



Building
Nutritious
FoodBaskets

Provitamin A Maize

Facilitator's Guide



Training of Trainers (ToT) Provitamin A Maize: A Biofortified Solution for Vitamin A Deficiency

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Foreword

Biofortification is the process of increasing nutritional value of food crops by increasing the density of vitamins and minerals in a crop through either conventional plant breeding, agronomic practices or biotechnology. It is one of the key nutrition interventions that addresses micronutrient malnutrition among populations / groups who consume most of the staple foods that they produce, especially the poor, rural, and other vulnerable populations. Often, they have limited access to diverse diets, supplements, and commercially fortified foods that provide essential micronutrients necessary for ensuring healthy and productive lives. Adoption of biofortified food crops such as vitamin A rich orange-fleshed sweetpotato (OFSP); provitamin A (PVA) maize (vitamin A rich maize), high iron and zinc beans and vitamin A cassava, is an effective way of addressing micronutrients malnutrition because it is sustainable, cost-effective and culturally acceptable.

The Building Nutritious Food Baskets (BNFB) project is a three-year project (November 2015 to October 2018) implemented in Nigeria and Tanzania and funded by the Bill & Melinda Gates Foundation. The goal of the project is to accelerate and support scaling up of biofortified crops for food and nutrition security and to help reduce hidden hunger by catalyzing sustainable investment for the utilization of biofortified crops (OFSP, PVA maize, high iron beans and vitamin A cassava) at scale. BNFB develops institutional, community and individual capacities to produce and consume biofortified crops. The objectives of the project are to strengthen the enabling environment for increased investments in biofortified crops and to develop institutional and individual capacities to produce and consume biofortified crops.

To sustainably support the implementation of BNFB's capacity development efforts, the project has developed a training of trainers (ToT) module titled ***Training of Trainers (ToT) Provitamin A Maize: A Biofortified Solution for Vitamin A Deficiency***. The module includes a PowerPoint presentation, an annotated facilitator's guide and a handout for participants. Partner institutions; academic institutions and other users are encouraged to adapt and reproduce these instructional materials and where appropriate, integrate the teaching and learning into existing curriculum.

This module is designed to potentially serve a wide variety of audiences (nutritionists and agronomists, policymakers, extension workers, community development workers, seed system specialists, farmers etc.). Not all the materials will be relevant to all audiences, but facilitators can adapt the content to their audience and facilitation best practices. To ensure sustainability and wide reach; BNFB will apply a cascading approach in the delivery of training; where key experts (agriculturalists, nutritionists, health workers, marketing and gender experts) will attend more detailed ToT workshops. The experts trained will then become primary facilitators and drive the agenda for biofortification. They will in turn deliver shorter version courses and step-down the training to various levels of audiences (secondary and tertiary). This trend will continue until the training cascades down to "farmer trainers" who finally train the end users in their communities.

This module greatly contributes to BNFB's efforts in strengthening institutional and community capabilities to produce and consume biofortified crops (entire value chains) and to reach a critical mass.



Dr Hilda Munyua
Project Manager - Building Nutritious Food Baskets Project
International Potato Center - March 2018



Acronyms and Abbreviations

ALT	Adult Learning Theory
BNFB	Building Nutritious Food Basket
CGIAR	Global Research Partnership for a Food Secure
CIAT	International Center for Tropical Agriculture
CIP	International Potato Center
CIYMMT	International Wheat and Maize Improvement Center
FARA	Forum for Agricultural Research in Africa
GMO	Genetically Modified Organism
IITA	International Institute of Tropical Agriculture
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
OFSP	Orange-Fleshed Sweet Potato
PVA	Pro-Vitamin A
SSA	Sub-Saharan Africa
TOT	Training of Trainers



How to Facilitate This Training Module

Overview

This training module is part of a series on biofortification and biofortified crops. At present, the series includes modules on:

- Biofortification
- High Iron Beans
- Provitamin A Maize

Each module consists of:

- A **PowerPoint presentation**,
- An annotated **facilitator's guide** and
- A **handout** for participants.

While we would encourage you to present the introductory “Biofortification” module before presenting the modules on specific crops, each module is self-contained and may be delivered independently if that is more appropriate for your audience.

