Duration	<ul style="list-style-type: none"> • Three cropping season starting from July 2017 to June 2020
Expected end result	<ul style="list-style-type: none"> • Increase in productivity • Better production • Increase income • Effective and efficient use of water • No water wastage • Reduce drudgery • Time conscious • Enhancement of safety is assured
Other Information	<ul style="list-style-type: none"> • The government of India and the USAID should assist Ghana farmers in the purchase of power tiller operated machines • Also help acquire the drip irrigational facility • Training and sensitization should be organized quarterly to refresh the memory of farmers • Manual maize Shellers should be introduce to growers • Farm machines do not operates on its own, human operates them and since a tractor is an on field slow moving vehicles;- • The Indian government and USAID should take into consideration to train operators mainly on its safety when operating • The USAID, Indian government and Ghana government should collaborate in the funding of these activities.

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Activity	PULSES FARMING MECHANIZATION IN KENYA
Problem	<ul style="list-style-type: none"> • Fish farming growth is slow in Kenya due to expensive animal protein source fish feed • Fish feed require high protein sources raw materials unlike other livestock • Farmers rely on low protein source materials that are inadequate in type and nutritive requirement • Farmers empowerment to produce high protein pulses in farm is prerequisite • This will be through using economical and efficient farm machineries • Farm-made feeds allow farmer to tailor feed inputs to their own financial resources and requirements, and facilitate the use of locally available agricultural products
Indian Experience	<ul style="list-style-type: none"> • Mechanization of pulses production at farm level will go a long way in problem evaluation • Farmers will be self-reliant in fish feed production for sustainable fish farming in Kenya • The machine to be adopted from India will include; Tractor drawn rotavator, Tractor drawn planter, manually operated wheel hoe and hand-operated knapsack sprayer. • Mulch use coupled with drip irrigation during short rains season will be adopted for the crop farming throughout the year
Place	<ul style="list-style-type: none"> • The proposed Mechanization innovations learned from India will be demonstrated in National Aquaculture Development Centre - Sagana (NADC-Sagana) Kenya. The centre incubates new Technologies and disseminates it to the whole Republic of Kenya.
Target Group	<ul style="list-style-type: none"> • Hatchery operators, organized group of famers, individual farmers, County extension services staff, students (from tertiary institutions, secondary and primary schools)
Duration	<ul style="list-style-type: none"> • 3 years
Expected end result	<p>Increased fish production, increased farmers income and improved food security in the country.</p>
Other Information	<ul style="list-style-type: none"> • The NADC-Sagana has a tractor and mouldboard plough, Fish feed pelletizer. Additional machines will facilitate pulses farming mechanization.

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Activity	1. Land development for increasing agricultural productivity
Problem	<ul style="list-style-type: none"> • The government of Kenya has embarked on many irrigation project to improve agriculture production. • The project being constructed is for surface irrigation. • Not all the area in the projects are under used as a result of none leveling of the fields.
Indian Experience	<ul style="list-style-type: none"> • Suitable land development machinery available • for precision leveling ,laser land leveler is very suitable for use in various irrigation schemes being developed by Kenya government
Place	<ul style="list-style-type: none"> • Oluch-kimira, kwale, migori,Turkana • Tana –Kulalu-is a major govt. flagship project in vision 2030
Target Group	<ul style="list-style-type: none"> • Small farmers in the various small schemes • Government of kenya
Duration	5 years
Expected end result	<ul style="list-style-type: none"> • Increased land put under agriculture production • Increased agriculture productivity • Increased income for farmers • Food security for the country • Improve standard of life
Other Information	<ul style="list-style-type: none"> • Required support and collaboration from the government of India in terms of financial support and human skill

Activity	2. Design and Development of motorized Coconut Grater
Problem	<ul style="list-style-type: none"> • Coconut is widely grown in the coast region of Kenya • The crop is processed to obtain virgin coconut oil (VCO) which fetches high price • In processing, the coconut flesh has to be grated. • A traditional tool called “mbuzi” which has a lot of drudgery is used.
Indian Experience	<ul style="list-style-type: none"> • Mechanization solutions are offered through value chain of various crops. In order to improve the farm income.

