This Trainer’s Guide to the Organic Cotton Training Curriculum (OCTC) guides master trainers how to use the OCTC training materials and tools for training of farmer trainers (ToT). The Guide also includes a summary and overview of all OCTC modules’ key content and available tools and resources for farmers trainers and interested experts.

The development of OCTC was supported by GIZ and developed by FiBL in collaboration with OCA.
Imprint

The Organic Cotton Training Curriculum for India (OCTC) tools and trainer’s guide was written by FiBL, Research Institute of Organic Agriculture, Switzerland, [www.fibl.org](http://www.fibl.org).

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The development of the OCTC was supported by GIZ.

All training materials are available free of charge online on [https://www.fibl.org/en/shop-en](https://www.fibl.org/en/shop-en) and [https://www.organiccottonaccelerator.org/](https://www.organiccottonaccelerator.org/).

All information contained in this manual has been compiled by the authors to the best of their knowledge and considering input from various stakeholders and experts. Reasonable efforts have been made by FiBL and all partners to publish reliable data and information. The authors and publishers cannot assume responsibility for the validity of the materials. Neither the authors nor the publishers nor anyone else associated with this publication, shall be liable for any loss, damage or liability directly or indirectly caused by or alleged to be caused by the training curriculum and its tools.

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Background: The OCTC Project

The Organic Cotton Accelerator (OCA) is a multi-stakeholder organisation fully dedicated towards development of organic cotton sector. As a global platform, OCA is committed to bring integrity, supply security and measurable social and environmental impacts to organic cotton.

The aim of OCA’s GIZ funded project “Harmonised Organic Cotton Training Curriculum for India” in collaboration with FiBL, the Research Institute for Organic Farming, was to develop a harmonised curriculum for trainers and field facilitators. The tools and materials aim train field staff to conduct quality trainings for organic cotton farmers with the end goal of strengthening the on-farm impact of OCA’s Farm Programme.

The curriculum was developed in 2020 and 2021 using a participatory approach in 4 stages to develop materials that are fine-tuned to the needs of cotton projects.
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What is the OCTC and who is it for?

The Organic Cotton Training Curriculum (OCTC) is a harmonized training curriculum for field staff who train and support organic cotton farmers in India. It was designed to allow a flexible training approach, combining online self-study with physical workshops and field-exercises.

Key Features of OCTC

- Compiles harmonized up-to-date best practice for organic cotton smallholder production in India
- Simple & comprehensive; visual & easy to digest
- Technical level primarily for junior field staff; interesting best practices also for intermediate & senior staff
- Suitable for training of field staff in a flexible blended learning approach that can be adapted to training needs: online self-study, in combination with workshops & field training sessions
- Includes suggestions for participatory farmers training exercises to help field staff plan interesting farmer field activities.

It is envisaged that trainings of trainers take place on two levels: training of “master trainers” (senior organic project staff or consultant), who can then train teams of field staff (“farmers trainers”) working in organic cotton grower groups and projects.
The OCTC Guide and set of training materials can also be used by other actors who support organic cotton projects, e.g. consultants, governmental agencies, NGOs supporting organic cotton projects, market partners etc. for training of field staff or learning more about organic cotton.

OCTC Structure & Available Training Materials

The training curriculum is structured in 13 modules, which cover agronomic practices as well as additional aspects such as farme business, certification and training methodology.

This OCTC trainer’s guide provides an overview of key training content and field-based farmer training activities across modules as well as additional guidance for training of trainers.

For each OCTC Module the following materials are available:

- A training manual (slide deck) is the key resource in each module.
- A separate Farmers’ Field Training Activity Guide is provided for most modules to help field staff to conduct hands-on interactive field training activities with farmers.
Additionally, links to external resources may be provided in a library section of the module to support master trainers and field staff to dive deeper if needed.

**FOR FIELD STAFF: Using the OCTC Guide & Training Materials**

This guide serves as a course handout and summary across all modules. You can use it to refresh your memory on selected topics covered in your training or to gain an overview and know where to find more information.

- The table of content provides overview across all modules
- In chapter 1 you find a summary of organic cotton management practices and farmer field training activities along the season.
- In Chapter 2 you will find for each module an overview of available field training activities and resources, as well as a section-by-section brief summary of key content of the respective module.

Training Decks: This guide includes only a very small selection of key slides and content. You need to refer to the (separate) full training decks per module to access the complete content of OCTC on a specific topic.

The slide decks were developed for you, the trainer, and not directly for use in farmers training. However, a few selected slides may be suitable for input sessions on a topic before engaging in a related discussion or field activity. Some parts may be interesting for lead farmers.

Field Training Activity Guides for Farmer training (for modules 2 to 11). These separate documents provide a step-by-step description for some field training activities on the respective topic.

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**FOR MASTER TRAINERS: Using the OCTC Guide & Training Materials**

Use of this Trainers guide for planning trainings of Trainers

- Chapter 3 provides guidance on how to plan training for master trainers or field staff. See Annexes 2 & 3 for sample Training Plans
- In Chapter 2 you will find for every module in the blue shaded ToT guidance boxes suggestions, indicative times and options for using the OCTC materials in ToT trainings.
- Chapter 1 useful just for initial overview of recommended practices and farmers training activities along the season.

The OCTC training slide decks per module are your ready-to-use training resource for ToT training – and you can assign trainees to read selected training decks in self-study before the in situ training.
You can use a selection of field activities in the Field Activity Guides per module for ToT training. Adaptation may be needed to fit your specific ToT timing and setting - these are suggested for each module in chapter 2 (in the blue ToT boxes).

1. Cropping & Training Calendar Summary

A calendar-based approach can be particularly helpful for the field staff’s work with farmers after they have understood the content of all modules under the curriculum in this guide, the cropping calendar summary of recommended practices (module 10) is combined with suggested training activities (as included in Module 0) along the season and presented as first chapter for easy reference.
1.1 Summary: The Cotton Season in India

Cotton development takes place in different phases, which are roughly aligned with what is commonly referred to as the “early”, “mid” and “late season”.

**Overview Cotton Development**

Depending on the zone of India, the timing of the cotton season varies slightly, in addition to regional climatic variabilities within the zone. Most certified organic farms are in the Central Zone and Southern Rajasthan (same characteristics) and in the Eastern Zone in Orissa (monsoon sowing roughly one week before Central Zone). For an overview of cotton production in India, see Module 1.

Additionally, there are significant differences in the time of sowing even between farms in the same region, in particular the access to water for irrigation before the monsoon rains.

Most organic cotton farmers in India depends on the onset of the seasonal rains to sow their cotton, with potentially some supplemental irrigation after the rains. Only an estimated 10% of organic farms have access to “full irrigation” for “summer sowing”.

**Overview Crop Development CENTRAL ZONE**
Detailed cotton calendars for the Central and Eastern Zone can be found in Module 10.

For some organic projects, this means that the farmers in their group may have different cropping seasons, depending on their access to irrigation before the seasonal rains. It may be helpful to group farmers according to their season for training & field extension activities.

As cotton crop development is determined by the (varying) time of sowing, the OCTC mainly uses the common concept of “DAS”- Days after Sowing to indicate the crop development stage. E.g. 30 DAS means mid July if the seeds were sown in mid June with the rains. But for a farmer with irrigation who sowed in late May, 30 DAS is end of June.

Crop Calendar Farmer Training Focus This overview following provides a suggested focus on different OCTC modules/topics with farmers along the season

**Farmer Training Focus Along the Cotton Season**

The list of activities suggested for different phase of the season follows in the coming sections.
1.2 Summary: Preparation & Planting Cotton

Before the onset of the season in summer, the fields need to be carefully prepared for sowing organic cotton and intercrops.

2-3 Months Before Planting

- Before field preparation: Improved follow with green manure, crop or livestock grazing
- Rotation with leguminous crop/cereal in some availability allows
- Interrupts bollworm (esp. Pink BW) & sucking pests reproductive cycle
- Improves soil fertility & adds nitrogen to soil – much needed by the cotton crop
- Cultivars selected & seeds procured, GM lab analysis of seed batch.
- Union guaranteed: GM-free cultivars need to be pre-ordered, selection may have been much earlier
- CPR testing of seed batches (supplier or by the group)
- Organise seed distribution to farmers.

2-5 Weeks Before Expected Sowing Time

- Farmer has GM-free seeds ready
  - Be ripen forms as needed
  - Germplasm seeds
- Planning of other crops: backrow for trap crops, intercrops (e.g. alley cropping) & green manure
- Central India: April (summer sowing)
  - May (monsoon sowing)
- Basal application: aim for > 80-100 kg N
  - Esp. 4-5:1 (N:P:K), manure + phosphorus
  - Established manure + green manure

Once the rains start (or a few weeks earlier, if irrigation is available), the cotton seeds are prepared and sown in the fields. Organic seed dressing is recommended for good results and it is important to explain to farmers that timely sowing of seeds (not late!) is very important. More detailed guidance on planting, including timing and spacing → Module 3.
Important farmers training topics pre-season:

► GM-free Seeds & Cultivars (Module 2): selecting suitable varieties and making sure the seeds are not GM-contaminated.
► Land preparation & planting (Module 3)
► Soil fertility and nutrient management (Module 5)

Before the onset of the season and during the last weeks before planting, the following farmers training activities are particularly suitable, as described in the OCTC field activities guides for the respective modules.

Some Training Ideas PRE SEASON/OFF SEASON

Module 11: Farm Business

- EXE 11.1 Farm record keeping
- EXE 11.2 Profit & loss calculation
- EXE 11.3 Financial management
- EXE 11.4 Basic Analysis: Role of Women

Module 2: Seeds and Cultivars

- Farmers selection criteria for cultivars (EXE 2.1-A)

Module 5: Soil Fertility & Crop Nutrition

- EXE 5.3 Compost Making
- EXE 5.2 NPK Content of materials
- EXE 5.1 Exploring Soil
- Discussing importance of crop rotation
- EXE 5.4 Impediments to composting

Module 8: Crop Diversity

- EXE 6.3 Economic benefits of diversification
- EXE 6.4 Crop rotation planning

**Note:**
- EXE 11.1 **→** Activity described in detail in a OCTC Field Activity Guide (FAG), e.g.: **EXE 11.1: FAG Module 11 activity 11.1**
- Other important activities
1.2 Summary: Early Season

During the vegetative development stage, the seedlings emerge and develop roots.

First 14 DAS: Seedlings Emerge

MODULE 3: Planting
- EXE 2.1 (Part A): Benefits of Green manure
- Interculture/Weed control
- Discussing importance of intercrops and collecting ideas for field planting patterns
- Preparing a little nursery for gap filling

MODULE 5: Fertilization
- Testing if compost & manure is well-rotten OR EXE 5.3 FYM Compost
- EXE 5.3 Quality composting

MODULE 6: Pest Control
- EXE 6.1: Planning for trap cropping (push-pull)

Central India: Monsoon Sowing: Late June/Early July

- Gap Filling & Thinning
  - Gap filling with nursery plants or re-sowing
  - Thinning after 10d if necessary

- Regular In-field pest monitoring
  - Focus on sucking pests
  - Every 3-4 days, at least weekly
  - 1-2 sprays of Garlic-Onion-Chili

- Humus seedling around seedling

- Interfarms for harvest & fertilisation
  - Pigeon pea, millet, soybean, millet, and/or cover crop
  - And/or cover crop/green manure

- Trap or push crops (pest control)
  - Pigeon pea, sorghum, millet, cowpea, or maize

- And/or cover crop green manure
  - Attach benefits of inoculants to the crop

Organic Cotton Training Curriculum (OCTC) Trainer’s Guide 13
Vegetative Phase until 40-50 DAS: Plant & Field

- G. Arboreum: pruning needed at 3-4 ft
- 30 days after sowing: “earthing up”: for nitrogen mineralization, weed control and keeping moisture in the soil.
- Protective irrigation may be needed if there is a dry spell after sowing.
- 50-60 DAS: incorporate green manure or mow cover crops to use as mulch.
- Keeping field free of weeds during this stage is very important.
- Consider cover crops instead of crosswise hoeing. Though a few rounds manual weeding are needed, they protect from weeds later.

Vegetative Phase until 40-50 DAS: Plant Nutrition

- Top dressing at around 30 DAS: 1-1.5 t/ha compost with 90-70 kg rock phosphate OR 1-2 t/ha Vermi-compost
- Foliar Applications (30-60 DAS): 2 t/ha compost in intervals of 2-3 weeks
Important farmers training topics early season:

► continue discussing crop nutrient management with farmers (Module 5),
► start with pest & diseases management training, focusing on sucking pests (Module 6)
► stress the importance of crop diversity in organic farming (Module 8) to promote sowing green manures and intercrops.

Training Ideas EARLY SEASON (~ 0-50 DAS*)

1.3 Summary: Mid Season
During the reproductive development stage, the cotton plants square and flower. This phase is critical for good yields (see also Module 4: the cotton plant). Nutrient and water availability is critical.

Reproductive Phase Water, Soil, Intercrops

![Critical Window for water availability to the plant!](image)

**Critical Window for water availability to the plant!**

- OK in a normal monsoon season if crops planted with onset of rains
- But supplemental irrigation may be needed if there is mid-season drought.

Harvest intercrops when ready, Residues: Incorporate or compost!

(if not Yet done: now cover crops and use as mulch)

2. Top dressing at around 60-90 DAS
- 1-2.5t/ha compost
- mixed 50-70 kg rock phosphate
- OR 1-2t/ha Vermi-compost

1 – 2 foliar applications until 63-70 DAS
- Neem, Savanna and/or Vertiwash.

Whiteflies and other sucking pests continue to need monitoring and it’s important to advise farmers to start checking for bollworm moths, eggs and first larvae.

Reproductive phase: Pest Management

**Moth & Whiteflies:** Check moths in pheromone traps and number of whiteflies in yellow/blue sticky traps.

**Check for bollworms (moths, eggs, first larvae)**
- Pink BW & American BW, from about 30-80 DAS.
- Spotted BW, from about 80 DAS.

**Check your trap crops & destroy infested crops with pests!**

- Yellow traps for whiteflies
- Release of egg parasitoids against bollworms: Braconid parasitoids, Stegodyphus

**Cow Urine Sprays until about 80-90 DAS:**
- Preventive every other week – weekly if pests appear.
- Top ten or Neem: every 1-2 weeks if pests appear AND/OR Garlic-chill- onion or fermented butter milk.

**Important farmers training topics mid season:**
- Focus on pest management (module 6).
- Water management (module 7).
- Continue discussing the benefits of crop diversity.
1.3 Summary: Late Season & Harvest

**Maturity Phase: Water & Soil**

- **(Supplemental) Irrigation:** Very normally needed at this stage once rains have stopped. Moisture pressure during soil filling affects the fibre quality.
- **Flood Irrigation Very Inefficient:** Slightly better: Ridges & Furrow
- **Drip Irrigation Very Efficient & Recommended**
- **3rd Top dressing of nutrients by granular bio-fertilisers or compost granules would be ideal:**
  - For flood irrigation it may be possible to combine with irrigation.
  - Attention: slow movement! Botanical spraying can cause decoloration of cotton.

