National Vocational Qualification level – 4

"Tunnel Farming, Green House & Agribusiness"

(Off-season Vegetable production & Agribusiness)

(Curriculum)

National Vocational and Technical Training Commission (NAVTTC)
Government of Pakistan

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1. Introduction

Agriculture is considered as the backbone of Pakistan's economy, which accounts for about 18.9% of Pakistan's GDP and employs about 42.3% of the labor force. Where agriculture is considered as the largest sector that supports GDP, horticulture sector (fruit and vegetables) contributes only 11 % to the total value addition. Pakistan exports vegetables to Afghanistan, Malaysia, Russia, Bahrain, UAE and Sri Lanka but not impressive figures. Despite favorable climatic and cropping condition Pakistan has repeatedly seen shortages of different vegetables like onions or tomatoes in the market that caused price rise and difficulty for many people. More than 35 varieties of vegetables are growing in different climatic zones in different provinces of Pakistan. Many Surveys reports different reasons for low production of vegetables in Pakistan. The government in history executed various projects to urge the farmer community for cultivation of vegetables but due to lack of technical skills and limited resources, farmers have not adopted this sector in a very impressive way.

Vegetable production can be heightening by improving cultivation techniques and enhancing profitability for farmers. Off-season vegetable production is also an important technique to enhance profits and meet market demand. Production of vegetables out of normal season through different techniques is called “off-season vegetable”. Growing Off-season vegetables not only provides fresh vegetables to the daily dietary meal of the consumers but also helps farmers to get abnormal profit as supply in the off-season is always lower than that of its demand.

Therefore, the importance of knowledge related to off-season vegetable production through the latest techniques makes this diploma very valuable not only in agriculture but also in its usefulness in all areas of our daily life. Market demands for qualified workers are therefore a need for time and can only be addressed by developing specific skills standards in partnership with all stakeholders and industry experts. Recognizing this fact, the National Vocational and Technical Training Commission (NAVTTC) has developed the National Vocational Qualifications Framework (NVQF) for tunnel farming, Greenhouse and agri. Business (off season vegetable production) qualifications. These competency standards have been developed by the Qualification Development Committee (QDC) and validated by the Qualification Validation Committee (QVC) with representation from the country's leading departments (IAGS, PU Lahore, UVAS, UAF, PCSIR and ARI KPK.

2. Purpose of the training program:

The aim of this qualification is to set high and applicable professional standards for all stake holders in agriculture sector. The basic goals of establishing these credentials are as follows:

1. Equip with the latest off-season vegetable production techniques
2. Improve trainees' professional competence
3. Provide opportunities for recognition of non-formal or informal skills
4. Raise standard and efficacy of scientific training and assessment
5. Improve crop production through the best management skills
6. Enable the existing workforce to learn new technologies and methods
7. Producing a skilled workforce for off-season vegetable production

3. Overall objectives of training program:

The main objectives of the Tunnel Farming, Greenhouse & Agribusiness (Level-4) are as follows:

1. Select and procure material required for poly-tunnel
2. Install Low Tunnel
3. Install walk-in Tunnel
4. Install high Tunnel
5. Perform Mulching
6. Maintain Poly-Tunnel Structure
7. Select Irrigation System
8. Apply Flood Irrigation
9. Install Drip Irrigation System
10. Perform Irrigation Post Care

11. Perform installation of fertigation system
12. Manage Soil Fertility
13. Develop Professionalism
14. Perform workplace communication skills
15. Manage workforce planning
16. Undertake project work 35
17. Apply interpersonal skills
18. Maintain professionalism in workplace
19. Manage meetings
20. Manage workforce planning
21. Undertake project work
22. Apply interpersonal skills

4. Competencies to be gained after completion of course:

At the end of the course, the trainee has attained the following core competencies:

National Qualification in the Tunnel Farming, Greenhouse & Agribusiness (Level-4).

1. Select and procure material required for poly-tunnel
2. Install Low Tunnel
3. Install walk-in Tunnel
4. Install high Tunnel
5. Perform Mulching
6. Maintain Poly-Tunnel Structure
7. Select Irrigation System
8. Apply Flood Irrigation
9. Install Drip Irrigation System
10. Perform Irrigation Post Care
11. Perform installation of fertigation system
12. Manage Soil Fertility

5. Entry level of trainees:

The entry for National Vocational Certificate level 2, in "**Tunnel Farming, Greenhouse & Agribusiness**" are given below:

Title	Entry requirements
National Vocational Certificate level 4, in **Tunnel Farming, Greenhouse & Agribusiness**	Entry for assessment for this qualification is open. However, entry into formal training institutes, based on this qualification is candidate having **SSC** and National Vocational Certificate level 3, in **Tunnel Farming, Greenhouse & Agribusiness**

6. Minimum qualification of trainer/instructor:

- Must be a holder of Bachelor of Engineering in Agricultural Engineering/ B.Sc. (Hons.) Agriculture/equivalent or Bachelor of Technology in Agricultural Engineering (with three years of experience)
- Must be able to communicate effectively both orally and in written form.
- Must be able to perform all competences, given in **Tunnel Farming, Greenhouse & Agribusiness Level-4**

7. Recommended trainer: trainee ratio

The recommended maximum trainer: trainee ratio for this program is 1 trainer for 20 to 25 trainees.

8. Medium of instruction i.e. language of instruction:

Instructions will be in Urdu/ English/ Local language.

