



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(In the Name of Allah, the Most Merciful, the Most Compassionate.)

Practical Notebook

AGRICULTURE SCIENCES

9



PECTAA

Transformation, Innovation and Excellence

**PUNJAB EDUCATION, CURRICULUM,
TRAINING AND ASSESSMENT AUTHORITY**





All rights are reserved with PECTAA.

No part of this practical notebook can be copied, translated, reproduced or used for preparation of test papers, guidebooks, keynotes and helping books.

Author

- **Prof. Dr. Muhammad Jafar Jaskani**

Institute of Horticultural Sciences, University of Agriculture, Faisalabad

Editor

- **Mr. Muhammad Tayyab Raza Hashmi**

Headmaster, Govt. High School, Bagrain, Shujabad

Reviewers

- **Dr. Anwar Hayder Khan Alvi**

Entomologist,
Agriculture Department Government of the Punjab

- **Dr. Harrem Khalid**

Lecturer, Horticulture Department,
University of the Punjab Lahore

- **Mr. Muhammad Akhtar Zia**

Senior Headmaster,
Govt. High School, 97/6-R, Haroonabad

- **Mr. Mureed Hussain Ojla**

Govt. Model High School, Jampur,
District Rajanpur

Director (Curriculum & Compliance)

- **Mr. Aamir Riaz**

Coordinator

- **Syed Saghir-ul-Hassnain Tirmizi**
Senior Subject Specialist (Agriculture)

Designing & Layout Setting

- **Ms. Minal Tariq**

Deputy Director (Compliance-Sciences)

- **Syed Saghir-ul-Hassnain Tirmizi**

Incharge Art Cell

- **Ms. Aisha Sadiq**





CERTIFICATE

Certified that:

Student Name _____

Class _____ Roll No. _____

School _____

has completed practical work of Agriculture Sciences IX

for session _____ as per syllabus.

Signature

Incharge Agriculture Sciences





Preface

Agriculture serves as the backbone of Pakistan's economy, contributing significantly to food security, employment and economic growth. In a province where a substantial portion of the population depends on farming for their livelihood, the inclusion of a well-structured agriculture curriculum in the education system is vital. For students in grades IX to X, such a curriculum not only equips them with theoretical knowledge but also fosters practical skills necessary for addressing contemporary challenges in agriculture. A particular focus on mechanization trends and skills can greatly enhance the relevance and effectiveness of this curriculum.

Mechanization in agriculture has become a key driver of productivity and efficiency. Traditional farming practices, while rich in heritage, often fall short in meeting the demands of modern agricultural production. Mechanization trends, including the use of tractors, harvesters, seed drills and precision farming technologies, have revolutionized farming practices worldwide. In Punjab, where landholdings are diverse and agricultural intensity is high, the adoption of mechanization is essential for improving crop yields, reducing labor dependency and ensuring sustainable farming practices.

Integrating mechanization trends into the agriculture curriculum can bridge the gap between traditional knowledge and modern advancements. For students, understanding the operation and maintenance of agricultural machinery can open pathways to employment and entrepreneurship. Courses that include hands-on training in machinery handling, safety protocols and troubleshooting can prepare students to meet the rising demand for skilled professionals in mechanized farming.

Moreover, the curriculum should emphasize the environmental and economic benefits of mechanization. For instance, precision farming technologies can help optimize the use of water, fertilizers and pesticides, reducing environmental impact while enhancing profitability. By teaching students these practices, the curriculum can instill a sense of responsibility toward sustainable agriculture, a critical need in the face of climate change and resource scarcity.

Importance of Matric- Tech education in present scenario

Recognizing agriculture's fundamental role in Punjab's economy and food security, the Government is dedicated to reshape education. This transformation focuses on providing students with practical, future-oriented skills. A key initiative in this effort is the introduction of the Matric-Tech Stream, featuring Agricultural Sciences as a vital subject, designed to directly align education with the requirements of the modern agricultural sector and entrepreneurial agribusiness.

Agricultural Sciences has been carefully developed as a core subject to equip learners with the latest essential knowledge, hands-on practical activities and critical skills necessary for professional achievement and entrepreneurial ventures in agriculture. Understanding the increasing demand for a confident, articulate and self-aware workforce within this crucial field, the subject specifically fosters the soft skills essential for success in areas like crop production, agribusiness management and the broader agricultural value chain.

This Practical Notebook is an indispensable component of the Agricultural Sciences curriculum. It acts as a vital link between classroom theory and real-world farming and agribusiness application.





By offering structured hands-on activities and realistic simulations, the notebook provides students with concrete opportunities for interactive, experiential learning, which is critical for understanding modern agricultural practices.

Salient Features of this Practical Notebook include:

Purpose and Core Function:

This Practical Notebook is a central component of the Agricultural Sciences curriculum designed to translate theoretical knowledge into practical competence. It actively supports the Matric-Tech Stream's goal of equipping students with the future-ready skills demanded by Punjab's vital agricultural sector and entrepreneurial agribusiness landscape.

Salient Features:

- **Curriculum-Aligned:** Directly supports the official learning objectives of the Matric-Tech Agricultural Sciences curriculum.
- **Structured Guidance:** Provides clear, step-by-step instructions for every practical activity, ensuring students can effectively engage with the tasks.
- **Reflective Learning:** Incorporates dedicated student reflection boxes to encourage self-assessment and solidify understanding.
- **Critical Thinking Development:** Features observation tables and targeted assessment questions designed to cultivate analytical skills and deeper comprehension.
- **Real-World Application:** Utilizes realistic scenarios and role-play exercises to build communication confidence and prepare students for actual agricultural settings.
- **Essential Skills Focus:** Emphasizes the development of crucial soft skills, including public speaking, professional presentation, business etiquette, teamwork and effective workplace communication.

Impact and Vision

Through this structured approach to experiential learning, the Practical Notebook aims to foster active engagement, build student confidence and instill the essential hands-on knowledge and skills required at this grade level. This initiative embodies the Government of Punjab's steadfast commitment to empowering its youth, preparing them comprehensively for future employment opportunities and achieving economic self-reliance. We extend our best wishes to all learners and educators across the province as they utilize this valuable resource in their classrooms.

Chief Executive Officer
Punjab Education, Curriculum Training
and Assessment Authority, Lahore





LIST OF PRACTICAL FOR GRADE 9

1. Identification and Collection of Seeds of Major and Minor Rabi Crops in Pakistan
2. Identification and Collection of Seeds of Major and Minor Kharif Crops in Pakistan
3. Make a Chart of Major Rabi & Kharif Crops Regarding Seed Rate, Water Requirement, Fertilizer Dose and Yield in Your Practical Copy
4. Studying Cropping Patterns in Local Agriculture
5. Prepare a Report on Water Losses in Canal Irrigation System of Pakistan
6. Collection and Identification of Mulching Materials
7. Draw the Main Canal System of Punjab
8. Investigating Salinity and Waterlogging in Affected Areas
9. Forest Visit Report: (Changa Manga National Park)
10. Identification of Agroforestry Trees and Shrubs of Pakistan
11. Vegetative Propagation of Forest Trees
12. Raising Plants from Seeds of Neem, Lemon, Mango, Ber and Jaman
13. Draw a Graph Between Food Supply and Milk Production of Cows and Buffaloes
14. Visit to Cattle Farm and Artificial Insemination Center
15. Products and By-Products from Livestock & Poultry
16. Identification of Common Medicines for Livestock & Poultry Diseases
17. Testing Milk Quality with a Lactometer
18. Dairy Industry Visit Report
19. Draw a Chart of Annual Livestock Vaccination Schedule
20. Draw the Annual Poultry Vaccination Schedule
21. Poultry Farm Health & Hygiene Survey





List of Apparatus / Materials Required to Perform the Practicals

1. Sample of seeds of major and minor Rabi crops e.g., Wheat, Gram, Mustard, Alfalfa, Oats, Linseed and Rape seed.
2. Sample of seeds of major and minor Kharif crops e.g., Rice, Cotton, Maize, Sorghum, Moong, Mash, Sesame, Guar and Bajra.
3. Different mulching materials e.g., Plastic sheets, Gravel, Fabrics, Straw and Grasses.
4. Sample of branches of Simbal, Popular, Mulberry and Hibiscus for identification.
5. Different samples of seeds e.g., Jaman, Ber, Mango, Lemon and Neem
6. Graph Papers
7. Magnifying glasses, Forceps, Slides
8. Glass Jars
9. Seed Collection Bags, Seed Trays, Plastic Pots
10. Measuring Tapes
11. Flow Meters
12. Agroforestry Manual "Trees of Pakistan" by S.I. Ali
13. EC Meters, pH Meters
14. Different growing Mediums, e.g., Sand, Silt, Clay, FYM, Vermicompost, Peat
15. Rooting Hormones like IBA, GA₃
16. Injection Syringes
17. Printed Medicine Labels of Oxytetracycline, Albendazole, Ranikhet, Amprolium, etc.
18. Lactometer and 250 ml cylinders
19. Different vaccination charts for Poultry and Livestock Diseases





Table of Contents

Sr. No.	PRACTICALS	Page No.
1.	Identification and Collection of Seeds of Major and Minor Rabi Crops in Pakistan	1
2.	Identification and Collection of Seeds of Major and Minor Kharif Crops in Pakistan	4
3.	Make a Chart of Major Rabi & Kharif Crops Regarding Seed Rate, Water Requirement, Fertilizer Dose and Yield in Your Practical Copy	7
4.	Studying Cropping Patterns in Local Agriculture	9
5.	Prepare a Report on Water Losses in Canal Irrigation System of Pakistan	11
6.	Practical Based Assessment 01	13
7.	Collection and Identification of Mulching Materials	15
8.	Draw the Main Canal System of Punjab	18
9.	Investigating Salinity and Waterlogging in Affected Areas	21
10.	Forest Visit Report: (Changa Manga National Park)	23
11.	Identification of agroforestry Trees and Shrubs of Pakistan	26
12.	Practical Based Assessment 02	29
13.	Vegetative Propagation of Forest Trees	31
14.	Raising Plants from Seeds of Neem, Lemon, Mango, Ber and Jaman	34
15.	Draw a Graph Between Food Supply and Milk Production of Cows and Buffaloes	38
16.	Visit to Cattle Farm and Artificial Insemination Center	41
17.	Products and By-Products from Livestock & Poultry	44
18.	Practical Based Assessment 03	47
19.	Common Medicines for Livestock & Poultry Diseases	49
20.	Testing Milk Quality with a Lactometer	52
21.	Dairy Industry Visit Report	55
22.	Draw a Chart of Annual Livestock Vaccination Schedule	57
23.	Draw the Annual Poultry Vaccination Schedule	60
24.	Poultry Farm Health & Hygiene Survey	62
25.	Practical Based Assessment 04	65
26.	Pairing Scheme	66
27.	Model Paper	67





GUIDELINES FOR TEACHERS ON PRACTICAL WORK

Teachers are encouraged to teach various concepts through learner-centered activities that promote curiosity, inquiry, creativity and critical discussions through group work and collaboration. The purpose of lab work is to enhance critical thinking skills, experimental design and instrument handling. Students should learn the skills to use tools, devices and apparatus with care and while noting observations and taking readings, they should strive for accuracy and precision. Students should not demonstrate a casual attitude toward practical work but should be active, careful and prioritize safety for themselves and their peers in the lab.

Preparation for Practical Work in the Lab

To optimize the use of limited lab equipment in a school setting, teachers should organize students into groups of 4 to 5 and encourage individual participation in handling apparatus and taking readings. A group-wise practical schedule chart should be prominently displayed in the lab, assigning multiple experiments to keep all groups engaged. The chart should track progress and indicate which group is assigned to each experiment. The lab in-charge should prepare apparatus in advance with teacher assistance, if needed. Teachers should supervise and provide support during lab work, keeping records of students' progress and providing feedback in their practical notebooks.

Bimonthly Practical Based Assessment/ Evaluation

Some bimonthly practical-based assessment papers are provided in the practical manual. The teacher may prepare additional papers following the same pattern if the need arises to overcome the shortage of available apparatus for each group. The teacher should move around to monitor and assess the students' performance by asking prompt questions about their practical work. The teacher should also conduct a Viva-Voce on the experiment they are performing and ask questions that enhance their critical thinking skills. If a student is stuck somewhere, the teacher may address the issue or provide hints to guide him / her back on the right track. Based on the performance record, the teacher can identify students with below average performance and provide them with extra care and personal attention to help them overcome their shortcomings.





PRACTICAL 01

Identification and Collection of Seeds of Major and Minor Rabi Crops in Pakistan

Date _____

Background Information

Rabi crops, sown in winter (October–December) and harvested in spring (April–May), are vital to Pakistan's agricultural economy. Major rabi crops wheat, barley, gram (chickpea), mustard and rapeseed dominate cultivation due to their economic and nutritional significance. Minor rabi crops, like oats, linseed, alfalfa and fenugreek are regionally important for fodder, oil and spices. Seed identification and collection are essential for preserving genetic diversity, ensuring seed quality for future planting and supporting crop improvement programs. This practical equips students with skills to recognize, collect and store Rabi crop seeds, fostering awareness of sustainable agriculture.



Wheat



Barley



Gram



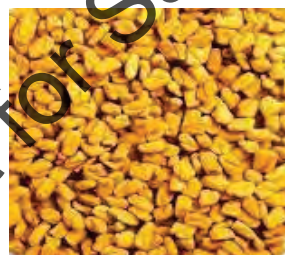
Mustard



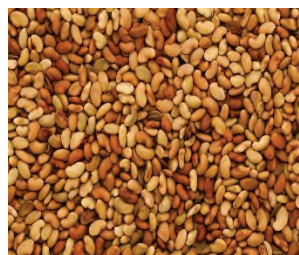
Oats



Linseed



Fenugreek



Alfalfa



Objective

1. **Identify** seeds of major (wheat, barley, gram, mustard, rapeseed) and minor (oats, linseed, alfalfa, fenugreek) rabi crops using morphological features.
2. **Collect** mature, disease-free seeds from reliable sources (e.g., farms, markets, or research stations).
3. **Preserve** seeds using proper drying and storage techniques to maintain viability.



Materials Required

i. Seed Samples:

- **Major crops:** Wheat, barley, gram (chickpea), mustard and rapeseed.
- **Minor crops:** Oats, linseed, alfalfa and fenugreek.