Also after harvest of intercrops - keep the soil covered as much as possible.
Important farmers training topics late season & after harvest:

► managing pests, in particular bollworms (Module 6),
► water management (Module 7),
► continue understanding the cotton plant (Module 4) and what affects yields, and to evaluate the results of cultivation trials (Module 2),
► Before harvest, farmers should be guided to good harvesting practices and how to assess their yields in the field (Module 9)

Maturity phase: BOLLWORM Management

► Bollworm like fresh leaves and fresh bolls to eat, not interested in lint
► If neighbouring field has late sown or late maturing crops, pay extra attention to bollworm control there

Monitor for bollworms every 2 weeks
Focus on fresh bolls and new leaves
Handpick any bollworm larvae, damaged buds/flowers/bolls

Top Ten or Neem ACD/Or Neem-Chill-Orion or Fermented buttermilk against bollworms if needed
Attention: May cause cotton decoloration at this stage

Up-proof cotton not too late to break break cycles
Grow crops from different crop family (e.g. cereals) on the field
No chick pea or cotton on this field where cotton shall be grown next year

Good Harvest & Post Harvest Practices

Cover hair during picking to avoid picking hair in cotton
Use cotton bags for picking and storing cotton
Bolls should be fully open, dry and undamaged

Organic Cotton needs to be kept separate from other cotton and free of contamination at all times!
Attention during harvest, drying, storage & transport

Special care to avoid any accidental GM contamination by conventional/GT cotton
The storage place should be clean, dry and well ventilated
• Temperatures should not be too high
• No contamination by chemicals (e.g. kerosene) or chemical resistant covers during transport

Contamination by other matter (hair, plastic, feathers, lints, etc.) causes major problems and losses in later processing stages, especially plastic, fibres from polyester fiber, bags or sheet covers during transport.
Training Ideas LATE SEASON

Module 4: Cotton Plant
- EXE 4.1 (100 DAS): Parts of the plant
- EXE 4.3 (130 DAS): Boll formation
- EXE 4.4 (150 DAS): Observing Boll Damage

Module 6: Pest Control
- EXE 6.3 Understanding Pink Bollworm

Module 7: Water Management
- Check drip irrigation system & furrows for damages/clogging
- EXE 7.3 (B): Visit fields with different irrigation system

Module 2: Seeds & Cultivars
- EXE 2.1-8 farmers criteria for evaluating cultivars (around 180 DAS)

Module 9: Harvest & Post Harvest
- EXE 9.1 Yield of different pickings
- Estimating yields in the fields (see EXE 9.1)
- EXE 9.2 Understanding & minimizing foreign fibre contamination

MODULE 3: Planting & Field Management
- EXE 3.2 (right after picking) signs of soil compaction
- EXE 3.3 Spacing Cotton

Training Ideas HARVEST

Module 4: The Cotton Plant
- EXE 4.5 (190 DAS) Yield distribution on the branch

Module 6: Pest Control
- EXE 6.3 (after harvest) Understanding Pink Bollworm

Important farmers training topics end of the season to prepare next:
- After the main harvest season, it may be a good moment to discuss farm business management and cash management (module 11)
- selection of cultivars for next seeds (module 2).
► crop rotation and soil fertility (module 8 and 5),
► landscape & field measures to improve water conservation (module 7)
2. OCTC Modules – Summary and Trainer’s Overview

MODULE 0: Farmer Extension & Training Methodology

M-0.0 Trainer’s Overview

<table>
<thead>
<tr>
<th>OCTC Tools Module 0</th>
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<tbody>
<tr>
<td><strong>Module 0 training deck</strong></td>
</tr>
<tr>
<td>included training activities for training of field staff:</td>
</tr>
<tr>
<td>► practice presentation skills by giving a 5-10 min presentation (for farmers) in the workshop. Feedback by trainer and fellow trainees</td>
</tr>
<tr>
<td>► Trainees facilitate simple field training activities (as suggested in the agronomic modules) e.g. in pairs of two</td>
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<tr>
<td>Note: this module is an introductory training session for field staff, therefore there is no farmers’ field training activity guide in this module.</td>
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<table>
<thead>
<tr>
<th>Library</th>
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<tbody>
<tr>
<td>► FAO (2016) Farmer field school guidance document</td>
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<table>
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<tr>
<th>Training of Trainers Guidance Module 0</th>
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<tbody>
<tr>
<td>Learning objectives for field staff (or master trainers)</td>
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</table>

| Knowledge: basic adult learning and communication principles; Effective farmer training and extension methods. |
| Skills: practicing effective communication and facilitation skills; how to plan farmers trainings along the season |
| Attitude: learn how the attitude towards farmers effects farmer’s uptake and learning (this will be practiced also in field exercises in other modules). |

<table>
<thead>
<tr>
<th>Planning the training of field staff</th>
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<tbody>
<tr>
<td>Option ToT Workshop session: 45 min training deck presentation + extra time for activities</td>
</tr>
<tr>
<td>Option Self-Study of OCTC deck: 30 min (but effective only with practical activity)</td>
</tr>
</tbody>
</table>
**ToT Field & Practical Exercises**

<table>
<thead>
<tr>
<th>(highly recommended): ToT-Exercise-0.1 Training presentation</th>
<th>Duration of exercise. When</th>
</tr>
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<tbody>
<tr>
<td>Participants prepare a very small technical topics as a “pretend farmers training” (5-10 minutes) to other field officers. Preparation by trainees before or during workshop. Feedback by other trainees and master trainer.</td>
<td>10min each for presentation. If possible, split group in subgroups in different rooms save time.</td>
</tr>
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<table>
<thead>
<tr>
<th>(highly recommended): ToT-Exercise 0.2 Farmer training activity facilitation</th>
<th>(Part of the field activities for other modules</th>
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<tbody>
<tr>
<td>Participants prepare &amp; facilitate selected hand-on field activity exercises (e.g. from OCTC field activity guides) in teams of 2-3.</td>
<td></td>
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<tr>
<td>• assign participants “their exercise” before the workshop so that they can prepare. Allow time for clarification or seeking support before the exercise.</td>
<td></td>
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<tr>
<td>• Best integrated in planning the ToT field activities for other modules, see training plan in Annex 3.</td>
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<table>
<thead>
<tr>
<th>ToT-Exercise 0.3 Farmer training activities for different topics:</th>
<th>0.5-1 hour at workshop venue</th>
</tr>
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<tbody>
<tr>
<td>• Draw a table on a flipchart showing key training topics (e.g. composting; plant nutrition, etc.) and different training methods (visits, demonstrations, lectures, etc.)</td>
<td></td>
</tr>
<tr>
<td>• Participants receive sticky notes (and place them on the table to indicate which activity is particularly helpful for which topic, possibly with key words of suitable activity examples.</td>
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</tr>
<tr>
<td>• Discuss the result and share ideas and experiences for interesting activities on different topics.</td>
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**M-0.1 What trainers should know about training**

This section introduces some basic principles for effective learning and training of farmers, including some core principles of effective communication and group facilitation (group work, how to split trainees into groups,) as well as attitudes for working with farmers.

These skills need to be put into practice. Most OCTC field activity guides include group work and suggestions for organizing interactive discussions and group sessions with farmers.

**M-0.2 Farm extension & training activities**

In this section, trainers get an overview of the most important type of training and extension activities for training farmers. Each activity has its particular strengths and constraints and in most cases, a mix of activities will have the best results.
It is very important to not plan only formal training lectures, although they allow to present information in a well prepared way to a large audience. They have limited learning benefits.

**Farm & Field Visits**

- Most relevant & helpful learning experience for farmers
- Teaching of skills
- Stimulating & interesting
- Helps to analyse problems & find solutions
- Does not need much preparation
- Allows the farmers to share proper experiences

Farmer needs to be confident to assess/demonstrate skills in the field
Right timing & field selection needed
Limited number of participants

**Demonstrations**

- “Seeing is believing” - very effective & powerful teaching method
- Especially suitable for less-educated audiences
- Demonstrate benefits of a practice or compare benefits of different approaches.
- Can be used to reach a large number of people
  (e.g. hands-on training around several thousand in small-medium groups)

Needs to be well prepared / set up
Many particularly interesting demonstration (demonstrations or e.g. compost, seed, preparation & long-term maintenance

Farmer field schools (FFS) are participatory practice oriented “learning by doing” programmes for farmers, usually set-up as multi-year projects with the aim that over time farmers run the FFS. See see also library for further reading.
M-0.3 The cotton season and planning activities

Key content of this section is already included in Chapter 1 of this guide for easier reference.

Module 1: Introduction to Organic Farming and Organic Cotton

<table>
<thead>
<tr>
<th>OCTC Tools Module 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1 training deck</td>
</tr>
<tr>
<td>This introductory training or reading session does not include any group activities, field activity guide nor external reading references.</td>
</tr>
</tbody>
</table>

Training of Trainers Guidance Module 1

Learning objectives for field staff (or master trainers)

Knowledge: Basic introduction to organic agriculture and certification, including a first overview to conversion and why to by an organic farms., which field officers may need as background for motivating farmers

Planning the Training of Trainers

Option ToT Workshop session: 30 min for training deck

Recommended option: Self-Study of training deck: 30 minutes
Note: This module provides introductory information for context. It is very suitable for self-study. If used in a workshop, the trainer could select just a few slides according to prior knowledge of participants before diving into the content of the other modules.

M-1.1 Introduction to organic farming

This section provides a first introduction on the Challenges for cotton farming in India, the difference between “traditional” and organic agriculture and the principles of organic farming. It also includes a first overview on organic certification in India.

Organic Farming and Certification

M-1.2 Organic Cotton production in India

India produces 51 of global organic cotton production and is the world’s largest producer of organic cotton since many years. However only 2.3% of cotton production in India is organic.

Organic cotton farmers are almost all in Indian’s central and Eastern region and their characteristics is quite different to the majority of conventional cotton production in India.

Characteristics of Majority of Organic Farms

<table>
<thead>
<tr>
<th>States</th>
<th>NORTH</th>
<th>CENTRAL &amp; EASTERN</th>
<th>SOUTH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Punjab, Haryana, Rajasthan</td>
<td>MP, Madhya Pradesh, Uttar Pradesh, Odisha</td>
<td>Andhra Pradesh, Telangana, Karnataka</td>
</tr>
<tr>
<td>Volumes</td>
<td>Very little organic production</td>
<td>94% of organic cotton</td>
<td>Very little organic production</td>
</tr>
<tr>
<td>Farm characteristics</td>
<td>Medium - large farms</td>
<td>Mostly marginal, many small farmers</td>
<td>Medium and larger farms</td>
</tr>
<tr>
<td>Irrigation</td>
<td>Mostly irrigated</td>
<td>Mostly non-irrigated with supplementary irrigation</td>
<td>Irrigation and rainfed</td>
</tr>
</tbody>
</table>

Main focus of OCTC
M-1.3 Why be an organic cotton farmer

Other slides provide an overview on benefits of organic farming system and for farmers.

M-1.5 How to become an organic cotton farmer

This section introduced certification for smallholder cotton farmers as a “grower group” with an Internal Control System (ICS), which is explained in more detail in Module 12.

Conversion to Organic

Understanding the conversion process is relevant for field staff even in certified groups, as there may be new farmers joining the group, or certified farmers may add new fields. There is also basic information on starting an organic project and becoming certified.
## Module 2: Cotton Species, Cultivars and Seeds

### M-2.0 Trainer’s Overview

#### OCTC Tools Module 2

- **Module 2 training deck**
  - Included group discussion suggestions:
    - local common varieties? Any desi cotton experience in the group
    - Seed evaluation & GM testing – local procedures; critical points
    - Cultivar preferences by organic farmers in the project/region & most successful local cultivars; do farmers trial different cultivars?

#### Field Training Activity Guide Module 2:

<table>
<thead>
<tr>
<th>Farmer Training Activity</th>
<th>Time needed</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise 2.1: Group Discussion on farmers’ cultivar selection criteria and preferences</td>
<td>1-2 hrs (1-2 sessions)</td>
<td>Before season optionally 2nd time in maturity phase</td>
</tr>
<tr>
<td>Exercise 2.2 Conducting a seed germination test</td>
<td>2-3 sessions of 30 min</td>
<td>Before sowing</td>
</tr>
<tr>
<td>Exercise 2.3 Using Bt strips</td>
<td>45 min</td>
<td>Before sowing or when cotton in the fields</td>
</tr>
<tr>
<td>Exercise 2.4 Cultivar trials: Farmers evaluate cultivars on trial plots.</td>
<td>3 - 5 sessions of 2-4 hrs each.</td>
<td>2 months before sowing to after harvest</td>
</tr>
</tbody>
</table>

#### Library

- OCA Non-GM Cottonseed Production Guidelines (2021)
- ISTA International Rules for Seed Testing. Chapter Sampling

## Training of Trainers Guidance Module 2

### Learning objectives for field staff (or master trainers)

- **Knowledge:** Basic overview of different cotton species and varieties. Importance to finding suitable cultivars and quality seeds for organic cotton farmers. The problem of GM contamination. Procedures to prevent GM contamination.

- **Skills:** practicing practical skills in seed testing and managing GM risks in cotton production.

Note: several topics in this module are particularly important for senior project staff or managers who define the group’s policies and procedures (e.g. selection of the cultivars and procurement of seeds.)
GM policy of the project). However, the background helps also junior field staff to work effectively with farmers according to the group’s quality procedures.

### Planning the Training of Trainers

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ToT Workshop session</td>
<td>1 hr 30 min using OCTC deck including discussions;</td>
<td>1 hr</td>
</tr>
<tr>
<td>Self-Study of OCTC deck</td>
<td>1 hr</td>
<td></td>
</tr>
</tbody>
</table>

Note: the training deck & discussions in this module may need be adapted to participants background, regional context or group specific procedures (e.g. seed sourcing, GMO).

### ToT Field & Practical Exercises Module 2

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Description</th>
<th>Duration / Where</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise 2.3 Using BT strip tests &amp; discussing GM contamination risk</td>
<td></td>
<td>30 min -1hr (ToT training venue)</td>
</tr>
<tr>
<td>Exercise 2.1. Cultivar selection discussion adapt to the ToT workshop setting:</td>
<td></td>
<td>45 min - 1 hr (with cotton farmers)</td>
</tr>
<tr>
<td>• OPTION A: Farmer training Session: 2-3 trainees conduct the exercise with a group of farmers (at ToT training venue)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• OPTION B trainees discuss perceived farmers’ cultivar preferences (or their own).</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### M-2.1 Cotton Species

Cotton belongs to the Malvaceae family it’s genus is “Gossypium” and there are four species of cotton. *Gossypium hirsutum* is by far most widely grown cotton species in India and worldwide. *Gossypium herbaceum* and *G. arboreum* (desi cotton) are the traditional Indian cotton species. The fourth species, *G. barbadense*, has a very long staple length but is very hard to grow and accounts for less than 1% of Indian Cotton production.
A particular challenge for organic cotton production in India is the loss of desi cotton species that are well adapted to local conditions and the rise of GMO cotton, which now accounts for more than 95% of all cotton grown in India.

**M-2.2 Selecting the right cultivars**

Most cotton seeds available to organic farmers in shops are not guaranteed GM free, even if they state so. The varieties are often not well suited to be grown under organic conditions. There is not “the one” perfect cotton cultivar for all organic farmers in India. Finding the right cultivar that thrives well under local climatic, soil conditions and prevailing farmers practices and preferences requires experimentation and exchange with farmers.
There are a few more slides on selection criteria for the most suitable varieties and cultivars.

**M-2.3 Non-GM seeds and seed testing**

Due to the extremely high presence of GM cotton in India all G. hirsutum varieties are very easily GM contaminated with the Bt (GM) gene. It is very hard to find cotton seed stock that is 100% GM-free as required by organic standards.

**Finding Non-GM Seed Stock**

Due to the very high adoption of GM cotton in India, contamination of cotton seeds is a major challenge for organic projects. Therefore, finding GM-free seed stock is a critical aspect of organic cotton production.

- GM-free seeds are not available at local stores.
- Even GM-free seeds are often contaminated.
- So far, no guaranteed GM-free seeds are available in India.

New OCA guidelines for cotton seed production shall support seed companies in producing guaranteed GM-free seed stock.

As long as no guaranteed GM-free cottonseed is available, cotton seed projects must adopt mitigating measures to ensure that all seeds used are GM-free:

- Non-GM cotton seed must normally be pre-ordered from seed companies in larger quantity to be distributed to farmers.
- Each seed batch must be qPCR tested.

This means for organic projects and field staff that they need to ensure that farmers do not plant seeds purchased at local shops, as such seed are very likely to be BT contaminated. Until guaranteed GM-free seed stock becomes available, GM testing by the group is needed to ensure that the grown cotton is GM free and can be sold as organic.

**OCA GM Testing Guidelines**

<table>
<thead>
<tr>
<th>qPCR tests need to be done on all seed lots</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ideally by the seed company, representative seed sampling and testing of each seed lot achieved before packing seed in bags.</td>
</tr>
<tr>
<td>• Otherwise: by the grower group before any seeds are distributed to farmers</td>
</tr>
</tbody>
</table>

- **Bi-Strip testing by the group’s ICS for risk management as a simple and quick additional check at critical stages, e.g.**
  - at the stage of seed distribution to the farmers
  - to check that only GM-free seeds have been used for gap filling
  - in case of identified risk for contamination

Credit: Santel et al. (2015) ANDRAO Methods (issue 21)
Quality of seeds is very important and seed germination testing can help to ensure quality. You can find a tutorial video on GM contamination and seed germination on the Seeding the Green Future website or as link in the slide deck.

For organic projects producing organic cotton seed stocks, there is additional specific information on how to prevent GM contamination in production of organic cotton seed stock.

M-2.4 Cultivar evaluation trials

OCA and FiBL recommend that organic cotton projects trial and evaluate different potential cultivars to find the best suitable seed stock for local conditions and farmers’ needs.

The slide deck provides introductory information on on-farm cultivar triadic trials and mother & baby cultivar evaluation trials. It also provides “participatory cultivar evaluation” with farmers, a method that is highly recommended by FiBL.

See links to further reading on this topic (library module 2) and field activities Exe 2.1 (cultivar preferences) and Exe 2.4 (full season cultivar evaluation trials).

