



GENERAL HORTICULTURAL CROP PRODUCTION & POST-HARVEST HANDLING TECHNIQUES (GHCP&PHHT) 24



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1. Introduction: Background

Pre to Post Cultivation Stages		Items	Horticultural Techniques Advocated for Adoption	Yes	No
1	Pre-Cultivation Preparation	Q1	Did you undertake any market survey to correct information of your crop cultivation and selling?		
		Q2	Did you prepare and use crop planning calendar(s) based on the market survey results or other information?		
		Q3	Did you estimate your land soil fertility from yield, plant growth and soil observation?		
		Q4	Did you use recommended composting practices by using different organic materials to supply major nutrients: Nitrogen (N), Phosphorus (P), and Potassium (K) in preparing manure/compost?		
		Q5	Did you use recommended quality seed/planting material(s) with one or more of the following characteristics: disease resistance and/or tolerance, high yield, early maturity, better tastes, size, marketability and/or longer shelf life?		
2	Land Preparation	Q6	Did you use one or more of the following recommended land preparation practices in management of pests & diseases: solarization, timely ploughing, appropriate depth of ploughing, removing diseased crop residue from the field, and washing farm tools when they move from farm to farm to minimize spreading spread of soil borne pests & diseases?		
		Q7	Did you incorporate crop residues into the farm at least one month before planting?		
		Q8	Did you incorporate manure/compost or other organic fertilizers as a basal application at least 1 – 2 weeks before the planting?		
3	Crop Establishment (Planting/Transplanting)	Q9	Did you use recommended practices in raising seedlings for vegetables?		
		Q10	Did you use recommended planting/transplanting spacing?		
		Q11	Did you apply fertilizer at recommended amount during your crop cultivation?		
4	Crop Management	Q12	Did you follow the appropriate frequency of irrigation in each crop and growth stages?		
		Q13	Did you ensure timely weeding and use of appropriate weeding tools in managing of weeds?		
		Q14	Did you undertake appropriate top-dressing practices: timeliness, type and recommended rate of application, and method of application?		
		Q15	Did you use at least two of the following pests and diseases control/management practices: cultural, biological, physical, and chemical? (crop rotation, removing diseased plant, ash application, monitoring and spraying chemical if necessary)		
		Q16	Did you follow the use of safe and effective use of pesticides: appropriate doses, recommended pesticides, and Pre Harvest Interval (PHI)?		
5	Harvest	Q17	Do you know the sign of crop maturity in your cash crop? (color, size, neck bending, etc.)		
6	Post-Harvest Handling	Q18	Did you consider appropriate post-harvest handling for your cash crops? (dry/cure the crops before transporting, cut the onion stem at appropriate height, keep harvest (tomato, potato, etc.) under shade, hung crops under roof with well-ventilated place (onion, garlic))		
		Q19	Did you perform sorting, grading and cleaning for value addition of your produce?		
7	Cost and Income Analysis	Q20	Did you keep records on cost of production and sales and undertake cost and income analysis (Did you review crop calendar you made?)		
8	Collective Action	Q21	Did you establish linkages with new business stakeholders? (buyers(wholesalers, middlemen), sellers(Agro-dealers), lenders, research institutes, cooperatives, seeds supplier)		
		Q22	Did you purchase agricultural inputs such as seed, fertilizer and chemicals as a group (group purchasing)?		
		Q23	Did you arrange transportation of the produce collectively or sell your produce collectively (group selling)?		
9	Gender	Q24	Did you discuss your farming plan (what to grow and how to sell) with your partner?		

Please tick (✓) appropriately for YES or NO. Any additional information, please write on the margin.

1. Introduction: Background Cont'



- General Horticultural Crop Production & Post-harvest Handling Techniques (GHCP&PHHT) 24 applies to the fundamental practices essential for horticultural crop production
- The fundamental practices are categorized into **7 broad topics** and **24 sub-topics** based on the smallholder Horticulture Empowerment Project (SHEP) experiences in mitigating production and marketing challenges facing smallholder horticultural farmers

1. Introduction: Background Cont'



The **7 broad topics** are:

1. Pre-Cultivation Preparation
2. Land Preparation
3. Crop Establishment (Planting / Transplanting)
4. Crop Management
5. Harvest
6. Post-Harvest Handling
7. Cost & Income Analysis

1. Introduction: Background Cont'



The **24 sub-topics** under each broad topic are:

1. Pre-Cultivation Preparation

- 1) Market Survey
- 2) Crop Planting Calendar(s)
- 3) Soil Sampling & Analysis
- 4) Composting
- 5) Quality Seed/Planting Material

2. Land Preparation

- 6) Land Preparation Practices
- 7) Incorporation of Crop Residues
- 8) Basal Application