Adapting the Materials for Your Specific Audience

The modules in this series have been designed to potentially serve a wide range of audiences, including:

- Agriculturalists and nutritionists
- Policymakers
- Government and NGO agricultural extension workers
- Farmers and other stakeholders in agricultural value chains

Not all the material included in the modules will be relevant for all these groups. Therefore, you are strongly encouraged to:

1. **REVIEW THE PRESENTATION MATERIALS** in advance and add, remove or edit slides or sections as necessary to better suit the specific needs, interests and knowledge level of your intended audience
2. **REHEARSE THE PRESENTATION** in advance to confirm that you will be able to cover the most important concepts in the time allotted, with adequate time left over for discussions and activities
3. **PRACTICE THE ACTIVITIES** with your colleagues before delivering the training, to confirm that you understand how to deliver them and know what supplies/materials you will need to bring on the day of training

Suggestions have been provided in the facilitator's guide and PowerPoint presentation notes to help you adapt the materials to specific audiences, though ultimately you will need to use your own best judgement.

Training Methodology / Adult Learning Principles

The training materials have been designed to help you, the facilitator, deliver the module in a way that follows adult learning principles and best practices.

While we will provide specific recommendations for facilitating each type of activity later in this guide, the table below provides a high-level synopsis of our recommendations.

Principle	Best Practice	What NOT to do
People process information best when visual aids are used to enhance a presentation	<ul style="list-style-type: none"> Rehearse the presentation, and familiarize yourself with the slide deck, so you can deliver the training in a natural, conversational style Face the audience and make eye contact with participants (to whatever extent is culturally appropriate) 	<ul style="list-style-type: none"> Stare at the screen or your notes and read the text word-for-word
Adults learn best when they take an active role in the learning experience	<ul style="list-style-type: none"> Engage learners in a dialogue through discussion questions. Direct questions to specific participants throughout the session 	<ul style="list-style-type: none"> Lecture for extended periods of time without giving learners a chance to participate in discussions, ask questions and/or engage in activities Allow one or two highly assertive participants to dominate discussions and activities, denying others the chance to participate
People are more likely to comprehend and retain new skills and concepts if they can relate them to their prior knowledge , and connect them to things they already know/believe/understand	<ul style="list-style-type: none"> Use discussion questions and brainstorming sessions to activate participants' prior knowledge, and highlight how the information you are about to cover relates to what they already know 	<ul style="list-style-type: none"> Present new information without helping participants place it in context

Principle	Best Practice	What NOT to do
Adults learn best when they can relate concepts and skills to their personal experience / job responsibilities	<ul style="list-style-type: none"> Edit the materials and remove / reduce any sections that are not relevant to your audience's work, or that your audience would already know Provide specific examples of how concepts apply to participants' work Use discussion and "Quick Survey" questions as an opportunity for participants to relate skills and concepts to their work 	<ul style="list-style-type: none"> Spend large amounts of time going into the details of concepts that are not particularly relevant to your audience Spend large amounts of time covering information that your audience would already know Present new information without providing some real-world context of how participants might use it in their work
People are more likely to retain and use skills and concepts that they learn through self-discovery	<ul style="list-style-type: none"> Use discussions as a chance for learners to arrive at key concepts through critical thinking and debate Use activities to help participants practice skills and discover key concepts through trial-and-error 	<ul style="list-style-type: none"> Intervene in discussions and activities and tell/show participants the "right" response or outcome, without first giving them a chance to arrive at the conclusion, themselves
Participants will retain information better if they are asked to actively recall it during the session	<ul style="list-style-type: none"> Use the "Quick Review" questions as a chance for participants to actively recall information 	<ul style="list-style-type: none"> Skip review questions Allow one or two participants to answer all the review questions
Facilitators should periodically check for understanding , to confirm that participants comprehend and retain information as it is presented	<ul style="list-style-type: none"> Use discussion and review questions to check for understanding Direct questions to specific participants throughout the session If participants do not answer review questions correctly, take a moment to review/revisit any points of confusion then ask again 	<ul style="list-style-type: none"> Simply ask "Any questions?" at the end of a section and assume that participants understood if they do not ask questions Treat review questions as a test and blame participants for not comprehending the course content Allow one or two participants to answer all the review questions

How to Use the PowerPoint Presentation

The PowerPoint presentation serves several functions:








- Offer visual reinforcement for participants
- Serve as an outline for the facilitator
- Indicate when the facilitator should break for discussion and review questions
- Provide general instructions for activities

Icons

Certain slides have symbols in the header or footer that provide the facilitator with additional guidance:



Below, find a list and explanations of the icons:

Icon	Description
	Expected Duration, minutes
	Quick Review/Survey Questions
	Brainstorming Session
	Discussion Session
	Group Activity
	Animated Slide
	End of Animation

“Expected Duration”