M-2.5 Seed production and breeding

Breeding suitable cultivars and seed production by organic farmers is complex and requires dedicated efforts over years. Resources and tutorial videos on participatory organic cotton breeding and seed production can be found on the Seeding the Green Future (SGF) website www.sgf-cotton.org/resources.

For organic field staff, this section is likely to be not directly relevant (unless the group runs a breeding & seed production project), but is included as background information.

Module 3: Land Preparation, Planting and Field Management

M-3.0 Trainer’s Overview

<table>
<thead>
<tr>
<th>OCTC Tools Module 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module 3 training deck</strong></td>
</tr>
<tr>
<td>Included group discussion suggestions:</td>
</tr>
<tr>
<td>➤ Local soil types and field preparation methods</td>
</tr>
<tr>
<td>➤ Sowing &amp; gap filling practices; spacing practices</td>
</tr>
<tr>
<td>➤ Current crop rotation, green manure and cover crop practices and constraints; Tilling practices and experiences with minimum tilling.</td>
</tr>
<tr>
<td>➤ Local prevailing weeds &amp; weed management practices. Composting weeds and importance for pest &amp; disease management</td>
</tr>
</tbody>
</table>

Field Training Activity Guide Module 3:
<table>
<thead>
<tr>
<th>Farmer Training Activity</th>
<th>Time needed</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise 3.1: Seeing the benefit of green manuring/cover crop in the field</td>
<td>3 sessions of 1 – 2 hrs</td>
<td>Before season 14-20 DAS During flowering</td>
</tr>
<tr>
<td>Exercise 3.2: Is there compaction of the soil limiting the cotton crop’s growth?</td>
<td>45 min</td>
<td>Picking season</td>
</tr>
<tr>
<td>Exercise 3.3: How do farmers choose the appropriate spacing of their cotton?</td>
<td>2 hrs</td>
<td>Boll bursting stage or just before picking</td>
</tr>
</tbody>
</table>

Other field activity suggestions (in training deck):
- Determining & discussing soil types and the effect on cotton growing
- Field visits for discuss and investigate the benefits of intercropping hands on

#### Training of Trainers Guidance Module 3

**Learning objectives field staff (or master trainers)**

- **Knowledge**: First introduction to the importance of a health fertile soil high in organic matter, field preparation and planting. Regenerative farming principles and fundamental organic field management practices. Weed management.

- **Skills**: Observation skills to assess how management practices affect the soil (compaction, green manure) and crop development (spacing).

#### Planning the Training of Trainers

**Option ToT Workshop session**: 1hr 30 min using OCTC deck including discussions.

**Option Self-Study**: 45 min of OCTC deck.

<table>
<thead>
<tr>
<th>ToT Field &amp; Practical Exercises Module 3</th>
<th>Duration of exercise</th>
<th>When</th>
<th>Where</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise 3.1 (Part 3) Seeing benefits of green manure in the field. Possible only if there are fields with established green manure crops to visit</td>
<td>1hr</td>
<td>Organic cotton fields, Mid season</td>
<td></td>
</tr>
<tr>
<td>Exercise 3.3. Spacing Adapt for ToT setting, e.g. field tour, to observe and discuss different spacings in cotton field</td>
<td>45 min - 1 hr</td>
<td>In organic cotton fields</td>
<td></td>
</tr>
</tbody>
</table>

**Other ToT Training activity Ideas**: Depending on timing and local field practices to observe, the master trainer may choose different field training activities instead, e.g.
discussing field preparation practices in the field during the planting season
• discussing different weed management practices and assessing the soil in fields with different intercultural operation and tilling practices.

M-3.1 Soil Types

This section provides a first introduction of the importance and properties of healthy fertile soil.

A Healthy Soil

Different soil types for cotton production are introduced with their key characteristics for growing cotton.

Soil Properties and Effects for Growing Cotton

M-3.2 Land Preparation
Land used for planting cotton must have been managed organically for 2 years before sowing.

The section also discusses advantages and disadvantages of planting in ridges and the problem of soil compaction.

**M-3.3 Sowing & Spacing in Cotton**

**Organic treatment of seeds** is highly recommended, e.g.

- with cow urine preparations (e.g. Beejamrut) or coating with clay or cow dung
- with Azotobacter and Phosphorus Solubilising Bacterial(PSB).
- with beneficial microorganisms (Trichoderma or Bacillus subtilis)

A FiBL Leaflet on how to prepare Beejamrut can be found here: https://systems-comparison.fibl.org/results/publications/leaflets-and-brochures.html
Timely Sowing

Timely sowing of cotton means planting EARLY rather than late because:

- Early sown crops have more time for vegetative growth → healthy plants → Less pests and early maturity.
- Quick maturing plants can often avoid the worst of the late season pests.
- If irrigation is available, early/summer sowing (from late May) recommended for better yields.

Optimal spacing of cotton depends on cultivar, soil, climate, irrigation and other factors. The section contains some discussion of the problem of rather sparse planting as practiced in India, which results in long duration, aggravating the late season pest problem of pink bollworm and water stress. It also discusses the challenges for more dense planting in organic production.

It is recommended to trial optimal different spacing for local conditions and farmers’ needs (see related field activity exercise). FiBL recommendations are

**FiBL spacing recommendations**

- **a) Heavy soil; summer-sown; irrigated:**
  - G. hirsutum varietal lines: 3 × 1 ft (90 x 30 cm) for
  - for G hirsutum hybrids: 3 × 2 ft (90 x 60 cm).

- **b) Light soil; monsoon-sown; rainfed / limited irrigation:**
  - 2 × 1 feet (60 x 30 cm) for hybrids and varietal lines

Other slides show also other examples of spacing recommendations for organic cotton as a benchmark reference for experimenting with ideal spacing for local conditions.

Key recommended practices in the early vegetative stage:

- check germination after 1 week and replant from nursery or re-sow if needed.

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Timely sowing is very important, and this *means planting EARLY rather than late because:*

- Early sown crops have more time for vegetative growth → healthy plants → Less pests and early maturity.
- Quick maturing plants can often avoid the worst of the late season pests.
- If irrigation is available, early/summer sowing *(from late May)* recommended for better yields.
• start monitoring for early sucking pests and root rot
• Earthen up after 30-60 days.
• If there is a dry spell directly after sowing, consider protective irrigation

M-3.4 Regenerative Practices in Field Management

Regenerative farming is a set of farming practices that increase biodiversity & soil organic matter. Most important aspects for cotton are well-known organic agriculture principles like crop rotation, use of green manures and cover crops as well as intercropping.

These practices are relevant for planting cotton as farmer needs to e.g. plan for intercrops in their field layout, and sow intercrops and green manures/cover crops shortly after cotton. The importance of crop rotation and crop diversity in producing organic cotton should be highlighted to farmers in many contexts, as it is important for soil fertility as well as pest & disease management.
Minimal tilling is recommended to keep the carbon in the soil, preserve the soil structure and to conserve moisture.

**M-3.5 Weed Management & Interculture**

Weeds need to be removed during land preparation and at later crop growth stages through intercultural operations and/or manual weeding by hand or hoe.

Cover crops, mulch and intercrops help to suppress weeds. Other recommended preventive weed management practices include:

- Use only fully decomposed manure or well matured compost
- Localised placement - avoid broadcast
- Summer ploughing reduce weed seeds in soil
- Drip irrigation instead of flood irrigation
- Mulching with green manures or other leaves recommended. Plastic mulch is discouraged in organic farming (permitted, but not sustainable practice).

In addition, intense crosswise hoeing practices are discouraged for weed control, as it increases soil erosion and degrades soil organic matter. Use of mulch between the cotton rows is recommended.

**Module 4: The Cotton Plant**

**M-4.0 Trainer’s Overview**
## OCTC Tools Module 4

### Module 4 training deck:
This introductory training or reading session for junior field staff includes no group discussions.

<table>
<thead>
<tr>
<th>FieldStaff/Farmer Training Activity</th>
<th>Time needed</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise 4.1*: understanding the plant parts</td>
<td>1 hr 30 min</td>
<td>Boll formation stage</td>
</tr>
<tr>
<td>Exercise 4.2* Observing vegetative phase</td>
<td>2 sessions of 1 hour</td>
<td>Vegetative season (10-24DAS &amp; 45-50DAS)</td>
</tr>
<tr>
<td>Exercise 4.3 Reproductive Phase</td>
<td>2 sessions of 1 hour</td>
<td>Flowering (e.g. 70 DAS) Boll formation (130DAS)</td>
</tr>
<tr>
<td>Exercise 4.4* Maturity Phase</td>
<td>1 hr</td>
<td>about 150 DAS</td>
</tr>
<tr>
<td>Exercise 4.5 Yield distribution on the plant</td>
<td>1 hr</td>
<td>Harvest season</td>
</tr>
</tbody>
</table>

* field activities which are primarily intended for field staff training, but depending on the farmer’s knowledge, may be useful in farmer training too

### Optional «Dive Deeper» readings for senior field staff:
- Georgia university: Cotton Growth and Development (2017)

## Training of Trainers Guidance Module 4

### Learning objectives for field staff (relevant mainly for junior field staff)

- **Knowledge**: understanding the cotton plant and its development stages
- **Skills**: recognizing and correct labelling of plants parts & development stages

### Planning the Training of Trainers

**Option ToT Workshop session**: 30 min (for junior field staff only)

**Option Self-Study of OCTC deck**: 30 min

### ToT Field & Practical Exercises Module 4

- **Exercises 4.1- 4.5 are all intended for junior field staff training.** Depending on prior knowledge of field staff, use all exercises or a selection.

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Organic Cotton Training Curriculum (OCTC) Trainer’s Guide 38
M-4.1 Plant Parts & Development stages.

This section introduces the cotton development phases in a simple way. A summary overview has been included in the cropping calendar summary in Chapter 1.

M-4.2 Early Season / Vegetative Phase

This section provides an overview of the vegetative development of the cotton plant from seedling stage to first buds (35-40 days after sowing). It also includes a critical management aspects during this stage (see crop calendar summary in chapter 1).

M-4.3 Mid Season / Reproductive Phase

This section provides an overview of “squaring”, the formation for the cotton bud from “square” to bloom and the flowering stage exposing the developing boll.

M-4.4 Late Season / Maturity Phase

This section provides an overview of boll development phases:

- Enlargement phase: boll gains full size within about 24 days after pollination
- Elongation/filling and maturity phase approximately 45-50 days after pollination

It also lists critical management aspects during this phase.

Module 5: Soil Fertility and Crop Nutrition

M-5.0 Trainer’s Overview

<table>
<thead>
<tr>
<th>OCTC Tools Module 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module 5 training deck:</strong></td>
</tr>
<tr>
<td>Included group discussions:</td>
</tr>
<tr>
<td>▶ Soil fertility: structure, health &amp; organic matter management practices</td>
</tr>
<tr>
<td>▶ Crop nutrition: timing of applications; Inputs used</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Field Training Activity Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise5.1: Experiencing and testing soil properties; soil organic matter content</td>
<td>Farmer Training Activity</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Exercise 5.2 Difference between FYM and composting
2 sessions of 1 hour
1) Pre-sowing or early season
2) 30 d after use of FYM

Exercise 5.3 Making quality compost: demonstration or group competition
1 session of 2-3 hrs.
(1 session 1 hr)
1 session 2 hrs
Any time, but best to start in Jan/February

Exercise 5.4 Discussing impediments to composting
1 hr
Any time

Optional «Dive Deeper» readings for senior field staff:

Training of Trainers Guidance Module 5

Learning objectives for field staff (or master trainers)

Knowledge: importance of soil, soil fertility management, cotton crop nutrition requirements, overview of on-farm sources of nutrition and selected organic/mineral fertilizers used in organic farming

Skills: composting, soil examination

Planning the Training of Trainers

Option ToT Workshop session: 2 hours using OCTC deck

Option Self-Study of OCTC deck: 1 hr 30 min

ToT Field & Practical Exercises Module 5

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Duration of exercise</th>
<th>When</th>
<th>Where</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise 5.1 Experiencing and examining soil: highly recommended</td>
<td>1 hr 30 min, any time but best after the rains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise 5.2 Difference Compost – FYM: is useful for field staff training, select one of the described sessions, e.g. 1. tour of compost &amp; FYM heaps</td>
<td>1-2 hrs, before planting or vegetative season</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise 5.3 Making compost is highly recommended; easiest if there is a compost demonstration site. Both sessions recommended: making a compost heap; checking progress</td>
<td>1 session a 2hrs 1 session 1hr 6-8 weeks later</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

M-5.1 Importance of a Healthy, Fertile Soil

Current farming systems tend to impoverish soils and the precious top layer is lost by wind & water erosion, leading to a global soil crisis. Organically managed cotton soils demonstrate
higher nutrient stores, higher biological activity and improved chemical properties, but to build up soil fertility take continuous efforts and care.

A healthy fertile soil is of key importance in organic farming. It has a good capacity to hold water and nutrients and supply them to the plants when they need them. An active and diverse community of soil organisms transfers nutrients from the soil’s organic matter a state usable by plants.

**Why Organic Matter is So Important**

- Soil Organic matter ...
  - Gives the soil a good structure.
  - Can hold water up to 5 times its own weight.
  - Has a great capacity to retain nutrients and release them continuously based on crop demand.
  - Food and environment for beneficial soil organisms.
  - Keeps pH balanced; prevents soils from becoming too acidic.

**The Importance of Soil Organisms**

- Larger soil organisms:
  - Pull dead biomass into the soil.
  - Feed on organic materials and mix them with the soil.
  - Dig tunnels and facilitate aeration and drainage.

- Earthworms:
  - Can help bring up nutrients from deep soil to top soil.
  - Worm cast contains high levels of nutrients in the right balance.

- Soil micro-organisms:
  - Decompose organic matter.
  - Improve the soil structure.
  - Make nutrients available for plants.
  - Protect the plants from disease attacks.

This section contains various educational slides on soil, what makes it alive (or dead), more details on soil organic matter, examining soil and caring for different types of soil, as well as a brief overview on the importance of soils for combating climate change.
M-5.2. Organic Soil Fertility Management & Soil Conservation

For soil fertility management, soil conservation is the most important element, that should be the primary focus of every organic farmer.

1. Overview Soil Conservation Practices

Objective: stabilize the soil & keep it covered; minimizing disturbance;

- Minimal Tillage and inter-cultural operations
- Contour planting and planting in ridges
- Landscape measures to prevent erosion
- Mulching
- Cover crops & Green Manure
- Rotation and Improved fallow with rotation

On the following slides, landscape measures and mulching are explained and the importance of cover crops, green manures, crop rotation and improved fallow is highlighted again (see also in Module 3 Field preparation and Module 8 Crop diversity).

The second most important measure for organic soil fertility management is application of organic matter from farm-own sources.

2. Adding Organic Matter: Farm-own Sources

- Balanced crop rotation or intercropping with leguminous crops
- Crop residues & mulching
- Green manures
- Own animal manure
- Compost
The following slides highlight the benefits of **leguminous crops** which fixate nitrogen from the air into the soil in their root nodes. Examples are green gram, black gram, sun hemp, cow pea, ground nuts or soy bean. Use of compost and farm yard manure is introduced (→ 5.4) If the soil conservation and adding farm-own organic matter practices are not sufficient, approved additional external supplements may be used.

### 3. Additional Permitted External Supplements

Some selected external non-synthetic minerals and bio fertilizers of biological origin may be used in organic farming - but only to complement nutrient recycling and nutrition from farm-own sources.

**Specified organic inputs from outside the farm are permitted - but must be "restricted"**
- E.g. guano, by-product, by-products from food or textile industries, e.g. castor de-oil cakes.
- Many off-farm inputs are "restricted" - must be checked & approved by certifier before use.
- If the group recommends use of selected off-farm inputs (e.g. rock phosphates to be added to compost), → best sourced by the group & distributed to farmers (→ available, approved, quality assured).

**List of permitted fertilizer inputs:** NPOP Annex 1 of Appendix 1
- Many off-farm inputs are "restricted" → must be checked & approved by certifier before use.
- If the group recommends use of selected off-farm inputs (e.g. rock phosphates to be added to compost), → best sourced by the group & distributed to farmers (→ available, approved, quality assured).