9. Duration of the course (Total time, Theory & Practical time):

Total - 1200 hours

Theory - 246 hours (20.5%)

Practical - 954 hours (79.5%)

10. Description and structure of the course

Following is the structure of the course:

Competency Standard	Category	Theory	Practical	Total	Credit
Select and procure material required for poly-tunnel	Technical	24	36	60	60
Install low tunnel	Technical	12	48	60	60
install walk-in tunnel	Technical	18	72	90	90
install high tunnel	Technical	20	90	110	110
perform Mulching	Technical	14	66	80	80
Maintain poly-tunnel structure	Technical	12	48	60	60
Select irrigation System	Technical	12	48	60	60
Apply flood irrigation	Technical	14	66	80	80
Install drip irrigation system	Technical	22	78	100	100
Perform Post care	Technical	12	48	60	60
Perform installation of fertigation system	Technical	14	66	80	80
Manage soil fertility	Technical	12	48	60	60

Develop Professionalism	Generic	6	24	30	30
Perform workplace communication skills	Generic	6	24	30	30
Manage workforce planning	Generic	6	24	30	30
Undertake project work	Generic	6	24	30	30
Apply interpersonal skills	Generic	6	24	30	30
Maintain professionalism in workplace	Generic	6	24	30	30
Manage meetings	Generic	6	24	30	30
Manage workforce planning	Generic	6	24	30	30
Undertake project work	Generic	6	24	30	30
Apply interpersonal skills	Generic	6	24	30	30
Total		**246**	**954**	**1200**	**1200**
Percentage		**20.5**	**79.5**		

Tunnel Farming, Green House & Agribusiness

Level 4

Module 31: Select and procure material required for poly-tunnel

Objective: After the completion of this module, the Trainee will be able to develop suitable material to build different types of poly-tunnels and to procure the suitable materials.

Duration: 60 Hours **Theory:** 24 Hours **Practice:** 36 Hours **Credit Hours:** 6

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Select foundation material	**Trainee will be able to:** • Collect data of climate and site conditions	Knowledge based questions • Describe the methods to collect climatic data. (thermometers, radar systems, barometers, rain gauges, wind vanes, anemometers, transmissometers, and hygrometers) • Discuss the conditions required for site selection. (Soil fertility, temperature, shade ,	**Theory-** 4Hrs **Practical-** 7Hrs **Total-** 11Hrs	Drawing sheet Pencil Rubber Sharpener Measuring tape Foundation bars Support bars Ventilation fans Door accessories Iron bars of different quality Polyethylene	Class Room Training Workshop Lab/ Field Visit

	• Select durable and corrosion resistant material • Select suitable material as per standards	effective sunlight ,humidity , irrigation and vehicular transportation) • Differentiate between durable and corrosion resistant material. • Discuss different materials required for the construction of poly tunnel. • (galvanized steel hoops, crop bars, base rails and a polythene cover) **Practical Activity:** Make a group of 5 students and demonstrate how to set foundation material. .		sheets	

LU2. Select poly-tunnel structure material	**Trainee will be able to:** • Select support bars for climbing plants • Select suitable material to walk underneath • Select structure for side vents as per standards • Select gauge of polyethylene sheet as per requirement	• Define the role of support bars in case of climbing plants. • Enlist suitable material required for polytunnel structure • State the role of side vents. • Discuss different gauge of polyethylene sheet. (720 guage, 600 guage and 800 guage) **Practical Activity:**	**Theory-** 5Hrs **Practical-** 7Hrs **Total-** 12Hrs	Drawing sheet Pencil Rubber Sharpener Measuring tape Foundation bars Support bars Ventilation fans Door accessories Iron bars of different quality • Polyethylene sheets	Class Room Training Workshop Lab/ Field Visit

		Make a model of poly tunnel structure			
LU3; Conduct market survey for procurement of material	**Trainee will be able to:** • Plan market survey according to prescribed standard • Collect data of material required for poly-tunnel structure on prescribed format • Ensure health and safety	• Discuss the protocols for market survey. (**surveys**, interviews, focus groups, and customer observation.) • Discuss poly tunnel materials as per requirment. (Polytunnel Kit, polythene covers, galvanized steel hoops, crop bars, base rails) • State health and safety regulations.	**Theory-** 5Hrs **Practical-** 7Hrs **Total-** 12Hrs	Drawing sheet Pencil Rubber Sharpener Measuring tape Foundation bars Support bars Ventilation fans Door accessories Iron bars of different quality • Polyethylene sheets	

	standards	**Practical Activity:** Conduct market survey for procurement of poly tunnel material.			
LU4: Perform procurement	**Trainee will be able to:** • Select poly-tunnel structure material as per job requirement • Procure the poly-tunnel structure material as per standards • Manage for labour to load and unload materials	• Enlist poly tunnel structure material. • Discuss procurement procedure for poly tunnel structure material • Differentiate between safe loading and unloading material	**Theory-** 5Hrs **Practical-** 7Hrs **Total-** 12Hrs	Drawing sheet Pencil Rubber Sharpener Measuring tape Foundation bars Support bars Ventilation fans Door accessories Iron bars of different quality • Polyethylene sheets	

	• Ensure health and safety standards	• Understanding risk assessment of personal health and safety (hand vibration syndrome, slips and trips , electricity, exhaustion and air borne fibers and toxins etc) • State health and safety regulations. **Practical Activity:** Conduct market survey for procurement of polytunnel material.			

LU5: Quality assurance	**Trainee will be able to:** • Ensure the quality of materials • Ensure the gauge of polyethylene sheet • Ensure quality of pipes or foundation material	• Define quality assurance • Discuss the protocols of quality assurance (checklists, process standards, process documentation and project audit) • Enlist the methods of quality assurance for poly tunnel (durability, weight, light transmission, and breakage. • Check the quality of materials. (galvanized steel hoops, crop bars, base rails and a polythene cover) • Understand polyethylene sheet's gauge	**Theory-** 5Hrs **Practical-** 8Hrs **Total-** 13Hrs	Drawing sheet Pencil Rubber Sharpener Measuring tape Foundation bars Support bars Ventilation fans Door accessories Iron bars of different quality • Polyethylene sheets	

		• Verify quality of pipes or foundation material. **<u>Practical Activity:</u>** Conduct visit and make a report to assess the material of poly tunnel.			