	<ul style="list-style-type: none"> • The problems in mechanization ones identified is researched on and design and development solution are made. • Prototype are developed and tested and ones accepted and innovations is commercialized.
Place	<ul style="list-style-type: none"> • The place will be in the coastal region of Kenya. • The centre will be at the agriculture technology development centre (ATDC) Mtwapa. • The centre is mandated to develop and test appropriate farm machinery.
Target Group	<ul style="list-style-type: none"> • Small farmers in the various small schemes • Government of kenya
Duration	3 years
Expected end result	<ul style="list-style-type: none"> • Mechanized package for coconut agro processing • Increased income • Improved standard of living of farmers in the coastal area
Other Information	<ul style="list-style-type: none"> • Design and fabrication of prototype for commercialization to be done in collaboration CIAE

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Activity	PRESSURIZED IRRIGATION
Problem	<ul style="list-style-type: none"> • Water scarcity for crop cultivation as well as for both animal and human • Inefficient water harvesting and utilization • Food scarcity
Indian Experience	<ul style="list-style-type: none"> • Pressurized and efficient irrigation technologies have been deployed at many places, which need less water for crop production • Use the sprinkler irrigation system • Drip irrigation systems • This technology is used for: <ul style="list-style-type: none"> • Plastic mulching techniques • Conservation agriculture technologies
Place	<ul style="list-style-type: none"> • KENYA
Target Group	<ul style="list-style-type: none"> • FARMERS-SMALL SCALE&LARGE SCALE
Duration	Two Years: 2017-19
Expected end result	<ul style="list-style-type: none"> • INCREASED WATER EFFICIEENCY • INCREASED AREA OF IRRIGATION • INCREASED ANIMAL FEEDS
Other Information	<ul style="list-style-type: none"> • OUTREACH PROGRAMMES • Other machinery such as twin wheel weeder, plastic mulch laying machine, seed-cum-fertilizer drills also needs to be promoted among farmers for timeliness of farm operations • Since farmers in Kenya are resource poor, assistance from government will be required for promotion of these technologies

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Activity	Farm Mechanization For Smallholder Farmers of Liberia (FMSOL)
Problem	<ul style="list-style-type: none"> • Farmers are not educated and so they find it difficult to operate the machines. • Land Tenure systems prevent large farm holdings. • The debris from cleaning, stumping and logs poses an obstacle to mechanization. • Spare parts are not available locally. • There is inadequate manpower to service the implements and machines in Liberia. • Farmers are too poor to be able to buy the expensive machines. This makes mechanization too costly to practice in Liberia. • Farmers cannot effect repair when there is a breakdown.
Indian Experience	<ul style="list-style-type: none"> • We the executives of Liberia, have discovered that each small farming unit has at least one tractor, plough, rotavator, disc harrow, seeds-cum-fert drill and postharvest machine. Beside that, technologies and innovations in agricultural are major priorities in India.
Place	Grand Bassa County, Bong County, Margibi and Nimba County, Republic of Liberia.
Target Group	<ul style="list-style-type: none"> • Smallholder farmers in; cassava, corn, coconut, rice, potatoes, yam, sugarcane, Plantain, banana and vegetables.

Duration	One to five years periods.
Expected end result	<ul style="list-style-type: none"> • This can referred to how we are going to closely work with our government, creams of the agricultural societies especially men and women who has make their marks in agriculture like Indian scientists, and other internal partners generate funds to find a possible ways of improving agriculture through mechanization in Liberia or our prospect of mechanization in Liberia within five years periods. • With the introduction of machines which will suit the nature of crops and types of soil in our environment like: • tractor, bulldozer, cassava processer, coconut processor, mobile primary processer unit, raised bed planter, light weight power tiller, self-propelled power weeder, power operator paddy thresher, multi-crops thresher, multi-grain mill, vegetable trans -planter, inclined plate planter, self-propelled rice planter, sugarcane planter and harvester, and automatic sprayer. • We strongly believe that there will be agricultural transformation in: yields, productions, storage facilities, transportations, postharvest handling, soil and water management, mechanization to commercialization of farmers produce, enhancement of farmers income generational changes, reductions of food insecurity and poverty will alleviation will exist in Liberia.
Other Information	<ul style="list-style-type: none"> • In conclusion to the above problems of agriculture in our localities, experiences of Indian innovations in the various agricultural sectors, expected results, our target groups, project duration ,other information's and suggestions that are needed to be provided, we conclude the following; • Farmer's co-cooperative societies will be establish and supported to pool resources together to buy machines for their members. • Machines should be developed locally to suit the nature of crops and types of soil. • If Indian government ready want to makes the different in our country, then we suggest that avenue be created for more personnel to be trained to repair, operate and maintain machines in Liberia • We will recommend to our government that agro-service centres should be established in the rural areas to make tractors available to farmers at a cheaper rate. • We apologized that USAID and the India government to please provide subsidies or funding to support our project so that we can establish farm machinery and post -harvesting hiring units for smallholder farmers to enhance productivity in Liberia. • Bank should give enough capital to serious farmers who cannot afford the collateral for the purchase of machines.

