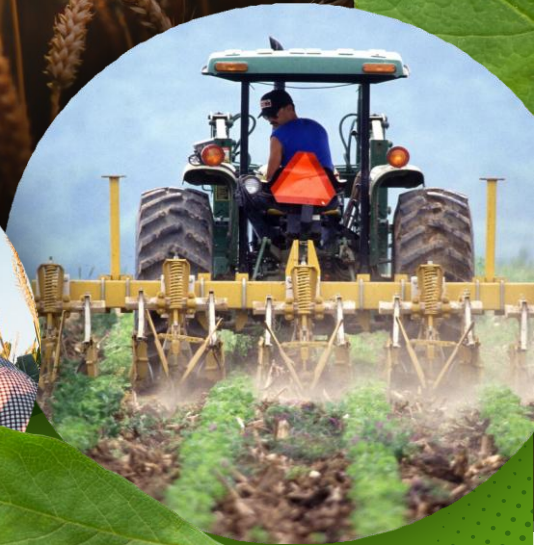


# YEAR BOOK

2024-25



**GOVERNMENT OF PAKISTAN  
MINISTRY OF NATIONAL FOOD SECURITY AND  
RESEARCH  
ECONOMIC WING**



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# **YEAR BOOK 2024-2025**

**GOVERNMENT OF PAKISTAN  
MINISTRY OF NATIONAL FOOD SECURITY AND  
RESEARCH ISLAMABAD  
[www.mnfsr.gov.pk](http://www.mnfsr.gov.pk)**

## MESSAGE



Pakistan continues to face significant challenges in ensuring food and nutrition security for all citizens, including inadequate access to safe, diverse, and nutritious food, along with persistent issues related to water, sanitation, and health services. While the country remains largely self-sufficient in the production of staple foods, economic access to and utilization of nutritious food continue to be major constraints at the household level. Addressing these multidimensional challenges remains a top priority of the Government.

Agriculture and allied sectors play a vital role in ensuring food security, improving nutrition, and supporting economic growth in Pakistan's agro-based economy. The sector supports rural livelihoods, contributes approximately 23.5 percent to GDP, and remains the largest employer in the economy, engaging over 37 percent of the labour force, with a particularly strong presence in rural areas. During FY 2024-25, consistent with historical trends, Pakistan's agriculture sector recorded a growth of 0.56 percent. Although below the historical average, this performance is notable given the challenging climatic conditions. Growth in the sector was largely supported by a 4.72 percent increase in livestock, 1.42 percent expansion in fisheries, and 3.03 percent growth in forestry.

Recognizing the critical role of agriculture in achieving food and nutritional security, the Government continues to prioritize development initiatives in crops, horticulture, and livestock, with a strong focus on research and innovation. Emphasis is being placed on enhancing productivity, improving access to nutrient-dense foods, and strengthening agri-food systems. The Year Book 2024-25 highlights the key activities, initiatives, and achievements of the Ministry of National Food Security & Research and its allied departments during the year.

**Mr. Rana Tanveer Hussain**

Federal Minister for National Food Security & Research

## **FORWARD**

The Year Book 2024-25 of the Ministry of National Food Security and Research is an official handbook published in pursuance of sub-rule (2) of Rule 25 of the Rules of Business, 1973, whereby each Ministry is required to prepare a Year Book for the information of the Cabinet and the public. The Year Book presents an overview of the activities undertaken by the various Wings of the Ministry, its attached departments, and autonomous organizations, along with the key achievements during the fiscal year 2024-25 and plans for the ensuing year.



It is hoped that this publication will serve as a valuable information resource and reference document for policymakers, researchers, planners, and the public on matters related to food and agriculture. I highly appreciate the efforts of the officers and staff of the Economic Wing for their dedication in compiling and publishing the Year Book in a timely manner.

Comments and suggestions for further improvement of the Year Book will be most welcome.

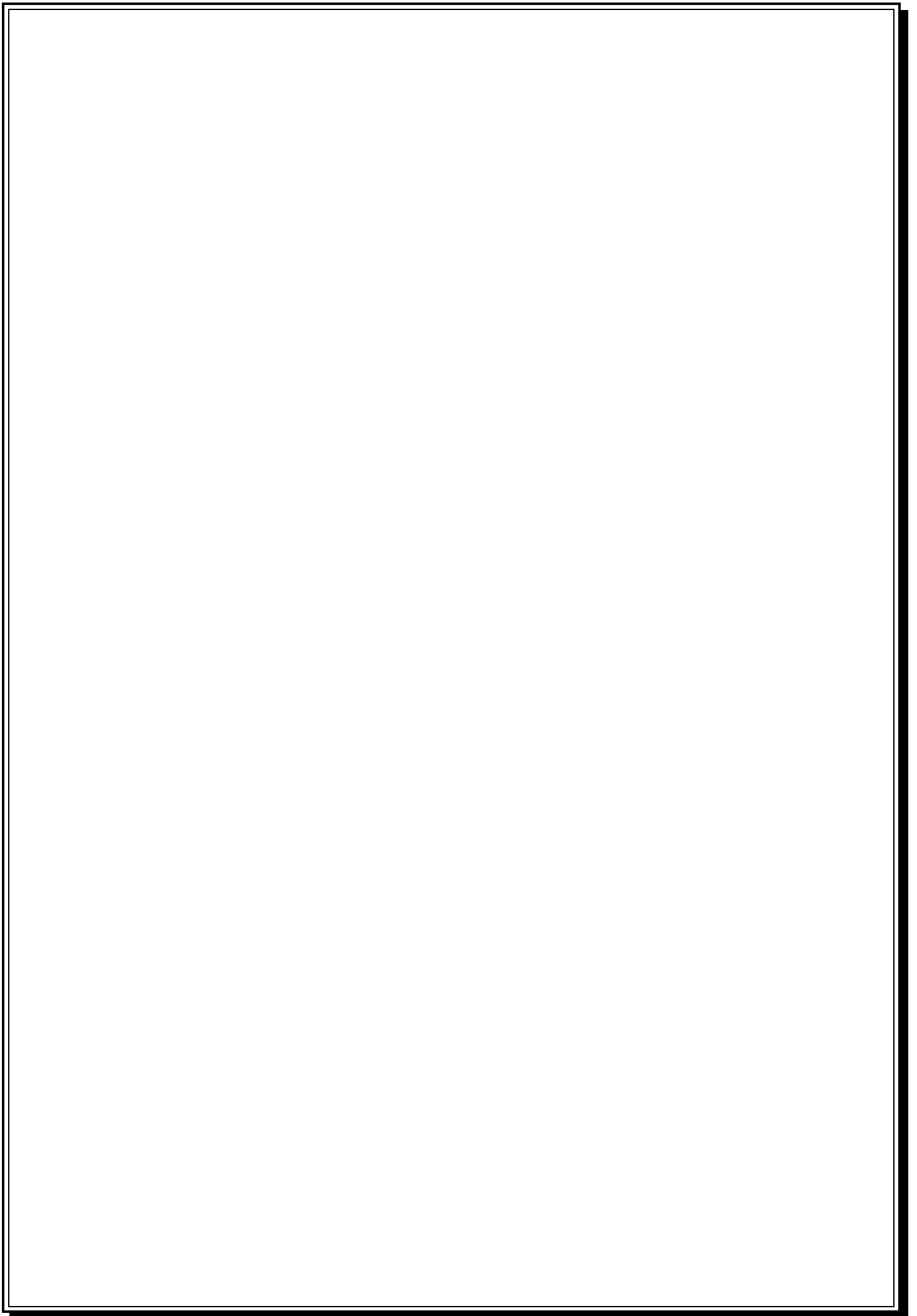
**Musaddiq Ahmed Khan**

Federal Secretary for National Food Security & Research

**February, 2026**

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Government of Pakistan  
Ministry of National Food Security and Research  
(Economic Wing)

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**EDITORIAL BOARD**

Dr. Haroon Sarwar Awan      Economic Consultant

Mr. Hafeezullah              Research Officer

Ms. Asma Sajjad              Monitoring Officer

## **INTRODUCTION**

Pakistan is endowed with diverse ecological zones characterized by wide variations in topography, altitude, climate, and seasons, enabling the cultivation of a broad range of crops and supporting livestock, forestry, and fisheries production nationwide. Agriculture remains the backbone of the economy, supporting rural livelihoods, providing raw materials to agro-based industries, and making a substantial contribution to national GDP and employment. During FY 2024-25, the agriculture sector contributed 23.54 percent to GDP and employed over 37 percent of the labour force, underscoring its critical socio-economic role.

In FY 2024-25, the agriculture sector recorded a growth of 0.56 percent, driven largely by the livestock sub-sector (4.72 percent), while forestry and fisheries grew by 3.03 percent and 1.42 percent, respectively, despite significant challenges in major crop production due to adverse weather and reduced cultivation area. Livestock continued to be the primary contributor within the sector, accounting for 63.60 percent of agriculture's value addition and 14.97 percent of national GDP, reflecting its resilience and importance for both domestic food security and export potential.

The sector's performance during 2024-25 demonstrates both its inherent resilience and the persistent vulnerabilities posed by climatic shocks, water scarcity, and structural constraints. In response, the Government focused on enhancing institutional support, promoting investment through measures such as the Special Investment Facilitation Council (SIFC), improving access to finance, and facilitating agribusiness development. Innovations in modern farming practices, corporate and precision agriculture, and climate-resilient technologies were further encouraged to boost productivity, enhance sustainability, and optimize resource use.

The Year Book 2024-25 presents a comprehensive account of the performance, initiatives, and achievements of the Ministry of National Food Security & Research (MNFSR) during the fiscal year. It highlights the collective efforts of the Ministry's Wings, attached departments, and autonomous bodies in strengthening agricultural governance, enhancing productivity, promoting research and innovation, improving regulatory frameworks, and advancing food security. With detailed insights across crops, livestock, forestry, fisheries, plant protection, seed and fertilizer development, storage, value addition, and export facilitation, the Year Book serves as an authoritative reference for policymakers, researchers, development partners, and the public, reflecting MNFSR's commitment to a food-secure, resilient, and prosperous Pakistan.

## OVERVIEW

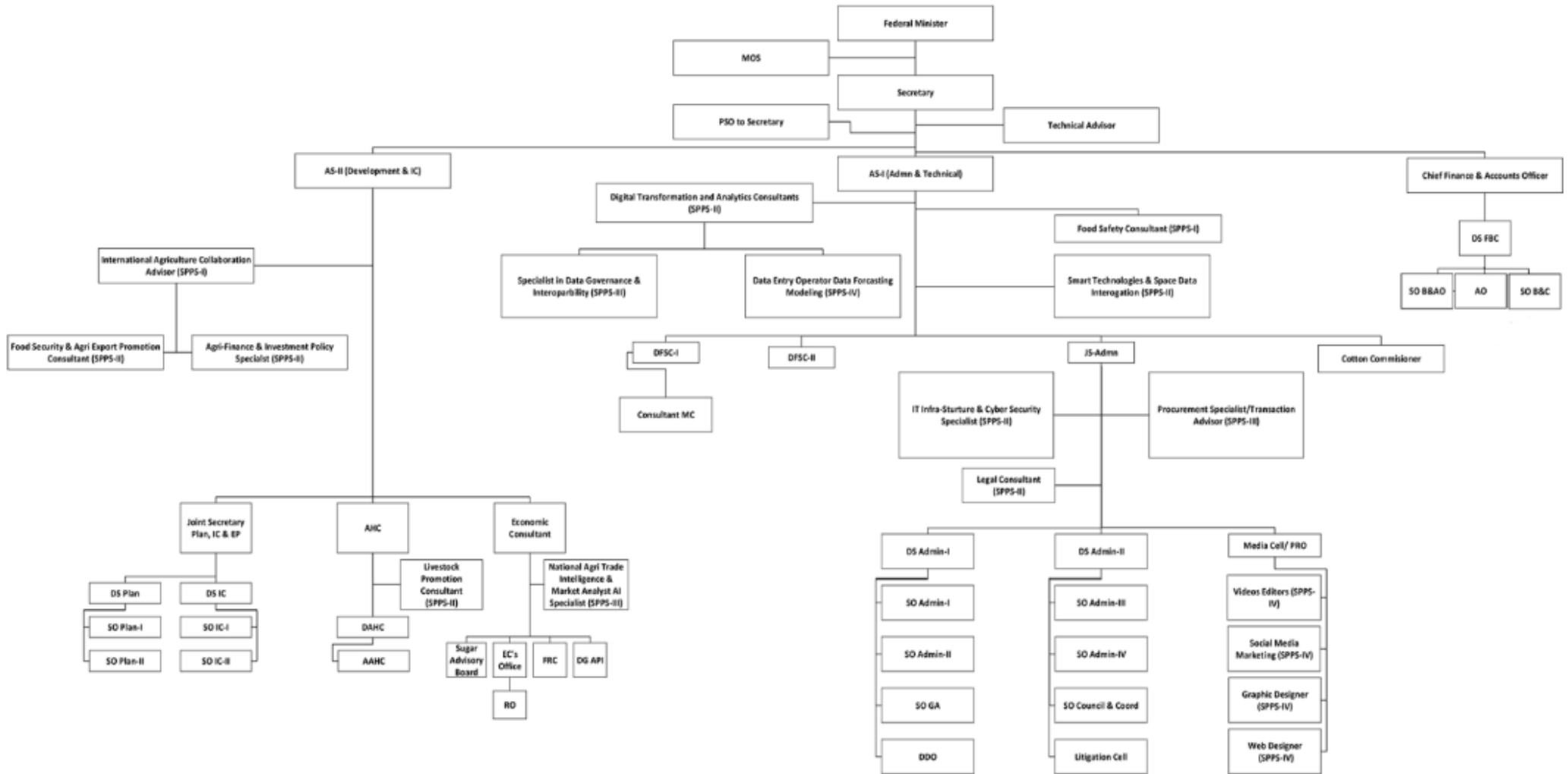
The Ministry of National Food Security and Research (NFS&R) through its attached departments, autonomous organizations and boards is focusing on ensuring food security. Links between agriculture and food security have long been recognized and there are major shifts in understanding that have led to recognition that agriculture is one of the main contributors to food security. The M/o NFS&R, since its inception, have been aiming to improve, coordinate and strengthen agricultural research and development activities in the country.

### Functions of M/o NFS&R under Rules of Business, 1973

1. Economic Coordination and Planning in respect of Food, Economic Planning and Policy making in respect of agriculture.
2. Imports and exports control on food grains and foodstuffs, inspection, grading analysis of food grains and foodstuffs, maintenance of standards of quality for import and export and inspection, handling, storage and shipment of rice exports.
3. Collection of statistics regarding production, consumption, prices, imports and exports of food grains.
4. Coordination with aid and assistance agencies in respect of food sector.
5. Pakistan Agricultural Research Council and other Federal agriculture research organizations.
6. Food and Agriculture Organization (FAO) of United Nations in respect of food.
7. Plant Protection, Pesticide import and standardization, Aerial Spray, Plant Quarantine and Locust control in its international aspect and maintenance of locusts warning organizations.
8. Federal Seed Certification and Registration.
9. Standardization and import of fertilizer.
10. Procurement of food grains, including sugar
  - i. from abroad.
  - ii. for Federal requirement.
  - iii. for inter-provincial supplies.
  - iv. for export and storage at ports.
11. Grading of agricultural commodities, other than food grains, for exports.
12. Administrative control of PASSCO.
13. Preparation of basic plan for bulk allocation of food grains and foodstuffs.
14. Price stabilization by fixing procurement and issue prices including keeping a watch over the price of food grains and foodstuff imported from abroad or required for export and those required for inter-provincial supplies.
15. Agricultural Policy Institute.
16. Animal Quarantine Departments, stations and facilities located anywhere in Pakistan.
17. National Veterinary Laboratory, Islamabad.
18. Laboratory for Detection of Drugs Residues in Animal Products at Karachi.
19. Veterinary drugs, vaccines and animal feed additives.
20. Import and export; and
21. Procurement from abroad for Federal requirements and for inter-provincial supplies.
22. Livestock, poultry and livestock products.
23. Import and export; and
24. Laying down national grades.
25. Livestock and Dairy Development Board (LDDDB).
26. Fisheries Development Board (FDB).
27. Pakistan Oilseed Development Board (PODB) (for federal areas only).
28. International cooperation matters relating to agriculture and livestock.
29. Administrative control of the Agricultural Counselor's Office at Rome, Italy.

# Organizational Chart of M/o NFS&R

## REVISED ORGANOGRAM OF MINISTRY OF NATIONAL FOOD SECURITY AND RESEARCH



## 1. ADMINISTRATION WING

<p><b><u>Admin Wing</u></b> headed by <b>Joint Secretary</b> <b>(Admn)</b></p>	<b><u>D.S (Admn-I)</u></b>	Supervision of work of Admn-I, Admn-II and GA Sections.
	<u>S.O (Admn-I)</u>	All administrative matters of main Ministry, AQD, NVL and FWMC.
	<u>S.O (Admn-II)</u>	All administrative matters of DPP, FSC&RD and PBRR.
	<u>S.O (GA)</u>	All matters relating to general administration of the Ministry.
	<b><u>D.S (Admn-II)</u></b> previously DS (FS)	Supervision of work of Admn-III & Admn-IV Sections and Litigation Cell.
	<u>S.O (Admn-III)</u>	All administrative matters of PARC, PCCC, PCSI, POD and NFDC.
	<u>S.O (Admn-IV)</u> previously SO (FS)	All administrative matters of API, PASSCO, PTB, LDDB and FDB.
	<u>Litigation Cell</u>	All litigation matters of main Ministry and departments/organizations where Ministry is respondent or petitioner.
	<b><u>D.S (FBC)</u></b>	Supervision of work of B&C and Council/Coord Sections.
	<u>S.O (Council/Coord)</u>	All matters relating to Parliamentary Business and those requiring coordination within Ministry and departments/organizations.
	<u>S.O (B&amp;C)</u>	All financial/budgetary matters of main Ministry and departments/organizations.
	<u>DDO</u>	Preparation and submission of bills and reconciliation of funds with the AGPR.
<p><b><u>Plan/IC Wing</u></b> headed by <b>Joint Secretary</b> <b>Plan/IC)</b></p>	<b><u>D.S (IC)</u></b>	Supervision of work of IC-I and IC-II Sections.
	<u>SO (IC-I)</u>	All International Cooperation matters of non-Muslim countries and UNO/allied agencies/organizations.
	<u>SO (IC-II)</u>	All International Cooperation matters of Muslim countries and OIC and other respective development agencies/ organizations.
	<b><u>D.S (Plan)</u></b> <u>SO (Plan)1</u>	Supervision of work of Plan Section. <ul style="list-style-type: none"> <li>• All PSDP matters of main Ministry and attached departments/organizations. Policy matters pertaining to Development side including preparation of PC-IIs, surveys or analysis</li> <li>• All matters related to PSDP (preparation of PC-Is, approvals by DDWP/CDW/ ECNEC, implementation through departments, monitoring through M&amp;E Cell etc)</li> <li>• All matters related to foreign funded projects including grants, TCPs etc</li> <li>• DDWP secretariat</li> </ul> Administrative section for all project employees

	SO (Plan)2	<ul style="list-style-type: none"> <li>• Coordinating activities pertaining to National Coordination Committee (NCC) on Agriculture Transformation Plan (ATP)</li> <li>• Processing of matters regarding PSDP+ Initiative</li> <li>• Court cases including cases of regularization</li> <li>• All matters related to liabilities of closed/developed projects</li> </ul> Processing of PC-IV and PC-V after closure of the projects.
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<b><u>Technical Wing</u></b>	<b><u>Commissioner Minor Crops / Food Security Commissioner-I</u></b>	FSC-I along with officer(s) under his supervision will deal with all technical matters as per job description besides technical matters of FWMC, DPP, POD, PARC and PTB.
	<b><u>Wheat Commissioner / Food Security Commissioner-II</u></b>	FSC-II along with officer(s), under his supervision will deal with all technical matters as per job description besides technical matters of FSC&RD, PBRR, API and PASSCO.
	<b><u>Cotton Commissioner</u></b>	Cotton Commissioner will deal with all technical matters pertaining to cotton crops besides technical matters of PCCC and PCSI.
	<b><u>Chief, NFDC</u></b>	Chief, NFDC along with officer under his supervision will deal with all technical matters pertaining to fertilizer besides administrative matters within NFDC.
<b><u>Livestock Wing</u></b>	<b><u>Animal Husbandry Commissioner</u></b>	AHC along with officer(s) under his supervision will deal with all technical matters pertaining to livestock sector besides technical matters of AQD, NVL, LDDDB and FDB.
<b><u>Economic Wing</u></b>	<b><u>Economic Consultant</u></b>	Economic Consultant along with officer(s) under his supervision will deal with all matters of economic coordination and planning besides other tasks assigned to him from time to time.

## 2. PLAN WING

The Plan Wing of Ministry of National Food Security and Research is responsible for coordinating developmental activities regarding Food Security through Public Sector Development Programmed (PSDP). This Wing analyses the project proposals/PC-I's initiated by the line Departments of the Ministry and processes those for approval of the competent forums such as DDWP, CDWP and ECNEC etc. as the case may be. Not only does it release the funds on quarterly basis after obtaining approval from the relevant quarters, but it is also responsible for monitoring and evaluation of the development projects and Policy matters pertaining to Development projects.

Funds to the tune of Rs.4253.738 million were allocated in PSDP 2025-26 for execution of the following development projects under this Ministry: -

Sr. No.	Project Name
1	Establishment of Seed Certification Laboratory Khuzdar, Turbat and Loralai
2	National Oilseed Enhancement Program
3	National Program for Enhancing Command Area in Barani Areas of Pakistan
4	Promotion of Olive Cultivation on Commercial Scale in Pakistan Phase-II
5	Pak-Korea Joint Program on Certified Seed Potato Production System
6	Professional Capacity Building in Agriculture (TEVT National Reforms Program)
7	Project Planning and Development Unit of M/o NFS&R
8	National Program for Animal Disease Surveillance and Control Track and Traceability Compliance with National and International Standards
9	National Agriculture Productivity Enhancement Programme
10	Pakistan Model Agriculture Research Centre
11	Establishment of Agriculture Research Institute, Sheikhpura
12	Pakistan National Sugar and Sugarcane Monitoring System; A Digital Revolution for Sustainable Growth & Production Efficiency
13	Financial Incentive Program for Sustainable Agri-Business and Agriculture Development
14	Reviving Cotton in Pakistan; Innovations for a Sustainable Future
15	Pak-Sar-Zameen Card (PSZC) Integrating GIS & Remote Sensing for Sustainable, Digitally Advanced, and Financially Inclusive Agriculture in Pakistan

### **3. ECONOMIC WING**

Economic Wing is a technical arm of this Ministry in terms of its responsibility for maintenance of data bank through imperative annual publications and provision of analytical support in the capacity of economic, trade and investment related issues of the food sector. The Wing collects information regarding Crop Area, Production and other Food Statistics from Federal and Provincial Governments, Pakistan Bureau of Statistics and other departments/agencies, and thereafter performs the function of its compilation, computerization and dissemination in the form of Publications on annual basis.

The Wing is also responsible for issuance of final estimates of about 54 major and minor crops at national and international level. Following two functions under Rules of Business empower Economic Wing: -

- Collection of statistics regarding production, consumption, prices, and imports and exports of grains (Fully)
- Economic Coordination and Planning in respect of food, economic planning and policy making in respect of agriculture (Partially)

Economic Wing published following books during the period under review: -

#### **Agricultural Statistics of Pakistan 2023-24**

The Wing released and uploaded the publication on Ministry's website. The next publication is in process The publication covers:

- Area, production and yield of major and minor crops including cereals, pulses, oilseeds, condiments, fodder, fruits and vegetables.
- Land use statistics
- Use of inputs
- Agricultural credit
- Agricultural mechanization
- Livestock, fisheries and forestry statistics
- Trade statistics
- Prices of agricultural commodities
- Miscellaneous statistics
- Conversion factors

#### **Fruit, Vegetables & Condiments Statistics of Pakistan 2023-24**

The Wing released and uploaded the publication on Ministry's website "Fruit, Vegetables and Condiments Statistics of Pakistan 2023-24" containing province-wise data for the year 2018-19 to 2023-24. It also contains data on exports, imports (by destination) and wholesale prices which provide updated information for researchers, government functionaries, exporters and all those interested in the issues concerning the agriculture sector. The next publication is in process.

#### **Crops Area and Production (By Districts) 2023-24**

Economic Wing released and uploaded the publication titled "Area and Production (By Districts)" on Ministry's website. This publication contained latest district-wise data on major/minor crops including condiments, fruit and vegetables. The next publication is in process.

#### **Yearbook of the Ministry 2023-24**

In pursuance of Rule 25(2) of the Rules of Business, 1973, the Economic Wing published Yearbook, containing details of activities and achievements of M/o NFS&R, its attached departments and autonomous bodies. The material was collected from all Wings, Departments and Autonomous bodies under the administrative control of M/o NFS&R. This publication has also been uploaded on ministry's website as well.

In addition to the above publications, this section was also involved in the following activities.

- Data supplied to IMF, FAO and Prime Minister's Secretariat including other national / international agencies and NGOs.
- Released Kharif and Rabi estimates of crops at national level for circulation among Federal and Provincial Government Departments/ Autonomous bodies.
- Prepared briefs on prices of Food/Agricultural Commodities for the Secretary, M/o NFS&R.
- Replies of various National Assembly/Senate Questions were prepared.
- Representing MNFS&R at National Price Monitoring Committee and presenting supply and Price situation of food commodities.

## **Performance of Essential Agriculture Food Commodities (EAFC) Cell**

### **I. Essential Agricultural Food Commodities (EAFC) Monitoring Cell**

#### **Background**

The Honorable Prime Minister in the meeting of Price Control held on 6<sup>th</sup> November 2019 directed to establish a cell to analyze and anticipate commodity supply and pricing trend. For implementation, the worthy minister NFS&R and Secretary NFS&R had granted approval for establishment of "Essential Agricultural Food Commodities (EAFC) Price Monitoring Cell. The objectives of EAFC Monitoring Cell is based on the American model of Production Estimates and Crop Assessment Program (PECAP) which is primary objectives of grant of Endowment Fund to the M/o NFS&R under "Agreement between USA and Islamic Republic of Pakistan" Recipient Agency Agreement between MINFAL(Economic Wing) of GoP and US Department of Agriculture of USA, and Rules and Regulations of Endowment Fund.

#### **Functions**

1. Monitoring of Area, production, prices, demand, import, export, stocks and area cultivated of 15 Essential Food Commodities
2. Reports on daily, weekly & monthly basis on these commodities
3. Consumption patterns identifying supply-demand gaps
4. Production forecasts and assessments of the stocks for food security
5. Updates on domestic and international stocks positions
6. Global supply-demand estimates, market outlook
7. Reporting on the WTO notifications and other key questions to the national assembly
8. Working in a close liaison to the Food security commissioners and technical advisor of the MNFS&R on critical issues of the food security
9. Cost benefits analysis.

Addition to the above the EAFC cell of the Economic Wing is providing policy feedback and generating reports on supply, prices and stocks, area cultivated and production of the essential food commodities on daily, weekly and monthly basis. The reports are shared with all the stakeholders mainly, PM office, the Finance Division, Planning Division and all other departments concerned. The EAFC since its birth is dedicated to the following tasks:

- 1) Collection of the data of the essential food commodities, maintaining/updating the records of the crop estimates obtained from the provinces.
- 2) Performing data cleaning, data analysis to draw insights from the data obtained from provinces and other departments.
- 3) Identification of the demand and supply gaps of the food commodities and provide policy feedback to the MNFS&R and other related departments.
- 4) Monitoring price trends, demand, import, export, stocks and area cultivated of 15 Essential Food Commodities.
- 5) Coordination with province to ensure data validity and availability for policy feedback and intervention.
- 6) Daily reports on wheat stocks & sugar at national and provincial level are being generated by EAFC cell shared with PM Office and other stakeholders for policy feedback.
- 7) Weekly and monthly reports on prices of essential commodities are being generated by the EAFC cell and potential supply and demand gaps identified and reported to the allied departments.
- 8) Cost benefit analysis of different government policies like Cotton, Wheat and pulses procurement to control prices.
- 9) Weekly and daily briefs are being prepared by the EAFC cell for Minister and Secretary MNFSR.
- 10) Monitoring dashboard on daily basis to ensure the data validation and frequency.
- 11) Suggestions/feedback to Economic Consultant/Secretary on front end development of dashboard and improvements of Graphic User Interface (GUI).
- 12) The monitoring officers have departed six training sessions to the provincial and federal departments on “how to upload the data, and how to utilize the portal for policy analysis?”
- 13) The EAFC cell is working on the further development of the portal.

## **II. Food Security Dashboard**

To cater to the emerging needs of an hour, FSP (Food Security Portal) was established in Ministry of National Food Security & Research (MNFS&R) on Prime Minister’s initiative. The Food Security Dashboard is established in compliance with the Prime Minister’s directive. It aims to monitor supply, demand and prices of essential agricultural food commodities, seasonal availability of these commodities at a high frequency level and provide policy feed back to the Ministry of National Food Security & Research for timely intervention. The objective of FSD is to bring the agriculture and food security data at a very high frequency for evidence-based policy planning and decision-making. This will help to achieve the objectives of reducing food insecurity included in the 12<sup>th</sup> Five Year Plan and National Food Security Policy adopted by the Government of Pakistan.

### **Objectives of Food Security Dashboard**

The primary objective of FSP to mainly provide high frequency data and digitize the following aspects of National Food Security, for timely & effective policy intervention:

1. Agri-production (area, yield, and production) of agricultural commodities.

2. Agri-inputs (seeds, fertilizers, pesticides, herbicides, fuel etc.) prices, domestic sales, imports, export.
3. Food consumption patterns and demand analysis.
4. Food Security (volume, rationale, storage type and efficiency of food stocks by Federal and Provincial governments).
5. Detailed forecasts on the unforeseen situations including the pest attacks and unfavorable weather conditions.
6. Market trends of both domestic and outlook of the essential food commodities
7. Linkages with different data sources to promote research on food security and agriculture food crops.
8. Support for planning and policy making processes of the Federal Ministry of Food Security and Research.
9. Data bases and DBMS to handle, manage, process and report data relevant to the process of agricultural planning and coordinating and facilitating the exchange of information among the producers and users of the agriculture data
10. Report wholesale & retail prices of essential agricultural food commodities and generate early price alerts for timely intervention by the government.
11. Seasonal availability of essential agricultural food commodities and suggest timely intervention.
12. Balance sheet of essential agricultural food commodities
13. Assessing the impact of policies, programs and modeling food security outcomes.

In addition to the functions contained in the EAFC & Dashboard, the Economic wing is also developing a digital data bank starting from 1947 using the given capabilities and manpower with the collaboration of the Asian Development Bank. This data bank will serve as the country's first ever digital platform for agricultural data which will be available for the public and for the decision support system to the relevant stakeholders. This is built solely on the international food security standards and best practices.

### **Current Status of FSD**

Ministry of National Food Security & Research has operationalized food security portal from 9<sup>th</sup> June 2021. Dashboard for wheat, sugar, vegetables, and pulses were completed in Food Security dashboard fully operational Dashboard on price analysis has been added to FSP and Module of Trade Analysis is under development.

### **Legal Support:**

To ensure data support by the provinces ***“Pakistan Food Security Flow of Information Ordinance, 2021”*** has been promulgated by the President of Islamic Republic of Pakistan. The ordinance comprehensively illuminates the importance of digitalization of Food Security data and legally bounds the provincial authorities to provide the required data for the Food Security Portal and coordinate with Economic Wing of M/o NFS&R.

## **4. INTERNATIONAL COOPERATION WING**

### **Detailed Functions of the IC Wing, MNFS&R**

The International Cooperation (IC) Wing of the Ministry of National Food Security and Research (MNFS&R) is responsible for managing and enhancing Pakistan's international collaboration in the agriculture and livestock sectors. Its functions are as follows:

#### **1. Coordination of Joint Working Groups (JWGs):**

The IC Wing is responsible for organizing and conducting sessions of Joint Working Groups on a regular basis, either annually or biannually, depending on the framework of cooperation with different bilateral and multilateral partners. It ensures that the sessions are well-structured and include participation from all relevant stakeholders.

It also maintains detailed records of the minutes, protocols, and agreements reached during these sessions. A critical function is to monitor the implementation status of the agreed decisions and actions. The wing develops follow-up mechanisms, prepares progress reports, and ensures that line departments and stakeholders act on their commitments within specified timelines.

#### **2. Inter-Ministerial Coordination:**

The IC Wing acts as the main coordination hub between MNFS&R and various federal ministries and agencies. It works closely with the Ministry of Commerce to address issues related to market access, export regulations, and trade promotion for agricultural and livestock products. It coordinates with the Economic Affairs Division to align foreign-funded projects and donor support in agriculture and livestock with national priorities. In collaboration with the Special Investment Facilitation Council (SIFC), the wing ensures that agricultural cooperation projects are integrated into broader investment strategies. Coordination is also maintained with the Ministry of Foreign Affairs on diplomatic and policy matters.

#### **3. Organisation and Facilitation of International Delegations:**

The IC Wing organizes and manages visits of foreign delegations, both bilateral and multilateral, concerning agricultural and livestock cooperation. It prepares background materials, technical briefs, and sectoral presentations to ensure meaningful engagement. The wing also facilitates discussions that aim at promoting technical collaboration, knowledge transfer, and investment in the agriculture sector.

#### **4. Identification of New Areas for Cooperation**

One of the core functions of the IC Wing is to conduct research and sectoral reviews to identify new areas where international cooperation can be expanded. These include areas related to research and development, technology transfer, infrastructure development, and capacity building. The wing evaluates existing frameworks and recommends new initiatives to deepen cooperation with international partners.

## 5. Import Profile Analysis and Export Potential Mapping

The IC Wing undertakes analytical studies to understand the import profiles of key partner countries, focusing on their demand for agricultural and livestock products. It identifies potential market gaps that Pakistan can target. By analyzing landed costs and comparing them with competing suppliers, the wing highlights products where Pakistan enjoys a competitive advantage. These insights are used to develop country-specific strategies for export growth and market penetration.