1. Introduction: Background Cont'



3. Crop Establishment (Planting /Transplanting)
 - 9) Raising Seedlings
 - 10) Planting/transplanting
 - 11) Fertilizer Application
4. Crop Management
 - 12) Water Requirement
 - 13) Managing of Weeds
 - 14) Top-dressing
 - 15) Pests & Diseases Management Practices
 - 16) Safe & Effective Use of Pesticides

1. Introduction: Background Cont'



5. Harvest:

17) Harvesting Indices

6. Post-Harvest Handling:

18) Appropriate Containers/Standard Packaging Materials

19) Value Addition Techniques

7. Cost and Income Analysis:

20) Cost and Income Analysis

2. GHCP&PHHT: Pre-Cultivation Preparation: Q1



Farmers conducting a market survey

2. GHCP&PHHT: Pre-Cultivation Preparation: Q1

“Does the farmer undertake a **market survey** to determine the crop(s) to cultivate each season?”

- Market survey is **the first fundamental practice** that smallholder farmers must undertake regularly in order to **realize economic returns** from farming
- It provides useful information in guiding farmers in producing what they can sell
- The results of the Market survey determine what the farmer can sell in terms of **quality & quantity** and the **anticipated profit margins**

2. GHCP&PHHT: Pre-Cultivation Preparation: Q1


- Farmers should obtain the following information on the crop(s) during the **market survey**:
 - The peak demand month(s) for crop product
 - **The price of crop** during the peak demand
 - **The crop variety** that has the highest demand
 - Supply requirements (**quantities** and **frequency**)
 - **Quality market requirements**
 - **Potential buyers and terms of payment**
 - **Marketing challenges**
 - **Dealer's willingness** to purchase the crop etc.

2. GHCP&PHHT: Pre-Cultivation Preparation: Q2

A Sample of a Onion Planting Calendar

Oomishaa qulubbii diimaa


Ani kan foyeesuu ykn jijjiru gosa/ midhani,
 Qulqulina, bayinaa, yeroo sassabbi,
 Wara bittu, kanen biroo (adda basuu: _____)




Aanaa: _____
 Ganda: _____
 Maqaa Q/B _____


Oodeefannoo Oomishaa

Walirra fagenyaa dhaabbii: sm **40 × 20 × 5**
 Omishitumaa: kun **75-88/he 0.25**
 Hangaa sanyii: kg **1.6-2.0 /he 0.25**
 Dikee: kun **25-30/he 0.25**







 NPS: **60 kg**


 Urea: **25 kg**

Gali qulqulu: (1 × 2) - 3



Baasi Oomishaa

Gosa	bayina	qarshii
		
		
		
		
		
3 Waligala		

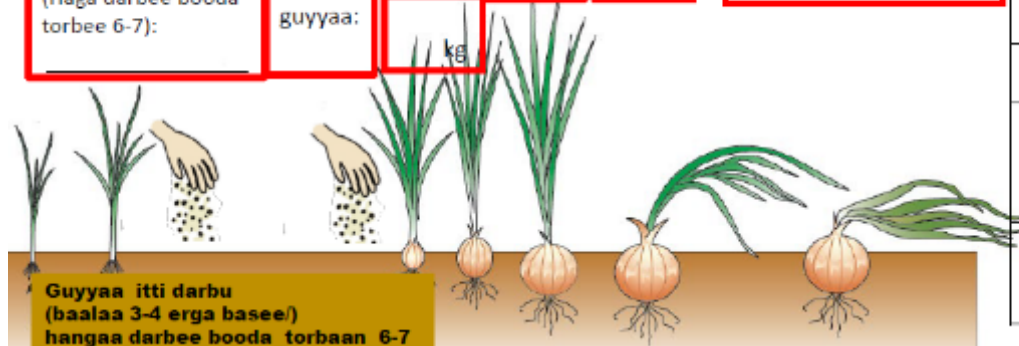
Gosa: _____
 B. Lafaa (ha): ha
 (kut): qt
 _____ kg
 Guyyaa facasaa: _____
 Guyyaa dhaabbii
 (Haga darbee booda torbee 6-7): _____

Torbaan 3 booda

Yeron sasabi torbe 17):
 ① Oomisha: _____
 Kun 1 = _____ kg
 ② gatti: _____
 Gaba: _____

Torbaan 2 booda

guyyaa: _____ kg
 guyyaa: _____ kg



Guyyaa itti darbu (baalaa 3-4 erga basee!) hangaa darbee booda torbaan 6-7

2. GHCP&PHHT: Pre-Cultivation Preparation: Q2

“Does the farmer prepare and use **crop planting calendar(s)** based on the market survey results?”