Module 32: Install Low Tunnel

Objective: After the completion of this module, the Trainee will be able to install low tunnel.

Duration: 60 Hours **Theory:** 12 Hours **Practice:** 48 Hours **Credit Hours:** 6

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare work plan for low tunnel installation	**Trainee will be able to:** • Identify and arrange required tools and equipment before installation • Perform calibration of instruments if required • Perform quality checks	Knowledge based questions • Define low tunnel • Enlist tools and equipment required for installation • Describe the procedure for calibration of instruments. • Interpret the layout plan for low tunnel installation.	**Theory-** 2Hrs **Practical-** 9Hrs **Total-** 11Hrs	• Iron rod • Steel wires • Bamboo sticks • Ropes • Different parts of low tunnel • Polyethylene sheets • Fencing staples • Sand bags • Measuring scale • Measuring tape	Class Room Training Workshop Lab/ Field Visit

	• Prepare plan for required task • Ensure required safety standards	• Understanding risk assessment of personal health and safety (hand vibration syndrome, slips and trips , electricity, exhaustion and air borne fibers and / toxins etc) **<u>Practical Activity:</u>** Perform group activity and design layout plan for low tunnel			
LU2. Perform transportation of materials for low tunnel installation	**Trainee will be able to:** • Ensure safe loading of material • Ensure safe transport of material for installation at	• Discuss the handling of loading material. • Explain the precautionary	**Theory-** 2Hrs **Practical-** 9Hrs **Total-** 11Hrs	• Iron rod • Steel wires • Bamboo sticks • Ropes • Different parts of low tunnel • Polyethylene sheets • Fencing staples	Class Room Training Workshop Lab/ Field Visit

	site as per recommendation • Ensure safe unloading of material • Ensure safe placement of material at site. • Ensure PPEs.	measures taken during transportation. • Describe the process of handling while unloading material • Manage materials on construction site (galvanized steel hoops, crop bars, base rails and a polythene cover) • Describe the importance of wearing PPEs **<u>Practical Activity:</u>** Perform loading and unloading		• Sand bags • Measuring scale • Measuring tape	

		operations for low tunnel			
LU3. Implement layout plan as per design	**Trainee will be able to:** • Understanding of layout design • Demarcation on site before installation • Perform placement of material in field as per recommendation • Ensure PPEs.	• Define the criteria for layout design • Discuss on site risks before installation • Describe the importance of wearing PPEs **<u>Practical Activity:</u>** Implement layout plan as per design	**Theory-** 2Hrs **Practical-** 9Hrs **Total-** 11Hrs	• Iron rod • Steel wires • Bamboo sticks • Ropes • Different parts of low tunnel • Polyethylene sheets • Fencing staples • Sand bags • Measuring scale • Measuring tape	

LU4: Perform installation of bamboo/mulberry structure for low tunnel	**Trainee will be able to:** • Install the bamboo/mulberry sticks in field as per recommendation • Perform fixing of sticks with plastic wire. • Perform polythene plastic covering as per recommendation.	• Discuss the durability of bamboo/ mulberry sticks. • Differentiate between different plastic coverings • Differentiate between pre and post installation practices. (plastics sheets management, water management, bamboo sticks durability) • Describe the importance of wearing PPEs **<u>Practical Activity:</u>**	**Theory-** 3Hrs **Practical-** 10Hrs **Total-** 13Hrs	• Iron rod • Steel wires • Bamboo sticks • Ropes • Different parts of low tunnel • Polyethylene sheets • Fencing staples • Sand bags • Measuring scale • Measuring tape	

	• Perform post installation practices as per standards • Ensure PPEs.	Perform installation of low tunnel using bamboo/mulberry sticks			
LU5: Perform installation of iron structure for low tunnel	**Trainee will be able to:** • Install the iron rod in field as per recommendation	• Discuss the durability and	**Theory-** 3Hrs **Practical-** 11Hrs **Total-** 14Hrs	• Iron rod • Steel wires • Bamboo sticks • Ropes • Different parts of low tunnel	

	• Perform fixing of sticks with suitable wire. • Perform polythene plastic covering as per recommendation. • Perform post installation practices as per standards	specification of different iron rod used for installation. • Differentiate between pre and post installation practices. • Describe the importance of wearing PPEs **Practical Activity:** Perform installation of low tunnel using iron rod		• Polyethylene sheets • Fencing staples • Sand bags • Measuring scale • Measuring tape	

	• Ensure PPEs.				

Module 33: Install walk-in Tunnel

Objective: After the completion of this module, the Trainee will be able to install a walk-in tunnel structure.