## 6. Strategic Advisory Role:

The IC Wing supports high-level policy planning by aligning international cooperation activities with Pakistan’s broader agricultural policy objectives and food security goals. It facilitates technical assistance programs in collaboration with development partners to build national capacity in key agricultural domains. The wing also assists in the preparation and submission of foreign-funded projects in coordination with the Economic Affairs Division and relevant donor agencies.

Through these functions, the IC Wing plays a pivotal role in promoting, sustaining, and expanding Pakistan’s agricultural and livestock cooperation with the international community. It ensures that international engagements are implemented effectively, strategically aligned, and beneficial for the long-term development of the sector.

### Consolidated List of Global and Regional Forums Participated by MNFS&R (Last 3 Years)

No	Forum / Platform	Focus Area	Actions Required by IC Wing
1	Joint Working Groups (JWGs) with Partner Countries (Iran, China, France, UAE, etc.)	Bilateral trade cooperation, SPS, market access, technical cooperation	Organize/coordinate sessions (annual/monthly), draft and track implementation of minutes and protocols, coordinate with Ministry of Commerce, EAD, SIFC, monitor progress
2	FAO High-Level Ministerial Engagements	Agriculture, livestock, food security, capacity building	Coordinate FAO-supported projects, align with national policy, ensure follow-up, compile national inputs, organize delegation visits
3	FAO Hand-in-Hand Initiative	Agricultural investment planning, geospatial tools, data-driven policy	Facilitate data sharing, engage in investment planning, coordinate participation in investment forums

No	Forum / Platform	Focus Area	Actions Required by IC Wing
4	FAO Technical Workshops and Policy Dialogues	Disease surveillance, digital agriculture, mechanization, food systems	Nominate focal persons, coordinate stakeholders, support logistics, monitor implementation
5	Global Forum for Food and Agriculture (GFFA), Germany	Sustainable food systems, global agri-policy dialogue	Coordinate participation, prepare briefs/statements, organize bilateral meetings, follow-up on MoUs
6	Agriculture Investment and Food Summits (FAO-supported)	Investment promotion in agri-food value chains, innovation	Liaise with BOIs, provincial departments, support B2B/B2G matchmaking, track investments
7	Donor Coordination Meetings (EAD, FAO, IFAD, World Bank)	Project funding, climate resilience, R&D	Prepare documents, coordinate internal inputs, monitor project status, follow-up with donors
8	Bilateral Technical Meetings on SPS, PRA, Market Access	Phytosanitary certification, export quality, trade barriers	Coordinate with Plant Protection, MoC, foreign partners; facilitate audit missions; monitor export compliance
9	FAO Desert Locust Secretariat Meetings	Locust monitoring and control	Coordinate locust response, facilitate information/resource sharing, engage provincial stakeholders
10	CIMMYT Meetings	Wheat research and development	Collaborate on breeding programs, share research, implement joint initiatives
11	WFP Events	Food security, nutrition programs	Participate in policy dialogues, support school feeding programs, coordinate stakeholders
12	Asian Development Bank (ADB) Meetings	Agricultural development projects and financing	Engage in project planning/implementation, align with national priorities, monitor progress
13	SAARC Agricultural Meetings	Regional agricultural cooperation	Represent Pakistan, collaborate on regional initiatives, share best practices, coordinate joint R&D
14	Shanghai Cooperation Organization (SCO) Meetings	Agricultural trade and cooperation	Promote agri exports, explore joint ventures, address trade barriers
15	Economic Cooperation Organization (ECO) Meetings	Regional economic and agricultural cooperation	Advocate for agri development, seek regional funding, strengthen ties
16	Organization of Islamic Cooperation (OIC) Meetings	Islamic countries' food security cooperation	Participate in policy formulation, collaborate on initiatives, share knowledge

No	Forum / Platform	Focus Area	Actions Required by IC Wing
17	Islamic Organization for Food Security (IOFS) Events	Food security and agricultural development among member states	Engage in capacity building, implement joint projects, facilitate knowledge exchange

### Summary of Actions Required by the IC Wing:

- Act as focal point and coordinator for MNFS&R in all international forums
- Organize and conduct sessions of Joint Working Groups regularly
- Keep track of implementation status of agreed minutes, protocols, and MoUs
- Coordinate closely with Ministry of Commerce, Economic Affairs Division, SIFC, and provincial stakeholders
- Organize and coordinate visits of international delegations related to agri and livestock cooperation
- Facilitate data collection and analysis, including import profiles and product competitiveness
- Support donor coordination and preparation of project proposals
- Monitor progress of international projects and collaborations
- Engage in policy alignment and capacity building with international partners
- Ensure follow-up on bilateral and multilateral agreements and commitments
- Provide technical and logistical support for workshops, training, and investment forums

This comprehensive list highlights the wide scope of international engagements and the central role of the IC Wing in enabling MNFS&R to effectively participate and implement international cooperation initiatives. It also underscores the need for sufficient staffing and resources within the IC Wing to meet these responsibilities effectively.

<b>Summary Of MoUs/ Agreements (IC-I)</b>	
<b>Total No. of MoUS</b>	25
<b>MoU' with Countries: Signed</b>	23
<b>MoU' with Organizations: Signed</b>	0
<b>MoU' with Countries: in pipeline</b>	2
<b>MoU' with Organizations: in pipeline</b>	0
<b>Summary Of MoUs/ Agreements (IC-II)</b>	
<b>Total No. of MoUS</b>	79
<b>MoU' with Countries: Signed</b>	24
<b>MoU' with Organizations: Signed</b>	2
<b>MoU' with Countries: in pipeline</b>	51
<b>MoU' with Organizations: in pipeline</b>	2

Sr. No.	MOU Status	Number of MOU's signed	Number of MOU's in pipeline
1	Pakistan-Kazhakistan	1	2
2	Pakistan-Japan		1
3	Pakistan-Kuwait	1	1
4	Pakistan-Phillipines		2
5	Pakistan-UAE	2	
6	Pakistan-ICARDA*	1	
7	Pakistan-Tajikistan	1	
8	Pakistan-IFAD	1	
9	Pakistan-Russia	2	3
10	Pakistan-Egypt		1
11	Pakistan-Azerbaijan	2	1
12	Pakistan-Malaysia		1
13	Pakistan-Kyrgistan		3
14	Pakistan-Uzbekistan	2	1
15	Pakistan-Bahrain	2	
16	Pakistan-Korea	1	
17	Pakistan-Thailand		2
18	Pakistan-WTO		1
19	Pakistan-Iran	2	1
20	Pakistan-Nigeria	1	
21	Pakistan-Oman		1
22	Pakistan-Indonesia	2	2
23	Pakistan-Turkey	1	1
24	Pakistan-Algeria		1
25	Pakistan-Ethopia		2
26	Pakistan-South Africa		1
27	Pakistan-Iraq		1
28	Pakistan-Vietnam		1
29	Pakistan-Afghanistan		1
30	Pakistan-Tunisia	1	
31	Pakistan-East Africa		1
32	Pakistan-Maldives		1
33	Pakistan-Syria	2	1
34	Pakistan-Palestine		2
35	Pakistan-Labanon	2	
36	Pakistan-Mulawi		1
37	Pakistan-Sudan		1
38	Pakistan-IOFs		1
39	Pakistan-Senegal		1
40	Pakistan-Libiya		1

41	Pakistan-Namiba		1
42	Pakistan-Gergia		1
43	Pakistan-Greece		1
44	Pakistan-Cambodia		1
45	Pakistan-HongKong		1
46	Pakistan-Cimmyt		2
47	Pakistan-Mali		1
48	Pakistan-Czech		1
49	Pakistan-Uganda		1
50	Pakistan-Kenya	1	
	<b>Total</b>	28	51

\*It is not extended because Mol has yet to grant NOC to ICARDA being INGO

## **5. FOOD SECURITY COMMISSIONERS**

### **(TECHNICAL WING FOOD SECURITY COMMISSIONER – I)**

The office of FSC-I is part of technical wing of M/o NFS&R and have following functions:

1. Professional and technical inputs in the formulation of policies and action programs for high value food crops to ensure food security.
2. Policy advice on various issues pertaining to production, price trends marketing and international trade of high value crops.
3. Maintain coordination and liaison with agricultural research institutes and extension services at Federal and Provincial level with a focus on national food security particularly in relation to high value crops.
4. Formulation of development strategy pertaining to high value food crops in order to ensure their availability and accessibility in the country.
5. Scrutinize and evaluate the development schemes/programs being executed by the Federal and Provincial Governments concerning high value food crops.
6. All technical, parliament and court cases pertaining to technical matters of PARC, DPP, FWMC, PTB and POD.

### **Key Performances**

1. Meetings of Federal Committee on Agriculture (FCA) for Rabi 2024 and Kharif 2025 were convened in time to harness the opportunity created for better productivity of different crops.
2. Number of Meetings of Agriculture Pesticide Advisory Committee (APTAC) were convened and various issues were resolved.
3. Amended Agricultural Pesticide Rules 1973 to import/formulate and registration of Bio-pesticides to enhance the production of crops with minimum reliance on chemicals.
4. Made amendments in Pakistan Plant Quarantine Rules, 2019 for ease of doing business.

5. Fixation of the minimum indicative prices of tobacco to safeguard the farmer's interest.
6. Effective supervision of POD, FWMC, PARC, PTB and DPP in all technical matters.
7. During the year more than 50 Assembly and Senate Starred, Un-Starred, Motions and Briefs were furnished by the Technical Wing.

### **FOOD SECURITY COMMISSIONER –II**

FSC-II Wing deals with main issue of wheat crops and its production and other issues: -

#### **Importance:**

Wheat is the staple food crop of Pakistan and plays a crucial role in ensuring national food security. During FY 2024-25, wheat was cultivated on an area of 9,074.5 thousand hectares, showing a decline of 6.78 percent compared to 9,734.8 thousand hectares in the previous year. Wheat contributes about 8.2 percent to value added in agriculture and 1.9 percent to GDP. Wheat production during FY 2024-25 stood at 28.39 million tonnes, reflecting a decline of 10.75 percent compared to 31.81 million tonnes last year. The reduction in wheat production is attributed to high input costs, adverse climatic conditions, and reduced cultivated areas.

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1. Professional and technical inputs in the formulation of policies and action programs for high value food crops to ensure food security.
2. Policy advice on various issues pertaining to production, price trends marketing and international trade of high value crops.
3. Maintain coordination and liaison with agricultural research institutes and extension services at Federal and Provincial level with a focus on national food security particularly in relation to high value crops.
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## **6. LIVESTOCK WING**

### **LIVESTOCK AND POULTRY**

#### **I. LIVESTOCK**

Animal husbandry plays a crucial role in Pakistan's rural economy, involving over 8 million rural families in livestock production. This sector is a key source of livelihood, contributing approximately 35-40% of their total income. On a broader scale, the livestock industry has become the primary driver of agricultural growth, accounting for 61.2% of agriculture's value addition and 14.7% of the national GDP in fiscal year 2024-25.

The sector has experienced steady growth, with its gross value addition increasing from Rs. 5,587 billion in 2022-23 to Rs. 5,837 billion in 2023-24 reflecting a 4.4% growth rate. Additionally, it contributes to net foreign exchange earnings, making up approximately 2.9% of Pakistan's total exports for 2024-25.

Recognizing its potential for economic growth, food security, and poverty reduction, the government has prioritized livestock development. The strategy focuses on a private sector-led approach, with public sector support through policy interventions. To enhance animal productivity, regulatory measures have been introduced to improve veterinary health services, modernize husbandry and breeding practices, and advance reproductive technologies such as Embryo Transfer Technique (ETT) and In Vitro Fertilization (IVF). Efforts are also underway to expand artificial insemination services, promote balanced livestock nutrition, and control economically significant diseases like Foot-and-Mouth Disease (FMD), Peste des Petits Ruminants (PPR), Lumpy Skin Disease (LSD), and Avian Influenza, which impact trade and the economy.

The government aims to harness the livestock sector's potential to drive economic growth, enhance food security, and improve rural livelihoods through diversification of livestock business. To address investment challenges in value-added livestock exports, plans are underway to establish dedicated export meat processing zones and disease-free compartments for FMD, PPR, Highly Pathogenic Avian Influenza (HPAI), and other livestock diseases. Additionally, efforts are being made to develop modern slaughterhouses that align with international standards. To further strengthen the sector, the government is introducing time-limited financial support schemes to encourage investment and expansion.

Breed improvement is a key priority, with efforts to establish a nucleus herd and identify breeds best suited to Pakistan's diverse agro-ecological zones. The government is also facilitating the import of high-yielding exotic dairy, beef, and mutton breeds, along with genetic materials such as sexed semen, ova, and embryos. These initiatives aim to boost livestock productivity, create employment opportunities, and strengthen both the economy and national food security.

The estimated livestock population and production for the last three years are presented in Table-I, Table-II, and Table-III. This statistic shall be sorted out once actual data is available being generated through integrated agriculture and livestock census by Pakistan Bureau of statistics.

**Table-I: Estimated Livestock Population (Million No)**

Species	2022-23 <sup>1</sup>	2023-24 <sup>1</sup>	2024-25 <sup>1</sup>	GR %
Cattle	55.5	57.5	59.7	3.77
Buffalo	45.0	46.3	47.7	2.97
Sheep	32.3	32.7	33.1	1.18
Goat	84.7	87.0	89.4	2.71
Camels	1.1	1.2	1.2	1.30
Horses	0.4	0.4	0.4	0.58
Asses	5.8	5.9	6.0	1.85
Mules	0.2	0.2	0.2	1.76

Notes:

1. Estimated Figure based on inter census growth rate of Livestock Census 1996 & 2006.

**Table-II: Estimated Milk and Meat Production**

Species	Units	2022-23 <sup>1</sup>	2023-24 <sup>1</sup>	2024-25 <sup>1</sup>
<b>Milk (Gross Production)</b>	000 Tons	<b>67,873</b>	<b>70,071</b>	<b>72,343</b>
Cow	"	25,151	26,099	27,083
Buffalo	"	40,678	41,887	43,132
Sheep <sup>2</sup>	"	42	42	43
Goat	"	1,046	1,074	1,103
Camel <sup>2</sup>	"	956	968	981
<b>Milk (Human Consumption)<sup>3</sup></b>	000 Tons	<b>54,707</b>	<b>56,474</b>	<b>58,300</b>
Cow	"	20,121	20,880	21,667
Buffalo	"	32,542	33,509	34,505
Sheep	"	42	42	43
Goat	"	1,046	1,074	1,103
Camel	"	956	968	981
<b>Meat<sup>4</sup></b>	000 Tons	<b>5,345</b>	<b>5,644</b>	<b>5,967</b>
Beef	"	2,385	2,465	2,548
Mutton	"	799	817	835
Poultry meat	"	2,160	2,362	2,583

Notes

- The figures for milk and meat production for the indicated years are calculated by applying milk production parameters to the projected population of respective years based on the inter census growth rate of livestock census 1996-2006
- The figures for the Milk production for the indicated years are calculated after adding the production of milk from camel and sheep to the figures reported in the livestock census 2006.

- Milk for human consumption is derived by subtracting 20% wastage (15% during faulty transportation and lack of chilling facilities and 5% in suckling calf nourishment) of the gross milk production of cows and Buffalo.
- The figures for meat production are of red meat and do not include the edible offal's.

**Table-III: Estimated Livestock Products Production**

<b>Products</b>	<b>Units</b>	<b>2022-23<sup>1</sup></b>	<b>2023-24<sup>1</sup></b>	<b>2024-25<sup>1</sup></b>
Eggs	Million No's	23,819	25,212	26,696
<b>Hides</b>	000 No's	<b>19,398</b>	<b>20,051</b>	<b>20,727</b>
Cattle	"	9,868	10,240	10,626
Buffalo	"	9,414	9,694	9,982
Camels	"	117	118	120
<b>Skins</b>	000 No's	<b>63,697</b>	<b>65,181</b>	<b>66,703</b>
Sheep Skin	"	12,231	12,376	12,523
Goat Skin	"	32,645	33,530	34,439
<u>Fancy Skin</u>	"	<u>18,821</u>	<u>19,275</u>	<u>19,741</u>
Lamb skin	"	3,633	3,676	3,719
Kid skin	"	15,188	15,599	16,022
Wool	000 Tons	49.0	49.6	50.2
Hair	"	31.8	32.7	33.6
Edible Offal's	"	462	475	489
Blood	"	78.3	80.4	82.5
Casings	000 No's	64,351	65,851	67,388
Guts	"	20,651	21,344	22,061
Horns & Hooves	000 Tons	69.0	71.1	73.2
Bones	"	1,031.4	1,063.0	1,095.5
Fats	"	326.1	335.8	345.8
Dung	"	1,493	1,540	1,587
Urine	"	450	464	477
Head & Trotters	"	294.9	303.2	311.9
Ducks, Drakes & Ducklings	Million No's	0.34	0.32	0.31

Notes

1. The figures for livestock product for the indicated years were calculated by applying production parameters to the projected population of respective years.

**II. Poultry**

The poultry sector is a dynamic and essential part of Pakistan's livestock industry, generating employment for over 1.5 million people nationwide. With a gross value addition of Rs. 853 billion, it has seen significant expansion, achieving an impressive average annual growth rate of 8.1% over the past decade. This rapid progress has positioned Pakistan as the world's eleventh-largest poultry producer, underscoring its vast potential for further growth and innovation. Additionally, the poultry industry plays a crucial role in the country's food supply, contributing approximately 43.3% to Pakistan's total meat production.

To enhance and expand the poultry industry, the development strategy focuses on disease prevention, modernizing production methods, value-added processing, improved husbandry practices, and product diversification. To support these initiatives, the Government of Pakistan has introduced farmer-friendly policies and interventions aimed at strengthening both rural and commercial poultry production.

Despite its growth and potential, the poultry sector faces several challenges, including disease outbreaks, high cost of poultry feed and quality, high production costs and market fluctuations. Addressing these challenges is essential for sustaining the industry's growth and ensuring long-term food security in the country.

Table-IV presents the estimated production of commercial and rural poultry and poultry products over the last three years.

**Table –IV: Estimated Domestic/ Rural & Commercial Poultry**

Type	Units	2022-23 <sup>1</sup>	2023-24 <sup>1</sup>	2024-25 <sup>1</sup>
<b>Domestic Poultry</b>	<b>Million No's</b>	94.04	95.50	96.98
Cocks	"	13.55	13.92	14.30
Hens	"	46.34	47.17	48.02
Chicken	"	34.15	34.41	34.66
Eggs <sup>2</sup>	"	4634	4717	4802
Meat	000 Tons	132.36	135.01	137.72
<b>Duck, Drake &amp; Duckling</b>	<b>Million No's</b>	0.34	0.32	0.31
Eggs <sup>2</sup>	"	15.12	14.49	13.89
Meat	000 Tons	0.46	0.44	0.42
<b>Commercial Poultry</b>	<b>Million No's</b>	1632.06	1792.46	1968.71
Layers	"	73.28	78.41	83.90
Broilers	"	1,703.36	1,873.69	2,061.06
Breeding Stock	"	15.81	16.61	17.44
Day Old Chicks	"	1,779.16	1,957.07	2,152.78
Eggs <sup>2</sup>	"	19,170	20,480	21,880
Meat	000 Tons	2027.57	2226.54	2445.14
<b>Total Poultry</b>				
Day Old Chicks	Million No's	1,813	1,991	2,187
Poultry Birds	"	1,887	2,065	2,260
Eggs	"	23,819	25,212	26,696
Poultry Meat	000 Tons	2,160	2,362	2,583

*Notes*

1. The figures for the indicated years are statistically calculated using the figures of 2005-06.
2. The figures for Eggs (Farming) and Eggs (Desi) are calculated using the poultry parameters for egg production.

**The 7th Agricultural Census-2024-25**

The Pakistan Bureau of Statistics (PBS) conducts agricultural censuses and surveys across the country, including Gilgit-Baltistan and Azad Jammu & Kashmir. Since 1960, it has completed 24 censuses covering agriculture, livestock, machinery, and Mouza-level data, along with various allied surveys on milk production, poultry, and livestock. In its 7th meeting, the PBS Governing Council decided to merge agricultural, livestock, and machinery censuses into the integrated 7th Agricultural Census – 2024-25, aligning with international best practices and the UN's World Census of Agriculture (WCA 2020) guidelines. The 9th Mouza Census-2020 was completed as a preparatory step.

PBS has modernized data collection by deploying digital technologies, including connectivity-enabled tablets, GIS-based monitoring dashboards, and in-house software for data management. These advancements build on its experience with the 7th Population & Housing Census, enhancing efficiency and security. A two-tier training program equipped 350 Master Trainers to train 7,868 field staff, utilizing interactive digital tools for effective learning.

The census is a collaborative effort involving federal and provincial governments, academia, and local institutions. Agricultural universities have supported awareness campaigns, while provincial departments have contributed expertise and manpower. With fieldwork completed in 24 districts and ongoing in 136, PBS is set to finalize data collection soon, aiming to publish the report by June 2025 to inform agricultural policy and development.

## **Projects in Livestock Sector**

**Antimicrobial Resistance (AMR) Initiatives in Pakistan:** Building on the achievements of Phase I (2019–June 2023), the UK government has allocated an additional £6 million for Phase II (January 2024–December 2025) of the Fleming Fund Country Grant (FFCG) Pakistan. This phase aims to strengthen AMR surveillance, enhance laboratory capacities, and promote data-driven policymaking under the oversight of the MoNFSR AMR Coordination Unit (AMR-CU). A key milestone includes the launch of the National AMR Surveillance Strategy in Aquaculture, alongside multiple training workshops on AMR surveillance, microbiology techniques, and bio-inventory management.

To foster collaboration and data sharing, several MoUs were signed with private sector stakeholders. Surveillance programs in aquaculture and animal health were also initiated, ensuring a more comprehensive approach to AMR monitoring. Public engagement was a major focus, highlighted by the nationwide observance of World AMR Awareness Week (WAAW) 2024, which featured awareness walks, symposiums, and stakeholder engagement events.

Additionally, a Technical Working Group (TWG) was formed to streamline AMR data reporting and inform policy development. A workshop on data-driven decision-making was conducted to strengthen evidence-based policymaking. These initiatives are instrumental in generating high-quality AMR data, promoting responsible antimicrobial use, and ensuring the long-term sustainability of AMR containment efforts in Pakistan.

**National Peste des Petits Ruminants (PPR) Eradication Programme; Phase-I, Risk Based PPR Control in Sheep and Goats of Pakistan:** This project was initiated in 2020-21 with an allocated budget of Rupees 1787.71 million by the National Veterinary Laboratory. It is in line with international commitments to eradicate the PPR disease by 2030. PPR, a highly contagious viral illness affecting sheep and goats, poses significant threats to animal health, livestock trade, and farmer livelihoods due to its high morbidity and mortality rates. The successful completion of this initiative is set to make Pakistan PPR disease-free and eligible for World Organization for Animal Health (OIE) Certification.

Key activities within the project encompass the procurement and distribution of PPR vaccines, training of veterinary personnel in sample collection, storage, and diagnosis, and provision of necessary laboratory equipment. A total of 19.85 million doses of PPR vaccine have been procured and distributed, with preventive vaccination campaigns commencing from May 2022. Provinces maintain emergency reserves, and awareness materials are circulated among farmers to facilitate disease control efforts.

**Pakistan’s Collaboration with the World Organization for Animal Health (WOAH) on Animal Health and Trade:** Adhering to WOAH standards is crucial for ensuring sanitary trade between countries, as required under WTO agreements. As a WOAH member, Pakistan must regularly report animal disease data to facilitate international trade and inform trading partners. To streamline this, WOAH manages the online World Animal Health Information System (WAHIS), where the Animal Husbandry Commissioner’s office submits biannual reports and immediate notifications for Transboundary Animal Diseases (TADs), zoonotic diseases, and emerging or re-emerging animal diseases—critical information for regional and global markets.

WOAH-sponsored technical experts have played a key role in legislative advancements and have successfully completed their contribution to the drafting of *The Pakistan Animal Health, Welfare, and Veterinary Public Health Act*. This draft legislation is designed to align Pakistan’s disease surveillance, animal welfare, and veterinary public health policies with international best practices.

Beyond legislative support, WOAH’s involvement extends to vital programs such as the WOAH Laboratory Training Program, Performance of Veterinary Services (PVS) evaluations, and veterinary service gap analysis. These efforts reflect WOAH’s commitment to enhancing Pakistan’s veterinary services, ultimately strengthening the country’s animal health sector and its global trade position.

**Emergency Centre for Transboundary Animal Diseases (ECTAD):** With a budget of \$1 million, FAO Pakistan, in collaboration with its Emergency Centre for Transboundary Animal Diseases (ECTAD) Asia-Pacific, is implementing a project to strengthen Pakistan’s animal health systems. Supported by USAID and running from 2023 to 2027, the initiative focuses on enhancing the country’s capacity to detect, prevent, and respond to zoonotic and transboundary diseases, including antimicrobial resistance (AMR).

As part of this effort, FAO conducted a comprehensive study on Pakistan’s Animal Disease Surveillance System, which has been endorsed by the Ministry of National Food Security and Research. This program study aims to improve the emergency preparedness under the One Health approach. Operating in over 45 FAO member countries, ECTAD will play a crucial role in preventing the spread of high-impact animal diseases, ultimately protecting both human and animal health at national, regional, and global levels.

**Action to Support Implementation of Codex AMR texts (ACT):** Antimicrobial resistance (AMR) in food producing animals is, is a major concern of foodborne AMR, where resistant bacteria spread to humans through food. To address this issue, the *Action to Support Implementation of Codex AMR Texts (ACT)* project, is launched by the FAO PAK which is funded by the Republic of Korea with a budget of \$10 million, is supporting Pakistan and five other countries—Bolivia, Cambodia, Colombia, Mongolia, and Nepal—in implementing international Codex Alimentarius standards to mitigate foodborne AMR.

Continuing from July 2021 to July 2026, the project is aimed to strengthen monitoring, surveillance, and risk management of foodborne AMR by developing global tools and country-specific approaches based on Codex standards. Key activities include raising awareness, improving data collection, supporting integrated monitoring of antimicrobial use (AMU) in food production, and enhancing national capacities to manage and control foodborne AMR. By ensuring the effective implementation of these standards, the project seeks to reduce the spread of AMR and provide a model for future interventions in other regions.

### **PSDP projects and Other Policy Measures:**

**National Program for Animal Disease Surveillance, FMD & PPR Control, Track & Traceability IN Compliance with National and International Standards:** The National Program for Animal Disease Surveillance, FMD & PPR Control, and Track & Traceability in compliance with National and International Standards. was approved in principle during the Central Development Working Party (CDWP) meeting on October 10<sup>th</sup>, 2025 worth of 7350 million PKR. The program is designed strengthen national disease surveillance and control systems, enabling Pakistan to move from FMD Stage 2 to FMD Progressive Control Pathway (PCP) Stage 3 and advance PPR eradication efforts in line with WOAHP global commitment. Implementation of this project will enhance compliance with international sanitary standards, improve animal health governance, and significantly reduce trade barriers for livestock and livestock products by ensuring disease-free zones and traceable animal movements.

### **Expansion of Export Markets**

- a) Actively pursued the registration of slaughterhouses and dairy companies with international regulatory bodies (e.g., GACC for China) to increase exports of meat, dairy, and other animal-origin products.
- b) Facilitate the registration of new meat exporters with key trade partners, including Saudi Arabia, UAE, Iran, and Uzbekistan.
- c) Developed and submit technical dossiers to potential new markets such as Russia, Malaysia, China, Oman, Vietnam, Hong Kong and Singapore to ensure compliance with their import requirements.
- d) Successfully obtained sanitary equivalence with Azerbaijan for export of meat and dairy products.

### **1.5.1 Submission of Animal Disease Data to World Organization for Animal Health (WOAH):**

Adhering to WOAHP standards is crucial for ensuring sanitary trade between countries, as required under WTO agreements. As a WOAHP member, Pakistan must regularly report animal disease data to facilitate international trade and inform trading partners. To streamline this, WOAHP manages the online World Animal Health Information System (WAHPIS), where the Animal Husbandry Commissioner's office submits biannual reports and immediate notifications for Transboundary Animal Diseases (TADs), zoonotic diseases, and emerging or re-emerging animal diseases—critical information for regional and global markets.

Epidemiology Section submitted six monthly reports for the current year to facilitate trading partners regarding the situation of animal diseases in Pakistan.

### 1.5.2 Harmonization of Trade Regulations:

- a) Strengthen veterinary health certificate agreements with key destinations to facilitate smooth trade of livestock and animal products.
- b) Align sanitary protocols with China such as signing of donkey meat protocol.
- c) Following is the list of harmonized health certificates for the current year:

Sr. No	Harmonization of Veterinary Health Certificate	Country	Import/Export
1	Veterinary Health Certificate for Bovine Semen	France	Import
2	Veterinary Health Certificate for Day old Chicks/ Hatching Eggs	New Zealand	Import
3	Veterinary Health Certificate for Dairy Products	China	Export
4	Veterinary Health Certificate for live fish, feed meal from fish and food products	Russia	Import
5	Veterinary Health certificate for Bovines	Netherlands	Import

### 1.5.3 Expansion of Export Markets:

Actively pursue registration of slaughterhouses and dairy companies with international regulatory bodies (e.g., GACC for China) to increase exports of meat, dairy, and other animal-origin products. Following companies have been registered with GACC for export of dairy products:

- i. M/s Gourmet Foods,
- ii. M/s Fauji Foods,
- iii. M/s Friesland Campina Engro
- iv. M/s Haleeb foods
- v. M/s Millac Foods

Facilitate the registration of new meat exporters with key trade partners, including Saudi Arabia, UAE, Iran, and Uzbekistan.

Develop and submit technical dossiers to potential new markets such as Russia, Malaysia, China, Oman, Vietnam, Hong Kong and Singapore to ensure compliance with their import requirements.

### 1.5.4 Enhancing EU Exports

- a) Continue implementing the annual residue monitoring plan in collaboration with the Animal Quarantine Department and NIAB Laboratories Faisalabad to maintain and expand the export of animal casings to the EU.
- b) Increase the number of registered exporters on the EU's TRACES NT system for animal casings, gelatin and crushed horns, hoofs, and big game hunted trophies.

### **1.5.5 New Export Avenue for Donkey Meat and Hide Trade:**

The export of donkey meat, hides, and related products offers a niche market with strong growth potential, driven by rising demand in China where donkey meat, milk, and Eijiao (gelatin) are valued for their nutritional and medicinal properties. To support this trade, the Federal Government has signed sanitary protocols with China for these exports, encouraging foreign investment, strengthening bilateral ties, and creating employment and livelihood opportunities for local farmers. A new license has been granted to M/s Shahzad and Shao to establish a donkey slaughterhouse in the Gwadar Free Zone, raising the total number of licensed companies to two beside M/s Hangeng Trade.

### **FUTURE PLANS**

24. The Future Plans will continue to focus on
  - a. Inter – Provincial Coordination for development of livestock sector,
  - b. Coordination with private sector to promote value addition in livestock industry and diversification of livestock products,
  - c. Control of Trans-boundary Animal Diseases (FMD, PPR, LSD, Bird Flu etc.) of trade and economic importance through provincial participation,
  - d. Implementation of National Foot and Mouth Disease (FMD) Official Control Program in the country that will facilitate entry into international markets such as Indonesia, Malasia, China etc.
  - e. Exploring new markets for export of halal meat and dairy products with focus on Global Halal Food Trade Market
  - f. Development of National Livestock Breeding Policy
  - g. Development of National Poultry Policy
  - h. Development of Export Policy for livestock Products
  - i. Breed improvement under Agriculture Transformation Plan; that has the objective to enhance national agricultural output and livelihood of farmers.
  - j. Task Force on Livestock for sectoral development.

## **PART –II**

### **ATTACHED /AUTONOMOUS DEPARTMENT OF M/O NFS&R**

#### **1. NATIONAL FERTILIZER DEVELOPMENT CENTRE (NFDC)**

National Fertilizer Development Centre (NFDC) was established in 1984 under the umbrella of Planning and Development Division. In 2018, the center was transferred from M/o Planning, Development and Special Initiatives to M/o National Food Security and Research (NFS&R). As a result of rightsizing process in Federal Government, NFDC which was a technical section of MNFSR has been merged with Economic Wing vide Notification No. 12-4-2024-P-002 dated 9<sup>th</sup> April

2025. The key function of NFDC is to give unbiased policy recommendations on various fertilizer related issues from factory gates or port of entry to farmer field. Salient achievement/activities of NFDC during 2024-25 are given below:

**a) Achievements**

- i. On the basis of NFDC forecast, full quantity of allocated gas is being provided to FFBL plant resulting in smooth availability of urea and reduced reliance on imports. This initiative has resulted in additional urea production of 30 thousand tonnes per month.
- ii. Two SNGPL network-based urea manufacturing plants (Agritech and Fatima Fert) have been operational since April 2023 which has resulted in additional production of 75 thousand tonnes per month. This initiative has led to buildup of sufficient buffer stocks (> 300 thousand tonnes per month) of urea resulting in price reduction by 6.5 % during 2024-25.

**b) Activities**

**i. Monthly Fertilizer Review Reports**

NFDC published twelve (12) monthly fertilizer review during 2024-25, which provided updates on supply / demand situation of different fertilizers in general and that of urea and DAP in particular. Further, international and domestic prices of fertilizer products are also reported for the readers.

**ii. Annual Fertilizer Review**

Publication of Annual Fertilizer Review (AFR) is one of the regular activities of NFDC. The AFR 2023-24 has been published. It contains season wise (Kharif 2023 & Rabi 2023-24) and financial year wise (2023-24), extensive details of supply/demand situation, domestic production, import and offtake at national, provincial and district level along with domestic and international price trend etc. Collection and compilation of the data for AFR 2024-25 is in process.

**iii. Fertilizer Demand Forecasting**

Fertilizer demand forecasting was done on short, as well as long-term basis. Under short term approach, the monthly fertilizer demands up to Kharif (September) 2026 was estimated, while on long term basis, annual estimates up to 2030 were calculated.

