Course Code 678

ORGANIC GROWER

NSQF LEVEL 4

PRACTICAL MANUAL

NATIONAL INSTITUTE OF OPEN SCHOOLING
(An autonomous institution under Ministry of Education, Govt. of India)
A-24-25, Institutional Area, Sector-62, NOIDA-201309 (U.P.)
Website: www.nios.ac.in, Toll Free No. 18001809393

COURSE TEAM

ADVISORY COMMITTEE

Chairman
NIOS, NOIDA, U.P.

Director, Vocational
NIOS, NOIDA, U.P.

CURRICULUM COMMITTEE

Dr Chandra Bhan Singh
Rt. Principal Scientist IARI
Pusa Campus, New Delhi

Dr Shivadhar
Principal Scientist
Division of Agronomy
IARI, Pusa Campus, New Delhi

Prof. O. V. S. Thenua
Principal
G.V.N. College, Budhpur
Ramala, Bhagpat, (U.P.)

Dr V. K. Verma
Principal Scientist
Regional Director, ICAR-NCQF
(Regional Centre for Organic
and Natural Farming)
Bhubaneshwar (Orrisa)

Dr Bipin Kumar
Scientist, WTC
IARI-ICAR, New Delhi

Dr Kiran Kumara TM
Scientist (Senior Scale)
Agricultural Economics
ICAR-NIAP, New Delhi

Dr Vipin Sharma
Associate Director
KVK, G.B. Nagar, (U.P.)
SVPUAT, Meerut

Dr Rajpal Singh
Assistant Professor & Head
Department of Agronomy
Amar Singh College, Lakhaoti
Bulandshahar (U.P.)

Smt Priyanka Prakash
DGM Standard
ASCI, Gurugram, Haryana

Dr Neelima Pant
Assistant Director (Academic)
NIOS, NOIDA, (U.P.)

LESSON WRITERS

Dr Seema Dhawan
Professor
HNB Garhbal University
Uttarakhand

Dr Pravin Kumar Upadhyaya
Scientist
Division of Agronomy
IARI-ICAR, New Delhi

Dr Bipin Kumar
Scientist, WTC
IARI-ICAR, New Delhi

Dr Vishal Tyagi
Scientist, Division of Agronomy
IARI-ICAR, Pusa, New Delhi

Dr Rajpal Singh
Assistant Professor & Head
Department of Agronomy
Amar Singh College, Lakhaoti
Bulandshahar (U.P.)

Dr Mona Nagargade
Scientist (ARS)
Division of Agronomy
IARI-ICAR, Pusa, New Delhi

Mr. Prashant Agrawal
Senior Executive Officer
(Agriculture & Animal Husbandry)
Vocational Education Department
NIOS, NOIDA (U.P.)

EDITORS

Dr Shivadhar
Principal Scientist
Division of Agronomy
IARI, Pusa Campus, New Delhi

Dr Vipin Sharma
Associate Director
KVK, G.B. Nagar, (U.P.)
SVPUAT, Meerut

PROOF READERS

Dr. Bipin Kumar
Scientist WTC
IARI-ICAR, New Delhi

Dr. Kiran Kumara TM
Scientist (Senior Scale)
Agricultural Economics
ICAR-NIAP, New Delhi

Mr. Prashant Agrawal
Senior Executive Officer
(Agriculture & Animal Husbandry)
Vocational Education Department
NIOS, NOIDA (U.P.)

COURSE COORDINATOR

Mr. Prashant Agrawal
Senior Executive Officer
(Agriculture & Animal Husbandry)
Vocational Education Department
NIOS, NOIDA, (U.P.)

GRAPHICS/DTP

M/S Sri Krishna Graphics
Delhi

CONTENTS

Notes

Practical 1

DEMONSTRATE THE SOIL COLLECTION AND SAMPLING TECHNIQUE

AIM

To demonstrate the proper soil collection and sampling techniques.

OBJECTIVES

After completing this practical, you will be able to:

- determine soil composition, structure, and nutrients;
- evaluate soil fertility and suitability for various uses;
- identify potential pollutants/contaminants; and
- monitor changes in soil quality over time.

PRINCIPLE

The collected soil sample should accurately represent the characteristics of the entire area being studied. To minimize bias, samples should be collected randomly from different parts of the area. Collect samples at a consistent depth to maintain uniformity and comparability. Prevent cross-contamination between samples by using clean tools and containers. Properly label each sample to link it to its collection location, date of collection and field number/name.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Shovel or Auger: for digging and collecting soil samples.
- Clean Containers: plastic bags or airtight containers for storing soil samples.
- Trowel: for digging small, precise samples.
- Gloves: to prevent personal contamination of samples.

Notes

PROCEDURE

1. Choose representative sites based on the variability of soil characteristics across the area (Fig. 1.1).

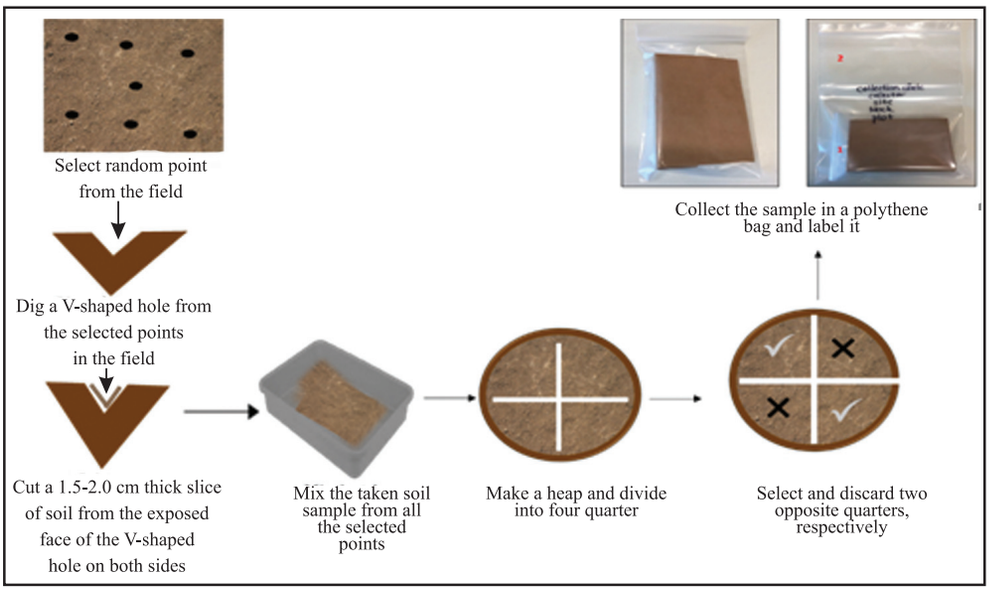


Fig. 1.1: Soil Sampling Procedure

2. If possible, use a randomized sampling technique to select the collection points.
3. Put on gloves to prevent contamination. Label containers with location, depth, and other relevant information.
4. Using a shovel/auger, dig a hole to a depth of 0-15 cm.
5. For deeper soil studies, consider up to 15-30 cm and 30-60 cm. Collect soil from the hole.
7. If the area is large, collect sub-samples from various points within the site and mix them to create a composite sample.
8. For uniformity, collect soil from the same depth in each location.
9. Remove any leaves, roots, or debris from the sample.
10. Place the soil sample in a clean container and seal it properly to prevent moisture loss and contamination.
11. Collect multiple samples following the same procedure to improve accuracy.

Notes

OBSERVATIONS

1. Note type of soil texture (sandy/loamy/clay)
2. Observe the colour of the soil, which can indicate mineral content and organic matter.
3. Assess the soil's moisture content.
4. Detect any unusual odours, which might indicate contamination.
5. Observe the presence of rocks, roots, or other non-soil materials.
6. Analyse the soil for organic carbon, nitrogen, phosphorus, potassium and micro-nutrients.

RESULT

Collect the soil from your field ..... (name and address) and notedown the activity for soil sampling.

.....

.....

.....

.....

.....

PRECAUTIONS

- Ensure all tools and containers are clean and free from contaminants before collecting samples.
- Minimize direct contact with soil to prevent personal contamination.
- Accurately label each sample to avoid confusion during analysis.
- Don't take samples in locations where there could be sources of contamination.
- Maintain consistent sampling depth across all locations.
- Avoid compacting the soil while collecting samples to retain natural structure.
- After the sample procedure is over, properly wash your hands.

Notes

KEY LEARNING OUTCOME

Expertise in proper soil sampling collection.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 2

CALCULATE THE QUANTITY OF DIFFERENT MANURES REQUIRED FOR DIFFERENT CROPS

AIM

To calculate the quantity of different manures required for different crops.

OBJECTIVES

After completing this practical, you will be able to:

- understand the nutrient requirements of different crops;
- calculate the nutrient content in different types of manures;
- determine the quantity of manure required to meet the nutrient needs of specific crops; and
- promote efficient and sustainable use of organic fertilizers.