### M-5.3 Cotton Nutrient Requirements

**Key Nutrients for Cotton**

- **Nitrogen:** 100 kg N/ha for irrigated cotton
  - Essential for plant growth
  - Lack of available Nitrogen is common on organic farms & has major effect on yields

- **Phosphorus:** 50 kg P₂O₅/ha (CICR irrigated & rainfed)
  - Promotes early root formation
  - Stimulates growth and early maturity

- **Sulfur:** 15-20 kg S/ha
  - Sulfur is important for oil seeds
  - Sulfur often deficient in cotton soils

- **Potassium (K):** 60 kg K₂O/ha (CICR irrigated & rainfed)
  - Increases photosynthesis
  - Essential to protein synthesis

**Secondary nutrients:** Magnesium, Zinc, Boron

Cotton requires nutrients in a well balanced composition.
The section highlights that according to research in organic cotton fields, Indian organic farmers often undersupply Nitrogen and Phosphorus. Most Indian smallholder farmers do not have enough farm yard manure from their livestock, so it is essential that they also add nitrogen to the soil by green manure or leguminous crops in their fields.
Cotton Crop Nutrition FiBL Guidance

Insufficient Nitrogen availability in first 60 days is a major bottleneck for yields.

- Organic cotton farmers should aim to apply at least 80-100 kg N/ha + 50 kg P₂O₅/ha

But: only 5-7 t FYM/ha is realistic for most organic smallholders = 50-70kg N

Other 30-50 kg of N needs to be from compost, green manure or legumes in the field

This extra N-input of compost, green manure etc. makes the difference for yields !!!

<table>
<thead>
<tr>
<th>Typical content as Rule of thumb</th>
<th>N</th>
<th>P₂O₅</th>
</tr>
</thead>
<tbody>
<tr>
<td>FYM (when used)</td>
<td>0.8-1.1 %</td>
<td>0.5%</td>
</tr>
<tr>
<td>Compost (plant)</td>
<td>0.5-0.75 %</td>
<td>1 %</td>
</tr>
<tr>
<td>Vermi-compost</td>
<td>2-3 %</td>
<td>1.5-2.25%</td>
</tr>
</tbody>
</table>

Applying 80-100 kg N/ha each cotton season:
- About 1/2 to 2/3 in basal application
- Rest in top dressings, foliar applications or fertigation
  (FiBL field recommendation for organic cotton smallholders in India)

Supplying enough P (60 kg P₂O₅/ha): all in basal
- Not a problem if using lots of P-rich vermicompost or compost
- If farmers use only 5-7 t FYM/ha: not enough Ph
- Add 12 kg rock phosphate per 1 ton of FYM
  (more efficient if buttermilk-acidulated)
- 60-85 kg RP/ha = 21-31 kg P₂O₅ Rest P from FYM

M-5.4 Compost, Manures & Fertilizers

Fertilisation Recommendation FiBL

Before Sowing

| Land Preparation: Incorporate green manure to increase N content. |
| Basal application: 2-3 weeks before sowing: |
| 5-7 tons farm yard manure (FYM) per ha |
| 12 kg of rock phosphate per ton of FYM* |
| OR Vermicompost 3-4t/ha |
| OR FYM 4-5t/ha (if higher N content) |

Optional: mix in up to 30 kg bacterial biofertilizers [Azotobacter, Azospirillum & FSB].

* Rock phosphate is “restricted” and may need to be sourced through FiBL. FiBL recommends KF acidulated with buttermilk. See information in next section.

Conversion Example: 5 t FYM /ha → 5000 kg/ha * 0.65 kg N/ha = 3250 kg N/ha

Field of 200 m² = 100 kg FYM

30 to 90 DAS

1st Top Dressing & Liquid applications (30-60 DAS)
- 30 DAS: 1-2 t tons Vermi-compost per ha
- OR 1.5-2.5 t tons compost per ha
- 30-60 DAS: Jeemumrit
  by: foliar spray (25 l/ton of 46% water)
  OR drenching at base of plant @ 20 ml/plant OR drip irrigation [200 ml/landscape/ha]
- 30-60 DAS: Vermilwash
  (10 l/10 l of water)
  Foliar application can be repeated in intervals of 2-3 weeks

2nd Top dressing 60-90 DAS
- 0.5 – 1 t Vermi-compost per ha
- 0.75-1.25 t tons compost/ha

The section also lists other examples of crop nutrition recommendations for organic cotton. It explains causes for disturbed nutrient uptake, how to make sure that the nitrogen supplied in organic manures is available to the plants and signs of nutrient deficiencies.

M-5.4 Compost, Manures & Fertilizers
Compost is very important in organic farming. It is a well-balanced fertilizer and improves long-term soil fertility. It improves the value of animal manure and results in higher volumes for fertilization. It can be used to balance the soil pH. The heating phase in well prepared compost destroys disease pathogens and weed seeds.

**Materials Used for Composting**

- **Mix should be roughly:**
  - 1/3 study/coarse materials (e.g. soybean stalks, twigs)
  - 1/3 medium-to fine rich in carbon (e.g. straw, leaves, weeds)
  - 1/3 rich in nitrogen (green manure, cow dung, green leaves, kitchen waste, soy bean stalks)

- Find suitable material composition during different seasons.

**Making good quality compost**

- Chose a shady place in proximity of water. Dig shallow pits.
• Collect materials, cut plant materials to size of a finger. Make 2 heaps, one with the manure and green materials, one with the dry materials. Mix & water both heaps well.

• Fill-in bottom layer of green material and water it well. Thickest layer at the bottom. Can be cotton stalks if no green material

• Then fill in a layer of dry materials, then again green materials, alternating the layers of dry materials and green materials with manure and water them well.

• Cover the compost with grass or leaves or soil. Put in a metal stick.

• Check the temperature of the metal stick regularly. Warm stick = Decomposition process in full action. Cold stick = Decomposition cannot start; or has declined. Heap can be turned.

• Check and adjust moisture regularly. Good compost keeps its form without dripping. If it falls apart, it is too dry. If it smears or drips, it is too wet.

• Turn compost twice when the temperature in the heap has declined.

• Compost should be ready 3-6 weeks after second turning.

Handling Farm Yard Manure

Farm Yard Manure (FYM) is the most important organic traditional fertilizer for cotton.

- It should be used after 6-6 months storage OR composted with plant materials in compost heap.
- Applied to the field 3-4 weeks before sowing. Nutrients in FYM are not immediately available to the crop, they are released gradually over years.

Proper storage of FYM to minimize nutrient losses

- FYM should be best stored in a pit or trench or as a compact heap to minimize nutrient leaching into the ground & evaporation losses.
- Chase pit or heap method depending on rain: it should not be too dry nor too wet.
- Keep FYM covered during storage to minimize losses: e.g. till one trench 1 pit continuously and once full – cover up. OR plastic with cow dung slurry.
- Turn the manure 1-3 times in a season (unless plastered) and use each pit after 4-6 months.

Typical Manure Quantities:

- 1 cow = 1.5 kg dung/day = 27-45 kg/d.
- 5-8 tons manure after 6 months.

Urine is rich in N (17%) and often wasted as the N-rich urea part evaporates quickly and the urine cannot be collected easily. Spread bedding or soil in shed and collect urine soaked soil with dung and add it into one trench until full; seal by cow dung slurry.

- OR collect washings from shed in cemented pit & use for organic spray or add to manure before use.

The nutrient content of used FYM can vary greatly, also due to poor handling & losses.

Typical content smallholders central India: N: 0.8-1.1  P: 0.5 (can be up to 0.7%); K: 0.5 (up to 2%).

FYM can be enriched to improve nutrient content, e.g. by adding ash, gliricidia or neem leaves, or – if approved by the organic certifier – rock phosphate or gypsum (to add sulphur).

Partial acidulation of rock phosphate with buttermilk is recommended, as it increases the P availability to plants considerably and can hence contribute to better yields.
Buttermilk Acidulation to solubilize Rock Phosphate (RP); suitable for smallholders

- Mix 1:10 RP to buttermilk (made with lactobacillus yoghurt) and leave for 12 days, stirring occasionally.
- Mix this buttermilk + RP mixture with FYM 3 days before application, at ratio 1:40
- 12 l butter milk + 1200 RP mixture – add to 50 kg FYM;
- Use this RP-FYM @ 0.5 kg/m² (=5 ton/ha)

Permitted Mineral Fertilizers

<table>
<thead>
<tr>
<th>Fertilizer</th>
<th>Origin</th>
<th>Characteristics</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limestone</td>
<td>Ground limestone</td>
<td>Surface has low pH content of Ca and Mg secondary; Algae-rich in trace elements</td>
<td>Every two to three years when soil pH is low; avoid excessive use, as it reduces availability of P and increases deficiencies in micronutrients.</td>
</tr>
<tr>
<td>Rock phosphate</td>
<td>Pulverized rock containing P; more commonly used in form of P₂O₅</td>
<td>Easily adsorbed to soil mineral; weakly adsorbed to organic matter; slow reaction</td>
<td>Should be added to compost, then added to soil by buttermilk; not to be added to leaf soil with high pH.</td>
</tr>
<tr>
<td>Mineral potassium</td>
<td>Natural potassium salts (e.g., uronic acid, potassium nitrate)</td>
<td>Soluble form of potassium is easily available; plant unavailable high content of Mg and S; easily available; in rock form slow reaction</td>
<td>Only in case of demonstrated potassium deficiency.</td>
</tr>
<tr>
<td>Clay</td>
<td>Natural</td>
<td>Good nutrient and water binding capacity</td>
<td>Large amounts required for soil improvement.</td>
</tr>
<tr>
<td>Sulfur</td>
<td>Volcanic</td>
<td>Sulfate of potassium is easily available, but it can be washed out; elemental sulfur slow reaction</td>
<td>Spraying onto plants where in case of nutrient deficiency known by soil or tissue testing.</td>
</tr>
<tr>
<td>Trace elements</td>
<td>Anorganic or complexed salts</td>
<td>Complexed salts are more easily available to plants than anorganic salts, but are more expensive</td>
<td></td>
</tr>
</tbody>
</table>

Also permitted and readily available are microbial fertilizers ("Bio-fertilizers"), with Rhizobium, Azotobacter or Azospirillum bacteria, but they are mostly used for seed treatment.

Module 6: Pest & Disease Management

M-6.0 Trainer’s Overview

| OCTC Tools Module 6
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Module 6 training deck:</td>
<td></td>
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</tbody>
</table>

Field Training Activity Guide

<table>
<thead>
<tr>
<th>Farmer Training Activity</th>
<th>Time needed</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise 1.1 : Trap cropping &amp; &quot;push pull&quot; strategy</td>
<td>2 sessions of 1h 30 min -2 hrs</td>
<td>Before season About August</td>
</tr>
</tbody>
</table>
### Exercise 6.2 Understanding Sap-Sucking Insects and Bollworm Complex incl. Pheromone Traps
- 2 sessions of 1hr 30 min
- 1) Vegetative phase
- 2) Fruiting phase

### Exercise 6.3 Observe Pests, Enemies and Growth in the Cotton Field
- 1 session of 3hrs. Follow up: 1hr 30 min
- 21-35 DAS Follow-up 1-3 weeks later or later

### Exercise 6.4 Pink Bollworm: Understanding Its Peaks and What to Watch Out For
- 2 sessions of 1 hr
- End of season (Feb/Mar)

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**Optional “Dive Deeper” readings for senior field staff:**


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### Training of Trainers Guidance Module 5

#### Learning Objectives for Field Staff (or Master Trainers)

**Knowledge:** Importance of soil, soil fertility management, cotton crop nutrition requirements, overview of on-farm sources of nutrition and selected organic/mineral fertilizers used in organic farming.

**Skills:** Composting, soil examination.

#### Planning the Training of Trainers

- **Option ToT Workshop Session:** 2 hours using OCTC deck.
- **Option Self-Study of OCTC Deck:** 1hr 30m.

#### ToT Field & Practical Exercises Module 5

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Duration of Exercise</th>
<th>When/Where</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exercise 6.1 Trap Cropping &amp; Push-pull Systems</strong> is highly recommended for ToT; Option 1: Planning session (Part 1) as workshop Option 2: Observing push-pull in the field (requires demo-plot or farmers who plant push-pull systems)</td>
<td>1hr 30 min - 2hrs</td>
<td>Before the season and/or field activity in August</td>
</tr>
<tr>
<td><strong>Exercise 6.3 Identifying &amp; Observing Pests in the Field</strong> is highly recommended;</td>
<td>3hrs; 21-35DAS</td>
<td></td>
</tr>
<tr>
<td><strong>Exercise 6.4 Understanding Pink Bollworm</strong> can be adapted for ToT training, e.g. field visit</td>
<td>1 hr</td>
<td>Late harvest season</td>
</tr>
</tbody>
</table>
M-6.1 Overview and Principles

This introductory section gives a first overview of key pests in organic cotton in India, reasons for pest and disease attack and basic principles to raise healthy crops. Sucking pest affect mainly the early growth of the crop. Towards the bud breaking stage, bollworms and other buds, flowers and boll feeders appear.

Main Reasons for Pest & Disease Attack in Cotton

- Excessive monocropping/Lack of rotation/fallow
- Excessive irrigation/exp. early sowing or climatic conditions/lack of water
- Imbalanced nutrition
- Absence of soil aeration
- Improper land management
- Unsuitable selection of cultivars: Seeds not (organically) treated
- Long duration of crop on own or neighbouring fields (pink bollworm)
- Untimely sowing

Basics of Organic Pest and Disease Management

- Maintain a healthy soil (soil fertility management, crop rotation, intercrops)
- Use suitable & pest resistant cultivars
- Timely Planting
- Maintain a healthy crop
- Irrigation: careful & timely irrigation
- Use of organic pesticide preparations
- Monitor the crop regularly: Good field hygiene
- Promote biodiversity & attract beneficial insects: Trap cropping

It is important to focus on the importance of cultural management practices, natural pesticide preparations are only one element in organic pest management.

M-6.2 Preventing pests from becoming a problem
Cultural measures: Cultivars, Seeds and Planting

Selection of suitable cultivars & seeds:
- Suited for local conditions
- Strong and resistant against common pests and diseases
- Good quality seeds & germination
- Consider seed treatment
- Consider shorter duration cultivars

Careful ploughing & field preparation
Plant as early as possible at the beginning of the rainy season so that plants grow quickly and strong
Timely & optimal spacing to optimise air & sunlight for each plant and keep duration short to escape late season stress & pests, esp. pink bollworm

Crop Diversity in the Cotton Field & Rotation

Border crops, intercrops and trap crops
- Increase the agrobiodiversity
- Increase the number of beneficial insects, that help suppressing pests and diseases
- Can help to confuse, attract or repel pests from the main crop

Examples:
- Intercropping with cow pea or pigeon pea
- Moong bean planted in same hole as cotton (removed or cut after 20d) attracts biting insects from cotton. Or planted as trap crop.
- Planting marigold to attract natural enemies
- Sorghum helps to build beneficial insect population.

Crop rotation & mango after cotton are very important for pest management
Rotation reduces the levels of pests and disease incidences by breaking their reproductive cycles.

The section also provides an overview of the benefits of different groups of crops as intercrops.
The following slides provide more information on trap crops and repellent crops in cotton fields and how to attract beneficial insects into the field.

**Crops Attracting Beneficial Insects**

The following slides provide an introductory overview of different natural enemies of cotton pests (predators) and parasitoids.

**Challenges for Natural Enemies Management in Organic Cotton**

- High pesticide use in BT cotton and mono-cropping results in very low natural beneficial insect levels around organic fields
• Bio-pesticides also repel the beneficial insect
• Few organic farmers invest in buying commercial sets to release natural enemies (like e.g. Trichogramma or green lace wings)

M-6.3 Direct Organic Control Measures

Economic Threshold Levels (ETL) or Action Threshold: helps farmers to decide at what level of pest numbers control actions are needed. In general ETLs in organic farming are lower than in conventional farming as the preparation of botanical preparations takes some time and hence proactive control measures are encouraged.

Scouting the field for Pests & Diseases

- Start scouting from seedling stage.
- Repeat weekly until the bolls open.
- Check the plants by crossing the cotton field.
- Every 5 to 10 steps, examine 2-3 plants especially under the leaves for sucking pests and/or squares/bolls for bollworm. Check for signs of diseases.
- Assess the level of damage and/or take notes on number of checked & affected plants;
- Take action if you find higher pest number than the recommended action threshold.

Monitoring of Cotton Pests and Diseases

- Monitor Pest & Damage Levels
- Low (under action threshold)
  - No direct control action, but keep monitoring
- High (more than action threshold)
  - take action, e.g. spray organic preparation
Instructions for use of pheromone traps:

- Traps are placed on a sturdy stick (15-50 cm above the plant canopy;)
- About 1 trap per 25 m² (monitoring & reasonable mass-trapping)
- Use sex pheromone lures specific to the species. Most used: pink bollworm
  Lures are placed into insect traps (set up according to instructions)
- Change lures after 15-20 days & dispose properly. Captured moths should be
  removed periodically; damaged bags replaced

Note: Bollworm pheromone traps attract only the male adults and hence do NOT control
bollworm larvae and are mostly used to monitor pest levels. But mass-trapping of adult
males can help to reduce reproduction and damage levels

There is a wide range of **home made botanical preparations** that are used in organic cotton
pest control. Ingredients, preparation and use of the most important preparations are
described on the next slides.