**c) Other Important Activities**

- i. NFDC is acting as secretariat of Fertilizer Review Committee (FRC) as a result of its transfer from Ministry of Industries & Production to Ministry of National Food Security & Research.
- ii. Compilation of daily fertilizer prices up to district level and furnishing it to Honourable Minister NFSR.

- iii. Regularly updated and maintained national data on fertilizer production, imports, sales, domestic and international prices. NFDC also maintained the relevant record of data up to district level.
- iv. NFDC participated and contributed in the meetings convened by Federal Committee on Agriculture (FCA), Fertilizer Review Committee (FRC), Pakistan Standard and Quality Control Authority (PSQCA) and Agriculture Policy Institute (API).
- v. NFDC has provided information and technical support to Ministry of National Food Security & Research to ensure timely availability of fertilizer at affordable prices.
- vi. Regularly updated Ministry dashboard pertaining to Urea and DAP supply/ demand (production, import, offtake) and price situation on weekly and daily basis.
- vii. Reply to National Assembly / Senate questions relating to fertilizer availability and prices were prepared for M/o NFS&R.
- viii. Fertilizer related statistics including prices and offtake along with analysis was provided to Ministry of Finance for Economic Survey 2024-25.
- ix. Centre provided information/data in the form of questionnaire and position papers to international organization like International Fertilizer Association (IFA), Paris, France and Food and Agriculture Organization (FAO) of United Nations.
- x. Data was provided to Economic Wing M/o, NFS&R for Agriculture Statistics of Pakistan 2023-24.
- xi. Contributed and provided information/data in the form of briefs and position papers to national organizations like Pakistan Bureau of Statistics (PBS), Federal Board of Revenue (FBR), Ministry of Industries and Production, Ministry of National Food Security and Research (NFS&R), provincial agriculture departments and Fertilizer Industry like Fauji Fertilizer Company (FFC), Engro Fertilizer Limited (EFL) etc.
- xii. Assisted Ministries of Petroleum, Industries & Production, Commerce and Finance and Competition Commission of Pakistan through technical expertise and data input keeping ever changing scenario of the fertilizer sector in an oligopolistic market.
- xiii. Provided comments supported by technical analysis on policy issues like export of urea by Engro Fertilizers, export of SOP from Gwadar Free Zone, export of potash by FMC, Pakistan Green Taxonomy Development, urea import requirement under credit facility, Revenue collection as a result of 5% GST on fertilizer and its impact on prices, import of 200 kt urea from Turkmenistan, fertilizer procurement under credit facility, procurement plan of TCP.
- xiv. Provided material/comments for 9th Session of Pakistan-Russia Intergovernmental Commission on Trade, Economic, Scientific and Technical Cooperation.

- xv. The E-office initiative launched by NITB of M/o Information Technology & Telecom under the directive of PM office has been adopted successfully.

## **2. National Veterinary Laboratories (NVL)**

The National Veterinary Laboratory (NVL) is a subordinate office of the Ministry of National Food Security & Research which is ISO 9001:2005 and ISO 17025:2017 accredited and formally designated as the National Reference Laboratory for Transboundary Animal Diseases (TADs). Its core mission is to deliver essential diagnostic, surveillance, and advisory services to the national livestock sector, with the strategic objective of enhancing sectoral profitability through advanced disease control and prevention initiatives.

### **1. Core Functional Mandates:**

- I. **National Reference Laboratory:** Serves as the national lab for the diagnosis and surveillance of Transboundary Animal Diseases (TADs), zoonoses, and diseases of significant economic and trade consequences.
- II. **Food Safety & Compliance:** Conducts comprehensive veterinary pharmaceutical residue analysis in livestock, poultry, and their by-products to ensure adherence to the stringent Sanitary and Phytosanitary (SPS) standards mandated by the World Trade Organization (WTO) and the European Union (EU).
- III. **Quality Assurance:** Executes rigorous quality control testing of veterinary biologics (vaccines) to guarantee their safety, efficacy, and potency.
- IV. **Epidemiological Support:** Provides expert technical assistance and surge capacity to provincial and regional livestock departments for the management of highly pathogenic and emerging disease outbreaks.
- V. **Capacity Building:** Develops and delivers specialized training programs and advanced refresher courses in state-of-the-art diagnostic methodologies for field and laboratory personnel.
- VI. **International Collaboration:** Fosters strategic partnerships with national entities, as well as key international organizations including the World Organization for Animal Health (WOAH), the Food and Agriculture Organization (FAO), the World Health Organization (WHO), and The Fleming Fund UK to advance animal and public health standards.

**VII. Antimicrobial Resistance (AMR) Focal Point:** Functions as the nation's principal center for diagnostic services related to antimicrobial-resistant pathogens and serves as the designated national focal point for livestock AMR surveillance and response.

## **2. Operational Structure:**

The NVL's technical operations are organized into four specialized sections:

- I. Disease Diagnostic & Surveillance (D&S)
- II. Vaccine Quality Control (VQC)
- III. Residue and Drug Testing (DRT)
- IV. Molecular Diagnostics & Genomics (MD&G)

During 2024-25, the Disease Diagnostic & Surveillance Section served as the nation's cornerstone for strategic and operational leadership in combating high-impact Transboundary Animal Diseases (TADs). The section's critical efforts were focused on surveillance and diagnosis of Foot-and-Mouth Disease (FMD), Peste des Petits Ruminants (PPR), and Lumpy Skin Disease (LSD) that directly challenge Pakistan's economic stability, food security, and One Health integrity.

The period was marked by significant, forward-looking scientific and collaborative advancements:

- i.** The development and deployment of novel, high-fidelity molecular diagnostic assays for the precise detection of *Brucella* and *Mycoplasma* species, enhancing diagnostic accuracy and speed.
- ii.** The pioneering launch of an active antimicrobial resistance (AMR) surveillance program within the aquaculture sector, representing a proactive step to safeguard public health and aquatic food systems from the emergent threat of drug-resistant pathogens.
- iii.** The strategic enhancement of multilateral partnerships with provincial livestock departments and key international entities (including WOA, FAO, WHO, and The Fleming Fund). This synergy was instrumental in fortifying national biosecurity architectures and developing robust mechanisms to mitigate the risks of cross-border disease transmission.

A paramount achievement was the successful collaboration with the Food and Agriculture Organization (FAO) and the World Reference Laboratory for FMD (WRL-UK) to conduct advanced molecular characterization of circulating FMD viruses. This cutting-edge genomic epidemiology provided unprecedented insights into the genetic diversity and evolutionary dynamics of various FMDV subtypes circulating within the country.

**Vaccine Quality Control (VQC)** Section is a distinguished facility offering high-quality veterinary vaccines testing services to provincial and regional livestock departments upon request. It serves a vital role in monitoring key and strategic vaccines such as Avian Influenza (AI), FMD, PPR, Newcastle Disease (ND), Hemorrhagic Septicemia (HS), and Enterotoxaemia, contributing significantly to diseases control efforts nationwide.

**Residue and Drug Testing** During the year 2024–2025, this section actively engaged in a range of analytical and research-based tasks within the domain of veterinary drug residue testing and food safety monitoring. The area of specialization includes the detection and quantification of drug residues using Enzyme-Linked Immunosorbent Assay (ELISA), High-Performance Liquid Chromatography (HPLC), and Thin Layer Chromatography (TLC), as well as the analysis of heavy metals through Atomic Absorption Spectrophotometry (AAS). Over the course of the year, a total of 283 meat samples, 284 liver samples, and 9 poultry meat samples were tested for four different antibiotics, resulting in the analysis of 576 individual residue samples. Additionally, 15 honey samples were analyzed for two antibiotic residues, amounting to 30 individual tests. We also conducted finished product analysis on 9 veterinary pharmaceutical formulations; each tested for a distinct antibiotic compound. Furthermore, we are currently actively communicating with the Food and Agriculture Organization (FAO) and are preparing to collaborate with them on a forthcoming ATLASS FAO project focused on residue analysis in food products. Our laboratory continues to contribute to capacity building by regularly hosting internship students from universities across Pakistan, offering them hands-on training in modern analytical techniques. Looking ahead, we have planned to initiate activities under the National Antimicrobial Residue Surveillance Project, with a particular focus on active antibiotic surveillance during the upcoming 2025–2026 period. These efforts reflect our commitment to ensuring food safety, supporting regulatory frameworks, and advancing laboratory-based surveillance systems

### **3. National and International Collaboration**

NVL has international collaboration with following projects.

- i. WOAH Brucellosis reference Laboratory at the China institute of veterinary drug control IVDC on the Brucellosis Twinning project between IVDC and NVL

During 2024-25, successful visits occurred between Chinese and Pakistani delegations. In August 2024, a Chinese delegation visited Pakistan, under the twinning project on Brucellosis between the China Institute of Veterinary Drug Control (IVDC) Beijing and NVL Islamabad. This visit supported and funded by WOAHP, included one-week hands-on training program where Chinese experts trained professionals of NVL.

- ii. Isolation and identification and culture sensitivity of E coli and Aeromonas from Healthy Fish intestine with the support of Fleming Fund country grant.

#### **4. PSDP Project**

The National Veterinary Laboratory (NVL) continued its execution of the Public Sector Development Programme (PSDP) project, "National Peste des Petits Ruminants (PPR) Eradication Program: Phase 1 - Risk-Based PPR Control in Sheep and Goats in Pakistan." With a total allocation of Rs. 1,787.71 million over a five-year period (2020-2025), the project's primary objective is the nationwide eradication of PPR.

To support this goal, NVL distributed 5 million doses of PPR vaccine, diagnostic kits, field consumables, and conducted awareness workshops across all provinces and regions for both preventive and emergency vaccination campaigns. Furthermore, the project enhanced national diagnostic capacity by provisioning essential equipment and consumables to NVL and provincial PPR diagnostic laboratories. This strategic support significantly strengthened Pakistan's capabilities for PPR testing and active disease surveillance.

#### **5. Brief achievement of NVL**

The National Veterinary Laboratories (NVL) function as the national reference facility for the diagnosis and surveillance of Transboundary Animal Diseases (TADs). In this capacity, NVL processed 1,452 samples for Foot-and-Mouth Disease (FMD) and 692 samples for Peste des Petits Ruminants (PPR) and provided extensive diagnostic services—testing a total of 12,655 samples to all Provincial and Regional Livestock, Fisheries, and Wildlife Departments. Additionally, awareness and diagnostic services related to Antimicrobial Resistance (AMR) and TADs were extended to livestock farmers nationwide.

NVL successfully underwent its annual external audit by PNAC for ISO/IEC 17025:2017 accreditation, covering FMDV diagnosis, serotyping, and ESBL E. coli detection, and has renewed the ISO 9001:2015 certificate following an audit by TUV Austria, re-affirming its commitment to a robust Quality Management System (QMS).

As a key partner in national disease control programs, NVL supports Pakistan's progression to Stage 2 of the Progressive Control Pathway for both FMD and PPR. Under the PPR project, eight ELISA labs were strengthened across all provinces and regions to enhance diagnostic capabilities for FMD and PPR. The laboratory also conducted annual refresher training courses for provincial lab workers on AMR and TAD diagnostics.

NVL's services included quality control testing of 153 veterinary drugs and 350 vaccines for the Animal Quarantine Department and regional livestock departments, and a pilot study on drug residues was conducted in the Islamabad Capital Territory (ICT). The laboratory actively participates in international proficiency testing schemes, including EQAsia (round 10) for FMD, E. coli, and Staphylococcus aureus, and the NEQAS program administered by NIH for bacterial samples.

In support of local vaccine production, NVL maintains a repository of 100 fully characterized FMD virus isolates from Pakistan. The institution is also committed to building capacity, having hosted and trained more than 70 interns and students at B.Sc., M.Sc., M.Phil., and Ph.D. levels, and supported 99 internees and 13 research students in laboratory activities.

NVL engages in ongoing international collaborations, including a Laboratory Twinning Program with IVDC China and a Fleming Fellowship program under WOA and the Fleming Fund. Fleming Two Fellows from NVL received advanced training at the Doherty Institute, Melbourne University, Australia, on AMU and AMR surveillance.

Contributing to national policy, NVL participated in the Technical Working Group for AMR and the National Veterinary Lab Working Group for Aquaculture. It successfully conducted the second round of the National External Quality Assurance Scheme (NEQAS) for livestock diagnostic laboratories and completed a PSDP-funded PPR control program, which included laboratory strengthening, surveillance, vaccination, and stakeholder awareness activities. In collaboration with NIH, Islamabad, NVL also conducted a sero-prevalence study of Crimean-Congo Hemorrhagic Fever (CCHF) from a zoonotic perspective.

## **6. Picture gallery**



Training and capacity evaluation of National Veterinary Laboratories Islamabad related to Antimicrobial Resistance (AMR) by Denmark Technical University Team under Fleming Fund Country Grant.



Technical Working Group Meeting for the Development of NAP 2.0 of AMR at Islamabad



Visit of Chinese delegation from China Institute of Veterinary Drug Control (IVDC) Beijing to National Veterinary Laboratory Islamabad for training and enhancing the Brucellosis diagnostic capacity under the WOAHLaboratory Twinning Program



Visit of Chinese delegation from China Institute of Veterinary Drug Control (IVDC) Beijing to National Veterinary Laboratory Islamabad for training and enhancing the Brucellosis diagnostic capacity under the WOAH Laboratory Twinning Program.



Training program for the technical staff of Disease Diagnosis and Surveillance section of NVL on Bacterial confirmation and its AST (MIC) on BD Phoenix & MALDI-TOF under Fleming Fund, Country Grant.



BIMS Training and Management system at National Veterinary Laboratories on the successful accreditation of ISO/IEC 17025/2015 and ISO 9001:2005.



Capacity Building and field activities of National veterinary Laboratory staff



Four-day Workshop of Technical working Group on one Health AMR Surveillance at Islamabad.

### **3. DEPARTMENT OF PLANT PROTECTION (DPP)** **DETAILS ACTIVITIES, ACHIEVEMENTS & PROGRESS DURING PROCEEDING** **FINANCIAL YEAR 2024-25.**

#### **1 PLANT QUARANTINE:**

The Department implements Plant Quarantine Rules 2019 read with Plant Quarantine Act 1976 and the International Standard for Phytosanitary Measures (ISPMs) developed under the WTO-SPS negotiated International Plant Protection Convention (IPPC) of 1997. The objective is to protect national plant wealth from insects, pests and diseases through legislation and to facilitate safe trade of plant and plant materials for export and import.

#### **EUROPEAN UNION**

Pakistan is successfully exporting agro-commodities to EU member countries by meeting their phytosanitary sanitary import requirements and the department is striving hard to keep the level of interception of agricultural goods at minimum level and avoid restrictions on import of agricultural goods from Pakistan to EU countries. Kinnow (citrus) exports to EU countries are continuing.

#### **AUSTRALIA**

Pakistan has been exporting a few agro-commodities to Australia, after conducting pest risk analysis particularly rice and mango etc, Negotiations with the NPPO, Australia is underway for approval of more hot water treatment facilities to further enhance the export of mango from Pakistan to Australia. Pakistan has been mainly exporting rice and mango to Australia.

#### **ARGENTINA**

PRA of mango, potato and onion are submitted to NPPO-Argentina in August, September 2025. Response is still awaited.

#### **RUSSIA**

DPP mainly exported rice, potato and citrus to Russia. Renewal of rice establishments is being carried out to ensure compliance of Russian protocols.

#### **MEXICO**

After technical delegation visit of SENSICA NPPO-Mexico in July, 2023 response is still awaited from NPPO-Mexico for rice export. Moreover, dossiers for export of peach, citrus (kinnow), mango, guava and potato are also submitted to NPPO-Mexico and response is still awaited.

#### **CHINA**

Pakistan has shared PRA of citrus, mango, potato, rhode grass, peanut, apricot, sorghum, guava, strawberry, banana, fresh dates and melon with NPPO-China for finalization of PRA and export of these goods from Pakistan to China. Currently, market access for export of medicinal herbs to China has been granted. Moreover, China has finalized Pest Risk Analysis (PRA) with DPP for import of maize and dried nuts and its PRA is at signing stage. Currently, Pakistan is exporting more than 80 different commodities to China. DPP has registered total 24 rice exporters, 29 sesame exporters, 4 pine nuts, 8 dried red chilli facilities for export from Pakistan to China.

#### **USA**

Pakistan is currently exporting dates, mango and rice to USA. Negotiation with APHIS/NPPO, USA is in progress to finalize pest risk analysis for grant of market access of kinnow and banana from Pakistan to USA and also to allow import of mangoes from Pakistan by using Pak Electron Bean Irradiation facility. Response is still awaited from NPPO-USA.

#### **KENYA**

Kenya has granted market access for import of mango and citrus from Pakistan. PRA of avocado, lilies cut flower and chrysanthemum are under process.

#### **JAPAN**

This year, DPP got permission of exporting vapor heat treated mango to Japan without pre clearance program. PRA of dry dates is also submitted.

#### **IRAN**

Bilateral trade between Pakistan and Iran is being continued smoothly. DPP is negotiating with NPPO, Iran for export of citrus from Pakistan to Iran. Delegation from NPPO-Iran also conducted site inspection for export of maize in October, 2025. Final response is still awaited from NPPO-Iran.

#### **UZBEKISTAN**

Currently, DPP has got market access for export of mango, citrus, potato and onion from Pakistan to Uzbekistan. DPP is registering potato exporters to further enhance export of processed table potato from Pakistan to Uzbekistan.

#### **GCC AND KSA COUNTRIES**

Pakistan has been exporting almost most of the agro-commodities including rice, maize, potato, animal feed, onion, sugar etc to GCC member states by meeting their SPS requirements.

#### **THAILAND**

-PRA for export of kinnow, mango, potato, onion, fresh dates, cherry and strawberry are submitted to NPPO-Thailand. Response is still awaited.

#### **VIETNAM**

DPP has shared PRA information with NPPO-Vietnam for grant of market access for export fresh dates, melon, apricot, guava, strawberry, citrus, mango and rhode grass. Potato dossier is under evaluation. Market access of onion export was granted in August, 2025.

#### **INDONESIA**

DPP has shared PRA information with NPPO-Indonesia for grant of market access for export of onion.

**SOUTH KOREA**

PRA of kinnow, cherry and grape fruit are shared with NPPO-South Korea .Response is still awaited.

**CAPACITY BUILDING OF TRADERS/ STAKEHOLDERS**

DPP in collaboration of various departments/ organization is working for capacity building of traders/stakeholders in compliance of WTO/ IPPC - Sanitary and Phytosanitary (SPS) regime/ International Standard for Phytosanitary Measures (ISPMs) through:

- a. Collaboration with PHDEC, Climate Change, provincial agriculture departments, All Pakistan Fruit and Vegetable Exporters, Importers and Merchants Association (PFVA) and Rice Exporters Association of Pakistan (REAP) for further enhance the export of agricultural goods.
- b. DPP registered 13 treatment providers to safeguard import/ export consignments of agricultural goods. DPP has registered 22 hot water treatment plants to export mangoes to Iran, 26 hot water treatment plants for mango export to EU.
- c. Registration of Post Entry Quarantine (PEQ) station for research of new agro-commodities and for holding imported consignments of plant and plant materials, so that exotic and alien pest may not penetrate into the environment. DPP registered 10 new PEQ facilities this year.

Activities report is attached as *Annexure-A*

**2. REGISTRATION OF PESTICIDES:**

Registration Section of this Department has registered / permitted the following pesticides under different scheme during 01<sup>st</sup> July, 2024 – 30<sup>th</sup> June, 2025.

SCHEME	FORM – 1	FORM – 16	FORM – 17	Total	Total Amount Collected
Registered/Permitted	20	535	579	1134	163,294,000/-
Renewal	289	1519	959	2797	82,552,300/-

**Registration of Formulation & Refilling / Repacking Plants:**

Registration section has registered the following formulation and repacking / refilling plants during the same period.

**(It is important to note that the registration period for formulation and refilling/repacking plants through PSW registration is not included in this report.)**

SCHEME	FORMULATIO N PLANTS (FORM – 18A)	REFILLING / REPACKING PLANT (FORM – 19A)	Total	Total Amount Collected
Registered/Permitted fresh	08	27	35	10,750,000/-
Renewal	12	07	19	1,550,000/-

### **Revenue**

A revenue of **Rs. 258,146,300/-** was collected through treasury challans on account of registration / import permission, renewal / revised fee, and registration of formulation and repacking / refilling plants.

### **3. FEDERAL PESTICIDE REFERENCE AND TESTING LABORATORY:**

<b>Sr. No.</b>	<b>Month &amp; Year</b>	<b>Sample Analysed</b>
1.	July, 2024	36
2.	August, 2024	17
3.	September, 2024	44
4.	October, 2024	60
5.	November, 2024	31
6.	December, 2024	19
7.	January, 2025	15
8.	February, 2025	24
9.	March, 2025	32
10.	April, 2025	18
11.	May, 2025	36
12.	June, 2025	12
13.	July, 2025	15

### **4. LOCUST SURVEY AND CONTROL**

#### **➤ DESERT LOCUST SURVEILLANCE ACTIVITIES IN PAKISTAN 2024-25**

The routine fortnightly desert locust surveys were carried out in Tharparkar and Nara desert in Sindh, Cholistan desert in Punjab and Balochistan from July, 2024 to June, 2025. During the survey, an area of 371,700 hectares were checked, where no desert locust was seen.

#### **➤ DESERT LOCUST INFORMATION OFFICER WORKSHOP.**

Desert locust information officer workshop was held from 07-11 March, 2025 in Rome, Italy to discuss the various issues of RAMSES Database and new elocust3K App for collection of data during survey.

## Annexure-A

### Trade Figures

Facilitation/Inspection of Export and Import from 1<sup>st</sup> July 2024 to 30<sup>th</sup> June 2025

	Rice	Food Grain	Fruits Vegetables (Fresh / Dry)	Seeds & Others	Raw Cotton	Cotton/ Waste/Product	Raw Jute	Misc Items
	M.Tons	M.Tons	M.Tons	M.Tons	M.Tons	M.Tons	M.Tons	M.Tons
Exports	4559878.739	1119279.32	1918726.239	93716.5135	0	2046.559	0	1324430.523
Imports	0	3740673.131	1434791.712	134694.832	0	1399229.21	25054.705	1012365.503

Revenue Collection from 1<sup>st</sup> July 2024 to 30<sup>th</sup> June 2025

Release Order		Phytosanitary Certificates		Import Permit		Examination /Inspection Charges	Fine Charges	Total Amount
Nos.	Amount/Rs	Nos.	Amount/Rs.	Nos.	Amount/Rs.	Amount/Rs.	Amount/Rs.	Amount/Rs.
82145	410725000	158848	397120000	21118	113150000	-----	30107500	951102500

Export Monthly Progress Report of The Month of July, 2024 to June, 2025										
Month, Year	Rice	Wheat	Food Grain	Fresh / Dry Fruit Vegetable	Seeds & Other	Raw Cotton	Cotton Products	Raw Jute	Misc.	Total
July,2024	203177.776	0	154702.806	104863.278	4047.288	0	180.963	0	84124.238	551096.349
August,2024	190434.536	0	94786.247	115190.69	8405.66	0	98.578	0	99463.236	508378.947
September,2024	235796.801	0	49798.318	124148.587	21869.941	0	299.729	0	93705.517	625618.893
October,2024	368875.229	0	34703.36	139622.48	11867.846	0	535.067	0	92982.04	648586.022
November,2024	330809.938	0	89145.155	73754.144	9792.122	0	410.321	0	156639.109	640550.789
December,2024	310019.392	0	37498.543	108322.885	5503.438	0	188.003	0	211258.376	672788.615
January,2025	351149.966	0	18122.496	221187.192	9225.641	0	0	0	343176.178	942861.473
February,2025	512266.819	0	92475.362	284075.683	6360	0	0	0	30550.715	925728.579
March,2025	580751.36	0	93861.853	277508.342	4040.99	0	0	0	47906.432	1004068.977
April,2025	697848.475	0	125454.552	227131.003	2084.687	0	333.898	0	29161.451	1082014.066
May,2025	600511.522	0	136857.79	146047.583	6289.417	0	0	0	65837.3715	855543.683
June,2025	278236.925	0	211874.838	96874.392	4229.486	0	0	0	69625.859	660841.5
<b>Total</b>	<b>4559878.739</b>	<b>0</b>	<b>1119279.32</b>	<b>1918726.239</b>	<b>93716.6135</b>	<b>0</b>	<b>2048.559</b>	<b>0</b>	<b>1324430.523</b>	<b>9018077.893</b>

Import Monthly Progress Report of The Month of July, 2024 to June, 2025										
Month, Year	Rice	Wheat	Food Grain	Fresh / Dry Fruit Vegetable	Seeds & Other	Raw Cotton	Cotton	Raw Jute	Misc.	Total
July,2024	0	0	203009.226	94024.701	3904.958	0	72912.143	1239.22	18762.708	393852.956
August,2024	0	0	197636.44	223247.516	6603.707	0	93338.472	1636.607	65765.821	588226.563
September,2024	0	0	225425.372	327147.488	9110.558	0	69880.143	1612.658	119093.479	752269.676
October,2024	0	0	209907.216	263390.281	11431.991	0	78671.077	4919.782	43129.476	611449.803
November,2024	0	0	287465.049	199607.655	10823.553	0	103858.63	1955.824	488494.216	1092204.927
December,2024	0	0	438631.148	76367.066	16122.98	0	133064.09	5082.27	63672.682	730940.214
January,2025	0	0	323652.636	64917.022	24488.805	0	134537.507	4725.705	25774.784	578096.459
February,2025	0	0	308202.648	49208.14	20131.068	0	136132.527	1753.425	27380.202	542808.028
March,2025	0	0	328707.687	36326.853	10531.421	0	140973.809	703.501	21642.8	538885.071
April,2025	0	0	447135.735	24301.09	8707.709	0	176125.278	371.713	21181.015	677822.54
May,2025	0	0	473053.495	26087.336	9302.028	0	137849.923	630	57660.188	704582.97
June,2025	0	0	299846.481	50167.606	3536.036	0	121887.611	424	59808.152	535669.886
<b>Total</b>	<b>0</b>	<b>0</b>	<b>3740673.131</b>	<b>1434791.712</b>	<b>134694.832</b>	<b>0</b>	<b>1399229.21</b>	<b>25054.705</b>	<b>1012365.603</b>	<b>7746809.093</b>

Revenue Monthly Progress Report of The Month of July, 2024 to June, 2025										
Month, Year	Release Order	Amount	Phytosanitary Certificate	Amount	Import Permit	Amount	Anchorage Permit	Amount	Fine	Total
July,2024	5698	28490000	14180	35450000	2421	12105000	348	17300	112500	76174800
August,2024	8074	40370000	11676	29190000	2104	10520000	495	24750	122500	80227250
September,2024	8886	44430000	10896	27240000	2211	11055000	256	12800	125000	82862800
October,2024	10784	53920000	12325	30812500	2894	14470000	386	19300	127500	99349300
November,2024	12240	61200000	9592	23980000	1888	9440000	390	19500	7740000	102379500
December,2024	8096	40480000	12753	31882500	1367	6835000	529	26450	1755000	80978950
January,2025	5831	29155000	14500	36250000	1630	8150000	685	34250	2415000	76004250
February,2025	4869	24345000	16246	40615000	1431	7155000	542	27100	2140000	74282100
March,2025	4244	21220000	16113	40282500	1213	6065000	790	39500	5687500	73294500
April,2025	4202	21010000	13226	33065000	1431	7155000	710	35500	9657500	70823000
May,2025	4217	21085000	14888	36720000	1333	10220000	846	42300	142500	68209800
June,2025	5004	25020000	12653	31632500	1195	9980000	507	25350	182500	66840350
<b>Total</b>	<b>82146</b>	<b>410726000</b>	<b>158848</b>	<b>397120000</b>	<b>21118</b>	<b>113150000</b>	<b>6482</b>	<b>324100</b>	<b>30107800</b>	<b>951426600</b>

## **4. PLANT BREEDERS' RIGHTS REGISTRY**

Pakistan has a comprehensive and business friendly legislative framework in place to regulate its evolving seed industry. To safeguard commercial rights of developer of new plant varieties, Plant Breeders' Rights (PBR) Registry was established as an attached department of the Ministry of National Food Security & Research.

### **ACHIVEMENTS/ACTIVITIES OF PBRR**

#### **1. PLANT VARIETY PROTECTION**

Details of Plant Variety Protection (PVP) related activities performed by the PBR Registry during 2024-25 are as under:

<b>Sr. No</b>	<b>Activity</b>	<b>Goals in KPIs</b>	<b>Achievements</b>
1.	New applications received	30	54
2.	PVP certificate issued	15	44
3.	PBR Journal Publication	-	4

#### **2. SCOPE OF PROTECTABLE CROPS**

List of the crop species for which IP protection is available was extended to 240 crops during 2024-25.

#### **3. FUNCTIONALIZATION OF PLANT VARIETY PROTECTION ADVISORY COMMITTEE**

First meeting of the Plant Variety Protection Advisory Committee (PVPAC), apex advisory forum was held on 3<sup>rd</sup> June 2025 at Ministry of National Food Security & Research (MNFS&R) under the chairmanship of Honorable Secretary MNFS&R. the participants discussed matters regarding formulation/ functionalization of Research Incentive Boards (RIBs) at provincial level, seed royalty distribution, farmers rights, getting UPOV membership and seed market surveillance for countering infringements.

## First PVPAC meeting session at conference room of MNFS&R



### **i. NATIONAL COLLABORATION**

The Registry has been working in collaboration with various institutes in multiple domains. It is collaborating with Federal Seed Certification and Registration Department (FSC&RD) in conduction field trials for plant varietal characterization. In collaboration with key stakeholders of the seed sector, the PBR Registry has refined the morphological descriptors of major crops to improve variety characterization, thereby facilitating the establishment of distinctness among varieties. The Registry has also been disseminating information of protected as well as provisionally protected varieties to all relevant stakeholders, i.e., academia, research and communities via various means of communication.

### **ii. CAPACITY BUILDING OF NATIONAL BREEDERS**

For capacity building, PBR Registry has organized multiple guidance seminars regarding importance and functioning of PBRs in Pakistan for national breeders, both public and private sector, across the country. Moreover, PBR Registry and FSC&RD, jointly organized series of training programs/workshops on the morphological characterization of wheat and maize crops for national breeders working on these crops.



Director PBRR briefing about PBR Registry at Groundnut Research Station, Fatch Jhang



Deputy Director briefing Students and Researchers about DUS to at DUS site Tando Jam



One day workshop on DUS studies/Morphological description of Wheat at Directorate General Agriculture Research, Sindh



One day workshop on DUS studies/Morphological description of Wheat at DUS site Khanewal, Punjab



One day workshop on DUS studies/Morphological description of Wheat at DUS site NARC, Islamabad



One day workshop on DUS studies/Morphological description of Wheat at DUS site NARC, Islamabad

### **iii. DEVELOPMENT OF RESEARCH INCENTIVE BOARDS (RIBs)**

In pursuance of PBR Act 2016 section 45, Federal Government and each of the Provincial Governments has to constitute a Research Incentive Board (RIB) which shall recommend to the respective Governments incentives for the promotion of research and development, including incentives for research scientists and their teams involved in developing new plant varieties. With the help and guidance of PBR Registry, PARC has developed RIB at Federal level. Moreover, Punjab province is near to functionalize its RIB while other provinces are under process of developing RIBs.

### **iv. INTERNATIONAL COLLABORATION**

For promotion of seed sector development in Pakistan, PBR Registry remained in contact with International Union for the Protection of New Varieties of Plants (UPOV) for attaining the status of member state. For technical capacity building of officers, PBR Registry is coordinating with KOPIA, Pakistan and Naktuinbouw, Netherlands.

**v. DEVELOPMENT OF ONLINE APPLICATION MANAGEMENT INFORMATION SYSTEM (MIS)**

To facilitate the PVP seekers, promote ease of doing business and enforce the paperless office vision of the honorable Prime Minister, PBR Registry has developed online application system (<https://mis.pbrr.gov.pk/ams/login>). The system enables the applicants to apply online. Work is in progress to develop a digital Management Information System (MIS) to fully digitize the application process.

**vi. BUDGET DETAILS**

Following is the budget detail for FY 2024-25 of PBR Registry;

Head of Accounts	Released Budget
ERE	42,670,186
Non-ERE	13,289,814
Grand Total	55,960,000

**5. PAKISTAN OILSEED DEPARTMENT (POD)**

Pakistan Oilseed Department (POD) is a Sub-Ordinate office of M/o National Food Security and Research (NFS&R). Presently it is working at federal level for promotion of oilseed crops and olive cultivation. Major activities of POD during 2024-25 are as under:

**MAJOR ACTIVITIES FOR THE YEAR 2024-25:**

- A meeting of the Senate Standing Committee on National Food Security & Research on 23-07-2024 on “*comprehensive briefing on the role, working and performance of the ministry of national Food Security and Research*” and it’s all attached Department.
- A consultative meeting on “*Strategic Development Plan for Import Substitution of Edible Oil*” held on 29-04-2025 in M/o NFS&R under the chairmanship of Honorable Federal Minister for National Food Security & Research.

To address the issue of our dependence on imports of edible oils in the long run Federal government constituted a committee under the chairmanship of Dr. Muhammad Jahanzeb Khan, Special Assistant to Prime Minister (SAPM) for Government Effectiveness including all stakeholders of oilseed sector for deliberation on policy framework. Accordingly, the Pakistan Oilseed Department, M/o NFS&R has prepared a Strategic Development Plan to attain self-sufficiency in edible oil for 70% of country’s requirements in 2035 by locally producing more than 4.578 million tons edible oils. In monetary terms there would be an import substitution of US\$7.017 billion per annum by 2035.

- Collected, compiled and maintained statistics in National and International oilseed sector.
- Progress review of oilseed promotion activities and future strategies.

- Managing Director (POD) chaired internal meeting of new project Olive Culture on 20-03-2024 with Italians.