Duration: 90 Hours **Theory:** 18 Hours **Practice:** 72 Hours **Credit Hours:** 6

Learning Unit	Learning Outcomes	• Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare work plan for walk-in tunnel installation	**Trainee will be able to:** • Identify and arrange required tools and equipment before installation • Perform calibration of instruments if required • Perform quality checks • Prepare plan for required task	• Define walk-in tunnel • Enlist tools and equipment required for installation • Describe the procedure for calibration of instruments. • Interpret the layout plan for walk-in tunnel installation. • Understanding risk assessment of personal health and safety (hand	**Theory-** 3Hrs **Practical-** 14Hrs **Total-17** Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scsle • Measuring tape	Class Room Training Workshop Lab/ Field Visit

	• Ensure required safety standards	vibration syndrome, slips and trips , electricity, exhaustion and air borne fibers and / toxins etc) **Practical Activity:** Perform group activity and design layout plan for walk-in tunnel			
LU2. Perform transportation of installation materials for walk-in tunnel	**Trainee will be able to:** • Ensure safe loading of material • Ensure safe transport of material for installation at site as per recommendation • Ensure safe unloading of material • Ensure safe placement of material at site. • Ensure PPEs.	• Discuss the handling of loading material. • Explain the precautionary measures taken during transportation. • Describe the process of	**Theory-** 3Hrs **Practical-** 14Hrs **Total-** 17Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scsle • Measuring tape •	Class Room Training Workshop Lab/ Field Visit

		handling while unloading material • Manage materials on construction site (galvanized steel hoops, crop bars, base rails and a polythene cover) • Describe the importance of wearing PPEs **Practical Activity:** Perform loading and unloading operations for walk-in tunnel			

LU3. Implement layout plan as per design	**Trainee will be able to:** • Understanding of layout design • Demarcation on site before installation • Perform placement of material in field as per recommendation • Ensure PPEs.	• Define the criteria for layout design • Discuss on site risks before installation • Describe the importance of wearing PPEs **Practical Activity:** Implement layout plan as per design	**Theory-** 3Hrs **Practical-** 14Hrs **Total-** 17Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scsle • Measuring tape •	
LU4. Perform installation of bamboo/mulberry structure for walk-in tunnel	**Trainee will be able to:** • Install the bamboo/mulberry sticks in field as per recommendation • Perform fixing of sticks with plastic wire. • Perform polythene plastic covering as per	• Discuss the durability of bamboo/ mulberry sticks. • Differentiate between different plastic coverings	**Theory-** 4Hrs **Practical-** 15Hrs **Total-** 19Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring	

	recommendation. • Perform post installation practices as per standards • Ensure PPEs.	• Differentiate between pre and post installation practices. (plastics sheets management, water management, bamboo sticks durability) • Describe the importance of wearing PPEs **Practical Activity:** Perform installation walk-in tunnel using bamboo/mulberry sticks		scsle • Measuring tape •	
LU5. Perform installation of iron structure for walk-in tunnel	**Trainee will be able to:** • Install the iron rod in field as per recommendation	• Discuss the durability and	**Theory-** 4Hrs **Practical-** 16Hrs **Total-** 20Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags	

	• Perform fixing of sticks with suitable wire. • Perform polythene plastic covering as per recommendation. • Perform post installation practices as per standards • Ensure PPEs.	specification of different iron rod used for installation. • Differentiate between pre and post installation practices. • Describe the importance of wearing PPEs **Practical Activity:** Perform installation of walk-in tunnel using iron rod		• Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scsle • Measuring tape •	

Module 34: : Install high Tunnel

Objective: After the completion of this module, the Trainee will be able to install different materials to construct a High-tunnel.

Duration: 110 Hours **Theory:** 20 Hours **Practice:** 90 Hours **Credit Hours:** 11

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare work plan for high tunnel installation	**Trainee will be able to:** • Identify and arrange required tools and equipment before installation • Perform calibration of instruments if required • Perform quality checks • Prepare plan for required task • Ensure required safety standards	• Define walk-in tunnel • Enlist tools and equipment required for installation • Describe the procedure for calibration of instruments. • Interpret the layout plan for walk-in tunnel installation. • Understanding risk assessment of personal health and safety (hand vibration syndrome, slips and trips , electricity, exhaustion	**Theory-** 4Hrs **Practical-** 15Hrs **Total-** 19Hrs	• Safety Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scsle • Measuring tape	Class Room Training Workshop Lab/ Field Visit

		and air borne fibers and / toxins etc) **Practical Activity:** Perform group activity and design layout plan for high tunnel			
LU2. Perform transportation of installation materials for high tunnel	**Trainee will be able to:** • Ensure safe loading of material • Ensure safe transport of material for installation at site as per recommendation • Ensure safe unloading of material • Ensure safe placement of material at site. • Ensure PPEs.	• Discuss the handling of loading material. • Explain the precautionary measures taken during transportation. • Describe the process of handling while unloading material	**Theory-** 4Hrs **Practical-** 15Hrs **Total-** 19Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scsle • Measuring tape •	Class Room Training Workshop Lab/ Field Visit

		• Manage materials on construction site (galvanized steel hoops, crop bars, base rails and a polythene cover) • Describe the importance of wearing PPEs **<u>Practical Activity:</u>** Perform loading and unloading operations for high tunnel			

LU3. Implement layout plan as per design	**Trainee will be able to:** • Understanding of layout design • Demarcation on site before installation • Perform placement of material in field as per recommendation • Ensure PPEs.	• Define the criteria for layout design • Discuss on site risks before installation • Describe the importance of wearing PPEs **Practical Activity:** Implement layout plan as per design	**Theory-** 4Hrs **Practical-** 15Hrs **Total-** 19Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scale • Measuring tape •	
LU4. Perform installation of bamboo/mulberry structure for high tunnel	**Trainee will be able to:** • Install the bamboo/mulberry sticks in field as per recommendation • Perform fixing of sticks with plastic wire. • Perform polythene plastic covering as per	• Discuss the durability of bamboo/ mulberry sticks. • Differentiate between different plastic coverings	**Theory-** 4Hrs **Practical-** 15Hrs **Total-** 19Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring	

	recommendation. • Perform post installation practices as per standards • Ensure PPEs.	• Differentiate between pre and post installation practices. (plastics sheets management, water management, bamboo sticks durability) • Describe the importance of wearing PPEs **Practical Activity:** Perform installation high tunnel using bamboo/mulberry sticks		scsle • Measuring tape •	
LU5. Perform installation of iron structure for high tunnel	**Trainee will be able to:** • Install the iron rod in field as per recommendation • Perform fixing of sticks with suitable wire. • Perform polythene plastic	• Discuss the durability and specification of different iron rod used for installation.	**Theory-** 4Hrs **Practical-** 15Hrs **Total-** 19Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet	

	covering as per recommendation. • Perform post installation practices as per standards • Ensure PPEs.	• Differentiate between pre and post installation practices. • Describe the importance of wearing PPEs **Practical Activity:** Perform installation of walk-in tunnel using iron rod		• Marker and steel wires • Measuring scsle • Measuring tape •	

