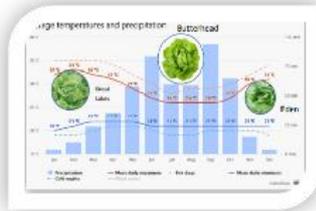




One-Day Training (Farmer Field School Approach) on Preharvest Factors, Postharvest Handling Technologies, and Application of Zero Energy Cooling Chamber to Extend the Shelf Life of Lettuce

Collaboration between the Postharvest Education Foundation (PEF), USA, and the University for Development Studies (UDS), Tamale, for Peace and Love Farmers Vegetable Growers Association, Gyinyaase, Kumasi



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1.0 Introduction

1.1 Scope of the report

This report provides information on a one-day training for vegetable farmers (26). The farmer field school (FFS) approach was used in training the farmers. Farmers were trained in Good Agricultural (Horticultural) Practices to produce high-quality lettuce for proper post-harvest handling and prolonged shelf life. The training was done on the 19th of April 2022. There were 17 men and 9 women farmers. Participants were members of the Peace and Love Vegetable Growers Association, Gyinyaase, Kumasi, in the Ashanti Region of Ghana (Appendix 1; Table 1). The report highlights three main topics; the influence of preharvest factors on the quality and shelf life of lettuce, postharvest handling technologies, and the use of Zero Energy Cooling Chamber (ZECC) in extending the shelf life of lettuce. This report covers the entire presentation and demonstration that were delivered in three sessions.

1.2 Purpose/objectives of Training

There were three main objectives for this training:

- i. To help the farmers understand how preharvest factors affect the shelf life of lettuce (Part 1; see attached the training guide and PowerPoint presentation on preharvest factors, post-harvest handling technologies, and the shelf life of lettuce).
- ii. To assist the farmers, understand how the shelf life of harvested lettuce can be extended with the appropriate post-harvest handling technologies for lettuce (Part 2; see attached the training guide on the post-harvest handling technologies).
- iii. To teach the farmers the operational mechanism of the low-cost zero energy cooling chamber (ZECC) and how to build their ZECC (Part 3; see attached a training guide on the ZECC).

1.3 Background information

Ghana's agriculture struggles to provide the required proportion of food needed for the increasing population due to significant post-harvest losses on the farm, wholesale and retail levels (Adom, 2018), and other factors. Annually, 30% or more of farm produce are lost in Ghana (Oteng-Adjei, 2013). Such high post-harvest losses will reduce producer prices (income), increase food prices, worsens malnutrition and hunger, and slow down or stagger general economic development (Munhuweyi, 2012). In Ghana, post-harvest losses of fresh vegetables are highest in tomato and lettuce, rising to 20% after five days of harvesting (Robbinson and Kolavalli, 2010). Limited access to improved post-harvest management

technologies (PHMT) and the lack of knowledge and or implementation of good PHMT contribute to the consistent rise in food losses and food shortages in Ghana.

In Ghana, the production of lettuce is popular on urban vegetable farms. However, lettuce deteriorates between 2 and 4 days after harvesting. Higher temperatures are disadvantageous to lettuce since lettuce is heat sensitive. Hence temperature management of harvested lettuce cannot be overemphasized. Therefore, the skill of building innovative mitigations is essential to improving preharvest crop management and post-harvest handling practices for food availability and safety. Zero Evaporative Cooling Chamber (ZECC) technologies is an eco-friendly system with a low-cost storage structure that has proven helpful for the short-term storage of fruits and vegetables.

2.0 Farmer training

2.1 Preharvest factors, quality, and shelf life (Part 1)

Mildred Osei-Kwarteng facilitated this section. The topics discussed included; types and nutritional information on lettuce, crop description and morphological forms, the influence of pre-harvest factors on quality and shelf life, and lettuce harvesting.



Zoom presentation by Mildred



Distribution of training materials



Gustav Mahunu seated among the participant during the presentation

2.2 Postharvest technologies (Part 2)

Mildred Osei-Kwarteng also facilitated this session. The topics discussed included the principal causes of post-harvest losses (poor handling, inadequate cooling, and temperature management) and appropriate postharvest handling technologies (pre-cooling, proper packaging materials, sorting and grading, and the recommended storage conditions

(temperature, humidity, and compatible storage produce). Detailed information is found in the training manual attached to this report.

2.3 Building of the Zero-energy cooling chamber (ZECC) and the operation of ZECC (Part 3)

Gustav Mahunu facilitated the third session, and the topics discussed included; principles of the ZECC, siting a ZECC, how to build your ZECC (materials and steps in laying bricks and watering the inner and outer walls of the ZECC), usage of the ZECC, materials for creating a simple cost effective ZECC, and the effective management of ZECC.