### **Expected Outcome of Strategic Development Plan**

Sr. No	Variable	Baseline	Short Term Plan (2025-27)	Medium Term Plan (2025-30)	Long Term Plan (2025-35)
			Targets		
1	Oilseed Area (000 hectare)	1,240	1,574	2,386	4,600
2	Annual edible oil Production +import substitution (000 tons)	883	1,391	2,245	4,578
3	Annual Import Substitution US\$ in billion (Rs. in billion)	0.900	2.276 (644)	3.453 (977)	7.017 (1985)
4	Cumulative Import Substitution in US\$ in billion (Rs. in billion)		4.313 (1221)	13.446 (3805)	41.108 (11634)
5	Total Fund requires US\$ in billion (Rs. in billion)		0.137 (39)	0.533 (151)	2.353 (666)
6	Mini expellers (Nos.)		400	600	1000
7	Farm Machinery (Nos)		600	900	1500

- Contributed in the completion of Pakistan Economic Survey 2024-25 on oilseed crops.
- Awareness campaigns regarding sunflower, canola and olive cultivation were carried out at different locations for promotion of these crops.
- Promoted, in collaboration with Provincial Governments, oilseed crops and oil yielding plants in the country to substitute the import of edible oil.

### **Area and Production of oilseed crops during 2024-25**

During 2024-25, 4.169 million tons edible oil (including 0.542 Million Ton oil extracted from imported oilseed) of value Rs.1407 billion (US\$ 4.971 billion) was imported. Local production of edible oil during 2024-25, is 0.474 million tons. Total availability of edible oil during 2024-25 from import and local production is 4.643 million tons.

### **Area and Production of Major Oilseed Crops.**

Year	Area: 000' Acres;			Production: 000' Tons		
	Area	2023-24		Area	2024-2025*	
		Seed	Oil		Seed	Oil
Cottonseed	5849	2142	257	5048	1807	217
Rapeseed- Mustard	897.08	389	148	1055	469	178
Sunflower	156	98.27	37	150	97	39
Canola	111.27	64	24	170	100	40
<b>Total:</b>	<b>7013.35</b>	<b>2693.27</b>	<b>466</b>	<b>6423</b>	<b>2473</b>	<b>474</b>

- Source: *Provisional Agriculture Crop Reporting Services* \*Provisional

Two mega projects titled “National Oilseed Enhancement Program” and “Promotion of Olive Cultivation on Commercial Scale in Pakistan Phase-II” is in progress.

**ACTIVITIES OF “NATIONAL OILSEED ENHANCEMENT PROGRAM” (NOEP)  
Progress Report (2024-25)**

	KP		Balochistan	
	Target	Achievement	Target	Achievement
Provision of subsidy on seed & inputs				
Canola (Acres)	5,000	2,077	10,000	Nil
Sunflower (Acres)	10,000	9,630	10,000	Nil
Sesame (Acres)	2,000	1,000	20,000	79,021
<b>Total:-</b>	<b>17,000</b>	<b>12,707</b>	<b>40,000</b>	<b>79,021</b>

**5 Years physical achievements of the project (NOEP)**

Intervention	Total Targets	Achievement up to April 30, 2025	Percent
Provision of Subsidy on Seed of sunflower, canola and sesame*	1,653,999	897,445	54.3
Provision of Subsidy on Demo plots on all three crops	587	328	56 (74 excluding Sindh)
Provision of Subsidy on Farm Machinery	1176	224	19
Mega/Smart Farmers’ gathering	423	904 (800 smart gatherings)	-

**Year wise physical progress of (NOEP)**

Fiscal Year	Targets as per PC-1	Achievements	Progress in Percent
2019-20	174,136	92,113	53
2020-21	221,961	133,455	60
2021-22	302,245	222,042	73
2022-23	405,166	233,767	58
2023-24	550,491	101,958	19
2024-25*	168,500	90,727	54

- Field survey for sesame crop to know the reasons and intensity of losses during last year monsoon in Punjab dated from 6<sup>th</sup> September 2024 to 13<sup>th</sup> September 2024.
- Focal person (NOEP) participated in “National Field day on high value oil crops (Sesame and castor bean) and food safety on 12<sup>th</sup> November 2024 at NIAB, Faisalabad.
- Field visit conducted by Focal Person (NOEP) regarding canola and sunflower at different locations of KP from 9<sup>th</sup> May 2025 to 30<sup>th</sup> May 2025.
- The 6<sup>th</sup> meeting of Federal Steering Committee (FSC) for the umbrella project titled “National Oilseed Enhancement Programme” was held under the chairmanship of Federal Secretary M/o NFS&R on 14<sup>th</sup> January 2025.

- The focal Person for Punjab, KPK and Balochistan regularly monitored the canola sunflower and sesame crop fields under NOEP project.

## National Oilseed Enhancement Programme Activities at a Glance

### Promotion of olive cultivation on commercial scale in Pakistan Phase-II



#### Olive Plantation:

According to the demand and budget availability, **622,000** local certified olive nursery plants of various varieties viz; *Arbequina*, *Koraneiki*, *BARI Zatoon-I*, *BARI Zatoon-II*, *Gemlik*, *Chemlali*, *Picual*, *Jerboui*, *Earlik*, *Ascolana*, *Manzalinna*, *Hojiblanca* were procured and distributed through project components in all over Pakistan.

A major share of olive plants 76.8% (478,026 plants) was demanded by the farmers of Balochistan province followed by Khyber Pakhtunkhwa 7.4 % (46,288), Punjab 5.5 % (34,661), Sindh 4 % (26,615), AJK 3 % (19,410), Federal 1 % (9,000) and GB 1 % (8,000). Overall, 4,607 acres have been brought under olive cultivation across the country on public and private lands.

#### Installation of Drip Irrigation System:

The development of efficient water-saving technologies for culturable waste is also the mandate of the project. Accordingly, drip irrigation system was installed on 1,000 acres involving 46 farmer sites during 2024-25.

#### Capacity Building:

45 training on Olive cultivation, Orchard / Nursery Management, value addition, oil processing and other aspects were conducted for capacity building of olive growers, stakeholders involving youth and gender by the project collaborating units. A total of 2,684 participants (average 58 participants/training) attended these training programs.



**Two days Pakolive Grand National Gala 2024 (6<sup>th</sup> Olive Festival)**



6<sup>th</sup> National olive festival “Pakolive Grand National Gala 2024” was organized at F-9 Park, Islamabad on 13<sup>th</sup> – 14<sup>th</sup> December 2024 to showcase the success story of olive sector development in Pakistan and to spread awareness about healthy and quality olive oil and its other

value-added products to the public. Honorable Rana Tanveer Hussain, Federal Minister, Ministry of National Food Security & Research graced the occasion with his presence as chief guest and inaugurated the Grand National Gala. He reiterated the commitment of Pakistani communities towards the promotion of Olive production. This is not only enhancing olive production but also providing income opportunities to communities, especially women and youth. He also stressed the need for an adequate policy that supports the rural development of the olive sector.

### **Workshop on “Innovative the Olive value Chain” Chain – Startups, Entrepreneurs & Opportunities”:**

One day Workshop on " Innovating the Olive value Chain – Startups, Entrepreneurs & Opportunities” held on 2<sup>nd</sup> May 2025 at Shaheed Zulfikar Ali Bhutto Institute of Science and Technology.

The workshop is mainly focused on olive business registration, branding, packaging, quality standards and global certification managing digital profiles to promote startups with regards to sales, quality and revenue along with training on cold press innovations and waste to energy ideas.

On this occasion, one of the Agri-Tech Entrepreneurs, Mr. Shoukat Rasool, under the brand name “LO” awarded by Honorable Federal Minister for winning silver award in New York International Olive Oil Competition, NYIOOC (world largest and prestigious Olive Oil quality contest bringing together 1,244 brands from 28 countries).



## 4th International Olive Conference:

Two days international olive conference was held on 17th & 18th June 2025 on the theme elevating the olive sector in Pakistan, innovation, sustainability, opportunities.

The conference was attended by eminent scientist researchers and stakeholders. International olive experts, Dr. Cinzea, Dr Marco, Dr. Parma, Dr. Biago from Italy, Dr. Kostas, and Dr. Philipos from Greece and Dr Maria from Portugal presented their research and insightful knowledge with the audience. Moreover, scientist from various institution of Pakistan also shared their research and development data in the conference. The conference emphasized that how Pakistan olive value chain can be a great opportunity for the world and how it's footprints can be enhanced by using holistic approach involving all stakeholders and other techniques like AI to enhance olive oil quality and exports in future.



The conference emphasized the carbon footprints and credits for olive groves and beyond. Major emphasis was given to make olive value chain sustainable, profitable in all aspects.

### **Formulation of Olive policy:**

There is a pressing need to establish an autonomous body like Pakistan Olive Oil Council/ Association to regulate and govern the newly emerged sector on sustainable basis, which will oversee the quality aspects, true labeling, good manufacturing practices, certification cover, developing linkages between growers, processors, international organizations, policy framework and public private partnership for olive sector development in Pakistan.

To achieve the result of an adequate policy support for the rural development of the olive sector, a stakeholder group has been appointed to be the core of the Pakistan Olive Oil Council (POOC) and to be established in the near future, to carry out the activity “Drafting of an Action Plan and Policy Recommendations for a holistic development of the Pakistani Olive Value Chain” (AP&PR), which is of paramount importance, as it provides innovative and creative insights to attain the stated objectives by highlighting the challenges and prospects of Pakistan’s burgeoning olive sector. The Olive Policy is submitted and in final stages for cabinet approval.

### **International Funded Olive Projects:**

*Olive Culture Scale-up Project- A Holistic and multi professional mechanism for a Pakistani olive value chain*

The previous project was completed with the grant of € 1.5 million through Pakistan Oilseed Department, AICS and CIHEAM BARI, Italy funded by government of Italy. Keeping in view the success of the current program a new phase-II program has been approved by CIHEAM BARI, Italy at the cost of € 3.00 million which will be executed during September 2024-27.

**TEVET Umbrella Project- Professional Capacity Building and Extension in Agriculture**

The project deals with specialized technical training by developing course contents and training infrastructures in olives and other fruit crops. The certain meetings for discussion and brainstorming on the contents and policy matters have been conducted between Pakistani experts and donor agency specialist. After all these meetings, a consolidated PC-I costing €20.00 million was prepared and got approved by CDWP on 22-05-2024. Hopefully in coming few months this project will be initiated after completing necessary formalities and issuing of funds from Italy.

### **Value Addition activities:**

Value addition is the key for the successful introduction of a crop. For this purpose, as a demonstration of olive farmers various products are being prepared under project.

Various edible and cosmetic products have been prepared at federal project management unit under the guidance of National Project Director i.e. Olive pickle, olive Murabba, roasted olives, olive leaf tea with blend of different ingredients, olive bam, olive moisturizing soup and hand washes and flaks for keeping olive oil fresh and easy to use.

### **Adaptability Trials:**

To examine the performance of various varieties in different Agro-climatic areas 20 adaptability trials have been planted this year. Variety wise data will be collected for morphological traits and oil quality parameters to assert the adaptability of olive in those areas.

### **Indigenous plants propagation:**

During FY 2024-25, 822,452 cuttings were planted by different project components for propagation of true to type, disease free olive nursery plants.



### **Pakistani Olive oil recognition on Global Stage:**

Amongst different areas of Balochistan, Loralai division has emerged as a premium quality extra virgin olive oil producer. One of the Agri- Tech Entrepreneurs, Mr. Shoukat Rasool, under the brand name “LO”, participated in New York International Olive Oil Competition, NYIOOC (world largest and prestigious Olive Oil quality contest bringing together 1244 brands from 28 countries). Remarkably, Pakistani brand “LO” has been declared as a winner of silver award in the competition in the category of mono varietal Extra Virgin Olive Oil. The success resulted in beating the traditional market players and creating a niche for Pakistan.

LO-Loralai Olives, born out of Pakistan’s emerging agri-entrepreneurship ecosystem, is a shining example of how innovation, quality, and local commitment can compete and win globally.

The success of LO on a global stage is a landmark moment for Pakistan. It reflects the strength of our national vision to integrate agriculture, innovation, and sustainability. This win is not just about one brand—it is about what Pakistan can achieve when government and private sector work together.

### **Issues / Bottlenecks:**

- Normally 48 to 68 % reduced release of funds are received against PC-I allocation
- Vehicles/ machinery/equipment could not be purchased due to ban under austerity measures

(2019-20, 2022-23)

- Baseless litigations/complaints hampered the pace of project activities
- Project outcomes were reduced due to the outbreak of pandemic covid 19 during 2019 to 2021.
- The higher farmer share (33%) for plantation & drip irrigation system hampered the demand among resource poor farmers, consequently less no. of applications received
- Vacant posts for the last two years could not be filled.

#### **Way Forward:**

- Formation of *Pakistan Olive Oil Association/Council* having representation of public & private sector stakeholders for regulating/ governing the olive sector
- Supporting stakeholders through trainings/guidelines HACCP - hazard analyses critical care points, GMP - good manufacturing practices, Global GAP - good agricultural practice
- Creating awareness of healthy food & olive tourism
- Promoting concept of branding, labeling, packaging, marketing & certification
- Organizing olive festivals, expos and road shows at small & large scale for olive promotion
- Preparation of holistic baseline information along with Geo mapping of olive oil production
- **Pilot interventions** for *Pomace oil extraction, Organic bio-dyes initiative, Cellulosic Ethanol production, Pomace pellets production, Cosmetics, Nutraceutical products etc.*
- For the **sustainability of the olive sector**, Govt. support should be continued for another couple of years

**Physical Progress- Province-wise (2014-25)**

Province	Plantation		Drip Irrigation		Trai ng	Oil Ext raction Unit s		Oil Lab eq uip t	Val ue Ad diti on Lab s	We ath er Sta tion	Fruit Proc Unit s	DS Nu rs. Tu nnel s	Mo th er Bl ock	Ad ap t. Trial s	Plant Prop g	Equipment 50:50					Wild oliv e graf ting
																Pos t Harv est Kits	DS Nu rs Tu nnel s (50 :50 )	Fr uit Proc es s Unit s	Oil Ex tr Unit s	Sota ge & filling Equip .	
	Plant (acre s)	Far mers	Acr es	No. of Farmer	Nos.	600 kg	100 kg														
Punjab	772,88 5,834	911	1070	50	43	1	1	1	1	1	1	2	1	14	1.25	100	1	1	2	1	40,300
Balochista	2,412,1 18,219	4185	3516	214	63	2	2	1	1	3	1	7	5	39	1.07	185	1	1	3	4	12,000
Khyber Pakhtunkh	728,73 5,535	1897	833	47	54	-	2	1	1	1	1	3	3	23	1.737	110	-	-	1	1	25,280
ICT	74,680 562	184	7	1	42	-	1	1	-	-	-	-	2	4	0.701	105	-	1	-	-	6,010
AJK	184,18 1380	3431	6	1	13	-	-	-	-	-	-	-	2	10	0.068	-	-	-	-	-	141,768
GB	79,751 591	1801	0	0	15	-	-	-	-	-	-	-	-	10	0.016	-	-	-	-	-	-
Sindh	130,36 946	98	162	6	8	-	-	-	-	-	-	-	-	9	0.002	-	-	-	-	-	40,000
<b>TOTAL</b>	<b>4,382,7 33,067</b>	<b>12,507</b>	<b>5,594</b>	<b>319</b>	<b>238</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>12</b>	<b>13</b>	<b>109</b>	<b>4.84</b>	<b>500</b>	<b>2</b>	<b>3</b>	<b>6</b>	<b>6</b>	<b>265,358</b>

## **6. AGRICULTURE POLICY INSTITUTE (API)**

Agriculture Policy Institute (API) is an attached department of MNFS&R and mainly deals with analysis of emerging policy issues in agriculture sector. On the evolving of WTO Regime and Regional Trade Agreements in place, the country needed to know/monitor the development of tradable commodities both domestically and internationally and suggest steps to position the Pakistan Agriculture in the emerging environment scenario. To advise the Government on formulating agriculture policy and to make Pakistani agriculture profitable, competitive and sustainable, the Government of Pakistan extended its role in Agriculture Sector and reconstituted APCoM as "Agriculture Policy Institute (API) in December 2006. The mandate of Agriculture Policy Institute is as under:

### **Mandate of API**

The functions of Agriculture Policy Institute are as under: -

- i. The focus will be broader on agriculture policies. Focus will be general and adjustable, keeping in view growing needs.
- ii. Conduct studies on emerging policy issues. Periodically examine, processing, storage and marketing costs of agricultural commodities and recommend policies and programs to reduce such costs and improve the competitiveness of commodities. Broader coverage and holistic approach.
- iii. Analyze the impact of important agricultural policies on groups such as consumers, processors and exporters and advise on policy adjustments needed for greater efficiency and equity.

## **During 2024-25, API carried out following major activities:**

### **A. FUNCTION UNDER THE RULES OF BUSINESS 1973:**

2. The API carried out Policy analysis for the Support Price for Wheat and Minimum Indicative Price for Sugarcane, for announcement by the provinces, under the following function under the Rules of Business 1973:

***"Function No. 14: Price stabilization by fixing procurement and issue prices including keeping a watch over the price of food grains and food stuffs imported from abroad or required for export and those required for interprovincial supplies"***.

### **B. PRICE STABILIZATION:**

3. Organized following meetings:
  - Meeting of the API Committee on Wheat was convened on September 13, 2025, to establish the Support Price for the 2024-25 crop.
  - Meeting of the API Committee on Sugarcane was organized on September 18, 2025, to determine the Indicative Price for the 2024-25 crop, being announced by the provinces.

### **C. PARLIAMENTARY BUSINESS & COORDINATION:**

4. The API provided technical and advisory support to various governmental bodies:
  - Responses were furnished to inquiries from Senate and National Assembly Standing Committees on National Food Security and Research.

- Technical input and coordination were provided to the Sugar Advisory Board, chaired by the Federal Minister for National Food Security & Research, and the Committee to Address the Increase in Sugar Prices under the chairmanship of Deputy Prime Minister.
- The institute offered technical assistance and analysis on matters related to food security.
- Prepared replies to various Cut Motions in the Budget on matters related to food security.

#### **D. TECHNICAL INPUT:**

5. The API contributed to national policy and data collection efforts:
  - The institute provided views, comments, and feedback on various topics, reports, articles, and letters on matters related to price stabilization and food security.
  - Participated in various meetings related to food security, price stabilization, de-regulation of sugar sector, Standing Committee on Commerce, Public Accounts Committee, .
  - Information was provisioned to various Federal Government Agencies and Organizations.

## **E. FOOD SUPPLIES COMMITTEE ON DEFENSE PLANNING:**

6. API provided technical input and assistance to MNFSR for
- the preparation of the Food Supplies Committee report on Defense Planning.
  - Coordinated the meetings of the Committee

### **CABINET DECISION ON RIGHTSIZING.**

- API has merged with the Economic Wing of MNFSR w.e.f 30th April 2025 .
- Out of 93 sanctioned positions, 24 Technical & 22 Non-technical vacancies abolished, 29 declared surplus and 26 retained.
- 02 Technical, 01 Accountant & 04 Support staff placed in various wings.
- Orders for delegation of powers (PAO and DDO) issued.

## **7. PAKISTAN AGRICULTURAL RESEARCH CENTRE (PARC)**

### **PAKISTAN AGRICULTURAL RESEARCH COUNCIL**

Pakistan Agricultural Research Council (PARC) is the apex national organization working in close collaboration with other federal and provincial institutions in the country to provide science-based solutions to agriculture of Pakistan through its statutory functions.

### **PLANT SCIENCES DIVISION**

Plant Sciences Division (PSD) is responsible for executing activities in coordination, research, and development pertaining to crop improvement, crop management, plant protection, plant genetic resources, food quality, and value addition.

### **National Coordinated Research**

Plant Sciences Division (PSD) oversees seven national coordinated research programs focusing on Wheat, Rice, Maize Sorghum Millet and Fodders, Pulses, Oilseeds, Sugar, and Horticultural crops. These programs are tasked with acquiring and distributing germplasm, conducting national testing, as well as planning and monitoring research activities in a coordinated manner. In accordance with the Seed (Amendment) Act, 2015, and Seed (Business Regulation) Rules, 2016, the Pakistan Agricultural Research Council (PARC) is responsible for the impartial evaluation of varieties/hybrids developed by the National Agricultural Research System (NARS) in the country.

### **CROP SCIENCES INSTITUTE (WHEAT PROGRAM)**

**Genetic Improvement/Crop improvement:** Evaluated 980 advance lines under station yield trials and national regional (multi-location) yield trials (NESWYT-A, NESWYT-B, NRYT). Based on the performance at various stages of testing, 23 advance lines were contributed to the Provincial Uniform Wheat Yield Trials in the different provinces i.e. Punjab, Sindh, KP and GB. 07 advance bread wheat lines contributed for testing in the National Uniform Wheat Trials (NUWYT) under rain fed and

irrigated conditions. In addition, 03 durum wheat advance lines tested in NUDYT during 2024-25 cropping season.



*Research trials of Wheat*

**Germplasm development and Evaluation:** Characterized and assessed 3249 test entries acquired from exotic sources for yield potential, diseases resistance, high zinc content and other traits of economic importance. 460 crosses were attempted to develop diverse recombinants. Maintained 1510 populations at different filial generations (F1-F6) and selected 1412 desirable populations for advancement and yield testing. 656 F7 head rows were planted and 150 genetically stable lines selected on the basis of disease resistance (rusts, smuts, bunt and powdery mildew), grain color and plant type.

**Rapid wheat generation advancement through Speed Breeding Technology:** 4000 new wheat lines developed rapidly through Speed Breeding Facility which saved 6 years from varietal development process. Locally we developed rapid wheat growth protocols for speed breeding.



*Pakistan's 1<sup>st</sup> Wheat Speed Breeding facility at NARC Islamabad*

**Crop management experiments:** 11 different types of crop management experiments conducted to find out the most suitable planting window, planting density, optimum fertilizers levels, Biochar and

varietal behavior, Effect of Magnesium, Climate Smart Agriculture and role of legume based cropping systems, Fertilize Right Pakistan, Biological Nitrification Inhibition, Seed Production of latest wheat cultivars and dissemination and popularization of wheat varieties at the farmer's fields and Foliar application of Urea to find out the best management practices, which should be high yielding, soil health & environment friendly and be cost effective for the farming community.

**Demo plots:** 302 wheat demo plots and 22 Field Days under various projects like PSDP-Productivity Enhancement of Wheat, C-SUCSeS, AIP-CIMMYT and Harvest Plus/NAF and Fertilize Right Pakistan ICARDA-USDA, were organized on farmer fields/ research centres in Punjab, KP, Sindh, GB and AJK.



**Seed multiplication:** Wheat varieties i.e. Pakistan-2013, Borlaug-2016, Zincol-2016, Markaz-2019, Wafaq 2023 and AZRC Dera were planted and harvested on an area of 270 acres and about 3 tonnes of wheat seed of different categories will be available for wheat farmers for the next crop cycle (2025-26).

#### *Wheat hybridization work at NARC Islamabad*

WFAQ-2023, an advance line NR-533 has been approved by Punjab Seed Council in 2025. This advance line has performing very well in Sindh (Farmer's fields / WRI Sakrand).

### **PULSES PROGRAM**

**Genetic Improvement:** The advance mashbean line “NMS 24-24” developed which ranked 1<sup>st</sup> in NUYT 2024. Second-year NUYT and DUS trials are currently in progress. The case for the advanced lentil line “NARC Lentil 24” submitted to Punjab and KP Seed Councils, while the case for “NARC Mung 24” submitted to the Punjab Seed Council. The cases of two advance lentil lines, LS-21-01 and LS-21-02, ready to be presented in the upcoming Varietal Evaluation Committee (VEC) meeting.





*Germplasm evaluation under field conditions and Hybridization in Speed Breeding Glass House*

*Field inspection and Seed production of Pulse varieties.*

### Genetic improvements in different pulses

Crop	Germ plasm evaluation	Cross Combination	Filial Generation Advanceme nt	On station trials	Multilocation trials	Disease resistant genotypes
Chickpea	172	4	110	7	2	15
Lentil	150	3	66	5	1	8
Mung	290	4	36	4	1	20
Mash	171	3	29	6	1	10
Fababean	55	-	-	3	0	0
Kidneybean	60	-	-	2	0	0
Cowpea	11	-	-	1	0	0

**Production Technology Improvement:** "Osmo priming with 0.2% KCl for 2 hours increased the yield of mung bean and mash bean by 5-10 % as compared to hydropriming and control. Optimal productivity of advance Lentil line *LS-21-02* in Pothwar can be achieved with 40 kg/ha seed rate, 30–45 cm row spacing, and 33.75–86.25 kg/ha NP levels. Application of bio stimulant at a low dose of 400 ml/acre at 50 days after sowing (DAS), or higher doses of 600 ml/acre and 800 ml/acre at 60 and 70 DAS respectively, improved chickpea productivity by 8-10 % compared to control.

### Detail of research experiments, demo plots and filed days

Crop	Research Experiments	Demonstration plots	Field days/seminars
Chickpea	1	16	-
Lentil	2	16	-
Mung bean	2	25	1
Mash	3	20	1

### Pulses seed production

Quality Seed in kg	Mung	Mash	Chickpea	Lentil	Total
Seed produced	1700	800	10000	2000	14,500
Seed sold	907	243	552	772	2,474

## **Maize, Sorghum & Millet Program**

**Evaluation of maize inbred lines for physiological traits:** 200 maize inbred lines with 02 checks evaluated under normal and cold stress conditions using an augmented block design. ANOVA showed significant genotype effects for SPAD chlorophyll ( $p < 0.05$ ), with environment strongly influencing total soluble sugar, sucrose content, SPAD chlorophyll, and canopy temperature.

**Development and evaluation of new hybrid/OPV combinations of maize:** 89 new hybrid cross combinations were developed and evaluated in the Preliminary Yield Trials (PYT).

**Evaluation of Pearl, Proso and Foxtail millet germplasm:** Evaluated 64 proso millet genotypes and 120 foxtail millet accessions phenotypically. Within the proso millet genotypes, 05 accessions displayed superior agronomic performance and good seed set. Likewise, 14 foxtail millet accessions exhibited enhanced reproductive success, along with better agronomic parameters and no plant lodging. 03 proso millet genotypes and 01 foxtail millet genotype performed well in first year NUYT evaluation

**Acquisition and evaluation of Sorghum germplasm:** 100 Sorghum accessions acquired from PGRI and planted along with the ruminant seed of 100 accessions of previous year and the data was recorded on number of plants, Stem anthocyanin, Brace roots, number of leaves, Plant type, Plant height, Head type, Head shape, Head angle, Days to male flowering and grain characters.

**Evaluation of Herbicides for Weed Control in Maize:** The study comprised 08 treatments i.e. T<sub>1</sub> = control (no weeding); T<sub>2</sub> = Hand weeding; T<sub>3</sub> = Atrazine + S-metolachlor (Pre-emergence); T<sub>4</sub> = Atrazine + S-metolachlor (Post emergence); T<sub>5</sub> = Atrazine + S-metolachlor (Pre+Post-emergence); T<sub>6</sub>=Atrazine + Mesotrione (Pre-emergence); T<sub>7</sub>= Atrazine + Mesotrione (Pre and Post emergence); T<sub>8</sub>= Atrazine + Mesotrione (Post emergence). After recording the data, the maximum yield (3155kg/ha) was recorded in T<sub>7</sub> while minimum yield (2083kg/ha) was obtained in T<sub>4</sub> treatment.

**Introduction of Tropical Adopted Inducer Lines (TAILs) and its acclimatization:** Two TAILs from CIMMYT, each with 100 seeds, were introduced, and 25 seeds per TAIL were sown in Autumn 2024, yielding approximately 700 g of P1 seed and 150 g of P2 seed under glasshouse conditions. The same material was planted in Spring 2025 in both temperature-controlled glasshouse and mash house environments. Seed setting was favorable under both conditions. P1 exhibited a high seed set without lodging, whereas P2 had low seed set and significant stem lodging.

**National Uniform Yield Trials (NUYTs):** Conducted four NUYT trials i.e. Maize Hybrid 1st year (58 entries), Maize Hybrid 2nd year (25 entries), Maize OPVs (4 entries) and Maize Sweet Corn (4 entries) trial. Phenological, agronomic (plant and cob height) and yield data collected and handed over to National Coordinator MSMF&OC.



*Pearl & Foxtail Millet Advance Lines Evalaution*



*Hybrid Cross Combination Development in Maize*



*Multiplication and Maintenance of Tails at Isolation Structures*

**FODDER & FORAGE PROGRAM**

Germplasm evaluation, purification and seed multiplication of total 579 lines i.e. Oat (42), Vetch (27), barley (60), sorghum (300), millet (120) and Sudan grass (30). Selection and evaluation of 80 oat, maize, millet, vetch and sorghum genotypes on the basis of green fodder yield, lodging resistance, stay green characteristics (late maturing). Conducted preliminary yield trials for 24 germplasm lines for oat, maize, vetch and sorghum. Thirty one (31) fodder lines contributed in National Uniform Yield Trials i.e. Rye Grass (6), Oat (5), vetch (10) and millet (10). Two rye grass lines “PARC-Ryegrass” and “NARC Ryegrass” recommended by Variety Evaluation Committee (VEC). DNA profiling and quality analysis of 5 advance ryegrass entries in progress.

**Seed multiplication:** Seed of approved Oat varieties multiplied on 120 acres, and produced ~50 ton of quality seed. Oat seed multiplication blocks at 12 villages and 24 farmers on 24 acres in Punjab, Sindh, KPK, AJ&k and GB, and produced 27.8 tons of seed.

**Trainings:** Organized farmer trainings for improved fodder production technologies at three different locations in Punjab, KPK and Islamabad with participation of 450 farmers.

			
<i>Oat seed Production at KP</i>	<i>Oat seed Production at Punjab</i>	<i>Farmer Training at Sindh</i>	<i>Farmer training at Punjab</i>

## RICE RESEARCH PROGRAM

**Germplasm acquisition and maintenance of crossing block:** 78 temperate rice lines were acquired from PGRI, and evaluated for morpho-physiological, agronomic traits and disease reaction.

A set of 58 genotypes including indigenous coarse and basmati varieties, GSR lines, temperate japonica rice genotypes were planted as a historical set and for hybridization purposes.

**Hybridization/recombinants development for combining ability and heterotic studies:** Rice breeding block comprises of 58 genotypes (historical coarse and basmati varieties, new indigenous varieties, obsolete cultivars, advanced lines and GSR lines) planted. More than 150 crosses combinations were attempted keeping in view the parameters i.e., high yield, disease (BLB, BLS) and insect resistance, short stature, short duration and lodging resistance. Out of which, 61 successful cross combinations were achieved.

**Filial generation advancement and selection:** F1: 91 new combinations raised in 2024. F2: 48 populations advanced through selection. F3: 17 populations evaluated for early selection. F4: 39 selected lines assessed for trait stability. F5: 31 lines grown to identify top performers.

Two sets of 25 F2 progeny and 51 F3 progeny were raised from seeds of succeeding generation.

Generation advancement of F<sub>3</sub> progeny was done, and 37 F<sub>4</sub> progeny seeds were harvested after selection for the next season's plantation. F<sub>4</sub> progeny of four commercial hybrids (Pride-1, WDR,

LP2 and LP18) was raised as reverse breeding for variety development, and 10 panicles were separately harvested from 10 selected plants as F5 progeny (04) for the next cycle of selection.

**Preliminary yield trial (PYT-coarse):** 44 coarse rice lines evaluated. ANOVA for yield reveals significant differences among genotypes for paddy yield. 18 advanced lines out of 44 have been selected on the basis of higher yields (>8 tons/ha).

**Advanced yield trial (AYT):** 22 GSR lines evaluated. 10 line identified further testing at multi-location on the basis of higher yield (>8 tons/ha).

**Multi-locational yield and adoptability trial:** 22 promising lines of coarse rice evaluated at 10 different rice growing zones in four provinces for stability in yield, adoptability and diseases/insect resistance. Six stable lines were selected to contribute in the NUYT and micro trials.

**National Uniform Yield Trials:** 05 advance coarse rice lines (yield 5 tons/ha) were contributed in the NUYT-2025.

**Agronomic Trials:** 02 agronomic trials were undertaken to enhance rice productivity, nutritional quality, and environmental sustainability. The first focused on zinc (Zn) biofortification, evaluating soil and foliar applications of ZnO nanoparticles and ZnSO<sub>4</sub> fertilizer on six rice genotypes (NRP-6, NRP-7, NRP-8, Vital-Super, KSK-133, and a control). Soil applications included ZnO nanoparticles at 1.5 kg/acre and ZnSO<sub>4</sub> at 5 kg/acre, while foliar sprays were applied at four concentrations during tillering and grain filling. The second trial addressed cadmium (Cd) remediation in alkaline-saline soils of rice–wheat systems by testing the synergistic application of synthetic fertilizers, vermicompost, and biochar.



*Capacity Building, and establishment of a glasshouse for the generation advancement of rice crop*  
The case for “NARC Rice-1” submitted to provincial Seed Councils of KP & Punjab for approval.



*Key features of "NARC Rice-1"*

## **OILSEEDS PROGRAM**

**Germplasm Evaluation:** Germplasm evaluated include; Sunflower (150), Rapeseed and mustard (200), Soybean (641), Groundnut (400), Linseed (100), Sesame (290).

**Selection of Germplasm:** Multiple oil seed crops germplasm were selected including; Sunflower (150), Rapeseed & mustard (20), Soybean (350), Groundnut (50), Linseed (27), Sesame (20)

**Preliminary Yield Trials:** Sunflower (12), Rape seed and mustard (100), Soybean (20), Groundnut (10), Linseed (14), Sesame (10).

**National Uniform Yield Trial:** Number of entries contributed include; Sunflower (2), Rape seed and mustard (6), Soybean (2), Groundnut (3), Linseed (0), Sesame (5).