- A Crop planting calendar is a tool for farmers to plan for production to ensure that marketing coincides with the period of the year **when the market price of a produce is highest**

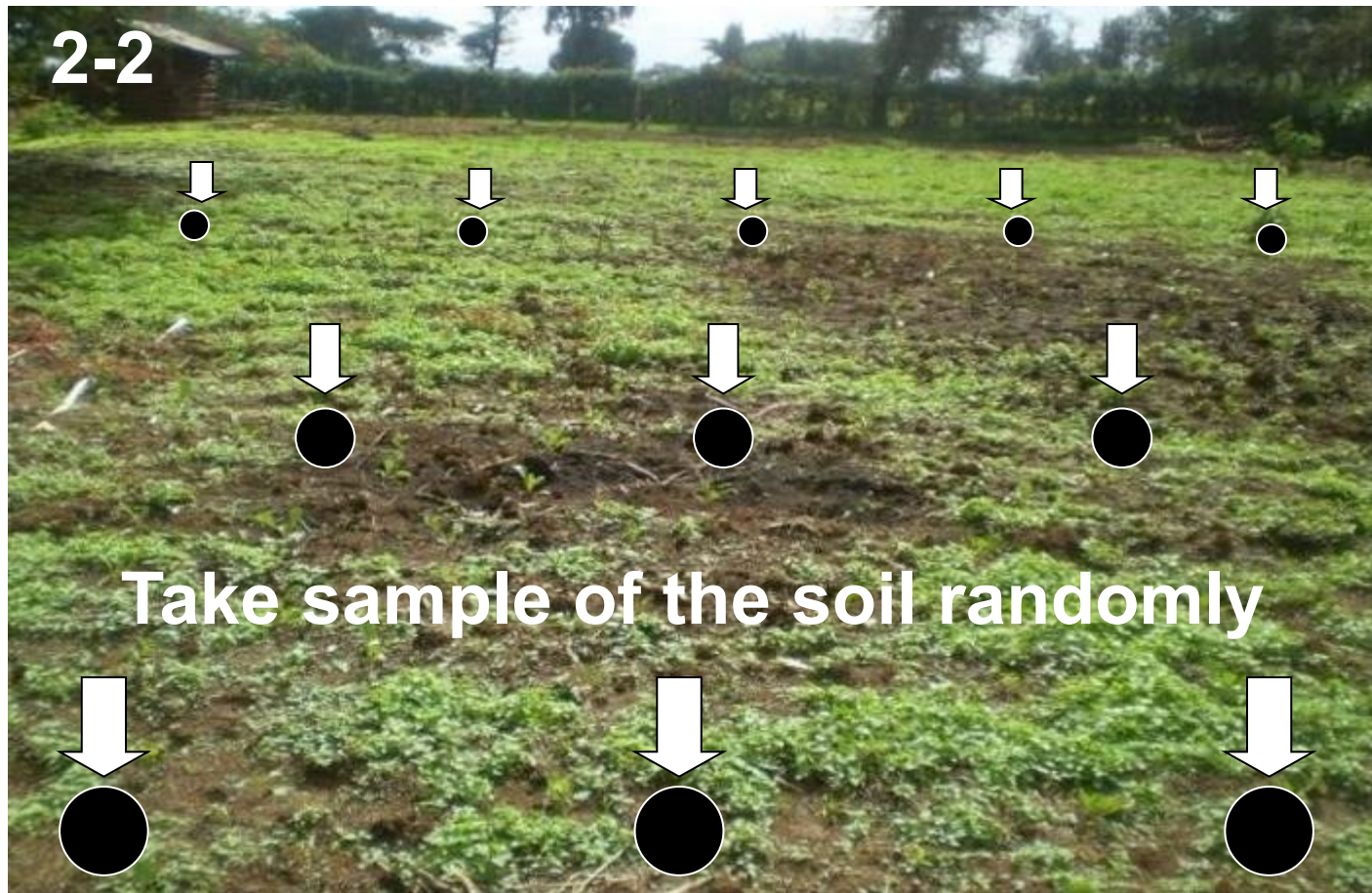
2. GHCP&PHHT: Pre-Cultivation Preparation: Q2

Summary of the Procedure of preparing Crop Planting Calendar(**details will be presented later**)

Procedure

1. Determine from the market survey (**GHCP&PHHT 20: Q1**) results when there is peak demand for selected crops
2. Work backward from the month when there is peak demand to prepare a monthly farm activities preceding the peak period
3. Use the monthly activities preceding the peak as a procurement plan for farm inputs and a guide for farm operations

2. GHCP&PHHT: Pre-Cultivation Preparation: Q3



Soil identification

2. GHCP&PHHT: Pre-Cultivation Preparation: Q3

“Does the farmer estimate your land soil fertility from yield, plant growth and soil observation?”

