Technician Training

Manual

(2008)
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Introduction

Cowpea Production in the World

- 3.7 million tons produced yearly in the World
- 70% of world production is made in West and Central Africa
- Niger produces 14%
- Burkina Faso produces 6%
- Nigeria up to 66%
Cowpea Production in West and Central Africa

Importance of Cowpea

- Cowpea contains high rate of proteins (23%)
- Fodder for animals
- Transformed by women for income-generating activities (kosaï / kékéna / samsa)
- Source of liquidity for farmers
- Nigeria’s importations: 260000 tons per year.
- Source of income for countries
  - Example: In Niger 1 billion CFA francs in 1996 and 8 billions in 2000
Bill and Melinda Gates Foundation

- Interventions centered on markets,
  - Creating value chains
  - Market-based solutions

- Taking into account all the dimensions,
  - Low-income producers
  - Big producers and cowpea traders

**PICS Value Chain**

- Cowpea consumers
- People transforming cowpea
- Traders and producers storing cowpea
- PICS bags makers
- PICS bags wholesaler and retailers
- Sales ↑ income ↑
- New product ↑ business ↑
- Cowpea quality ↑ benefit ↑ poverty ↓
- Cowpea quality ↑ sells ↑ poverty ↓
- Kossai quality ↑ health ↑ poisoning case ↓
PICS - Nigeria Partners

- Purdue University
- IITA
- ADPs
- PROGREEN and WDI
- Other NGO's
- Extension services
- Producers and farmer's organizations

Project Vision

- In 5 years, 50% of the cowpea stored at the farm level in West and Central Africa will be protected in non-chemical, hermetic storage.

TRIPLE BAGGING
Project objectives

- To cover 28,000 villages in 10 countries in 5 years.
- To popularize the use of triple bagging via:
  - Demonstrations in the village
  - Sensitization through radio
- To facilitate the establishment of a sustainable system of production and distribution of triple bags to Wholesalers, Distributors, Farmers
- Adoption of triple bagging by producers and cowpea traders
- To increase small producer’s income
- To increase the marketability of cowpea

The Problem

Cowpeas are very susceptible to attacks by bruchids during storage.
Cowpea Price

October/November

April/May

Eliminate Air

The bruchids cannot live without air

We should use PICS bags to store our cowpea
10 Countries
28,000 Villages
5 Years (2007 – 2012)
After hearing a radio announcement a merchant in Zinder contacted Dr. Baoua (the person responsible for PICS in Maradi, Niger) for assistance. The merchant purchased 500 PICS bags. In this storage area we counted about 250 bags full of cowpeas.
Specifications of the Bags

• Inside Bags
  – 2 bags PEHD 62 X 113 X 80 μ

• Outside Bag
  – Woven Bag 60 X 110 cm for 100 kg. of cowpea printed on 2 sides with PICS logos and logos of partners
YOU ARE THE AMBASSADORS OF THIS PROJECT

Notes
Triple Bagging Technology
The Technique/Demonstration

Close the second plastic bag in the same way twisting at the end and then attach the woven bag outside.

Extract the maximum of air!!!
History

This technology was developed in Cameroon 20 years ago by Professor Larry Murdock and his team under the Bean Cowpea CRSP from USAID.

The Problem
Research Considerations

• The bruchids need air to breathe and grow
• The need to find methods that are available to all producers, without danger to people and the environment
• The need to integrate locally available materials
• The need to capitalize on the current practices by producers
• The method of sealed containers is well known and effective

Suggestions

• To have a plastic impervious to oxygen
• The bag must contain no holes
  – Could be checked with water – if water tight then there are no holes
• The system must support the operations in usual handling
• The best Quality/Price relationship
The Tests are Conclusive

Components of the PICS Bags

- The exterior bag is woven polyethylene
- Bag in the middle HDPE 80 microns
- Inside bag HDPE 80 microns
Principles of triple bagging

The triple bag technology allows very little air from outside to get to the grain. The bruchids consume the small amount of oxygen available, and emit CO2. In just a few hours, a low oxygen and enriched CO2 environment is created which stops the bruchids from causing the damage. The bruchids eventually die.