- **Neem based sprays** (repel sucking pests)
- **Top 10** (to repel sucking pests) & other bio-dynamic preparations
- **Garlic-Onion-Chilli (GOC)** (Sucking pests, bollworms)
- Fermented buttermilk spray (bollworms)
- Cow urine spray
FiBL leaflets with full instructions for these preparations and how to apply them are in the OCTC library or can be downloaded on [https://systems-comparison.fibl.org/results/publications/leaflets-and-brochures.html](https://systems-comparison.fibl.org/results/publications/leaflets-and-brochures.html). The Seeding the Green Future website also provides useful training videos on Integrated Pest management practices in organic cotton, including making of preparations: [https://www.sgf-cotton.org/resources/videos.html](https://www.sgf-cotton.org/resources/videos.html).

M-6.4 Sucking Pest and their Organic Management

Sucking Pests are the key problem in the early / vegetative phase of the plant up to 50 DAS, just when the plant is switching to squaring phase. The plant also harbors insect predators such as lady bird beetles, syrphids and green lace wings during that time.

**Key cultural measures to control sucking pests:**
- Trap crops (e.g. moong) on the border
- Intercropping/strip cropping with pigeon pea & cow pea or sorghum
- Grow marigold and other plants to attract natural enemies (ladybird beetles, lacewing, hoverfly, damsel bug, ground beetle, spiders etc.)
- Rainfall/spraying water washes down insects.
- Avoid heavy manure application
- Avoid waterlogging and water shortage

**Repellents of Sucking Pests:**
- Neem Spray
- Botanical preparations, e.g. 'Top Ten' etc, gliricidia, sweet flag, turmeric, ginger, marigold
- Garlic-Chilli-Onion repellent
- Cow Urine Sprays
- Use of Jaggery
- Bio control agents, in particular Verticillium Lecanii

*Cotton Aphids* (*Aphis gossypii*) are a key pest in organic cotton. If their reproductive cycle is not broken and controlled early on, the population will grow exponentially.
Cotton Jassids (*Amrasca biguttula*) is season long sucking pest, but attains pest status during July-August in Central India.

**Cotton Jassids Damage & Control**

- Nymphs and adults suck the cell sap and inject toxins into it resulting in 'hopper burn symptoms'.
- The affected areas show curling and curling can result in dying of leaves.
- This reduces the productivity of cotton and may result in losing up to 30% of yields.

**Specific Cultural Control Measures for JASSIDS**

- No excessive nitrogen
- Crow cotton early
- Use of Jassid resistant cultivars
- Wash plants with water
- Use sticky traps

<table>
<thead>
<tr>
<th>Jassid</th>
<th>Recommended</th>
<th>Threshold (Hill)</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 nymphs/adults per leaf (under surface)</td>
<td>3 leaves (under surface)</td>
<td>3 leaves</td>
<td></td>
</tr>
</tbody>
</table>
Whitefly (Bemisia tabaci) feeds on more than 600 plants, including cotton. Organic control measures are very similar to control of aphids and jassids: yellow sticky traps, neem sprays and other botanical preparations, encourage natural enemies in the cotton fields (e.g. lacewings, spiders, ladybird beetles).

Mealybug Phenacoccus solenopsis (Tinsley) is a relatively new pest in cotton and requires specific control measures as it spreads by wind, water and agricultural activities.
There is also basic information on Mirid bugs and Root-knot nematodes.

**M-6.5 Cotton Bollworms and their Management**

Bollworms are a very serious problem in the maturity /late season stage of the crop, both in conventional and organic cotton production in India.

**Bollworm Control – Cultural Measures**

- **Timely planting & short duration** (e.g. pink bollworm)
- **Trap Cropping and Push-Pull Systems**: e.g. e.g. okra, hibiscus, sunflower – destroy when full of bollworms, marigold or field borders
- **Intercropping:** with cow pea, ground nut, green gram and soya bean. Sorghum scattered over cotton field. Maize as border crop
- **Encourage natural enemies** (aphid, lacebugs, beetles, ladybirds, spiders) in the field
- **Remove or compost cotton stalks after harvest**
- **Bird perches, Cattle grazing after picking is over**
Pheromone traps and light traps are very helpful for monitoring pest populations. For mass-trapping of the bollworm moths, a reasonable number of traps needs to be set up in the field (e.g. 1 per about 25m²). Although only the male adults are captured (not the egg-laying females) the trapping of males can help to reduce infestation in the field. Pheromone traps tend to be more efficient, and are recommended as they do not attract and kill beneficial insects.

The American bollworm (*Helicoverpa armigera*) is a major cotton pest.

**American bollworm - Damage & Measures**

- The larvae feed on the leaves initially, then they bore into squares/bolls/seeds, with their head into the boll to feed, leaving the rest of the body outside.
- A single larva can damage 30-40 squares/bolls during its growth.

**Control Measures Helicoverpa**
- All mentioned bollworm control measures
- Trap crops okra or hibiscus combined with push crops; marigold
- NPV viral inoculations (see later slide)

FBL recommended Threshold: 1 egg/larva per 3 plants or 5% damaged fruiting structures
The Spotted Bollworm (*Earias insulana*) affects both *G. Hirsutum* as well as “desi” cotton varieties.

## Spotted Bollworm Damage

- Larvae bore into the shoot terminals and cause withering of the growing terminals. Main stem may collapse.
- Larvae bore into squares, flowers and bolls. Bolls open prematurely and are damaged. Excessive shedding of buds and bolls.
- Mean damage in rained cotton can be up to 10%.

FiBL recommended threshold:
1 larva per 3 plants or 5% damaged shoots or bolls

Specific control measures Spotted BW:
- Sacrifice crops: Oara, sunflower, castor
- Neem preparation, COG, Tao Ten, etc.
- Release of Trichogramma chilonis and Braconid parasitoids
- Hand-picking damaged squares
- Yellow sticky trap smeared with grease
- Nipping terminal buds

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The pink bollworm (*Pectinophera gossypiella*) has become a particularly dreaded pest in cotton in recent years. It feeds only on cotton. It occurs twice in the season: it damages the flowers at the beginning and the intensity is far less, and then resurfaces late in the season to effect bolls that form late/ during the winter months.

## Pink Bollworms: Specific Control Measures

Specific control measures PINK BOLLWORM

- **VERY important that the field has a cotton-free period to disrupt the pest cycle**
- **Crop rotation**
- **Mass trapping & mating disruptions:**
  - At 90-120 DAS install pheromone traps at a distance of 50 m @ five traps per ha. Use Gossypid traps and change after every 15-20 days (Source: Dr. S. Kranthi, ICAR)
- **Early Planting & Termination of the Crop by December**
- **Hand Picking of larvae & affected squares/flowers/buds**
- **Pulverizing Cotton Stalks after harvest**
- **Neem sprays, Botanical preparations, trichogramma cards** (loopen, buttomik spray, GO)
Tobacco Catterpillar Damage & Control

Spodoptera causes square and boll damage
Signs are e.g. eaten square/boll tracts

FIBL Economic threshold: 2 larva/10 plants or 3 skeletonized leaves with young larvae

Specific Control Measures Spodoptera
✓ Collect and destroy egg masses/ gregarious larvae/ solitary larvae by hand picking.
✓ Spray crop with Neem oil based products
✓ NPV viral inoculations (see later slide). Dipel (bacillus thuringiensis)
✓ Other recommended measures for bollworm control, e.g. 3OC, fermented buttermilk spray.

Using NPV and GV in control of American Bollworm or Tabacco Caterpillar

NPV (Nucleopolyhedrovirus) and GV (Granulovirus) are natural viral diseases of Helicoverpa (American Bollworm) and Spodoptera (Tabacco caterpillar). Larvae tissue extract suspensions can be used as viral inoculum for the organic management of these pests

Preparing a bio- insecticidal spray from mass collected larvae
- Mass collection of Helicoverpa armigera (American bollworm) and Spodoptera (Tobacco caterpillar) larval population from trap crops (mainly maize) and from the main crops.
- Keeping these larvae in closed SS container for 2 days and then extract the insect tissue suspension, dilute it to have 100 larval equivalent / 50 litres and spray on trap crop and main crop cotton.

Explantation:
- In a balanced ecosystem there is strong possibility of getting natural infection of NPV and GV. In a larval herd of approx. 100 larvae a thumb rule.
- By keeping them in closed containers, the satiaus virosis will spread – the entomopathogenic virosis will grow and proliferate on insect tissue at rapid pace.
- Note: 55 containers with proper lid/cap are needed to contain the larvae.

Source of information: N.Y. Baby Rapheal. Seminex India Organics

M-6.6 Cotton Diseases and Management

Diseases are not the most pressing problem in organic cotton farming, but are becoming more of an issue. Growing a healthy crop and preventing diseases is much better than cure.
Preventing Diseases: Principles

A healthy crop is more resistant to disease. Preventing diseases by good soil & water management as well as field hygiene is key.

- Crop diversification & rotation with non-cotton-related crops
- A healthy soil & balanced crop nutrition:
  - Adding compost or organic soil amendments for healthy microflora around the roots
  - Balanced crop nutrition (esp. Nitrogen & potassium) → plants less susceptible to disease
- Minimise risk to spread pathogens from field to field by cleaning machinery & vehicles, boots, etc. regularly
- Careful water management to avoid over watering and keep crops healthy. Avoid contamination from field to field by irrigation

Prevention measures from planting to harvest

Field Preparation & Planting

- Avoid to grow cotton on a field with history of Fusarium wilt/root rot
- Adapt crop rotation
- Avoid mono-cropping
- Avoid cultivation of Cucurbit family crops (gourd, cucumber, squash) and Solanaceous crops (potatoes, tomatoes, peppers, eggplant) in adjoining fields

Recommendations based on: ICAR-CIRC, Cotton technical Bulletin 1/2019

- Disease-free & quality seeds for vigorous growth (germination > 90%) ; Seed treatment, e.g. with Trichoderma
- Pick opened bolls immediately to avoid seed borne infection

For managing cotton diseases it is important to:

- Remove all infected plants to minimise spread of the infections
- Clean all tools that come into contact with infected plants with alcohol or by heating over fire
• Burn all diseased plant parts
• Affected field should be deeply ploughed and soil left for solar solarization to expose the soil borne pathogens (2-4 weeks)

**Biological Control of Diseases**

**Biocontrol by Trichoderma harzianum**
- This beneficial micro-organism works as a growth stimulant and improves yields and product quality.
- It can affect plant diseases by antibiosis and competition with the pathogen.
- *Trichoderma* should be used in the soil, not sprayed into stem & leaves.

**Compost application helps in disease management**
- Competition for nutrients by beneficial micro-organisms
- Antibiotic production by beneficial microorganisms
- Activation of disease resistant genes in plant
- Enriching compost with *Trichoderma* helps to even better compete against pathogens

Source: ICAR/ICCR, Chitrambaram (2007), Integrated Disease Management

There are also some slides with pictures and symptoms of root rot, boll rot, Alternaria blight, Fusarium wilt, grey moldew and bacterial leaf blight.

**Module 7: Water Management**

**M-7.0 Trainer’s Overview**

<table>
<thead>
<tr>
<th>Exercise 7.1: Effectiveness of different soil moisture conservation techniques</th>
<th>Time needed</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>1hr 30 min - 3 hrs</td>
<td>Any time but best during or after the monsoon</td>
<td></td>
</tr>
<tr>
<td>Exercise 7.2 Drip irrigation: Roots &amp; wetting patterns in different soils &amp; maintenance</td>
<td>2 sessions of 1 hour</td>
<td>During irrigation (e.g. after monsoons)</td>
</tr>
<tr>
<td>Exercise 7.3 Furrow &amp; alternate furrow irrigation: advantages and best practices</td>
<td>2 sessions of 1 hour</td>
<td>Mid season Late season</td>
</tr>
</tbody>
</table>

- Recommended for field staff: Water footprint network (2017): Guiding farmers towards sustainable cotton production: managing the water footprint on cotton farms.

---

### Training of Trainers Guidance Module 7

#### Learning objectives for field staff (or master trainers)

- **Knowledge**: water requirements of cotton, soil moisture conservation methods, water management in organic farming; water harvest and good irrigation practices.
- **Skills**: drip irrigation correct use & maintenance. Moisture conservation practices.

#### Planning the Training of Trainers

- **Option ToT Workshop session**: 1 hr using OCTC deck
- **Option Self-Study of OCTC deck**: 1 hr (for junior field staff)

#### Exercises 7.1 and 7.2 are recommended for field staff training and can be used as suggested (see details above)

---

**M-7.1 Introduction and Water Requirements of Cotton**

Cotton is a desert crop (Xerophyte), well adapted to dry conditions. But it needs sufficient water at critical stages of its growth.
Cotton is known globally for a big “water footprint”, i.e. the total amount of water consumed to produce a kilo of a crop. Several slides explain the green (rain water), blue (irrigation water) and grey water (water needed to replace polluted water) footprint of cotton.

Farms consume water through *evapotranspiration*, i.e. transpiration by the plant’s leaves and evaporation from the soil and standing water. Organic farming practices should aim to improve transpiration (= getting water into the plant) and minimize evaporation (= water lost to the plant or people).

For sowing, the field must have a minimum soil water moisture. The critical window, when the cotton crop has highest needs and evapotranspiration, is in the mid season, about 50-90 DAS (from first blooming to first boll opening).
Cotton is also sensitive to water logging, especially during seedling and squaring stage. If the farms irrigate during this stage, irrigation should be moderate, to avoid water logging.

**M-7.2. Soil Moisture Conservation**

**Overview Soil Moisture Conservation Measures**

- **Physical / Landscape Measures**
  - Contour burning
  - Field leveling
  - Bench terracing
  - Building water catchments & ponds
  - Maintain landscape to manage drainage of excess rain into a catchment

- **Crop & Field Management**
  - Mulching
  - Conservation Tillage
  - Contour Farming
  - Bartering up/ridges
  - Cover crops
  - Intercrops

For organic cotton, this graph highlights:

- Earliness of cultivars cultivars should mature early enough in the season to match water availability.
- Planting right at onset of rains & finding optimal spacing to achieve early maturity.

Late maturing cultivars or late sown cotton faces serious moisture stress during critical boll formation phase, unless irrigation is provided!
During crop growth it is important to “ridge around the cotton plants during the first weeding, to grow a cover crop, applying green manure or crop residues as mulch and to minimize soil disturbance by minimizing intercultural operations.

Landscape moisture conservation measures such as stabilizing hillsides by contour bunding are also very important. Field levelling as well as harvesting and storing rainwater in catchments or ponds at lower end of the field for irrigation later in the season is highly recommended!

**Landscape Measures to Prevent Run-off & Erosion and Maximize Water Availability**

**M-7.3 Rainfed Cotton & Irrigation**
Many farmers in remote areas depend only on the seasonal rains for their cotton crop, with no/hardly any irrigation at all. They depend mainly on the recommended practices of water harvesting and soil moisture conservation.

Additional recommended practices for entirely rain-fed cotton production:

- **Adapt time of sowing to the local rain patterns** to ensure that enough water is likely to be available during the critical time window (50–90 DAS). In a few cases this may mean planting slightly later, rather than early. E.g. Rains are common in August → planting in late June is better than early June

- **Focus on early maturing and drought tolerant cultivars**, e.g. **G. arboreum**. Cotton nurseries at the homestead may help if the rains are late. Risk of crop failure is high → best using farm’s own seeds (no cost)

- **Minimal protective irrigation** e.g. by bucket or hose can help to avoid crop failure.

**Availability of Irrigation and Time of Sowing**

<table>
<thead>
<tr>
<th>Assured / full irrigation: summer sowing</th>
<th>Monsoon sowing with or without supplemental irrigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Irrigating the field for planting in the dry season allows “Summer sowing” → in Central India in May.</td>
<td>• &gt;90% of organic cotton farmers wait for the onset of monsoon to sow cotton.</td>
</tr>
<tr>
<td>• Normally sown in November (Central India) before planting a Rabi crop (wheat, chickpea).</td>
<td>• Irrigation is needed after the receding of the rains or if there is a mid-season drought.</td>
</tr>
</tbody>
</table>

- **Summer sowing and irrigation in the critical crop periods helps to achieve good yields.**
- **Early sowing & uprooting of the cotton crop helps for controlling e.g. pink bollworm.**

- **Excessive irrigation is harmful for the crop and the environment.**
- **Easy access to irrigation may tempt farmers to keeping cotton in the fields long after the rains → aggravates the pink bollworm problem.**

Most common irrigation methods in cotton include flood irrigation which is very inefficient and with higher water losses, ridge & furrow irrigation which is slightly better and the highly efficient drip irrigation. Irrigation needs to be adapted to different soil.

