

# ADAPTATION STRATEGIES TO CLIMATE CHANGE



**3. ADAPTATION PRACTICES** 

## **TRAINING OVERVIEW**

You are in the 3<sup>rd</sup> step of your training

#### Learning outcomes

- What is Climate Change Adaptation
- Which key practices can cotton producers adopt

Step 1	Introduction to Climate Change
Step 2	Mitigation Practices
Step 3	Adaptation Practices
Step 4	Finance & Funds
Step 5	Climate Change & the CIP

Chapters	Time
1. Adapting to Climate Change	5mins
2. Adapting cotton varieties and calendar	5mins
3. Adapting cultural practices	10mins
4. Adapting water conservation practices	10mins
Assessment	10mins
Total tim	e: 40mins



# 1. ADAPTING TO CLIMATE CHANGE

### **ADAPTATION IN CLIMATE CHANGE RESILIENCE**

#### **Mitigation**

Avoid GHG emissions

Energy conservation & efficiency

Carbon sequestration – maintain and restore stocks

#### **Adaptation**

Moderate potential damage

Cope with consequences

Take advantage of opportunities

Adaptation to climate change is an adjustment in response to climate change impacts, which moderates harm or exploits beneficial opportunities

# MAIN CLIMATE CHANGE THREATS TO COTTON PRODUCTION



# WHAT CAN WE DO? 3 DIFFERENT STRATEGIES AT FIELD LEVEL





# 2. ADAPTING COTTON VARIETIES AND CALENDAR

# **COTTON VARIETY CHOICE**

- Some seeds can help farmers adapt to climate change impacts
- Farmers are encouraged to select varieties which are:
  - drought tolerant
  - resistant to water logging
  - resistant to soil salinity
  - resistant to pests & diseases

*I.e.:* Gossypium arboretum or Gossypium hirsutum are more drought tolerant varieties

- A smaller area of a higher value product could provide a greater return in situations of limited water
- Choosing a variety with specific fibre properties can cover for some climate or management challenges



# VARY PLANTING TIME: FLEXIBILITY OF SOWING DATES

Adapting the planting period is a way for farmers to:

- maintain/improve yield
- improve fiber quality
- reduce the risk of adverse effects of high temperatures and low humidity (high evaporative demand)
- reduce the incidence of seedling diseases early in the season

Sowing dates depend on weather variability

- → affects calendar differently from one cotton growing area to another
- → Farmer should refer to local weather reports over several years when available

*I.e.: in case of drought or cold stress in spring, Chinese growers will delay planting by few weeks* 





Case study

## BCI FARMERS' ADAPTATION MEASURES FOR FACING WEATHER HAZARDS IN PAKISTAN

- Avoiding cultivating crops in flood prone areas
- Cultivating drought & heat resistant varieties
- Start sowing with consultation with meteorological experts
- Update crop calendars and align it with metrological projections
- Water shortages can be mitigated using modern and better irrigation practices (i.e.: use of rice straws)

Could you confirm that those are adaptation (and not mitigation) measures?



# 3. ADAPTING CULTURAL PRACTICES

# THE 7 WAYS TO ADOPT CULTURAL PRACTICES

There are 7 key practices farmers can adopt so to adapt to Climate Change impacts in their everyday practices:

- 1. Zero tillage/conservation tillage
- 2. Avoid bare soil
- 3. Rotate crops
- 4. Maximising plant diversity
- 5. Manipulate crop maturity
- 6. Using IPM techniques

## **1. ZERO TILLAGE / CONSERVATION TILLAGE**

No-tillage is a way for farmers to adapt to CC impact by:

- Maintaining soil structure: it reduces erosion, maintains soil compaction and moisture, and keeps a lower temperature
- Avoids emissions from soil to air so to have more carbon stock
- Maintaining soil biology; as it maintains habitats for microbial communities, fungus, earthworms, etc.
- Reducing usage of fuel, labour and equipment; because tillage is not conducted

However, this means that weed management has to be conducted using other techniques (cover crops, litter...)



# 2. AVOIDING BARE SOIL

- Protecting the soil with organic material allows for a better resilience to drought by preserving soil moisture
- It helps to minimise:
  - Loss of organic matter and nutrient leachate
  - Run-off
  - Wind erosion





# **3. NUTRIENT USE EFFICIENCY: ROTATION CROPS**

# Link with climate?

- Crop rotation consists in growing a series of different crop types in the same area in sequenced seasons
- For more efficiency, farmers should select crops that have different root systems
- Legume rotation crops can benefit cotton crops by:
  - reducing N fertilizer use
  - improving P and K nutrition of following
  - helping pest and disease control
  - improving overall soil quality
  - reduced application of pesticides



### 4. MAXIMIZE PLANT DIVERSITY DURING / BETWEEN COTTON CYCLES



- A cropland design that has plant diversity will benefit soil fertility: link with climate?
  - cover crops
  - intercropping annuals or perennials
  - push-pull crops
  - Exemples
    - In India, intercropping cotton and pigeonpea or maize or the use of castor as trap-crop
    - In the US, research is experimenting pecan (Carya illinoensis K. Koch) – cotton (Gossypium hirsutum L.) cropping system