PICS bags are available

50 kg bag made in 2007

100 kg bag made in 2008
Opening Ceremony of triple bags in May 2008

Chadakori’s show, Niger
12, May, 2008

Healthy cowpea after 6 months storage - no bruchid attacks

The Advantages of Triple Bagging

- No use of pesticide
- Effective when it is properly used
- Cost-effective, simple and quick
- The grains are ready to be consumed
- The bag can be stored in homes
- Easy to explain and to disseminate
- Possibility of reusing the bags
- Good for storage of small and large quantities of cowpea
The Bruchids and Cowpea Storage
The Bruchids and Cowpea Storage

Bruchids

- Small coleopter whose tip of the abdomen is not completely covered by élytrons
- Small coleopter whose tip of the abdomen is not completely covered by élytrons
Bruchids

Specialization by legume type
- *Callosobruchus maculutus* / cowpea
- *Bruchidius atrolineatus* / cowpea
- *Callosobruchus subinnotatus* / Bambara nut
- *Acanthoscelides obtectus* / bean (Phaseolus)
- *Caryedon serratus* / groundnuts

Cowpea bruchids

Non flying type
- Quick reproduction = destructive to cowpea in storage

Flying type
- Limited reproduction = disseminate to many areas
Stages of development

- 50 to 100 eggs laid by a female
- 4 larval stages + 1 nymph
- Duration of development: 20 - 32 days depending on conditions

Relationship Cowpea and Bruchids

- Insects contaminate cowpeas from the field at the end of growing season
- The eggs are deposited on the pods
- At harvest the seeds are apparently healthy but already contain larvae and eggs of the bruchids
- It is often reported an initial rate of infestation of 3 to 5%
- During storage, the development of bruchids continues and several generations can succeed in a few months

Initial infestation = 3-5 %
After 5-6 Months in Non Protected Storage

80 to 100% loss during storage

Conclusion

• The bruchids are insects that are in nature and can infest cowpeas from field
• The bruchids multiply rapidly within the stock of cowpeas and eat the cowpeas
• Without protection, the entire harvest of cowpea can be completely lost
The Importance of Cowpea in the Economy of West and Central Africa
The Importance of Cowpea in the Economy of West and Central Africa

Cowpea

• 3.7 million tons of production in Africa -70% of world production
• Is the most economically important autochthonous leguminous plant in tropical Africa
  - For farmers
  - For export
  - For food
  - For the informal sector
For Farmers

- Well adapted crop to harsh climatic conditions of West and Central Africa
- Fodder for animals
- Cowpea grain used for human nutrition for family
- Source of liquidity for farmers

For Exports

- Nearly 300,000 tons were traded annually in West Africa in the 90’s
Cowpea has Various Uses as Food

- Used in many traditional dishes
- High nutritional value, very rich in protein
- Consumed in villages and rural areas

For the Informal Sector

- Plays an important role in the economy
- Cowpea is very important for the formal and informal sectors
- Cowpea based products are very important for women’s activities
“If a woman starts to sell Kosaï to solve her problems and she cannot solve her problems; then she is not a “good woman”.” (Maradi, 2005)

Conclusion

• Constitutes the most economically important indigenous crop in tropical Africa
• All cowpea is harvested between October and November
• Consumption occurs throughout the entire year
• Good cowpea storage can contribute to improving the living conditions of many sectors of the population
Cowpea

October/November

The Price ↑ increases after harvest

Notes
Notes

Notes
Profitability of Cowpea Storage
Profitability of Cowpea Storage

Objective
To provide some assessment of the profitability of cowpea storage
Costs and Benefits of Cowpea Storage

• Benefits:
  - Sell when the price is higher
  - Have food during the lean period

• Costs:
  - Storage place and / or container
  - Manpower for handling
  - The need to provide protection for the plastic bags
  - Losses in storage - mainly insects and handling
  - Opportunity costs - What the producers could have done with their money, had they sold their grain at harvest time?