There are slides about irrigation in different soils, soil water availability and crop water stress.
Climate-Smart Irrigation Strategies

**Supplemental irrigation, as common in rain-fed cotton**
- providing rainfed crops a limited amount of water during critical crop stages, when rainfall is no longer enough.
- Compared to rainfed cotton without any irrigation, supplemental irrigation increases yields and crop security considerably.

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**Water harvesting**
Collecting and storing rainwater.
→ See previous slides

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**Deficit irrigation: “Maximising Crop per Drop”**
Proving slightly less irrigation than lost by evapotranspiration. Useful when water is scarce.
- Often causes some yield losses, but acceptable as cost of water is high too.
- Induces roots to grow deeper & water better water uptake.

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**Good practices in managing irrigation**
- Chose the most efficient system that the farmer can afford (with available subsidies)
- Adapt the water volume to the changing moisture needs of the crop along the season and to the field’s capacity.
- Most fields have a capacity to absorb 30-40 l/m². Irrigating more than 30-40 l/m² at a time → leaching of nutrients!
- Irrigate in cool morning hours or late evening only. Irrigation water should not be contaminated
- Regularly check systems (or channels) for leakage and malfunctioning.
- Extra focus on good minimal moisture levels during the critical time window 50-90 DAS and avoiding water-logging during vegetative growth & squaring

The section also includes information on the advantages and downside of drip irrigation and surface irrigation (flood irrigation, furrow or improved furrow systems) as well as more information and maintenance tips for drip irrigation.

Module 8: Crop Diversification

M-8.0 Trainer’s Overview

### OCTC Tools Module 8

**Included group discussions:**
- Crop diversity challenges and choosing intercrops

### Field Training Activity Guide

<table>
<thead>
<tr>
<th>Farmer Training Activity</th>
<th>Time needed</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise 8.1 Nitrogen fixation</td>
<td>30 min</td>
<td>When green manure crop well established</td>
</tr>
<tr>
<td>Exercise 8.2: Exploring crop diversification in the field</td>
<td>30 min-1hr</td>
<td>Mid season</td>
</tr>
<tr>
<td>Exercise 8.3 Economic benefits of crop diversification</td>
<td>1-2 hrs</td>
<td>Mid season</td>
</tr>
<tr>
<td>Exercise 8.4 Selecting a suitable crop rotation for your farm</td>
<td>1-2 hrs</td>
<td>In between seasons; any time</td>
</tr>
</tbody>
</table>

### Training of Trainers Guidance Module 8

Learning objectives for field staff (or master trainers)
Knowledge: benefits of crop diversification, options to diversify in cotton production, guiding principles and examples of crop rotations, benefits of different crop families in rotation or intercropping

Skills: composting, soil examination

Planning the Training of Trainers

Option ToT Workshop session with OCTC deck: 1 hr
Option Self-Study of OCTC deck: 0.5 hr

<table>
<thead>
<tr>
<th>ToT Field &amp; Practical Exercises Module 8</th>
<th>Duration of exercise</th>
<th>When /Where</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise 8.1 Nitrogen fixation is suitable for field staff; could be adapted to be done at workshop venue</td>
<td>30 min;</td>
<td></td>
</tr>
<tr>
<td><strong>Highly recommended</strong>: Exercise 8.2 Exploring and discussing crop diversity in the field</td>
<td>1-2hrs field visits (mid season)</td>
<td></td>
</tr>
<tr>
<td>Exercise 8.3 exploring economic benefits and impediments of crop diversification with farmers or as discussion exercise between field staff</td>
<td>1 hrs group discussion (as ToT: any time)</td>
<td></td>
</tr>
</tbody>
</table>

**M-8.1 Benefits of diversification**

Continuous cultivation and mono-cropping create various problems, e.g. declining soil fertility, higher pest & disease pressure, low agrobiodiversity and lower farm resilience. Crop diversity is extremely important in organic agriculture and has various agronomic, environmental and economic benefits,
The section explains the positive intercropping effect that many plants grow better when grown together in the field, the benefits and important role of leguminous crops (like green gram, black gram, sun hemp, cow pea, ground nut, soy) to add nitrogen to the soil.

It also summarizes the importance of intercrops and traps crops as well as crop rotation for organic management of pests and diseases.

M-8.2 Diversification: Options, Suitable Crops & Recommendations

Green manures are very important as they prevent nutrient & moisture loss by covering the soil and supply organic materials and nitrogen (if leguminous) to the soil. Mulching with the green manure crop suppresses weeds. Green manures can be grown before planting cotton or between the cotton rows.

Important Green Manures Crops in Cotton

SUNREMP(Crotalaria juncea)
- Early can grow to 3 m + intercropping
- Good intercrop biomass production
- Leguminous: N fixation 110-150 kg/ha
- Nutrient value: N 3.75%, P 0.25%, K 1.25%
- Good as mulch, drought tolerant (no waterlogging)
- Quick growing, good cover for crop
- Incorporate green biomass 45 mC/ha (seeds from 150 kg/ha)
- Seeds: 40kg/ha

COWPEA (Vigna unguiculata)
- Climbing: busy and needs frame
- Moderate biomass production
- Leguminous: N fixation 50 to 100 kg per ha
- Good as livestock fodder (dried)
- Incorporate 45 mC/ha

DHAINCHA (Sebania aculeata)
- Important legume matter 50-60 kg/ha (seeds from 100 kg/ha)
- Climbing plant: N 3.25%, P 0.55%, K 1.25%
- Needs sufficient nitrogen
- Green manure seed rate: 50kg/ha (tree seed)

[Diagram of crop diversification benefits]
Mung bean and gwar (cluster bean) are also good leguminous green manure crops in cotton fields. Some leaves from nearby shrubs can be used as green manure, in particular Gliricidia, Cassia siamea or Cassia fistula, neem, Sesbania grandiflora or Moringa.

Organic cotton farmers have also made many positive experiences with intercropping. Good examples are Maize; Black and green gram, Sorghum, Millets, Pigeon pea, Sesame, Fennel, Chilli, Turmeric, Soybean, Groundnut.

**Crop rotation**

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**Leguminous Crops**

Planting leguminous crops as green manure, intercrops or in rotation is very important in organic farming and the best way to get more Nitrogen into the soil in addition to the limited amount of farm yard manure.

**Leguminous crops are able to fix nitrogen from the air.**

- This benefits the growth of the leguminous crop but also the following crop as well as other crops in the field!
- For good fixation results, the legume crop needs good growth conditions (enough water, sun, etc).
- See also field activity to explore nitrogen fixation

---

In designing crop rotation, it is very important to consider 3 main points:

1) Chose crops from different plant families to break disease & pest cycles
2) Balanced nutrition: Alternate crops with different nutrient requirements
3) Include leguminous crops to add nitrogen to the soil.

Common crops and their families

<table>
<thead>
<tr>
<th>Family</th>
<th>Crops (common names)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allium</td>
<td>Chile, garlic, leek, onion, shallot</td>
</tr>
<tr>
<td>Cucurbit (Gourd family)</td>
<td>Bottle gourd, bottle gourd, chayote, cucumber, ivy gourd, loofah gourd, melons,</td>
</tr>
<tr>
<td></td>
<td>pumpkins, snake gourd, squash, wax gourd</td>
</tr>
<tr>
<td>Crucifer (Brassica)</td>
<td>Cauliflower, broccoli, brussels sprouts, cabbage, Chinese cabbage,</td>
</tr>
<tr>
<td></td>
<td>cauliflower, collard, kale, kohlrabi, mustard, radish, turnip, watercress</td>
</tr>
<tr>
<td>Legumes</td>
<td>Common beans, black bean, broad bean (Fava), clover, pea, garbanzo, hyacinth</td>
</tr>
<tr>
<td></td>
<td>bean, kidney bean, lima bean, lentil, mung bean, peanut, pigeon pea, pinto bean,</td>
</tr>
<tr>
<td></td>
<td>runner bean, snap pea, snow pea, soybean, string bean, white bean</td>
</tr>
<tr>
<td>Solanaceous (Nightshade family)</td>
<td>Potato, tomato, pepper, eggplant</td>
</tr>
<tr>
<td>Grains and cereals</td>
<td>Corn, rice, sorghum, wheat, oat, barley, millet</td>
</tr>
<tr>
<td>Carrot family</td>
<td>Carrot, celery, cilantro, parsley, parsley</td>
</tr>
<tr>
<td>Root crops</td>
<td>Cassava, sweet potato, taro, yam, water chestnut</td>
</tr>
<tr>
<td>Mallow family</td>
<td>Okra, Cotton is in the mallow family too – so okra attracts the same pests as</td>
</tr>
<tr>
<td></td>
<td>trap crops</td>
</tr>
</tbody>
</table>

Crop groups and their advantages

Other options for farm diversification are briefly mentioned, e.g. bee keeping, mushroom production, vegetable and fruit production for home consumption and local market, etc.

Although crop diversification has many benefits, it is challenging for farmers, especially very small farmers who depend on cotton as their main cash crop. Competition with cotton must be minimized, diversified production tends to be labour intensive and markets must be found for the other crops, which often can not be sold as organic to the grower group.
M-8.3. Organic management of selected other crops

This section provides basic organic management recommendations for pigeon pea, chick pea, green/black gram, lentils and soy bean.

Module 9: Harvest & Post Harvest

M-9.0 Trainer’s Overview

<table>
<thead>
<tr>
<th>Field Training Activity Guide</th>
<th>Time needed</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise 9.1 Validating the contribution of yield of the different picking</td>
<td>3 sessions of 1 hr</td>
<td>Before picking After 1st picking After 2nd &amp; 3rd picking</td>
</tr>
<tr>
<td>Exercise 9.2. Understanding foreign fibre contamination (FFC) and what farmers can do to keep the same under check</td>
<td>1 hr 30 min</td>
<td>Before picking</td>
</tr>
</tbody>
</table>

Training of Trainers Guidance Module 9

Learning objectives for field staff (or master trainers)

- **Knowledge**: extended picking practices, problem of foreign fibre contamination, best practices for harvest and post-harvest handling by the farmer. Cotton quality parameters, yields and income. Cotton buying and processing (overview).
- **Skills**: estimating yields, recognizing cotton contamination, best practices for harvest & handling

Planning the Training of Trainers

- **Option ToT Workshop session**: 1-1 hr 30 using OCTC deck
- **Option Self-Study of OCTC deck**: 45 min

<table>
<thead>
<tr>
<th>ToT Field &amp; Practical Exercises Module 9</th>
<th>Duration of exercise When /Where</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly recommended: Exercise 9.1 estimating yields One session e.g. after 1st picking;</td>
<td>1 hr during picking season</td>
</tr>
</tbody>
</table>
Exercise 9.2 product flow from harvest to point of sale and discuss risks of contamination at all stages:

- done as group exercise at workshop,
- or as a field visit observing and discussing harvest, transport & storage at farmers house

<table>
<thead>
<tr>
<th>Picking season</th>
<th>Field visit OR group exercise during workshop</th>
</tr>
</thead>
</table>

**M-9.1 Cotton Picking and Intermediate Storage**

Other than typical in larger commercial cotton farming, organic smallholder cotton farmers in India tend to leave the crop in the fields much longer and harvest in up to 3-4 pickings. The first picking is typical 30-45% of total harvest, 2\(^{nd}\) and 3\(^{rd}\) picking is 55-70% of harvest. After that the yields decline further and the crop is uprooted.

**The Problem with Extended Picking**

Many organic farmers have only minimal irrigation and can not grow another cash crop in the Kharif Season. They like to keep the cotton in the fields for longer to maximise their yields. They start harvesting early as possible as they are in urgent need of cash by the onset of harvest.

The longer the crop is in the fields, the higher the moisture stress & bollworm attack!

Great care must be taken to avoid foreign fibre contamination of cotton, which is a serious quality problem in Indian cotton. Many Indian farmers collect the seed cotton in used fertilizer bags that are made of High Density Polyethylene (HDPE) / Polypropylene. Material of the bags also gets into the seed cotton and causes real problems in further processing. Other common contaminants are: hairs colour thread, polypropylene feather, plastic, jute.
Good Practices Cotton Picking

- Cotton should not be picked in early morning dew.
- Cloth should be tied around head while picking to avoid mixing of cotton picker's hair in cotton.
- Bolls spoiled by rains, or damaged by insects, or otherwise damaged, should be picked separately and discarded.
- Cotton from different cultivars or species should be kept and sold separately.

Use cotton bags instead of gunny bags while picking and storing cotton.

Avoiding GM Contamination during Harvest

Organic cotton should be grown with sufficient distance to BT cotton fields and not by the same household (parallel production). This is important to minimize risk of cross-pollination or contamination (> see Module 2).

Since there may still be some BT cotton fields nearby, or other conventional cotton that may be BT-contaminated, the farmer should take extra care to avoid GM contamination:

- Clean cotton bags (not previously used for conventional cotton).
- If using baskets make sure that there is no contamination by wind, when accidentally spilled, etc.
- If conventional cotton fields are nearby: harvest some bolls along the border and conduct Bt strip test of the seeds, in case of any doubt, harvest “buffer zone cotton” separately.
- Avoid any accidental contamination with other cotton during drying the seed cotton at home, storage, and transport.
- Bt strip testing may be done at point of buying organic cotton, and the farmer could lose the organic premium, if the cotton is found to be GM contaminated.

Good care needs to be taken during storage. Picked cotton should be dried (on clean mats) before storage. The storage place should be dry and well ventilated; not in direct sunlight

After harvest, it is important to get at least some of the nutrients (especially nitrogen) back into the soil after harvest to improve soil fertility & nutrients available for the next crop. Cotton stalks can be pulverised by tractor driven stalk choppers or should be composted

M-9.2 Quality Parameters, Yields and Income
Other quality parameters are also important for determining the quality of the cotton lint and hence sales price for the grower group/organic cotton project: Micronaire (finess of fibre), Colour, Ginning Out Turn and length uniformity.

The productivity in organic cotton production can match those of conventional systems, but it varies depending on crop management practices. Cost of production tend to be considerably lower. In OCA’s farm engagement programmes, organic farmers earned 4% more net income from cotton than their local non-organic peers.

M-9.3 Buying and Processing Organic Cotton
Organic Requirements Buying & Handling

Organic standard requirements for buying cotton or any other organic crops:

- Only seed cotton produced by approved organic farm group members = organic
- Check that the farmer is organic, and send the seed as per farmers
- Check that they sell only their own cotton (comparables to yield estimate)

Organic Cotton must be kept separate from conventional cotton at all stages. This is also key to avoid accidental GM contamination at this stage.
- Separate storage areas (e.g., non-contaminated area, rice paddy)
- separate organic/contaminated cottons in different locations

No CONTAMINATION during transport or storage!
- No chemical pest (or rodent) control in the room where organic cotton is stored
- No contamination by GM cotton – ATTENTION during TRANSPORT!

Note: It is the role of the group’s ICS to ensure that organic standards are met during purchase!

The section also discusses challenges in buying all organic cotton from the farmers and options for value addition by collective ginning by farmer producer organisations.

Module 10: Crop Calendar Summary

The key content of Module 10 is included in chapter 1 of this Guide.

Module 11: Farm Business Management

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Time needed</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1 Farm Record Keeping</td>
<td>2 hrs</td>
<td>Any time,</td>
</tr>
<tr>
<td>11.2 Profit &amp; Loss Calculations</td>
<td>1-2 hrs</td>
<td>Any time</td>
</tr>
<tr>
<td>11.3 Cash Flow Statement</td>
<td>1-2 hrs</td>
<td>Any time</td>
</tr>
<tr>
<td>11.4 Gender Analysis/Discussion of roles</td>
<td>1-2 hrs</td>
<td>Any time</td>
</tr>
</tbody>
</table>
Learning objectives for field staff (or master trainers)

Knowledge: extended picking practices, problem of foreign fibre contamination, best practices for harvest and post-harvest handling by the farmer. Cotton quality parameters, yields and income. Cotton buying and processing (overview).

Skills: estimating yields, recognizing cotton contamination, best practices for harvest & handling

Planning the Training of Trainers

Option ToT Workshop session: 1-1 hr 30 using OCTC deck

Option Self-Study of OCTC deck: 30 min-1 hr

<table>
<thead>
<tr>
<th>ToT Field &amp; Practical Exercises</th>
<th>Module 11</th>
<th>Duration of exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercises 11.1 to 11.3 can be adapted for training of field staff. Exercises 11.1 and 11.2 are particularly recommended</td>
<td>M-11.1 Farm Business Planning &amp; Strategy</td>
<td></td>
</tr>
</tbody>
</table>

### Farm Business Planning & Strategy

#### Farm Business Planning Process

1. **Analysis of the farm situation**
   - What crops grow well on my farm?
   - What sets well?
   - Yields compared to average?
   - Profitability of different farm enterprises

2. **Setting goals**
   - What crops & farm enterprises?
   - Production targets?
   - Inputs & Labour needs?
   - New opportunities or threats?