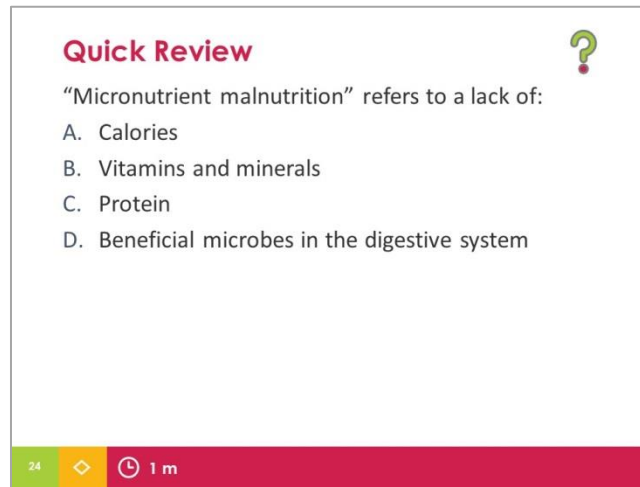
The various question, discussion and activity slides have an “expected duration” to indicate how long that part of the presentation should reasonably take.

Not every slide has an expected duration. You should time yourself during rehearsals to ensure that you are able to complete the presentation in the time allotted, with enough time left over for discussions, activities and a 30- to 60-minute buffer at the end.

Time Management Tips

- Explain up front that, while everyone will get a chance to answer questions and participate in discussions, not everyone will get a chance to answer *every* question and participate in *every* discussion and that, for the sake of time, you might need to cut some discussions short.
- If a participant gives a long, unfocused response, ask guiding questions to help them reach a conclusion and/or summarize what the participant has said thus far then continue on or invite another participant to contribute.
- For activities and discussions, notify the group when there is one minute or half a minute remaining, as appropriate.
- If a group discussion goes off topic, make a note of the subject being discussed and say the class can revisit it at the end of the day (people will likely forget in the interim).
- If a discussion goes over time, wait for a pause then intervene, summarize the points raised in the discussion, then move on to the next part of the module.

? Quick Review/Survey Questions



Purpose

The Review/Survey Question slides serve two purposes:

1. As a **check for understanding**, to confirm that the participants understood the information that was just presented
2. To improve retention through **active recall**, by forcing participants to remember details of what was just presented

Instructions

- For review questions, correct answers can be found in the PowerPoint presentation notes
- Most sections will end with several slides featuring multiple choice questions followed by an “alternate” slide with free-response questions. The facilitator should decide which questions to use, based on the size of the audience and personal preference
 - With large audiences (more than 16), multiple choice questions might be faster, and can potentially allow more people to answer.
 - You can either direct the question to an individual or have the entire class answer through a show of hands / mobile response clickers.
 - If using mobile response clickers, you will need to format the question slides as necessary for your specific brand/model of clicker. For example: <https://www.turningtechnologies.com/response-options>
 - With smaller audiences (fewer than 16), free response questions can often give you a better sense of how well learners understand the concepts, but you will need to be mindful of time.

Best Practices

If	Do	Do NOT
Participants do not answer the questions correctly.	<ul style="list-style-type: none"> Go back and review any concepts / key points that the participants did not understand, then ask again. 	<ul style="list-style-type: none"> Tell the participants they are “wrong” Answer the question yourself without reviewing the concept first.
One or two participants answer most of the review questions	<ul style="list-style-type: none"> Direct questions to other participants Tell the dominating participant(s) that we need to hear from others. Switch to having the entire class answer, using clickers or a show of hands 	<ul style="list-style-type: none"> Allow one or two participant(s) to dominate
When answering via a show of hands, participants seem to be going with whatever the majority decides.	<ul style="list-style-type: none"> Instead of using a show of hands, direct the question to individuals or to pairs of individuals (<i>“Miguel and Isobel – what are the three types of malnutrition?”</i>) Use mobile response clickers and set the slide to not display answers until everyone has responded. 	<ul style="list-style-type: none"> Assume most participants understand just because the majority are selecting the correct response via show of hands





Brainstorming Session

Brainstorming

Symptoms of malnutrition

What are the visible symptoms of macronutrient (calorie/protein) deficiency?

What are the visible symptoms of micronutrient (vitamin/mineral) deficiency?

28 3 m

Purpose

The Brainstorming Session slides allow participants to **activate prior knowledge**, by relating what they already know to any new information received in the training course. People generally comprehend and retain new information and ideas better when they can connect it to ideas they already know/believe.

Instructions

- A list of possible responses can be found in the PowerPoint presentation notes (note that this list is not necessarily complete – there may be other valid responses)
- Give the prompt, then encourage the class to think of as many possible responses as they can
- Write down the group's responses on a flip chart, whiteboard or other surface.
 - For each brainstorming session, you can assign the task of writing down the responses to a different participant, if you feel that might help them feel more engaged.