- It is important to understand the basic soil characteristics in order to manage their field properly.
- The soil data can be used to determine fertilizer and manure requirement.
- Establishing the type and quantity of fertilizer one needs to apply is vital in:
 - Avoiding making the soils either too acidic or alkaline
 - Saving expenditure on inputs thus reducing the cost of production and increasing the profitability

Simple check method for your soil characteristic

Sandy soil



Silty soil



Clay soil



2. GHCP&PHHT: Pre- Cultivation Preparation: Q4



Compost preparation

2. GHCP&PHHT: Pre-Cultivation Preparation: Q4

“Does the farmer use recommended **composting** practices by using different organic materials to supply major nutrients: Nitrogen (N), Phosphorus (P), and Potassium (K) in preparing manure/compost?”

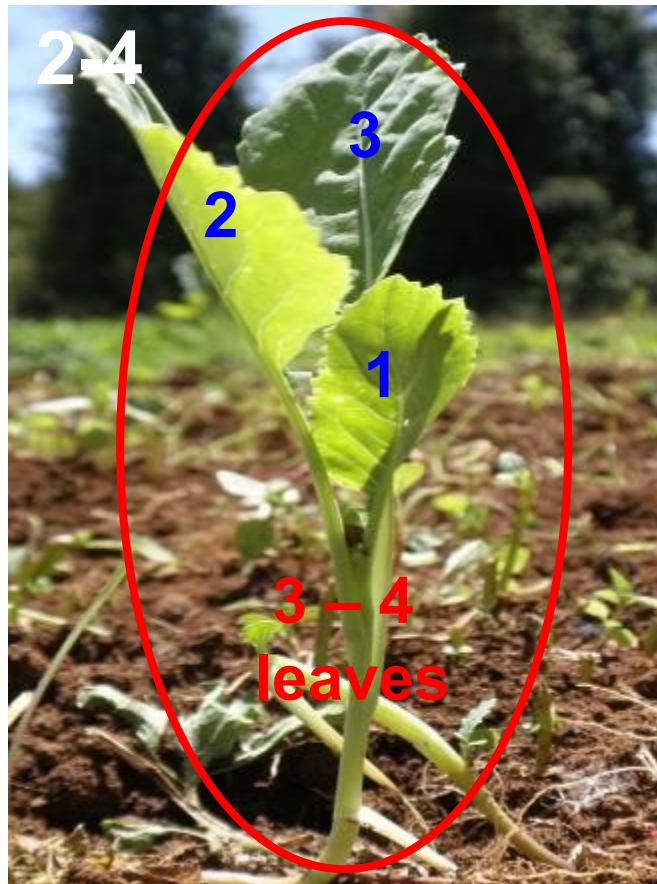
Most smallholder farmers:

- Apply either uncomposed or inadequate quantity of manure/compost
- Due to significant role of manure in increasing crop productivity, farmers need to adopt more efficient methods of preparing the manure.

One such method is the “*BOKASHI*” technique (**details will be presented later**)

- Adopting efficient methods of preparing manure will ensure optimal application, thus increased productivity.

2. GHCP&PHHT: Pre-Cultivation Preparation: Q5



Right sized seedling

Overgrown seedlings

2. GHCP&PHHT: Pre-Cultivation Preparation: Q5

“Does the farmer use recommended **quality seed/planting material(s)** with one or more of the following characteristics: disease resistance and/or tolerance, high yield, early maturity, better tastes, size, marketability and/or longer shelf life?”

- Use of **quality seed/planting material(s)** can positively improve the returns of smallholder farmers for two (2) major reasons:
 - **High yields**
 - **Less expenditure** on control of pests and diseases,
- The overall effect is higher net income

3. GHCP&PHHT: Land Preparation: Q6



Land preparation using an Oxen

3. GHCP&PHHT: Pre-Cultivation Preparation: Q6

“Does the farmer use one or more of the following recommended **land preparation practices** in management of pests & diseases: solarization, timely ploughing, appropriate depth of ploughing, and washing farm tools when they move from farm to farm to minimize spreading of soil borne pests & diseases?”

- **Land preparation** is critical in management of soil borne pests and diseases and the recycling of soil nutrients

3. GHCP&PHHT: Pre-Cultivation Preparation: Q6

Recommended practices for management of soil borne pests and diseases are:

- **Soil solarization/sterilization**, especially in the establishment of the nursery
- **Appropriate depth of ploughing** (The soil must be ploughed to a minimum depth of 30 cm)
- **Timely ploughing**
- **Exposure of pests** to desiccation

Soil Solalization using Plastic



3. GHCP&PHHT: Land Preparation: Q7

3-2



Incorporation of crop residues

3. GHCP&PHHT: Pre-Cultivation Preparation: Q7

“Does the farmer **incorporate crop residues** into the farm at least one month before planting?”