**ii. Tools:**

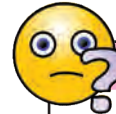
- Magnifying glass (10x).
- Forceps, small envelopes, ziplock bags and labels.
- Seed storage containers (e.g., airtight glass jars).

iii. Supplies:

- Silica gel packets (desiccant) for drying.
- Notebook, camera (for documentation).
- Scale (to measure seed weight).

iv. Reference Materials:

- Seed identification guides or pictorial keys

**DO YOU KNOW?**

Fenugreek seeds are a veritable pharmacy in a pod. They are renowned in traditional medicine for helping to regulate blood sugar levels in diabetics and for aiding digestion.

Instructions to Conduct the Practical**Step 1: Seed Identification****1. Study Morphology:**

- Examine each seed sample under a magnifying glass.
- Note size (e.g., tiny mustard vs. large gram), shape (e.g., oval wheat vs. angular fenugreek), colour (e.g., golden rapeseed vs. brown linseed) and texture (e.g., smooth barley vs. wrinkled alfalfa).

2. Compare Features:

- Use reference guides to distinguish similar seeds (e.g., barley vs. oats; mustard vs. rapeseed).
- Record observations in a table:

Crop	Size/Shape	Colour	Texture
Wheat	medium, oval	Golden-brown	smooth, firm
Gram (Chickpea)	large, round/angular	Beige/yellow	rough, dimpled
Mustard	small, spherical	Yellow/black	smooth
Alfalfa	tiny, kidney-shaped	Yellow-brown	smooth

Step 2: Seed Collection**1. Source Selection:**

- Visit local farms, markets, or agricultural research stations.
- Collect mature, healthy seeds (avoid insect-damaged or moldy samples).

2. Documentation:

- Label each sample with crop name, location, date (e.g., "Wheat, Lahore, 14-07-2025").

3. Quantity:

- Collect 20–50 seeds per crop (use envelopes for minor crops to prevent loss).
- Seed Preservation





Step 3: Seed Preservation

i. Drying:

- Spread seeds in a single layer on paper.
- Dry in the shade for 48 hours.

ii. Storage:

- Place dried seeds in airtight jars with silica gel packets.
- Store in a cool, dark place (e.g., cupboard; ideal temperature: less than 15°C).
- Record storage conditions in your notebook.

Step 4: Documentation

- Compile a seed inventory: list crops, collection sites and key features.
- Attach photographs and sketches.



Assessment Questions

Question 1: Which crop's seeds are of an oval shape?

Answer: Wheat (*Triticum aestivum*).

Question 2: Name two crops from the *Poaceae* family grown in *rabi*.

Answer: Wheat and barley.

Question 3: What is the key purpose of drying seeds before storage?

Answer: To prevent mold and insect damage.

Question 4: Which minor *rabi* fodder crop has kidney-shaped seeds?

Answer: Berseem (*Trifolium alexandrinum*).

Question 5: Define *Agronomy* in one phrase.

Answer: Science of soil management and crop production.

Question 6: List any two major factors affecting crop production.

Answer: Climate and soil quality.

Question 7: Name a wheat variety for irrigated Punjab areas.

Answer: Dilkash-2020.

Question 8: When are *rabi* crops harvested in Pakistan?

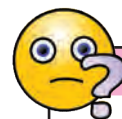
Answer: April-June.

Question 9: Name major potato variety grown in Punjab.

Answer: Sante.

Question 10: How is sugarcane typically propagated?

Answer: Through stem cuttings (setts).



DO YOU KNOW?

Grams (chickpeas) improve soil health by fixing atmospheric nitrogen, reducing the need for synthetic fertilizers.

Roll No.: _____

Date: _____

Class Incharge Signature: _____





PRACTICAL 02

Identification and Collection of Seeds of Major and Minor Kharif Crops in Pakistan

Date _____

Background Information

Kharif crops, sown at the onset of the monsoon (April–July) and harvested in autumn (September–November), are vital for Pakistan's agriculture. These crops rely heavily on rainfall and high temperatures. Major crops (e.g., rice, cotton) form the backbone of the economy, while minor crops (e.g., mung bean, sesame) enhance nutritional security and soil fertility. This practical focuses on identifying and collecting seeds of these crops to study their morphological features and agro-economic significance.



Rice



Cotton



Maize



Sorghum



Sugar cane



Mung bean



Mash



Sesame



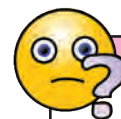
Objective

- Identify and collect seeds of 5 major and 5 minor Kharif crops.
- Document seed morphology (size, shape, colour and texture).
- Classify crops by botanical family and agronomic use.



Materials Required

- Seed collection bags (paper/cloth)
- Permanent markers for labeling
- Magnifying lens
- Seed trays/containers
- Field notebook and weighing scale
- Gloves and forceps



DO YOU KNOW?

Sugarcane requires 12–18 months to mature and consumes significantly more water than most crops, making it highly dependent on consistent irrigation.





Procedure

- i. **Site Selection:**
 - Visit local farms, markets, or agricultural research stations.
- ii. **Seed Collection:**
 - For pods (e.g., mung bean), thresh and clean seeds before storage.
- iii. **Labeling:**
 - Record: Crop name, Botanical name, collection site, date and habitat.
Example: "Rice (Oryza sativa), Lodhran, Punjab, 05-July-2025, Irrigated field."
- iv. **Identification:**
 - Examine seeds using a magnifying lens; note key features (Table 1).
- v. **Storage:**
 - Dry seeds (sun-dry for 2–3 days) and store in airtight containers.
- vi. **Seed Identification Guide (Table 1)**

Major Kharif Crops (Table 1)

Crop	Botanical Name	Family	Seed Characteristics
Rice	<i>Oryza sativa</i>	Poaceae	oval, hulled (brown) or polished (white), 5–7 mm.
Cotton	<i>Gossypium hirsutum</i>	Malvaceae	fuzzy, grey-black, 0.5–1 cm, attached to lint.
Sugarcane	<i>Saccharum officinarum</i>	Poaceae	true seed rarely used; propagates via stem cuttings (setts).
Maize	<i>Zea mays</i>	Poaceae	flattened, wedge-shaped, 8–12 mm; white/yellow/red.
Sorghum	<i>Sorghum bicolor</i>	Poaceae	spherical, 3–4 mm; white/red/brown.

Minor Kharif Crops

Crop	Botanical Name	Family	Seed Characteristics
Mung bean	<i>Vigna radiata</i>	Fabaceae	Small, cylindrical, green; 3–4 mm.
Mash	<i>Vigna mungo</i>	Fabaceae	Black, oblong, 4–5 mm; white hilum.





Crop	Botanical Name	Family	Seed Characteristics
Sesame	<i>Sesamum indicum</i>	Pedaliaceae	Flattened, pear-shaped, 2–3 mm; white/brown/black.
Guar	<i>Cyamopsis tetragonoloba</i>	Fabaceae	Irregular, oval, cream-colored; 3–5 mm.
Bajra	<i>Pennisetum glaucum</i>	Poaceae	Greyish, tear-drop shaped, 3–4 mm (as minor fodder).



Precautions

1. Avoid immature/insect-damaged seeds.
2. Label samples immediately to prevent mix-ups.
3. Use gloves when handling treated seeds (e.g., market-bought cotton).
4. Verify botanical names from authentic sources (e.g., *Flora of Pakistan*).



Assessment Questions

Question 1: During which months are Kharif crops sown in Pakistan?

Answer: April–July

Question 2: Name two major Kharif crops vital for Pakistan's economy.

Answer: Rice, Cotton (or Sugarcane, Maize, Sorghum)

Question 3: What is the characteristic color of polished rice seeds?

Answer: White

Question 4: Which botanical family do *both* Rice and Sugarcane belong to?

Answer: Poaceae

Question 5: State one agro-economic importance of minor Kharif crops.

Answer: Enhance nutritional security or Improve soil fertility

Question 6: What must be done to mung bean pods before seed storage?

Answer: Thresh and clean the seeds

Question 7: Which Kharif crop has seeds attached to fuzzy lint?

Answer: Cotton

Question 8: Why are sugarcane "seeds" rarely used? What is used instead?

Answer: "Seeds" are not viable for commercial propagation; but stem cuttings (setts) are used

Roll No.: _____

Date: _____

Class Incharge Signature: _____



**PRACTICAL 03**

Make a chart of major Rabi & Kharif Crops regarding Seed rate, water requirement, fertilizer dose and yield in your practical copy

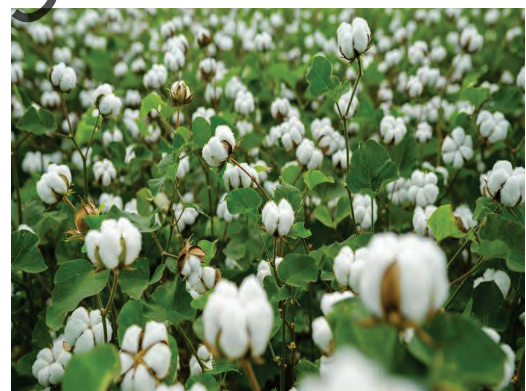
Date _____

Background Information

- **Rabi crops** (e.g., wheat, gram) are sown in winter (Oct–Dec) and harvested in spring (Apr–Jun).

**Wheat****Gram**

- **Kharif crops** (e.g., rice, cotton) are sown in monsoon (Apr–Jul) and harvested in autumn (Sep–Nov).

**Rice****Cotton**

- Each crop needs specific seed rates, water and fertilizers (NPK) for optimal growth.

**Objective**

To compare seed rates, water needs, fertilizer doses, and yields of major Rabi and Kharif crops using a chart.

**Materials Required**

- Practical notebook, ruler and coloured pencils.
- Reference book (e.g., *PARC Crop Guide*), Punjab Agriculture Department leaflets.





Tabulated Data

Crop	Season	Seed Rate (kg/acre)	Water Requirement	Fertilizer (NPK kg/acre)	Yield (Monds/Acre)
Wheat	Rabi	40–50	5–6 irrigations	100-60-50	50–60
Gram	Rabi	15–20	2–3 irrigations	20-40-00	20–30
Mustard	Rabi	1–1.5	2–3 irrigations	30-40-00	20–25
Rice	Kharif	8–10 (nursery)	Flooded fields	100-60-50	50–60
Cotton	Kharif	8–10	6–8 irrigations	80-50-50	30–40
Maize	Kharif	8–10	6–8 irrigations	150-60-60	75–100



Assessment Questions

Question 1: What is the seed rate of mustard crop per acre?

Answer: Mustard (1–1.5 kg/acre).

Question 2: How many irrigations does wheat need?

Answer: 5–6.

Question 3: Which crop grows in flooded fields?

Answer: Rice.

Question 4: What fertilizer dose is used for gram? (Give NPK)

Answer: 20-40-00 kg/acre.

Question 5: What is the yield of maize crop in mounds per acre?

Answer: 75–100 mounds per acre.

Question 6: What is the seed rate for cotton?

Answer: 8–10 kg/acre.

Question 7: What is the recommended fertilizer dose of maize crop?

Answer: Maize (150-60-60 kg/acre).

Question 8: When is gram harvested? (Season)

Answer: Kharif (April–June).

Question 9: What yield can a farmer expect from mustard?

Answer: 800–1,000 kg/acre.

Question 10: Why does rice need flooded fields?

Answer: To suppress weed growth.



DO YOU KNOW?

Cottons fluffy bolls produce natural fibers that are actually soft, hair-like outgrowths on the seeds, not part of the fruit itself.

Roll No.: _____

Date: _____

Class Incharge Signature: _____



**PRACTICAL 04****Studying Cropping Patterns in Local Agriculture****Background Information**

Date _____

Cropping Patterns**Background Information**

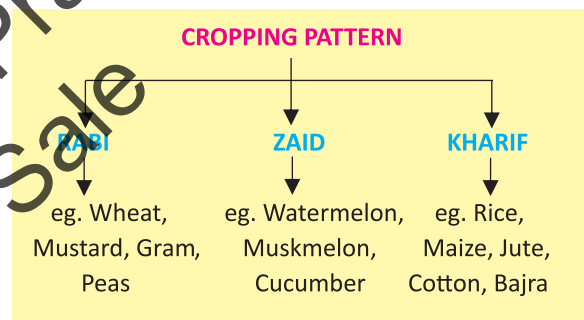
Cropping patterns refer to the sequence and spatial arrangement of crops cultivated on a piece of land over a year. These patterns are influenced by:

- **Environmental factors:** Soil type, rainfall, temperature and topography.
- **Socio-economic factors:** Market demand, labour availability, government policies and farming traditions.
- **Technical factors:** Irrigation access, seed varieties and pest management.

Studying local cropping patterns helps optimize resource use, enhance soil fertility (e.g., through crop rotation) and improve farmers' resilience to climate change. This activity involves field visits to nearby farms to document and analyze these patterns.

**Objectives of the Activity**

1. Document the type of crops grown in different seasons.
2. Identify factors influencing crop choices (e.g., soil, climate, profit).
3. Analyze sustainability practices (e.g., intercropping, crop rotation).
4. Relate observed patterns to food security and environmental health.

**Materials Required**

1. **Field Kit:**
 - Notebook, pen, clipboard.
 - Smartphone (for photographing fields with permission).
 - Measuring tape (to estimate plot sizes).
2. **Survey Tools:**
 - Pre-designed questionnaire (sample below).
 - Local map (to mark crop locations).
3. **Safety Gear:**
 - Hat, water bottle, sunscreen and masks (if handling soil/chemicals).

Step-by-Step Instructions**1. Pre-Visit Preparation:**

- Contact a local farmer (seek school/parental help).
- Examine regional crops and seasons.
- Prepare a questionnaire:





- Sample Questions:
 - Which crops are grown in Kharif/Rabi/Zaid seasons?
 - Why were these crops chosen? (Profit, soil suitability, tradition)
 - Do you practice crop rotation/intercropping? If yes, describe.

2. Farm Visit Tasks:

- **Observe & Record:** Sketch the farm layout; note adjacent water sources/vegetation.
- **Measure:** Estimate plot sizes and spacing between crops.
- **Interview:** Respectfully ask 5–6 relevant questions.

3. Post-Visit Analysis:

- **Tabulate data:** List crops, season and reasons for their selection.
- **Identify patterns:** e.g., "Rice-Wheat-Mustard rotation" or "Cotton intercropped with legumes."
- Write a 1-page report linking findings to sustainability.



Assessment Questions

Question 1: What is a *cropping pattern*?

Answer: The sequence and spatial arrangement of crops cultivated on land over a year.