Module 35 : Perform Mulching

Objective: After the completion of this module, the trainee will be able to to prepare for work, perform organic mulching, perform in-organic mulching and post application management

Duration: 80 Hours **Theory:** 14 Hours **Practice:** 66 Hours **Credit Hours:** 8

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare for work	**Trainee will be able to:** • Identify and arrange required tools and equipment before installation • Perform calibration of instruments if required • Perform quality checks	Knowledge based questions • Define mulching • Differentiate between organic and inorganic mulch • Enlist tools and equipment required for mulching • Determine the quality of mulching material. • Explain the criteria of as	**Theory-** 3Hrs **Practical-** 16Hrs **Total-** 19Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scsle • Measuring tape	Class Room Training Workshop Lab/ Field Visit

	• Prepare plan for required task • Ensure required safety standards	per mulching. (organic mulching , inorganic mulching) • Understanding risk assessment of personal health and safety **Practical Activity:** Conduct field visit and explore different types of mulch			
LU2. Perform organic mulching	**Trainee will be able to:** • Identify and arrange required organic material for mulching as per recommendations. • Perform placement of organic mulch as per standard.	• Enlist tools and equipment required for organic mulching • Discuss the pros and cons of organic mulching	**Theory-** 3Hrs **Practical-** 16Hrs **Total-** 19Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and	Class Room Training Workshop Lab/ Field Visit

	• Ensure health & safety standards	• Define the proper way of placing mulch. (distance maintenance as per crop) • Understanding risk assessment of personal health and safety **<u>Practical Activity:</u>** Conduct field visit and prepare organic mulch		steel wires • Measuring scsle • Measuring tape • •	
LU3. Perform in-organic mulching	**Trainee will be able to:** • Identify and arrange required in-organic material for mulching as per recommendations.	• Enlist tools and equipment required for organic mulching.	**Theory-** 4Hrs **Practical-** 17Hrs **Total-** 21Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts	

	• Perform placement of in-organic mulch as per standard. • Ensure health & safety standards	• Discuss the pros and cons of inorganic mulching • Define the proper way of placing mulch. (distance maintenance as per crop) • Understanding risk assessment of personal health and safety (hand vibration syndrome, slips and trips , electricity, exhaustion and air borne fibers and toxins etc) **<u>Practical Activity:</u>** Conduct field visit and perform		of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scsle • Measuring tape •	

		in organic mulching.			
LU4. Perform post application mangement.	**Trainee will be able to:** • Perform periodic visits and prepare a report • Analyses the report and make prerequisite. • Perform post management.	• Discuss periodic visits criteria.(hourly, weekly, fortnightly or as per requirement) • Describe the precautionary measures taken after mulching. (health and safety measures) • Discuss the risks involved in post management practices.	**Theory-** 4Hrs **Practical-** 17Hrs **Total-** 21Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scsle • Measuring tape •	

		Practical Activity: Conduct a field visit and make a report on efficacy of different materials used as mulch			

Module 36: : Maintain Poly-Tunnel Structure

Objective: After the completion of this module, the Trainee will be able to effectively maintain the poly-tunnel.

Duration: 80 Hours **Theory:** 14 Hours **Practice:** 66 Hours **Credit Hours:** 8

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Monitor the poly-tunnel	**Trainee will be able to:** • Perform periodic surveys of the poly-tunnel	Knowledge based questions • Define periodic surveys. (hourly, weekly and fortnightly) • Compare conditions which need to be checked in periodic surveys. • Explain factors responsible for poly-tunnel damage • State the report writing criteria for structural	**Theory-** 7Hrs **Practical-** 33Hrs **Total-** 40Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scsle • Measuring tape	Class Room Training Workshop Lab/ Field Visit

	• Identify structural damage • Report the structural damage as per standard format • Ensure health and safety standards	damage. • Understanding risk assessment of personal health and safety (hand vibration syndrome, slips and trips , electricity, exhaustion and air borne fibers and toxins etc) **Practical Activity:** Conduct field visit and monitor poly tunnel structure.			

LU2. Maintain poly-tunnel structure	**Trainee will be able to:** • . Arrange required material and tools for repairing • Repair the required damage of poly-tunnel structures • Maintain mulching as per standard • Maintain records • Ensure health and safety standards	• Enlist repairing tools and material • Discuss Management practices regarding damage in poly-tunnel • Differentiate between mulching and cover cropping. • Knowledge of keeping record (remaining stock, monitoring of repairing tools) • Understanding risk assessment of personal health and safety (hand vibration syndrome, slips	**Theory-** 7Hrs **Practical-** 33Hrs **Total-** 40Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scsle • Measuring tape	Class Room Training Workshop Lab/ Field Visit

		and trips , electricity, exhaustion and air borne fibers and toxins etc) **Practical Activity:** Make a group and maintain poly tunnel structure			

Tunnel Farming, Green House & Agribusiness

Module 37: Select Irrigation System

Objective: After completing this module, trainee will be able to require the plan for identification and layout of irrigation system.