- **Incorporating crop residues** into the farm is a sustainable means of recycling the soil nutrients
- The crop residues should be incorporated to a depth of **30 cm** at least **1 – 2 months** before planting to allow decomposition.
- The crop residues preferably **chopped into smaller pieces** to hasten the decomposition process
- Diseased material should be **discarded to avoid possible risk of disease build-up**

3. GHCP&PHHT: Land Preparation: Q8



Manure application for Nursery bed

3. GHCP&PHHT: Land Preparation: Q8

“Does the farmer incorporate manure/compost or other organic fertilizers as a **basal application at least 1 – 2 weeks before the planting?”**

- The release of nutrients from manure/compost is a slow process.
- Manure/compost should be applied **1 – 2 weeks before planting or transplanting.**
- Manure/compost **should never be exposed to direct sunlight** as the material tend to loose nitrogen through volatilization.

3. GHCP&PHHT: Land Preparation: Q8

- The applied manure/compost can be **broadcasted / or applied in a line underneath of the plant**
- Use of partially decomposed manure/compost **should be avoided** as this tends to compound the problem of soil borne pests and diseases

4. GHCP&PHHT: Crop Establishment: Q9



Nursery of leafy vegetables

3. GHCP&PHHT: Pre-Cultivation Preparation: Q9

“Does the farmer use recommended practices in **raising seedlings** for vegetables?”

Raising healthy seedlings should be the ultimate goal of every farmer.

- This should start with appropriate location of the nursery.
- The nursery should be located at a site that has not been planted with crops in the family of the seedlings to be raised for **at least 3 years**.

3. GHCP&PHHT: Pre-Cultivation Preparation: Q9

- Conditions that are likely to predispose seedlings to pest and diseases, such as **overcrowding, dampness and excessive shading** should be avoided.
- Seedlings should be **hardened 1 – 2 weeks before transplanting** by reducing the frequency of watering and the shading.
- Other than on-farm, seedlings should only be sourced from **registered and certified producers / research stations**.

4. GHCP&PHHT: Crop Establishment: Q10



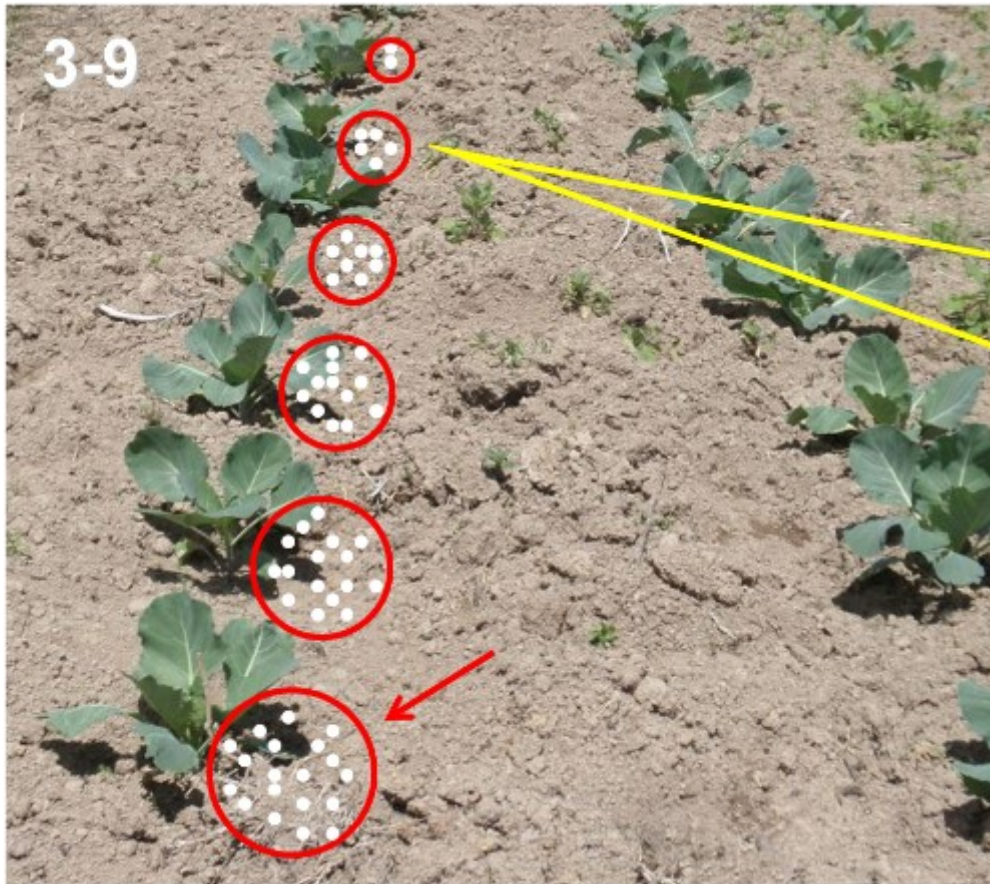
Use a string for straight line planting

3. GHCP&PHHT: Pre-Cultivation Preparation: Q10

“Does the farmer use recommended **planting/transplanting spacing**?”