Question 2: Name one environmental factor influencing cropping patterns.

Answer: Soil type, rainfall, temperature or topography.

Question 3: Why study local cropping patterns? (State one purpose)

Answer: To optimize resource use, enhance soil fertility, or improve climate resilience.

Question 4: Which tool is used to estimate farm plot sizes?

Answer: Measuring tape.

Question 5: What sustainability practice involves growing two crops together?

Answer: Intercropping.

Question 6: List one socio-economic factor affecting crop choices.

Answer: Market demand, labor availability, policies or farming traditions.

Question 7: How does crop rotation benefit soil health?

Answer: Replenishes nutrients (e.g., nitrogen) and reduces pests.

Question 8: What should you seek before photographing a farm?

Answer: Permission/consent.

Roll No.: _____

Date: _____

Class Incharge Signature: _____





PRACTICAL 05

Prepare a Report on Water Losses in Canal Irrigation System of Pakistan

Date _____

Background Information

Overview of Pakistan's Canal Irrigation System

Pakistan's agriculture relies on the Indus Basin Irrigation System (IBIS), the world's largest contiguous canal network. Built during the British colonial era, it spans 64,000 km of canals and serves 90% of the country's farmland. Despite its scale, the system suffers severe water losses, exacerbating water scarcity in this semi-arid region.

Key Causes of Water Losses:

1. Seepage and Evaporation:

- Unlined earthen canals lose 25-40% of water through seepage.
- High temperatures during summers cause evaporation losses, especially in Sindh/Punjab.

2. Operational Inefficiencies:

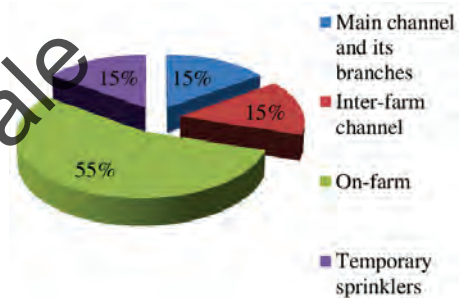
- Outdated infrastructure (e.g., manual gates, silt-clogged channels).
- Unequal distribution: Head-reach farmers overuse water; tail-end farms face shortages.

3. Management Gaps:

- Fragmented oversight between provincial irrigation departments.
- Inadequate funding for maintenance.

4. Impacts of Losses:

- **Economic:** Wastes 59 MAF (million acre-feet) annually – enough to irrigate 9 million acres.
- **Agricultural:** Reduces crop yields, costing 1.3% of GDP.



Flow chart of water losses in canal irrigation system of Pakistan



Objectives of the Study

1. Quantify water losses in the major canals (e.g., Upper Chenab Canal, Rohri Canal).
2. Identify technical, managerial and environmental causes of losses.
3. Evaluate the impact of losses on agricultural productivity.
4. Propose sustainable solutions for loss reduction.

Materials Required

1. Secondary Data Sources:

- Pakistan Council of Research in Water Resources (PCRWR) reports.
- Provincial Irrigation Department records (e.g., Punjab Irrigation).
- On-Farm Water Management Department, Punjab.



**Assessment Questions**

Question 1: What percentage of water is lost through *seepage* in unlined canals?

Answer: 25–40%.

Question 2: Name the world's largest contiguous canal network in Pakistan.

Answer: Indus Basin Irrigation System (IBIS).

Question 3: Which tool measures seepage rates in canal beds?

Answer: Infiltrometer.

Question 4: What is the annual economic cost of water losses to Pakistan's GDP?

Answer: 1.3% of GDP.

Question 5: Identify one key cause of unequal water distribution.

Answer: Head-reach farmers overuse; tail-end farms face shortages.

Question 6: Which agency provides reports for secondary data on water losses?

Answer: Pakistan Council of Research in Water Resources (PCRWR).

Question 7: How much water (MAF) is wasted annually in Pakistan's canals?

Answer: 59 million acre-feet (MAF).

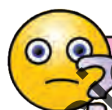
Question 8: What solution reduces seepage losses in earthen canals?

Answer: Lining canals with concrete.

Roll No.: _____

Date: _____

Class Incharge Signature: _____

**DO YOU KNOW?**

The world's largest contiguous irrigation system loses enough water annually to irrigate an additional 9 million acres of farmland—a staggering 59 million acre-feet (MAF) wasted due to seepage, evaporation, and mismanagement.





Practical Based Assessment 01



Instructions for Teachers

The teacher will divide students into groups and assign a specific practical to each group from given ones. Students are required to list the necessary apparatus, describe the procedure and note precautions. They should also record their observations in the Observation Table, if necessary. The teacher will conduct a Viva Voce with each student to evaluate their performance. The teacher will also provide guidance to students on any discrepancies in their work and award marks accordingly.

Roll No: _____

Class/ Section: _____

Time Allowed: 2 hour

Maximum Marks: 35

1. Identify the given seeds of different Rabi crops and write their Botanical names. (12)

OR

Complete the given table regarding Botanical name, Seed Rate, Water Requirement, Fertilizer Dose and Yield of given crops. (12)

Crop (Season)	Botanical Name	Seed Rate (kg/acre)	Water Requirement (irrigations)	Fertilizer Dose (NPK kg/acre)	Yield (monds/acre)
KHARIF CROPS					
Rice					
Cotton					
Sugarcane					
Maize					
Sorghum					





2. Identify the given seeds of different kharif seeds and write their Botanical names.

OR

Recall your visit and prepare a chart of cropping pattern of different crops grown in your locality.

3. Practical Work on Copy (checked by Teacher)

(6)

4. Viva Questions

(5)

1. Which crop is known as white gold in Pakistan?
2. Give three examples of rabi crops?
3. Tell the names of three kharif crops?
4. Define cropping pattern?
5. What environmental factors affect the cropping pattern?
6. What is common cropping pattern in the Indus plains of Pakistan?





PRACTICAL 06

Collection and Identification of Mulching Materials

Background Information

Date _____

Mulching is a soil conservation technique involving a protective layer (organic or inorganic) spread over the soil surface. It reduces evaporation, suppresses weeds, regulates soil temperature and enhances soil fertility.

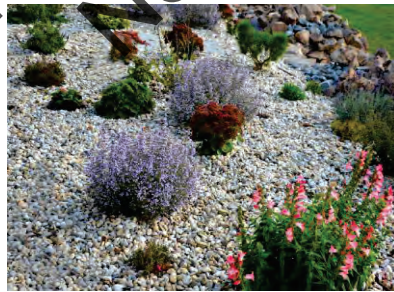
Common materials include:

- **Organic:** Straw, leaves, grass clippings, compost, wood chips.
- **Inorganic:** Plastic sheets, gravel, landscape fabric.
- In Pakistan, organic mulches improve water retention in arid regions, while plastic mulch boosts crop yields in vegetable farming.



Objectives of the Activity

1. Identify 6–8 locally available mulching materials.
2. Compare their physical properties (texture, water retention, biodegradability).
3. Analyze their suitability for different crops (e.g., plastic mulch for tomatoes, straw for wheat).
4. Promote sustainable material reuse (e.g., crop residues).



Different Mulching Materials



Materials Required

1. **Collection Kit:**
 - Gloves, pruning shears, ziplock bags, labels.
2. **Identification Tools:**
 - Magnifying glass.
 - pH strips (to test organic matter acidity or alkalinity).





3. Mounting Materials:

- Practical notebook, glue/tape, transparent sheets.
- Marker pens for labeling.

Step-by-Step Instructions

1. Pre-Lab Preparation:

- Research local mulching materials (e.g., rice husks in Punjab, coconut coir in Sindh).
- Prepare a table for recording properties:

Material	Source	Texture	Water Retention	Biodegradable?
Example: Wheat straw	Farm residue	Coarse	High	Yes

2. Collection (Fieldwork):

- Collect 6 samples (e.g., dried leaves, plastic mulch, grass clippings, wood bark, newspaper shreds, gravel).
- Note the source (e.g., "plastic mulch from tomato farm," "fallen leaves from orchard").
- Wear gloves; avoid toxic plants/chemical-treated materials.

3. Identification & Mounting:

- Test water retention: Sprinkle 10ml water on each sample; observe absorption rate.
- Paste small, dried samples in your practical notebook.
- Label each sample with:
 - Material name
 - Source
 - Key property (e.g., "High insulation").



Precautions

1. Do not collect sharp/chemically treated materials (e.g., industrial waste plastic).
2. Sterilize organic samples (sun-dry for 2 days) to prevent mold growth.
3. Handle plastic mulches carefully to avoid cuts.
4. Work under supervision in agricultural areas.



**Assessment Questions**

Question 1: What is the primary purpose of mulching?

Answer: To conserve soil moisture and reduce evaporation.

Question 2: Name two organic materials used for mulching.

Answer: Straw or grass clippings (or leaves/wood chips/compost).

Question 3: Why is plastic mulch preferred for vegetable farming?

Answer: It boosts crop yields (e.g., in tomatoes).

Question 4: What is the method to test water retention of mulch samples?

Answer: Weigh the sample, sprinkle 10ml water and record absorption rate.

Question 5: What safety step is needed before mounting organic samples?

Answer: Sun-dry for 2 days to prevent mold.

Question 6: Identify a mulch material unsuitable for collection.

Answer: Chemically treated industrial waste plastic.

Question 7: What property makes straw mulch ideal for wheat?

Answer: High water retention and biodegradability.

Question 8: How should you label samples in your notebook?

Answer: With material name, source and key property.

Question 9: Which mulch type is non-biodegradable?

Answer: Inorganic mulch (e.g., plastic/gravel).

Question 10: Why avoid collecting sharp materials during fieldwork?

Answer: To prevent cuts or injuries.

Roll No.: _____

Date: _____

Class Incharge Signature: _____

**DO YOU KNOW?**

Mulch acts as an insulating blanket, keeping soil cooler in summer and warmer in winter. This stabilizes root condition, boosting plant health and yield.





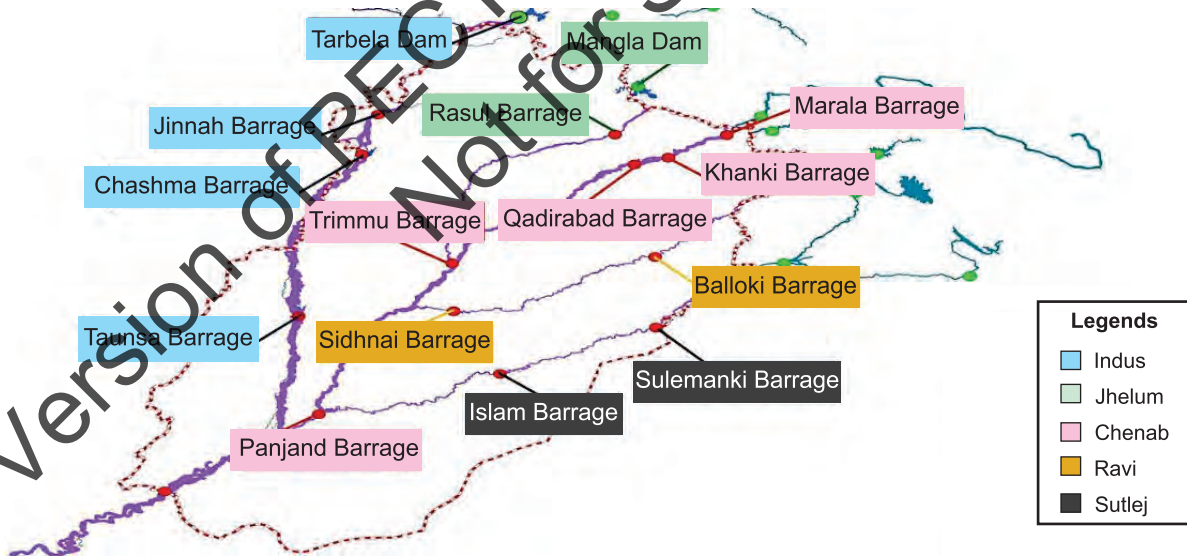
PRACTICAL 07 Draw the Main Canal System of Punjab

Date _____

Background Information

Punjab, Pakistan's agricultural backbone mainly relies on the **Indus Basin Irrigation System (IBIS)**. Its key rivers are Indus, Chenab, Jhelum, Sutlej and Ravi which feed a network of canals that irrigate 20 million acres of land. Major canals include:

- **Upper Bari Doab Canal (UBDC):** From Ravi River (serves Lahore, Sheikhupura).
- **Lower Chenab Canal (LCC):** Largest canal (Chenab River; irrigates Faisalabad, Toba Tek Singh).
- **Sidhnai Canal:** Off Ravi River (Multan region).
- **Trimmu-Sidhnai Link:** Connects Jhelum and Ravi rivers. It was built during British rule, this system faces 30% water loss due to seepage, siltation and outdated infrastructure.
- **Thal Canal:** From Jinnah Barrage (Indus river; irrigates Khushab, Bhakkar, Layyah).
- **Chashma Right Bank Canal:** From Chashma Barrage (Indus river; irrigates Mianwali, Bhakkar).
- **Taunsa-Panjnad Link Canal:** Transfers water between Indus and Chenab systems.
- **Dera Ghazi Khan Canal:** Indus river (irrigates D.G. Khan district).
- **Muzaffargarh Canal:** Indus river (irrigates Muzaffargarh district).



Main canal system of Punjab



Objective

1. Illustrate Punjab's primary canal network, highlighting rivers and major canals.
2. Label critical infrastructure (barrages, head works).





Materials Required

1. Drawing Tools:

- A3 paper/poster board
- Pencils (HB, 2B), eraser, ruler
- Colored pencils/markers (blue for rivers, green for canals)

2. Reference Materials:

- Outline map of Punjab (rivers marked)
- Punjab Irrigation Department canal maps (digital/print)

3. Labeling Supplies:

- Fine-tip pens, adhesive labels

Step-by-Step Instructions

1. Sketch Rivers

- Draw Sutlej (south), Ravi (central), Chenab (central), Indus (west) and Jhelum (north).
- **Mark barrages:** Balloki (Ravi), Khanki (Chenab), Sulemanki (Sutlej), Jinnah (Indus).
- Add Main Canals
- **From Ravi:** UBDC (northeast), Sidhnai Canal (south)
- **From Chenab:** LCC (east), Rachna Doab Canal (Ravi-Chenab link).
- **From Sutlej:** Punjnad Canal (joins Chenab).
- **From Indus:** Taunsa-Panjnad Link Canal (joins Indus and Chenab)

2. Label Infrastructure

- Circle key headworks (e.g., Maraala on Chenab).
- Shade high-loss areas (e.g., tail-ends of LCC in Sahiwal).