PRINCIPLE

The principle behind this exercise is to determine the nutrient requirements of different crops and then calculate the quantity of various manures necessary to meet those requirements. This ensures the efficient and sustainable use of organic fertilizers in agriculture. The quantity of manure required for different crops can vary based on several factors, including the type of crop, its nutrient requirements, soil fertility, and the specific manure being used. Additionally, the type and quality of the manure or compost can also impact the required quantity, so it's crucial to consider the nutrient content of the material you're using. Remember that manure should be well-rotted or composted before application to avoid issues with pathogensthat can harm plants. It's also a good practice to follow local agricultural

Notes

guidelines and recommendations for manure application to ensure optimal crop growth and environmental stewardship.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Soil test report or information on soil nutrient status.
- Crop-specific nutrient requirement guidelines.
- Different types of manure (e.g., compost, cow dung, poultry litter, etc.).
- Measuring tools (scale, measuring cup, etc.).
- Calculator.
- Notebook and pen.

PROCEDURE

1. Gather information about the specific crop you intend to cultivate, including its nutrient requirements. This information can be obtained from agricultural extension offices or online resources.
2. Obtain a soil test report to determine the existing nutrient levels in your soil. This will help you identify any nutrient deficiencies.
3. Calculate the nutrient content in the manure you plan to use. This can be done by analysing the nutrient composition provided on the manure label or through laboratory testing.
4. Using the information from steps 1, 2, and 3, calculate the quantity of manure required to meet the nutrient needs of your crop. The formula for this calculation is:

$$\text{Quantity fo Manure (in kg or tons)} = \frac{\text{Nutrient Requirement (kg/ha)}}{\text{Nutrient Content in Manure (\%)}}$$

5. Record your calculations for each type of manure and crop.

OBSERVATIONS

1. The nutrient content of the different manures.
2. Properly calculated manure quantities to optimize crop growth.
3. Monitoring the crop's performance and effectiveness of the different manures.

Notes

RESULT

List the name of different manures ……. write the calculation procedure of different manures

.....

.....

.....

.....

PRECAUTIONS

- Ensure the accuracy of the nutrient content data for the manure you plan to use. Inaccurate information can lead to over- or under-application of nutrients.
- When handling and applying manures, always adhere to safety precautions, as some may contain pathogens or odors that can be harmful.
- Consider the crop's growth stages and nutrient requirements over the entire growing season. Adjust the application of manure accordingly.
- Use protective gear, such as gloves and masks, when handling manure to avoid any health hazards.

KEY LEARNING OUTCOME

Proficient in understanding of different manures and calculation procedure.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 3

DEMONSTRATE THE METHOD OF VERMICOMPOST PRODUCTION

AIM

To demonstrate the different method of vermicompost production.

OBJECTIVES

After completing this practical, you will be able to:

- understand the vermicomposting process and its benefits for soil and plant health;
- learn the principles of managing organic waste using earthworms;
- demonstrate the correct procedures for setting up a vermicomposting bin;
- observe the transformation of organic waste into nutrient-rich vermicompost; and
- identify and apply safety precautions while handling earthworms and organic materials.

PRINCIPLE

Vermicomposting is based on the principle of using earthworms (specifically *Eisenia fetida*) to decompose organic matter such as kitchen scraps, garden waste, and other organic materials. The earthworms ingest and digest the organic material, and their castings (excrement) are rich in beneficial microorganisms and nutrients, making an excellent organic fertilizer (Fig. 3.1).

Notes

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Vermicomposting bin or container
- Red wiggler earthworms (*Eisenia fetida*)
- Organic waste materials (kitchen scraps, leaves, shredded newspaper)
- Shovel or trowel
- Water spray bottle
- Moisture meter (optional)
- pH meter (optional)
- Protective gloves
- Apron
- Notebook and pen
- pH-balanced water (if needed)
- Thermometer
- Newspaper or burlap to cover the bin

PROCEDURES

1. Build the vermicompost facility*ie* vermi-shed.
2. Create a layer of bricks for the base.
3. Fill it with a mixture of organic materials, including dung and worms.
4. Add small amounts of kitchen scraps to feed the worms.
5. Ensure the bedding remains moist, but not waterlogged, by using a water spray bottle.
6. Keep the vermi-bed temperature range of 55-77°F (13-25°C).
7. Allow the composting process to complete.
8. Separate the worms from the finished compost.
9. Your nutrient-rich compost is now ready for use.
10. It's also ready for sale.

Notes

Fig. 3.1: Preparation of Vermicompost

OBSERVATION

1. Observe the activity of earthworms in the vermi-bed.
2. Monitor the decomposition of organic waste into vermicompost.
3. Note changes in temperature, moisture, and pH levels in the bin.
4. Record the time it takes for vermicompost to be ready for harvesting.

RESULT

Write the vermicompost production

.....

.....

.....

.....

.....

Notes

PRECAUTIONS

- Wear gloves and an apron to protect your hands and clothing.
- Handle earthworms gently to avoid harming them.
- Avoid adding meat, dairy, oily, or citrus-based foods to the vermicompost, as these can attract pests.
- Do not over water the vermi-bed, as it can drown the worms.
- Keep the vermi-bed in a shaded area to prevent overheating.
- Maintain proper ventilation to prevent anaerobic conditions.
- After working with the vermicomposting process, properly wash your hands.

KEY LEARNING OUTCOME

Proper understanding of vermicompost input requirement and production**.**

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 4

SEED TREATMENT BY BIO-FERTILIZERS IN DIFFERENT SEED PROPGULES

AIM

The aim of this practical exercise is to demonstrate the process of seed treatment using bio-fertilizers.

OBJECTIVES

After completing this practical, you will be able to:

- understand the benefits of seed treatment with bio-fertilizers;
- compare the effect of different bio-fertilizers on various seed propagules; and
- observe and record the impact on seed germination and early plant growth.

PRINCIPLE

Living bacteria that improve soil fertility and plant nutrient uptake are known as biofertilizers. Treating seeds with bio-fertilizers can improve seedling establishment and overall plant health.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Different seeds (e.g., soybean, maize, wheat, or any local crops of interest)
- Bio-fertilizers (e.g., Rhizobium for legumes, Azotobacter for cereals, or any suitable bio-fertilizer)
- Sterile containers for seed treatment
- Distilled water
- Measuring cups and spoons
- Petri dishes

Notes

- Garden soil
- Labels
- Marker
- Incubator
- Ruler or callipers
- Notebook and pen

PROCEDURE

1. Gather all the required materials and label the containers for each seed type and bio-fertilizer treatment.
2. Measure the appropriate amount of bio-fertilizer as per the recommendations.
3. Take a set of seeds for each type you are testing (e.g., soybean, maize, and wheat).
4. In the labeled containers, add the measured bio-fertilizer to the respective seeds.
5. Add distilled water to create a slurry, ensuring all seeds are adequately coated with the bio-fertilizer.
6. Allow the seeds to soak in the solution for a specified period (e.g., 30 minutes to 1 hour).
7. Prepare petri dishes with garden soil. Place an equal number of treated and untreated seeds in each petri dish. Cover the seeds with a thin layer of soil. Label the petri dishes accordingly.
8. Place the petri dishes in an incubator or a suitable environment for germination.
9. Maintain appropriate temperature and humidity conditions.
10. Observe and record seed germination, seedling emergence, and early growth over a specific period (e.g., 7-10 days).

OBSERVATIONS

- Record the number of germinated seeds in each group.
- Measure and record the height of seedlings.
- Note any differences in growth and health between treated and untreated seeds.

Notes

RESULT

At organic farms different tools for seed treatments are

.....

.....

.....

.....

.....

PRECAUTIONS

- Handle bio-fertilizers according to safety guidelines and manufacturer recommendations.
- Maintain sterile conditions when treating seeds.
- Keep records accurately and legibly.
- Monitor the germination environment to ensure consistent conditions for all samples.

KEY LEARNING OUTCOME

Knowledge of seed treatment with biofertilizers in different crops.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 5

DEMONSTRATE THE METHOD OF COW URINE-BASED INPUT PRODUCTION

AIM

The aim of this practical exercise is to demonstrate the method of producing cow urine-based inputs.

OBJECTIVES

After completing this practical, you will be able to:

- understand the importance of cow urine in agriculture and traditional medicine;
- learn the process of extracting and concentrating cow urine to create Cow Urine Concentrate (CUC);
- observe the changes that occur during the production process; and
- practice safety precautions when working with organic materials.

PRINCIPLE

The urine of cow has been used traditionally in various cultures for its potential benefits in agriculture and medicinal applications. Cow Urine Concentrate (CUC) is produced by concentrating cow urine, making it a valuable input for organic farming and traditional medicine. The principle behind this exercise is to show how to extract and concentrate the beneficial components of cow urine.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Fresh cow urine
- Wide-mouthed containers
- Filter cloth or fine mesh strainer

Notes

- Distillation apparatus (optional)
- Glass or plastic bottles with lids
- Sunlight or a warm, well-ventilated area
- pH testing kit (optional)
- Gloves and protective eyewear
- Stirring rods
- Funnel
- Labels and markers

PROCEDURE

1. Start by collecting fresh cow urine in wide-mouthed containers.
2. Filter the collected cow urine through a fine mesh strainer or filter cloth to remove any solid impurities.
3. If you have a distillation apparatus, you can distill the filtered cow urine to remove excess water and concentrate the urine. Otherwise, you can proceed without distillation, although it will take longer to concentrate the urine.
4. Transfer the filtered urine (or distilled urine, if using a distillation apparatus) into glass or plastic bottles.
5. Place the bottles in a location with ample sunlight or in a warm, well-ventilated area to allow the liquid to evaporate gradually. This process may take several days, and you should observe the changes during this period.
6. Periodically check the pH of the liquid using a pH testing kit (optional) to ensure it falls within the desired range for Cow Urine Concentrate (typically slightly acidic to neutral).
7. Once the liquid has concentrated to a desired level, transfer it to clean, labelled bottles with lids.
8. The Cow Urine Concentrate (CUC) is now ready for use in agricultural or medicinal applications.