3. **Action plan & implementation**
   - Planning crops & production
   - Planning & managing the crops
   - Cooperation with others for production or procurement of farm inputs, etc.

4. **Monitoring & evaluation**
   - Did we meet our goal?
   - What went as per plan, what not?
   - Changes to make in the farm business for the next season
Farmer & Group Rely on Each Other

Indian cotton farmers are certified as a “group” which provides support & training, operates an Internal Control System and buys/consolidates the seed cotton for joint sales.

**Farmer expectations from FPO/FPC or Contract Trader:**
- Support & advice in organic farming
- A reliable purchase partner & fair prices
- Fast & convenient purchase of the harvested seed cotton (against cash) when willing to sell
- Other benefits (e.g. inputs, support programmes)

The FPO/Contract Trader has invested in support & certification of the farmer.
- relies on the farmers selling his/her organic cotton
- Expect farmers to comply with organic standards

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**Strategy Considerations**

- **Inter-crops & Other crops**
  - Intercrop with other profitable crops
  - Rotation/intercrops improve yields & productivity

- **Cash Flow & Finance**
  - Plant intercrops that can be sold (cash crop)
  - Enough capital for next season
  - Insurance for seed/cotton
  - Emergency grain/food storage

---

**M-11.2 Farm Business Performance**
Farm Profit = Farm Revenue – Production Costs

Production Costs: Inputs, tools, labour
- Seeds purchase (cotton & other crops)
- Costs for FUM, DGC and pest control ingredients
- or commercial bio-pesticides or self
- amendments
- Land preparation costs e.g. tillage/plowing
- Labour costs e.g. planting, weeding, harvesting
- Irrigation costs
- Storage and/or land rental costs

Are any of these costs "fixed" costs that you would occur even if stopping to grow cotton?

Farm Revenue

Farm Revenue = Yields x sale prices
for all crops grown in Roby & Profit season

Farm Profit = Farm Revenue – Production Costs

Profits increase with:
- lower production costs
- higher yields
- better sales prices
- value addition (esp. better quality)

Assessing Profitability per crop – simplified

For smallholder farms, the assessment whether e.g. cotton is profitable as a crop – or whether they would be better off planting other crops on their land is usually based on the expenses the farmer had to pay to cultivate the crop and the total revenue.

Costs of the farmer for cotton cultivation:
- Cotton Seeds
- Inputs bought for cotton fields
- Labour hired for cotton cultivation
- Machine/tools/equipment/facilities rental (if any)
- It helps to also record own-family-man-days of work for cotton cultivation to compare how labour-intensive crop is

Revenues & Crop:
- Area & number of rows of cotton & rows of intercrops
- Quantity of cotton harvested (in batches)
- Sales revenues (in batches)

A simplified Profit & Loss calculation exercise for Cotton is included in the Field Activity Guide of Module 11

M-11.3 Financial Management
There is also a slide and related exercise on planning farm business and family cash flows and on planning on the relevance of crop loans and crop insurance schemes.

**Optimizing Farm Profitability & Family Income**

- Good active crop management for optimal yields under given conditions (e.g., rain-fed)
- Adding intercrops & crop diversification to increase income, reduce dependency/risk
- Reducing/optimizing production costs (e.g., inputs, fuel, and labour)
- Selling mainly to the FPC/contract company with organic premium
- Focus on product quality (cultivation, harvesting, storage)
- Planning and recordkeeping is important to analyze profits, loss, and profitable farm enterprises, and options to improve

---

**M-11.4 Marketing & Prices**

(Continued discussion and content on marketing and prices strategies for cotton farming businesses.)
As a grower group/cotton project it can be a challenge to buy all organic cotton produced by the farmer. The farmer will aim to get a good price, but may also need to pay off debts to local Mandis, or simply wish to sell the cotton very quickly at the onset of the season, before the organic group is willing to buy. This can be a challenge for the group which has invested in farmer training and certification.

There is also a slide on Prices and Premium paid to farms in the group.

**M-11.5 Role of Women in Organic Cotton**

**Challenges Faced by Women in Farming**

Key challenges for Women in organic cotton:
- All organic cotton farmers tend to be very marginalized and caught in the cycle of poverty.
- Land & profits owned by man
- Women are cheap labour for planting, weeding & harvest.

Opportunities:
- In some farmers communities women take an active & self-confident role
- Women have been actively included in trainings since years
Module 12: Group Certification

M-12.0 Trainers’ Overview

OCTC Tools Module 12

Module 12 training deck
Included group discussion on set up of farmer training and extension versus ICS, and managing conflicts of interest

Recommended reading for field staff with ICS duties:
► NPOP Chapter 5 Grower Group Certification

Training of Trainers Guidance Module 12

Learning objectives for field staff (or master trainers)

Knowledge: How does group certification work; What’s the role of the Internal Control System (ICS) and how does it work. Conversion requirements. What makes an ICS strong and successful and what are the challenges to be aware of.

Skills: helping farmers in keeping basic data; basic internal inspection skills to be aware of risks and address them in farmers’ training
Proposed activities for training of field staff:

- Review farmer diary with farmer during extension visit and discuss why keeping notes can also help farmer for good farm business management (input use, sold volumes & price, time spent on field work)
- Accompany an internal inspection
- When visiting a farmer, take along the ICS file of the farmer to familiarize yourself with the ICS

M-12.1 Organic certification of smallholder groups

Why is Certification Needed?

Certification ensures that everyone adheres to defined organic standards:
- Organic farmers adhere to the Indian Organic Standard
- Ginners and further manufacturers keep the organic cotton fibre separate and comply with organic textile standards (e.g., Global Organic Textile Standard)

Certification is compulsory for products to be sold as “organic” and carry an organic label. Certification is needed to access the organic market.

Organic Certification in India is regulated by the Indian National Programme for Organic Production (NPOP). The regulation defines the rules that organic farms and processors must meet, and how they are inspected by accredited certification bodies and can label products. Normally, each certified organic farm needs to inspected annually by the organic certification body. The NPOP’s model of “grower group certification” allows smallholder cotton farms to get certified as a group with an internal inspection system instead.
Indian organic cotton grower groups tend to be organized by cotton companies or supported by NGOs. The NPOP allows only up to 500 farmers to be certified in one group. Many organic cotton projects consist of several "ICS Groups" who are organized & supported by a trader or larger NGO.

**M-12.2 The Internal Control System (ICS)**

The NPOP Chapter 5 incudes a detailed list of requirements for the ICS. It has to ensure that all growers in the group comply with the NPOP standard at all times, implementing documented procedures with qualified staff, keeping various documents and conducting annual internal inspections of all farms.

**Overview ICS Requirements**

- **Documented Procedures & Internal Inspections:**
  - Audited scope & duration recorded
  - Chapter 5 of the NPOP standard defines the requirements for Grover Groups in detail and provides various sample ICS documents

- **ICS Manager & Other ICS Personnel:**
  - Inspects the farmer group each year
  - Checks whether the ICS is effective
  - Re-inspects some group members farms to evaluate ICS
  - Checks product flow from members to sales by the group
  - Issues ONE certificate for the group

This section then described all ICS requirements in more detail.

**M-12.3 Conversion to organic**
When a farm or a grower group begins with organic production, it needs to undergo a conversion period in order to build soil fertility and establish an organic management system. The begin of conversion is normally set by the certifier and it depends on the date of last application of prohibited inputs by the farmer.

The conversion period for cotton is 24 months before sowing the first organic crop.

Labelling & Selling Products during Conversion

A slide explains the process for managing the conversion status, e.g. if new farms join the group and need to undergo conversion.

M-12.4 Common challenges & best practice

Grower group certification is very common worldwide. About 80% of all certified organic farms are certified under this model. There are various challenges in managing an Internal Control System and keep organic farmers motivated for organic production.

The section outlines common challenges & possible solutions, e.g.

- Farmer capacity & motivation
- Collection and processing a lot of farm data and reports
- Effective control of organic practices by the farmer
- Effective follow up and sanctions in case problems are detected
- Supervising correct product from farms to the group/purchase centre/processing units.
3. Planning the ToT Training Programme

3.1 Using the OCTC tools for Training of Trainers

The OCTC was developed as a training of trainers (ToT) curriculum for organic field staff (“farmers’ trainers). It was designed to allow blended learning: a flexible combination of self-study with workshop sessions conducted by experienced “master trainers” with field activities for the trainees.
In rolling out the OCTC curriculum, ToT trainings will take place on two levels:

**Cascading OCTC Training of Trainers Approach**

<table>
<thead>
<tr>
<th>Training of “Master Trainers” e.g. by OCA</th>
<th>OCTC “Master Trainers” train Field Staff (“Farmers Trainers”)</th>
<th>Well-trained Field Staff train &amp; support organic cotton farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master trainers = senior field staff in organic cotton projects or experienced consultants who will train field staff</td>
<td>Field staff in organic cotton projects or grower groups, e.g. farm advisors, field facilitators, extensionist, field officers, ICS field staff</td>
<td></td>
</tr>
</tbody>
</table>

In both of these cases, the OCTC materials can be used as summarized here:

**The OCTC training decks (slide decks)** for each module are suitable for ToT training sessions as they are. They contain suggested group discussion questions for inspiration.

The master trainer can slightly adapt the training to the knowledge and experience level of participants, e.g. by using only a selection of slides, or adding a few local or project specific details (on separate slides).

If selecting only a few key slides to present during a workshop, e.g. to discuss questions for a module that participants have studied online, the selection of slides included in this Guide (chapter 2) is a helpful start.

**Self-Study of training decks and materials:** In order focus on discussion and field activities during the physical training session time, trainees complete part of the training curriculum by self-study.

The master trainer determines which modules to assign for self-study, depending on time available for workshop, existing knowledge and training needs. → See training plans in Annex 2 & 3 as suggestion which modules to assign for self-study or present in Workshop.
Field exercises and activities for ToT training:
The OCTC field activity guides provide suggestions for farmers’ training activities to help the field staff plan interesting hands-on field activities. Some of the exercises are directly suitable also for training of field staff. Others may need adaption for use in a ToT training workshop.

- Adapted ToT training activities are suggested for each Module in Chapter 2 in the blue ToT tables. A compilation of recommended ToT training activities along the season can be found in Annex 3.

3.2 Planning the Training of Trainers’ Workshop

TRAINING OF MASTER TRAINERS
- Recommended duration: 2.5 - 4 days.
- Example Master Trainers Training Plan → see Annex 2.

TRAINING OF FIELD STAFF (farmers trainers)
- Recommended duration: total of 5-7 days workshop split in different sessions along the season.
- Annex 3: Detailed 7 days OCTC training plan for novice field staff in 4 sessions with 1-1.5 days self-study.
- The field staff workshop sessions focus on
  ▶ Presenting & discussing the selected key OCTC training decks.
  ▶ Clarification of questions for self-study OCTC modules.
  ▶ Practical communication skills (holding presentations, communication with farmers)
  ▶ Practical farmer training facilitation skills by shadowing trainings by master trainer and conducting own activities, e.g. as a team of 2-3 trainees.
  ▶ Selected technical exercises to be a competent trainer, e.g. GMO test use, understanding the cotton plant.

As for any training programme, the plan (e.g. Annex 3 Training Plan for Field Staff) will need to be adapted by the master trainer to consider the following variables:
• **The timing of the training workshop** in the cotton season affects the selection of field activities: many field exercises can only take place during a specific period within the cotton season, but some can be done at any time. Preferably, ToT training take place at different times of the season (see example in Annex 3).

• **The scheduled length of the onsite training session**: The shorter the group workshop training, the more content should be read in self-study before the workshop. For shorter training duration, it is highly recommended to use the limited time for hands-on field activities and group discussions based on self-study of the OCTC training decks (and recommended materials) rather than presentation of OCTC decks in a lecture.

• **Access to organic cotton fields and availability of organic farmers for training activities during the ToT workshop**: The distance between training venue and organic cotton farms will affect which and how many of the ToT field activities can be done. Prevailing practices on nearby farms will affect some of the exercises: E.g. a push pull-system can only be shown if some farmers plant at least traps crops or if the group manages a demonstration plot to show farmers the benefits of the push-pull system.

• **Identified training needs and experiences of the trainees**: Completely novice field staff will need more practical training (see e.g. full training programme in Annex 3) to than intermediate or senior farmers trainers with several years of experience, who participate in trainings to update and refine their knowledge and skills.

### 3.3 Use of the OCTC Tools for Farmers Training

The OCTC tools and this guide were primarily developed as a training for trainers, to give organic field staff the technical knowledge and skills to support and train farmers, with the main tool directly usable for farmers training being the Field Activity Guides for each module.

While not directly designed for use in farmers’ training it was found during the consultation phase of the OCTC tools, that the selected parts of the training manuals may also be interesting and useful for experienced organic farmers or lead farmers.

**Farmer Field Activities included in the OCTC**

The OCTC Farmers Field activity Guides of Module 2 to 12 can be directly used by field staff to plan hand-on interactive field activity sessions with farmers.

Module 0 provides an overview of suitable training activities described in the field activity guides per module for the different stages of the Indian Organic cotton season.
In principle, FiBL does not recommend farmers training as lectures using slide decks. However, trainers may still find that depending on the most pressing topics for farmers in their group, selected sides of the OCTC slide deck may be helpful as an introductory input session before engaging more with farmers in group discussion and field activities.

If using slides, the selection should focus on the most relevant challenges or knowledge deficits of the group’s farmers, preferably as identified by the farmers themselves (what topics would THEY like to receive input training on).

Some slides may also need to be adapted to the organic cotton project’s specific processes and production guidelines as defined in the group’s Internal Organic Standard and ICS manual (e.g. local bio-pesticide formulations; seed distribution, GM testing protocol, etc.)

OCA plans to develop farmer training & handout materials based on the OCTC.
# Annex 1: List of Key Resources

<table>
<thead>
<tr>
<th>Resource</th>
<th>Use in OCTC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic Cotton Crop Guide &amp; Training Curriculum (2005), Eyhorn &amp; al. FiBL</td>
<td>Use of selected content, slides &amp; illustrations</td>
</tr>
<tr>
<td>FibL/OCA Manual for Participatory On-Farm Breeding of Organic Cotton (2020), OCA/FiBL</td>
<td>Use of content; provided as external resource</td>
</tr>
<tr>
<td>NCOF National Centre for Organic Farming“Organic Agriculture: concept, Scenario, principals and practices “ by A.K. Yadav, National Project on organic Farming, Dep.t of Agriculture &amp; Cooperation</td>
<td>Review of practices</td>
</tr>
<tr>
<td>ICAR / Dharwad centre: Organic Production Technologies developed in Crops</td>
<td>Review of recommended practices for cotton and intercrops (focus on Karnataka)</td>
</tr>
<tr>
<td>Venugopalan, M.V.(CICR/ICAR) several training presentations</td>
<td>Use of selected slides adapted into OCTC and of selected pictures with reference</td>
</tr>
<tr>
<td>CICR/ICAR Presentation “Pest and Disease management in Cotton” by Sandhya Kranthi</td>
<td>Use of selected slides and many pictures with full reference</td>
</tr>
<tr>
<td>Center for Sustainable Agriculture (CSA) Secunderabad, India: Let’s understand pests</td>
<td>Use of selected recommendations and illustrations with reference; external resource Module 6.</td>
</tr>
<tr>
<td>Department of Commerce (2014)National Programme for Organic Programme (NPOP) Ver. 7</td>
<td>Regulatory requirements included and considered in all modules</td>
</tr>
<tr>
<td>SysCom/FiBL/Bio Re (2014) Leaflet Series Preparation and Application of self-made organic pest control products, available on system-comparison.fibl.org</td>
<td>Selected recommendations are included in OCTC; recommended external resource.</td>
</tr>
<tr>
<td>Aga Khan Foundation: Farmers leaflets on organic cotton production</td>
<td>Review of recommended practices</td>
</tr>
<tr>
<td>Better Cotton Initiative: ToT Training Modules &amp; Manuals (kindly provided by BCI)</td>
<td>Review of practices, use of selected slides &amp; pictures with reference</td>
</tr>
<tr>
<td>FiBL Sys Com Project : System comparisons organic – conventional: cotton in India</td>
<td>Use of selected key research findings</td>
</tr>
<tr>
<td>MEAS: What every extension worker should know – Core Competency Handbook</td>
<td>Review of content; Use as external reading resource</td>
</tr>
<tr>
<td>Keshav &amp; Sandhya Kranthi ICAC/Solidaridad «Cotton Field Manual»</td>
<td>Selected chapters as reading resource</td>
</tr>
<tr>
<td>Resource</td>
<td>Use in OCTC</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>The University of Georgia Cooperative Extension (2007): Cotton Growth and Development</td>
<td>Use of selected content &amp; illustrations with full reference. Recommended as external resource</td>
</tr>
<tr>
<td>Riar, A. et al (2020). Technical Efficiencies and Yield Variability are comparable in Organic and Conventional farms, Sustainability 2020, 12, 4271.</td>
<td>Use of selected findings and illustration with reference (Module 2)</td>
</tr>
<tr>
<td>R. Lal et al (2004): Soil Carbon Sequestration Impacts on Global Climate Change and Food Security, Science 304, 1623</td>
<td>Review of content; recommended external resource (Module 3)</td>
</tr>
<tr>
<td>FiBL Technical Guide: Good Agricultural Practice in Irrigation Management (2020) by P. van den Berge</td>
<td>Use of selected content &amp; illustrations; recommended external resource Module 7</td>
</tr>
<tr>
<td>Water footprint network (2017): Guiding farmers towards sustainable cotton production.</td>
<td>Use of selected content and illustrations with reference; recommended resource Module 7</td>
</tr>
</tbody>
</table>
Annex 2: Training Plan Master Trainers’

This training plan is a sample schedule for a training of “master trainers”, i.e. training managers of organic cotton projects or local consultants who will take on training of organic field staff.