3. Finalize

- Trace canals in green; rivers in blue.



Assessment Questions

Question 1: What is the primary source of Punjab's canal network?

Answer: The Indus Basin Irrigation System (IBIS).

It is fed by five rivers: Indus, Sutlej, Ravi, Chenab and Jhelum.

Question 2: Which canal serves Lahore and Sheikhupura?

Answer: The Upper Bari Doab Canal (UBDC).

It originates from the Ravi River.

Question 3: Name Punjab's largest canal and its key function.

Answer: The Lower Chenab Canal (LCC).

It irrigates Faisalabad and Toba Tek Singh, sourced from the Chenab River.





Question 4: Where does the Sidhnai Canal operate?

Answer: It flows from the Ravi River to the Multan region.

It supports agriculture in southern Punjab.

Question 5: What critical infrastructure connects the Jhelum and Ravi rivers?

Answer: The Trimmu-Sidhnai Link canal.

It was built during British rule to manage water distribution.

Question 6: Identify two major barrages in Punjab.

Answer: Balloki (on Ravi) and Khanki (on Chenab) or Taunsa (on Indus).

They regulate water flow into canals.

Question 7: What causes 30% water loss in Punjab's canals?

Answer: Seepage, siltation and outdated infrastructure.

Unlined earthen canals worsen these losses.

Question 8: Which canal is linked to the Rachna Doab?

Answer: The Rachna Doab Canal.

It connects the Ravi and Chenab rivers.

Question 9: Why are tail-end regions (e.g., Sahiwal) high-loss zones?

Answer: They receive less water due to upstream overuse and seepage.

This reduces irrigation efficiency for farms.

Question 10: What role did British rule play in Punjab's canal system?

Answer: They designed and built the core network (e.g., Trimmu-Sidhnai).

The system now requires modernization to reduce losses.

Roll No.: _____

Date: _____

Class Incharge Signature: _____



DO YOU KNOW?

The foundational network of Indus Basin Irrigation System (IBIS), which is the world's largest contiguous canal network was constructed during the British Colonial era. This vast infrastructure is the lifeblood of the region, irrigating a massive 20 million acres of farmland, making Punjab Pakistan's agricultural powerhouse.



**PRACTICAL 08****Investigating Salinity and Waterlogging in Affected Areas**

Date _____

Background Information

Salinity (soil salt accumulation) and waterlogging (saturated soil) affect 4.5 million hectares in Pakistan, primarily in Punjab and Sindh. These issues arise from:

- **Poor drainage:** Inefficient canal systems raise groundwater tables.
- **High evaporation:** Leaves salt residues in semi-arid climates.
- **Irrigation mismanagement:** Overuse of saline groundwater.

Impacts include 50% crop loss, soil degradation and rural displacement. The Indus Basin sees 25% of irrigated land degraded, costing \$1.5 billion/year.

**Objective of the Practical**

1. Identify visual and chemical indicators of salinity/waterlogging.
2. Measure soil salinity (EC) and water table depth.
3. Correlate findings with agricultural damage.
4. Propose mitigation strategies.

**Materials Required**

1. **Field Kit:**
 - Soil auger, 1-meter measuring tape
 - Test tubes, distilled water, filter paper
2. **Documentation Tools:**
 - Notebook, symptom guidebook (e.g., "salt crust," "stunted crops")
 - Ziplock bags (for soil samples)
3. **Safety Gear:**
 - Gloves, boots, hat, portable first aid

Step-by-Step Instructions**A. Pre-Visit**

1. Site Selection: Identify affected areas
2. Research: Study salinity/waterlogging signs

B. Fieldwork

1. **Observation:**
 - Document surface indicators:
 - Salt crust (white/grey deposits)
 - Water pools, algae growth
 - Stunted crops (e.g., yellowing wheat)



Soil Salinity



Water logging



**Assessment Questions**

Question 1: What are the primary causes of salinity in Punjab and Sindh?

Answer: Poor drainage from canal systems and high evaporation in semi-arid climates. These leave salt residues in the soil, raising groundwater tables.

Question 2: How would you identify salinity/waterlogging visually in a field?

Answer: Look for white/grey salt crusts on the soil surface and stunted, yellowing crops. Pools of stagnant water with algae also indicate waterlogging.

Question 3: What is the economic impact of salinity/waterlogging in Pakistan?

Answer: It causes \$1.5 billion/year loss and 50% crop reduction. Degradation affects 25% of the Indus Basin's irrigated land.

Question 4: Why is overuse of saline groundwater problematic?

Answer: It accelerates salt accumulation in soil and worsens crop production. This leads to long-term soil infertility and rural displacement.

Question 5: What safety gear is essential during fieldwork?

Answer: Gloves, boots, hats and a portable first aid kit. These protect against contaminated soil and extreme weather.

Question 6: What two mitigation strategies could address these issues?

Answer: Installing tube wells to lower groundwater and use canal irrigation to reduce salt accumulation.

Planting salt-tolerant crops (e.g., barley, sorghum) also helps.

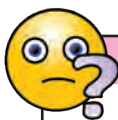
Question 7: How would you document crop damage during the survey?

Answer: Photograph stunted/yellowing crops and record loss percentages (e.g., "70% wheat loss").

Roll No.: _____

Date: _____

Class Incharge Signature: _____

**DO YOU KNOW?**

Salinity and waterlogging are not minor issues but affect a massive 4.5 million hectares of land in Pakistan, primarily in its most productive agricultural provinces, Punjab and Sindh.



**PRACTICAL 09****Forest Visit Report: (Changa Manga National Park)****Background Information**

Date _____

- **Location:** Kasur District, Punjab (80 km southwest of Lahore).
- **Forest Type:** Man-made irrigated plantation (world's largest hand-planted forest).
- **Area:** 12,510 acres.
- **Climate:** Semi-arid (hot summers: 45°C max; mild winters); reliant on canal irrigation.
- **Key Features:**
 - Established in 1866 by British foresters.
 - Dominated by exotic species (eucalyptus, mulberry) for timber.
 - Artificial lake, wildlife breeding center and recreational facilities.
- **Threats:** Groundwater depletion, invasive species (*Parthenium*), over-tourism and monoculture vulnerability.



Changa Manga National Park

**Objective of Visit**

1. Analyze plantation composition (native vs. exotic species).
2. Assess irrigation efficiency and water sustainability.
3. Document recreational impacts on forest sustainability.
4. Study wildlife adaptation to artificial ecosystems.

**Materials Required**

Category	Items
Documentation	Notebook, Mobile, Camera.
Field Tools	DBH tape (for tree girth), binoculars.
Guides	"Trees of Punjab" field guide, historical map of Changa Manga.





Category	Items
Safety	Sunscreen, reusable water bottle, hat, anti-mosquito spray.
Optional	Bird identification chart or app.

Instructions for the Visit

1. Pre-Visit:

- Obtain permission from Punjab Forest Department (Lahore).
- Review canal irrigation schedules (critical for plantation survival).

2. On-Site Protocol:

- Start at the Forest Nursery (record sapling species and irrigation methods).
- Follow the Heritage Trail (mark 5 observation points at 500m intervals).

3. Safety Rules:

- Avoid snakes in dense undergrowth.
- Do not enter restricted plantation blocks (chemical treatments).

4. Ethical Guidelines:

- Do not feed wildlife (monkeys, deer).
- Stay on designated paths to prevent soil compaction.



Assessment Questions

Question 1: Where is Changa Manga National Park located, and what makes it unique?

Answer: Kasur District, Punjab (80 km from Lahore).

It is the world's largest hand-planted forest, established in 1866.

Question 2: Name two dominant tree species in Changa Manga and their origin.

Answer: Eucalyptus and mulberry.

Both are exotic species introduced for timber production.

Question 3: Why is canal irrigation critical for Changa Manga's survival?

Answer: Punjab has a semi-arid climate (45°C summers).

Natural rainfall is insufficient for tree growth without artificial water supply.

Question 4: What tool measures tree girth during fieldwork?

Answer: A DBH tape (Diameter at Breast Height tape).

It helps assess tree growth and health.

Question 5: Identify two major threats to the forest ecosystem.

Answer: Groundwater depletion and invasive species (e.g., Parthenium weed).

Over-tourism and monoculture also increase vulnerability.

Question 6: Why should visitors avoid feeding wildlife like monkeys?

Answer: It disrupts natural foraging behavior and risks disease transmission.

Human food can harm animal health.





Question 7: Which department grants permission for forest visits?

Answer: The Punjab Forest Department (based in Lahore).

Teachers must obtain formal approval before entry.

Question 8: Why must visitors stay on designated paths?

Answer: To prevent soil compaction and understory plant damage.

Straying risks disturbing wildlife habitats or chemical-treated zones.

Roll No.: _____

Date: _____

Class Incharge Signature: _____



Interesting Information

Changa Manga is not a natural forest, but a massive man-made irrigated plantation, recognized as the largest of its kind in the world. It was meticulously planted beginning in 1866 during the British colonial era, initially to meet the high demand for timber and fuel wood for the expanding railway network.



DO YOU KNOW?

Agroforestry is a critical tool in combating a massive environmental problem: soil degradation, which affects 60% of Pakistan's arable land. By integrating trees into farming systems, it directly addresses this issue through soil conservation, improving fertility, and preventing erosion, making farms more sustainable and productive.





PRACTICAL 10

Identification of agroforestry Trees and Shrubs of Pakistan

Date _____

Background Information

Agroforestry integrates trees/shrubs with crops/livestock to enhance sustainability. In Pakistan, it combats soil degradation (affecting 60% of arable land), improves microclimates and boosts farmer incomes. Key ecological roles include:

- Nitrogen Fixation Dhencha (e.g., *Sesbania*)
- Windbreaking Poplar (e.g., *Populus*)
- Soil Conservation Van Tulsi (e.g., *Vitex*)
- Regional adaptations:
 - Punjab/Indus Plains Sheesham: *Dalbergia sissoo* (water-tolerant)
 - Arid Zones Kikar: *Acacia nilotica* (drought-resistant).
 - Highlands Mulberry: *Morus alba* (frost-hardy).



Objectives of the Study

1. Identify 5 key agroforestry trees/shrubs.
2. Document morphological traits and agroecological functions.
3. Analyze economic benefits (timber, fodder, soil enrichment).
4. Correlate species with regional suitability.



Materials Required

Category	Items
Documentation	Field notebook, pencils (HB, 2B), ruler, camera.
Field Tools	Pruning shears (for samples), magnifying glass, soil pH strips.
Reference	Field guide (e.g., <i>Trees of Pakistan</i> by S.I. Ali), agroforestry manual.
Safety	Gloves, first-aid kit, hat.

Part 1: Tree Identification & Diagrams

(Sketch key features: leaves, bark, flowers/fruit)

1 Sheesham (*Dalbergia sissoo*)

- **Habitat:** Canal banks, crop boundaries.
- **Morphology:**
 - **Leaves:** Alternate, pinnate (3-5 leaflets).
 - **Bark:** Grey, deeply fissured.
 - **Flowers:** Pale yellow, clustered.



Sheesham





- **Agroforestry Role:**

- Timber (furniture), leaf fodder, prevents waterlogging.

2. Poplar (*Populus deltoides*)

- **Habitat:** Field boundaries, irrigated farms.

- **Morphology:**

- **Leaves:** Triangular, serrated margins.
- **Bark:** Pale grey, smooth (young); rough (mature).
- **Roots:** Shallow, spreading.

- **Agroforestry Role:**

- Windbreak, pulpwood (matches, packaging).

Part 2: Shrub Identification & Diagrams

1. Ber (*Ziziphus nummularia*)

- **Habitat:** Arid farms, rangelands.

- **Morphology:**

- **Leaves:** Small, rounded, hairy underside.
- **Thorns:** Paired, curved (defense).
- **Fruit:** Yellow-brown drupe.

- **Agroforestry Role:**

- Fodder (high-protein leaves), soil binder.

2. Dhencha (*Sesbania bispinosa*)

- **Habitat:** Rice-wheat rotations, saline soils.

- **Morphology:**

- **Leaves:** Pinnate (20-30 leaflets).
- **Flowers:** Yellow with purple streaks.
- **Roots:** Nodules (nitrogen-fixing).

- **Agroforestry Role:**

- Green manure, reclaims saline land.

3. Van Tulsi (*Vitex negundo*)

- **Habitat:** Field margins, eroded slopes.

- **Morphology:**

- **Leaves:** Palmately compound (5 leaflets), aromatic.
- **Bark:** Thin, reddish-brown.

- **Agroforestry Role:**

- Pest repellent (leaf extract), soil conservation.



Poplar



Ber



Dhencha



Van Tulsi



**Assessment Questions**

Question 1: Which agroforestry shrub fixes nitrogen in soil? Describe its root feature.

Answer: Dhencha (*Sesbania bispinosa*).

It has root nodules that host nitrogen-fixing bacteria.

Question 2: Identify a tree used for windbreaks in irrigated farms. State its leaf shape.

Answer: Poplar (*Populus deltoides*).

It has triangular leaves with serrated margins.

Question 3: Name a tree that tolerates waterlogged soils. What is its key economic product?

Answer: Sheesham (*Dalbergia sissoo*).

Valued for high-quality timber used in furniture.

Question 4: Which shrub supports soil conservation in arid zones? How does it protect itself?

Answer: Ber (*Ziziphus nummularia*).

It has paired, curved thorns to deter herbivores.

Question 5: What morphological trait helps identify *Vitex negundo* (Van Tulsi)?

Answer: Its palmately compound leaves (5 leaflets) and aromatic scent.

Used as a natural pest repellent.

Question 6: Why is *Acacia nilotica* suited to arid zones?

Answer: It is drought-resistant and thrives with minimal water.

Common in Sindh/Balochistan for fodder and fencing.

Question 7: Which species is used to reclaim saline soils? How?

Answer: Dhencha (*Sesbania*).

Its deep roots absorb salts and add organic matter as green manure.

Question 8: What role does *Morus alba* (mulberry) play in highland agroforestry?

Answer: It provides fodder and fruit and is frost-hardy.

Supports sericulture (silk production) in northern areas.

Question 9: How do *Populus* roots influence its agroforestry function?

Answer: Shallow, spreading roots stabilize soil.