Best Practices

If	Do	Do NOT
Participants do not volunteer any responses	<ul style="list-style-type: none"> Ask guiding questions. For example, if asking participants to list vitamins and minerals say, <i>"What do we need for strong bones?"</i> or <i>"What vitamin is in orange juice?"</i> Direct the question to a specific participant <i>"Caroline, any ideas?"</i> 	<ul style="list-style-type: none"> Start listing answers, yourself Skip ahead without listing any answers
One or two participants dominate	<ul style="list-style-type: none"> Thank them for their input, then invite other participants to reply (<i>"Thank you, James – Prasanth, can you name some vitamins and minerals?"</i>) 	<ul style="list-style-type: none"> Allow one or two participants to dominate
Responses are incorrect / off-topic	<ul style="list-style-type: none"> Ask guiding questions Advance to the next slide, which will typically have a list of valid responses, and say something like <i>"Okay, here are some answers– how many of these did we identify?"</i> 	<ul style="list-style-type: none"> Tell participants they are "wrong" Allow the brainstorming session to continue off-topic for a long time





Discussion Section

Discussion

*If calories, fats and protein are examples of “**macronutrients**”, what do you think is meant by the term “**micronutrients**”?*

13
5 m

Purpose

The Discussion Session slides encourage participants to:

- **Learn through self-discovery** – Giving participants the chance to arrive at key concepts on their own, versus simply explaining the concepts to them, can improve engagement, comprehension and retention.
- **Relate concepts to their personal experience / job responsibilities** – If participants see the relevance of the course content to their own life/work, it will increase their engagement and boost long-term retention
- **Think critically** about the concepts presented in the course, improving comprehension and the likelihood that they will apply the concepts later in their work.
- **Take an active role in the learning experience** by sharing ideas with other participants and helping each other to learn.

Instructions

- Present the class with the prompt, then allow them to discuss amongst themselves
- Ensure that participants treat each other with respect and that everyone – not just the most assertive participants – is given a chance to be heard
- Gently guide the discussion with prompts and leading questions to ensure that it stays on-topic
- Be mindful of time, and politely bring the discussion to a conclusion if you are nearing the end of the expected duration (unless you are ahead of schedule, in which case the facilitator may – at their discretion – allow the discussion to continue for longer).

Best Practices

If	Do	Do NOT
Learners do not initiate discussion	<ul style="list-style-type: none"> If the question is general, try relating it to a specific, concrete example. E.g., if the question is about disaster preparedness, ask <i>"What steps could have been taken to mitigate the damage from last year's floods?"</i> Invite specific participants to share their personal experience: <i>"Mahmood, have you encountered this issue in your own work?"</i> 	<ul style="list-style-type: none"> Skip the discussion Tell participants what conclusions they are expected to reach
One or two participants dominate	<ul style="list-style-type: none"> Thank them for their input, then invite other participants to reply (<i>"Thank you, James – Prasanth, can you name some vitamins and minerals?"</i>) Pass around an object to indicate who is allowed to speak, and make sure it is circulated around the entire class 	<ul style="list-style-type: none"> Allow one or two participants to dominate
Responses are incorrect / off-topic	<ul style="list-style-type: none"> Ask guiding questions Politely point out that the current subject of conversation is off-topic, and write a note to revisit it at the end of the day (odds are participants will forget) 	<ul style="list-style-type: none"> Tell participants they are "wrong" Allow the brainstorming session to continue off-topic for a long time
Discussion runs over time	<ul style="list-style-type: none"> Summarize the points raised in the discussion thus far and move on 	<ul style="list-style-type: none"> Impose <i>too much</i> closure by drawing conclusions participants did not reach, (it is OK to leave some questions open/unresolved)



Group Activities

Activity (Groups)

Labeling

- Divide into groups
- Each group should design a label for biofortified products
 - Convey essential information for consumers as succinctly as possible
 - Give sense of benefits
 - Include an appropriate, distinctive symbol

182
30 m

Purpose

The Group Activities offer participants a chance to:

- **Learn through self-discovery** – Giving participants the chance to discover key concepts through trial-and-error practice, versus simply explaining the concepts to them, can improve engagement, comprehension and retention.
- **Apply concepts from the course to solve real-world problems** – If participants see how the course content applies to real-world situations, it will increase their engagement and the likelihood that they will apply the concepts later in their work.
- **Think critically** about the concepts presented in the course, improving comprehension and the likelihood that they will apply the concepts later in their work.
- **Take an active role in the learning experience** by sharing ideas with other participants and helping each other to learn.

