Cotton Technical Assistance Programme For Africa

Strengthening the Value Chain

Training Programme on

"Modern Cotton Production Technology"

22 October 2012 – 3 November 2012

Central Institute for Cotton Research (CICR), Nagpur, India

Government of India

Programme Implementing Agencies

Directorate of Cotton Development (DOCD)

Central Institute for Cotton Research (CICR)

Central Institute for Research on Cotton Technology (CIRCOT)

IL&FS Cluster Development Initiative Limited

Background Note on the Programme schedule of Training Programme on Modern Cotton Production Technology

The Central Institute for Cotton Research (CICR) was established at Nagpur in 1976 under the aegis of Indian Council of Agricultural Research (ICAR), New Delhi. It has emerged as a pioneer in conducting basic and strategic research on various problems confronting cotton production in the country.

CICR has close linkages with Central Institute for Research on Cotton Technology (CIRCOT), Mumbai and Agricultural Universities located in the cotton growing regions of the India and Indian Agricultural Research Institute (IARI), New Delhi through its All India Coordinated Cotton Improvement Project and other collaborative research institutes (NBRI, Lucknow; NRI, UK; NCIPM, NCPB, NCFP etc.). The Central Institute for Cotton Research has trained large number of Indian and foreign scientists/extension personnel through a variety of programs on different aspects of cotton production.

A Training / capacity building of Master Trainers from the C-4 countries (Benin, Burkina Faso, Mali and Chad), Nigeria, Uganda and Malawi is planned under the Technical Assistance Programme for Africa with IL&FS Clusters, New Delhi as the Project Implementing Agency.

A. Objectives:

1. To orient the participants to the recent developments in cotton production and protection technologies

2. To provide the participants a hands-on experience of the technologies

B. Contents

Several changes in cotton production have taken place in the world. These include widespread cultivation of Bt cotton, development of resistance in cotton pest population, consumer preference for eco-friendly cotton, quality conscious buyers and call for sustainable agriculture. Insecticide resistance has emerged as a serious problem to crop protection programs world over, especially as a potential threat to pest management programs in cotton. After the introduction of Bt cotton, IPM perspectives have changed dramatically. To ensure sustainability of the powerful transgenic technology, it is imperative that the phenomenon of development of insect resistance to Bt toxins is understood properly. Breaking yield barriers is essential to improve productivity per unit area as well as lower cost of production. Newer concepts of agronomy have come out such as the high density planting systems. Further, developments in science and technology have paved the way for improved water and nutrient management.

The course would cover:

1) **Basic Introduction to GM Cotton -**

   The participants will be given an overview of the present status of cotton and the global scenario. Trainees will be introduced to GM cotton and our experience of a decade of GM cotton cultivation will be shared with the participants, the future scope of the technology and the various GM traits would be shared with the trainees.

2) **Basic principles of cotton breeding and seed production -**

   The principles of cotton breeding will be elucidated and the participants exposed to the cotton germplasm and the various species of cotton. Different stages of seed production, hybrid seed production both convention and male sterility based causes of genetic deterioration, genetic purity test etc. will be discussed.

3) **Crop production technologies, land preparation and tillage -**

   Recent concepts of tillage systems such as conservation tillage will be discussed. Calibration of planters, drills and their operation and maintenance will be demonstrated. Merits of conservation tillage implements like Zero-till-drill etc. will be discussed.

4) **Cropping patterns and weed management strategies -**

   Cotton is grown under diverse soil and climatic conditions. The trainees will be exposed to the different cropping patterns that have evolved traditionally and through research findings. New concepts of high density planting system of cotton will be showcased. Management of weeds is crucial during the first sixty days of the cotton crop. A number of weed management strategies – mechanical, cultural, chemical and biochemical (transgenic) for management of weeds will be presented.

5) **Water harvesting, soil and moisture conservation -**

   Rain dependent cotton experiences soil moisture stress. Hence in-situ water conservation, preparing small pond and storing rainwater for supplemental irrigation, use of mulch helps to sustain the cotton crop during the post rainy season. Participants will be given hands-on experience of water harvesting and soil and water conservation methods through field visits.

6) **Drip irrigation -**

   Drip Irrigation is an efficient method and substantial amount of irrigation water and fertiliser can be saved as the applied irrigation water and fertilizers is placed in active crop root zone and at frequent interval. The participants will be given exposure to this technology and information on calibration, designing, lay-out will be provided.