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Activity	FARM MECHANIZATION FOR RICE PRODUCTION IN MALAWI
Problem	<ul style="list-style-type: none"> • For rice production we still depend on man power. • There is enough animal population but not suitable animal drawn machinery. • Government provides animals with low cost but there are no any animal drawn machines for rice production.
Indian Experience	<p>We have seen a lot of animal drawn and manual operated machinery are available in India for rice production for land and seed bed preparations</p> <ul style="list-style-type: none"> • Improved Bakhar • Patela harrow • Patelapuddler • For sowing • Paddy drawn seeder • Manual Rice transplanter • Weeding • Conoweeder • Power weeder • Harvesting • Self-propelled • Vertical conveyor reaper • Threshing equipment • Pedal operated thresher
Place	<ul style="list-style-type: none"> • Salima, Malawi
Target Group	<ul style="list-style-type: none"> • Small farmers interested in rice production
Duration	3 years
Expected end result	<ul style="list-style-type: none"> • Mechanization package for rice production • High yield of Rice • Drudgery will be reduced • Saves time • Reduce cost of operation
Other Information	<p>In order to achieve farm mechanization in Rice production in Malawi, the following are supposed to be followed:</p> <ul style="list-style-type: none"> • Conduct trainings for the farmers • Formation of Farmer clubs and Associations • Custom hiring centres • Demonstration of different available suitable machinery for Malawi

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Activity	Farm mechanization and uses of hand tools
Problem	<ul style="list-style-type: none"> • Drudgery and un-timeliness operation mainly in weeding due to small farm tools. • Majority of farmers in Malawi use hand tools such as hoes for cultivation. Ensuring timeliness weeding within the critical period of the maize crop, becomes difficult because of drudgery and scarcity of labour during peak agriculture seasons. This results into low production.
Indian Experience	<p>During the farm mechanization training in India, I have learnt about the benefits of using farm equipments. Because;</p> <ul style="list-style-type: none"> • It reduces drudgery as well as the cost of cultivation. • There is timeliness of agricultural operations. • It facilitates conservation and sustainable agriculture while improving the livelihood opportunities, income and environmental sustainability. • It enhances productivity. <p>By using intervention of Twin Wheel Weeder in Maize Crop:</p> <ul style="list-style-type: none"> • As one way of improving timeliness weeding in Malawi, I would like to introduce the use of twin wheel weeder using some approaches I have learnt from India training “farm mechanization for small holder farmers.”
Place	<ul style="list-style-type: none"> • The project will be implemented in group Dzomodya area in Neno District.
Target Group	<ul style="list-style-type: none"> • Implementation of Twin wheel weeder among interested men and women farmers (Will start with 30 farmers).
Duration	<ul style="list-style-type: none"> • Ongoing project from May – to October, 2017: The farmers will be trained in Maize Production and the importance and use of twin weeder equipment. • From December 2017 to April 2018, will be the implementation of Twin Wheel Weeder in the fields, conduct field days and monitoring of the project.
Expected end result	<ul style="list-style-type: none"> • One farm mechanization group of at least 30 farmers will be trained.

	<ul style="list-style-type: none"> • Increase in maize production (yields) as well as Income of the existing farmers. • Farm mechanization group will be able to reach 50 individual farmers through custom hiring. • Increase in no. of farmers involved in Farm Mechanization.
Other Information	<ul style="list-style-type: none"> • The requirement of Twin Wheel Weeder (Total 20) from government of India for group of farmers to learn the benefits. • The targeted farmers will be identified through awareness meeting on farm mechanization in the area and registering of interested farmers. • Project replicated in at least 4 groups in the successive years. • The group will have a custom hiring centre so that other farmers can also be benefited. • The group will have different types of farm equipment's used in maize production. • The group will have agro-processing equipment's and centre as an income generating activity.