Average change in prices

<table>
<thead>
<tr>
<th>Countries, Time Period</th>
<th>Average Dec - June</th>
<th>Average Dec - Aug.</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Ghana; May, 2000, to April, 2002</td>
<td>10%</td>
<td>30%</td>
</tr>
<tr>
<td>Mali; Oct. 1999-Dec. 2001</td>
<td>44%</td>
<td>30%</td>
</tr>
<tr>
<td>Nigeria; Oct.1998-Oct. 2001</td>
<td>86%</td>
<td>121%</td>
</tr>
<tr>
<td>North Ghana, 1997-2000</td>
<td>15%</td>
<td>12%</td>
</tr>
<tr>
<td>Cameroon; 1997-2000</td>
<td>67%</td>
<td>60%</td>
</tr>
<tr>
<td>Senegal; Jan. 1998- Dec. 2003</td>
<td>50%</td>
<td>51%</td>
</tr>
<tr>
<td>Niger; April 2002 - Dec. 2005</td>
<td>28%</td>
<td>34%</td>
</tr>
</tbody>
</table>

Source: Different studies/ Bean/Cowpea CRSP Average 41% 48%
Reduction in the price of cowpea due to infestation

<table>
<thead>
<tr>
<th>Countries</th>
<th>Markets</th>
<th>Decrease for each bruchid hole in % of mean price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameroon</td>
<td>Maroua</td>
<td>0.17%</td>
</tr>
<tr>
<td>Senegal</td>
<td>Bambey</td>
<td>1.50%</td>
</tr>
<tr>
<td>Senegal</td>
<td>Tilene</td>
<td>2.30%</td>
</tr>
<tr>
<td>Ghana</td>
<td>Bolgatanga</td>
<td>1.20%</td>
</tr>
<tr>
<td>Ghana</td>
<td>Accra</td>
<td>0.50%</td>
</tr>
</tbody>
</table>

* Sources: Langyintuo et al. (2003) and Mishili (2005)

Simple calculation of cost/benefit

- Cowpea is sold at harvest at 50 Naira/kg and 4 to 6 months after harvest at to 100 Naira/kg.
- The increase from storage is 50 Naira/kg.
- For 100 kg the 50 Naira x 100 = 5000 Naira
- The cost of triple bag is 300 Naira
- Gain/total benefit is then 4700 Naira
For a farmer that sold 100 kg

Option 1: Sell 100 kg. at harvest
Cowpeas sold at harvest time at 50 Naira/kg
50 Naira/kg * 100 kg = 5000 Naira

Option 2: Sell later
Cowpeas sold 4 to 6 months after harvest can be sold for 100 Naira/kg.
100 Naira/kg * 100 kg = 10000 Naira
Buy a bag at 300 Naira/bag = 300 Naira
Net:
Naira 10000 - 300 = 9700 Naira

Gain from Storage: 4700 Naira

For a farmer that sold 200 kg

Option 1: Sell 200 kg. at harvest
Cowpeas sold at harvest time at 50 Naira/kg
50 Naira/kg * 200 kg = 10000 Naira

Option 2: Sell later
Cowpeas sold 4 to 6 months after harvest can be sold for 100 Naira/kg.
100 Naira/kg * 200 kg = 20000 Naira
Buy a bag at 300 Naira/bag = 600 Naira
Net:
Naira 20000 - 600 = 19400 Naira

Gain from Storage: 9400 Naira
For a farmer that sold 300 kg

Option 1: Sell 300 kg. at harvest
Cowpeas sold at harvest time at 50 Naira/kg
50 Naira/ kg * 300 kg = 15000 Naira

Option 2: Sell later
Cowpeas sold 4 to 6 months after
harvest can be sold for 100 Naira/ kg.
100 Naira / kg * 300 kg = 30000 Naira
Buy a bag at 300 Naira / bag = 900 Naira
Net:
Naira 30000 - 900 = 29100 Naira

Gain from Storage
14100 Naira

For Farmers

MORE MONEY FOR:
Nutrition, medical care, ceremonies,
purchases of inputs, livestock.
Thank you
This is the type of cowpea we want to see:
Everywhere
All the time
For the best price

Notes
Facilitation for Village Demonstrations
Facilitation for Village Demonstrations

Outline

• Facilitator Definition
• Difference between facilitator and teacher
• Its tasks
• Its golden rules
• How to boost learners
• The tools of facilitation
• The framework of learning
Facilitator

A GOOD FACILITATOR:
• Stimulates learning
• Assists, helping to discover and make decisions.
• Facilitator = moderator

Adults remember 20% of what they hear, 40% of what they see and 80% of what they practice and discover for themselves

Facilitation Vs Teaching

<table>
<thead>
<tr>
<th>Horizontal Communication</th>
<th>Vertical Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Discussion</td>
<td>• Very little discussion</td>
</tr>
<tr>
<td>• Promotion of ideas</td>
<td>• New ideas are all introduced by teacher rather than from the group</td>
</tr>
<tr>
<td>• Exchange of ideas</td>
<td>• Directives from the teacher</td>
</tr>
<tr>
<td>• Bottom-up communication</td>
<td>• Top-Down communication</td>
</tr>
</tbody>
</table>
The Tasks of the Facilitator