Duration: 60 Hours **Theory:** 12 Hours **Practice:** 48 Hours **Credit Hours:** 6

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. **Identify irrigation system**	**Trainee will be able to** • Identify source of irrigation water • Prepare plan for use of selected source	• Knowledge based questions • Explain different water sources. • Discuss different types of irrigation system. • Enlist tools and equipment required for irrigation system. • Understand the risk assessment of personal health and safety.	**Theory-** 4Hrs **Practical-** 16Hrs **Total-** 20Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scale • Measuring tape	Class Room Training Workshop Lab/ Field Visit

	• Identify and arrange tools as per the job requirement. • Maintain Records • Ensure required safety standards	• **Practical Activity:** Conduct a field visit and identify different irrigation systems			
LU2. Prepare layout for Irrigation system	• Identify available resource • Select irrigation method • Draw proper design for selected irrigation method • Maintain Records	• Enlist available irrigation water resources. • Enlist different irrigation methods. • Understand layout design as per selected irrigation method. • Manage records of irrigation system • Knowledge of PPE,s.	**Theory-** 4Hrs **Practical-** 16Hrs **Total-** 20Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scale	Class Room Training Workshop Lab/ Field Visit

	• Ensure required safety standards	**Practical Activity:** Prepare layout plan for different irrigation method.		• Measuring tape	
LU3. Cost Estimation	**Trainee will be able to:** • Conduct market survey for cost estimation as per recommendation • Select suitable material as per requirement • Procure selected material as per SOPs • Maintain records as per	• Enlist the materials required as per selected irrigation system. • Determine the cost analysis on the selected system. • Discuss the management and maintenance practices as per irrigation system. • Discuss record keeping of irrigation inputs as per format. **Practical Activity:**	**Theory-** 4Hrs **Practical-** 16Hrs **Total-** 20Hrs	• Tools • Foundation bars • Fencing staples • Structure bars • Sand bags • Different parts of walk in tunnel • Polyethylene sheet • Marker and steel wires • Measuring scale • Measuring tapls	

	prescribed format • Ensure required safety standards	Prepare report on cost analysis of irrigation system.			

Module 38: Apply Flood Irrigation

Objective: After completing this module, trainee will be able to develop the plan for identification and layout of irrigation system.

Duration: 80 Hours **Theory:** 14 Hours **Practice:** 66 Hours **Credit Hours:** 80

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare work plan	**Trainee will be able to:** • Identify and arrange required tools for measuring environmental conditions • Perform calibration of instruments if required • Perform quality checks • Prepare plan for required task • Ensure required safety	Knowledge based questions • Enlist gadgets and equipment for measuring environmental conditions. • Discuss calibration criteria of tools and equipment • Describe general rules for personal hygiene. **Practical Activity:**	**Theory-** 3Hrs **Practical-** 16Hrs **Total-** 19Hrs	• White chart • Sickle and shovel • Wire cutter • Wrenches and knife • Sharpener and fencing staples	Class Room Training Workshop Lab/ Field Visit

	standards	Perform calibration of any environmental gadget or equipment			
LU2. Ensure pre-irrigation requirements	**Trainee will be able to:** • Identify the conditions of selected area (topography, climate and soil) • Perform pre checks of required irrigation source • Identify and arrange required tools and equipment • Maintain Records • Ensure required safety standards	• Discuss pre irrigation conditions • Enlist tools and equipment for irrigation • Knowledge of different irrigation sources **<u>Practical Activity:</u>** Identify different tools and equipment required to set up irrigation system	**Theory-** 3Hrs **Practical-** 16Hrs **Total-** 19Hrs	• White chart • Sickle and shovel • Wire cutter • Wrenches and knife • Sharpener and fencing staples	Class Room Training Workshop Lab/ Field Visit

LU3. Prepare layout for flood irrigation	**Trainee will be able to:** • Identify and arrange required tools and equipment • Draw proper design for selected irrigation method • Maintain Records • Ensure required safety standards	• Enlist tools and equipment required for flood irrigation. • Explain plan for flood irrigation and its sustainability. **Practical Activity:** Make a group of 5 students and prepare layout for flood irrigation	**Theory-** 4Hrs **Practical-** 17Hrs **Total-** 21Hrs	• White chart • Sickle and shovel • Wire cutter • Wrenches and knife • Sharpener and fencing staples	
LU4. Perform flood irrigation	**Trainee will be able to:** • Follow the planned layout design • Apply irrigation as per standard • Ensure health and safety	• Define Delta of water • Discuss the irrigation frequency as per crop requirement • Explain principles and	**Theory-** 4Hrs **Practical-** 17Hrs **Total-** 21Hrs	• White chart • Sickle and shovel • Wire cutter • Wrenches and knife • Sharpener and fencing staples	

	standards	techniques involved in personal health management. **Practical Activity:** Conduct field visit and perform the flood irrigation			

Module 39: Install Drip Irrigation System

Objective: : After completing this module, trainee will be able to develop plan for identification and layout of irrigation system.