Prevents erosion but may compete with crops for nutrients.

Question 10: Which tree has grey fissured bark and pinnate leaves? Where is it commonly planted?

Answer: Sheesham (*Dalbergia sissoo*).

Planted along canal banks and crop boundaries in Punjab.

Roll No.: _____

Date: _____

Class Incharge Signature: _____





Practical Based Assessment 02



Instructions for Teachers

The teacher will divide students into groups and assign a specific practical to each group from given ones. Students are required to list the necessary apparatus, describe the procedure and note precautions. They should also record their observations in the Observation Table, if necessary. The teacher will conduct a Viva Voce with each student to evaluate their performance. The teacher will also provide guidance to students on any discrepancies in their work and award marks accordingly.

Roll No: _____

Class/ Section: _____

Time Allowed: 2 hour

Maximum Marks: 35

1. Identify different mulching materials placed on the table and complete the given table. (12)

Material	Source	Texture	Water Retention	Biodegradable
Example: Wheat straw				

OR

Draw the main canal system of Punjab and label it.

2. Identify different plants from their leaves and write their botanical names. (12)

Sr.No	Name of the Plant	Botanical Name
(i)	_____	_____
(ii)	_____	_____
(iii)	_____	_____
(iv)	_____	_____
(v)	_____	_____
(vi)	_____	_____

OR

Recall your visit of Changa Manga National Park and write the names of 6 trees and animals found there.



**3. Practical Work on Copy (checked by Teacher).****(6)****4. Viva Questions.****(5)**

1. What is the benefit of mulching?
2. Which are the key rivers of Indus basin irrigation system?
3. What do you mean by salinity and waterlogging?
4. What is deforestation?
5. What is the purpose of windbreaks in agroforestry?

Web Version of PECTAA Practical Notebook
Not for Sale



**PRACTICAL 11****Vegetative Propagation of Forest Trees**

Date _____

Background Information

Vegetative propagation via cuttings is a cost-effective method to clone trees with desirable traits (fast growth, disease resistance). In Pakistan, species like Simbal (*Bombax ceiba*), Poplar (*Populus deltoides*), Mulberry (*Morus alba*) and Hibiscus (*Hibiscus rosa-sinensis*) are propagated for agroforestry, erosion control and sericulture.

- **Ecological Benefits:** Rapid reforestation, biodiversity support (e.g., Mulberry for silkworms).
- **Challenges:** Rooting failure due to improper cutting selection, fungal infections, or drought stress.



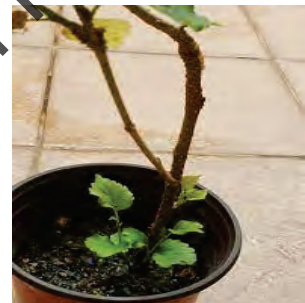
Poplar



Simbal



Hibiscus



Mulberry

**Objectives of the Study**

1. Prepare stem cuttings of Simbal, Poplar, Mulberry and Hibiscus.
2. Demonstrate optimal planting techniques for each species.
3. Compare rooting success under standardized conditions.
4. Document growth parameters over 4 weeks.

**Materials Required**

Category	Items
Plant Material	Healthy branches (1-2 yrs old) of Simbal, Poplar, Mulberry, Hibiscus.
Tools	Pruning shears, ruler, gloves, potting trays, labels.
Growing Medium	Sand:vermiculite:peat (1:1:1), rooting hormone (IBA 0.2%).
Irrigation	Spray bottle, watering can.
Monitoring	Notebook, pH meter.





Part 1: Cutting Preparation

(All cuttings: 20-25cm long, pencil-thick diameter, 45° basal cut)

Species	Cutting Type	Key Features
Simbal	Hardwood cuttings	Select leafless branches (dormant season).
Poplar	Semi-hardwood cuttings	3-5 nodes; remove lower leaves.
Mulberry	Softwood cuttings	Young green stems; retain 2 apical leaves.
Hibiscus	Semi-hardwood cuttings	Flowerless stems; wound bark at base.

Part 2: Step-by-Step Planting Techniques

1. Pre-Treatment

- **Step 1:** Dip basal end in **IBA rooting hormone** (10 sec).
- **Step 2:** Dust with fungicide (e.g., *Carbendazim*) to prevent rot.

2. Planting Protocol

Species	Depth	Spacing	Soil Moisture	Light
Simbal	10-12 cm	20 cm	60% field capacity	Full sun
Poplar	8-10 cm	25 cm	70% field capacity	Partial shade
Mulberry	5-7 cm	15 cm	80% field capacity	Full sun
Hibiscus	6-8 cm	20 cm	70% field capacity	Filtered sunlight

3. Post-Planting Care

- **Watering:** Mist cuttings 2 times/day (Weeks 1-2); reduce to 1 time/day (Weeks 3-4).
- **Environment:** Maintain 25-30°C; use polythene tent for humidity (Hibiscus, Mulberry).
- **Monitoring:** Record root initiation (gentle tug test) and leaf sprouting weekly.

Part 3: Data Recording & Assessment

Growth Monitoring Table

Week	Simbal (Roots)	Poplar (Shoots)	Mulberry (Leaf Count)	Hibiscus (Root Length)
1	-	-	-	-
2	Callus formed	2 cm shoot	3 leaves	0.5 cm
3	1 cm	5 cm	6 leaves	2 cm
4	3 cm	10 cm	10 leaves	5 cm



**Assessment Questions**

Question 1: Why is IBA rooting hormone used on cuttings?

Answer: It stimulates root formation and increases success rates.

Applied as a 0.2% solution for 10 seconds before planting.

Question 2: Which species requires softwood cuttings? Describe its key feature.

Answer: Mulberry (*Morus alba*).

Cuttings use young green stems with 2 apical leaves retained.

Question 3: How deep should *Simbal* cuttings be planted? Why use a 45° basal cut?

Answer: 10–12 cm depth.

The angled cut maximizes surface area for root initiation and water uptake.

Question 4: What environmental condition is critical for *Hibiscus* and *Mulberry*?

Answer: High humidity (maintained via polythene tent).

Prevents desiccation while roots develop.

Question 5: How is fungal infection prevented during cutting preparation?

Answer: Dusting with fungicide (e.g., Carbendazim).

Protects against rot in moist soil.

Question 6: Which species shows shoot growth in Week 2? How much?

Answer: Poplar (*Populus deltoides*).

Develops 2 cm shoots by the end of Week 2.

Question 7: Why retain leaves on *Mulberry* cuttings but remove them from *Poplar*?

Answer: Mulberry Leaves support photosynthesis for root development.

Poplar reduces transpiration stress; energy focuses on rooting.

Question 8: What is the "tug test"? When is it performed?

Answer: Gently pulling cuttings upward to check root resistance.

Done weekly from Week 3 to monitor root establishment.

Question 9: Which species needs the highest soil moisture (80% field capacity)?

Answer: Mulberry (*Morus alba*).

Consistent moisture is vital for softwood cutting survival.

Question 10: Why select 1–2-year-old branches for cuttings?

Answer: They have optimal cambium activity for rooting.

Younger/older wood has lower success rates.

Roll No.: _____

Date: _____

Class Incharge Signature: _____





PRACTICAL 12

Raising Plants from Seeds of Neem, Lemon, Mango, Ber and Jaman

Date _____

Background Information

Raising plants from seeds is essential for forest restoration, agroforestry and biodiversity conservation. In Pakistan, indigenous species like Neem (*Azadirachta indica*), Lemon (*Citrus limon*), Mango (*Mangifera indica*), Ber (*Ziziphus mauritiana*) and Jaman (*Syzygium cumini*) provide ecological services (shade, soil improvement) and economic benefits (timber, fruits and medicine).

- **Seed Dormancy:** Mango/Ber have hard seed coats; Neem/Jaman require moisture stratification.
- **Climate Adaptation:** Neem (arid zones), Jaman (riverine), Mango (tropical/subtropical).
- **Germination Challenges:** Fungal attacks, improper depth and temperature fluctuations.



Lemon



Neem



Mango



Ber



Jaman



Objective of the Study

1. Apply species-specific seed pretreatment techniques.
2. Demonstrate optimal sowing methods for each species.
3. Monitor germination rates and early growth parameters.
4. Compare seedling vigor under controlled conditions.



Materials Required

Category	Items
Seeds	Fresh Neem, Lemon, Mango, Ber, Jaman seeds.
Containers	Seed trays, polybags (20x25 cm), pots.
Growing Medium	Soil:sand:compost (3:1:1), coco peat.
Tools	Ruler, labels, spray bottle, magnifying glass.





Category	Items
Chemicals	Fungicide (Captan), gibberellic acid (GA ₃).

Part 1: Seed Preparation & Pretreatment

(Critical for breaking dormancy)

Species	Pretreatment	Purpose
Neem	Soak in water (48 hrs); remove pulp.	Soften seed coat.
Lemon	Scarify with sandpaper; soak in GA ₃ (24 hrs).	Break physical dormancy.
Mango	Remove husk; soak in warm water (50°C, 6 hrs).	Weaken seed coat.
Ber	Crack seed coat gently; soak in water (12 hrs).	Facilitate water uptake.
Jaman	Cold stratification (7 days at 5°C in sand).	Simulate winter conditions.

Part 2: Sowing Techniques & Nursery Management

Sowing Protocol

Species	Depth	Medium	Spacing	Environment
Neem	2 cm	Sandy-loam	10x10 cm	Full sun (30-35°C)
Lemon	4 cm	Coco peat + compost	15x15 cm	Partial shade (25-30°C)
Mango	4 cm	Clay-loam	20x20 cm	Full sun (28-32°C)
Ber	3 cm	Sandy soil	10x10 cm	Arid (35-40°C)
Jaman	1.5 cm	River silt	15x15 cm	Humid shade (25-28°C)

Post-Sowing Care

- Watering:** Mist daily (keep moist, not waterlogged).
- Fertilization:** Apply 10-10-10 NPK at 4 weeks (1g/L water).
- Pest Control:** Spray neem oil weekly (prevents aphids/fungi).
- Transplanting:** Shift to polybags at 10 cm height (Week 6).





Part 3: Growth Monitoring & Assessment

Data Recording Table (Weeks 1-6)

Species	Germination Time	Week Height	Week Leaf Count	Survival Rate (%)
Neem	7-14 days	3.2 cm	4-6 pinnate leaves	85%
Lemon	14-28 days	1.5 cm	2-4 oval leaves	70%
Mango	10-21 days	4.5 cm	3-5 lanceolate leaves	90%
Ber	5-10 days	2.8 cm	4-7 round leaves	95%
Jaman	21-35 days	2.0 cm	2-3 elliptic leaves	65%



Assessment Questions

Question 1: Why is cold stratification required for Jaman seeds?

Answer: To simulate winter conditions and break dormancy.

Seeds are stored at 5°C in sand for 7 days to trigger germination.

Question 2: Which species has the shortest germination time? What pretreatment is used?

Answer: Ber (5–10 days).

Seeds are gently cracked and soaked for 12 hours to soften the seed coat.

Question 3: How is physical dormancy overcome in Lemon seeds?

Answer: Scarification with sandpaper followed by soaking in GA₃ (24 hours).

This weakens the seed coat and stimulates growth hormones.

Question 4: Why sow Mango seeds (stones) at 4 cm depth?

Answer: Its large size and stones need deeper planting for stability.

Clay-loam soil retains moisture for optimal germination.

Question 5: Which species shows the highest survival rate (95%)? What soil suits it?

Answer: Ber (*Ziziphus mauritiana*).

Thrives in sandy soil under arid conditions (35–40°C).

Question 6: What role does GA₃ play in Lemon seed germination?

Answer: It promotes cell elongation and breaks seed dormancy.

Applied after scarification to accelerate germination.





Question 7: Why mist Neem seedlings daily?

Answer: They require moist, well-drained sandy-loam and full sun (30–35°C).

Prevents drought stress but avoids waterlogging.

Question 8: When are seedlings transplanted to polybags?

Answer: At Week 6 or when they reach 10 cm height.

Ensures robust root development before field planting.

Question 9: How is fungal attack prevented during seed sowing?

Answer: Pretreat seeds with Captan fungicide.

Weekly neem oil sprays protect emerging seedlings.

Question 10: Why record leaf morphology (e.g., "pinnate" in Neem)?

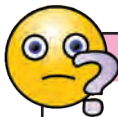
Answer: To monitor species-specific growth characteristics and identify health issues.

Early detection ensures timely intervention (e.g., fertilization).

Roll No.: _____

Date: _____

Class Incharge Signature: _____



DO YOU KNOW?

Van Tulsi (Vitex) acts as a natural pest repellent, its leaves can be used to make a pesticide extract, while Ber (Ziziphus) provides high-protein fodder for livestock from its leaves, crucial for sustaining animals in dry regions.



**PRACTICAL 13**

Draw a graph between Food Supply and Milk Production of Cows and Buffaloes

Date _____

Background Information

Dairy farming is a key activity in Pakistani villages. Cows and buffaloes are the primary milk-producing animals. Their milk yield depends heavily on the quantity and quality of feed they consume.

- **Cows:** Typically produce 10–15 liters of milk daily. They thrive on green fodder, grains and protein supplements.
- **Buffaloes:** Produce 15–20 liters daily but need 20% more feed than cows. They prefer nutrient-rich diets like oilseed cakes and minerals. Poor nutrition reduces milk output, animal health and farmer income. This experiment explores how feed quantity affects milk production.



Objective

To analyze the relationship between feed quantity (kg/day) and milk production (liters/day) in cows and buffaloes.