**Variety/ Hybrid Developed:** Sunflower (2), Rapeseed and mustard (1), Soybean (1), Groundnut (2), Linseed (0), Sesame (2)

**Seed Production (in tons):** Sunflower (1), Rapeseed & mustard (35), Soybean (150), Groundnut (0.150), Linseed (5).

## **HORTICULTURE RESEARCH INSTITUTE (FRUIT RESEARCH PROGRAM)**

**Avocado:** Developed 04 Avocado varieties (NARC-Avo-S3, NARC-Avo-S4, NARC-Avo-S9 & NARC-Avo-S10) and submitted to VEC for approval. Grafted plants have also been planted in Abbottabad, Mansehra and Haripur as multiple location trial.



**Grape:** Developed 01 grape variety: “NARC-Trakya Ilkeren” and case was submitted to VEC for recommendation.



**Citrus Rootstock:** Selected 03 Citrus Rootstock varieties i.e. NARC-Cox, NARC-C35 and NARC-Troyer with characteristics of adaptable to local soil & climatic conditions and also compatible with our local scion varieties including sweet oranges, kinnow and grapefruits.



**Germplasm Unit (GPU) of fruit crop plants at NARC:**

Planted most of the registered fruit varieties under the supervision of FSC&RD to support Certified Nursery Plant Production. 25 citrus (15 exotic & 10 Local), 04 lime/lemon and 16 peach germplasm are under evaluation in the Evaluation block of GPU.

**Collection & Evaluation of fruit crop germplasm including novel fruits:**

Collected 08 germplasm of Dragon fruit & evaluating their adaptability in pothohar conditions. Initiated work on adaptability & propagation techniques of Blue Berry. Collected 66 grape germplasm with the objective to identify and select seedless, low chilling, early maturing and drying quality cultivars. Collected 25 fig germplasm with the objective to identify and select good quality fig particularly drying quality.



**Developmental Activities:** Produced 30,000 true-to-type healthy nursery plants of different fruits including avocado, citrus, almond, peach, pear, apricot, plum, fig, grape, pecan nut, guava, loquat, Jaman, falsa, Mexican lime and sweet lime for farmers.

One-day training workshop “Introduction of Novel High Value Fruit Crops, certification of nurseries, Production Certified Nursery Plants and Orchard Management” was organized where 85 stakeholders (Nursery owners, progressive farmers, Scientists & students) participated.

Provided services about fruit plant nursery & orchard, nutrient and diseases management to about 2200 Agricultural officers, Field Assistant, Extension workers, university students & farmers.

**Vegetable Crops Research Program**

**Onion:** An early maturing and high yielding (28-33 t/ha) variety “NARC Onion-1” recommended by the Provincial Seed Council of Khyber Pakhtunkwa in its 45<sup>th</sup> meeting on April 10, 2025. Developed another Onion line, “NARC Onion-5” which is early maturing & moderately resistant against major diseases & submitted to VEC for recommendation.



**Peas:** Two high yield advanced lines viz; “NARC-Pea-1” & “NARC-Pea-2” with potential

green pod yield (14.18 & 19.61 t/ha) were got registered with FSC&RD on the basis of their decoded top yield performance in National Uniform Yield Trials (NUYT) conducted across four different locations of the country.

**Developmental Activities:** Distributed 550,000 vegetable seedlings (summer & winter) & 1,000 vegetable seed kits for kitchen gardeners. Advisory services were provided to visitors (100-150) about vegetable production technology and other technical issues.

### POTATO RESEARCH PROGRAM

**Potato:** 02 Potato varieties i.e. “HRI-P1” & “HRI-P2” with virus resistance and early-maturing approved by VEC. 400 kg seed produced of these two varieties. 300 seed tubers of local crosses were produced during autumn, 2024-25. 300 kg seed potatoes of 12 advance clones were produced. 12 varieties of potato (from adaptability trials 2024-25) were evaluated for dry matter and among them 06 were selected for further evaluation on the basis of high dry matter content (>20.3-22.3%).



**Sweet Potato:** Maintained 04 Sweet Potato Clones i.e. White Star, Puertorico, Red Portugal & Hondoros.



### FLORICULTURE PROGRAM

**IRIS Flowers:** Developed three varieties of cut IRIS flowers & will be submitted for VEC approval. Distinguishing features of these varieties are as under  
“NARC-Iris-white” is seasonal with more than 67cm of height. The flower size is large with 43 cm of peduncle length. Filament color is white and maximum shelf life from yellow and white. “NARC-Iris-Yellow” is seasonal with plant height more than 57cm of height. The flower size is medium with 36cm of peduncle length. The potential cut variety having flame like spot on blade. “NARC-Iris-Purple” is



seasonal with 53 cm length. The flowers are early maturing with small size as compared to others with 21cm of peduncle length. The filament color is purple with flame like spot on blade of outer tepal. Selection of four varieties of Lisianthus (*Eustoma grandiflorum*) for F1 hybrid seed production for different color combination. The selection criteria consisted of color, Size of flowers, shape of petals and petal phenotype. The good performing flowers were selected and crosses were made among them for different color combinations and flower yield.



**Developmental activities:** Seedlings of different winter annuals (7000-8000 seedlings) were raised for hobby gardeners of Rawalpindi/Islamabad. Advisory services were provided to visitors (200-250) regarding commercial farming of cut flowers.

**INSTITUTE OF PLANT AND ENVIRONMENTAL PROTECTION (INSECT PEST MANAGEMENT PROGRAM)**



**Biological control of fall armyworm (FAW) in maize:** The study was conducted to assess the efficacy of the biological control agents (BCAs) *Trichogramma chilonis* and *Telenomus remus* against fall armyworm (*Spodoptera frugiperda*) in maize. Results revealed that BCA-treated plots exhibited significantly lower FAW infestations compared to conventional pesticide applications and untreated plots.

**Biocontrol of rice leaf folder (RLF) using *T. chilonis* and *T. japonicum* along with semiochemicals:** Field experiments were conducted to evaluate the efficacy of *T. chilonis* and *T. japonicum* against RLF under five treatments. The lowest leaf damage (26.73%) was recorded in *T. chilonis*-treated plots where rice plants were sprayed with 0.1% semiochemical, showing superior parasitism efficiency. In *T. japonicum*-treated plots, a minimum infestation of 41.84% was observed with the BCP (0.1%) application.

**Biocontrol of *Helicoverpa armigera* using *T. chilonis* along with semiochemicals:** Experiment conducted in lab to evaluate the efficacy of *Trichogramma* spp. in combination with semiochemicals against *H. armigera* eggs on chickpea, maize, and tomato plants. Semiochemicals significantly enhanced parasitism, with 12% increase in chickpea, 5% in tomato, and 3% in maize.

**Screening of Wheat entries against wheat aphid:** The feeding behavior of aphid on wheat entries was recorded using the Electrical Penetration Graph (EPG) for 8 hours. The results revealed that 3 entries exhibited high resistance, 25 entries were classified as resistant, 28 entries showed moderate resistance and 4 entries were found to be susceptible.

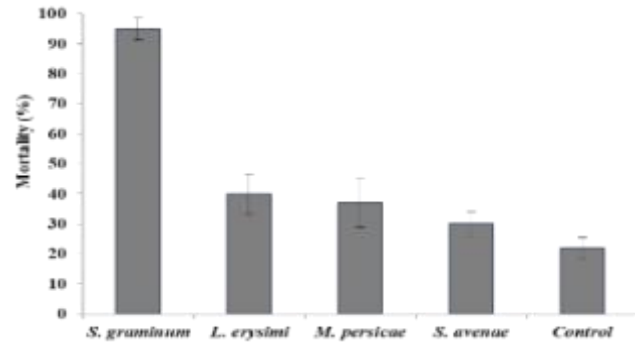
**Screening of Rice entries against insect pests:** 115 Rice hybrids were screened against Rice Leaf Folder (RLF) and Brown Plant Hopper (BPH). For coarse hybrid, 34 entries found to be highly susceptible and 81 entries classified as susceptible. Rice entries screening through EPG, 8 entries were found resistant, 8 entries were moderately resistant, and 10 entries were susceptible against BPH. In the NUYT fine rice entries screening by EPG, 9 entries were found resistant, 15 moderately resistant, and 6 susceptible against BPH.

**Evaluation of green chemistry insecticides:** Afidopyropen, a green chemistry insecticide derived from microbial metabolites, has shown promising activity against a range of sucking pests. LC50 of Afidopyropen against BPH six concentration viz., 0.005, 0.01, 0.02, 0.04, 0.08 and 0.16 were used with the comparison of Thaimethoxam. The LC50 was 0.0027 percent. Percentage mortality in afidopyropen was 94.67.

**Development of Biopesticides:** dsRNA bio-pesticides and dsRNA loaded on nanoparticles were tested for their insecticidal efficacy against brown plant hopper under field setting environment. The Nano-based dsRNA caused more mortality 82% compared to dsRNA bio-pesticides which caused 71% mortality.

RNAi-based bio pesticide (dsRNA) caused 64% mortality, while Nano loaded –dsRNA resulted in 75% mortality in wheat aphid. The botanical insecticide Alka caused 68% mortality, while nano-formulation resulted in 78% mortality in wheat aphid, which resulted in 27% mortality. Alka is commonly recommended for controlling sucking insects.

dsRNA bio-pesticides and dsRNA loaded on nanoparticles were also tested against different species of aphids (*Schizaphis graminum*, *Myzus persicae*, *Sitobion avenae*, *Lipaphis. erysimi*) in lab condition. The maximum mortality was observed in wheat aphid (95%), compared to *L. erysimi* (40%), *M. persicae* (37%) and *S. avenae* (30%).



### *dsRNA biopesticides effect on different aphid species*

Environmental Risk Assessment of Biopesticides (dsRNA based biopesticides, Microbial biopesticides, Botanical biopesticides) against non-target organisms (*Crysoperla carnea*, Ladybird beetle, and *Trichogramma chilonis*) were conducted. The research findings showed above biopesticides have no harmful effects on natural enemies.

### **NATIONAL INSECT MUSEUM PROGRAM**

National Insect Museum is Pakistan's premier center for insect biodiversity research, diagnostics, and education. With over 100,000 insect specimens, museum has country's most comprehensive reference collection. This year alone 3,000 new specimens were collected, 300 species identified. Diagnostic services extended to 03 national institutions, analyzing 17 specialized samples.

**Combatting Invasive Pests:** Surveys in 17 locations across Punjab and Khyber Pakhtunkhwa confirmed widespread infestations of *T. absoluta*, leading to targeted interventions. Pheromone and yellow light traps were used for pest disruption, while natural enemies like *Trichogramma chilonis*, *Chrysoperla carnea*, and *Coccinella septempunctata* supported biological control. In Sindh, studies revealed high susceptibility in local tomato varieties, whereas hybrid T-1057 showed resistance and higher yields. Among control options, Neem extracts were the most effective botanical, while synthetic pesticides Belt and Tracer provided superior control and significantly improved crop



**Uncovering New Species:** Added 39 Odonate species, including five new country records, bringing NIM's odonate coverage to 71%. DNA from 89 species was extracted and preserved, providing a genetic resource for future research. 27 young entomologists trained in molecular techniques, enhancing national expertise.

### **ECOTOXICOLOGY RESEARCH PROGRAM**

**Determination of pesticide residues in tomato:** 37 tomato samples were collected from different districts of Punjab and Sindh to assess the status of pesticide contamination. Previously validated analytical method was verified for 72 multi-class pesticides using LC-MS/MS. Twelve samples (32 %) were found to be contaminated with five different pesticides. The detected pesticide levels were associated with low acute and chronic risks to tomato consumers.

Method optimization and validation for analysis of acidic herbicides: Instrumental conditions (LC conditions; column temperature, flow & injection volume and MS conditions; precursor-product ion combination, polarity, fragmentor and CE) for 09 elected acidic herbicides were tested on two different column chemistries (C-18, C-8 with different particle size) and various gradients of acetonitrile and methanol with buffered water. Method selectivity and sensitivity of all the selected herbicides were higher on C-8 except 2, 4-D and MCPA.

Development and validation of analytical method for pesticide residues in Mango: A GC- $\mu$ ECD method for 15 targeted pesticides in mango samples collected from Muzaffargarh were optimized using QuEChERS extraction method. The validated method recoveries were in between 70-120%, and matrix effect was less than 20%. Twenty mango samples from Multan and Muzaffargarh were analyzed, out of which 50% were contaminated with pesticide residues.

Monitoring of pesticide residues in strawberries of Pakistan: 20 strawberry samples were collected from Islamabad Sabzimandi, brought to the lab, chopped, and stored for analysis. The QuEChERS extraction method was optimized for 61 pesticides.

#### **VERTEBRATE PEST MANAGEMENT PROGRAM**

**Development of Animal Fat Coated Zinc Phosphide (4%) Bait for Wild Boar Control:** This study evaluated the effectiveness of 4% zinc phosphide-coated maize grain bait, mixed with animal fat, as a toxicant bait for wild boar control under field conditions. During the poison baiting a total of 337 kg of bait was placed at 18 active baiting points, out of which 233 kg was consumed, resulting in an overall bait consumption rate of 69.14%. The bait consumption on the first night was highest that is 93.26%, but it decreased steadily over the next two nights due to mortalities. More than 200 dead bodies were found from the field area.



*Dead Bodies of Wild Boar Found in Nilore Field Area, Islamabad*

**CROP DISEASES RESEARCH INSTITUTE**

**Resistant Sources against Wheat Rusts and other Foliar and Seed-borne Diseases:** Evaluation of the wheat material at different hot spots of the country provided the resistant sources against rusts and other foliar and seed-borne diseases in Pakistan. Based on the resistant material, breeders select the best resistant material and ultimately used to release new variety. PARC has been providing these services to breeders and researchers for many years; due to this high high-yielding and resistant material is in the field. Wheat material is evaluated under the National Wheat Disease Screening Nursery (NWDSN) and National Uniform Yield Trial (NUYT) every year. In addition, historical lines comprised of the released wheat material are also evaluated under natural and inoculated conditions to check the status and to generate early information to stop the multiplication of the susceptible wheat varieties.

**National Wheat Disease Screening Nursery (NWDSN) 2024-25:** 898 wheat lines comprising 817 advanced lines, with the remainder checks (Morocco, Local White, Galaxy-13, and Seher-06) designed to impose maximal disease pressure. Thirty-three research institutes, stations, and private seed companies contributed their top germplasm, which was evaluated across 14 locations in Pakistan identified as rust hotspots, as well as zones for spot blotch and powdery mildew. The results indicated that only 9 lines exhibited desirable ACIs across all three rust types (leaf, stem, and yellow), 296 lines showed desirable ACIs for both leaf and yellow rust, 3 lines for leaf and stem rust, 4 lines for stem and yellow rust, **77 lines** had ACIs below 9 for yellow rust only, 170 lines for leaf rust only, 3 lines for stem rust only. A subset of the resistant lines will be nominated as candidate varieties for the 2025–26 wheat season, pending confirmation of acceptable agronomic traits.

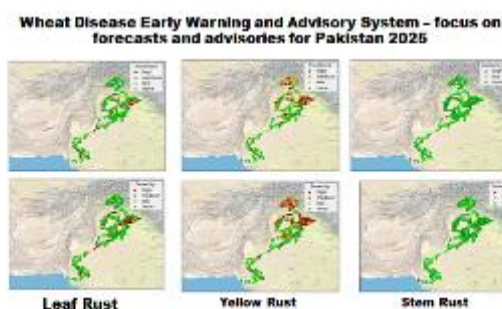
**National Uniform Yield Trial (NUYT) 2024-25:** 72 promising candidate lines of bread wheat, sixty-nine candidate lines (Nursery), two released commercial varieties (Akber-19 and Arooj-22), and a universally susceptible check, Morocco evaluated at the 14 locations in Pakistan. None of the line was resistant to all three rusts during two consecutive years. Fourteen candidate lines i.e. 10-HP-435 (NIBGE-Faisalabad), V-21243 (WRI-AARI, Faisalabad), V-19317 (WRI-AARI, Faisalabad), TWS-19125 (AZRI- Bhakkar), SDW-4 (NIA-Tandojam), TRB-72-311(ARI-Peshawar), DN-140 (ARI-D.I. Khan), NRL-1901 (NIFA- Peshawar), BRS-38 (ARI , Quetta), V-20330 (WRI-AARI, Faisalabad), NR-595 (NARC, Islamabad), BF-21151 (RARI-Bahawalpur), N-GANDUM-10 (NIBGE-Faisalabad) and N-GANDUM-11 (NIBGE- Faisalabad), showed desirable RRI 6 and above to leaf and yellow rusts during two consecutive years. Two candidate lines, NW-103 (NIAB-Faisalabad) and NBW-50(NIA-Tandojam), were found resistant to leaf rust only. Only one candidate line V-7016S1 ((WRI-AARI, Faisalabad) showed desirable RRI to yellow rust during two consecutive years 2023-24 and 2024-25.

**Wheat Disease Early Warning Advisory System (DEWAS)-Surveillance and Diagnostics:** The key objectives of the national wheat disease surveillance initiative are: to conduct regular monitoring in major wheat-growing regions. 618 wheat fields were surveyed across different regions of Pakistan. Disease severity and incidence were categorized as Low: <20%, Moderate: 20–40% & High: >40%. Key findings are:

**Leaf Rust**

- Detected in 62 out of 618 fields (10% prevalence)
- Moderate to high incidence observed in 25 fields (40% of infected fields)
- Moderate to high severity observed in 33 fields (53% of infected fields)

**Stripe Rust**



- Detected in 235 out of 618 fields (38% prevalence)
- Moderate to high incidence in 63 fields (27% of infected fields)
- Moderate to high severity in 117 fields (50% of infected fields)

**Stem Rust**

- Detected in only 2 out of 618 fields (<1% prevalence)
- Moderate to high incidence in 1 field (50% of infected fields)
- Moderate to high severity in 1 field (50% of infected fields)

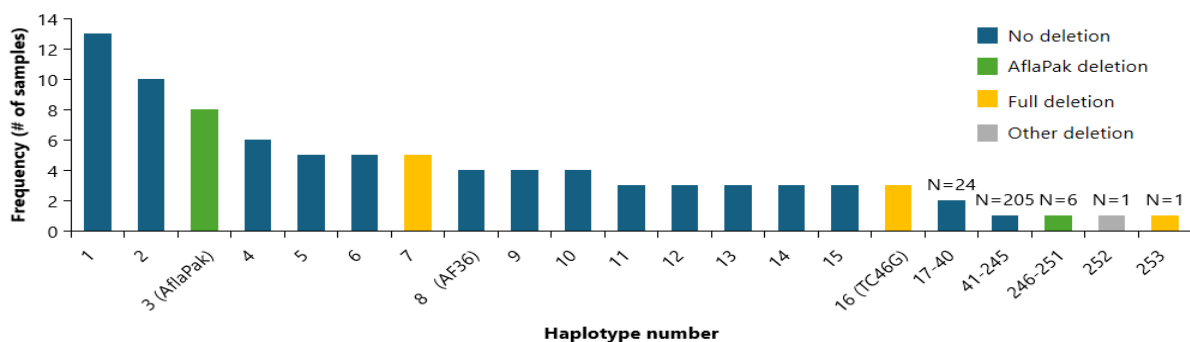
**Screening of rice against Bacterial Leaf Blight:** Fifty-six OP rice varieties (30 fine and 26 coarse) and 200 rice hybrids and several advance lines were screened against bacterial leaf blight (BLB) of rice. Forty-five-day-old seedlings were inoculated by the leaf clipping method in the field.



Data scoring and response of rice germplasm against *X. oryzae* pv. *oryzae*.

**Screening of Maize, Millet & Sorghum against Charcoal and Stalk rot:** 168 lines of maize, 29 lines of Sorghum, and 3 lines of Millet were evaluated against Charcoal rot. One line was resistant in maize, 21 lines were moderately resistant and 8 showed a resistant response in sorghum. In millet, all lines showed a moderately resistant response.

**Aflatoxin bio-control in Chilies:** 09 atoxigenic strains were identified based on Cluster Amplification Pattern (CAP) analysis from *Aspergillus flavus*. Based on 17 simple sequence repeat (SSR) markers, 253 unique haplotypes were recovered. Seven haplotypes had the same deletion pattern as the AflaPak genotype whereas three haplotypes (N= 3) had a complete deletion of the aflatoxin biosynthesis gene cluster. These atoxigenic strains will be evaluated in the lab and the best performing strain(s) will be applied in the field.



Graph showing diversity and frequency of *A. flavus* genotypes associated with chilies

**Provision of Plant Viruses Diagnostic services to Public/Private Sector through PATCO:** 4848 ELISA tests were conducted on potato leaves, including commercial samples received from different

clients. Out of these 4848 tests, 906 were for PepsiCo. Intl., 3720 (3504 leaf & 216 tubers) were for Fauji Fresh & Freeze (Ltd.), 138 were of Western Agri. Pvt. Ltd., 12 were from Jaffer Brothers (Pvt.) Ltd. & 72 were from Ali orchards.

**Sugarcane Hot water treatment and Single bud planting Demonstration Trials:** The initial data showed an increased germination in treated seed i.e. up to 85 % as compared to 46 % germination in untreated seed plots. Similarly, the plants grown from single buds showed a higher number of tillers per plant i.e. up to 19 tillers as compared to 6 tillers per plant produced in plants grown from seed cuttings as per farmers' practice.

**Virus indexing and management in Seed Potato Production:** Being partner with NIGAB, and KOPIA for the production of certified seed potato in Pakistan with a role to index all seed crops for major potato viruses and monitoring and managing the overall health of seed crops. About 4830 random and symptomatic samples were collected from all the KOPIA facilities at NARC and ELISA was performed against six potato viruses i.e. PVX, PVY, PLRV, PVA, PVM & PVS. A few plants samples from greenhouses and screen houses were tested positive for any of the tested viruses while all other crops were found absolutely virus free. The virus-positive samples were traced back and roughed out. It continues throughout the season.

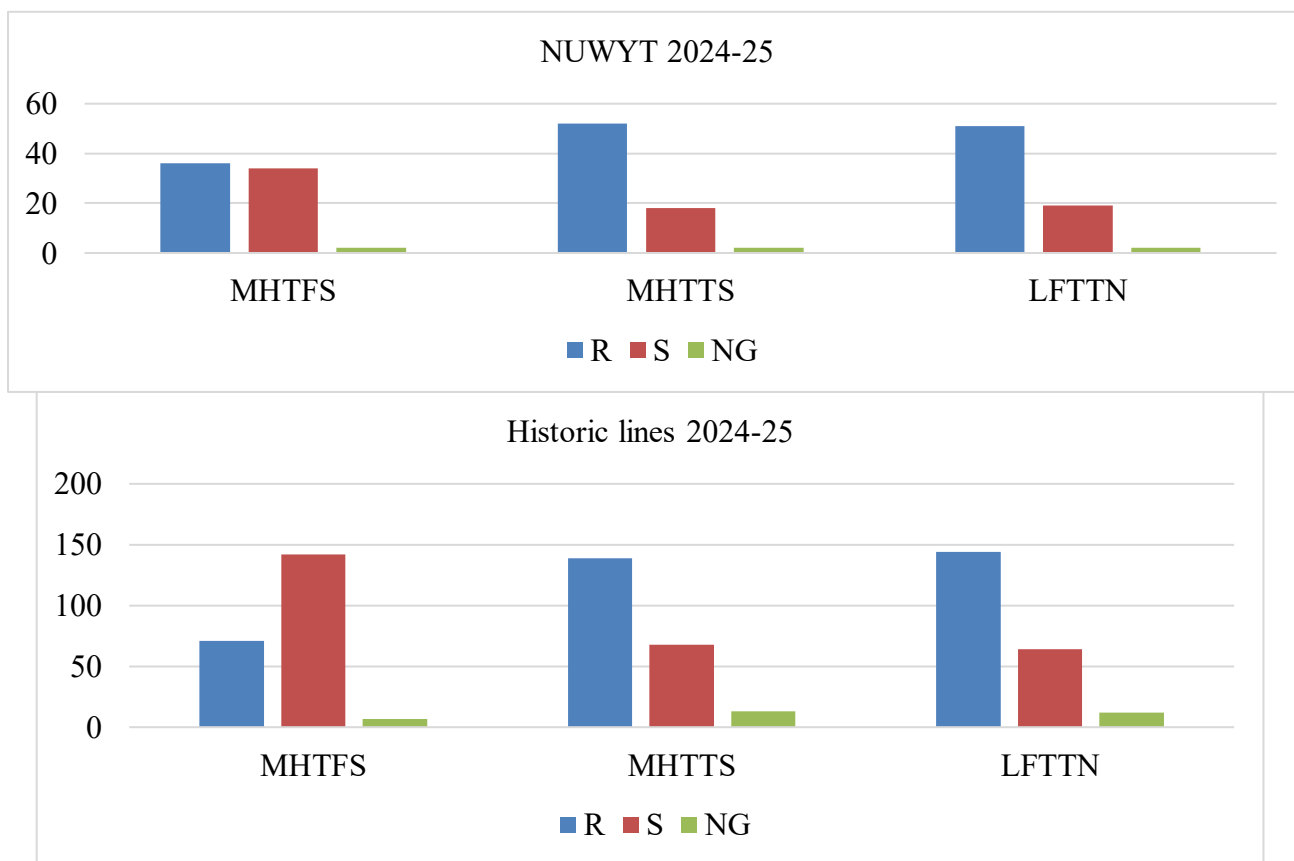
**CDRI Murree: Rust race analysis is main activity of the station for which extensive rust surveillance was conducted by the National partners and virulence/race analysis was accomplished by CDRI Murree. Apart from this, screening of genetic stocks, maintenance of rust culture collection and maintenance of resistant genetic stocks and their analysis were also conducted. Provision of inoculum for Stem rust screening nursery at CDRI Karachi, yellow rust screening at NARC Islamabad & CCRI Pirsabak and leaf rust screening at Faisalabad & Bahawalpur was also ensured by increasing inoculum at CDRI Murree. Rust distribution maps for yellow leaf and stem rust were also generated by feeding data at Arhus University website which is available at CIMMYT rust tracker page**



**Screening of NUWYT lines against leaf rust:** Seventy-two NUWYT advance lines along D-NUYT and B-NUYT twenty-seven lines were screened against three leaf rust races i.e. Race#1 (MHTFS), Race#2 (MHTTS) and Race#3 (LFTTN). Thirty-six, Fifty-two and fifty-one NUWYT lines showed resistant response whereas thirty-four, eighteen and nineteen lines found susceptible along with two lines showed poor/zero germination to leaf rust races MHTFS, MHTTS and LFTTN respectively.

*Frequency of NUWYT (2024-25) entries resistant and susceptible to leaf rust races*

**Screening of Pakistani Historic lines with leaf rust:** Two hundred and twenty commercial cultivars in historic sets were screened against three leaf rust dominant and aggressive races including MHTFS, MHTTS and LFTTN.

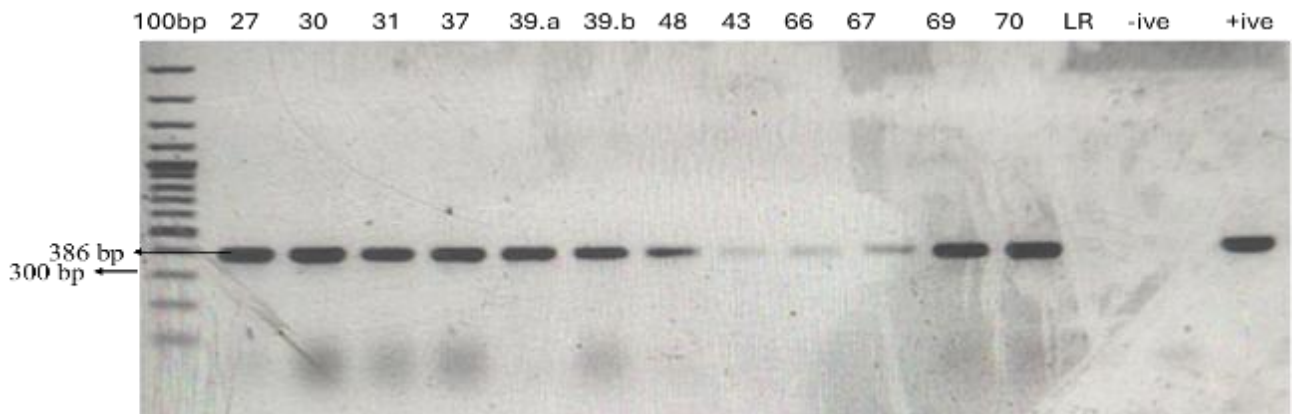


*Frequency of historic lines (2024-25) resistant and susceptible to leaf rust races*

**NATIONAL INSTITUTE OF GENOMICS AND ADVANCED BIOTECHNOLOGY  
TRANSGENIC RESEARCH PROGRAM:**

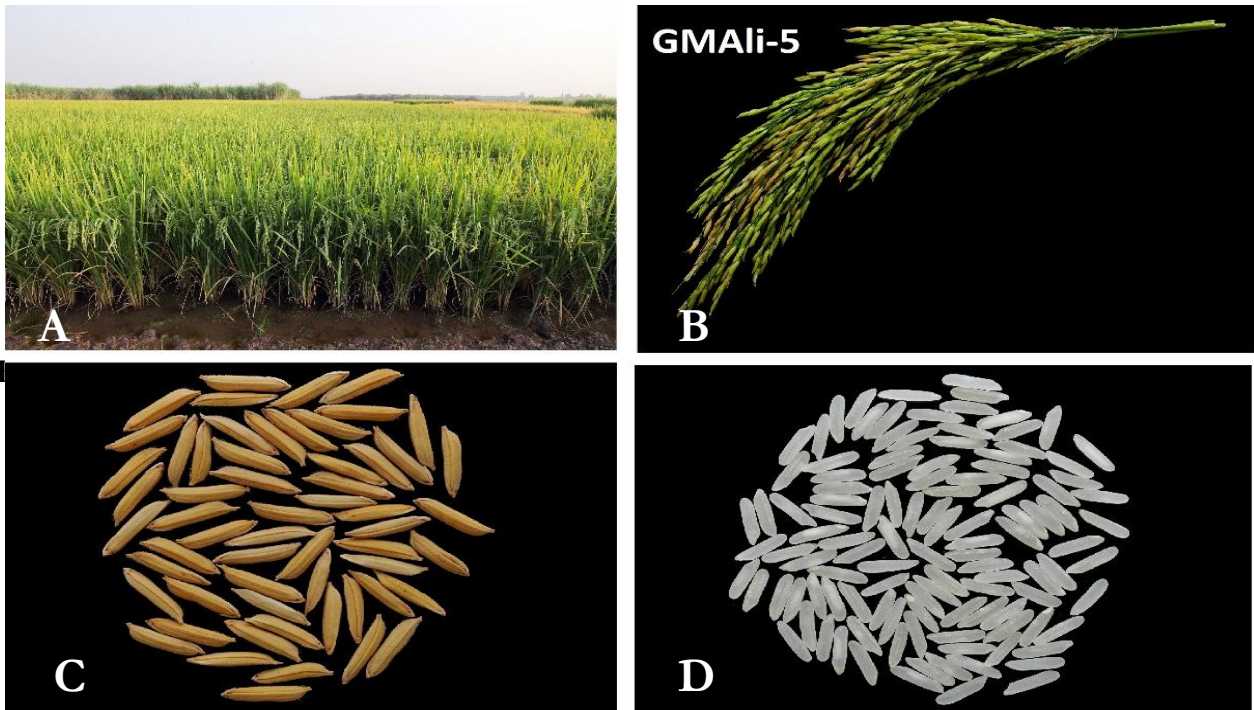
**CRISPR-Cas9-based Genome Editing for Reduced Enzymatic Browning in Potato Tubers:** The objective of the study is to develop genome-edited lines with modifications in the *PPO2* gene. PCR amplification of the *Cas9* genes from several putative edited events confirmed the successful

integration. The expected Genome edited plants have been acclimatized and are now progressing toward mini tuber formation.



*Confirmation of GE plants with Cas9 gene amplification*

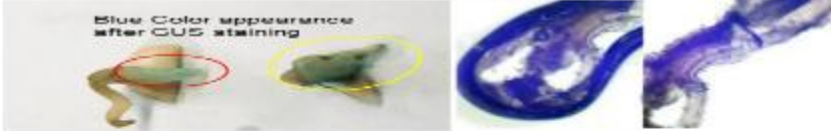


**Productivity Enhancement of Rice:** Four rice varieties have been registered with Punjab Seed Council and protected under Plant Breeder Rights Act. These varieties have 40 to 68% more Nitrogen Use Efficient compared to already cultivated varieties. DNA profiling of selected GSR lines through molecular markers was done. Barcodes were also developed for VEC recommended candidate rice varieties.



*Evaluation of 510 GSR lines under extreme environmental conditions during pollination stage*

**Herbicide resistant gene in Chickpea:** Herbicide resistant gene (EPSPS) was transformed into two cultivars of chickpea. Transgenic chickpea was advanced to T5 generation under control condition and molecular evaluation confirmed the presence of transgene in T5 generation.

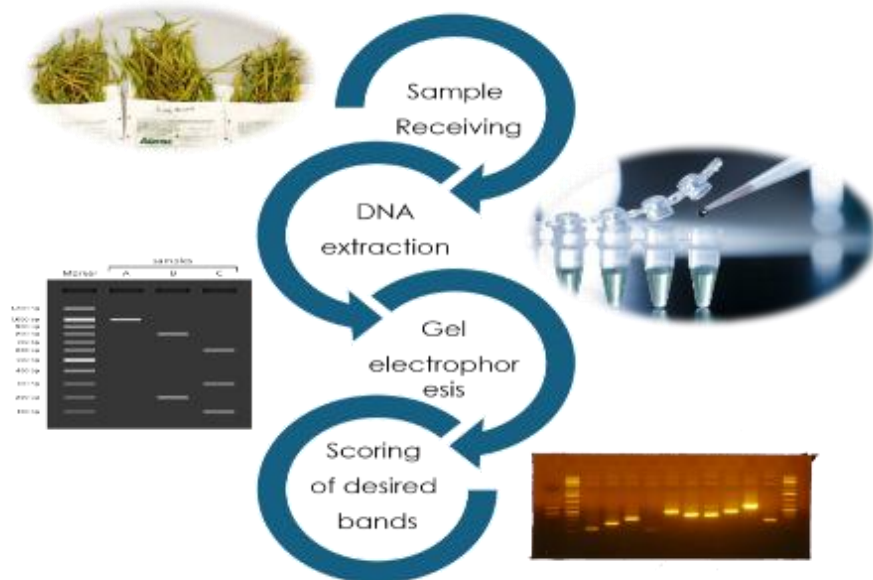
*Development of herbicide resistant transgenic chickpea plants*

- **Evaluation of chickpea for foreign gene insertion**  

- **Development of herbicide resistant transgenic chickpea lines**  

- **Molecular Evaluation confirmation of EPSPS gene**  


DNA fingerprinting of 07 crops and 24 entries (onion, sunflower, mustard, sesame, ispaghol, tomato and chillies) were performed and reports were sent to their respective institutes.