OBSERVATIONS

- Observe the gradual concentration of cow urine as it evaporates over time.
- Record any changes in color, consistency, or odor during the concentration process.
- Monitor the pH level of the concentrate.

Notes

RESULT

Visit the organic farm……(Name and address) write concentration of nutrients in cow urine……and other properties

.....

.....

.....

.....

PRECAUTIONS

- Wear gloves and protective eyewear when handling cow urine to prevent contact with skin or eyes.
- Work in a well-ventilated area to avoid inhaling fumes.
- Ensure cleanliness and sterility of containers and equipment to prevent contamination.
- Keep the concentrate away from children and pets.
- Label the bottles clearly to avoid confusion with other substances.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 6

WEEDS IDENTIFICATION IN ORGANIC FARMS

AIM

To indentify the different weeds in organic field.

OBJECTIVE

After completing this practical you will be able to identify

- various important weeds of organic farming.

PRINCIPLE

It's not a simple effort to identify every weed on an organic farm. But a crucial first step in implementing successful weed management is accurately identifying the key weeds. Two weed species can look very similar at certain growth stages, yet they may different life cycle, modes of reproduction, effects on crops, and responses to control measures. In general, weeds are divided into two major category i.e. narrow and broad leaved weeds.

PROCEDURE

1. Identify weeds using a taxonomy of agricultural weeds in your area, a good field guide, or a practical manual.
2. Collect a few representative specimens and examine them closely, including foliage, stem, flowers, roots, and other below ground parts. Separate the collected weeds into narrow and broad leaved.
3. Learn some of the terminology from your field guide or key (most references include a glossary of terms).

Notes

4. Plants are identified by visible characteristics that remain roughly constant among all individuals within a species. These can include:

   - Leaf shape, leaf margins, and venation (branching pattern of leaf veins)
   - Leaf structure (simple or compound)
   - Arrangement of leaves on the stem
   - Presence or absence of hairs on leaves or other parts of the plant
   - Flower structure, color, size
   - Inflorescence (arrangement of flowers or flower clusters on plant)
   - Size, shape, structure, color, and arrangement of fruits and seeds
   - Roots, rhizomes, and other underground structures
   - Life cycle (annual, biennial, perennial)
   - Habit of growth (erect, prostrate, climbing, etc.)

List of identified weeds:

S.No.	Scientific Name	English Name	Family	Common Name
1.	*Ageratum sp.*	White weed	Compositae/ Asteraceae	Visadodi
2.	*Agropyron repens*	Quack grass	Gramineae/ Poaceae	–
3.	*Amaranthus viridis*	Pig weed	Amaranthaceae	Jangalichaulayi
4.	*Argemone mexicana*	Mexican poppy	Papaveraceae	Satyanashi
5.	*Asclepiascurassavica*	Milk weed	Apocynaceae	Kakatundi
6.	*Asphodelustenuifolius*	Wild Onion	Asphodelaceae	Pyazi
7.	*Achyranthes aspera*	Snake's Tail/ Prickly Chaff Flower	Amaranthaceae	Chir Chita or Latzeera
8.	*Anagallis arvensis*	Scarlet pimpernel	Primulaceae	Krishna Neel or BilliBooti
9.	*Azolla* sp.	Water fern	Salviniaceae	–
10.	*Avenafatua*	Wild oat	Gramineae/ Poaceae	Jangli jai
11.	*Bidenspilosa*	Beggar's tick	Compositae/ Asteraceae	Kumra

Notes

S.No.	Scientific Name	English Name	Family	Common Name
12.	*Boerhaaviadiffusa*	Red Hog weed	Nyctaginaceae	Punarnava
13.	*Brassica arvensis*	Wild mustard	Brassicaceae	JangliSarson
14.	*Berberis vulgaris*	Barberry	Berberidaceae	Chitra
15.	*Celosia argentea*	Qail grass	Amaranthaceae	Lalmurga
16.	*Cissampelospareira*	Bhatindu/Valvet leaf	Menispermaceae	Laghupatha/ Akanadi
17.	*Convolvulus arvensis*	Bind weed	Convolvulaceae	Hirankhuri
18.	*Cynodondactylon*	Bermuda grass	Poaceae	Doobghash
19.	*Chenopodium album*	Bacon weed/ Pigweed	Amaranthaceae	Bathua
20.	*Cannabis sativa*	Hemp grass	Cannabaceae	Bhang
21.	*Cyperusrotundus*	Nut sedge	Cyperaceae	Motha
22.	*Daucuscarota*	Wild carrot	Apiaceae	Gajri
23.	*Digeraarvensis*	False Amaranth	Amaranthaceae	Lahsuva
24.	*Echinochoacrusgalli*	Barnyard grass	Poaceae	Samwa
25.	*Eichornia crassipes Pontederiacrassipes*	Water hyacinth	Pontederiaceae	JalKhumbhi
26.	*Erigeron canadensis*	Canadian Horse weed	Asteraceae	–
27.	*Euphorbia hirta*	Asthma weed	Euphorbiaceae	Bari Dudhi
28.	*Fumariaparviflora*	Fumitory	Papaveraceae	Ban Soya or Gajari
29.	*Ipomea spp.*	Morning glory	Convolvulaceae	Beshram
30.	*Lepidium ruderale*	Narrow leaved pepper grass	Brassicaceae	–
31.	*Lantana camara*	Lantana	Verbenaceae	Phoollakri/ Raimuniya
32.	*Medicago sp.*	Black medick	Leguminaceae	Lasunghas
33.	*Oryza sativa var. fatua*	Wild rice	Gramineae/ Poaceae	Janglidhan
34.	*Phalaris minor*	Canary grass	Gramineae/ Poaceae	Gahunsa
35.	*Papaver somniferum*	Opium poppy	Papaveraceae	Khuskhus
36.	*Partheniumhy sterophorus*	Congress grass	Compositae	Gajarghas

S.No.	Scientific Name	English Name	Family	Common Name
37.	*Rumexnepalensis*	Napal Dock	Polygonaceae	Janglipalak
38.	*Setariapumila*	Yellow Fox tail	Gramineae/ Poaceae	Pilli kangani
39.	*Sonchusarvensis*	Field Milk thistle	Asteraceae	Dudhi
40.	*Sorghum halepense*	Johnson grass	Gramineae/ Poaceae	JangaliJowar
41.	*Tagetesminuta*	Genuda (Jungli)	Compositae/ Asteraceae	Genda
42.	*Trifoliumrepens*	White clover	Fabeaceae	Jangalibarseem
43.	*Viciavillosa*	Winter/Hairy vetch	Fabaceae	Chatri
44.	*Verbascumthapsus*	Wild tobacco/ Mullein	Scrophulariaceae	Janglitambaku

Cynodondactylon*

Phalaris minor

Chenopodium album

Anagallisarvensis

Convolvulus arvensis

Avenafatua*

Parthenium hysterophorus

Cannabis sativa

Source: https://portal.wiktrop.org/files.jpg, www.shutterstock.com

RESULTS

List the weeds observed in your field

S.No.	Scientific Name	Common Name
1.		
2.		
3.		

Notes

S.No.	Scientific Name	Common Name
4.		
5.		
6.		
7.		
8.		
9.		
10.		

EXERCISE

Collect five weeds from Paddy/ Maize and Wheat/ Mustard crop field and prepare a herbarium mentioning full details.

PRECAUTIONS

- Be careful when using pruning shears or a knife to avoid injury. Handle sharp tools with caution.
- Wear gloves to protect your hands, especially if you have allergies or sensitivities to plant materials.
- Do not remove all the fruits / stem/ leaf from the weed plant if you want to continue monitoring their growth or if they are not all mature yet.
- Avoid damaging the crop during the examination process.

KEY LEARNING OUTCOME

Learning the proper identification of weeds helps to take effective control measures and avoid losses.

NOTES

.....

.....

.....

.....

Notes

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 7

WEED MANAGEMENT IN ORGANIC GROWER

AIM

To learn weed management measures in organic farming

OBJECTIVE

After completing this practical you will be able to:

- learn various mechanical, cultural, and biological weed control in organic farming.

PRINCIPLE

Knowing the type of weeds present, their habitat, their responses to changes in the environment, and the length of the crop is essential for developing any weed control program in a particular area. Before selecting a method of weed control, one must have information on life span of the weed, soil texture, crop-weed competition and moisture. Particularly on heavy soils may flooding be an effective weed-control technique.

PROCEDURE

1. **Preventive management**
   - Avoid using seed from crop that are infested with weed seeds for sowing.
   - Always use certified seed of crops free from weed seed.
   - Avoid feeding screenings and other material containing weed seeds to the farm animals.
   - Don't fill the manure pits with weeds.