- Seedlings should be transplanted at the recommended **stage** and **spacing** (check the label of the seed packet)
- Right spacing **minimizes pests and diseases incidences, ease farm operation and has the overall effect of improved productivity**
- Avoid transplanting **immature and over grown seedlings** as they will have poor take off.
- **Line planting/transplanting** using a string makes field operations easier.

4. GHCP&PHHT: Crop Establishment: Q11



Fertilizer application at transplanting

4. GHCP&PHHT: Pre-Cultivation Preparation: Q11

“Does the farmer plant/transplant using recommended **fertilizer application rates**?”

- It is important to follow the recommended **planting/transplanting fertilizer application rates**.
- Inorganic fertilizers (DAP, NPS etc.) should thoroughly be mixed with the soil to avoid scorching or volatilization of nitrogen based fertilizers.
- Because the effectiveness of fertilizers is highly dependent on **soil pH**, it is recommended to apply manure in order to neutralize the soil pH

5. GHCP&PHHT: Crop management: Q12



5. GHCP&PHHT: Crop management: Q12

“Does the farmer supplement crop **water requirement** through one or more of the following irrigation methods: watering can, overhead, drip, and furrow to meet the minimum crop water requirement?”

- **The type of irrigation** to be applied should take into consideration disease prevalence e.g. in areas with high prevalence of blight disease of Tomato and/or Potato, **furrow irrigation** is preferred to overhead(watering can) /sprinkler irrigation

5. GHCP&PHHT: Crop Management: Q12

Factor to consider when choosing an irrigation system: **terrain, soil type, type of crop** (whether the crop is a fruit bearing or vegetative) and **climatic conditions.**

- For fruit bearing and flowering crops, **furrow and drip irrigation** are preferred over overhead / sprinkler irrigation
- For sandy soil, small amount but frequent irrigation is preferable.
- Clay soil has high water holding capacity, therefore, too wet conditions would invite root rot disease or other fungal diseases.

5. GHCP&PHHT: Pre- Cultivation Preparation: Q12

- Irrigation water should be applied as per the recommendations and should be quality water.
- Irregular application of irrigation water can lead to defects such as “**Blossom-end Rot**”, **toughness, bitter flavor, cracking or irregular fruits shape.**
- Inadequate water leads to **water stressed crops with significantly reduced yield**

5. GHCP&PHHT: Crop Management: Q13



Weeding Kales using simple tools

5. GHCP&PHHT: Pre-Cultivation Preparation: Q13

“Does the farmer ensure timely weeding and use of appropriate weeding tools in **managing of weeds?**”

- Weeds are **suppressive to crop yields & alternative host to many pests and diseases**
- More often, smallholder farmers unintentionally aid in weed proliferation by either weeding seeded weeds; or chopping the weed into smaller propagules for the vegetatively propagated weeds.
- **Timely weeding** need to be undertaken regularly in order to suppress the weeds.
- Weeding when the farm is too wet should be avoided as it **leads to compaction.**