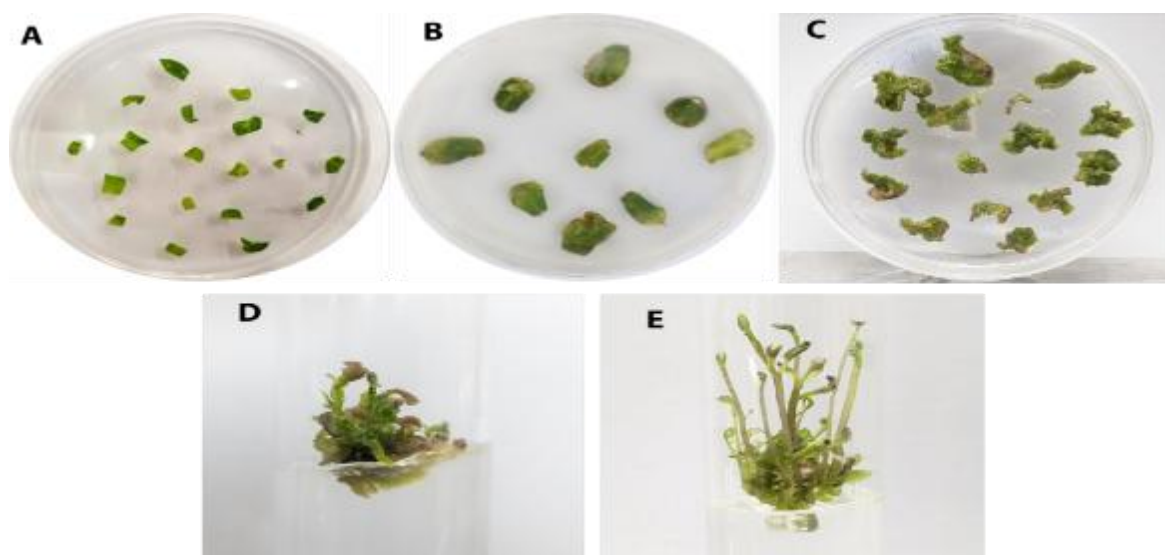
Filed 03 industrial designs from IPRs related activities i.e “Artificial intelligence based device for production of animal probiotic feed supplements”. Second industrial design include “Design for IoT automated intelligent agricultural glasshouse” and the last one “AI based device for yeast extract production”.

**DNA profiling .**



*Overview of DNA fingerprinting from crop sample*

**Downregulation of StCHL1 gene to enhance late blight resistance in Potato: 1000+ Asterix explants were infected, and 36 plants were survived after selection pressure. Out of 36, 26 explants were able to survive on regeneration medium & tested through gene specific primers and found positive. 6 pants are on rooting medium for tuber formation and 20 are maintained in in-vitro conditions.**



*Transformation, regeneration, and selection of leaves*

*(A) Transformed internodal stems on regeneration medium without kanamycin (B) Growth after seven days on regeneration medium. (C) Survived explants after 30 days of selection pressure. (D) Regenerated explants on MS medium. (E) After 15 days on MS medium, further propagation by sub-culturing of regenerated explants.*

**Next Generation Sequencing:** 144 crop samples (Rice:90, Tomato:48, Garlic:6) proceeded for RNA-Seq, their libraries were prepared, DNB were made and successfully completed transcriptome. 33 samples (Rice:16, Potato:1, Goat and Cattle: 15) were considered for Whole Genome Sequencing (WGS) and successfully completed it.

**Lectin Gene Transformation in Cotton:** 1500+ explants of local cotton variety NIAB were infected; 16 explants able to survive after selection pressure. Putative 16 explants in regeneration medium.

**Functional Genomics and Bioinformatics:**

Acquired/developed 320 rice germplasm lines including; 268 from IRRI and 47 from CAAS.



*Transplanted 315 rice germplasm at NARC, Islamabad*

## PLANT TISSUE CULTURE PROGRAM

100 new cultures were initiated for the production 20000 disease-free plants, from which 100,000 (G-0) nucleus seeds were produced. FSC&RD certified 4 tons of G-1 potato seed for further multiplication and issued tags. In the current year one cold store 1250 square ft and two solar system 25 KW each has been installed under this project at NIGAB and Chilas GB.

**Certified Seed Potato Production System:** 80 new meristems were excised from virus indexed plants of (Asterix, Bartina, Lady Rosetta and Sante). 30,000 in vitro plants of these varieties were produced and 29,778 plantlets were shifted in hydroponic hardening system for acclimatization. A total of 28,302 hardened plants were shifted to the five aeroponic greenhouses. From these greenhouses produced 655,819 nucleus seed (G-0) of Asterix, Bartina, Sante and Lady Rosetta



through aeroponic technology. Produced 21.763 tons of Prebasic-1 seed potatoes of Asterix, Bartina



and 9.52 tons of Lady Rosetta Basic-2 category and the Lady Rosetta seed has been

released to progressive farmers for summer plantation 2025 at GB. Also released 20,000 G-0 tubers of Asterix and Bartina (10,000 each) to GB Agriculture research department (partner institute of the project) for summer 2025 plantation and seed multiplication under screen houses.

Prime Minister of Pakistan Muhammad Shahbaz Sharif inaugurated Pakistan Korea Seed Potato Production Complex on 24<sup>th</sup> March 2025.



*Seed potato production through tissue culture and aeroponic technology*



*Inauguration of KOPIA Greenhouses by Prime Minister Muhammad Shahbaz Sharif and Federal Minister Raza Tanveer*

*Press Release*

*Inauguration of Aeroponic Screen Houses by the Prime Minister of Pakistan Muhammad Shahbaz Sharif on 24<sup>th</sup> March 2025 at NARC Islamabad*

**Micro propagation of elite Ginger germplasm:** Rhizome of six ginger genotypes (Thailand, Turkish, Indonesia, Indian, Chinese and Burma from the market) were selected for Tissue culture and field plantation and evaluation. Produced 20,000 in vitro plants and 10,560 plants were hardened for field plantation. 160 kg of ginger rhizomes were harvested and stored for sprouting and field plantation. To study genetic diversity of ginger germplasm, 29 samples of Ginger were collected from different fields/sources and reported 25 ISSR and 16 SSR primers were optimized.



**Hardened plants shifted in Field**



**Harvesting of Ginger rhizomes**



**Plants distributions**



**Sprouting of ginger rhizome**



**Culture initiation**



**Micropropagation of ginger**



**In vitro plantlets of ginger were hardened in cups**



**Harding in hydroponic room**

*Micropropagation of elite ginger germplasm and field evaluation*

**Micro propagation of Banana Germplasm:** Suckers of 04 banana varieties (NIGAB-1, NIGAB-2, NIGAB-3 and NIGAB-4) were collected from Sindh for invitro culture initiation. 4000 hardened plants were given to farmers PATCO and nearly 4000 hardened plants are ready for plantation in the field. In lab, 2000 in vitro plants are ready for hardening.

### **ANIMAL BIOTECHNOLOGY PROGRAM**

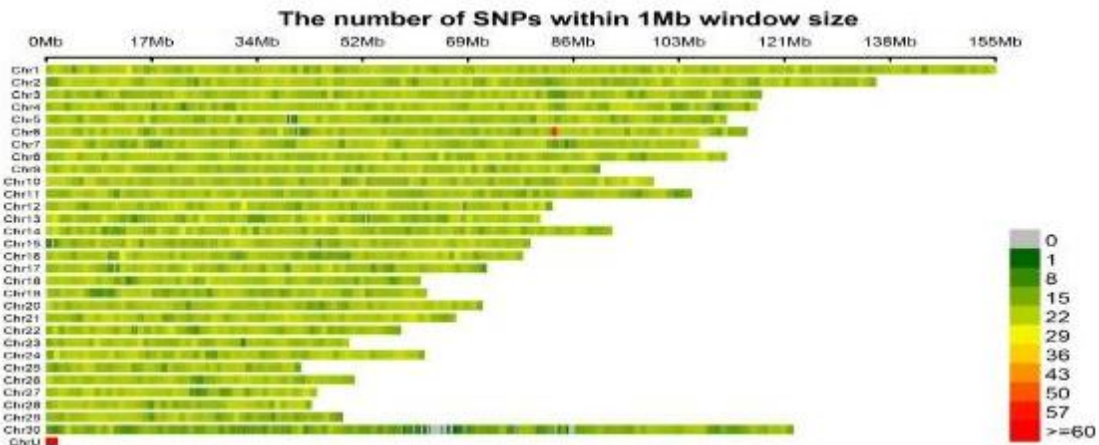
Modern dairy breeding involves the identification of candidate genes /potential SNPs related to milk, meat & disease resistance etc. and their variants that can be incorporated into breeding programs. So, unraveling genetics of milk production and growth in indigenous livestock breeds is one of the major thrusts. Exploring the genetic potential of indigenous livestock is currently carried out using innovative genotyping & WGS approaches in potential cattle breeds is underway.



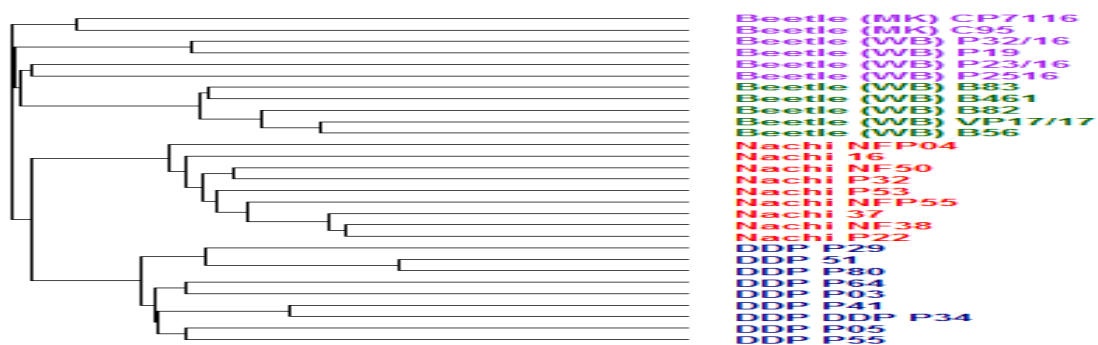
*Sampling of Goat, Buffalo and Cattle in the field*

DNA samples prepared for Whole Genome Sequencing (100) and Optimization of bioinformatics pipelines for genomic data analysis has been carried out. Similarly, GWAS analysis of Sahiwal cattle showing 10 potential SNPs showing association with milk production that crossed the applied statistical significant threshold  $\log_{10}$  (p-value) of 4.29.

**Genotyping of Goat breeds:** The genetic characterization of three goat breeds (Beetal, Dera Din Panah and Nachi) was carried out using SNP array. The DNA extracted from goat samples including Beetal (White Black), Beetal (Makhi Cheeni), Dera Din Panah (DDP) and Nachi were genotyped using SNP array GGP Goat 70k chip. Raw genotypic data contained 67088 SNPs in total. After QC, the dataset contained 53630 SNPs.

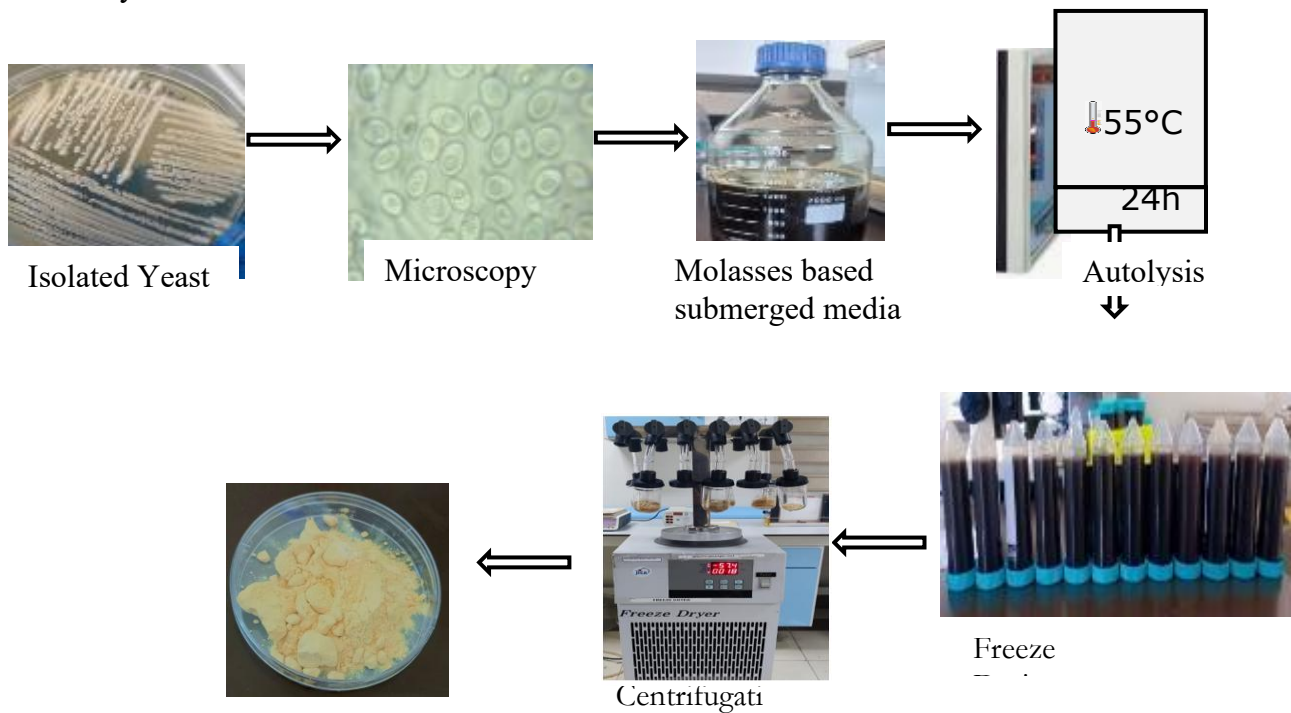


*Chromosomal map showing total SNPs distribution map*



*Phylogenetic tree of goat samples. Four clusters formed representing evolutionary relationship among goat breeds; Beetal (MK), Beetal (WB), DDP and Nachi on the basis of their genotypes.*

**Probiotic development:** After collecting 245 samples from various food sources, 48 local yeast strains were isolated, with YNIGAB-1 and YNIGAB-2 identified as *Saccharomyces cerevisiae*. These strains exhibited excellent yeast extraction potential, and safety trials on mice confirmed their suitability for industrial use.



*Flow Diagram of Production of Yeast Extract from Local Yeast NIGAB Y1*

**Lumpy Skin Disease Virus:** Processed tissue samples, extracted DNA, optimized PCR for molecular characterization. Genomic DNA of samples extracted and confirmed by PCR. **Antimicrobial Resistance:** Processed and tested bacterial samples. Screening of samples has been achieved by 60% positive samples.

**PPR Virus:** Processed swab samples of PPR diagnosis from AJK & samples sent for sequencing.



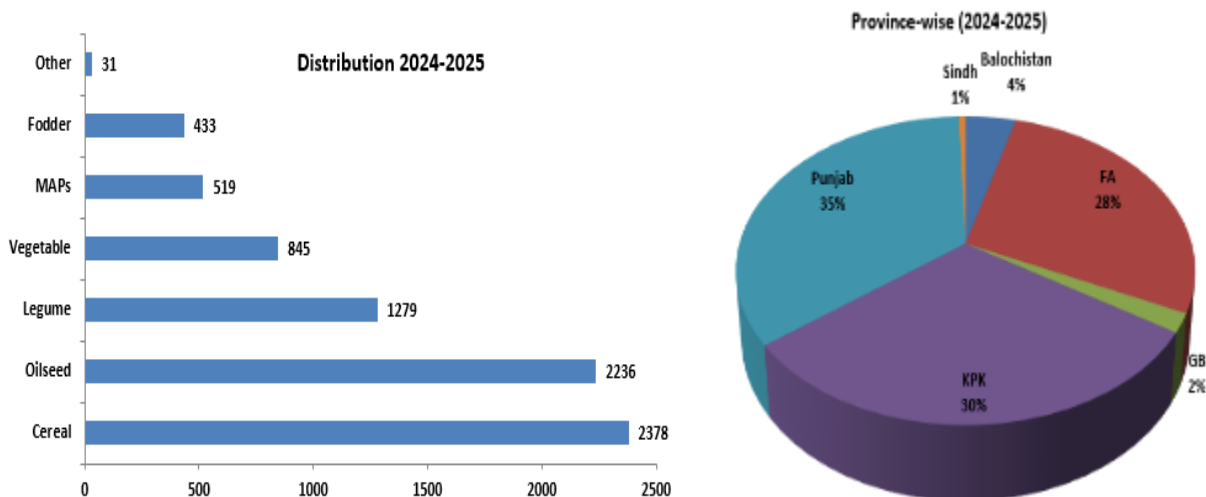
*E.coli Testing by Using API Kit*

**PLANT GENETIC RESOURCES INSTITUTE**

**National Genebank of Pakistan:** located at NARC, Islamabad, is the sole national facility for conserving plant genetic resources. It is mandated to support breeders engaged in crop improvement.

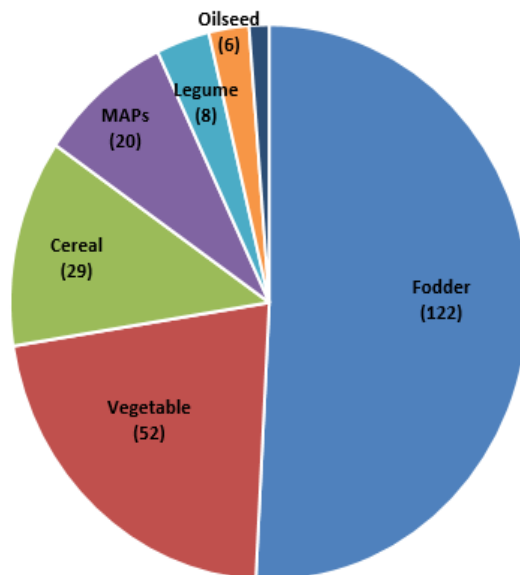
The final germplasm inventory in the genebank reached to 43571 accessions, which are accessible to all researchers.

**Germplasm Distribution:** National Genebank of Pakistan received 152 seed requests from various universities and institutions. Upon confirming compliance with the required SOPs, 7,721 accession samples representing a range of crops were distributed to breeders, researchers, and academic bodies across the country.



*Distribution of germplasm accessions to stakeholders by crop groups and provinces.*

**Acquisition/Donation and Collection:** Around 240 samples of diverse crops including white lupin, cereals, vegetables, and medicinal and aromatic plants (MAPs) were added to the Genebank collection.



*Acquisition of germplasm accessions.*

**Seed Germination and Viability Testing:** 5,276 accessions were tested for viability, demonstrating the Genebank's commitment to safeguarding these valuable resources.

**Medicinal & Aromatic Plants:** A comprehensive research initiative is underway focusing on the cultivation and propagation of various Medicinal and Aromatic Plants (MAPs) including *Withania*

*coagulans* (commonly known as Indian Rennet or Paneer Dodi), Rosemary (*Rosmarinus officinalis*), Lemongrass (*Cymbopogon citratus*), Thyme (*Thymus vulgaris*), Stevia (*Stevia rebaudiana*), Sweet Basil (*Ocimum basilicum*), Oregano (*Origanum vulgare*), Lavender Mint (*Mentha x piperita* 'Lavender'), Pennyroyal Mint (*Mentha pulegium*), and Lavender (*Lavandula angustifolia*).

**National Herbarium:** Native medicinal/aromatic, edible and ornamental plants and herbarium specimens were collected from different parts of the country. Herbarium specimens of native flora collected from different areas were accessioned to the national collection, in total 501 specimens were accessioned. Plants collected from different ecologies are being maintained in the Botanical Conservatory, over 500 native and exotic plants. A new monotypic plant genus *Zhobia* discovered and described from Northern Balochistan. Five new species *Tragopogon pashtunianus* and *Semenovia zhobica* from Zhob district, *Astragalus kanjuensis* from Swat district, *Neotrinia kurramica* from Kurram district and *Astragalus saifullaica* from Qila Saifullah have been described, while *Nannorrhops baluchestanica*, *Astragalus nigocalyx*, *Lepidium bonariense*, *Lepidium campestre*, *Shangwua masarica*, *Solanum nitidibaccatum* and *Solanum sisymbriifolium* are newly recorded from Pakistan.



A. *Astragalus saifullaica* from Qila Saifullah, B. *Astragalus kanjuensis* from Lower Swat, C. *Tragopogon pashtunianus* from Qamardin Karez, Zhob, D. *Zhobia glabra* from Zhob

**Capacity Building:** 47 research interns from various universities and academic institutions received training in agro-morphological characterization and evaluation of crop germplasm under field conditions. Their laboratory work also included biochemical and molecular analysis, in-vitro conservation, seed viability testing, seed processing, gene-bank management of plant genetic resources, and herbarium specimen identification. 1586 visitors, including high-level national and international delegates, dignitaries, researchers, and university students, toured the National Genebank and allied facilities.



## SOUTHERN AGRICULTURE RESEARCH CENTER (SARC) KARACHI

**Introduction of Special Crops / Plants:** Guar (Cluster Bean) showed 80% germination and healthy growth under coastal conditions, while quinoa trials under saline irrigation demonstrated that organic mulching improved water productivity and yield. 30-year-old Chiku (Sapota) germplasm was maintained, with 1,000 grafted plants distributed to farmers.

**Promotion of olive** in Sindh included distributing 100,000 climate-resilient olive plants of eight varieties, grafting 50,000 wild olives under the Green Pakistan Initiative, and conducting field demonstrations to assess adaptability.

**Dragon fruit** cultivation trials at Karachi using marginal-quality water yielded promising results, with plants maturing in two years and producing fruits averaging 370 g under coastal conditions.

**Kallar grass**, *Leptochloa fusca* was successfully introduced, showing satisfactory growth (~1 m height) under saline furrow irrigation, with its proven ability to improve soil properties, fix nitrogen, and thrive in degraded soils.

**Mushroom spawn production:** Pure culture spawn of five high-value mushroom species was developed to support sustainable and commercial-scale cultivation. Further, the mycelium colonized substrates in bio-fabrication mushroom and spawn were formed into mold shaped structures.



*Introduction of different crops*

**Tropical Horticulture Research:** Invitro protocol using Benzyl aminopurine (BAP) was developed for papaya propagation, achieving 90% shoot initiation and robust multiplication. Maintaining 14 mother blocks and nurseries, yielding 56.50, 29.34, 6.60, 138, 3.12, and 20.40 mounds/acre from Chiku, Guava, Falsa, Ber, Lemon, and Sweet lime, respectively. Produced disease-free plants of four banana varieties (NIGAB-1, NIGAB-2, NIGAB-3, and G-9), selling 14,000 plants and generating Rs. 860,000 in revenue.

**Sugarcane R&D:** Evaluated 3,200+ lines through multi-cycle trials, advancing top-performing genotypes, with four new varieties selected for further testing, two promoted to zonal trials, and two entered into NUVYT; juice quality ranged from 10.43–13.39% CCS, and pest monitoring showed borer infestation at 6.37–10.38%.

332 germplasm lines were evaluated, yielding 800.6 g fuzz; 14 crossing-block combinations produced 106.9 g fuzz; 12.5 kg fuzz was collected, dried, and stored; 6,426 seedlings were raised from local fuzz; 24,000 seedlings of six varieties were produced via bud chip technology; seed multiplied on 3.5 acres (bud chip) and 50 acres (conventional).



*Sugarcane varietal development activities at Thatta*

**Pest Management Research:** Characterized and applied strychnine-based secondary metabolites from *Strychnos* as a sustainable, residue-free pest management solution, achieving  $92\% \pm 3.4\%$  target rodent mortality within 72 hours and zero measurable chemical residues in soil and crops.

Laboratory studies on albino rats revealed impairment of female reproductive organs from exposure to botanicals and chemical rodenticides, highlighting endocrine disruption and reproductive toxicity risks. Rodent surveys in sugarcane fields of Thatta and Sujawal identified *Bandicota bengalensis*, *Nesokia indica*, *Tatera indica*, and *Millardia meltada* as key pests causing up to 22% yield loss. Supervised fumigation and inspection of wheat stocks across various districts of Sindh to assist the Government of Sindh in ensuring proper wheat storage.

**Crop Disease Research:** In Wheat Nurseries 2024-25, leaf rust screening of 898 lines showed 54.67% resistant, 31.62% moderately susceptible–susceptible, 11.35% susceptible, and 2.22% trace MSS; among 72 NUWYT lines, 70.83% were resistant. Stem rust screening of 898 NWDSN lines showed 36.52% MSS, 30.06% susceptible, and 19.04% MRMS, while among NUWYT lines, 48.61% were MSS and 25% susceptible against local race RRTTF.

Screening of 21 sugarcane genotypes revealed 11 with varying resistance to whip smut, ranging from Very Highly Resistant (Th-1970, 2.5% incidence) to Intermediate (CoTj-1111, 13.04% incidence), while 10 genotypes were immune. Against red rot, 13 genotypes were resistant, 4 moderately resistant, and 4 highly susceptible when artificially inoculated.

**Agricultural Water Management:** 80 underground tube well and 40 surface water samples from Lasbela district were analyzed for pH, electrical conductivity, and total soluble solids, revealing that most surface waters met safe limits for agriculture and domestic use, a significant portion of underground water exceeded permissible salinity levels, posing risks to crop yield, soil fertility, and long-term agricultural productivity.

**Desert Agriculture:** Developed and implemented a sustainable horticulture model utilizing brackish water with solar-cum-electric powered drip irrigation for Date Palm, Ber, Chiku, Guava, Falsa, and Lemon, successfully adopted by growers across 1,200+ acres in Thar.

Evaluated chickpea, lentil, mung bean, cluster bean, groundnut, and chili varieties under NUWYTs, and distributed high-yielding seeds free of cost to 200+ Thar farmers to enhance productivity.

Established 253 Agro Pastoral Field Schools and 0.5–1.0 acre arid horticulture demonstration plots in Umerkot and Tharparkar; about 6,586 trained farmers in dryland farming, soil and water conservation, and integrated rangeland-livestock management; rehabilitated five 40-acre natural resource sites; and set up a community seed bank in Thar to supply quality seed directly to farmers.



## *Desert Agriculture*

**Food Safety & Quality:** Assessed fungal load and aflatoxin contamination in locally sold spices including nutmeg, cumin, and cinnamon and initiated a culture library of *Aspergillus flavus* strains for potential biocontrol.

Developed and validated an improved QuEChERS-based method for efficient pesticide residue extraction from rice, achieving over 70% recovery with enhanced cleanup and reduced solvent use, supporting environmentally friendly analytical practices.

Investigated the conversion of agro-waste (date seeds and mango kernel seeds) into sustainable functional food ingredients, achieving enhanced fibre-enriched cookies, a caffeine-free coffee alternative, and high-purity starch for novel health-oriented products, thereby promoting zero-waste agro-processing.

Developed intelligent, edible, and biodegradable packaging films using anthocyanins and silver nanoparticles that indicate spoilage and reduce microbial load, offering sustainable solutions for enhanced food safety and shelf life.

Onion and citrus peel extracts were identified as effective natural preservatives with strong antioxidant and antimicrobial properties, demonstrating potential for use in sustainable, polysaccharide-based

## **NATURAL RESOURCES DIVISION**

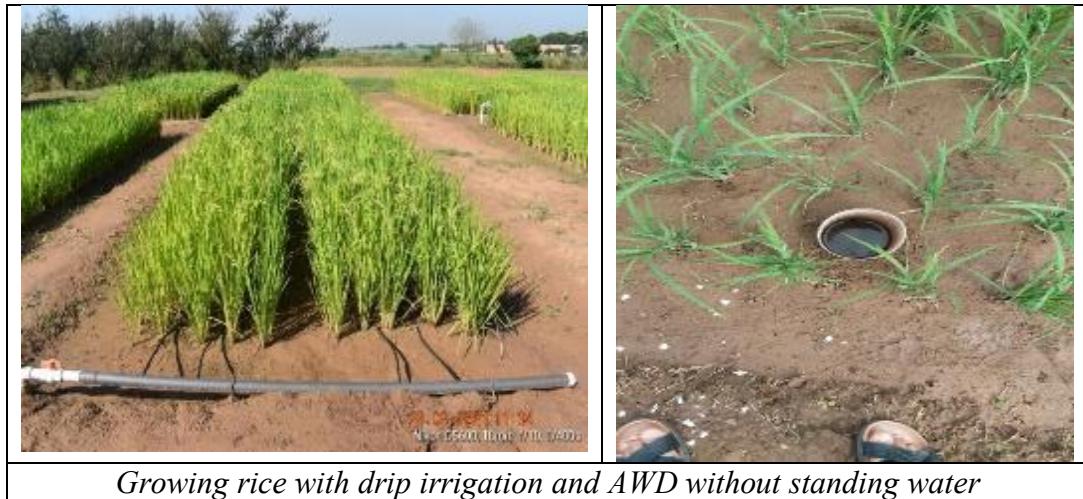
### **CLIMATE, ENERGY AND WATER RESEARCH INSTITUTE**

**Effect of land and water management on rice yield and water productivity in silty loam soil:** Field trials in Pakistan compared Direct Seeded Rice (DSR) and Puddled Transplanted Rice (PTR) under four irrigation methods: Alternate Wetting and Drying (AWD), Furrow Irrigated Narrow Bed (FNB), Drip Irrigated Wide Bed (DWB), and Basin Flooding (BF). Results showed that Green Super Rice 305 (GSR305) yielded 141% higher than Fakhar-e-Malakand (FM), with the highest yield under PTR with AWD (10.71 t ha<sup>-1</sup>).



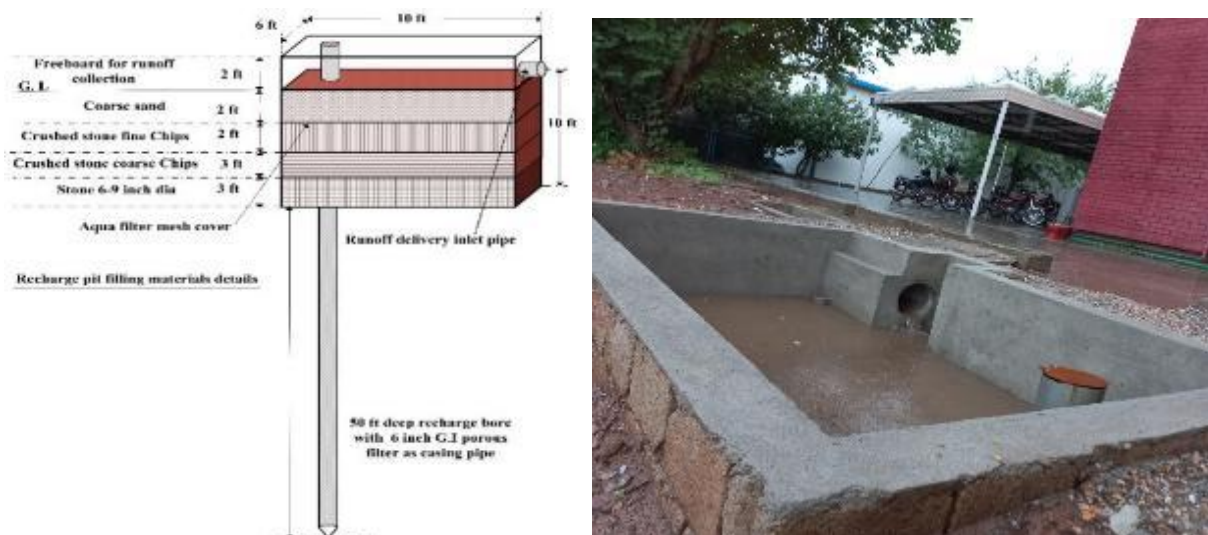
*Layout of Experimental plot at CEWRI field station in NARC Islamabad*

**Enhancing the irrigation water productivity of rice farming: a study on sowing and irrigation practices in Pakistan:** Field trials (2020–2023) showed that no-tillage with Alternate Wetting and Drying (AWD) and Furrow-Irrigated Narrow Bed (NB) improved rice water productivity (11–35%) and yield (2–10%) compared to conventional practices. Drip-Irrigated Wide Beds saved up to 73% water but reduced yields by 4–47%. Optimized practices offer 2–22% yield gains, while poor choices can reduce yields by up to 47%.



*Growing rice with drip irrigation and AWD without standing water*

**Improving groundwater through Low-Cost Artificial Recharge System using Rainwater:** Rooftop rainwater harvesting in the Rawal watershed can support kitchen gardening (25–1339 m<sup>2</sup>) with storage tanks of 10–59 m<sup>3</sup> and recharge aquifers with ~1.2 m rainfall annually. This can slow groundwater decline (>1 m/year), enhance food security, and sustain springs, dug wells, and tube wells in the region.