The example is for a rather compact master training (2.5d, thereof 1 d field training) combined with 1 day of pre-work preparatory self-study. A longer master workshop allows to gain more practice in facilitating field activities and less self study may be required. See Sample Field Staff Training Plan in Annex 3 for inspiration.

The training plan may need to be adapted to identified training needs and to the time & setting of the master training session.

► Many field activities can only be conducted during a specific period in the cotton cycle, so the list of suitable field activities may need to be adapted.

► Depending on the workshop setting it may not be easily possible to conduct any training sessions with local organic cotton farmers (though highly recommended). The plan below

<table>
<thead>
<tr>
<th>Master trainers: Self-Study Assignment before the training</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Document</strong></td>
</tr>
<tr>
<td>OCTC Trainer’s Guide</td>
</tr>
<tr>
<td><strong>Module 0</strong> (Training methodology): training deck</td>
</tr>
<tr>
<td><strong>Module 1</strong> (Introduction): training deck</td>
</tr>
<tr>
<td><strong>Module 2</strong> (Varieties, cultivars &amp; seeds): training deck &amp; field activity guide</td>
</tr>
<tr>
<td><strong>Module 3</strong> (Field preparation, planting &amp; field management): training deck &amp; field activity guide</td>
</tr>
<tr>
<td><strong>Module 4</strong> (Cotton Plant): training deck</td>
</tr>
<tr>
<td><strong>Module 8</strong> (Crop diversity) training deck and field training exercises</td>
</tr>
<tr>
<td><strong>Module 9</strong> (harvest &amp; post harvest) training deck and field activity guide</td>
</tr>
<tr>
<td><strong>Module 11.</strong> (Farm business): training deck and field activity guide</td>
</tr>
</tbody>
</table>
Module 12 (Grower Group Certification): Self-study only (to raise questions, if any)

<table>
<thead>
<tr>
<th>Total estimated self-study time for preparation: 1 day</th>
</tr>
</thead>
</table>

### DAY 1 (Half day)

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
</table>
| Afternoon Session with break | Welcome & Introduction  
0. Training methods: Warm-up group activity training methods for different topics (ToT-Exe 0.3)  
Questions Module 1 & Module 4 (self-study modules):  
- show 3-4 selected slides of Module 1 (e.g. “why to be an organic farmer”); Any questions Module 1?  
- Ideas for field staff to motivate cotton farmers for organic farming? (sticky notes exercise or discussion)  
- Module 4: Any content questions?  
Module 2: Brief Input & discussion  
- Input presentation : 5-10 slides from Training deck  
- Discussion questions Module 2, if any  
- Discuss need for adaption to group policies (seed procurement, GM testing, etc) for training field staff  
Module 3: Brief Input & discussion  
- Input presentation : 5-10 slides from Training deck 2  
- Discussion questions Module 3, if any  
Note to Trainer: as M3 introduces soil management & crop diversity there may to be many questions which may be better deferred to later modules |
| How long | 30 min  
30 min  
30 min  
1 hr  
1 hr |

### Materials

- 2-3 Flip charts or black board, stick notes, pens

### Training handouts

- OCTC trainer’s Guide (printed)  
- Printed Training Decks Handouts (e.g. 3 slides per page with room for notes) of all OCTC Modules in a folder for Master trainers.

### DAY 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
</table>
| Morning session with break | Module 5: Content & discussion  
- Presentation of OCTC Slide deck M5 with proposed group discussions  
- Briefly discuss proposed ToT activities for field staff training (See chapter M5.0 ToT Info-box)  
Materials  
2 hrs |
| How long | 2 hrs |
**ToT Exercise 8.3 Crop diversity:** benefits and impediments to intercropping (Field Activity exercise adapted to group discussion with master trainers)

**Questions Module 8:** (self study modules)
- Show a few sample slides Module 8 and Module 12 crop diversity (e.g. those included in this guide)
- Discuss questions on Modules 8 and 12

<table>
<thead>
<tr>
<th>Afternoon Session</th>
<th>Module 6: Content &amp; discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Presentation of OCTC Slide deck M6 with proposed group discussions</td>
</tr>
<tr>
<td></td>
<td>Small group exercise: participants to plan a cotton field with push/pull system and varied intercropping in teams of 2-3 as a poster → groups review each others field layouts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 7: content &amp; discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation of OCTC slide deck M7 with proposed group discussion</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3 Flip charts or black board, stick notes, pens</td>
</tr>
</tbody>
</table>

Note: this plan is a for a training session before the cotton season, i.e. without cotton in the fields. If the master training takes place during the season, field activities can be adjusted according to the season, see recommended ToT field exercises along the season in Annex 3

<table>
<thead>
<tr>
<th>DAY 3</th>
<th>What (off season option: with or without farmers present)</th>
<th>How long</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field day with breaks</td>
<td><strong>Exercise 5.2 farmers compost and FYM heaps tour</strong>: discussion of best practices for composting, checking composting progress and balanced composition; Discuss recommended FYM storage on farms</td>
<td>2 to 2hrs 30 min</td>
</tr>
<tr>
<td></td>
<td><strong>If possible: demonstration of rock phosphate acidulation</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Exercise 5.1. Examining soil</strong> (better if there have been some rains already) <strong>AND/OR field tour to observe &amp; discuss field preparation practices</strong></td>
<td>1 to 2 hrs</td>
</tr>
<tr>
<td></td>
<td><strong>Exercise 6.4 Selecting suitable crop rotation plan OR Exercise 3.1 (1st part): Discussing benefits of green manures OR Exercise 11.1 Farm records</strong></td>
<td>1 to 2hrs</td>
</tr>
<tr>
<td></td>
<td>Teams of 2-3 “Trainee Master trainers” facilitate the farmer training (e.g. split farmers in groups and let several</td>
<td></td>
</tr>
</tbody>
</table>
Alternative Option for Day 3: If there is no option of training in cotton growing areas during the Master trainer training, then some of the suggested ToT field training activities (see also Annex 3 for more complete list) may be adapted to a workshop setting (discussion based).

- E.g. planning green manures & intercropping in the field; discussing how to convince farmers of intercropping;
- Share & Discuss best working practices for pest scouting and assessing damage levels in the fields; working groups on best working practices to control different pests, what recommendations for farmers had a good uptake and were most successful.
- Small working groups (e.g. for different regions) discuss local best water conservation & irrigation practices and how to motivate farmers to improve their practices.
Annex 3: Training Plan Field Staff

Notes for master trainers:

This is a sample plan for training completely new/junior “organic field staff (farmers trainers)”, by a master trainer. The total duration of the training course is 7 days, split over 4 sessions along the cotton season with a longer initial workshop and focus on field activity sessions along the season. Additionally at least 1 day of self-study is expected.

The plan may need to be adapted to participants’ experience and timing of the trainings. For already more experienced field staff training, the master trainer picks a suitable selection of field exercises and can reduce the duration of workshop sessions by more self-study assignments.

<table>
<thead>
<tr>
<th>Field Staff Training: Self-Study Assignment before 1st workshop</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCTC Trainer’s Guide</td>
</tr>
<tr>
<td>Module 1 (introduction)</td>
</tr>
<tr>
<td>Module 2 (Varieties, Cultivars &amp; Seeds): training deck</td>
</tr>
<tr>
<td>Module 3 field preparation &amp; planting</td>
</tr>
<tr>
<td>Module 4 (Cotton Plant)</td>
</tr>
<tr>
<td>Module 8 (Crop diversity)</td>
</tr>
</tbody>
</table>

Note for trainers: Depending on prior knowledge of participants, the trainer can ask participants to study also OCTC modules 3, 5 & 6 online in preparation of the workshop. During the training, the trainer presents only a shortened version of the slide deck and focusses on discussion and exercises. This will shorten the duration of the proposed sessions slightly.

TRAINING SESSION 1 before the Season (TOTAL: 2.5 days)

<table>
<thead>
<tr>
<th>DAY 1</th>
<th>Training activity at workshop venue</th>
<th>Time needed</th>
</tr>
</thead>
</table>
| Morning session with break | Module 0:  
- Presentation Slide deck  
- ToT Exe 0.1 Participants give a 3-5 minute “pretend presentation to farmers” on a small topic of Module 3. | 1hr 30 min |
| | Module 1 Introduction Organic Cotton:  
- Brief presentation of 3-5 key slides of training deck. Questions Module 1 | 30 min |
<table>
<thead>
<tr>
<th>Module 2 Varieties, Cultivars and Seeds</th>
<th>1hr 30 min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Group discussion (or flipchart sticky notes group activity) on how to best motivate farmers for organic production &amp; support conversion.</td>
<td></td>
</tr>
<tr>
<td>Training deck Module 2 with included group discussions</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Afternoon session with break</th>
<th>Exercise 2.3: using Bt strip tests and discussing GM contamination risk</th>
<th>45 min</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Module 3 Field Preparation &amp; Planting</td>
<td>1hr 30 min</td>
</tr>
<tr>
<td>Training deck Module 3 with included group discussions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 5</th>
<th>2 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training deck Module 5 with discussions</td>
<td></td>
</tr>
<tr>
<td>BT strip test sets (at least one per 2-3 participants); water &amp; different cotton seeds incl. GM seeds (see instructions for Exe 2.3)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials</th>
<th>DAY 2 Field Activity Day (near fields; with farmers)</th>
<th>Time needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT strip test sets (at least one per 2-3 participants); water &amp; different cotton seeds incl. GM seeds (see instructions for Exe 2.3)</td>
<td>Exercise 2.2 Cultivar selection: trainees facilitate farmer session on cultivar selection OR Exe 3.1 ((1st part): Discussing benefits of green manures with farmers</td>
<td>1 hr</td>
</tr>
<tr>
<td>Exercise 5.2 farmers compost and FYM heaps tour; discussion of best practices AND/OR 5.3 Making Compost: setting up compost (group site) and/or checking composting progress in an established heap &amp; discussing composition</td>
<td></td>
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<tr>
<td>Exercise 8.3 economic benefits of crop diversification with farmers AND/OR Exercise 6.4 Selecting suitable crop rotation plan Teams of 2-3 Trainees facilitate the farmer training sessions (e.g. split farmers in groups and let several teams facilitate the same training session); feedback to trainers.</td>
<td>3 hrs</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>DAY 3 -Half Day</th>
<th>Training activity at Workshop venue</th>
<th>Time needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option to conduct Exercise part with farmers</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Materials</th>
<th>DAY 3 -Half Day</th>
<th>Time needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depending on exercises, see materials listed in the field activity guides e.g. Seeds or plant pots with recommended local good green manure crops to show farmers; Shovel &amp; composting materials, metal stick, Poster paper and pens, note paper</td>
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</tbody>
</table>

Organic Cotton Training Curriculum (OCTC) Trainer’s Guide
### Morning

<table>
<thead>
<tr>
<th>Module 6 Part 6.1 to 6.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training deck Module 6 with discussions</td>
</tr>
</tbody>
</table>

**Workshop Training session (with or without farmers)**

**Exe 6.1. Part A: Planning for trap crops - push pull crops:**

- a) With farmers (starting with short input on push-pull cropping)
- b) OR the master trainer conducts the exercise with the field staff who take on the role of farmers and plan a cotton field with suitable crops and why they chose each intercrop/push/pull crop.

<table>
<thead>
<tr>
<th>Time needed</th>
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<tbody>
<tr>
<td>1 hr 30 min to 2 hrs</td>
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</table>

**Materials**

- Poster paper and pens, note paper

### TRAINING SESSION 2 Early Season (Total 1-1.5 days workshop with field)

#### DAY 1

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5d workshop, 0.5 field trainings (with farmers)</td>
<td>1 hr 30 min</td>
</tr>
</tbody>
</table>

**Optional:** with farmers at a training venue or near fields

#### Morning

<table>
<thead>
<tr>
<th>Module 6 from Part 6.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remaining parts of training deck Module 6 (6.4, 6.5 &amp; Summary) with discussions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module 7 Water Management</th>
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</thead>
<tbody>
<tr>
<td>Presentation of training deck with discussions</td>
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</table>

<table>
<thead>
<tr>
<th>Time needed</th>
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<tbody>
<tr>
<td>1 hr 30 min</td>
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#### Afternoon

**Training in the cotton field (with or without farmers):**

- **Exe 6.3 Observe pests, natural enemies & growth** (Step ); but follow up 1-2 weeks later recommended
- **Exe 5.1 Experiencing and examining soil:** Master trainer can lead the exercise
- Optional add-on field visit or group discussion: good planting practices for different intercrops and green manure crops in the cotton field

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<thead>
<tr>
<th>Time needed</th>
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<tbody>
<tr>
<td>2-2 hrs 30 min</td>
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<tr>
<td>1 hr 30 min (30min)</td>
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</table>

**Materials**

- Cotton plants
- Note paper and pens
- Polyethylene bags & rubber bands
- Spades for soil sampling, Water & soap to wash hands;
- Optional: Soil sample (of another typical soil type which cannot be found on nearby fields) to compare with local soil.
- Optional: Print outs of Soil sample form for Exe 5.1 if planned: extra tools for soil organism exploration exercise
<table>
<thead>
<tr>
<th>DAY 2</th>
<th>Optional extra 0.5 Training at a local farm or the training venue, best with farmers</th>
<th>Time needed</th>
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<tbody>
<tr>
<td></td>
<td>Exercise Module 6: Making organic plant preparations</td>
<td>2-4 hours</td>
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<tr>
<td></td>
<td>If field staff has not yet experienced or facilitated trainings on making organic plant preparations:</td>
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<td></td>
<td>Trainees prepare and facilitate a training session on making &amp; use of one of the recommended plant preparations. Use FiBL leaflets or recommended formulation guidelines as recommended by the group</td>
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<table>
<thead>
<tr>
<th>TRAINING SESSION 3  Mid Season (Total 1 Field Day)</th>
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<tbody>
<tr>
<td>DAY 1</td>
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<thead>
<tr>
<th>Self-Study Assignment before End of Harvest Season training</th>
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<tbody>
<tr>
<td>Module 11. Farm business: Self-study of training deck in preparation of field activities</td>
</tr>
<tr>
<td>Module 12 Certification Self-study of training deck</td>
</tr>
</tbody>
</table>
### TRAINING SESSION 4  Harvest Season e.g. after 1st picking (TOTAL 1 day)

<table>
<thead>
<tr>
<th>DAY 1</th>
<th>Training venue near cotton fields; without or with farmers</th>
<th>Time needed</th>
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<tbody>
<tr>
<td>Field day with breaks</td>
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</table>
| **Exercise 9.1. Estimating yields in the field**  
*Can be combined with Exercise 4.5 yield distribution on the plant* |                                                            | 1hr 30 min to-2 hrs |
|                               |                                                            |             |
|                               | During the same field visit: 6.4. part 1 observing & discussing  
Pink bollworm in the fields | 1 hr         |
| **Exercise 9.2: contamination risk during harvest, home storing & transport**  
*(visit tour and/or discussion)* |                                                            | 1-2 hrs      |
| **Exercise 11.1 Farm records**  
**AND/OR 11.2 Profit & Loss Calculation example** |                                                            | 2-3 hrs      |

*End of Training.*