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Activity	Sowing Interculture & Threshing of Rice and Maize Maize-Legume, Rice-Rice are major cropping systems of Malawi with 60 % of women in all activities
Problem	<ul style="list-style-type: none"> Improved hand tools and women friendly equipment are not available Lack of available hand tools and equipment , a lot of drudgery on farmers which takes much time for farm operations
Indian Experience	<ul style="list-style-type: none"> Mechanization in rice cultivation has taken roots in India, hence, increasing production. More tools and equipment have to be introduced in all aspects as far as Agripreneurship in women is concerned. Malawi Government should introduce and procure these improved tools and equipment's in order to meet farmers demand as we depend much on agriculture.
Place	<ul style="list-style-type: none"> Cluster villages namely Gojo, Kane, Lufaneti and Mchiwi in Mulanje district southern part of Malawi
Target Group	<ul style="list-style-type: none"> Small scale farmers club (20 clubs with 15 members each in total 300 farmers)
Duration	3 years (November, 2017-october, 2020)
Expected end result	<ul style="list-style-type: none"> Ultimate developed of cluster villages in respect to rice cultivation which will be beneficial to other parts of the country. Increase in area under rice and maize cultivation. High yield will be obtained. Surrounding Communities will benefit after the intended duration because it will be a pass on. Knowledge transfer to fellow extension workers.
Other Information	<ul style="list-style-type: none"> Sincerely hope that government of India through Malawi Government will help us in procurement other Improved machinery in all crops in order to achieve rural live hoods.

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Activity	Mechanization of Maize Cultivation in Mongolia
Problem	<ul style="list-style-type: none"> • Summer duration shorter in nature. • Maize is only livestock feed. • Don't have irrigation system. • Don't have mechanization in maize crop
Indian Experience	<ul style="list-style-type: none"> • During this training, I have learnt about seed bed preparation, planting, intercultural and weeding, and harvesting machineries in India which is suitable to farmers for maize mechanization in Mongolia. • The introduction of mechanization package for maize crops in Mongolia which is suitable to commercial farmers.
Place	<ul style="list-style-type: none"> • The implementation of mechanization package for maize crops will be conducted in Selenge Province, BaruunkharaaSoum.
Target Group	<ul style="list-style-type: none"> • Total 15 farmers (10 men and 5 women) in Selenge Province, BaruunkharaaSoum up to 30 ha.
Duration	<ul style="list-style-type: none"> • The duration of this project from 2017 to 2020.
Expected end result	<ul style="list-style-type: none"> • Maximum crop yield by intervention of maize mechanization packages. • More feed stock available for livestock. • Training and demonstration to the farmers for better experience on the use of mechanization package for maize production technology.

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Activity	Zero Tillage Agriculture Machine Utilization for Small Farmers in Mongolia
Problem	<ul style="list-style-type: none"> • Cultivated soil is small, the rest is hard pan. • Low rainfall in the country as a result there is low soil machine in the fields. • The traditional cultivation causes soil erosion. • Resolution of investment problem.
Indian Experience	<ul style="list-style-type: none"> • During this training, I have learnt about the zero tillage agriculture machine in India which is suitable to small farmers along with soil conservation. • Than the introduction of zero tillage machine in Mongolia which is suitable to commercial farmers. • Introduction of zero tillage machine along with 25 hp tractor is needed.
Place	<ul style="list-style-type: none"> • The implementation of zero tillage agriculture machine will be conducted in Selenga province Baruunkharaa sum Zundui's area
Target Group	<ul style="list-style-type: none"> • Total 20 farmers (15 men and 5 women) in "NyamBaigalDavaa" LLC
Duration	<ul style="list-style-type: none"> • The implementation will start from 2017 to 2020.
Expected end result	<ul style="list-style-type: none"> • Minimum soil erosion and maximum crop residue incorporation in soil. • High production of crop, with low energy input. • Training and demonstration to the farmers for better experience on the use of zero tillage machine/technology.
Other Information	<ul style="list-style-type: none"> • The project might be started with necessary budget loan and technology support from Indian Government

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Activity	Micro Irrigation System for Small Farmers in Mongolia
Problem	<ul style="list-style-type: none"> • Land is undulated. • No drainage system available. • No electricity available for pumping.
Indian Experience	<ul style="list-style-type: none"> • During this training, I have learnt about the land leveller machine and micro irrigation system in India which is suitable to level farmers' field along with soil conservation. • Than the introduction of laser land leveller and micro irrigation system in Mongolia which is suitable to commercial farmers. • Introduction of Laser Land Leveller along with 80 hp tractor is needed. • Introduction of micro irrigation system which is suitable to Mongolian farmers
Place	<ul style="list-style-type: none"> • The implementation of Laser Land Leveler and Micro Irrigation System will be conducted in Dornod Province KhalkhGol area.
Target Group	<ul style="list-style-type: none"> • Total 10 farmers (7 men and 3 women) in Dornod Province KhalkhGol area.
Duration	<ul style="list-style-type: none"> • The duration of this project from 2017 to 2018.
Expected end result	<ul style="list-style-type: none"> • Maximum use of available water. • No water being available to weeds. • Maximum crop yield. • Training and demonstration to the farmers for better experience on the use of Laser Land Leveller and Micro Irrigation System technology.