*Schematic view of artificial recharge of rainwater harvested from rooftop to sustain groundwater*

**Updation of Agro-ecological zones:** Under a PSDP project (2020–2023), Pakistan’s agro-ecological zones were updated for the first time since the 1980s to reflect current climate, land use, and irrigation conditions. The major zones identified include Western Dry Mountains (19.1%), Western Dry Plateau (14.4%), Sandy Desert (14%), Northern Irrigated Plain (11.3%), and Coastal Zone (9.9%). The findings highlight the need to build community and institutional capacity in efficient water use, advanced water conservation techniques, and climate-smart agriculture, particularly in dry mountains, rainfed plateaus, and desert areas. These updated zones provide a scientific basis for climate-smart agriculture, water resource management, land use policy, and productivity improvements in crops, livestock, and trade.



highest densities (0.5 springs/km<sup>2</sup>) found in the 1500–2000 m elevation and 1600–1800 mm rainfall zones. Spring occurrence was strongly linked to rainfall and vegetation (NDVI), highlighting the need for ecosystem-based land use planning and improved governance for sustainable spring management.

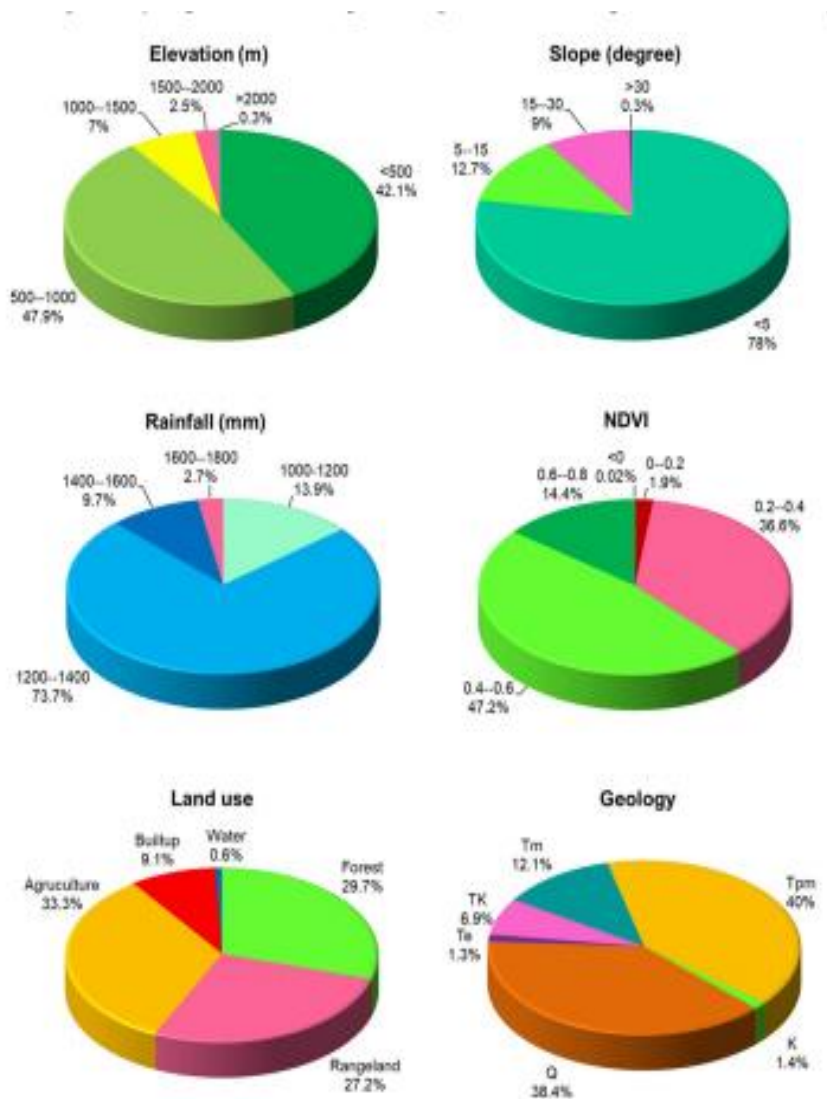
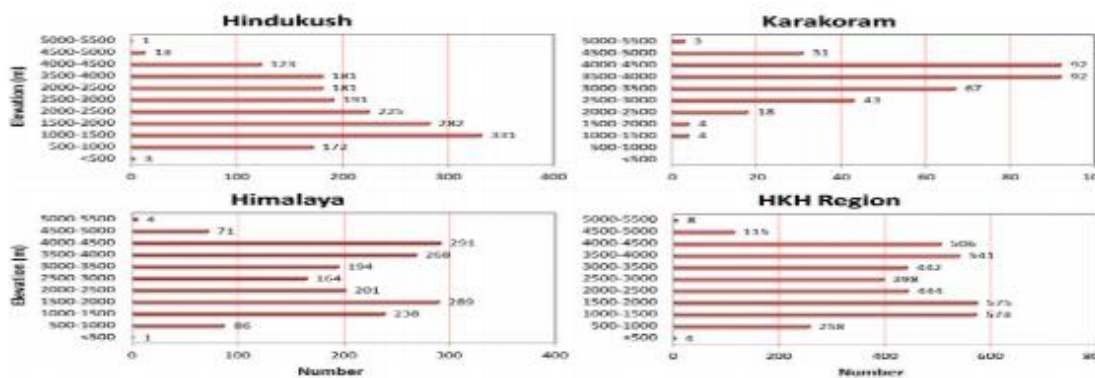


Fig. 2 Percentage coverage of different thematic regions in the study area

*Springs in different resources parameters*

**Prospecting high-altitude springs in the Upper Indus Basin, Pakistan: Knowledge towards policy development:** In the Upper Indus Basin, 3,864 springs were mapped across the Hindu Kush, Karakoram, and Himalaya, with the highest density in the Himalaya (0.05 springs/km<sup>2</sup>). Spring occurrence showed a strong correlation with rainfall ( $R^2 = 0.79$ ), underscoring the need for integrated water management and efficient use to sustain water security in mountain communities.



*Distribution of springs by elevation in different HKH regions of Pakistan*

**Dynamics Changes in Rainfall Necessitate Efficient Rainwater Harvesting in Different agro-Ecologies for Sustainable Development:** Rainfall trend analysis (1960–2019) across Pakistan’s agro-ecologies showed significant increases in the Rainfed Plateau (+30.6%), Piedmont Plain (+14.2%), and Western Dry Mountains (+5.9%), but declines in the Western Dry Plateau (–3.2%) and Coastal Zone (–6.2%). The findings stress the need for rainwater harvesting, storage ponds, and groundwater recharge to sustain agriculture and build climate resilience in arid regions.

## LAND RESOURCES RESEARCH INSTITUTE

### Fertilizer Trials on Wheat and Sugar Cane

- During 2024-25, a total of 10 field experiments were conducted to demonstrate the effects of potassium and key micronutrients zinc (Zn), boron (B), and iron (Fe) on sugarcane yield and quality across various agro-ecological zones of Pakistan. The results showed a yield increase of over 25% compared to conventional practices. Economic analysis revealed a net return of Rs. 4,146 per acre from the application of Zn, Fe, and B, while the use of potassium fertilizer alone resulted in a significantly higher net return of Rs. 16,534 per acre. These findings underscore the economic and agronomic benefits of balanced nutrient management in sugarcane production.
- Nine field demonstrations were conducted to evaluate the impact of Integrated Nutrient Management (INM) (DAP 1.5 bag + Urea 1 bag + SOP 0.5 bag + ZnSO<sub>4</sub> 3 Kg + Humic Acid 1 L + Biozote 1 Pack + Boric Acid 1.5 Kg per 1 acre) on wheat yield and quality. The results revealed a significant yield improvement of 27% compared to traditional farmer practices. Additionally, the application of INM led to a notable reduction in fertilizer costs, amounting to Rs. 11,450 per hectare. Enhanced zinc (Zn) bio-fortification was also observed in the harvested wheat grains, indicating improved nutritional quality.

### Fertilize Right Pakistan Project: Optimizing Nitrogen Use with 4R Stewardship, Biofertilizers and Slow-Release Technologies

- Soil test-based N dose with 4R application showed a substantial yield increase (6033 kg/ha) over the farmer practice (4681 kg/ha).
- Using sensor-based foliar application at 75% of soil test N also gave a high yield (5474 kg/ha), suggesting potential for reducing N use without compromising productivity.
- Coating urea with zinc or neem oil over farmer practice showed moderate yield increases, but when used with a soil test-based N dose, both coatings (zinc and neem) delivered significantly higher yields (up to 6191 kg/ha).
- Replacing a portion of traditional fertilizer with humic acid or Biozote at 75% of the standard dose improved yields over the farmer practice. The best performance came from Biozote + 75% soil test-based N (5891 kg/ha), nearly matching full synthetic N application.

### **Formulation of value-added compost by charging Rock phosphate and microorganism for a cost-effective, phosphorus-rich compost preparation using local resources.**

- A value-added compost was formulated by enriching poultry manure with rock phosphate and phosphate-solubilizing bacteria (PSB), resulting in enhanced phosphorus availability (up to **2.28%**).
- Effect of this value-added compost on the yield and yield attributes of wheat and tomato crop depicted that its combination with chemical fertilizer ( $\frac{1}{2}$  VAC +  $\frac{1}{2}$  SSP), significantly improved crop performance.
- Tomato fruit yield increased by 57.05%, wheat grain yield by 46.44% and wheat biomass by 74.05% over control.



*Preparation and Testing of Value-Added Compost*

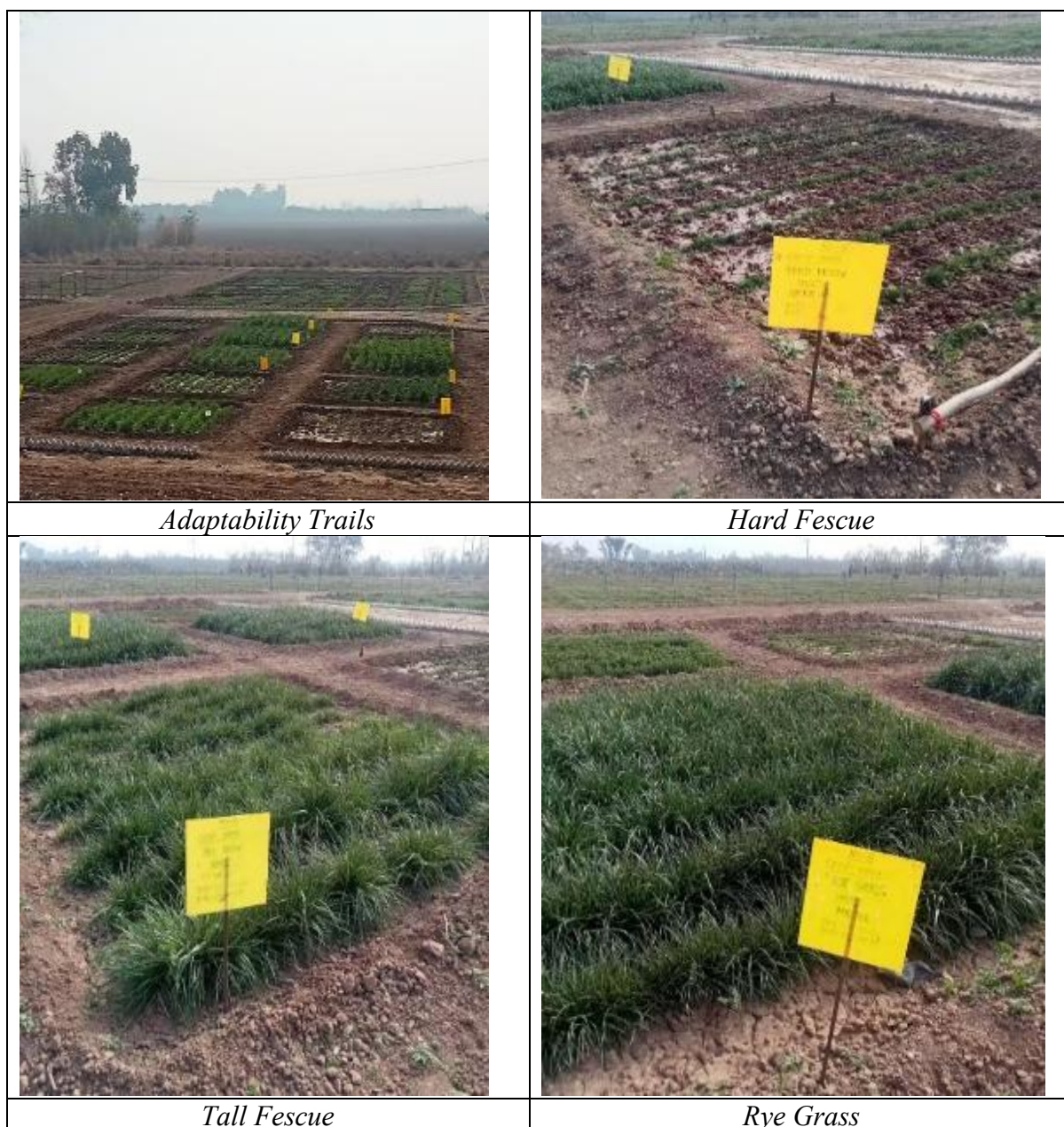
The combination of wheat residue, bacterial decomposers, and the leguminous jantar crop incorporation produced the most significant improvement with an 8% increase in soil nitrate nitrogen. Soil water retention was also increased by 5% compared to the other treatments, indicating better soil health and structure in the treatment combining wheat residue, bacterial decomposers and jantar.

Rice establishment methods were evaluated with wheat residue incorporation. 12% increment in paddy yield was observed for Non-Puddled Transplanted Rice (NPTR) when compared to Puddled Transplanted Rice (PTR). Wheat residue incorporation further increased the paddy production by 10 and 20% for PTR and NPTR.

### **RANGELAND RESEARCH INSTITUTE**

**Adaptability Trials of Seeds of summer and winter grasses:** Grass seeds imported from different countries of the world namely Australia, Thailand by private companies were tested for their adaptability in Pakistan. Evaluation trials of seeds were conducted in experimental field area of Rangeland Research Institute (RRI), National Agricultural Research Centre Islamabad. The objectives of study were to examine evaluation and adoptability of seeds of forage grasses imported by various seed companies. Different varieties of grasses and forages were evaluated. A total of 12 varieties of major groups of forages and grasses were evaluated for their adaptability including 01 lotus corn, 03 Rye grass, 02 Clovers, 01 Cooks foot grass, 02 fescue. 01 cichorium, 01 plantago, 01 chicory Data on biomass production of the experimental grasses were recorded at the end of the trials. Results showed that Louts corn 21 t/ha, Berseem Clover 45 t/ha, Crimson Clover/crim KN 68 t/ha, Tall Fescue/TFKN22 44 t/ha, Hard Fescue/HFKN33 10 t/ha, Itlian Rye/Davis 49 t/ha, Itlian Rye/Master 34 t/ha, Itlian Rye/Kn7000 38 t/ha , Cooks Foot /KNCF 17 t/ha, Cichorium / kohenoor captain, 43 t/ha , Plantago/Army 25 t/ha , Chicory forage/speedo 44 t/ha. Data on agronomic parameters as well as insect/disease attack symptoms were recorded of the tested species and shared

with the federal seed certification and registration department and respective seed company for further facilitation with respect to seed import.



**Adaptability Trial of fodder/forage grasses in RRI, NARC, Islamabad**

Sr.	Local Name	Scientific Name	Seed Company	Production t/ha.
1	Birds foot trefoil/Louts corn	<i>Lotus corniculatus</i>	Kohenoor	21
2	Berseem Clover	<i>Trifolium alexandrinum</i>	kohenoor	45

3	Crimson Clover/crim KN	<i>Trifolium incarnatum</i>	Kohenoor	68
4	Tall Fescue/TFKN22	<i>Festuca arundinacea</i>	Kohenoor	44
5	Hard Fescue/HFKN33	<i>Festuca trachyhylla</i>	Kohenoor	10
6	Itlian Rye/Davis	<i>Lolium multiflorum</i>	Kohenoor	49
7	Itlian Rye/ Master	<i>Lolium multiflorum</i>	Kohenoor	34
8	Itlian Rye/Kn7000	<i>Lolium multiflorum</i>	Kohenoor	38
9	Cooks Foot /KNCF	<i>Dactylis glomerata</i>	Kohenoor	17
10	Cichorium /kohenoor captain	<i>Cichorium intybus</i>	Kohenoor	43
11	Plantago/Army	<i>Plantago Lanceolata</i>	Kohenoor	25
12	Chicory forage/speedo	<i>Cichorium intybus</i>	Rachna agri business	44

**Development of a Climate Resilient Pasture Model through integration of high yielding forages and grazing of small ruminant:** In the arid and semi-arid regions of Pakistan, livestock depend mainly on grazing rangelands and crop residues for sustenance. The country has approximately 6.7 million hectares of pastureland, covering about 8% of its total land area. To enhance fodder production and promote sustainable grazing practices, a 0.5-acre pasture development plot has been established at the RRI field area in NARC. Key activities include site selection and preparation, the selection of drought-resistant grass species, proper seeding and planting techniques, fencing to protect the pasture, and supplemental irrigation to ensure growth. The nutritional quality of the grasses will be assessed through proximate analysis, measuring crude protein, fiber, and other key components. Further studies include digestibility analysis to determine forage efficiency and weight gain trials in livestock to assess the impact of improved pasture on animal health and productivity.

#### Feed Intake Data of Stall Fed Goats Given Fresh Alfalfa at Goat Section, ASI, NARC

S. No.	Goat Tag No.	Body weight (kg)	Fresh Alfalfa Intake (kg)					Average Individual Intake (kg)
			Day 1	Day 2	Day 3	Day 4	Day 5	
1	1P	39.1	5.2	5.0	5.1	5.2	5.4	5.18
2	19	51.8	6.4	6.0	6.2	6.1	6.1	6.16
3	13P	29.1	4.4	4.1	4.2	4.1	4.2	4.20
4	56	44	5.4	5.6	5.4	5.5	5.3	5.44
5	39	42	5.1	5.3	5.1	5.0	5.3	5.16
6	Brown, No Tag	33.8	4.6	4.3	4.8	4.4	4.4	4.50
<b>Total Daily Intake by Group (kg)</b>			<b>31.1</b>	<b>30.3</b>	<b>30.8</b>	<b>30.3</b>	<b>30.7</b>	
<b>Average Individual Intake (kg)</b>			<b>5.18</b>	<b>5.05</b>	<b>5.13</b>	<b>5.05</b>	<b>5.12</b>	

In stall feeding trial, six goats were offered fresh alfalfa fodder at a rate equivalent to 15% of their body weight (on fresh matter basis) to evaluate feed intake. Alfalfa is a highly nutritious leguminous fodder, rich in protein (18-20%) and minerals, making it ideal for growth and maintenance of small ruminants. During the trial the fodder offered and refusals were carefully recorded to estimate the actual feed intake. Intake usually varied according to body weight, physiological status and individual feeding behavior with heavier goats generally consuming more as shown in table.



*Pasture Area in RRI*

**Acquisition and characterization of ryegrass germplasm for high-yielding and nutritious variety development:**

The research study titled “Acquisition and characterization of ryegrass germplasm for high-yielding and nutritious variety development” is designed as a two-year evaluation program. The study objectives are: 1) Sourcing ryegrass germplasm, 2) Evaluating the collected germplasm for forage yield and quality-related traits, and 3) Identifying promising genotypes for further breeding. In the first year (2024-25), 22 ryegrass genotypes were collected from local research institutes and seed companies. These genotypes were evaluated under field conditions using a randomized complete block design (RCBD) with three replicates. Standard fertilizer and irrigation practices were applied to support plant growth. At the 50% heading stage, data were recorded on several forage yield-related traits, including plant height, leaf area, number of tillers per plant, number of leaves per plant, fresh and dry plant weight, fresh and dry biomass/m<sup>2</sup>, and days to 50% heading. Samples are also being analyzed for nutritional quality traits, including crude protein, NDF, ADF, NDL, and ash content.

The initial ANOVA showed significant differences among the genotypes for forage yield-related traits, indicating strong genetic variation in the germplasm. Additional statistical analyses, including correlation analysis, principal component analysis (PCA), and cluster analysis, are underway to better understand trait relationships and group genotypes.

A second-year field trial will be conducted to validate the results and assess genotype stability across seasons. The study’s early findings are encouraging and directly contribute to achieving its objectives, particularly in evaluating and identifying high-performing ryegrass accessions for future breeding efforts.



**Introduction and propagation of seedling in agro-forestry nursery:** Agro-forestry nursery in RRI produced more than six thousands healthy plants included one thousand Turbo hybrid Robinia plants, two thousand willow cultivars, four hundred *Paulownia elongata* 9501, two hundred hybrid *Tecoma grandis*, and one thousand hundred *Populus deltoides* were successfully propagated from different ways in agro-forestry nursery.

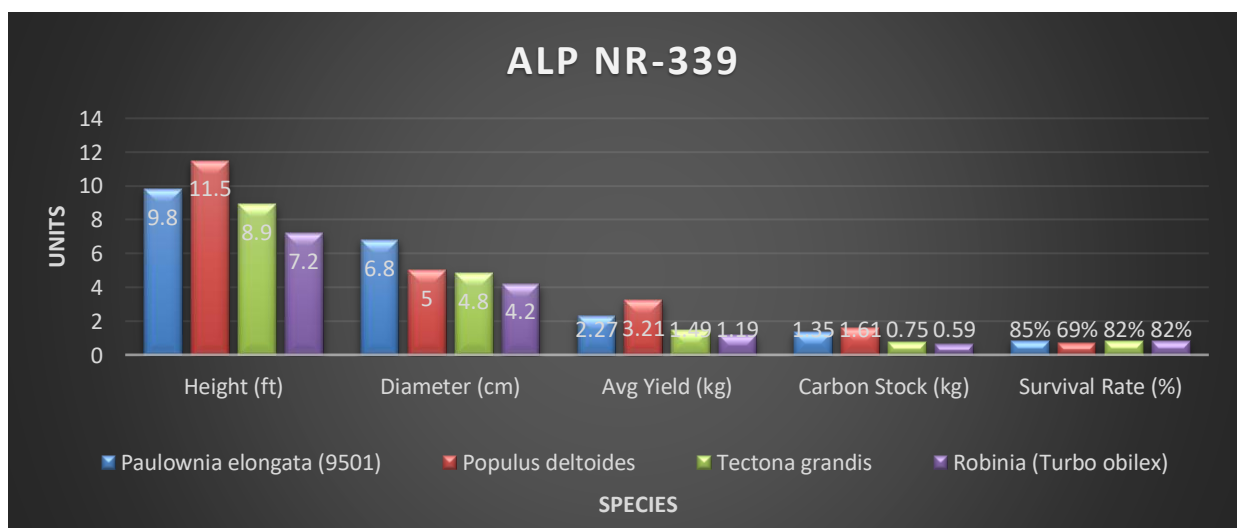


Demonstration about Nursery Raising Techniques

**Assessment of Potential Fast Growing Hybrid Tree Species in Silvo-Agricultural System in Pakistan:** Three sites (Naganwali in district Pindigheb, Tandali in district Muzaffarabad, and the third site at Oghi in district Manshera) have been selected for agro-forestry interventions under the ALP project provision. Significant difference was observed in growth, yield and carbon stock in four tree species especially in *Paulownia elongate* in Pindigheb site as compared to other two sites. Seasonal crops were sown in alleys in two sites at Naganwali and at Tandali site in district Muzaffarabad, Kashmir, and the bean was sown in Oghi in district Manshera were observed trees allelopathy effect on crops yield and also recorded the soil parameters in each season before and after the crops.

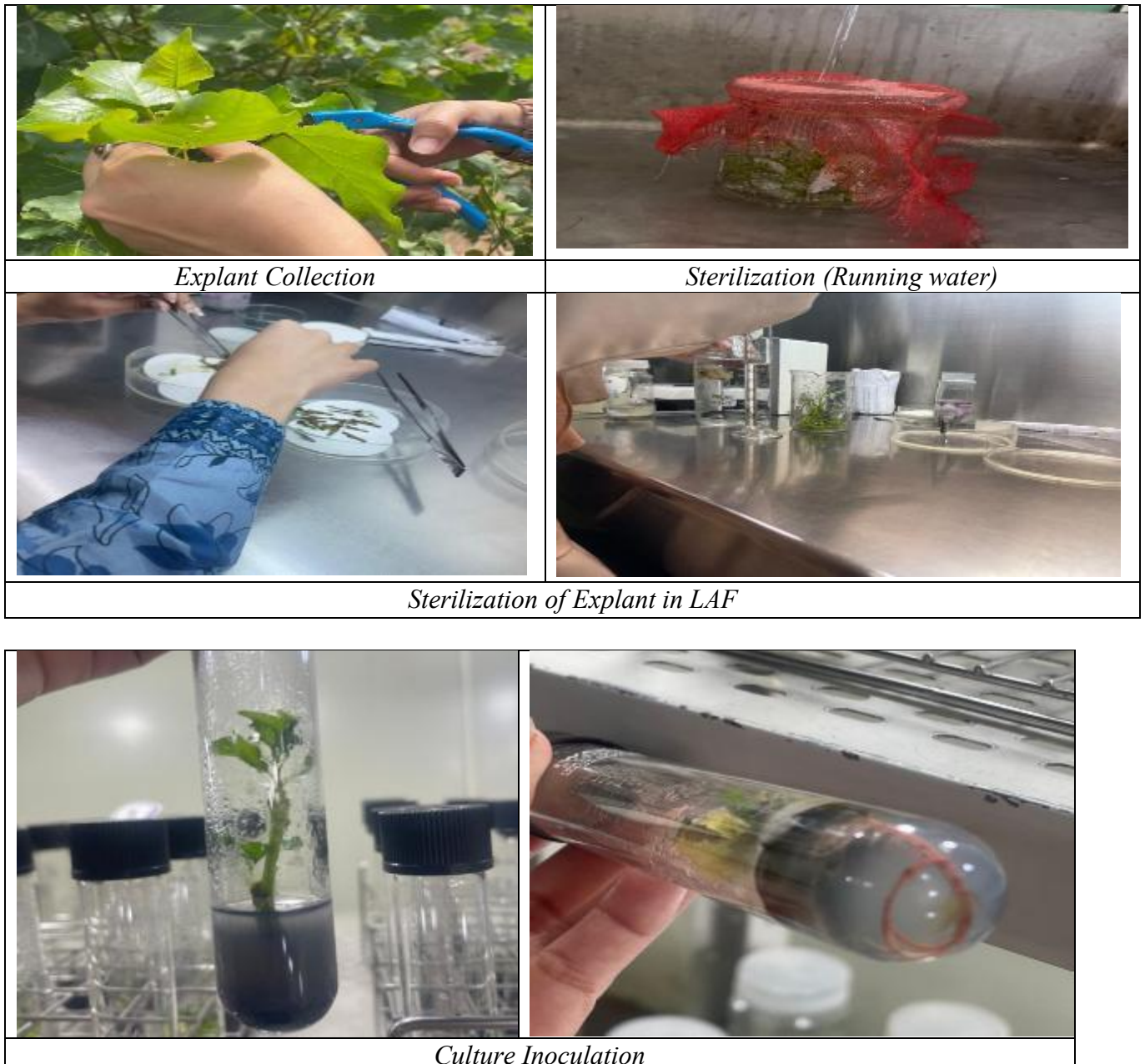
**Yield Potential Hybrid Tree Species in Silvo-Agricultural System.**

	Average Height (ft)	Average Diameter(cm)	Average Yield (kg)	Carbon Stock (kg)	Survival Rate (%)
<i>Paulownia elongata</i> (9501)	9.8	6.8	2.267	1.351	93 %
<i>Populus deltoides</i>	11.5	5.0	3.210	1.605	72 %
<i>Tectona grandis</i>	8.9	4.8	1.488	0.744	92 %
<i>Robinia (Turbo obilex)</i>	7.2	4.2	1.188	0.594	94 %



*Optimization of Micro propagation protocol for Populus deltoides*

Micro propagation protocol for *Populus deltoides* was optimized to meet the growing need for rapid multiplication of this economically important agroforestry tree species in Pakistan. The study was conducted at the In Vitro Preservation Laboratory of the Plant Genetic Resources Institute (PGRI), National Agricultural Research Centre (NARC), Islamabad. Explants were collected from the multipurpose tree species (MPTS) nursery of the Rangeland Research Institute (RRI), NARC. Explants exhibited an average of 15 leaves after six weeks of culture, indicating a strong shoot proliferation response. The regenerated plants achieved an average height of approximately 3 inches, demonstrating effective growth under optimized conditions. All fungal and bacterial contamination was eradicated by optimizing the sterilization process. Successful root formation was observed in 50% of cultured plants, indicating effective rooting conditions.



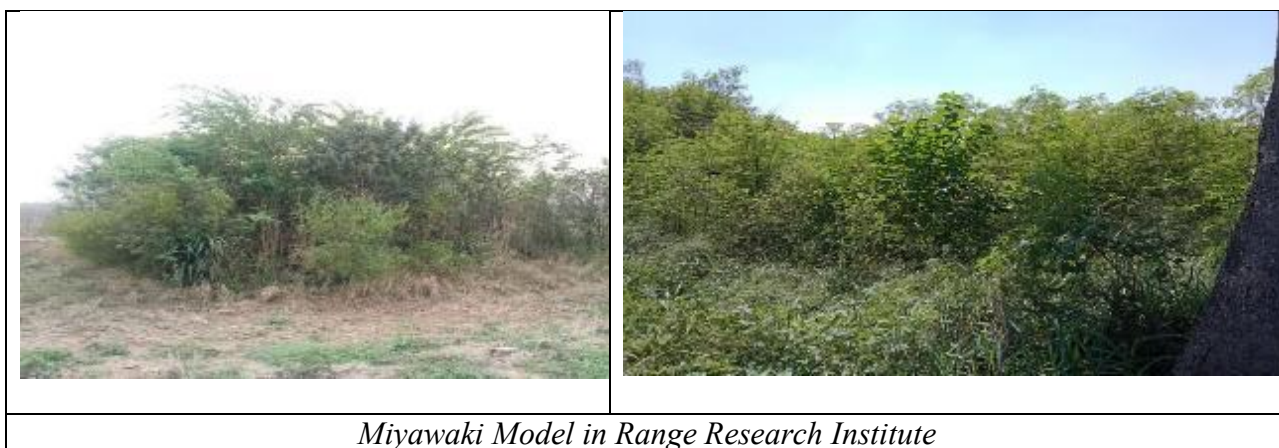
- Explants exhibited an average of 15 leaves after six weeks of culture, indicating a strong shoot proliferation response. The regenerated plants achieved an average height of approximately 3 inches, demonstrating effective growth under optimized conditions.

- All fungal and bacterial contamination was eradicated by optimizing the sterilization process.
- Improvements were seen in explant survival and growth after applying charcoal, ascorbic acid, and frequent sub culturing.
- Successful root formation was observed in 50% of cultured plants, indicating effective rooting conditions.

**Maintenance of Multipurpose Tree and Shrub Species (MPTS) in agroforestry nursery:** Raising of nurseries provide quality planting stock and self-employment opportunities to the farmers where they can use their free time for nursery operations. Precious plants such as indoor ornamental plants, fruit and forest trees using nursery facilities, ensure sustainable economic returns. By using scientific techniques plants can be raised and a farmer can earn a reasonable income by selling them. This technology is highly environment friendly and is ecologically plus economically sustainable. Right tree for right place is key to any conservation and development endeavor. Nurseries help tremendously to achieve desire objectives in most effective way. An average fifty-five thousand plants (MPTS) of more than 45 species were raised in agro-forestry nursery, RRI, NARC. The following MPTS were grown in agro-forestry nursery, details are given below:

- Produced sixty five thousand healthy MPTS species in agro-forestry nursery.
- Twenty kg seed of different MPTS species were collected.
- Conducted internship in forest nursery techniques to seven BS and four MPhil. Students from PMAS, Arid Agricultural University, Rawalpindi and Four BS and three MPhil. Students from International Islamic University, Islamabad.

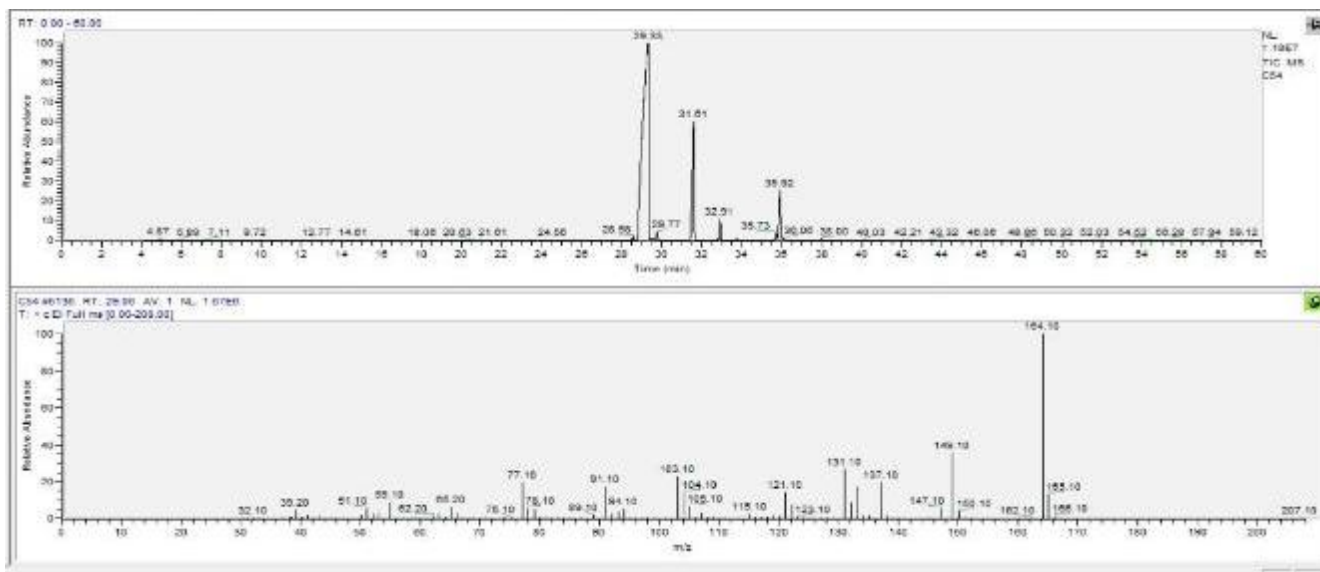
**Introduction and evaluation of various plants species in Miyawaki Model:** New concept for afforestation for urban area was introduced under rain-fed condition in RRI. The experiment was maintained under rain fed condition and the following result was recorded according during the reported period. The *Morus alba* species was observed for maximum height 22.7 ft. with diameter 8.2 cm and then followed by the species *Leucaena leucocephala* attained height of 19.3 ft. with diameter 7.5 cm. Moreover, the *Grevillea robusta* was observed at height of 13.4 ft. with diameter 7.5 cm.