Instructions

- Review the activity instructions with the class
- Quickly divide the class into groups (usually of 3 to 5)
- Let participants know how much time they have to complete the activity
- Observe the groups, answer questions that arise provide clarification / direction as needed
- Ensure that everyone is actively participating, and no one is dominating the group
- Be mindful of time and remind groups of the time remaining as you near the end of the expected duration.
- Ask questions and give participants time to reflect on the activity afterwards, during debriefing

Best Practices

If	Do	Do NOT
Participants seem to fundamentally misunderstand the activity or not understand the instructions	<ul style="list-style-type: none"> Re-explain the instructions and answer any questions 	<ul style="list-style-type: none"> Intervene and start completing the activity for the group, yourself Explain the desired outcome or divulge too much information, denying learners the chance to learn through self-discovery
One or two learners are doing all the work while other learners seem disinterested / disengaged	<ul style="list-style-type: none"> Assign specific roles / responsibilities to each team member, to ensure everyone contributes Ask the disinterested / disengaged learners questions, or ask them to summarize the group's progress, which may prompt them to re-engage Have smaller groups to increase individual accountability Change groups for the next activity, to ensure the dynamic does not continue 	<ul style="list-style-type: none"> Directly confront disinterested learners about their non-participation
Group members argue with one another	<ul style="list-style-type: none"> Remind participants to be civil Ask participants to summarize the points of conflict Look for points of agreement Encourage group to refocus on problem solving 	<ul style="list-style-type: none"> Ignore the conflict Favor one participant over another



Provitamin A Maize Module Overview

Module Objectives

Upon completing this module, participants should be able to:

- Explain how biofortified provitamin A maize can address vitamin A deficiency among poor populations
- Describe the process followed in developing new PVA Maize varieties
- Outline a strategy for promoting PVA maize to farmers, consumers and partner organizations
- Describe how PVA maize can be integrated into a healthy diet
- Summarize key studies demonstrating the effectiveness of PVA maize for addressing vitamin A deficiency
- Review best practices for maize cultivation

Module Outline

The 'Provitamin A Maize' module is divided into units and sub-units, as follows:

- 1) Introductions and housekeeping
- 2) Micronutrients and biofortification: An introduction
 - a) The problem of "hidden hunger"
 - b) Biofortification: An intervention for "hidden hunger"
- 3) Vitamin A Deficiency and PVA Maize
- 4) Breeding PVA Maize
 - a) Breeding PVA Maize varieties
 - b) The breeding process
- 5) Fostering demand for PVA Maize
 - a) Variety release
 - b) Seed systems
 - c) Promoting farmer adoption
 - d) Promoting consumer demand
- 6) Scaling PVA Maize
- 7) Integrating PVA Maize into a healthy diet
- 8) Conclusion



Unit 1 – Introductions and Housekeeping

1.1 Key Points

- Welcome participants and introduce the course topic
- Do a very quick assessment participants' prior knowledge and experience with the topic
- Explain course objectives
- Cover essential housekeeping information (facilities, breaks, lunch etc.)
- Explain the “ground rules”
- Establish presenter's credibility
- Get people to know each other, particularly if participants are from different organizations or countries
- Help people start talking and feel more comfortable

1.2 Adaptations

Feel free to create your own “Ground Rules” but we recommend...

- Mobile phones off
- In addition to lecturing, there will be opportunities for discussions and asking questions.
 - To keep things moving, we might have to cut some conversations short and move on to the next topic
 - Not everyone will get to answer every question, but everyone will get multiple chances to speak and be heard throughout the session
 - If one or two people are answering every question, we will politely ask them to give someone else a chance to speak.
- As participants in this learning experience, we need to:
 - Share our ideas without fear of criticism, and listen to the ideas of others without criticizing
 - Engage in discussions without arguing
 - Help other participants and accept help from others
 - Create a safe, supportive environment for everyone to learn
 - Have fun

1.3 Activities

Suggested Icebreaker exercises

For small-mid size audience (up to 30 people):

Ask everyone to find a stranger and briefly interview them about:

- Their name
- One interesting fact about their professional background
- Something they enjoy outside of work, such as hobbies, favorite foods or favorite holiday destination

After 5 minutes, go around the circle and have each participant introduce the person they interviewed to the group.



For larger audiences (>30 people):

Ask people to get up (and then sit down after each question) if they:

- Were born in July
- Have a pet (or ever had a pet in their lives)
- Play a musical instrument
- Speak [language other than the language of instruction]
- Love [popular food item]
- Are you the youngest child in your family
- Didn't get up yet in response to any of these questions

Conclude by saying: *"There is something we all have just learned about each other, but we learned the most about the **last** group of people – we know that they aren't born in July, never had pets, don't play any instruments, etc."*



Unit 2 - Micronutrients and Biofortification

2.1 Objectives

By the end of this unit, participants should be able to:

- List and describe the three types of malnutrition
- Define 'hidden hunger' and explain the importance of micronutrients for good health
- Identify natural sources of micronutrients
- List and describe common interventions for micronutrient deficiency
- Define 'biofortification'
- Compare biofortification to other interventions and summarize its major advantages and challenges
- Differentiate between biofortified crops produced through selective breeding and GMOs

2.2 Synopsis

This unit introduces the basic concepts of micronutrient malnutrition and biofortification.