5. GHCP&PHHT: Crop Management: Q14



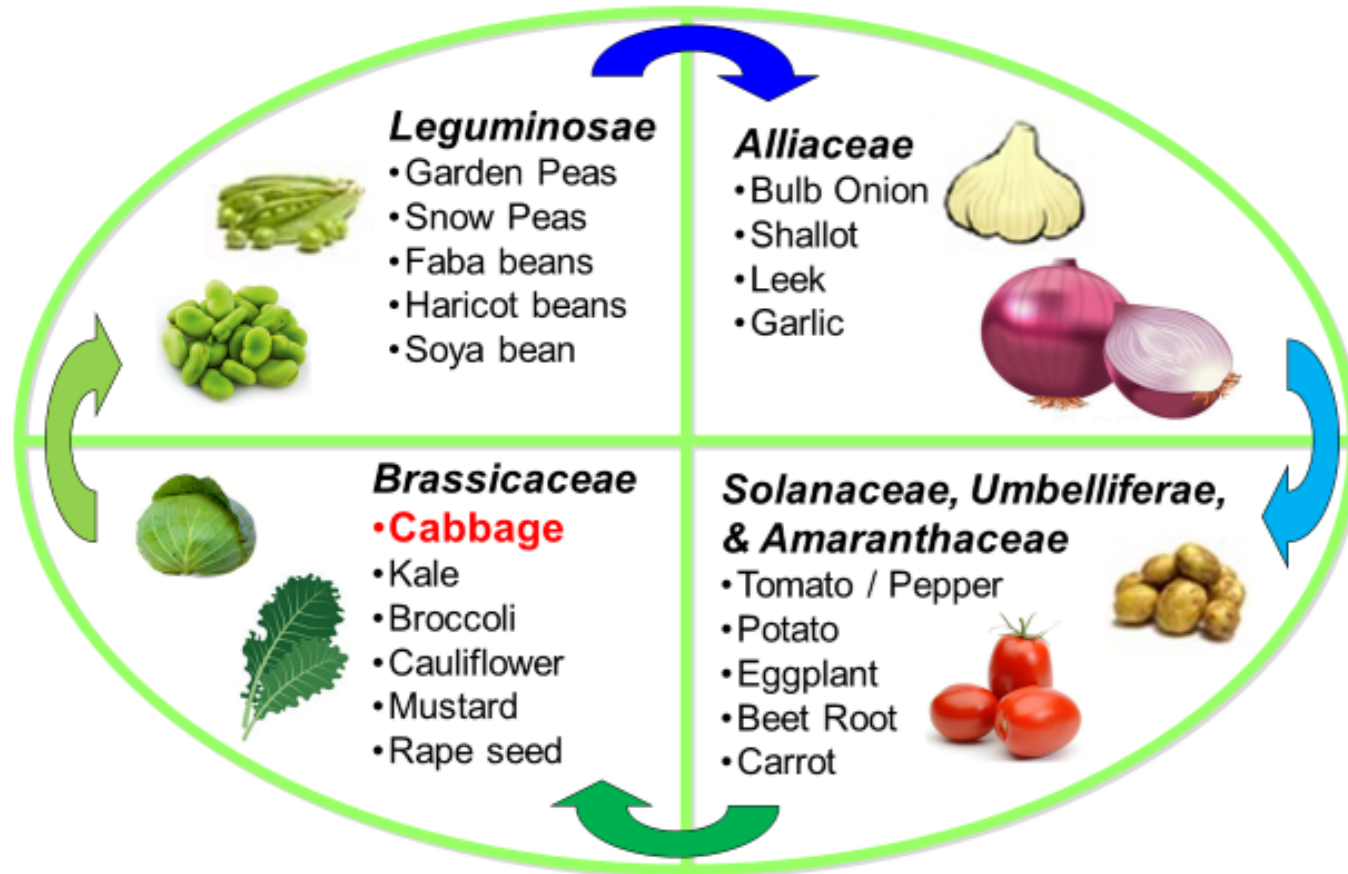
Top-dressed Cabbages

5. GHCP&PHHT: Crop Management : Q14

“Does the farmer undertake appropriate **top-dressing practices: timeliness, type and recommended rate of application, and method of application?**”

- Top-dressing fertilizers are essential for **vigorous crop growth and better yields**
- The fertilizers must be applied appropriately in terms of **timing, type, quantity and the method**
- Top-dressing fertilizers should be applied **when the root system of the seedling is well established** to enable faster uptake by the crop
- Top-dressing fertilizers can be applied through **broadcasting or placement methods**

5. GHCP&PHHT: Crop Management: Q15



An example of a Crop Rotation

5. GHCP&PHHT: Crop Management : Q15

“Does the farmer use at least two of the following **pests and diseases control/management practices**: cultural, biological, physical, and chemical?”

- **Pests and diseases** can be managed through either **single control strategies** or an **integration of 2 or more methods**
- The single control strategies are:
 - **Cultural**
 - **Physical**
 - **Biological**
 - **Chemical**

5. GHCP&PHHT: Crop Management : Q15

Cultural Control:

- Involves managing the environment in which the crop is growing/grows with a view of maintaining pest and disease below the harmful level
- The cultural methods include: **field sanitation/hygiene** (e.g. footbath), **intercropping**, **crop rotation**, **weeding**, **fallow**, **flooding**, **solarization** etc.

Physical Control

- Physical control involve use of **insect traps**, **hand picking**, **screening house** etc.

5. GHCP&PHHT: Crop Management : Q15

Biological Control

- This involves use of **natural enemies** (predators and parasitoids), **resistant/tolerant varieties**, **push and pull system** (e.g. use of tomato crop to repel (push) Diamond Back Moth and Indian Mustard to attract (pull) the pest from cabbage crop), and **repellant plants**

Chemical Control

- This involves use of **pesticides**
- Pesticides have **quick knock down effect**
- Pesticide usage has been linked to environmental degradation and should be used as last resort

5. GHCP&PHHT: Crop Management : Q15

Integrated Pest Management (IPM)

- Due to limitation of a single control strategy, use of IPM is a more recommended strategy
- IPM integrates **cultural, mechanical, biological** and as a last resort, **chemical control** to minimize the crop loss caused by pests and diseases

5. GHCP&PHHT: Crop Management: Q16



Putting on protective clothing before application of pesticide

5. GHCP&PHHT: Crop Management : Q16

“Does the farmer observe **safe and effective use of pesticides**: protective clothing, recommended pesticides, appropriate doses, appropriate disposal of surplus mix, obsolete pesticides and containers, Pre-Harvest Interval (PHI) and storage?”