Materials Required

1. Notebook and pen
2. Measuring scale (for weighing feed)
3. Milk-measuring jug (in liters)
4. Data table (below)
5. Calculator (optional)

Data Table

Collect data for 7 days from a village farm:

Day	Feed to Cow (kg)	Milk from Cow (L)	Feed to Buffalo (kg)	Milk from Buffalo (L)
1	10	5.0	12	7.0
2	12	5.8	14	8.5
3	14	6.5	16	9.0
4	16	7.0	18	9.5
5	18	7.5	20	10.0
6	20	8.0	22	10.5
7	22	8.5	24	11.0

Graph Instructions

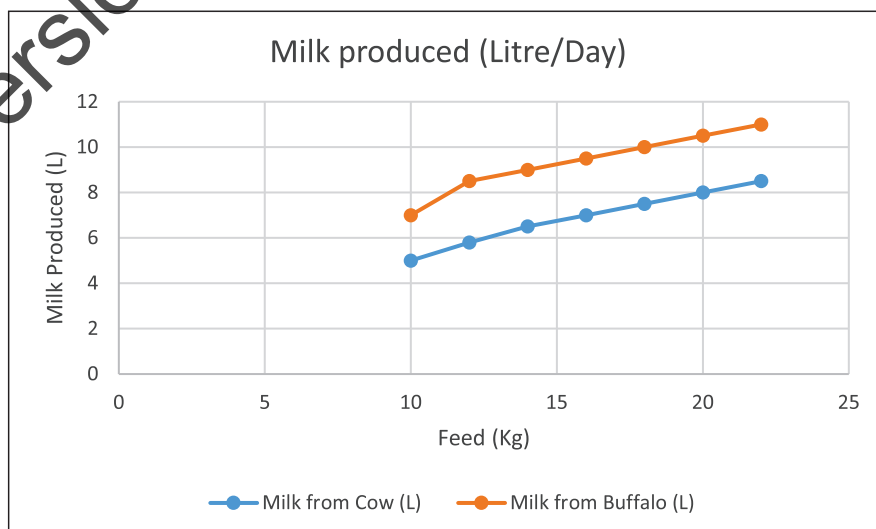
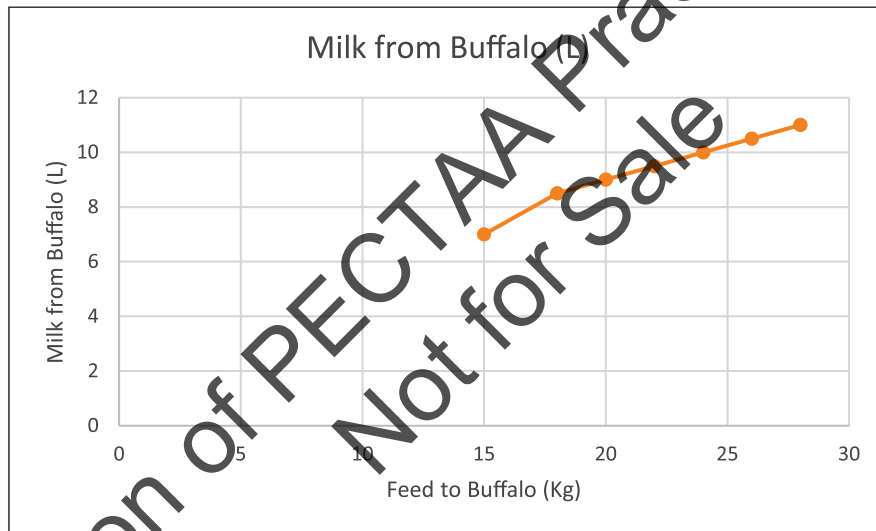
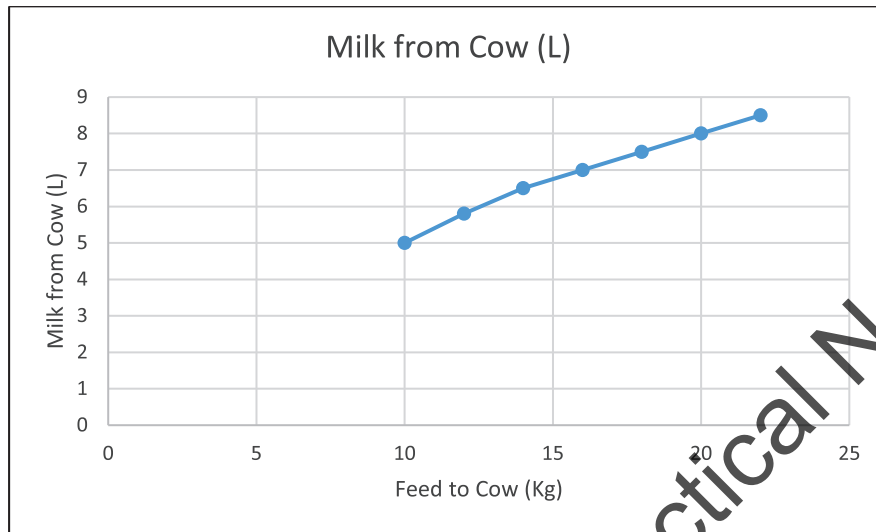
1. **X-axis:** Feed quantity (kg/day).
2. **Y-axis:** Milk production (liters/day).
3. **Plot two lines:**
 - **Blue line:** Cow (plot feed vs. milk from the table).
 - **Orange line:** Buffalo (plot feed vs. milk from the table).





4. **Label:** Title ("Feed vs. Milk Production"), axes, and legend (Cow/Buffalo).

Sample Graph Trend



**Assessment Questions**

Question 1: At 20 kg feed, how much milk does the cow produce? How does this compare to the buffalo?

Answer: Cow: 8.0 liters

Buffalo: 9.0 liters (produces more milk with same feed increase).

Question 2: Which animal shows a steeper slope on the graph? What does this indicate?

Answer: Buffalo.

It has a higher milk yield response per kg of added feed compared to cows.

Question 3: Calculate milk yield per kg of feed for buffalo on Day 4 (22 kg feed → 9.5 L).

Answer: $9.5 \text{ L} \div 22 \text{ kg} = 0.43 \text{ L/kg}$.

This measures feed efficiency.

Question 4: Why do buffaloes need 20% more feed than cows for optimal production?

Answer: They are larger-bodied and produce richer milk (higher fat content).

Nutrient demands are greater.

Question 5: What trend is observed in both animals as feed increases from 10kg to 28kg?

Answer: Milk production rises steadily.

Cow: 5.0L→8.5L; Buffalo: 7.0L→11.0L.

Question 6: If a farmer has only 15 kg of feed, which animal should be prioritized? Why?

Answer: Cow (5.8L milk at 12kg feed).

At 15kg, buffalo (7.0L) is less efficient than cow (6.5L at 14kg).

Question 7: What would the graph look like if feed quality (not quantity) was poor?

Answer: Flatter slopes/plateauing lines, showing minimal milk increase despite more feed.

Nutrient deficiency limits yield.

Question 8: How many liters more does buffalo produce than cow at 24 kg feed?

Answer: Buffalo: 10.0L vs. Cow: 7.5L.

Difference: 2.5 liters.

Question 9: Identify a non-diet factor affecting milk yield not shown in the graph.

Answer: Animal health (e.g., mastitis) or breed genetics.

Stress or climate also impacts production.

Question 10: Why might milk yield stop increasing beyond 28kg feed?

Answer: Biological limits—animals reach maximum intake capacity.

Excess energy is stored as fat, not converted to milk.

Roll No.: _____

Date: _____

Class Incharge Signature: _____



**PRACTICAL 14**

Visit to Cattle Farm and Artificial Insemination Center

Date _____

Background Information

In Pakistan, dairy farming supports millions of rural families. Cattle (cows and buffaloes) are raised for milk, meat and labor. To improve milk production, farmers use artificial insemination (AI), a modern technique where semen from high-quality bulls is collected and inserted into female animals. This method:

- Ensures healthier, higher-yielding offspring.
- Prevents diseases spread by natural mating.
- Uses superior breeds like Sahiwal cows or Nili-Ravi buffaloes.
- Small farms often lack artificial insemination (AI) access, relying on traditional methods. This visit helps students see how science boosts agriculture



Objective

1. Observe daily farm operations (feeding, milking and animal care).
2. Understand the artificial insemination (AI) process and its role in improving livestock.
3. Compare traditional vs. modern farming practices.



Materials Required

1. Notebook and pen
2. Camera (optional; ask permission)
3. Thermometer (to check semen storage temperature)
4. Questionnaire (example below)
5. Safety items: Gloves, masks and boots



Cattle Farm

Sample Questionnaire for Farmers/AI Technicians

Question	Cattle Farm Answer	AI Center Answer
How many animals are on the farm?	_____	N/A
What feed do you give daily?	_____	N/A
How is semen stored?	N/A	_____
What breeds do you use for AI?	N/A	_____
Challenges faced?	_____	_____





Data Collection Table

Record observations during the visit:

Location	Observations
Cattle Farm	- Breed: _____ Milk yield/day: _____ Feed type: _____
	- Milking method: Hand _____ Hygiene practices: Good _____ Machine _____ Poor _____
AI Center	- Semen storage temp: _____ °C Breeds stored: _____
	- AI steps observed: 1. _____ 2. _____ 3. _____
Farmer Feedback	AI improved milk yield by _____ %. Challenges: _____.



Assessment Questions

Question 1: What is the primary advantage of artificial insemination (AI) over natural mating?

Answer: Prevents disease transmission (e.g., brucellosis).

Ensures genetically superior offspring (e.g., high-yield Nili-Ravi buffalo).

Question 2: Name two superior cattle breeds used in AI in Pakistan.

Answer: Sahiwal cows (heat-tolerant) and Nili-Ravi buffaloes (high-fat milk).

Both improve dairy productivity.

Question 3: How should semen be stored at the AI center? What tool checks this?

Answer: In liquid nitrogen tanks at -196°C . A thermometer verifies storage temperature.

Question 4: Why might small farms lack AI access?

Answer: Limited infrastructure (e.g., no storage tanks) and training gaps. They rely on traditional bulls for mating.

Question 5: What hygiene practice is critical during milking? How is it observed?

Answer: Udder cleaning and sterilized equipment. Check for "Good" in hygiene practices on the data table.

Question 6: List three steps of the AI process observed at the center.

Answer: 1. Semen thawing, 2. Insertion using AI gun, 3. Post-procedure care.

Question 7: How does AI boost milk yields? Support with farmer feedback.

Answer: Upgrades herd genetics; e.g., "Artificial Insemination improved milk yield by 20–30%." High-quality bulls enhance lactation potential.





Question 8: Which breed produces higher-fat milk—Sahiwal or Nili-Ravi?

Answer: Nili-Ravi buffalo (6–8% fat). Sahiwal cow milk averages 4–5% fat.

Question 9: What safety gear is essential during the farm visit? Why?

Answer: Gloves, masks, boots. Prevents zoonotic disease transmission (e.g., TB) and injuries.

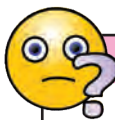
Question 10: Identify a common challenge in Artificial Insemination implementation.

Answer: Semen supply shortages or poor timing of heat detection in cattle.

Roll No.: _____

Date: _____

Class Incharge Signature: _____



DO YOU KNOW?

Artificial Insemination (AI) is a powerful tool for preventing the spread of contagious diseases like brucellosis and tuberculosis that are commonly transmitted through natural mating. By using carefully screened and disease-free semen, AI acts as a vital biosecurity measure, protecting the health of the entire herd and, by extension, the humans who consume the milk.



**PRACTICAL 15 Products and By-Products from Livestock & Poultry**

Date _____

Background Information

Livestock (cows, buffaloes, goats) and poultry (chickens) provide essential products for daily life. Products are primary items like milk or meat. By-products are secondary materials derived from processing, often reused to reduce waste. For example:

- **Cattle:** Leather from hides, gelatin from bones.
- **Poultry:** Feathers for pillows, manure for fertilizer.
- In Pakistan, these resources support food security, industries (textiles, cosmetics) and eco-friendly practices like biogas from dung.



Chicken



Beef



Eggs



Wool



Butter



Animal Skin

**Objective**

1. Identify primary products and by-products from livestock/poultry.
2. Understand their societal uses (food, medicine, industry).
3. Promote awareness of sustainable waste utilization.

**Materials Required**

1. Research sources (books/internet)
2. Notebook & pen
3. Printed images (optional)
4. Access to local farm/market (virtual or real visit)



**Data Table: Livestock and Poultry Products/By-Products**

Animal	Primary Products	By-Products	Uses in Society
Cow	Milk, Beef	Leather, Blood Meal	Milk: Dairy products; Leather: Shoes/Bags; Blood Meal: Animal Feed
Buffalo	Milk, Meat	Horns, Dung	Horns: Crafts; Dung: Biogas/Fertilizer
Goat	Milk, Mutton	Wool (hair), Bones	Wool: Sweaters; Bones: Soup/Glue
Chicken	Eggs, Poultry Meat	Feathers, Manure	Feathers: Pillows; Manure: Fertilizer
Sheep	Wool, Mutton	Lanolin (wool wax), Tallow	Lanolin: Cosmetics; Tallow: Soap/Candles

**Assessment Questions**

Question 1: What are primary products from chickens? Give one example of a poultry by-product.

Answer: Eggs and poultry meat. Feathers (used in pillows/insulation) are a key by-product.

Question 2: Identify two by-products from cattle hides and bones.

Answer: Leather (for shoes/bags) and gelatin (from bones for food/pharma). Blood meal is another by-product for animal feed.

Question 3: How is buffalo dung utilized sustainably?

Answer: As organic fertilizer for crops. Also converted to biogas for cooking fuel in rural Pakistan.

Question 4: Which animal produces lanolin? What is its industrial use?

Answer: Sheep (from wool wax). Used in cosmetics (lotions) and ointments for moisture retention.

Question 5: What by-product supports composting?

Answer: Goat manure (rich in nutrients). Also used in vermicompost production for organic farming.

Question 6: Contrast *primary products* and *by-products* using goat examples.

Answer: Primary: Milk and mutton (direct consumption).

By-product: Wool (for sweaters) and bones (for glue/soup stock).





Question 7: Why is poultry manure valuable to farmers?

Answer: High nitrogen content boosts soil fertility. Cheaper and eco-friendlier than chemical fertilizers.

Question 8: Name a by-product used in both textiles and fuel.

Answer: Sheep tallow (rendered fat). Makes soap/candles and biodiesel in some industries.

Question 9: Which livestock by-product prevents anemia in animals?

Answer: Blood meal (from cattle processing). Rich in iron/protein; added to poultry/livestock feed.

Question 10: How does leather production support environmental sustainability?

Answer: Repurposes hides (waste reduction). Biodegradable leather replaces synthetic materials (plastic pollution).

Roll No.: _____

Date: _____

Class Incharge Signature: _____



Interesting Information

Animal dung is a powerhouse by-product. It's not just used as a simple fertilizer; it is a key ingredient for producing biogas, a renewable energy source used for cooking and lighting in rural areas. This turns a disposal problem into a sustainable energy solution.