2.3 Key Points

- Micronutrient malnutrition is a serious public health issue
- While everyone is affected, children and women of reproductive age are most vulnerable
- Biofortification is a promising new intervention for micronutrient malnutrition that can be quite effective for vulnerable populations, especially in combination with other interventions
- Biofortification involves the development and distribution of new staple crop varieties with higher micronutrient levels than traditional varieties
- The crops discussed in this program are all the product of *conventional breeding* (i.e., natural reproduction) and are **not** GMOs

2.4 Adaptations

- Most of the explanations, as well as the review and discussion questions, are written with non-expert audience in mind. For target audiences who are nutritionists, doctors or other subject-matter experts, the materials can be rewritten or condensed.



Unit 3 – Provitamin A Deficiency and PVA Maize

3.1 Objectives

By the end of this unit, participants should be able to:

- Describe the effects of Vitamin A deficiency on human health
- Identify populations particularly vulnerable to Vitamin A deficiency
- Describe the nutritional characteristics of PVA Maize
- Describe the agronomic qualities of maize that make it a good crop for biofortification
- Define “Biofortification Priority Index”
- Explain key benefits of PVA Maize
- Summarise key challenges with PVA Maize adoption

3.2 Synopsis

This unit reviews the effects of provitamin A deficiency on human health and introduces PVA maize as a potential intervention for provitamin A deficiency.

3.3 Key Points

- Vitamin A deficiency is one of the most common micronutrient deficiencies in the world, and it particularly affects preschool aged children
- The effects of vitamin A deficiency can be severe and devastating, including permanent blindness, reproductive issues, low blood cell count, susceptibility to infection and disease, among others
- Maize is a #1 crop in the world, consumed in large quantities in many areas where vitamin A deficiency is a serious risk
- Maize has agronomic qualities that make it attractive to farmers, such as high yield and adaptability to adverse climate conditions
- PVA maize has been bred to contain high levels of vitamin A, to help alleviate vitamin A deficiency

3.4 Adaptations

- Most of the explanations, as well as the review and discussion questions, are written with non-expert audience in mind. For target audiences who are nutritionists, doctors or other subject-matter experts, the materials can be rewritten or condensed.
- It is possible that participants will want to discuss the specific situation/markets in their particular country or region. If all participants are from the same country or region, then it might be worthwhile to edit the materials to reflect the specifics of that geographic area. If not, then you should probably encourage participants to keep discussions general and focus on points that would be of interest to all attendees.



Unit 4 – Breeding PVA Maize

4.1 Objectives

By the end of this unit, participants should be able to:

- List the factors nutritionists consider while setting micronutrient targets for biofortified crops
- Identify causes of micronutrient loss
- List the characteristics that farmers and consumers find desirable in maize varieties
- Explain the significance of maize being a “hybrid” crop
- Outline the key steps of the breeding process and summarize what happens at each step

4.2 Synopsis

This unit reviews the process for breeding PVA maize, from setting nutritional targets through breeding and testing new varieties.

4.3 Key Points

- Nutritional targets are set based on the dietary needs of preschool aged children and non-pregnant women – the most vulnerable groups – and must account for micronutrients lost during storage, processing and/or preparation
- PVA maize is a hybrid crop, and its seeds cannot simply be replanted. Farmers must purchase new seeds from certified suppliers every season, to ensure quality.
- Breeders must account for agronomic qualities and consumer preferences
- Selectively breeding varieties with the desired traits involves years of work, crossing different varieties of maize with desirable traits to create new lines with all the best qualities of the parent lines
- New varieties are tested for nutrient content in the lab and tested for their agronomic performance in the field
- Breeders might “fast track” release of promising varieties that do not fully meet the targets, to help vulnerable populations, benefit from biofortified crops sooner

4.4 Adaptations

- It is possible that the brief general explanation in Unit 1 of how biofortified crops are produced through selective breeding will be sufficient for your audience and it will not necessary to delve into all of the technical detail in this section. Use your best judgment to determine the relevance of this information to your audience and edit accordingly.
- Most of the explanations, as well as the review and discussion questions, are written with non-expert audience in mind. For target audiences who are nutritionists, doctors or other subject-matter experts, the materials can be rewritten or condensed.