Notes

- Before relocating farm equipment from one field to another, it must be completely cleaned. For seed drills, this is especially crucial.
- Refrain from using weed-infested soil, sand, or gravel.
- Inspect nursery stock for the presence of weed seedlings, tubers, rhizomes, etc.
- Keep irrigation channels, fence-lines, and un-cropped areas clean
- Use vigilance. Inspect your farm frequently for any strange looking weed seedlings. Destroy such patches of a new weed by digging deep and burning the weed along with its roots. Sterilize the spot with suitable chemical.
- Quarantine regulations are available in almost all countries to deny the entry of weed seeds and other propagules into a country through airports and shipyards.

2. **Eradication measures:**
   - Involves complete removal of weed species from a given area including its seed and vegetative part so that it will not reappear unless reintroduced.
3. **Control measures:**
   - It includes the methods used to lessen but not completely eradicate weed infestations.
   - **Mechanical weed control:** Mechanical or physical methods of weed control are being employed ever since man began to grow crops. The mechanical methods include tillage, hoeing, hand weeding, digging cheeling, sickling, mowing, burning, flooding, mulching, and use of mechanical weeders. etc.
   - **Cultural weed control:** Includes field preparation, tillage, maintenance of optimum plant population, crop rotation, fertiliser application, growing of intercrops, mulching, solarisation, stale seedbed, blind tillage and improved crop management practices. In addition, aspects like selection of variety, time of sowing, cropping system, cleanliness of the farm etc., are also useful in controlling weeds. Soil moisture management is also a good practice to control weed population.
   - **Biological weed control:** Includes use of insects, nematodes, bacteria, fungi, snails and birds to control weed growth.

EXERCISE

Manage weed in 10 sq meter plot of maize/ mustard/ vegetables fields through hoeing and enlist number of weeds before and after hoeing.

Notes

RESULTS

Visit the field and observe the mechanical, biological and cultural weed management approaches

.....

.....

.....

.....

PRECAUTIONS

- Avoid deep tillage in late spring when using delayed planting; this can stimulate weed germination at the same time the crop germinates.
- Choose the correct crop planting rate and obtain good stands to make the crop competitive and to compensate for stand loss due to mechanical weed control operations.
- Avoid spreading vegetative propagules of perennial weeds with primary tillage.
- Perform when the soil is dry for maximum weed control.
- Do not rely on inter-row cultivation as your primary method for weed control – use in conjunction with pre- and post-emergence operations.

KEY LEARNING OUTCOME

Learning the proper weed management methods for effective weed control.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 8

DEMONSTRATION OF DIFFERENT IRRIGATION SYSTEM

AIM

To know the different irrigation system.

OBJECTIVE

After completing this practical you will able to:

- understand the different type of irrigation system.

PRINCIPLE

Irrigation is the application of water to crops, plants, or landscapes in order to give the moisture required for growth and development. It is a necessary practise in agriculture and landscaping, especially in locations with limited or unpredictable rainfall. Irrigation aids crop production by ensuring appropriate water availability, allowing crops to grow and develop properly. It lowers the danger of drought stress, increases agricultural output, and enables farmers to cultivate a larger range of crops in places with little rainfall.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Sprinkler
- Pumps
- Emitterline
- Drip line
- Center Pivot
- Flush Valve

Notes

- Hydroponic system
- Filter
- Greenhouse

PROCEDURE

1. Visit a nearby farming community with well-developed irrigation systems.
2. Contact farm-in-charge or farmers to seek the permission to visit the farm
3. Note down the different method of irrigation available there

A. SURFACE IRRIGATION METHODS

Surface irrigation systems distribute water across the soil surface, allowing it to penetrate and absorb by the plants. Here are a few examples of typical surface watering methods (Fig):

- **Furrow Irrigation:** Furrow irrigation involves creating tiny channels or furrows between crop rows and directing water down these furrows. Water is drawn down the furrows by gravity and infiltrates the soil to reach the plant roots. Row crops such as maize, cotton and vegetables are typically irrigated with furrow irrigation.
- **Flood Irrigation:** Flood irrigation entails saturating the whole field surface with water, forming a temporary shallow pond or flooding the field. Water is delivered to the field via channels or pipelines and let to flow. It percolates into the soil and irrigates the plants. Flood irrigation is commonly utilised on flat areas to raise rice and other crops.
- **Border Irrigation:** Border irrigation entails dividing a field into long, narrow strips known as borders. Water is delivered to one end of the border and let to flow equally across its length, covering the whole border. The water seeps into the soil and irrigates the plants along the boundary. Border irrigation is appropriate for sloping fields and crops such as lucerne, wheat and some vegetables.
- **Basin Irrigation:** Basin Irrigation entails forming flat, level regions or basins bordered by little earthen ridges. Water is poured into each basin, where it infiltrates the soil and irrigates the plants. For orchards, vineyards, and small-scale gardening, basin irrigation is often employed.
- **Contour Irrigation:** Contour irrigation is appropriate for sloped fields. It entails building curved channels or contour lines along the land's contour.

Water is provided at the field's higher end and let to flow gently over the contours, following the land's natural slope. This strategy reduces erosion and allows water to permeate the area uniformly.

- **Check Basin:** Check Basin Irrigation is the process of constructing tiny, level basins or depressions around individual plants or clusters of plants. Each basin is filled with water, which infiltrates and irrigates the plants. This technique is frequently employed in orchards, vineyards, and garden beds.

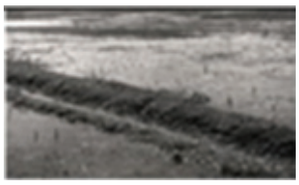
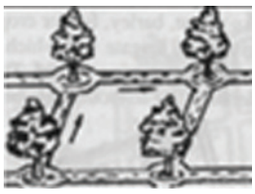
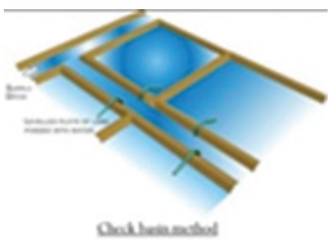
Complete Flooding	Partial Flooding
 Wild Flood Irrigation	 Furrow Irrigation
 Border Irrigation	 Basin and Ring
 Check Basin	 Surge Irrigation

Fig. 8.1: Different surface irrigation methods

Source: https://optimizeias.com/

B. SPRINKLER IRRIGATION METHODS

Sprinkler irrigation is a type of micro irrigation in which water is sprayed or dropped on crops or plants in the form of raindrops. Sprinkler systems, which can be permanent or movable, are widely used for watering sports fields, gardens, and farms.

Notes

C. DRIP IRRIGATION

Drip irrigation is the most effective method of delivering water and nutrients to crops. It provides water and nutrients straight to the root zone of the plant in the proper amounts and at the right time, ensuring that each plant receives precisely what it requires, when it requires it, to grow effectively. Farmers may increase yields while conserving water, fertiliser, electricity, and even crop protection goods by using drip irrigation.

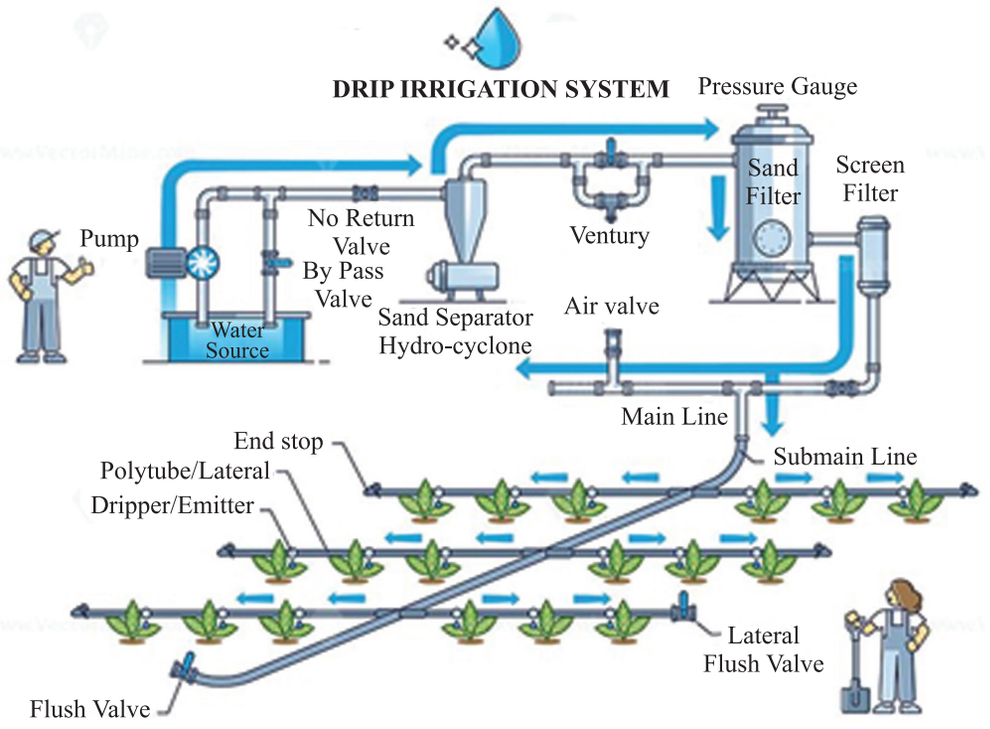


Fig. 8.2: Layout of Drip Irrigation System

Source: https://vikaspedia

D. SUB-SURFACE IRRIGATION

Sub-irrigation is defined as "irrigation below the surface (as by a periodic rise in the water table or through a system of underground porous pipes)." The subsurface irrigation system is an irrigation device that includes water emitters and a delivery line put beneath the soil surface to administer water directly to soils, preventing airborne drift and minimizing runoff.