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Activity	Mechanization for Cereals, Pulses and Vegetables
Problem	<ul style="list-style-type: none"> • Use of human power in most of the operations during the cultivation and post-harvest of maize, rice, groundnut and vegetables.
Indian Experience	<ul style="list-style-type: none"> • A lot of experience in manufacturing simple and affordable machinery for small farmers • Transfer of technology to small farmers • Training of small farms and stakeholders • Acquire some (small) machines from India to benefit family sector farmers • Share technologies and machinery to Extension officers, research institutions, entrepreneurs and small farmers • Identify other machinery that does not exist in Mozambique and include them in the Mechanization Policies and Programs of the Government • Coordinate with the Agriculture Development Fund (FDA) and enterprisers to promote the trade of bigger to benefit private sector farmers • Promote local manufacturing of machinery
Place	<ul style="list-style-type: none"> • Maputo, Gaza and Inhambane Provinces
Target Group	<ul style="list-style-type: none"> • Trainings: Technologies officers and Extension Supervisors • Machinery: Small farmers associations
Duration	2018 – 2020
Expected end result	<ul style="list-style-type: none"> • Reduced time of operations, giving producers time to do another activities • Reduced post-harvest losses and improved final quality produce • Trained 7 Technologies Officers, 18 Extension supervisors, 144 Extension Officers and 90 Stakeholders • Benefited 5400 small farmers with some production and agro-processing machinery

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Activity	Mechanization for Cereals, Pulses and Vegetables
Problem	<ul style="list-style-type: none">• Use of human power in most of the operations during the cultivation and post-harvest of maize, vegetables and groundnut.
Indian Experience	<ul style="list-style-type: none">• Long experience in manufacturing simple and affordable machinery for small farmers• Transfer of technology to small farmers• Training of small farms and stake holders <p>Solutions/innovations:</p> <ul style="list-style-type: none">• Acquire some (small) machines from India to benefit Family sector farmers• Share technologies and machinery with Extension officers, research institutions, entrepreneurs and small farmers• Coordinate with the Agriculture Development Fund and enterprisers to promote the trade of bigger machines to benefit Private sector farmers• Promote local manufacturing of machinery
Place	<ul style="list-style-type: none">• District of Magude
Target Group	<ul style="list-style-type: none">• Trainings: Extension officers and stakeholders• Machinery: Small farmers associations
Duration	2018-2020
Expected end result	<ul style="list-style-type: none">• Reduced time of operations, giving producers time to do another activities• Reduced post-harvest losses and improved final quality produce• Trained 8 Extension Officers and 15 Stakeholders• Benefited 900 small farmers with some production and agro-processing machinery

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Activity	Establishment of Rain Water Harvesting Structure & Micro Irrigation system for Vegetable Production in Covered Cultivation
Problem	<ul style="list-style-type: none"> • Inefficient rain water harvesting equipment's and its utilization • Unreliable rains due to climate change • Limited supply of vegetables compared to the market demand especially during dry season • Pest and disease attack is common in open cultivation hence low quality and quantity of vegetable
Indian Experience	<p>The following technologies should be adopted:</p> <ul style="list-style-type: none"> • Construction of dam for rain water harvesting structure from the roof of houses • Popularization of micro irrigation system for vegetable production • Tractor operated/manual ridger for water management. • Tractor operated/plastic mulch layer for water management.
Place	Bukalasa Agricultural College
Target Group	Student and Community especially Women and Youth
Duration	3 Years
Expected end result	<ul style="list-style-type: none"> • At the end of the project; • Vegetable production will increase by 30% • Cases of malnutrition among children and expecting mothers will reduce by 20% • Income status of the community especially women and youth will increase by 15-20%
Other Information	<p>Following are locally available resources from the institute:</p> <ul style="list-style-type: none"> • Tractor and disc plough • One hectare of land • Human resource for starting the project