# **5. MANIPULATE CROP MATTURITY**

- Early crop maturity may avoid quality downgrades and can save on water or late season insect protection
- Artificially shorten the time to maturity can be a good way to avoid heat stress
- Crop maturity can be manipulated by
  - choice of cultivar
  - insect management
  - nutrition
  - late season irrigation management

### 6. OPTIMIZE THE USE OF HERBICIDES, PESTICIDES AND DEFOLIENTS

- Farmers are strongly encouraged to prioritise other pest control techniques, so to avoid:
  - GHG emissions environmental contamination
  - Risks for human health
  - Development of resistance amongst insect population



## 6. OPTIMIZE THE USE OF HERBICIDES, PESTICIDES AND DEFOLIENTS

- BCI recommend using early warning systems and implementing IPM to efficiently use pest and weed control techniques
- > IPM criterion 1.1. states that:
  - Applications should only be made based on actual needs in a specific field, according to field observations of specific pest level
  - When pest control becomes necessary, non-chemical methods should be considered first
  - The use of pesticides should be seen as a last resort (especially those with broadspectrum activity)





#### BCI FARMERS' ADAPTATION MEASURES FOR CONTROLLING PESTS IN PAKISTAN

- To face pest invasions, BCI Farmers are practicing plant to plant and row to row spacing improvement / management to break the life cycle of crop pests
- PB Ropes and Pheromone traps are used for monitoring and managing the number of pink bollworms
- Avoiding early sowing so to better control growth and population of pests

Could you confirm that those are adaptation (and not mitigation) measures?

Case study



# 4. WATER MANAGEMENT



# WATER MANAGEMENT: WHAT CAN BE DONE BY COTTON PRODUCERS?



#### MONITOR WATER USE EFFICIENCY: IRRIGATED AND RAINFED COTTON

BCI recommends the adoption of practices to:

Improve water		
storage	Re	duce water losses
	fror	n water storage to
		field

Increase soil water holding capacity and limit evaporation (land cover, notillage, etc) Better schedule irrigations by using technologies that monitor weather Adapt water use according to soil type, demand of the crop (if several) and climatic conditions (temperature and humidity)

Refer to Water Stewardship Training Module

## USING ALTERNATIVE IRRIGATION SYSTEMS FOR LESS WATER CONSUMPTION

Refer to Water Stewardship Training Module

- Drip irrigation systems or sub irrigation systems can be a good option to limit water consumption and run-off
- However, these can be costly to install





- Furrows are also a good way to save water
- However, furrows are not as performant as drip systems in term of water management







# **CONCLUSION & ASSESSMENT**

# THE URGE TO ADAPT

The impacts of climate change will differ for each country
Adaptation will be focused on:



- Practices will have to be specific to local climate variations and field conditions
- Cotton rural communities will have to seek crop diversification & alternative income sources



What does Climate Change adaptation consist in?





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Which ones are adaptation practices to implement for cotton production?

Reducing the amount of cotton produced

Adapting water management practices

Adapting cotton varieties & calendar

Adapting cultural practices

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*What can producers do in terms of adapting cotton varieties* & *calendar?* 

Adapting the planting period<br/>based on weather variability<br/>and reportsSelecting drought tolerant<br/>varietiesAvoiding varieties which are<br/>resistant to water loggingGossypium arboretum and<br/>Gossypium hirsutum are<br/>best for drought areas

*What can producers do in terms of adapting cotton varieties* & *calendar?* 

Adapting the planting period based on weather variability and reports

Selecting drought tolerant varieties

Avoiding varieties which are resistant to water logging

Gossypium arboretum and Gossypium hirsutum are best for drought areas

# Which local practices can farmers adopt so to adapt to Climate Change impacts?

Maximising plant diversity	Rotate crops
Using IPM techniques & optimising the use of herbicides and pesticides	Zero tillage/conservation tillage & covering soil
None of the above	All of the above

# Which local practices can farmers adopt so to adapt to Climate Change impacts?



Which of the following are true?

No-tillage is a way to avoid emissions from soil to air so to have more carbon stock

Covering the soil with organic material allows for a better resilience to droughts

None of the above

Using alternative pest control is a way to avoid GHG emissions

Artificially shortening the time to crop maturity can avoid heat stress and save water

All of the above

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None of the above

All of the above



# *True or False: both irrigated and rain-fed farms can reduce their water use?*





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# Which water use best practices can be used by cotton farmers?

Improving water storage	Adapting water use according to soil type, demand of the crop and climatic conditions
Only relying on technologies that monitor weather	Increasing soil water holding capacity and limiting evaporation

# *Which water use best practices can be used by cotton farmers?*



#### What is true about the urge to adapt to Climate Change?

Cotton will remain the first fiber of choice to face climate's negative effects Practices will have to be specific to local climate variations and field conditions

Cotton rural communities will have to seek crop diversification & alternative income sources

The impacts of climate change will differ for each country

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Suggestion for other questions?





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