E. CENTER PIVOT IRRIGATION

A huge, mechanized irrigation system is used in the centre pivot irrigation technique for crop irrigation. It comprises of a long, segmented arm that extends from a central pivot point. The arm, which spans the irrigation field, is supported by wheels.

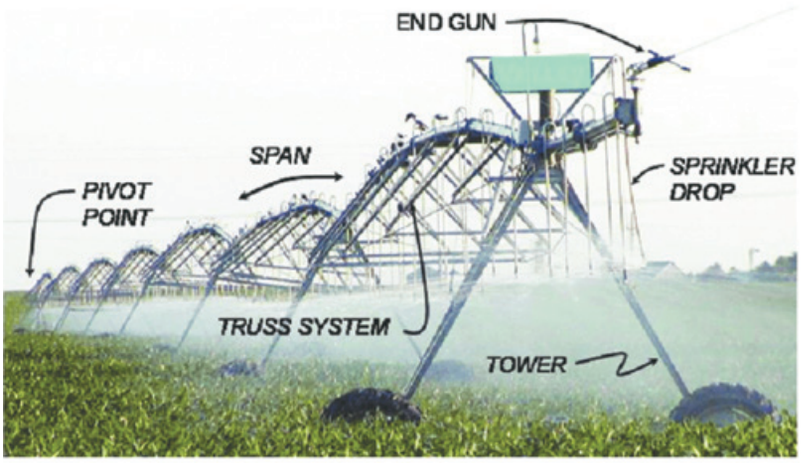


Fig. 8.3: Components and Field Layout for Typical Center Pivot Irrigation

OBSERVATION

(i) Write the name of different irrigation system

.....

.....

(ii) Write the different methods of surface irrigation system

.....

.....

RESULTS

You have observed ..... types of irrigation. The component of drip irrigation ....., ..., ..., ..., ..., …….

.....

.....

.....

.....

Notes

PRECAUTIONS

- Visit the farm only with approval of the In-charge or manager.
- Do not cause damage to the plants in the farm.
- Carefully observe the different parts of the bamboo plant.

KEY LEARNING OUTCOME

Proper understanding of different efficient irrigation system and their use.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 9

IDENTIFICATION OF DIFFERENT DISEASES AND SYMPTOMS

AIM

To know the different types of diseases and their symptoms

OBJECTIVES

After completing this practical, you will be able to:

- identify different types of disease; and
- diagnose symptoms of diseases

PRINCIPLES

Identification of local symptoms are helpful in the identification of diseases appears on local lesions on all aerial plant parts. While, systemic symptoms are also most important like epidemic which affect the plant systematically and infect the plants and their diagnosis and identifications are very important than local symptoms. Symptoms identification provides the actual sanitation and application of management strategies for plant diseases.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Infected plants
- Microscope
- Scissor
- Sample collection box

Notes

PROCEDURE

1. Obtain a fresh infected sample.
2. Place root/stem/leaf in a separate plastic bag
3. Avoid drying out and soil contaminating the leaves.
4. Place samples in appropriate bags.
5. Keep samples cool and moist, protected from crushing, freezing and heat.
6. Label the sample with the pertinent information required.

OBSERVATIONS

- Note type of infection
- Observe infected plant part
- Record the magnitude of infection
- Analyse the causal organism

RESULTS

Collect the plant sample from your field ..... (Name and address) and note down the type of diseases

.....

.....

.....

.....

EXERCISE

Collect two different diseases of Rabi and Kharif crops and write their causal organism.

PRECAUTIONS

- Lift plant samples carefully so as not to leave feeder roots or rotted roots behind.
- Place samples in appropriately sized plastic bags, including a paper towel for a blotter if sample is very wet.
- Duplicate dry samples if the sample is succulent or fragile.

Notes

- Wrap a wire twist-tie around stem at ground line to keep soil off of above-ground plant parts.
- Accurately label samples.
- Keep samples cool, protected from crushing.

KEY LEARNING OUTCOME

Expertize in proper understanding of different types of diseases.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 10

USE AND APPLICATIONS OF BIOPESTICIDES

AIM

To know different types of bio pesticides and its application.

OBJEVTIVES

After completing this practical, you will be able to:

- Understand the importance of bio pesticides;
- Know different types of bio pesticide; and
- Application of bio-pesticides.

PRINCIPLES

Population of microorganisms that are antagonistic towards a particular pest species can well be utilized to provide a natural means of pest control (biological control). In terms of plant disease management, biological management of the pathogens is giving natural management and minimizes all other pests with better results.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Sprayer
- Gloves
- Mask
- Apron
- Container

Notes

PROCEDURE

1. Select the field
2. Select the proper bio agent
3. Prepare mixture with proper carrier
4. Deliverer through seed treatment/root dip/soil application/irrigation water.

OBSERVATIONS

- Record the performance of crop.
- Note down the selectivity of bio pesticide.
- Observe the growth of bio agent.

EXERCISE

Apply *Trichoderma sp.* on 20 sq. meter plot of Paddy to control fungal disease.

RESULTS

Note down the name of disease controlled by bio pesticide

.....

.....

.....

.....

.....

PRECAUTIONS

- Follow label directions carefully.
- Prevent spilling, leaking, drifting spray, and contaminating garments.
- Don'teat, smoke, drink, or chew while using bio pesticides.
- Wear proper gloves, mask and apron.
- Avoid applications in high wind speed and rainy conditions.

KEY LEARNING OUTCOME

Expertize in proper use and application of bio pesticides

Notes

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 11

IDENTIFICATION OF INSECTS AND THEIR BODY PARTS

AIM

To identify major harmful insects of crops in organic farming.

OBJECTIVES

After completion of this practical, you will be able to:

- To identify harmful insects of crops; and
- Familiar with insect's body and their mouth parts.

TOOLS/ EQUIPMENT/MATERIALS REQUIRED

- insect collecting net
- insect collection box
- notebook
- magnifying glass

PROCEDURE

1. Visit to any insect museum or crop field.
2. Observe insect species and their body parts.
3. Try to identify differences in the body parts of different species for their size, shape and colour.
4. Collect any insect with the help of insect collecting net from crop field and match with identified insect of museum.
5. Put it in the collection box.
6. Observe the body parts and their mouth parts to know the nature of damage.

Notes

OBSERVATIONS

- Complete address of the site/insect museum visited
- List the insect species observed
- List different body parts

RESULT

Visit the field and list the insect species

.....

.....

.....

PRECAUTIONS

- Strictly follow the rules and regulations of the museum.
- Don't try to touch the specimen.
- Carefully read the description of the insects.
- Take precaution while collecting the insects.
- Don't kill the collected insect.

KEY LEARNING OUTCOMES

Proper identification and understanding of different insects and their body parts.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 12

LOSSES DUE TO INSECT PEST

AIM

To estimate losses due to insect pest

OBJECTIVES

After completion of this practical, you will able to identify the

- Damage caused by insect pests and estimate the per cent loss occurred.

TOOLS/ EQUIPMENT/ MATERIALS REQUIRED

- Damaged plant part viz. leaf, stem, flower and fruit.
- scissors/scat ear
- scale
- magnifying glass

PROCEDURE

1. Visit to any crop field / farm.
2. Observe and collect the damaged plant parts (leaf, stem flower and fruit).
3. Try to identify insect species responsible for losses.
4. Measure the leaf surface area/ number of flower and fruits damaged or infected.
5. Estimate the loss caused by measuring the surface area of the damaged leaf /number flower and fruit.
6. Calculate for 100 such leaves.

Notes

OBSERVATIONS

- Complete address of the site/garden visited
- Identification of plant and insect species
- Measurement of leaf surface area.
- Number of number insect infected flower and fruit.

EXERCISE

Collect two different type of insect infected plant parts of two different crops and estimate

RESULTS

Description of the deformity occurred and estimate loss caused for 100 leaves.

.....

.....

.....

PRECAUTIONS

- Don't damage to the insect (if found any).
- Carefully cut the leaf/stem using scissors or scatear.
- Use scatear cautiously.

KEY LEARNING OUTCOME

Understanding the losses caused by insects.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 13

MAJOR INSECTS OF IMPORTANT CROPS, FRUITS AND VEGETABLE

AIM

To identify major insects of important crops, fruits & vegetable

OBJECTIVES

After completion of this practical, you will be able to

- Identify the insect species attack on crops/fruits/vegetables; and
- Know the insect mode of damage to crops/fruits/vegetables.

TOOLS/ EQUIPMENT/ MATERIALS REQUIRED

- scatear
- cotton
- petridish
- glass jar
- insect collection box
- microscope
- magnifying glass
- notebook

PROCEDURE

1. Visit to any garden/field.
2. Observe insect damage to the plant.
3. Observe the way of damaging the plant part by the insect.

Notes

4. Collect the insect species (any stage of life cycle).
5. Identify the species of insect and plant.
6. Release the insect.

OBSERVATIONS

- complete address of the site/garden/field visited
- List insect found and associated crop.

RESULT

Describe the type of damage of plant part and mention the stage of life cycle of the insect found and draw a diagram

.....

.....

.....

PRECAUTIONS

- Don't damage the plant.
- Take precaution while collecting the insects.
- Don't kill the collected insect.
- Carefully cut the leaf/stem using scatear.
- Use scatear cautiously.