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Activity	<ul style="list-style-type: none"> Promotion and use of women friendly technologies Promotion and use of covered cultivation technology in production of vegetables
Problem	<ul style="list-style-type: none"> Due to lack of mechanization and women friendly machines, women are mostly using manually operated tools like hand hoe for all the field operations Due to scarcity of labour, farmers are not able to do farm operations timely, thereby reduced production and productivity In Uganda (luweero district) 80% of the agricultural production comes from small scale farmers There is low production of vegetables due to lack of improved technologies, the production methods is still poor and production is mainly done in open fields depending on rain fed water Limited access to affordable machines and technologies Inadequate knowledge in farm mechanization
Indian Experience	<ul style="list-style-type: none"> From this training, I learnt about women friendly tools and equipment to reduce drudgery in farm operations and use of greenhouse technologies and plastic mulching materials to improve the production of vegetables
Place	Luweelo district, Uganda
Target Group	<ul style="list-style-type: none"> Vegetable farmers, Rural women groups and small scale farmers
Duration	Three years: May 2017 - April 2020
Expected end result	<ul style="list-style-type: none"> New employment opportunities for woman with reduced drudgery Increased food and vegetable production Reduction in poverty level
Other Information	<ul style="list-style-type: none"> Since farmers in Uganda has limited resources, the technologies/equipment required for this activity need to be funded by the Government agencies. For success adoption of new technologies the farmers need skill development for operation and maintenance of new machines/equipment Training of extension personnel's is required for successful transfer of technologies to the farmers For development of new technologies establishment of new research centres is required

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Activity	Introduction of New Mechanization Technologies for Maize Cultivation among Women Farmers in Uganda
Problem	<ul style="list-style-type: none"> • Land preparation is mainly done manually by hand hoe, which is labour intensive, time consuming operation and involves a lot of drudgery • Most of the farmers use broadcasting method for planting maize, which leads to seed wastage and uneven plant population resulting in low yields • Weeding in maize is also mainly done by hand hoe, which is a slow, labour intensive and drudgery prone operation • After harvesting, maize shelling is done by hand, which is a slow and injury prone process as well
Indian Experience	<p>A lot of low cost manually operated and animal operated equipment can be used in Uganda for mechanization:</p> <ul style="list-style-type: none"> • Use of animal drawn ox-plough and clod breaker for land preparation • Use of manual/3-row animal operated inclined planter for planting maize • Use of twin wheel weeder for inter-cultural operations in the maize fields. • Use of Tubular Maize Sheller for separating of dry maize kernels from cob.
Place	SERERE DISTRICT, EASTERN UGANDA
Target Group	WOMEN AND SMALL FARMERS
Duration	3 YEARS
Expected end result	<ul style="list-style-type: none"> • Timeliness in farm activity will be ensured, which will lead to increased yield • Reduced seed wastage and improved crop establishment for subsequent field operations • Reduced drudgery among the women farm workers in different field operations • Reduced injuries during maize shelling

ANNEXURE IV: FEEDBACK

**Feed The Future India Triangular Training (FTF ITT) Programme
“Farm Mechanization for Small Farmers” for Executives from Africa and Asian Countries
11-25thApril, 2017at ICAR-Central Institute of Agricultural Engineering (CIAE), Bhopal, Madhya Pradesh, India**

Executive Feed Back

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Avg
		Afghanistan	Botswana			Ghana		Kenya			Liberia		Malawi			Mangolia			Mozambique			Uganda			
1	Pre-Training Test. – Dr. PS Tiwari, Head, AMD, ICAR- CIAE, Bhopal	8	10	10	9	8	9	8	5	2	9	9	9	10	9	10	9	10	10	10	10	10	7	10	8.74
2	Planning and Land Development for Small Farms.- Dr.Ramadhar Singh, PS, IDED, ICAR- CIAE, Bhopal	9	10	8	8	9	10	9	7	8	9	10	9	9	8	10	9	10	10	10	9	8	9	10	9.04
3	Strategies for Promotion of Small Farm Mechanization in African & Asian Countries. - Dr.Surendra Singh, Technical Advisor,AMMA, India	9	10	8	10	9	10	9	8	9	8	10	9	10	9	10	8	10	9	10	9	10	10	10	9.3
4	Over View of CIAE & Campus Visit - Dr. PC Bargale, Head, TTD. - Dr AC Saxena, PS, ICAR-CIAE, Bhopal	8	8	8	9	10	9	8	6	6	9	10	8	10	10	10	10	10	10	10	10	10	10	10	9.09
5	Mechanization of Millets Production and Its Primary Processing. - Dr. KP Singh, SS, AMD, ICAR-CIAE, Bhopal	8	8	8	10	9	9	7	5	7	10	10	9	10	9	10	9	10	10	9	10	8	9	10	8.87
6	Mechanization of Maize and Sorghum Cultivation. - Dr B. M. Nandede, Scientist AMD, ICAR-CIAE, Bhopal	8	8	8	7	10	9	9	5	9	9	10	9	10	10	10	9	10	9	9	10	8	8	10	8.87
7	Agricultural Machinery Manufacturing – Sector in India & Its Potential for African & Asian Countries. - Dr.Surendra Singh, Technical Advisor, AMMA, India	9	9	9	9	9	10	8	7	6	9	10	9	9	7	10	10	10	10	10	9	10	7	10	8.96
8	Mechanization of Pulse and Oilseed Production. - Dr P. S. Tiwari, Head, AMD, ICAR-CIAE, Bhopal	9	9	8	10	9	9	8	6	8	8	10	9	9	8	10	10	10	10	10	9	9	8	10	8.96
9	Calibration, Operation & Repair Maintenance of Seed Drills and Planters. Dr NS Chandel, Scientist AMD, ICAR-CIAE, Bhopal	8	8	9	8	9	9	8	6	10	8	10	8	9	7	10	10	10	8	9	9	5	7	10	8.48