- Explain
- Attend
- Managing time
- Accompany
- Help
- Respect learners *
- Monitor
- Adaptor
- Initiate
- Maintaining the momentum
- Assess
- Identify potential opportunities

Golden Rules of a Facilitator

- Knowing the level of knowledge and understanding of your audience
- Respect the opinions of your audience
- Understand the technical aspects of the problem so you can fully explain it
- Arrange for a demonstration location that is conducive for learning
- Always maintain good manners
- Keep visual contact with the entire group
- Manage time effectively
The Qualities of a Facilitator

Initiator, observer, listener, patient, flexible, available, transparent, tolerant, committed, accessible, sociable, consultative, presentable, collaborator, adapted, speaks the local language, good knowledge of the environment, control the process, give explanations in a timely manner, does not force ideas on people, proactive etc.

How to Improve Relations with Learners

- Use local language
- Create a positive environment
- Encourage participation of all learners,
- Know and respect local customs and traditions
- Be honest and punctual
- Encourage dialogue
- Be well informed about new technologies
- Be a professional and rational
The Framework of Learning

- Good Communication
- Prepare the location ahead of time
- Use appropriate educational tools
- As a facilitator move and maintain eye contact with the group
- Structuring group according to customs for effective learning
- Audience gets useful information they can use to their benefit

Before the Demonstration

- Visit the village chief to inform him about the project objectives and get permission for the demonstration
- Establish a date and place for the demonstration
- Verify the availability of the bags
- Find out and record the current price of cowpeas
- Find out whether local radio messages are being broadcast, what time of day, and what message.
- Get people talking about the upcoming demonstration to spread the word
Before the Demonstration

• Arrange for advertising or spreading the word of the upcoming demonstration
• Communicate the date of the upcoming demonstration
• Arrange for a media coverage of demos
  – This is a good place for interviews with producer

Demonstration

• The demonstration should take place in a public place
• Identify 5 volunteers:
  – 3 men
  – At Least 2 women
• Have the farmers fill the bags with the cowpea that they brought
• Ensure that all participants can easily see and understand how the bags should be sealed
Demonstration

- Ensure the participation of men and women
- Remind the audience the key principles of the technology
- Inform farmers of the availability of bags
- Fill the bags right there during the demonstration
- Ask each volunteer to fill his/her own bag and carefully seal it

Follow up Monitoring and Assessment

- Sensitizing farmers on how to store the bags of cowpeas
  - Away from rats/mice
- Collect data and report back
- Media coverage of the celebrations
  - Open the Bag Demonstrations
Research on Human Subjects and Relevance for PICS
Research on Human Subjects and Relevance for PICS

Research Activities that Involve Human Subjects

• Previously, there have been abuses and people have been exploited
• Universities and other institutions around the world are now taking this very seriously
  - If we do not safe-guard our procedures the credibility of our work will be called into question
• NGOs take this very seriously
  - World Vision has a specific regulation that every employee must sign (child protection)
Research Activities that Involve Human Subjects

- This should be applied to research and development activities
- Some examples of abuse in medical research
  - Disadvantaged people were subjected to medical tests that affected their health without their knowledge or consent
  - People were forced to participate in studies because researchers held a position of dominance over the subjects and exerted pressure for them to participate

The research activities that involve human subject

The Purdue University has a department called the Internal Review Board (IRB) = Internal Council of evaluation whose objective is to ensure the protection of human subjects in research work in real conditions.