Duration: 100 Hours **Theory: 22 Hours** **Practice: 78 Hours** **Credit Hours: 10**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare work plan	• **Trainee will be able to** Identify and arrange required tools for measuring environmental conditions • Perform calibration of instruments if required • Perform quality checks • Prepare plan for required task • Ensure required safety standards	• Knowledge based questions • Enlist gadgets for measuring environmental conditions. • Discuss calibration criteria of tools and equipment. • Explain environment assessment method. • Describe general rules for personal hygiene.	**Theory-** 4Hrs **Practical-** 15Hrs **Total-** 19Hrs	• Safety White chart • Sickle and shovel • Wire cutter • Wrenches and knife Sharpner and fencing staples	Class Room Training Workshop Lab/ Field Visit

		• **Practical Activity:** Prepare work plan for drip irrigation			
LU2. Ensure pre-installation requirements	**Trainee will be able to** • Identify the conditions of selected area (topography, climate and soil) • Identify and arrange required tools and equipment • Ensure ava**il**ability of required material for drip irrigation system installation • Maintain Records ○ Ensure required safety standards	• Enlist tools for drip installation • Discuss merits and demerits of drip irrigation system • Discuss different components of drip irrigation system **Practical Activity:**	**Theory-** 4Hrs **Practical-** 15Hrs **Total-** 19Hrs	• White chart • Sickle and shovel • Wire cutter • Wrenches and knife • Sharpner and fencing staples	Class Room Training Workshop Lab/ Field Visit

		Identify different tools and equipment required to set up drip irrigation system			
LU3. Prepare layout for drip-Irrigation system	**Trainee will be able to** • Identify and arrange required tools and equipment • Draw proper design for selected irrigation method • Maintain records • Ensure required safety standards	• Enlist tools and equipment required for drip irrigation. • Explain plan for drip irrigation and its sustainability. **<u>Practical Activity:</u>** Make a group of 5 students and prepare layout for drip irrigation	**Theory-** 4Hrs **Practical-** 16Hrs **Total-** 20Hrs	• White chart • Sickle and shovel • Wire cutter • Wrenches and knife • Sharpner and fencing staples	

LU4. Perform drip irrigation system installation	**Trainee will be able to** • Identify and arrange required tools and equipment for drip irrigation system installation • Perform installation as per planned layout design • Ensure PPEs.	• Describe irrigation scheduling as per crop requirement • Understand the methodology of drip irrigation installation. • Explain principles and techniques involved in personal health management. **<u>Practical Activity:</u>** Conduct field visit and identify different components of drip irrigation system	**Theory-** 5Hrs **Practical-** 16Hrs **Total-** 21Hrs	• White chart • Sickle and shovel • Wire cutter • Wrenches and knife • Sharpner and fencing staples	

LU5. Perform drip irrigation	**Trainee will be able to** • Apply irrigation as per standard • Maintain records • Ensure health and safety standards**.**	• Describe the performance criteria for drip irrigation. • Explain principles and techniques involved in personal health management. **<u>Practical Activity:</u>** Conduct field visit and operate drip irrigation system	**Theory-** 5Hrs **Practical-** 16Hrs **Total-** 21Hrs	• White chart • Sickle and shovel • Wire cutter • Wrenches and knife • Sharpner and fencing staples	

Module 40: Perform Irrigation Post Care

Objective: : After completing this module, trainee will be able to plan for care/ handling after irrigation.

Duration: 60 Hours **Theory: 12 Hours** **Practice: 48 Hours** **Credit Hours: 60**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare work plan	**Trainee will be able to:** • Identify and arrange required tools for measuring environmental conditions • Perform calibration of instruments if required • Perform quality checks • Prepare plan for required task • Ensure required safety standards	• Enlist tools and equipment required for post irrigation management • Describe general rules for personal hygiene	**Theory-** 3Hrs **Practical-** 12Hrs **Total- 15** Hrs	• White chart • Pencil • Writing pad • Eraser • Sharpener calculator • File covers	Class Room Training Workshop Lab/ Field Visit

		• **Practical Activity:** Perform calibration of hygrometer			
LU2. Post-flood irrigation care	**Trainee will be able to:** • Identify and arrange required tools and equipment • Perform periodic visits • Observe conditions of selected area regarding soil moisture and climatic condition and make a report • Perform management of erosion • Maintain records • Ensure required safety standards	• Define erosion • Discuss different types of erosion • Explain methods for management of erosion • Define salinity • Discuss methods to overcome water salinity • Enlist tools and equipment required for post flood irrigation • Knowledge of post flood irrigation requirement	**Theory-** 3Hrs **Practical-** 12Hrs **Total- 15** Hrs	• White chart • Sickle and shovel • Wire cutter • Wrenches and knife • Sharpener and fencing staples	Class Room Training Workshop Lab/ Field Visit

		Practical Activity: Conduct field visit and identify different tools and equipment's for post flood irrigation			
LU3. Post-drip irrigation care	**Trainee will be able to:** • Identify and arrange required tools and equipment • Perform periodic visits • Observe conditions of selected area regarding soil moisture and climatic condition and make a report • Maintain records • Ensure required safety standards	• Enlist tools and equipment for drip irrigation • Discuss management practices required after drip irrigation(moisture control, temperature control) • Discuss working efficiency of different types of emitters used in drip irrigation system	**Theory-** 3Hrs **Practical-** 12Hrs **Total- 15** Hrs	• White chart • Sickle and shovel • Wire cutter • Wrenches and knife • Sharpner and fencing staples	

		Practical Activity: Evaluate working efficiency of drip irrigation system			
LU4. Report Analysis	**Trainee will be able to:** • Follow up the visits of post-flood irrigation and post-drip irrigation. • Analyse report and make recommendation as per standard • Maintain records • Ensure health and safety standards	• Discuss the report analysis s criteria for post management of drip irrigation(pesticide use , equipment maintenance and fertilizer use)	**Theory-** 3Hrs **Practical-** 12Hrs **Total- 15** Hrs	• White chart • Sickle and shovel • Wire cutter • Wrenches and knife • Sharpner and fencing staples	

		Practical Activity: Prepare and summarize report for post irrigation management			

Module 41: Perform installation of fertigation system

Objective: : After completing this module, trainee will be able to plan installation of fertigation system.