KEY LEARNING OUTCOME

Explain the important crops, fruits and vegetables.

NOTES

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 14

PRINCIPLES OF INSECT MANAGEMENT

AIM

To aware about the principles of insect management

OBJECTIVE

After completion of this practical, you will be able to:

- familiar with various principles of insect management.

TOOLS/ EQUIPMENT/ MATERIALS REQUIRED

- Notebook

PROCEDURE

1. Visit to any crop field.
2. Identify insect present in crop field and apply suitable principle.
3. Enquire about the use of principles of insect management and their importance.
4. Observe the principle of eradication fora termite colony if it is present.
5. Prepare a report.

OBSERVATIONS

- complete address of the site/crop field visited
- principle/s of insect management

Notes

RESULT

Describe the importance of principles of insect management

.....

.....

.....

PRECAUTIONS

- Carefully enquire for the principles used.
- Take precaution while eradication.

KEY LEARNING OUTCOME

Understanding of the principles of insect management.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 15

INSECTS CONTROL MEASURES

AIM

To know the different insect control measures.

OBJECTIVES

After completion of this practical, you will be able to:

- to select appropriate measure of insect control; and
- to prepare and use insects control measures.

TOOLS/ EQUIPMENT/ MATERIALS REQUIRED

- bottle
- paper
- source of light
- insect collection box
- transparent sheets
- magnifying glass

PROCEDURE

1. Plan to prepare an insect trap instrument.
2. Collect required materials.
3. Prepare the instrument and use the same in any field.
4. Record time and no. of insects trapped.
5. Take pictures.
6. Identify the species of the insects trapped.
7. Use any suitable control measures.

Notes

OBSERVATIONS

- Complete address of the site/field visited
- Draw a diagram of the instrument and describe the materials required
- Explain the process of preparation of the instrument

EXERCISE

Apply *Trichogramma sp. cards* in paddy or sugarcane field to control borer insect.

RESULT

Identify the pictures of insects and explain control measures

.....

.....

.....

.....

.....

PRECAUTIONS

- Plan for low cost and effective trapping instrument.
- Carefully use the materials (electricity) to prepare the trap instrument.
- Take every precaution while destroying the insects/using insecticides.
- Don't touch the insecticide.
- Keep others away from the insecticide.

Notes

KEY LEARNING OUTCOME

Learning of different insect control measures.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 16

IDENTIFYING THE MATURITY STAGE OF CROPS

AIM

To identify proper maturity stage of crop

OBJECTIVES

After completing this practical, you will be able to:

- learn how to identify the maturity stage of crops;
- understand its importance in determining the right time for harvesting; and
- practice using the necessary tools and precautions during the process.

PRINCIPLE

Identification of maturity and harvesting the crop at right time is really important in farming. Maturity stage is the perfect time to harvest of cropfor getting best quality and quantity produce. Harvesting of crops too early might mean they are not as flavourful yet. Waiting too long could lead to them losing their goodness and yield also. We look at signs like colour, size, and how the crops feel to know if they are ripe. This helps us make sure we are getting the most crops with the most flavour and nutrients.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Pruning shears or sharp knife
- Magnifying glass or hand lens
- Gloves for hand protection
- Marker or tags (optional)

Notes

PROCEDURE

- Choose a representative sample of tomato plants from different areas of your field or garden. Make sure the plants are healthy and have typical fruiting patterns.
- Examine the selected plants to determine their overall growth stage. Tomatoes go through various growth stages, including vegetative (leafy) stage, flowering stage, and fruiting stage.
- Examine the fruits on the tomato plants. The size, colour, and firmness of the fruits can help determine their maturity.
- Observe the colour of the fruits. Tomatoes change colour as they mature. Depending on the variety, mature tomatoes can range from green to yellow, orange, pink, red, or other colours.
- Gently touch the fruits to feel their texture. Ripe tomatoes are typically firm but yield slightly to gentle pressure.
- If available, use a magnifying glass or hand lens to examine the seeds inside the fruit. Mature tomatoes will have well-developed seeds.
- If you are only harvesting mature fruits at this stage, you can use markers or tags to identify them for future harvest.

OBSERVATIONS

Observation	Result/measurement
Identify the growth stage	Vegetative, flowering, fruiting
Note the progression of flowers	Newly opened, fully bloomed, wilted
Observe colour and texture of tomatoes	Red/orange/yellow colour, smooth texture
Gently press tomatoes	Slightly yielding (ripe), firm (unripe)
Measure the size of tomatoes	Compare to typical mature size
Examine seeds closely (optional)	Well-developed, evenly distributed
Inspect skin for wrinkles, cracks, blemishes	Smooth, intact skin

Notes

RESULTS

Visit tomato field and collect the fruits for observation. The collected tomato fruits were of..... colour during harvesting.

.....

.....

.....

PRECAUTIONS

- Be careful when using pruning shears or a knife to avoid injury. Handle sharp tools with caution.
- Wear gloves to protect your hands, especially if you have allergies or sensitivities to plant materials.
- Do not remove all the fruits from the plant if you want to continue monitoring their growth or if they are not all mature yet.
- Avoid damaging the plants during the examination process.

KEY LEARNING OUTCOME

Learning the proper time of maturity to harvest, understanding how plants grow better, making smarter decisions, using resources wisely, and giving people really good produce.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 17

HARVESTING AND THRESHING OF ORGANIC CROPS

AIM

This practical exercise provides participants with hands-on experience in harvesting and threshing organic crops using traditional tools and methods.

OBJECTIVES

After completing this practical, you will be able to:

- familiarize with proper techniques for harvesting and threshing organic crops;
- skilled to harvest crops at the proper maturity stage to maintain quality and yield; and
- perform efficient threshing to separate grains or seeds from the crop.

PRINCIPLE

Harvesting is the process of gathering the mature crops from the fields. Harvesting crops is like finding the right balance between when to pick them and how to do it correctly. We have to use the right tools and methods to avoid harming the plants, the environment around them and yield loss. Imagine only picking the mature crops – this helps the environment by not taking too much too soon and keeps everything in balance. Threshing is an important step where we separate the edible parts of the plants from the crop produce. We try to be energy-efficient by using right methods that don't use too much power, like using our hands or machines that don't need a lot of energy.

Notes

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Harvesting knife or sickle
- Pruning shears or scissors
- Harvesting baskets or containers
- Threshing floor or tarpaulin sheets
- Wooden or bamboo beaters
- Winnowing basket or shallow pan
- Cleaning sieve or mesh
- Brush or broom
- Weighing scale

PROCEDURE

1. Select a suitable organic crop for harvesting practice (e.g., wheat, rice, or millet).
2. Observe the crop and identify the appropriate stage of maturity for harvesting.
3. Use the sickle to cut the mature crop at the base, ensuring clean cuts and minimizing damage to the plant.
4. Handle the harvested crop with care and place it in the harvesting baskets or containers.
5. Record the time taken to harvest a specific area or quantity of the crop.
6. Spread the harvested crop evenly on a clean and dry threshing floor or tarpaulin sheets in a well-ventilated area.
7. Use wooden or bamboo beaters to gently strike the crop, separating the grains or seeds from the rest of the plant.
8. Periodically gather the separated grains or seeds and place them in a winnowing basket or shallow pan.
9. Stand on an elevated spot and pour the grains or seeds slowly from the winnowing basket or pan onto the threshing floor. Allow the wind to blow away the chaff while the heavier grains fall back into the winnowing basket.
10. Repeat the winnowing process until most of the chaff is removed.

Notes

11. Use a cleaning sieve or mesh to remove any remaining debris and impurities from the grains or seeds.
12. Weigh the clean, separated grains or seeds and record the quantity obtained.

OBSERVATIONS

Observation	Result/measurement
Note the observed stage	Early, mid, fully mature, etc.
Observe how well it separates	High efficiency, moderate, low efficiency
Record any difficulties faced	Labour intensive, weather issues, etc.
Measure the weight obtained	..... kg (weight)
Calculate the percentage of clean grains	(%)

EXERCISE

Harvest and thresh 20 sq. meter area of paddy crop and take yield observation.

RESULT

…….. percent clean grains were obtained out of total produce.

.....

.....

.....

.....

.....

PRECAUTIONS

- Handle the harvesting tools with care to avoid injuries.
- Ensure the harvesting and threshing area is clean and free from contaminants.
- Take measures to protect the harvested crop from rain or excessive moisture during threshing.
- Avoid over-threshing, as it can lead to unnecessary grain loss.

Notes

KEY LEARNING OUTCOME

This practical exercise provides participants with hands-on experience in harvesting and threshing organic crops. It highlights the importance of careful handling and timing during harvesting and efficient techniques for separating grains or seeds during threshing. Participants gain valuable insights into maintaining crop quality and yield in organic farming practices.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 18

SORTING AND GRADING OF VEGETABLES

AIM

To teach participants how to organize and classify vegetables based on their quality and characteristics.

OBJECTIVES

After completing this practical, you will be able to:

- learn the process of sorting and grading vegetables;
- understand the importance of uniformity and quality in market preparation;
- develop skill in practice of using necessary tools; and
- follow correct procedures for sorting and grading.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Worktable or sorting surface
- Baskets or containers
- Gloves
- Measuring scales
- Grading labels (optional)

PRINCIPLE

Sorting involves visually inspecting and removing vegetables that do not meet the desired quality standards. Grading is like giving vegetables a grade or score based on how good they look and how well they match the standards. These practices help us make sure that the vegetables we send to markets or stores are of high quality and uniform. It also helps us reduce waste by using every vegetable for its best purpose.