Practical Based Assessment 03



Instructions for Teachers

The teacher will divide students into groups and assign a specific practical to each group from given ones. Students are required to list the necessary apparatus, describe the procedure and note precautions. They should also record their observations in the Observation Table, if necessary. The teacher will conduct a Viva Voce with each student to evaluate their performance. The teacher will also provide guidance to students on any discrepancies in their work and award marks accordingly.

Roll No: _____

Class/ Section: _____

Time Allowed: 2 hour

Maximum Marks: 35

1. Visit the model plot in the school reserved for growing/raising different plants through seeds and cutting by students. Check their growth and observe the success percentage and allocate marks accordingly. (12)

OR

Draw a graph between food supply and Milk production of Cows and Buffaloes from the provided data. (Provide data from the data table of the practical.)

2. Complete the given table: (12)

Animal	Primary Products	By-Products	Uses in Society
Cow			
Buffalo			
Goat			
Chicken			
Sheep			

OR

Complete the given table by recalling the sowing protocols of given species.



**3. Practical Work on Copy (checked by Teacher)****(6)****4. Viva Questions****(5)**

- (i) Explain why the simbal requires hardwood cutting while Mulberry uses softwood?
- (ii) Tell two differences between hand milking and machine milking, which one is better?
- (iii) Name two by-products from chicken and buffalo.
- (iv) What are Milch animals?
- (v) Which disease is common in poultry?
- (vi) Which animals are used as Draught Animals?





PRACTICAL 16

Identification of Common Medicines for Livestock & Poultry Diseases

Date _____

Background Information

Livestock (cows, buffaloes, goats) and poultry (chickens) often suffer from infectious diseases caused by bacteria, viruses or parasites. Using the right medicines:

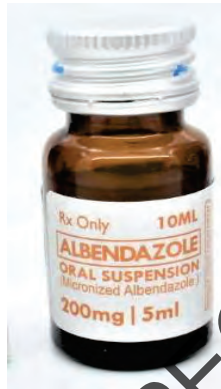
- Prevents animal deaths and economic losses.
- Ensures safe milk, meat and eggs for humans.
- **Veterinarians** prescribe medicines; *self-treatment is dangerous*.

Common Diseases in Pakistan:

- **Livestock:** Foot & Mouth Disease (FMD), Mastitis (udder infection), Worms.
- **Poultry:** Ranikhet (viral), Coccidiosis (parasitic), Fowl Cholera (bacterial).



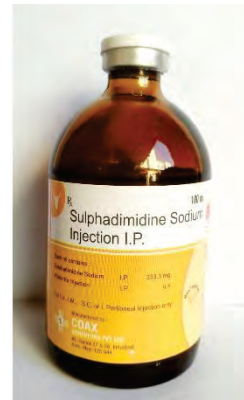
Oxytetracycline



Albendazole



Ranikhet



Sulfadimidine



Objective

1. Identify key medicines for common animal diseases.
2. Understand their uses and safety rules.



Materials Required

1. Notebook & pen
2. Reference books/websites (e.g., *Livestock & Dairy Development Department, Punjab and Poultry Research Institute, Punjab* promotion leaflets)
3. Printed medicine labels (samples)
4. Safety gear (gloves, masks - for demonstration only)



Remember

Antibiotics (like Oxytetracycline) only work on bacterial infections (e.g., Mastitis, Fowl Cholera). They are useless against viruses. For viral diseases like Foot & Mouth Disease (FMD) or Ranikhet, vaccines are the only effective tool because they train the animal's own immune system to fight the virus.





Data Table: Common Medicines for Animal Diseases

Diseases	Animals Affected	Medicine	Purpose	Administration
Foot & Mouth (FMD)	Cattle, Buffalo	Vaccine	Prevent virus spread	Injection
Mastitis	Cows, Goats	Oxytetracycline (e.g., Terramycin)	Kill bacteria in udder	Intramammary infusion
Worms	All livestock	Albendazole (e.g., Albezol)	Remove intestinal parasites	Oral drench/tablet
Ranikhet	Chickens	Ranikhet Vaccine	Prevent deadly viral infection	Eye drop/drinking water
Coccidiosis	Poultry	Amprolium (e.g., Amprol)	Stop parasitic growth in gut	Drinking water
Fowl Cholera	Chickens, Ducks	Sulfadimidine (e.g., Avimix)	Treat bacterial infection	Water/food mix

**Safety Notes:**

- Never use human medicines for animals.
- Follow dosage instructions; overdose can kill animals.
- Withdrawal period: Milk/eggs must not be consumed until medicine clears (e.g., 7 days after antibiotics).

**Assessment Questions**

Question 1: Which medicine prevents FMD in cattle? How is it administered?

Answer: FMD Vaccine. It is given via injection to build immunity against the virus.

Question 2: What drug treats mastitis in goats? State its administration route.

Answer: Oxytetracycline (e.g., Terramycin). Delivered as intramammary infusion directly into the udder.

Question 3: How is Ranikhet disease controlled in poultry?

Answer: Using Ranikhet Vaccine. Administered via eye drops or drinking water for chicks.





Question 4: Why is Albendazole used for livestock? Give an example brand.

Answer: To eliminate intestinal worms. Albezol is a common brand (oral drench/tablet).

Question 5: What safety rule applies to milk/eggs after antibiotic use?

Answer: Withdrawal period (e.g., 7 days). It ensures residues clear, making products safe for humans.

Question 6: Which medicine combats coccidiosis? How is it given?

Answer: Amprolium (e.g., Amprol). This vaccine is mixed in drinking water to kill gut parasites.

Question 7: Name a bacterial disease in poultry and its treatment.

Answer: Fowl Cholera. Treated with Sulfadimidine (e.g., Avimix) in feed/water.

Question 8: Why must human medicines NOT be used for animals?

Answer: Dosage/formulation differences risk toxicity. Animal-specific medicines ensure safety/efficacy.

Question 9: Which disease requires a vaccine instead of antibiotics? Why?

Answer: Foot & Mouth Disease (FMD). Caused by a virus; antibiotics only work on bacteria.

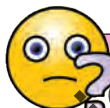
Question 10: What could happen if a farmer ignores dosage instructions?

Answer: Overdose may kill animals; underdose causes treatment failure. Veterinarians prescribe doses based on body weight/disease severity.

Roll No.: _____

Date: _____

Class Incharge Signature: _____



DO YOU KNOW?

A Critical Food Safety Rule:

There is a mandatory waiting period between treating an animal and consuming its products. After giving an antibiotic like Oxytetracycline, farmers must wait 7 days before selling the milk. This "withdrawal period" allows the animal's body to fully metabolize and clear the drug, ensuring no harmful residues enter the human food chain and protecting consumer health.



**PRACTICAL 17****Testing Milk Quality with a Lactometer**

Date _____

Background Information

Milk is a vital source of nutrition, but its quality varies due to adulteration (adding water, starch) or spoilage. A lactometer measures milk density to check purity:

- **Pure milk density:** 1.026–1.032 g/mL.
- **Diluted milk** (with water) has lower density (closer to 1.000 g/mL).
- **Adulterated milk** (e.g., with starch) may show abnormal density.
- In Pakistan, informal milk sales often lack quality checks. This test helps identify safe milk!

**Objective**

1. Use a lactometer to test milk samples for density.
2. Compare purity levels of different milk types (packaged, raw, buffalo, cow).
3. Understand how adulteration affects density.

**Materials Required**

1. **Lactometer** (with temperature correction guide)
2. **Milk samples** (4 types):
 - Sample A: Packaged milk
 - Sample B: Raw cow milk (local)
 - Sample C: Raw buffalo milk (local)
 - Sample D: Adulterated milk (add 20% water to Sample B)
3. **Cylinder** (250 mL glass)
4. **Thermometer**
5. Notebook, pen and data table.

**Lactometer****Safety Precautions**

- Wash hands after handling raw milk.
- Clean equipment with soap post-experiment.

Data Table: Lactometer Readings

Milk Sample	Temperature (°C)	Lactometer Reading	Corrected Density (g/mL)*	Purity (✓/✗)
A: Packaged	25	30.5	1.030	✓
B: Raw Cow	27	28.0	1.028	✓





Milk Sample	Temperature (°C)	Lactometer Reading	Corrected Density (g/mL)*	Purity (✓/✗)
C: Raw Buffalo	26	32.0	1.032	✓
D: Adulterated	25	22.0	1.022	✗ (Diluted)

***Correction Formula:** *Add 0.001 g/mL for every 3°C above 15°C* (e.g., at 27°C: Reading + 0.004 g/mL).

Step-by-Step Procedure

1. Pour 200 mL milk into the cylinder.
2. Insert lactometer gently.
3. Record reading *at eye level* (ignore foam).
4. Note temperature and apply correction.
5. Compare density to pure milk range (1.026–1.032 g/mL).



Assessment Questions

Question 1: What is the density range of pure milk? What does lower density indicate?

Answer: 1.026–1.032 g/mL.

Density < 1.026 g/mL suggests dilution (e.g., water added).

Question 2: Why is a thermometer used alongside the lactometer?

Answer: Temperature affects density; correction is applied (e.g., +0.001 g/mL per 3°C above 15°C).

Example: At 27°C, add 0.004 to the reading.

Question 3: Which milk sample showed the lowest density? Why?

Answer: Sample D (1.022 g/mL).

It was adulterated with 20% water, reducing density.

Question 4: How would you test for starch adulteration (undetectable by lactometer)?

Answer: Iodine test – turns blue-black if starch is present.

Lactometers only measure density, not additives.

Question 5: Why does buffalo milk (Sample C) show higher density than cow milk?

Answer: It has higher fat and solid content (1.032 g/mL vs. 1.028 g/mL).

Naturally denser and richer.

Question 6: What safety step is essential after handling raw milk?

Answer: Wash hands thoroughly and clean equipment with soap.

Prevents bacterial contamination (e.g., *E. coli*).





Question 7: Calculate corrected density if a sample reads 29.0 at 30°C.

Answer: $29.0 + [(30-15) \div 3 \times 0.001] = 29.0 + 0.005 = 1.035 \text{ g/mL}$.

Above range → likely adulterated or concentrated.

Question 8: Why ignore foam during lactometer reading?

Answer: Foam lowers apparent density by trapping air.

Readings must be taken below the foam layer for accuracy.

Question 9: Which sample represents "safe" milk? What confirms its purity?

Answer: Samples A, B, C (✓).

Densities fall within 1.026–1.032 g/mL after correction.

Question 10: Why might informal milk sales in Pakistan fail quality checks?

Answer: Lack of testing infrastructure and deliberate adulteration for profit.

Highlighted by Sample D's dilution (common malpractice).



Extension Activity

Home Experiment: Test milk from local vendors. Compare with packaged milk results!

Field Link: Interview a dairy farmer about milk quality challenges.

Roll No.: _____

Date: _____

Class Incharge Signature: _____



Interesting Information

Pakistan is the 4th-5th largest milk producer in the world, producing over 65 million tonnes of milk annually. This highlights the immense scale of the sector.





PRACTICAL 18 Dairy Industry Visit Report

Date _____

Background Information

Dairy industries transform raw milk into safe, packaged products (milk, yogurt and cheese) using modern technology. In Pakistan, companies involved in dairy sector follow strict steps:

1. **Milk Collection:** Raw milk from farms is tested for purity.
2. **Processing:** Pasteurization (heating to kill germs) and homogenization (mixing fat evenly).
3. **Packaging:** Sealed in cartons/bottles to prevent contamination.
4. **Quality Checks:** Labs test for fat content, bacteria and adulterants. This visit explores how science ensures safe dairy products for consumers.



Objective

1. Understand milk processing stages (collection → packaging).
2. Observe hygiene and quality control measures.
3. Document machinery used (pasteurizer, filling machines).



Materials Required

1. Notebook, pen and clipboard
2. Camera (optional; ask permission)
3. **Checklist:**
 - Milk testing equipment
 - Pasteurization temperature (72°C for 15 sec)
 - Packaging types (tetra packs, bottles)
4. Safety gear: Lab coat, hairnet, gloves (if provided).



Dairy Farm



Assessment Questions

Question 1: What is the purpose of pasteurization in milk processing? State the standard temperature/time used.

Answer: To kill harmful germs (e.g., *E. coli*, *Salmonella*).

Heated to 72°C for 15 seconds to ensure safety without compromising nutrients.

Question 2: Why is homogenization critical after pasteurization?

Answer: It breaks fat globules into smaller particles.

Prevents cream separation and ensures uniform texture in packaged milk.

Question 3: What safety gear is required during the plant visit?

Answer: Lab coat, hairnet and gloves.

Prevents human contamination of products in sterile zones.





Question 4: How is raw milk tested upon arrival at the industry?

Answer: For purity (e.g., adulterants, bacteria) using lactometers/chemical kits. Samples with density < 1.026 g/mL or high bacteria are rejected.

Question 5: What packaging method keeps milk fresh longest? Why?

Answer: Tetra packs (multi-layer cartons).

They block light/air, preventing spoilage for months without refrigeration.

Question 6: Which lab test detects bacterial contamination in milk?

Answer: Total Plate Count (TPC) or coliform tests.

Ensures compliance with PSQCA standards ($< 100,000$ bacteria/mL).

Question 7: Why must the filling machine be sterile?

Answer: To avoid post-pasteurization contamination.

Sealed bottles/cartons should contain zero pathogens.

Question 8: What is checked in the quality control lab besides bacteria?

Answer: Fat content (e.g., Gerber test) and adulterants (e.g., starch, urea).

Ensures nutritional value and safety for consumers.

Question 9: How does modern processing benefit Pakistan's informal milk sector?

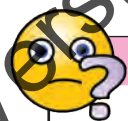
Answer: Provides safe, standardized products reducing foodborne illnesses.

Promotes farmer training in hygienic milk production for supply chains.

Roll No.: _____

Date: _____

Class Incharge Signature: _____



DO YOU KNOW?

The livestock sector, which dairy dominates, contributes approximately 60.5% to the agricultural GDP and about 11.7% to the country's total GDP. It is a critical source of livelihood for millions.



**PRACTICAL 19****Draw a chart of annual Livestock Vaccination Schedule**

Date _____

Background Information

Vaccinations prevent deadly diseases in livestock, ensuring animal health and farmer income. In Pakistan, seasonal outbreaks (e.g., Foot & Mouth Disease in monsoon) make timely vaccines crucial.

Why Vaccinate?

- Stops disease spread.
- Reduces death rates (e.g., PPR kills 90% of infected goats).
- Protects human health (e.g., zoonotic diseases like Anthrax).
- Key Livestock:** Cattle, buffalo, goats, sheep, poultry.