Duration: 80 Hours **Theory: 14 Hours** **Practice: 66 Hours** **Credit Hours: 80**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare work plan for fertigation system installation	**Trainee will be able to:** • Identify and arrange tools required for fertigation system installation • Prepare work plan for required task • Adopt precautionary measures regarding personnel health and safety as per standard	Knowledge based questions • Enlist tools required for fertigation • Demonstrate the terms and condition required to design fertigation system **Practical Activity:** Conduct field visit and perform fertigation system	**Theory-** 7Hrs **Practical-** 33Hrs **Total-** 40Hrs	• Kassi • Spade • Drawing sheet • Penscil • Stationary • Plastic bags • Permanent marker • Irrigation pipes • Welding plant • Generators	Class Room Training Workshop Lab/ Field Visit

LU2. Perform Fertigation system installation	**Trainee will be able to:** • Identify and arrange required tools and equipment • Arrange materials required for fertigation system • Perform conventional installation of fertigation system • Perform modern installation of Fertigation system	• Enlist tools and equipment required fir fertigation • Differentiate between conventional and modern fertigation system **Practical Activity:** Identify operating systems used for modern and conventional fertigation system	**Theory-** 7Hrs **Practical-** 33Hrs **Total-** 40Hrs	• Spade • Drawing sheet • Penscil • Stationary • Plastic bags • Permanent marker • Irrigation pipes • Welding plant • Generators	Class Room Training Workshop Lab/ Field Visit

Module 42: Manage Soil Fertility

Objective: This competency standard covers the skills and knowledge required to manage soil fertility

Duration: 60 Hours **Theory: 12 Hours** **Practice: 48 Hours** **Credit Hours: 60**

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
LU1. Prepare work plan	**Trainee will be able to:** • Identify and arrange tools required for Nutrition management. • Prepare work plan for required task • Adopt precautionary measures regarding personnel health and safety as per standards	• Define soil • Discuss soil fertility • Explain factors affecting soil fertility • Enlist tools required for nutrient management of soil • Discuss method for soil management • Knowledge of PPEs	**Theory-** 3Hrs **Practical-** 12Hrs **Total-** 15Hrs	• Gardening tool kit • PPEs • First aid box	Class Room Training Workshop Lab/ Field Visit

		Practical Activity: Make a group of 5 students and prepare a work plan to manage soil fertility			
LU2. Organic fertilizer	**Trainee will be able to:** • Select required organic fertilizers for managing nutrition. • Calculate the required amount of organic fertilizer as per standard • Perform application of organic fertilizers as per standards • Ensure health and safety standards	• Enlist organic fertilizer • Differentiate organic and inorganic fertilizer • Discuss merits and demerits of organic fertilizers • Knowledge of organic fertilizer calculation a per crop requirement • Knowledge of PPEs(overall, eye protection)	**Theory-** 3Hrs **Practical-** 12Hrs **Total-** 15Hrs	• Gardening tool kit • PPEs • First aid box • Fertilizers and manures	Class Room Training Workshop Lab/ Field Visit

		Practical Activity: Make a group of five student to apply organic fertilizer			
LU3. Inorganic fertilizers	**Trainee will be able to:** • Identify and enlist the inorganic fertilizers • Calculate the amount and type of inorganic fertilizer as per standard • Perform the application of inorganic fertilizer as per	• Enlist organic fertilizer • Differentiate inorganic and inorganic fertilizer • Discuss merits and demerits of inorganic fertilizers • Knowledge of inorganic fertilizer calculation a per crop requirement • Knowledge of PPEs(overall, eye protection)	**Theory-** 4Hrs **Practical-** 12Hrs **Total-** 16Hrs	• Gardening tool kit • PPEs • First aid box • Fertilizers and manures	

	standard • Ensure health and safety standards	• **Practical Activity:** • Make a group of five student to apply inorganic fertilizer			
LU4. Perform soil nutrient management	• **Trainee will be able to:** • Identify and arrange tools required for manuring • Adopt precautionary measures regarding personnel health and safety as per standards • Prepare work plan for required task	• Define green manuring • Define fertilizer and its types • Enlist tools that required for manuring • Knowledge of personal health safety • Discuss manure application method including broadcasting manure **Practical Activity:** Make a group of five students and conduct field visit to apply fertilizer	**Theory-** 4Hrs **Practical-** 12Hrs **Total-** 16Hrs	• Gardening tool kit • PPEs • First aid box • Fertilizers and manures	

11. List of Tool & Equipment:

As mentioned in **'Materials required'** column

12. Members of the Curriculum Development Committee

S#	Name	Designation
1	Dr. Adnan Zahid	Associate Prof (IAGS,PU, Lahore)
2	Dr. Sumaira Maqsood	Associate Prof (IAGS,PU, Lahore)
3	Ms. Noor ul Ain	M.Phil. Scholar, (IAGS,PU, Lahore)
4	Ms. Hina Ashraf	PhD Scholar (PU, Lahore)
5	Mr. Muhammad Faheem	RA, Arid University Rawalpindi
6	Mr. Muhammad Asif	Master Trainer, off Seasonal Vegetables Lahore

7	Syeda Tehmeen Fatima	M.Phil. Scholar, (IAGS,PU, Lahore)
8	Mr. Abdul Manan Saleem	PhD Scholar
9	Ms. Sana GulDad	Agriculture Department KPK
10	Mr. Farhan Mehmood	Parks and Horticulture Authority, Rawalpindi
11	Ms. Iqra Haider Khan	IAGS,PU, Lahore
12	Ms, Hadia Maqsood	IAGS,PU, Lahore
13	Muhammad Abdul Basit	R&D Manager, Lahore
14	Engr. Aijaz Ahmed Zia	DACUM Facilitator

15	Mr. Muhammad Ishaq	Deputy Director/ Coordinator – (Skills Standards and Curricula) NAVTTC HQ