Watering of sand between the ZECC walls



Roofing of the ZECC

3.0. Outcomes/ Farmer interactions

The farmer field school demonstration has effectively enhanced farmers' understanding of preharvest and post-harvest management practices to reduce losses and increase market value. The training was timely and essential because the farmers had just received a packing house and a produce transport vehicle from the Ministry of Food and Agriculture. We envisage that the training will reduce postharvest losses should the farmers apply the good practices they acquired during the training. More so, the farmers, received illustrative training guides during the training. Others can help farmers who cannot read, and also, the illustrations can tell some part of the story.

3.1 Questions and Observations raised by farmers

The following questions were raised by the farmers:

1. In cases where seeds are not stored at the required temperature in retail shops, what should we do to get better germination in the nursery?
2. Some seed packages do not have crop management information; how do we get such information from the retailer shops?

3. How do we identify a treated seed?
4. How do we identify lettuce seeds bred for the tropics?
5. What quantity of inorganic and organic manure per area enhances high-quality produce at harvest?
6. What are the sustainable soil management practices for intensive lettuce production to enable high-quality produce?
7. How often should we irrigate to obtain high-quality produce at harvest?
8. Can all types of vegetables be stored in the ZECC?
9. Can we use other materials apart from a brick if bricks are too expensive?
10. How often can we water the sand?
11. Do we need to water the inside of the ZECC as well?
12. What quantity of lettuce can be stored in the ZECC?
13. Does the function of the ZECC reduce overtime, or how long will the ZECC be functional?

Observations

The participation of the farmers during the training was very commendable. Farmers wanted to learn more about the training sessions, particularly regarding pre-harvest concerns that may be remedied to improve crop quality and shelf life. The farmers appreciated the ZECC demonstration as a cheaper alternative to electric-powered coolers. The demonstration of the construction and application of ZECC was very successful. The farmers also gave suggestions on how best they could construct a bigger ZECC in the future to benefit all members.

The Peace and Love vegetable growers' association seems forward-looking since they are more open to acquiring knowledge on building their farming business. The attitude of these farmers has made them beneficiaries of other essential training, such as cost-benefit analysis, which will go a long way to improve their income.

Frequent visits were made to the farmers to have feedback on any immediate challenges. We observed that the farmers have improvised a padlock for the ZECC to secure their goods during our visit. We planned to raise a structure on the ZECC to protect it from heavy rains because the cover material is made of thatch (bamboo).



Group picture of participants at the ZECC demonstration site

We also observed that the farmers produce other vegetables such as cabbage, cauliflower, beets, and spring onions. An in-depth discussion on post-harvest handling stimulated the farmers to think about the proper handling of all the other vegetables they produce.

4.0. Conclusion and general outlook/recommendations

The training program brought together more farmers (26) who expressed their appreciation for the resource persons and the funders (Postharvest Education Foundation) in building their capacity to reduce post-harvest losses in lettuce. Their main challenge of extending the shelf life of harvested produce can be reduced by utilising the ZECC. Farmers are willing to learn and adopt these innovative post-harvest technologies to improve on-farm productivity. Based on the participatory vitality and readiness for knowledge acquisition (good agricultural practices) and implementation of the Peace and Love Vegetable Growers association, we recommend the group for additional post-harvest facilities and training.

Acknowledgment

We thank the Postharvest Education Foundation (PEF), the USA, for providing the funds to undertake this project. Also, we thank the University for Development Studies (UDS), Tamale, for providing the team with the space to work and deliver on the project's objectives.

Our appreciation to the farmers of Peace and Love Vegetable Growers Association, Gyinyaase, Kumasi, for their participation in the training. We also wish to acknowledge the tremendous support by Professor S.K. Oppong (Kwame Nkrumah University of Science and Technology, Kumasi, Ghana) in the mobilization and construction of the ZECC materials and organization of the Farmer Field School.

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Appendix 1

Table 1: List of Participants

S/N	Name	Sex	Position
1	John Yeboah	M	Chairman
2	Stephen Nobio	M	Secretary
3	Thomas Asuming	M	Treasurer
4	Christopher Kuunyada	M	Member
5	Akosua Abrafi	F	Member
6	Simon Antwi	M	Member
7	Adu Gyamfi	M	Member
8	Isaac Boakye	M	Member
9	Joseph Asiamah Yeboah	M	Financial Secretary
10	Prince Appiah	M	Member
11	Afia Dankwa	F	Member
12	Mary Nsia	F	Member
13	Kwaku Osei	M	Member
14	John Awusi	M	Member
15	Alex Kusi	M	Member
16	Joseph Antwi	M	Member
17	Magaret Nyarko	F	Member
18	Francis Noyore	M	Member
19	Victoria Adwoa Nyarko	F	Member
20	Rollande Ibuombingoro	F	Administrator
21	Seth Nuama	M	Member
22	Awuni Sampano	M	Member
23	Nyamekye Ezabel	F	Member
24	Ama Dufie	F	Member
25	Douglas Adjei	M	Member
26	Margaret Yeboah	F	Member