10	Visit to ITC, e-Choupal, Vidisha&manufacturers of 9Farm Machinery, Dr. NS Chandel, Dr.ChetanSawant, Er. Ramesh Sahani, Er MB Tamhankar,Er. AP magar	7	6	9	10	9	10	8	9	8	9	10	9	10	10	10	10	10	8	9	9	10	9	10	9.09
11	Animal Operated Farm Machinery. - Dr. M. Din, PC, UAE	8	8	8	5	8	9		6	8	8	10	8	10	8	10	10	10	8	10	9	10	7	10	8.88
12	Farm Machinery for Small Farms in African & Asian Countries. - Dr.Gyanendra Singh, Ex-ADG [Engg], ICAR	10	10	10	6	10	9	9	9	9	7	10	10	10	9	10	10	10	10	10	9	10	7	10	9.3
13	Practical / Demonstration of Tools and Machinery Related to Millet, Maize, Rice, Wheat and Sorghum Production System. - Dr. KP Singh, SS, Dr. Manoj Kumar (FMP), Scientist, ICAR-CIAE, Bhopal	8	8	9	9	8	10	9	7	10	10	10	9	10	10	10	10	10	7	10	10	10	7	10	9.17
14	Energy Gadgets for Small Farms - Dr. KC Pandey, PC, EAAI	8	10	8	4	9	9	8	7	9	9	10	9	9	9	10	10	10	9	8	9	9	8	10	8.74
15	Status of Small Farm Mechanization in Asia and Africa. -Dr CR Mehta, PC, FIM	8	8	8	9	9	9	9	7	4	9	10	9	9	9	10	10	10	8	10	9	10	7	10	8.74
16	Ergonomics & Safety in Agriculture and Women Friendly Technologies -Dr. L. P. Gite, Ex-PC, ESA; Er. SweetiKumari, Scientist, ICAR-CIAE, Bhopal	8	7	9	10	9	8	10	8	10	10	10	8	8	9	10	10	10	9	8	9	10	10	10	9.13
17	Economics and Energetics of Agricultural Machinery. - Dr. RS Singh, PS, AMD, ICAR-CIAE, Bhopal	8	6	9	8	8	9	9	6	10	9	10	10	8	8	10	10	10	8	5	8	10	7	10	8.52
18	Covered Cultivation Technologies for Small Farmers. - Dr. KVR Rao, PS, IDED, AMD, ICAR- CIAE, Bhopal	9	8	8	9	8	10	9	7	10	10	10	10	10	10	10	10	10	9	9	9	10	10	10	9.35
19	Visit to Central Farm Machinery Training & Testing Institute & (CFMT&TI), Budni&Eicher Tractors, Mandideep - Dr NS Chandel, Er. MB Tamhankar, Dr.AshutoshPandirwar, PP Ambalkar	9	8	10	10	9	10		10	10	10	10	8	10	10	10	10	10	10	10	10	10	10	10	9.88
20	Farm Machinery Management for Small Farms. - Dr. CR Mehta, PC, FIM	8	10	10	9	9	7	8	9	7	9	10	9	7	8	10	10	10	10	8	9	10	6	10	8.83