4.5 Activities

Explaining Biofortification (Breakout Groups)

Resources: Flipcharts (1 per group), flipchart markers (5-6 per group)

- Split the audience into several groups (4-8 people per group)
- Introduce the activity: *"Each group is to prepare a one-minute statement that explains the biofortification process to a smallholder farmer or policymaker, who might not be familiar with the concept or the underlying science."*
- Instruct some groups to prepare the one-minute explanation for farmers, and other groups – to policymakers (or other relevant stakeholders).
- *You have 5 min to prepare your statements*
- After the discussion each group is to present their one-minute statement.
- Time permitting, at the end of the exercise, ask: *"Would these statements be different depending on country? Region? What other factors do we need to consider when explaining biofortification? What kind of questions might you expect from these audiences?"*



Unit 5 - Fostering Demand for PVA Maize

5.1 Objectives

By the end of this unit participants should be able to:

- Outline the steps for “scaling” and “anchoring” PVA maize in local food systems
- List key activities for introducing a new crop
- Differentiate between different seed systems
- Explain the role of private sector partners for promoting hybrid crops
- Summarise advantages of PVA maize for the farmers
- Summarise advantages of PVA maize for the consumers

5.2 Synopsis

This unit focuses on strategies for supporting the introduction of PVA maize within a country and influencing farmers, consumers and partner organizations to support PVA maize adoption.

5.3 Key Points

- Biofortification cannot succeed unless farmers can be persuaded to grow biofortified crops and consumers can be persuaded to purchase and eat them
- Ensuring a secure seed system is critical (if farmers cannot acquire seeds, they cannot grow biofortified crops)
- The fact that farmers cannot replant seed year over year makes PVA maize more appealing to commercial seed companies
- Emphasizing the agronomic qualities of PVA maize is often an effective way of promoting adoption among farmers
- Consumers generally prefer the sensory qualities of biofortified varieties, and providing them with nutrition information can further increase demand
- There are many possible channels and media for distributing promotional messages, though studies have shown that broadcast media such as radio is often more cost-effective than delivering messaging face-to-face
- Potential partners for promoting biofortified crops include local governments, seed companies, NGOs, multilateral organizations and various participants in the agricultural value chain (e.g., food processors)

5.4 Adaptations

- It is possible that participants will want to discuss the specific situation/markets in their particular country or region. If all participants are from the same country or region, then it might be worthwhile to edit the materials to reflect the specifics of that geographic area. If not, then you should probably encourage participants to keep discussions general, and focus on points that would be of interest to all attendees.



5.5 Activities

Promoting to Farmers (Breakout Groups)

Resources: Flipcharts (1 per group), flipchart markers (5-6 per group)

- Divide into groups
- Each group is to prepare a 2-min presentation to a group of farmers to explain the advantages of planting biofortified crop (can be any biofortified crop – we are just talking about generalities, not specifics of any one crop)
- Groups have 10 minutes to discuss
- Once complete, groups will deliver their explanation. Facilitator will play the role of a farmer, and group should be ready to address the farmer's concerns.
- Possible questions for the farmer (facilitator) to ask include:
 - I have other varieties that have performed very well for me for many years. Are you saying I should stop planting them? *(Response sought: No, but we would encourage you to try devoting at least some land to biofortified varieties, and if you like them you can devote more land in the future)*
 - Will I have to buy special fertilizer to grow biofortified crops? *(Response sought: No, you can cultivate them the same way you would cultivate any other variety)*
 - What if people don't like how they taste? *(Response sought: These varieties have all been bred to have excellent sensory qualities, and we will be doing promotion to make consumers aware of the nutritional benefits, which should increase demand)*
 - I tried planting some other [crop] that came from [foreign country] and it just didn't grow very well in my soil. *(Response sought: these varieties have been tested extensively in local conditions and have been found to perform very well)*

Biofortification Sensory Test (Whole Class)

Resources: samples of both PVA maize and traditional maize, dry and cooked

- Distribute samples of regular and PVA maize. Depending on sample availability, distribute individually, in groups or layout samples on a demonstration table and ask participants to gather around the table and examine.
- Ask: *"Can you detect any obvious differences? In dry maize? In cooked maize?"*
- Time permitting, ask: *"What are the advantages of having detectable differences between regular and biofortified maize? What are the disadvantages?"*



Developing Messages (Breakout Groups)

Resources: Flipchart (one per group), markers (5-6 per group)