Notes

PROCEDURE

- Weigh a sample of carrots using measuring scales to establish the average weight.
- Determine the size categories for grading (e.g., Small, Medium, Large).
- Sort the carrots within each size category based on their overall quality.
- Place the sorted and graded carrots into separate baskets or containers.
- Empty the baskets or containers of carrots onto the sorting surface.
- Examine each carrot carefully for any signs of damage, disease, or deformity.
- Separate the carrots into different categories: "Grade A" (high quality), "Grade B" (acceptable quality), and "Culls" (rejects).

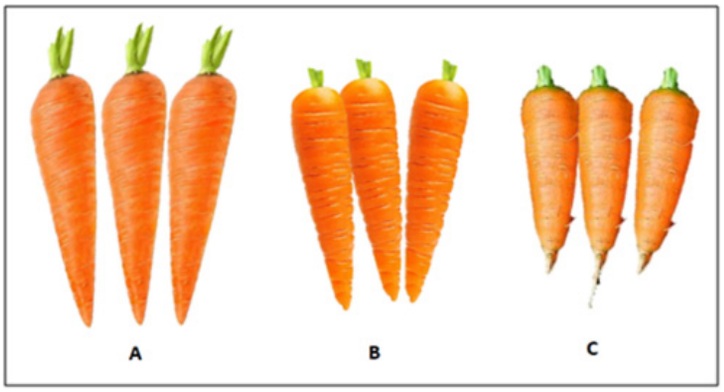


Fig. 18.1: Different Grade of Carrot

OBSERVATIONS

Observation	Result/Measurement
• Categorize vegetable by size	Small, medium, large, etc.
• Note any variations in shape	Regular, irregular, deformed, etc.
• Record vegetable colour	Expected colour, deviations
• Evaluate external appearance	Pest damage, bruises, disease, etc.
• Assess consistency within size/grade	High, moderate, low
• Observe texture of vegetable skin	Smooth, rough, wrinkled, etc.
• Categorize vegetable into grades	Grade A, Grade B, Reject, etc.
• Record quantity in each grade	Estimated percentage for each grade
• Document waste generated	Discarded portions, unusable pieces

Notes

RESULT

Collected carrot graded into A, B and rejected categories based on their size and appearance.

.....

.....

.....

EXERCISE

For this practical exercise, do sorting and grading of 2 kg of "**Carrots**" as the vegetable.

PRECAUTIONS

- Use gloves to handle the vegetables and prevent contamination.
- Handle the carrots gently to avoid further damage.

KEY LEARNING OUTCOME

After completing the practical exercise on sorting and grading of vegetables, participants will have gained a comprehensive understanding of the practical skills, knowledge, and a systematic approach to ensuring that vegetables meet quality standards, which is crucial for successful agricultural production and market success.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 19

QUALITY ASSURANCE AND CERTIFICATION

AIM

To understand quality assurance and process of certification in organic farming

OBJECTIVES

After completing this practical, you will be able to learn:

- significance of quality assurance and quality standard;
- certification standards and regulations governing inorganic farming practices; and
- documentation and record-keeping requirements for organic certification.

PRINCIPLE

The organic products standards are typically enforced through third-party certification programs that verify compliance with established organic farming guidelines.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Copies of relevant organic certification standards
- Case studies of certified organic farms.
- Pen and paper.

PROCEDURE

1. Briefly explain the concept of organic certification and its importance in assuring quality in organic farming.

Notes

2. Provide an overview of the selected organic certification standards.
3. Distribute copies of the chosen certification standards to students.
4. In small groups, ask students to review the standards and identify key criteria for organic certification, including soil management, pest control, and record-keeping.
5. Present case studies of certified organic farms, highlighting their practices and adherence to certification standards.
6. In groups, ask students to analyze the case studies and identify specific practices that align with certification requirements.
7. Facilitate group discussions to share findings and insights from the case studies.
8. Encourage students to discuss challenges faced by organic farmers in meeting certification criteria and potential benefits.

OBSERVATIONS

- Note down the crop history and input used in certain organic production.
- Write down their nutrient management strategy.
- Write the name of bio-agent used for pest/disease control.
- Write the source of planting material.
- Document the handling and processing facilities.
- Write the source irrigation water

RESULTS

Collect the farm produce and note down the different constituent of farm produce

.....

.....

.....

.....

.....

Notes

EXERCISE

Apply for third party certification of one acre land farm cultivating basmati rice production and prepare a flow diagram of certification process.

PRECAUTIONS

- Avoid mixing of organic product with inorganic products
- Thoroughly understand the organic standards applicable to your region
- Keep detail and accurate record of all farming practices inputs
- Maintain records for the required number of years as specified by the certification body
- Ensure all the staffs involved in farming activity are trained in organic farming
- Strictly avoid the use of synthetic pesticides, herbicides and genetically modified organisms
- Ensure that all inputs such as fertilizers, soil amendments comply with organic standards

KEY LEARNING OUTCOME

Expertize in quality assurance of organic produce.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 20

PREPARATION OF ENTERPRISE DEVELOPMENT/BUSINESS PLAN

AIM

To learn appropriate marketing strategies and prepare effective business plan.

OBJECTIVES

After completing this practical, you will be able to learn:

- how to prepare an enterprise development/business plan; and
- review and check the soundness of the business plan.

PRINCIPLE

The fundamental responsibility of an entrepreneur is to explore, identify, and ultimately select a viable and appealing business opportunity– determining what to produce and in what quantities. During the selection process, the entrepreneur must conduct a thorough assessment of the project's feasibility, taking into account technical, financial, and commercial aspects. The market analysis section helps in understanding customer demographics, analyzing competitors, and developing effective marketing strategies. Overall, an agribusiness plan is crucial for decision-making, attracting investors, and fostering continuous improvement in the agricultural enterprise. This practical exercise is primarily drawn from the research paper by Balakrishnan et al. (2018).

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Micro screening analysis
- SWOT analysis

Notes

PROCEDURE

1. Provide a brief background on the project and entrepreneur/promoter, including details such as name, date of birth, address, education, current profession, and affiliations with farmer groups/SHGs/NGOs/APMC or any government institution.
2. Detail the technical aspects of the project, covering product specifications, location suitability, infrastructure needs, required machinery and equipment, raw materials, technical standards for raw materials and products, gestation period, suggested capacity, capacity utilization, and the implementation schedule.
3. Provide the commercial aspects of the project, including product strategy, demand forecasting, demand-supply gap analysis, pricing strategy, and distribution plan.
4. Provide managerial and organizational aspects, encompassing considerations like skilled labour, the entrepreneur's knowledge and experience, training history, available facilities in the area, organizational structure, and connections with other farmer groups/organizations.
5. Finally, outline the financial aspect of the project, including capital requirements, sources of capital, available securities, profitability projections, repayment plans, and the break-even point.

OBSERVATIONS

PJ	MKT	RM	TEC	SKL	GOP	SFT	EI	RE	PFT	C/B	TTL	CSF
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

PJ-Project
MKT-Availability of market
RM-Availability of raw material
TEC-Availability of technology
SKL-Availability of skill
GOP-Government priority
SFT-Strategic Fit
EI-Ease of implementation
RE-Risk exposure
PFT-Profitabiliyt
C/B-Cost/benefits
TTL-Total
CSF-Critical success factors

Notes

RESULTS

The designed enterprise/business plan to meet ....., ..., ... and ..... aspects of the project.

.....

.....

.....

.....

.....

EXERCISE

Prepare a business plan of vermin- composting for a farmer who have 20 cattle dairy and his farm is 6 km from metro city and suggest suitable marketing plan for sale.

PRECAUTIONS

- The estimated costs and returns must be as realistic as possible.
- The projected cost and returns must be used to determine the project's overall profitability.
- Projected profits have to be calculated taking into account interest on loan, depreciation on assets, and rates of return on investment in plant and machinery etc.

KEY LEARNING OUTCOME

Preparation of efficient business plan and understanding technical, financial, marketing and commercial aspects of the business.

References:

Renu Balakrishnan, Ashish Santosh Murai, Yogesh Kalnar, K. Bembem and Vikas Kumar. (2018). Project Profile Preparation for Start-Up's in Agriculture. Emerging Post-Harvest Engineering and Technological Interventions for Enhancing Farmer's Income. ICAR-CIPHET, Ludhiana, Punjab.

NOTES

.....

Notes

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 21

IDENTIFY THE DIFFERENT IMPLEMENTS USE AT WORK PLACE

AIM

To know the different health and safety implements use at work place

OBJECTIVES

After completing this practical, you will be able to:

- Understand the importance of health and safety implements at work place;
- Understand the use of health and safety implements; and
- Understand procedure to use it.