7) **Integrating science and management strategies for better plant health through integrated nutrient management (INM) & integrated pest management (IPM) -**

A sound nutrient management strategy should ideally provide the right quantity of different nutrient at the right time. Biological, chemical and integrated nutrient management strategies keeping both economic criteria & ecological dimensions will be discussed which will help in formulation of efficient nutrient management strategies. The trainees will also be exposed to different nutrient deficiency symptoms. Insect pest and disease management options available including bio-pesticides will be explained. Detection kits using molecular techniques will be demonstrated.

8) **Identification of insects in the cotton ecosystem -**

Emerging and key pests of Bt cotton, their taxonomy and genetic diversity determination using molecular tools and their interactions with natural enemies in the ecosystems. Methods of scouting will be discussed. Latest approaches for insect pest scouting will be open for discussion. Insect adaptation to insecticides and Bt cotton, monitoring and the science of management will be discussed.

9) **Disease identification and management, basic principles of eco-sustainable pest management -**

The trainees will be exposed to major cotton diseases, prevalent in the cotton ecosystem across the country and the pre-disposing factors responsible for their incidence.

10) **Pesticide selection and application techniques -**

Trainees will be exposed to the principles being followed in India in choosing the appropriate pesticide in compliance with the tenets of IPM. Different pesticide application equipment including those developed at CICR will be demonstrated.

11) **Harvesting methods – machine picking, cleaning & storage -**

Different systems of cotton harvesting prevalent in the world, their merits, demerits and suitability under different farming situation will be discussed. Information on pre- and post-cleaning systems and storage for minimum contamination of produce will be provided. Timing and method of application of different harvest aid chemicals for machine picking and stripping will also be covered.

12) **Basic principles of plant transformation and biosafety issues -**

Agrobacterium tumetaciens mediated transformation techniques. The selection methods of the putative transformants in the tissue culture medium, their establishment in the soil rite pots, molecular confirmation of the transgenics by PCR,

Southern blotting techniques for the presence of the gene will be demonstrated. The biosafety experiments carried before the release of the transgenics will be narrated.

13) **Study tours -**

Study tours will be conducted to provide participants a hands-on experience of the various technologies.

- A decade of IRM in India will be showcased at Wardha. The scientific principles behind the strategies developed will be discussed. Benefits in terms of input costs, ecology and environment will be dealt with. Impact of IRM will be demonstrated.

- Visit to the seed production farm, a ginning and spinning unit is included.

- Visit to the Ginning Training Centre to demonstrate the HVI for fibre testing is scheduled.

- Participants will be introduced to the National Bureau of Soil Survey and Land Use Planning

14) **Field visits**

- Various primary and secondary tillage implements, bullock drawn as well as tractor drawn and planting equipment, their evaluation, testing and calibration will be demonstrated.

- Visit to the cotton germplasm and other crop production and protection technologies in the Institute farm will be conducted.

15) **Practical training**

- Practical exercises on seed viability tests and laboratory methods to detect seed purity will be done

- Rapid estimation of plant analysis will be demonstrated to test the nutrient status of the plant

- Methods to detect the soil health through various soil analytical methods will be provided

- Methods of lepidopteran and sucking pests rearing will be discussed and demonstrated. Precautions in insect rearing will be elucidated. Practical utility of such protocols will be discussed

- Protocols for testing of Bt plant parts using quantitative tests. Precautions and implications of the use of such kit will be explained. India's experience in patenting and commercialisation of these kits will be showed with the trainees.

C. Methodology:

The training programme is prepared to be an interactive one with the participants interacting with the faculty. Although the training programme proposes theoretical lectures; these would essentially be short lectures using AV aids. Emphasis would be given to exercises and group discussion at the end of each lecture. Exercises and practical sessions are also planned on the various topics. Field visits to the different demonstration plots and the Institute experimental plots will be a part of the training programme. Furthermore, participants will gain from two full day study tours to the ginning and spinning unit, a seed production farm as well as organic farms.

D. Participants:

The participants in the programme would include Production, Protection Scientists in government, private or NGO sector..

E. Duration and Dates:

The duration of the programme would be two weeks days. The programme would be held from 22 October - 3 November 2012.

F. Venue:

The programme would be held at Central Institute for Cotton Research (CICR) campus, Nagpur (India).