Foot and Mouth Disease

**Objective**

- Create an annual vaccination schedule for common livestock.
- Link diseases to seasons and vaccine types.
- Promote proactive animal healthcare.



Anthrax

**Materials Required**

- Notebook, coloured pens, ruler
- Reference: *Pakistan Livestock Department* guidelines
- Sample vaccine labels (e.g., FMD Vaccine, PPR Vaccine)
- Access to local vet/farmer (for interview)

Annual Vaccination Schedule Chart

Diseases	Livestock	Vaccine	When to Give	Booster
Foot & Mouth (FMD)	Cattle, Buffalo	FMD Inactivated Vaccine	March & September	Every 6 months
PPR	Goats, Sheep	PPR Live Vaccine	April	Yearly
Hemorrhagic Septicemia	All livestock	HS Vaccine	May-June (pre-monsoon)	Yearly





Diseases	Livestock	Vaccine	When to Give	Booster
Newcastle Disease	Poultry	ND Live Vaccine	Day 7, 28, then every 3 months	Quarterly
Anthrax	Cattle, Sheep	Anthrax Spore Vaccine	October	Yearly

Annual Vaccination Schedule for Livestock

Months	Animals	Diseases	Vaccine Names	Ages/Stages of Animals	Methods
January	Cattle/Buffalo	Foot and Mouth Disease (FMD)	FMD Vaccine	Every 6 months	Injection
February	Sheep/Goat	Enterotoxemia	Enterotoxemia Vaccine	3 months and annually	Injection
March	Cattle/Buffalo	Hemorrhagic Septicemia (HS)	HS Vaccine	Before monsoon (every year)	Injection
April	Cattle/Calves	Black Quarter (BQ)	BQ Vaccine	6–8 months of age	Injection
July	Sheep/Goat	PPR (Peste des Petits Ruminants)	PPR Vaccine	3–4 months of age	Injection
September	Cattle/Buffalo	Foot and Mouth Disease (2nd Dose)	FMD Vaccine	Every 6 months	Injection
October	All Livestock	Deworming (Worms)	Albendazole / Levamisole	Every 6 months	Oral
December	Calves/Lambs	Brucellosis (Female calves)	S19 Vaccine (Brucella)	4–8 months old (once only)	Injection



Assessment Questions

Question 1: When should FMD vaccine be administered to cattle/buffalo? Why biannually?

Answer: January and September.

Biannual doses prevent monsoon/winter outbreaks when FMD spreads rapidly.

Question 2: Which disease requires vaccination in goats/sheep during July? What age group?

Answer: PPR (Peste des Petits Ruminants).

Given at 3–4 months to protect young, vulnerable animals.

Question 3: Why is Hemorrhagic Septicemia (HS) vaccine given in March?

Answer: Before monsoon season (May–June) when high humidity triggers outbreaks. Ensures immunity peaks during high-risk periods.

Question 4: Identify a zoonotic disease in the schedule. How is its vaccine administered?

Answer: Anthrax (via *Anthrax Spore Vaccine* in October).





Delivered by injection to prevent human transmission.

Question 5: What vaccine is critical for calves aged 4–8 months? Is it repeatable?

Answer: Brucellosis vaccine (S19).

Single lifetime dose protects female calves, preventing reproductive losses.

Question 6: Which disease in poultry needs quarterly boosters? State the vaccine type.

Answer: Newcastle Disease.

Live ND vaccine given via water/eye drops at Day 7, 28, and quarterly.

Question 7: Why deworm livestock in October? Name a dewormer used.

Answer: Post-monsoon parasite surge; controls worms before winter.

Albendazole/Levamisole administered orally.

Question 8: What vaccine targets Enterotoxemia? When is it given to sheep/goats?

Answer: Enterotoxemia Vaccine.

In February to kids/lambs (≥ 3 months) and annually to adults.

Question 9: Which disease affects calves aged 6–8 months in April?

Answer: Black Quarter (BQ).

Prevented with BQ vaccine injection to combat soil-borne bacteria.

Question 10: Why vaccinate against PPR? What mortality rate does it prevent?

Answer: PPR kills 90% of infected goats/sheep.

Vaccination in July reduces economic losses in small ruminants.



Extension Activity

- **Create a Poster:** Design a "Vaccine Calendar" for local farmers!

Roll No.: _____

Date: _____

Class Incharge Signature: _____





PRACTICAL 20

Draw the Annual Poultry Vaccination Schedule

Date _____

Background Information

Poultry farming provides eggs and meat but faces disease threats like Newcastle Disease (ND) and Fowl Pox, which can kill entire flocks. Vaccines build immunity and prevent outbreaks. In Pakistan, timely vaccination is critical due to seasonal disease spikes. This practical teaches students to plan a vaccination schedule for healthy and productive poultry.



Objective

1. Learn key vaccines for common poultry diseases.
2. Create an annual vaccination schedule with ages, methods and purposes.
3. Understand how vaccines protect birds at different growth stages.



Vaccination



Materials Required

1. Practical notebook or chart paper
2. Pencil, ruler, coloured markers
3. Reference book/textbook (*Pakistan Poultry Association Guidelines*)
4. Sample vaccination schedule (teacher-provided)



Poultry Farm

Vaccination Schedule Table

Annual Poultry Vaccination Schedule

Age of Bird	Disease	Vaccine Name	Method	Purpose
Day 1	Newcastle Disease (ND)	ND (F1/Lasota)	Eye drop/nasal	Early immunity against deadly ND
Day 5-7	Infectious Bursal Disease (IBD)	Gumboro Vaccine	Drinking water	Protects bursa (immune organ)
Day 10-12	Newcastle Disease (Booster)	Lasota	Drinking water	Strengthens ND protection
Day 14	Infectious Bronchitis (IB)	IB Vaccine	Eye drop	Prevents respiratory infections





Day 18–21	Fowl Pox	Fowl Pox Vaccine	Wing stab	Blocks skin lesions & scabs
4–6 Weeks	Infectious Coryza (optional)	Coryza Vaccine	Injection	Controls bacterial respiratory disease
6–8 Weeks	ND + IBD (Booster)	Combined Vaccine	Drinking water	Long-term immunity
Every 2–3 Months	ND (for layers)	R2B Vaccine	Injection	Maintains egg-layers' health



Assessment Questions

Question 1: Which vaccine is given on Day 1? How is it administered?

Answer: Newcastle Disease (ND) vaccine. Given as eye drop or nasal drop.

Question 2: At what age is the Fowl Pox vaccine given? Describe its method.

Answer: Day 18–21. Administered via wing stab (skin prick).

Question 3: Why is a booster dose for ND needed at 10–12 days?

Answer: To strengthen immunity after the first vaccine wears off.

Question 4: Which disease affects the bursa? What vaccine prevents it?

Answer: Infectious Bursal Disease (IBD). Prevented by Gumboro vaccine.

Question 5: How is the Gumboro vaccine delivered to chicks?

Answer: Mixed in drinking water for easy consumption.

Question 6: Which vaccine is optional? When is it given?

Answer: Coryza vaccine at 4–6 weeks (if disease risk is high).

Question 7: How often must egg-laying hens get the ND vaccine?

Answer: Every 2–3 months (using R2B vaccine injection).

Question 8: What does the Combined Vaccine at 6–8 weeks protect against?

Answer: Newcastle Disease (ND) + Infectious Bursal Disease (IBD).

Roll No.:

Date:

Class Incharge Signature:



**PRACTICAL 21****Poultry Farm Health & Hygiene Survey**

Date _____

Background Information

Poultry farming is vital for eggs and meat in Pakistan. Health and hygiene directly impact on bird health, product quality and disease spread (e.g., *Avian Influenza*). Key risks include:

- Poor sanitation: Leads to bacterial infections (e.g., *Salmonella*).
- Overcrowding: Causes stress, feather pecking and mortality.
- Inadequate ventilation: Ammonia from waste irritates lungs.

This survey teaches how hygiene prevents outbreaks and ensures food safety.

**Objective**

Survey a local poultry farm to:

1. **Observe hygiene practices** (cleanliness, waste disposal).
2. **Identify health indicators** (bird behavior, disease signs)
3. **Recommend improvements.**

**Materials Required**

1. Notebook, pen, clipboard
2. **Checklist** (below)
3. Thermometer & ammonia test strips (optional)
4. Camera (ask permission)
5. Safety gear: mask, gloves, boots

Data Table: Poultry Farm Survey Checklist

Observation Area	Good (✓)	Poor (X)	Notes
1. Farm Layout			
- Uncrowded space (8-10 birds/m ²)	✓	X	
- Separate sick/quarantine area			
2. Hygiene & Cleanliness			
- Regular waste removal	✓	X	Manure pile near shed?
- Clean waterers/feeders			
- Footbath at entrance			





Observation Area	Good (✓)	Poor (X)	Notes
3. Bird Health Signs			
- Active, alert birds	✓	X	Lethargic birds?
- Clean feathers, no injuries			
- No coughing/sneezing			
4. Disease Control			
- Vaccination records	✓	X	e.g., Ranikhet vaccine?
- Rodent/pest control			



Assessment Questions

Question 1: Why is overcrowding risky in poultry farms?

Answer: Causes stress, feather pecking and disease spread.

Limits space per bird (<8–10 birds/m² increases mortality).

Question 2: What hygiene practice prevents pathogen entry at farm entrances?

Answer: A footbath with disinfectant.

Stops workers/visitors from carrying germs on shoes.

Question 3: How does poor ventilation affect bird health?

Answer: Ammonia buildup from waste irritates lungs.

Leads to respiratory diseases (e.g., bronchitis).

Question 4: Which bird behavior indicates good health on the checklist?

Answer: Active, alert birds with clean feathers.

Lethargy or coughing suggests illness.

Question 5: Why check for vaccination records? Give a key vaccine example.

Answer: Ensures disease prevention (e.g., Ranikhet vaccine for Newcastle).

Unvaccinated flocks risk 100% mortality.

Question 6: What does "regular waste removal" prevent?

Answer: Fly/rodent infestations and bacterial growth (e.g., *Salmonella*).

Manure piles near sheds attract pests.

Question 7: How would you identify a sick bird needing quarantine?

Answer: Injuries, sneezing, or isolation from the flock.

A separate sick area prevents disease spread.





Question 8: Why is rodent control critical?

Answer: Rodents contaminate feed and spread *Avian Influenza*.
Traps/sealed storage are essential.

Question 9: What safety gear protects during the farm visit?

Answer: Mask, gloves, boots.

Prevents zoonotic disease transmission (e.g., bird flu).

Question 10: If birds gasp with watery eyes, what environmental issue exists?

Answer: High ammonia levels from poor ventilation/waste.

Sample Recommendations from Survey

- **Improve ventilation:** Install exhaust fans to reduce ammonia.
- **Daily waste removal:** Move manure piles away from sheds.
- **Vaccinate:** Follow schedule for Ranikhet (Newcastle disease).

Safety Notes

✗ Wash hands thoroughly after visit

✓ Do not touch birds or equipment without permission.



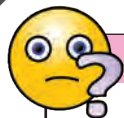
Extension Activity

Design a Poster: "5 Hygiene Rules for Poultry Farmers" using survey findings.

Roll No.: _____

Date: _____

Class Incharge Signature: _____



DO YOU KNOW?

Poor ventilation doesn't just smell bad; it creates ammonia gas from manure that causes measurable physical distress in birds, such as gasping, watery eyes, and lung irritation, making air quality a critical hygiene factor.





Practical Based Assessment 04



Instructions for Teachers

The teacher will divide students into groups and assign a specific practical to each group from given ones. Students are required to list the necessary apparatus, describe the procedure and note precautions. They should also record their observations in the Observation Table, if necessary. The teacher will conduct a Viva Voce with each student to evaluate their performance. The teacher will also provide guidance to students on any discrepancies in their work and award marks accordingly.

Roll No: _____

Class/ Section: _____

Time Allowed: 2 hour

Maximum Marks: 35

1. Draw a chart of Annual Livestock Vaccination Schedule? (12)

OR

Test the adulteration of milk with the help of Lactometer.

2. Complete the given chart of annual vaccination schedule of poultry? (12)

Annual Poultry Vaccination Schedule

Age of Bird	Disease	Vaccine Name	Method	Purpose
Day 1				Immunity against ND
Day 5–7				Protect bursa immunity
Day 10–12				Continued protection
Day 14				Respiratory protection
Day 18–21				Prevent skin lesions
4–6 Weeks				Respiratory disease
6–8 Weeks				Long-term immunity
Every 2–3 Months				Maintain protection

OR

Recall your visit of dairy industry and write a comprehensive report with the given headings,

(i) Background information, objective, material required and findings of the visits.

3. Practical Work on Copy (checked by Teacher) (6)

4. Viva Questions (5)

- How are infectious diseases caused?
- Which are common diseases of Livestock in Pakistan?
- What is the density of pure milk?
- What temperature is ideal for pasteurization of milk?
- Which vaccine is given twice a year to cattle?





PAIRING SCHEME

INSTRUCTIONS FOR PREPARATION OF PRACTICAL PAPER OF AGRICULTURE SCIENCES FOR CLASS-9

ESSENTIAL INSTRUCTIONS FOR PRACTICAL PAPER SETTERS

Max Marks: 35

Time Duration: 2 Hrs.

Attempt any two practicals from the following:	
Note: Attempt any one of the following practical. Q-1: 1 practical will be given from Practicals No. 1, 2, 3, 20, 21 - OR 1 practical will be given from Practicals No. 4, 5, 6, 14, 15	12
Q-2: 1 practical will be given from Practicals No. 9, 10, 11, 13, 16, 18 - OR 1 practical will be given from Practicals No. 7, 8, 12, 17, 19	12
This section will consist of checking Practical Notebooks and conducting Viva Voce. The details are as follows:	
Practical Notebook	6
Viva Voce	5





Practical Model Paper for Agriculture Sciences Class-9

Maximum Marks: 35

Time Allowed: 2 Hours

Question No. 1

Note: Attempt any one of the following practical.

Identify the given seeds of different Rabi and Kharif Crops and write their Botanical names.

OR

Identify different Products and By-Products from Livestock and Poultry (Cow, Buffalo, Goat, Chicken and Sheep).

Question No. 2

Note: Attempt any one of the following practical.

Identify different plants with the help of their leaves and then write their Botanical names.

OR

Test the adulteration of milk with the help of Lactometer.

Practical Notebook

Viva Voce

12

12

6

5