PRINCIPLES

The foundation of workplace health and safety is a dedication to provide a secure and healthy working environment for employees. The principle of identifying different implements used in the workplace involves understanding and categorizing the tools, equipment, and resources necessary for specific tasks or functions within an organization.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Safety Glasses or Goggles
- Respirators
- Hard Hats/Helmat
- Gloves
- Fire Extinguishers

Notes

PROCEDURE

Implements	Procedure
Safety Glasses or Goggles	1. Ensure the glasses or goggles are clean and in good condition. 2. Put them on before entering an area with potential eye hazards. 3. Adjust the fit to ensure they sit snugly on your face, covering your eyes completely. 4. Do not remove them until you have left the hazardous area. 5. After use, clean and store them properly.
Respirators	1. Choose the right type of respirator for the specific hazard (e.g., dust, gases, vapors). 2. Conduct a fit test if required for the respirator. 3. Put on the respirator so it forms a tight seal against your face. 4. Breathe normally and adjust as needed for comfort. 5. Follow proper storage and maintenance procedures.
Hard Hats/ Helmat	1. Ensure the hard hat is the right size and in good condition. 2. Adjust the suspension to fit snugly on your head. 3. Wear it at all times in areas where falling objects or head injuries are possible. 4. Replace the hard hat if it sustains an impact or shows signs of damage.
Gloves	1. Choose gloves appropriate for the specific task and type of hazard (chemical-resistant, cut-resistant, etc.).

Notes

	2. Put on gloves and ensure they fit snugly without restricting movement. 3. Avoid using damaged gloves, and replace them if they become compromised. 4. Remove gloves safely, avoiding contact with any contaminants, and dispose of them properly.
Fire Extinguishers	1. Familiarize yourself with the location and type of fire extinguishers in your workplace. 2. Use the PASS (Pull, Aim, Squeeze, Sweep) method to operate a fire extinguisher. 3. Maintain a safe distance from the fire while attempting to extinguish it. 4. Evacuate the area if the fire is not controllable.

RESULTS

The organic farm must have PPE kits …… for the safety of workers

.....

.....

.....

.....

.....

EXERCISE

Write the name of different safety tools/ implements require at organic production farm.

PRECAUTIONS

- Ensure that PPE fits correctly and comfortably to provide maximum protection without hindering movement or causing discomfort.
- Check for any damages or wear and tear regularly. Replace damaged or worn-out PPE immediately.

Notes

- Train employees on the correct way to wear and use PPE. Emphasize its importance in specific work situations.
- Conduct regular fire drills and provide training on how to use fire extinguishers, fire blankets, and emergency exits.
- Inspect and maintain fire safety equipment according to regulations. Ensure they are accessible and unobstructed.
- Place first aid kits in easily accessible areas and ensure all employees know their locations.
- Ensure that safety signs and labels are clear, visible, and understandable to all employees.
- Encourage the use of protective gear when dealing with hazardous materials and emphasize proper ventilation in such areas.
- Conduct routine inspections of all safety implements to ensure they are in good working condition.

KEY LEARNING OUTCOME

Learning the proper identification and use different implements, they will understand, how to use it and can maintain a safety environment at workplace.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 22

DONNING, DOFFING, AND DISCARDING PPE SUCH AS FACE MASKS, HAND GLOVES, FACE SHIELDS, PPE SUITS, ETC.

AIM

To know the correct way of handling different health and safety implements at workplace

OBJECTIVES

After completing this practical, you will be able to:

- learn to donning, doffing and discarding of different safety items of PPE; and
- understand the importance of proper handling.

PRINCIPLE

To reduce the danger of contamination and illness, personal protective equipment (PPE) must be placed on, taken off, and disposed of properly. Following are general instructions for putting on, taking off, and discarding different PPE items, such as face masks, gloves, face shields, and PPE suits**:**

(i) Hand Hygiene

(ii) Donning Gown

(iii) Face Mask (Surgical or N95/FFP2/FFP3)

(iv) Face Shield

(v) Gloves

(vi) Additional PPE

Notes

Doffing PPE:

Sequence Matters: The order of removing PPE is crucial to avoid contamination. Always follow the reverse order of donning.

Gloves:

- Start by removing gloves. Pinch one glove near the wrist without touching your skin and pull it off, turning it inside out.
- Hold the removed glove in the gloved hand.
- Slide your fingers inside the remaining glove and peel it off, turning it inside out.
- Dispose of both gloves in a designated receptacle for contaminated items.

Face Shield:

- Carefully remove the face shield without touching the front.
- Place it in a designated area for cleaning and decontamination.

Face Mask:

- Remove the mask by touching only the ear loops or ties, avoiding the front of the mask.
- Discard it in a proper receptacle.

PPE Suit:

- Carefully unzip or unfasten the suit.
- Remove it inside out, starting from the top, and roll it down your body.
- Step out of the suit without touching the outside.
- Dispose of the suit in a designated bin for contaminated items.
- additional PPE (if used): Remove any other PPE items in the specified order.

Discarding PPE:

- **Dispose of PPE in designated containers:** Place used PPE, such as gloves, masks, and suits, in specially marked bins or bags for infectious waste.
- **Hand Hygiene:** After doffing, wash your hands thoroughly with soap and water for at least 20 seconds or use hand sanitizer.

Notes

RESULTS

The order of removing PPE is **……**

.....

.....

PRECAUTIONS

- Be cautious not to tear or damage the PPE while removing it. Dispose of it properly according to the guidelines provided.
- The exterior of the PPE could be contaminated, so avoid touching it with bare hands.
- Ensure that the PPE fits properly and comfortably to prevent any exposure to contaminants.
- Be mindful of the environment around you. Avoid situations where PPE could cause harm, such as in the presence of flammable substances.
- Before and after handling PPE, thoroughly wash or sanitize your hands to prevent any potential contamination.

KEY LEARNING OUTCOME

Learning the proper way of handling the PPE kits, understanding the importance of given instruction, will lead to safely handling of different kits.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 23

FAMILIARIZING WITH ONLINE TRANSACTION

AIM

To familiarize different type of transaction in business.

OBJECTIVE

After completing this practical, you will be able to:

- Understand different type of transaction; and
- Use different transaction in different situation.

PRINCIPLE

Online transaction is payment system in which fund or money transfer happens online over electronic means. It is secure and password protected. Unified Payments Interface (UPI) is a real-time payment system in India that enables seamless money transfers from one bank account to another instantly and free of charge through a mobile device.

Users can transfer money to each other with the help of a unique UPI ID or a Virtual Payment Address (VPA). Users can also transfer money by selecting receiver's contact from their phone book or entering the receiver's contact number.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Mobile
- Application
- Internet

Notes

PROCEDURE

1. Open the UPI app on your phone.
2. Log in to your account using your mobile number and UPI PIN.
3. Select the "Send Money" option.
4. Enter the recipient's UPI ID or VPA.
5. Enter the amount you want to send.
6. Enter your UPI PIN to confirm the transaction.

OBSERVATIONS

1. Note type of application for UPI transaction.
2. Asses the receivers are having UPI or not.
3. Detect internet status of mobile.
4. Know that receiver get payment?

RESULT

Collect the information of all customers' Name, amount of transaction and UPI transaction ID for proof….

.....

.....

.....

.....

.....

PRECAUTIONS

- Secure Your UPI PIN.
- Download Official UPI Apps.
- Verify Transaction Details.
- Be Wary of Phishing Attempts.
- Use Secure Networks.

Notes

- Regularly Monitor Account Activity.
- Install Security Software.
- Keep Your Device Secure.

KEY LEARNING OUTCOME

Expertise in proper handling of UPI transaction

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)

Notes

Practical 24

KNOWING MICROSOFT WORD, EXCEL AND POWERPOINT

AIM

To know creation of document, excel and power point

OBJECTIVE

After completing this practical, you will be able to:

- Create word document file;
- Create Excel file and fill the data; and
- Create PowerPoint.

PRINCIPLE

Use clear headings and subheadings to organize content. Employ consistent formatting for a professional and cohesive look. Make use of styles for consistent formatting throughout the document. Use rows and columns to organize data logically. Assign clear headers to columns. Group related data together. Choose appropriate slide layouts for content types (title slide, content slide, etc.). Maintain consistency in slide design for a professional appearance.

TOOLS/EQUIPMENT/MATERIALS REQUIRED

- Computer/ Laptop
- Microsoft Office
- Pen drive/ hard disk

Notes

PROCEDURE

To create a document file in Microsoft Word, follow these steps:

1. Launch Microsoft Word
2. Select a document template (optional)
3. Begin a new blank document
4. Fill in the blanks with your content
5. Save your work
6. Customize your document (optional)
7. Review and update your document
8. Save and share your document
9. Step to create file in excel

To Create Microsoft Excel

1. Start a new workbook
2. Fill up the blank worksheet with data and labels
3. Format cells
4. Formulas and functions
5. Create extra sheets (optional
6. Save your workbook

To Create Powerpoint

1. Launch Microsoft PowerPoint
2. Select a presentation template (optional)
3. Begin a new blank presentation
4. Add slides

OBSERVATIONS

- Write the location of file saved.
- Write the file size
- Note down the name saved file

Notes

RESULTS

Create a document of Microsoft word, Excel and PowerPoint ..... (file name and location).

.....

.....

.....

.....

PRECAUTIONS

- Save versions of your document regularly.
- Save the document in a compatible and widely used format (e.g., .docx).
- Remove any personal information or metadata before sharing.
- Embed fonts in the presentation to ensure consistent formatting on different devices.
- Compress images and multimedia elements to reduce file size.
- Optimize file size for efficient sharing.

NOTES

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Instructor's Signature)