- Pesticides are **harmful** both to people and the environment
- This has led to restriction and ban of some pesticides e.g. methyl bromide

5. GHCP&PHHT: Crop Management : Q16

- **To minimize the negative effect of pesticides**, there is need for smallholder farmers to be sensitized on aspects such as:
 - Recommended pesticides
 - Dosage
 - Pre-entry interval
 - Pre-Harvest Interval (PHI)
 - Appropriate usage of pesticides application devices
 - Storage
 - Protective clothing

6. GHCP&PHHT: Harvest: Q17



Harvesting Cabbages

6. GHCP&PHHT: Harvest : Q17

“Does the farmer use at least one of the following **harvesting indices**: color, size, shape, and firmness?”

- The shelf life of a produce is **highly correlated** to the physiological maturity at harvesting
- Understanding the **unique characteristics** of different produce at physiological maturity is vital in ensuring that **only mature produce is harvested**
- This greatly reduces **the post-harvest losses** associated with produce harvested prematurely

6. GHCP&PHHT: Harvest : Q17

- Harvesting indices for different produce:
 - Color of the skin & seeds** (e.g. Tomato, Chili)
 - Size/Color of leaves**(e.g. Kale, Onion, Potato)

7. GHCP&PHHT: Post-Harvest Handling: Q18



Tomatoes packaged in wooden containers

7. GHCP&PHHT: Post-Harvest Handling : Q18

“Does the farmer use **appropriate** harvesting, handling, transportation and storage **containers** or **standard packaging materials** with the following characteristics: well ventilated, easy to clean, and smooth surface which minimizes produce damage?”

- Post-harvest handling greatly influence the **produce quality, shelf life** and **post-harvest losses**
- There is need for **appropriate post-harvest** handling of produce in terms of: **cooling, sorting, grading, cleaning, packaging, transportation** and **storage**

7. GHCP&PHHT: Post-Harvest Handling: Q19



Grading of Tomatoes in the field

7. GHCP&PHHT: Post-Harvest Handling : Q19

“Does the farmer apply one of the following appropriate **value addition techniques**: cooling, cleaning, sorting, grading, packaging, or processing of the produce?”

- Markets for fresh produce have become **increasingly competitive** in terms of the produce quality
- There is need for farmers to add value to their produce in terms of presentation and processing for the products to be competitive

8. GHCP&PHHT: Cost & Income Analysis: Q20

Item	Quantity	Unit Price	Total (ETB)
Marketable Yield			
Variable Costs			
Land Preparation			
Manure/Compost			
Seeds			
Fertilizers			
Fungicides			
Insecticides			
Others e.g.) selective Herbicides			
Labour			
Planting			
Spraying/Weeding/Harvesti ng/Grading			
Transportation/Packaging			

8. GHCP&PHHT: Cost & Income Analysis : Q20

“Does the farmer keep records on cost of production and sales and undertake **cost and income analysis**?”

- Viable decisions on any enterprise can only be based on **accurate data** or **information**
- Such decisions are largely based on **the income generated**
- Most smallholder farmers rarely keep records; subsequently, most decisions are **abstract, highly subjective** and **not economically viable**
- There is need to sensitize smallholder farmers on the importance of **keeping accurate farm records** in making economically viable decisions

9. Post-Training Evaluation Exercise

QUESTION	YES	NO
1. The fundamental practices of GHCP&PHHT 20 are categorized into three (3) broad topics and twenty (20) sub-topics.		✓
2. Market survey provides useful information in guiding a buyer in producing what he/she can sell.		✓
3. A planting calendar is a tool for farmers to plan for production to ensure that marketing coincides with the period of the year when the market price of a produce is highest.	✓	
4. It is a recommendation to have soils analyzed for nutrient availability and other factors vital for crop production after every five (5) years.		✓
5. Use of quality seed/planting material(s) can positively improve the returns of smallholder farmers due to higher yields realized and reduced expenditure on control of pests and diseases.	✓	
6. Land preparation is critical in management of soil borne pests and diseases and recycling of soil nutrients.	✓	
7. Seedlings should be hardened for a period of 1 – 2 days before transplanting.		✓
8. The type of irrigation to be used should take into consideration disease prevalence.	✓	
9. The ONLY control strategies for pests and diseases are cultural, physical, and biological.		✓
10. Keeping accurate farm records help smallholder farmers to make economically viable decisions.	✓	

Thank you for your attention

THANK YOU

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