32	Visit to a CIAE Adopted Village Kachhibarkheda to Demonstrate Impact of CIAE Intervention for Mechanization – Interaction with Farmers. - Dr RS Singh, PS, AMD; Er. DK Diwedi, ICAR-CIAE, Bhopal	9	8	5	4	7	8	8	5	10	10	10	10	10	9	10	10	10	8	8	10	9	9	10	8.57
33	Small Farm Mechanization through Custom Hiring of Agricultural Machinery - Case Studies. - Dr. U.R. Badegaonkar, PS, ICAR-CIAE, Bhopal	9	10	8	6	8	7	8	7	9	9	10	9	9	7	10	10	10	9	9	10	10	4	10	8.61
34	Mechanization of Orchard Production for Small Farms. - Dr. BB Gaikwad, Scientist, AMD, ICAR- CIAE, Bhopal	8	9	7	5	8	8	8	6	6	10	10	10	10	7	10	10	10	9	9	10	10	5	10	8.48
35	Mechanization of Vegetable Production for Small Farms. - Dr. AP Magar, Scientist, AMD, ICAR- CIAE, Bhopal	8	9	7	7	7	10	9	8	9	10	10	10	10	8	10	10	10	10	9	9	10	10	10	9.13
36	Technologies for Post-Harvest and Value Addition for Small Farms. - Dr.NachikatKotwaliwale, Head, APPD, ICAR-CIAE, Bhopal	9	9	8	7	7	7	10	9	9	10	10	10	10	8	10	10	10	10	10	10	10	10	10	9.26
37	Practical on Soybean Processing & Utilization. - Dr. SS Despande, PS, CESPU, ICAR-CIAE, Bhopal	9	9	9	8	5	9	9	10	8	10	10	10	10	9	10	10	10	10	10	10	10	10	10	9.35
38	Post Training Test. - Dr. PS Tiwari, Head, AMD, ICAR-CIAE, Bhopal	9		8	8	7		9	8	10	10	10	10	10	9	10	10	10	10	8	10	10	9	10	9.59
39	Back at Work Plan		9				9		9	10		10	9	10	8	10	8	6	10	10	10	10	8	10	9.15
40	Food Facility	8	8	7	7	5	7	10	8	10	10	10	10	8	10	10	7	9	7	10	10	10	10	10	8.74
41	Accommodation Facility		9	7	6	6	10	10	8	10	10	10	10	10	9	10	8	10	9	9	10	10	10	10	9.14
42	Transport Facility	8	6	6	6	4	8	6	5	10	10	10	10	10		10	10	7	8	7	10	9	7	10	8.67
43	Overall Impression about Training Progam	9	9	8	7	7	9	10	7	9	9	10	9	10	10	10	10	10	10	10	10	10	9	10	9.22

ANNEXURE V: PRE AND POST TEST

**Feed The Future India Triangular Training (FTF ITT) Programme
International Training Program on “Farm Mechanization for Small Farmers”
for Executives from Africa and Asian Countries
11 - 25th April 2017 at ICAR-Central Institute of Agricultural Engineering (CIAE)
Bhopal, Madhya Pradesh, India**

Pre and Post Training Test Evaluation Report of FTF ITT Programme

Sl. No.	Executive name-Country	Post Test Score (Max 25 Marks)	Pre-Test Score (Max 25 Marks)	Gain Score (Post-Pre Scores)	Gain Percentage
1	Mr. Wesal Mohammad Qasim, Afghanistan	21	7	14	56
2	Mr. Omid Farhad, Afghanistan	21	7	14	56
3	Mr. OtisitsweThapelo, Botswana	20	17	3	12
4	Mr. DintweRebaone, Botswana	20	18	2	8
5	Mr. Modikanele Alpha, Botswana	20	17	3	12
6	Mr. Barakah Nana Kuuku, Ghana	16	7	9	36
7	Ms. AtchuloAzara, Ghana	18	17	1	4
8	Mr. Opar SamwelOdooyo, Kenya	18	16	2	8
9	Ms. Wangila Catherine Namboko, Kenya	21	11	10	40
10	Mr. Macharia Simon, Kenya	16	8	8	32
11	Mr. Paye Archie S, Liberia	14	5	9	36
12	Mr. Woods Basie Konah, Liberia	16	10	6	24
13	Ms. Muhama Constance, Malawi	21	14	7	28
14	Mr. Chiomba Mathews Mike, Malawi	17	9	8	32
15	Ms. Kalinga Charity, Malawi	21	13	8	32
16	Mr. TserenpilZundui, Mongolia	17	5	12	48
17	Mr. NarankhuuKhurts, Mongolia	17	6	11	44
18	Mr. SanjaaGochoosuren, Mongolia	17	9	8	32
19	Mr. Danca Jose Manuel Jose, Mozambique	17	11	6	24
20	Mr. NovidadeCiro Alexander Matlaba, Mozambique	19	7	12	48
21	Mr. Oluka William, Uganda	19	17	2	8
22	Mr. JaferAbubakar, Uganda	17	11	6	24
23	Ms. Nakitto Sarah, Uganda	21	7	14	56
	Average Score	18.43	10.83	7.61	30.4