- Divide the audience into several groups (4-8 people per group)
- Introduce the activity: *"Design one of the following for PVA maize for a specific audience (farmers, consumers, women, families):"*
- Assign each group to develop one of the following:
 - 30-60 seconds "radio" message
 - One-page pamphlet
 - Series of three SMS messages
- If there are more than 3 groups, further separate groups by target audience, e.g. one group creates a pamphlet targeting farmers, another group creates a one-pager for consumers
- *You have 10 min to create your messages*
- After 10 minutes have each group present their message
- Time permitting, ask: *"What messaging channel would work better for your country/region and why?"*



Unit 6 - Scaling PVA Maize

6.1 Objectives

By the end of this unit participants should be able to:

- Outline the strategic goals of biofortification interventions
- Identify potential partner organizations for supporting PVA maize over the long term
- Recognize the potential impact of policies, regulations and trade on biofortification initiatives
- Explain the importance of integrating biofortification into international standards

6.2 Synopsis

In this unit we explore long-term strategies for “scaling” and “anchoring” PVA maize within national food systems, including the impact of policy, regulations, trade and international standards on the promotion, adoption and sustainability of biofortified crops generally, and PVA maize in particular.

6.3 Key Points

- The introductory phase of intensive promotion and support for biofortified crops is not intended to last forever
- Goal is to achieve sustainability and transfer ownership to local stakeholders
- Creating incentives and supports through policy, regulations, trade and international standards can help to ensure that biofortified crops become permanently anchored within local food systems

6.4 Adaptations

It is possible that participants will want to discuss the specific situation/initiatives/regulations in their particular country or region. If all participants are from the same country or region, then it might be worthwhile to edit the materials to reflect the specifics of that geographic area. If not, then you should probably encourage participants to keep discussions general and focus on points that would be of interest to all attendees.



6.5 Activities

Explaining Maize Benefits (Breakout Groups)

Resources: Flipcharts (1 per group), flipchart markers (5-6 per group)

- Split the audience into several groups (4-8 people per group)
- Introduce the activity: *"Each group is to prepare a one-minute statement that explains the benefits of PVA maize adoption to a policymaker or local government representative, who might not be familiar with the concept or the underlying science."*
- *You have 5 min to prepare your statements*
- After the discussion each group is to present their one-minute statement.
- Time permitting, at the end of the exercise, ask: *"Would these statements be different depending on country? Region? What other factors do we need to consider when explaining benefits of PVA maize adoption? What kind of questions might you expect from policymakers?"*

Labeling (Breakout Groups)

Resources: Flipchart (one per group), markers (5-6 per group)

- Divide the audience into groups of 4-8 people
- Introduce the activity: *"You are responsible for designing a packaging label for PVA maize. The label should:*
 - *Convey essential information for consumers as succinctly as possible*
 - *Give a sense of benefits*
 - *Include an appropriate, distinctive symbol"*
- Each group designs a label
- *You have 10 minutes*
- After group discussions, each group is to present their idea for a packaging label
- Time permitting, ask: *"What information have you decided to leave out and why? Do you think it would be helpful if all biofortified crops had a standard label? Why or why not?"*



Unit 7 – Integrating PVA maize into a healthy diet

7.1 Objectives

By the end of this unit participants should be able to:

- Review the nutritional benefits of eating PVA maize
- Compare different methods of preparing PVA maize in terms of nutrition
- Name some of the other nutrients contained in PVA maize

7.2 Synopsis

In this unit we discuss different methods for preparing PVA maize and the impact of consuming PVA maize on human health.

7.3 Key Points

- PVA maize can provide an excellent source of provitamin A, though some methods of preparation are more nutritious than others
- Studies indicated PVA maize is as effective as supplementation and resulted in improved serum concentration

7.4 Adaptations

We strongly encourage providing participants with an opportunity to cook dishes with PVA maize, using recipes provided in the participants guide. If that is not possible due to logistical or time constraints, ready-made dishes (frozen/microwaved or pre-cooked) may be made available. Alternatively, discuss recipes in the participants guide and encourage participants to share their own favourite recipes involving maize.

If sufficient quantities of PVA maize are available, it can be distributed to the participants for cooking at home.

7.5 Activities

Cooking with PVA maize (Breakout Groups)

Resources: ingredients for one or more recipes from the participant handout

- Divide into groups
- Each group will prepare a different recipe from the participant handout using PVA maize
 - Refer to the appendix on recipes
- Share with the class and discuss the results

Depending on how much attention the recipes require, you might want to continue the presentation while cooking.



Unit 8 - Conclusion

Key Points

- Mention any recent developments in the field of biofortification
- Summarize key takeaways from the course
- Refer participants back to the course objectives and any other issues they may have been raised at the beginning of the training and seek feedback on how well the objectives were met
- If appropriate, share your contact details, to allow them to get in touch with you after the training
- Allow at least 15 min for Q&A session at the end
- Collect feedback forms, if appropriate