PICS project must comply with rules and procedures of the IRB and other partners
Important considerations in the context of PICS project demonstrations

- Respecting the customs and traditions in demonstration at villages;
- Explaining the objectives of PICS and obtain authorization from the villagers before doing demonstration
- The demonstrations must be conducted within a framework of dialogue without forcing, humiliation, threat and abuse of villagers

Taking into Account Gender

- PICS project has been implemented for the interest of men and women.
- It is important to involve at least 30% of women in all activities:
  - Research
  - Training of trainers
  - Doing demonstrations
  - Experimentation of technology
Information to be collected

• It is extremely important to collect information for impact assessment
• The Gates Foundation places high value on this aspect - Impact Assessment is the third phase of this project
• 2 levels of data/information collection
  - Households
  - Villages
• 3 periods of data/information collection
  - Before the demonstration
  - During the demonstration
  - After the demonstration
• Data Collection Guide - Manual
Data Collected by Field Technicians

Name of Technician:

Name of Facilitator:

Cell Phone of Facilitator:
<table>
<thead>
<tr>
<th>Name of Village:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Pre-Demonstration</th>
<th>Demonstration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td>Date:</td>
</tr>
<tr>
<td>Time:</td>
<td>Time:</td>
</tr>
<tr>
<td>People you met with:</td>
<td>People you met with:</td>
</tr>
<tr>
<td>Chief: ____________ Num. cell. ____________</td>
<td>Chief: ____________ Num. cell. ____________</td>
</tr>
<tr>
<td>Mayor: ____________ Num. cell. ____________</td>
<td>Mayor: ____________ Num. cell. ____________</td>
</tr>
<tr>
<td>Counselor: ____________ Num. cell. ____________</td>
<td>Counselor: ____________ Num. cell. ____________</td>
</tr>
<tr>
<td>Teacher: ____________ Num. cell. ____________</td>
<td>Teacher: ____________ Num. cell. ____________</td>
</tr>
<tr>
<td>Number Women Participants at the Demonstration:</td>
<td>Number Women Participants at the Demonstration:</td>
</tr>
<tr>
<td>Number Men Participants at the Demonstration:</td>
<td>Number Men Participants at the Demonstration:</td>
</tr>
<tr>
<td>Number Children Participants at the Demonstration:</td>
<td>Number Children Participants at the Demonstration:</td>
</tr>
<tr>
<td>List of names of Farmers who brought Cowpea for Demonstration:</td>
<td></td>
</tr>
<tr>
<td>1. ______________________________</td>
<td>2. ______________________________</td>
</tr>
<tr>
<td>3. ______________________________</td>
<td>4. ______________________________</td>
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<tr>
<td>5. ______________________________</td>
<td>5. ______________________________</td>
</tr>
<tr>
<td>Logistics:</td>
<td>Logistics:</td>
</tr>
<tr>
<td>Date pour Démonstration: ______________________________</td>
<td>Number of Women: ________</td>
</tr>
<tr>
<td>Temps pour Démonstration: ______________________________</td>
<td>Number of Men: ________</td>
</tr>
<tr>
<td>Place pour Demonstration: ______________________________</td>
<td></td>
</tr>
<tr>
<td>Other Observations:</td>
<td>Other Observations:</td>
</tr>
<tr>
<td>______________________________</td>
<td>______________________________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sale of PICS bags</th>
<th>Sale of PICS bags</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merchant selling the bags: ______________________________</td>
<td>Merchant selling the bags: ______________________________</td>
</tr>
<tr>
<td>Location of the Merchant: ______________________________</td>
<td>Location of the Merchant: ______________________________</td>
</tr>
<tr>
<td>Price of the bags: ____________/100 kg bag</td>
<td>Price of the bags: ____________/100 kg bag</td>
</tr>
<tr>
<td>Price of Cowpea: ____________ Naira/___________ (local units)</td>
<td>Price of Cowpea: ____________ Naira/___________ (local units)</td>
</tr>
</tbody>
</table>

For the Sample of 100 grains:

Number of Live Bruchids: ________  Number of Dead Bruchids: ________  Number of Grains with Holes: ________
<table>
<thead>
<tr>
<th>Follow-up Visits</th>
<th>First Visit</th>
<th>Second Visit</th>
<th>Third Visit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price of Cowpea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities accomplished</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Information from the Open the Bag</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date for the Open the Bag Demonstration</td>
</tr>
<tr>
<td>People met with</td>
</tr>
<tr>
<td>Date for Open the Bag Demonstration</td>
</tr>
<tr>
<td>Location for Open the Bag Demonstration</td>
</tr>
<tr>
<td>Number of Women Participants</td>
</tr>
<tr>
<td>Number of Men Participants</td>
</tr>
<tr>
<td>Number of Children Participants</td>
</tr>
<tr>
<td>Observations</td>
</tr>
</tbody>
</table>

For the Sample of 100 grains:

Number of Live Bruchids | Number of Dead Bruchids | Number of Grains with Holes