## HONEYBEE RESEARCH INSTITUTE

### **Extraction and application of plant-based essential oils from (*Apis mellifera*) colonies:**

Integrated pest management (IPM) in apiculture and aligns with PARC's broader goals of promoting **organic beekeeping, pollinator health, and export enhancement** of Pakistani honey.



The chemical analysis of clove showed that there are three active compounds i.e., Eugenol, Caryophyllene, and Aceteugenol that have the properties of miticide.

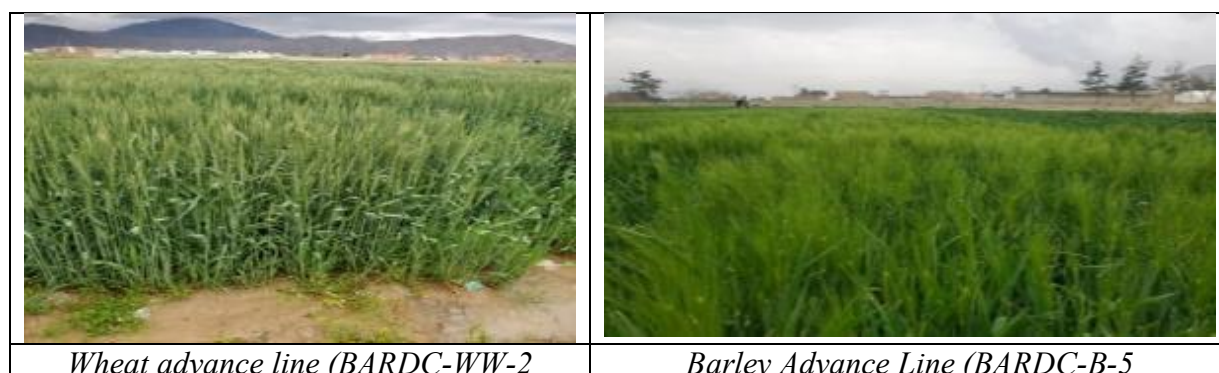
**Pollinator Profile and Role of *Apis mellifera* on the Yield Enhancement in Sesame:** The investigation took place at the oilseed research farm, National Agricultural Research Centre aiming to evaluate the pollinator profile of sesame and the impact of *Apis mellifera* on yield enhancement. The result revealed that Hymenopterans were the predominant floral visitors, constituting 90.81% of the total floral visitors, followed by the Dipterans and Coleopterans. Bees emerged as the most frequent floral visitors, with *Bombus haemorrhoidalis* being the most abundant at 27.16%, followed by *A. dorsata* (25.04%), *A. mellifera* (16.27%), and *A. florea* (9.34%). All the bee species started their activity before 09:00 am. *Bombus haemorrhoidalis*, *A. dorsata*, *A. cerana*, and *A. mellifera* attained their peak activity at 09:00 am whereas *A. florea* at 03:00 pm and *Xylocopa fenestrata* at 12:00 pm. The maximum number of pods with greater seed weight and yield was obtained in open-pollinated (41.53 pods/m<sup>2</sup>, 3.44 gm/1000 seeds, and 91.97 gm/m<sup>2</sup> respectively) followed by *A. mellifera* and self-pollinated. This study concluded that honeybees especially *A. mellifera* play an important role in increasing the sesame yield.

**Impact of bee pollination on soybean yield:** The experimental field crop of soybean of three treatments applied, open free visit of pollinators, caged plants and with only bees. Caged Plants without bees were harvested and data number of pods per plant, number of seeds per pod, and yield per meter square was measured in three treatments. The Open free visit of pollinator's treatment showed good impact on crop yield of soybean followed by caged plants with only bees and Caged Plants without bees respectively. Mean no. of pods per plant in T1 were recorded 49.7, followed T2 (42.5/pods per plant), T3 (32.0 pods per plant) respectively. Similarly yield per square meter recorded maximum in T1 302.4 gram followed by T2 (256.0 grams) and T3 215 grams per meter square respectively.

## BALUCHISTAN RESEARCH & DEVELOPMENT CENTER (BARDC), QUETTA Varietal Development

BARDC is working on breeding field crops has released 03 wheat, 02 barley and 01 lentil varieties. BARDC selected two new high yielding facultative winter wheat genotypes (BARDC-WW-2 and BARDC-WW-4) after rigorous selection ready for registration under provincial seed council. The genotypes outperformed local wheat and advanced lines by 5-10% over four years. Both genotypes

showed 100% resistance against rust in Baluchistan, while showed complete to moderate resistance against yellow rust under NWDSN. Similarly, two new high yielding barley genotypes (BARDC-B-5 and BARDC-B-2) were submitted for testing under National Uniform Yield Trials.



**Seed Multiplication of High Yielding Varieties Under Village-based Seed System:** BARDC has produced 100 tons of seed of high yielding wheat (Wafaq, AZRC-Dera, Akbar, Nawab, Advance lines) on 50 acres, barley (JE-21, Sanober-96, Advance lines) on 10 acres, Lentil (Dasht-21) on 100 acres and will be disseminated further through farmer-to-farmer system. Similarly, promotion of Ispaghul was conducted on an area of 51 acres, Sesame on 12 acres, and 4000 Pistachio nursery plants developed for budding and further dissemination at BARDC. Moreover, 442 pistachio plants were budded. Similarly, produced 2000 saffron bulbs with 430 grams of along with others 1500 sapling of Thyme, Rosemary and Oregano produced.



*Saffron (Stigma)*

**Promotion of Olive Cultivation under Commercial Scale in Pakistan:** At BARDC Olive oil Extraction mill, 46,102 kg of olive fruit was crushed resulting in 6396 liters of extra virgin olive oil produced (BARDC and farmers produce). In addition, a total of 108,859 olive plants were planted in different districts of Baluchistan with a cost share of 33% from farmers (Rs. 10,015,047), as part of targets allocated to BARDC component. BARDC also installed Drip Irrigation System on 737 acres in different districts of Baluchistan with a cost share of 33% from farmers and 67% from the project (farmers deposited share of PKR 54,870,130). Additionally, Six thousand (6000) plant nursery developed for different olive varieties at BARDC, Quetta. BARDC progressive farmer Mr. Jabbar Khan from Loralai Baluchistan won silver medal in International olive oil competition at New York International Olive Oil Competition USA (NYIOOC) during April 2025.



*Olive plantation at Zhob*

*Olive oil extraction*

*Drip Irrigation System*



*Ispaghool Project farmers field day at Kachi*



*Farmers field day at Sibi*



*Sesame Project Farmer field day at Tali*

**MOUNTAIN AGRICULTURAL RESEARCH CENTER, JUGLOT, GILGIT**

**Establishment of multi-purpose nursery:** Established multi-purpose forest tree species nursery, for the promotion of agro-forestry research intervention to promote farm forestry in the mountainous ecosystem. About 1500 plants of Eucalyptus and Mulberry have been raised in 2024-25 and ready to be distributed next year. 1000 plants of Eucalyptus and Mulberry have been distributed among the farmers on subsidize rates during 2024-25.



*Forest Plants Nursery, MARC GB*

**Evaluation and pine nursery:** To of Chilgoza pine propagation has been establishment of a dedicated nursery aimed at developing efficient

**testing of Chilgoza** support the restoration forests, ex-situ initiated through the production technologies.

Approximately 2,000 seedlings have been successfully raised. These seedlings will be transplanted



into their natural habitats as part of a research-based intervention to enhance regeneration, conserve genetic diversity, and promote sustainable management of Chilgoza forests in Gilgit-Baltistan.

*Chilgoza Pine Nursery, MARC GB*

**Olive cultivation on commercial scale in Pakistan GB component:** Under this initiative approximately 8000 Olive plants have been planted at barren and marginal double cropping zones of GB to uplift the socio-economic improvement of mountain farming community of GB



*Olive Orchard at Farmer Field*

**Walnuts plants Production and Dissemination:** More than 2000 high quality walnuts, early fruiting and normal fruit bearing varieties have been produced and will be issued in next planting season.



*Walnut Nursery, MARS-Chilas*

**Seed production block of Rye grass:** During winter, forage and fodder availability is a major challenge in the harsh climate of Gilgit-Baltistan. To address this, MARC has introduced cold-tolerant exotic ryegrass vertex variety, which has shown strong performance in local conditions. A seed production block has been established to support its wider cultivation, producing approximately 8 kg of seed during the reporting year.



*Rye Grass Seed Production Plot*

**Soil analysis:** 100 soil samples were collected from district Ghizar and Hunza for soil fertility assessment and mapping under project titled “Mainstreaming of MARC for Promotion of High Value Agriculture in Gilgit-Baltistan”. The soil samples collected from two different depth 0-15 and 15-30 and the coordinates for each sampled area have been noted and analyzed their physio-chemical properties (pH, EC, Soil Texture, OM, NO<sub>3</sub>-N, Extractable P and K).

KIU student from the department of Botany Co-Supervised in their research “Physiochemical properties of soil and vegetation pattern along the altitudinal gradients of Minimarg valley, Astor”.



*Soil Sampling from Farmer Field, Hunza*

#### **Evaluation and Seed/Seedlings Production Trials of different vegetable crops**

- Different experiments were conducted and evaluated 4 Tomato (Roma, Nayab and Nadir), 4 Brinjal (Padagoda, Nirala, Local / Desi), 4 Hot Chili (China Red, Khatmando and Kuneri/Longi) and 3 radish (Green Neck, Mino Early and China Red) varieties were evaluated at MARC Juglote. Tomato variety **Roma (27.65 t ha<sup>-1</sup>)**, Brinjal variety **Nirala (29.26 t ha<sup>-1</sup>)**, Chili variety **China Red (19.41 t ha<sup>-1</sup>)** and Radish variety **China red (38.61 t ha<sup>-1</sup>)** gave highest yield this year. The experiments will be continued next year for final selection.
- 100 Kg seed of China cabbage, 25 Kg Nipali Cabbage and 5 Kg Redish were produced and distributed among progressive farmers on subsidize rate. Also raised 80 thousand seedlings of sweet pepper, hot chili, tomato, brinjal and onion and provided to farmers / agriculture Extension department GB.



### *Vegetables Field Trials, MARC GB*

#### **Fruit Plants Production and Dissemination**

- During the reporting year, 51,00 true-to-type deciduous fruit plants distributed (including Apricot, Apple, Cherry, Pear, Plum, Fig, Walnut, and Almond) to farmers, NGOs, and Government organizations. Additionally, grafted 8,000 deciduous fruit plant on rootstocks of Apricot, Apple, Pear, Peach, and Cherry.
- Introduced kiwi cultivation in Gilgit-Baltistan, established 07 kiwi orchards (01 in Diamer and 06 in Gilgit districts) and also established a new orchard of 08 kiwi varieties (Hong, Fari, Gin, Argu, Bru, Hort, Aeci and Hoy) after the successful establishment of Hayward kiwi variety orchard at MARC farm.
- Furthermore, we established three cherry varietal experimental orchards at farmer field in district Darail, Hunza and Gilgit under PSDP project with the aim to test and promote superior cherry varieties.



*Kiwi Orchard, MARC GB*

#### **Wheat Yield Trials at MARC**

- During 2024–25, multiple wheat yield trials were conducted at MARC, Juglote under the coordination of the Wheat Program, NARC. The GB Uniform Wheat Yield Trial (GB PUWYT) comprising 10 entries with 3 replications showed that Entry-2 recorded the highest yield (3762.5 kg/ha) at MARC, Juglote, while Entry-5 (5524 kg/ha) performed well at FCRS, Basin Gilgit.
- The National Elite Spring Wheat Yield Trial (NESWYT-B), consisting of 30 entries with 2 replications, recorded Entry-7 with a promising yield of 4265 kg/ha at MARC, Juglote. Similarly, in the 5th NESWYT-A trial, which included 40 entries with 2 replications, Entry-30 showed the highest yield of 3740 kg/ha.
- The National Uniform Wheat Yield Trial (NUWYT) with 80 entries was also executed, and data has been compiled and shared with the concerned authorities.

- Furthermore, the National Regional Wheat Yield Trial (NRYT) comprising 20 entries was conducted, and the compiled data was submitted to the Wheat Program at NARC for further evaluation.
- About one acre was planted for the production of different wheat varieties i.e., wafaq-2022 Pakistan-2013, Borlaug-2016, Zincol-2016 and Markaz-2019. About 25 tons of seed have been harvested and will be available to famers for the crop season 2025-26.

**Maize Yield Trials at MARC**

- The experiment, which consisted of 13 (Haq Nawaz, Gold Shival Sweet-1, QPM, Pirsabak New-1, Gohar-19, Jalal, Pharri, Azam, Kaptan, Malhan, Edhi, Cimmyt Pak and Shival Gold) cultivars were conducted at MARC. Results showed significant variation in yield potential among cultivars. Jalal showed maximum yield potential and showed excellent resistance to lodging.
- About 2 acres were planted for the production of different maize varieties Jalal, Pharri, Azam QPM.-5 and Kuptan. About 3 ton maize seeds were produced, sell and disturbed among local farmers.



*Seed production Plot of maize, MARC*

**Value addition:** Developed the following By-products for the promotion of high value agriculture in Gilgit-Baltistan

- Mulberry Jam
- Apricot Jam and bars
- Apple and sea buck thorn juice
- Olive pickle
- Cured olives (brine)
- Olive preserve
- Olive jam
- 



*By Product of different items*

**Introduction of High-Quality Exotic Herbs:** PARC-MARS Astore is working on introduction of high-quality herbs for the development of herbal products such as herbal tea, essential oil production as well as value added products. For this, Sage, English lavender, Greek Oregano and German chamomile etc. were successfully propagated and planted at MARS, Astore for the future research activities.



**Virus Free Pre-Basic Potato Production:** Produce G-0 (pre basic) potato virus free seed through tissue culture at MARS Chilas annually. More than 15000 to 30000 mini tubers have been produced in screen house Chilas. In 2024-25 about 3000 vitro potato plant has been provided to GB Agriculture Research from tissue culture laboratory.

#### **ARID ZONE RESEARCH INSTITUTE (AZRI), BAHAWALPUR**

**Comparison of various advanced lines of Ispaghool (Screened out of Ispaghool germplasm) for their growth & yield under agro climatic conditions of Bahawalpur:** Field evaluation of seven advanced Ispaghool lines at AZRI, Bahawalpur (Rabi 2024–25) identified line 21213 as the top performer (1,316.6 kg/ha), followed by 21988 (1,283.3 kg/ha). Five promising lines were shortlisted for variety approval, with 21213 completing the DUS trial through FSC&RD.



*Collecting data for DUS trial with the inspection team of FSC and RD.*

### **Response of different weed control methods on various cultivar of Mungbean**

A weed management trial on Ispaghul at AZRI, Bahawalpur (2024) showed that Stomp 330 EC (2.5 L/ha) with two hoeings produced the highest seed yield (1,756.6 kg/ha), followed by two hoeings alone (1,536.3 kg/ha). The control (no weed control) gave the lowest yield (843.7 kg/ha), confirming integrated weed management as most effective.



*Collecting data on vegetative growth at mungbean experimental area of AZRI, Bahawalpur*

**Evaluation of various accessions of mungbean germplasm (obtained from PRI AARI, Fsd) for their growth & yield under drought agro-climatic conditions of Bahawalpur:** A germplasm evaluation trial comprising 40 entries of mungbean (provided by the Pulses Research Institute, Faisalabad) was conducted at the Experimental Area, PARC–AZRI, Bahawalpur. Data were recorded on key traits including days to 50% flowering, plant height, number of pods per plant, and days to 90% maturity as per the research plan.



*Collection of data of growth and other parameters of mungbean*

**Testing/Evaluation of screened mungbean germplasm for better growth & yield under arid region in drought stress conditions:** A mungbean germplasm trial at PARC–AZRI, Bahawalpur (Kharif 2024) identified five high-yielding, drought-tolerant lines, with seed yields ranging from 1120.4 to 2000.3 kg/ha. The results demonstrate the stability of selected accessions across seasons, showing strong potential for future cultivation in arid regions.



*Collecting data of pod and yield contributing characteristics of mungbean*

**Response of seed inoculums growth and yield of various varieties of Mungbean:** The trial was conducted under the Agricultural Linkages Program (ALP) Mungbean Project at the Experimental Area, PARC–AZRI, Bahawalpur. Three mungbean varieties—AZRI-2021, NM-2021, and Jumbo Mungbean—were evaluated under arid agroclimatic conditions, with and without seed inoculum application. The objective was to assess their growth and yield performance for potential adaptation in water-scarce environments.



*Inspection of disease incidence of Mungbean*

**National Elite Spring Wheat Yield Trial (NESWYT-B) 2024-25:** The 6th National Elite Spring Wheat Yield Trial (NESWYT-B) 2024–25 was successfully conducted at the Experimental Area, PARC–AZRI, Bahawalpur. The trial included 30 entries with two replications. Data on key growth and yield parameters—including days to maturity, plant height (cm), tillers per plant, and spikes per plant—were recorded as per the plan of work provided by the Program Leader (Wheat), NARC, Islamabad.



*A field view of Wheat Experimental area.*

**High-density, true-to-type mother orchard for arid horticultural plants:** The High-Density True-to-Type Mother Orchard at AZRI enhances fruit production in arid regions, supporting food security and rural livelihoods in Cholistan. Serving as a germplasm repository of drought-tolerant species—Ber, Guava, Fig, Pomegranate, Date Palm, and Falsa—it ensures genetic fidelity for propagation. Thirteen elite Ber genotypes with superior yield and quality traits have been selected to provide certified planting material. This initiative leverages drought resilience to develop arid fruits as commercial crops while promoting genetic conservation, climate resilience, and poverty reduction.

**True-to-Type Mother Orchard of High-Density Fig:** A high-density true-to-type mother orchard of fig (*Ficus carica*) has been established for the first time under hot arid conditions at AZRI, Bahawalpur. Initial results show strong yield potential and excellent climatic adaptation of the selected varieties. To support commercial cultivation, over 4,000 disease-free nursery seedlings have been propagated from this elite germplasm, ensuring the supply of high-quality planting material for large-scale farmer adoption.



*A field view of mother orchard of fig at PARC AZRI, Bahawalpur*

**Establishment of True to Type Mother Orchard of Anar Demonstration Plot:** AZRI, Bahawalpur has developed a high-density true-to-type mother orchard of pomegranate (*Punica granatum* L.) in its experimental fields. From this verified germplasm source, 3,000 disease-free nursery seedlings have been propagated for distribution to farmers. The initiative promotes large-scale cultivation of quality pomegranate varieties, ensuring genetic purity and enhanced productivity in the region.



*Field view of pomegranate, true to type mother orchard and its nursery*

**True to type Mother Orchard of Dateplam Varieties:** AZRI, Bahawalpur has established a mother orchard of elite date palm (*Phoenix dactylifera* L.) cultivars—Dhakki, Aseel, Zaidi, and Bara—to assess their performance under local agroclimatic conditions. Serving as a germplasm repository, it

provides genetically superior offshoots for conservation and propagation, with the goal of supplying disease-free, true-to-type suckers to boost commercial date palm production in the region.



*Field View of date various palm varieties at PARC AZRI, Bahawalpur*

**Research Trials on Desert Grasses:** At the Cholistan Farm of AZRI, Bahawalpur, a study was carried out to assess the growth performance of selected grass species on sandy desert soils. Ten pre-selected genotypes were planted on sand dunes and evaluated for key parameters, including vegetative propagation, sprouting, germination, plant height, tiller production, flowering time, and fresh and dry biomass yields. Results highlighted four drought-tolerant species—*Lasiurus indicus* (Gorkha), *Cenchrus ciliaris* (Dhaman), *Symbopogon jawarancusa*, and *Panicum antidotale*—which not only survived extreme arid conditions but also produced significantly higher biomass than the other tested varieties.



*Various desert grasses at Cholistan Farm of AZRI Bahawalpur*

**Plantation of desert grasses on sand dunes of Cholistan farm of Bahawalpur:** Chronic overgrazing has degraded large rangeland areas in the Cholistan desert near Bahawalpur, depleting native grasses, legumes, and shrubs. To restore ecological balance and support pastoral livelihoods, AZRI has launched a desert greening program focused on sustainable rangeland rehabilitation. Diverse local and introduced species are being propagated and evaluated at AZRI and Cholistan Farm to conserve native flora. The initiative also includes systematic seed collection and germination testing under field and laboratory conditions to determine optimal propagation techniques.



*Various desert grass on sand dunes at cholistan farm*

**Olive Adaptability Trial:** Olive cultivation in Pakistan has expanded rapidly in recent years, supported by government-led initiatives to promote commercial production. The Pakistan Agricultural Research Council (PARC) and Barani Agricultural Research Institute (BARI), Chakwal, are leading these efforts through large-scale development projects. In southern Punjab, especially the Cholistan desert, farmers are increasingly adopting olive farming. To assess local suitability, a study in Bahawalpur evaluated six varieties—Zaiti, Nabali, Gemlik, Oliana, Arbosana, and Frontio—under regional agro-climatic conditions. The findings provide essential data for guiding variety selection and supporting the expansion of olive cultivation in the area.



*Inspection of olive orchard at AZRI Bahawalpur*

## **WATER & AGRICULTURAL WASTE MANAGEMENT INSTITUTE TANDOJAM**

### **Assessing the Impact of Climate Change on Agricultural and Water Resources:**

#### **A Comprehensive Analysis using ClimDex Indices for Tandojam, Sindh, Pakistan (1981-2023)**

A climate analysis for Tandojam, Sindh (1981–2023), revealed rising temperatures, more frequent warm nights, and intensifying rainfall events. These changes pose risks to water resources, crop productivity, and environmental health. Adaptive water management, stronger flood control, and climate-resilient agriculture were recommended as key mitigation strategies.

#### **Comprehensive Assessment of Groundwater Quality for Drinking and Irrigation purpose for Sustainable Utilization in the Hyderabad District, Sindh, Pakistan:**

A groundwater assessment in District Hyderabad, Sindh, showed mild to moderate alkalinity, elevated TDS, and widespread microbial contamination, with several sites exceeding WHO safety limits. Sewage infiltration was identified as a major source, posing serious risks to public health and agriculture. The study recommended stricter policy enforcement, infrastructure improvement, and community-level treatment measures.

#### **Response of Banana variety NIGAB-1 to application of different Micro-nutrients at Agriculture Research Sindh Tandojam.**

A field study at Agriculture Research Center (ARC), Tandojam, evaluated the role of micronutrients alongside macronutrients on the growth and yield of tissue culture banana (NIGAB-1). Zinc application increased yield by 9.95%, followed by sulphur (4.74%), iron (3.79%), and boron (1.89%) compared to NPK alone. The results highlight that micronutrients, often overlooked, play a vital role in improving banana yield and quality. Farmers are advised to integrate them with NPK for sustainable productivity.

**Seed Multiplication Trial of Potato under the Umbrella Project entitled “. Pakistan-Korea Joint Program on Certified Seed Potato Production System”:** Potato trial results showed the highest number of tubers (102) and maximum yield (30.60 t ha<sup>-1</sup>) in plot-3, while plot-1 recorded the lowest tuber count (62) and yield (19.20 t ha<sup>-1</sup>).

**Furrow and Raised Bed Irrigation System under Ladyfinger (Okra), Tandojam, Sindh:** Okra trials showed that furrow irrigation produced a slightly higher yield (3,500 kg/acre) than raised beds (3,195 kg/acre). However, raised bed irrigation improved water use efficiency by 9.94% and saved

18.08% water, demonstrating better control over irrigation and reduced wastage. Despite lower yield, raised beds delivered higher productivity per unit of water, highlighting their suitability for water-scarce regions.

**Climate Smart Agriculture in Sindh:** Key initiatives included groundwater gallery recharge in the Desvi spate area to improve subsurface moisture and drought resilience, development of a tunnel nursery for early onion seedlings, and establishment of vermicomposting infrastructure to enhance soil fertility and promote organic farming. A weather station was installed to provide real-time climate data for timely decision-making, while a 100-meter parabolic water channel improved on-farm water distribution and reduced erosion. Additionally, capacity building in vermicomposting empowered local farmers to adopt sustainable soil management practices.

#### **ARID ZONE RESEARCH CENTRE, UMERKOT**

**Increased area of the fodders at the center to produce the fodder seeds:** Evaluation and introduction of 20 exotic and indigenous varieties of fodders, the biomass production i.e. dry and wet were recorded carefully of each grass. Seed collection is continued from fodder blocks i.e. *Panicum Tanzania*, *Panicum maximum*, *Rhode*, *Elephant grass*, *Cenchrus ciliaris*, and *Panicum antidote* L etc. The collected seeds after drying in shed and will be stored to distribute among different NGO and also directly to the farmers of the area

**Development & adaptation of Postharvest Technologies for Chillies:** Introduced Solar tunnel dryer and one solar-cum-gas fired dryers, along with drying of Chillies, dates of different varieties, different vegetables like onion, spinach, cluster bean, musk melon, olive leaves, Moringa leaves even fodders were dried to store for livestock programme, in this way; 40-60%-time period was saved on drying, Quality products were produced and 80-90% aflatoxin infestation reduced.

**Introduction and Multiplication of Moringa Olifera and Medicinal Plants:** Two acres of Moringa, known as a “miracle tree” with medicinal properties, were cultivated for leaf production, alongside 2,000–5,000 saplings of Gugral, Aloe vera, Imli, Jungle Julibi, and Khavi, which were multiplied and distributed to farmers directly and through NGOs. To address malnutrition in Thar, value-added products such as Moringa leaf powder, Aloe vera gel, Khumbhat gum, and Gugral gum were developed, along with dried olive leaf tea and vegetables including onion, spinach, gourds, and ber.

**Ground nut (*Arachis ypogea*) National Uniform Varietal Yield Trials 2024:** The NUYT of Groundnut experimental trials-2024 was conducted on 04-06-2024 as per instructed from Coordinator Pulses programme PARC-NARC Islamabad. 12 lines in RCB design with 3 replication. The results demonstrated that groundnut line with entry number 06 surpassed all the entries in the trial by producing maximum mean yield of 4537.50 kg ha<sup>-1</sup>. While, the lines with entry number 05 and 10 displayed the next best performance with mean yields of 3006.25 and 2974.17 kg ha<sup>-1</sup>, respectively. Moreover, among the tested entries, the lowest mean yield of 1409.21 kg ha<sup>-1</sup> was recorded from the groundnut line of entry number 07.

**Mung bean and Mash Bean National Uniform Varietal Yield Trials 2024:** In mung bean trials, entry No. 01 recorded the highest mean yield (1,180.28 kg/ha), followed by entries No. 07 (1,109.17 kg/ha) and No. 11 (1,100.0 kg/ha), while entry No. 05 showed the lowest yield (443.40 kg/ha). In mash bean trials, entry No. 05 performed best with a mean yield of 822.99 kg/ha, followed by entries No. 03 (768.82 kg/ha) and No. 02 (767.78 kg/ha), whereas entries No. 01 and 04 had the lowest yields (~662 kg/ha).

**Cluster bean (*Cyamopsis tetragonaloba*) National Uniform Varietal Yield Trials 2024:** The cluster bean entry with coded No. 2 yielded higher seed yield of 593.28 kg/ha followed by entry

coded No. 5 with seed yield of 555.56 kg/ha, whereas entry No. 3 remained lower than others with 452.67 kg/ha seed yield. Whereas for green fodder yield again entry coded No. 2 yielded higher green fodder yield of 12.49 ton/ha yield followed by entries coded No. 5 & 1 yielded 11.71 & 11.13 ton/ha green fodder yield respectively, whereas entry coded No. 3 remained lowest than others with only 9.467 ton/ha green fodder yield. In this way entry No. 2 was remained better performing for fodder as well as for seed yield at PARC-AZRC Umerkot and arid areas.

**Chickpea (*Cicer arietinum* L.) National uniform varietal yield trials 2024-25:** In NUYT (Desi) chickpea trials, entry No. 26 (472.22 kg/ha) and No. 13 (466.43 kg/ha) outperformed others, while entry No. 01 recorded the lowest yield (274.06 kg/ha). In NUYT (Kabuli), entries No. 3 (653.70 kg/ha), No. 21 (641.89 kg/ha), and No. 23 (639.81 kg/ha) showed superior performance, with entries No. 9, 5, and 2 recording the lowest yields (433–482 kg/ha). Overall, Kabuli lines performed better than Desi lines under Thar, Umerkot conditions, and selected high-yielding lines will be included in the germplasm for further evaluation.

**Comparison of drip and basin irrigation method on yield of grafted BER:** The research study was conducted at PARC-AZRC field for comparison between drip and ring basin irrigation method for water saving, yield per plant and water used. The results pertaining comparison of drip and basin irrigation method are presented in following table. The findings of this study indicate that in Drip canopy of ber plant was measured 14.7. Whereas, in basin was obtained 14.75 ft. Likewise, only 0.20 m<sup>3</sup>/plant water was used in Drip against 0.38 m<sup>3</sup> / plant in ring basin.

**To evaluate the performance of the Solar tunnel, solar cum gas fired dryer compare with conventional sun drying:** A drying experiment was conducted on 50 kg of freshly harvested red chilies to compare solar tunnel drying, solar-cum-gas drying, and open sun drying. Chilies were sorted, graded, washed, and placed in thin layers on trays, with drying carried out daily from 9:00 am to 5:00 pm until moisture content reduced from 80% to 8–10%. Temperature, humidity, and moisture data were recorded throughout to evaluate the efficiency of each drying method.

**Effect of different spacing of cluster bean on growth and yield under rainfed:** The research study was conducted during kharif season 2024 with local variety at PARC-AZRC farm Umerkot to evaluate the effect of five plant spacings (15,22,30,45 cm) on growth and yield under rainfed. The experimentation put down in Randomized Block Design which containing of four treatments with T1 - 15 cm (300cm x 50cm), T2- 22 cm (300cm x 50cm), T3-30 cm (300cm x 50cm), T4-45 cm (300cm x 50cm) T5-Control farmers practice (300cm x 50cm) was replicated thrice. Results showed that T5-Control (farmers practice) performed better over other plant spacing

**Evaluation of Cluster Beans, Mustered and Ispaghool Lines in Germplasm under Rainfed and Irrigation System:** Cluster bean cultivated at AZRC farm Umerkot on rain fed for testing their performance. Yield was obtained 12 mandis. Evaluation of 60 germplasm lines of cluster bean for 2024-25 season is under process. Mustard crops cultivated at AZRC farm Umerkot during the Rabi season 2024-25 for testing their performance. Yield was recorded 158 mounds. Total 148 lines of Ispaghool (Germplasm) were tested at AZRC farm under ALP project (CS-53). Total 10 yield potential trials were conducted at farmer fields

**Performance Evaluation of off-Season Onion Vegetable in Glass House/Artificial and field/Natural Environment under Drip Irrigation System for Water Use Efficiency at PARC-AZRC Umerkot:** An off-season onion study at PARC-AZRC Umerkot under drip irrigation showed markedly better performance in greenhouse conditions compared to open field. The greenhouse crop achieved a 95% survival rate, average plant height of 29 inches, and yield of 134 maunds/acre, versus

50% survival, 17 inches height, and 32.5 maunds/acre in the field. Water use efficiency was also higher in greenhouse cultivation (7.595 vs. 1.842 kg/m<sup>3</sup>/ha), confirming greenhouse production as a successful strategy for off-season onion.

**Livestock & Backyard Poultry Management:** The livestock farm was successfully managed with three sheds (camel, cattle, and goats) and regular maintenance. Current stock includes 6 camels (Dhati and Maricha breeds), 7 Thari cattle, 19 goats (Samrooti and Tharki), and 5 poultry birds. Research was initiated on breed purification and artificial insemination to benefit the local farming community. A free veterinary clinic was established, treating 4–5 animals monthly, while low-production animals were auctioned to improve herd efficiency.

**Climate Resilience of agro-pastorals in Umerkot and Tharparkar Districts:** In collaboration with FAO, PARC-AZRC implemented a nine-month project to strengthen the resilience of agro-pastoralists in Umerkot and Tharparkar through climate-smart agriculture and natural resource management. A total of 48 field facilitators were trained, who then established 278 Agro-Pastoral Field Schools (APFS), benefiting 7,256 farmers. Of these, 253 APFS (6,584 farmers) completed full training cycles, covering CSA, INRM, livestock management, and sustainable practices through hands-on demonstrations and field experiments.

#### ANIMAL SCIENCES DIVISION

The broader researchable areas are livestock, poultry and fisheries sector comprising innovation in nutrition, genetics, reproduction, health, dairy value addition and biotechnology. The detail of research activities, and progress of different research programs are

#### ANIMAL REPRODUCTION AND GENETICS PROGRAM (ARGP)

**Breed Improvement through Efficient Artificial Insemination Services by Using Korean Holstein Semen in Cattle:** Nine-hundred and thirty-seven (937) cows were artificially inseminated with frozen-thawed spermatozoa of Korean Holstein in the field area of Punjab, and Khyber-Pakhtunkhwa. Pregnancy tests were performed in 639 cows, among these, 402 cows were detected confirm pregnant (62.91%). Nineteen kids were born in Punjab (Mandi Bahauddin) and Islamabad Capital Territory. A three-day international training workshop was conducted on Modern Breeding Technologies in Cattle from March 26 to 28, 2024 and Farmer Field Day was organized on Genetic upgradation of non-descript cattle on December 07, 2024 at Mandi Bahauddin, Punjab.



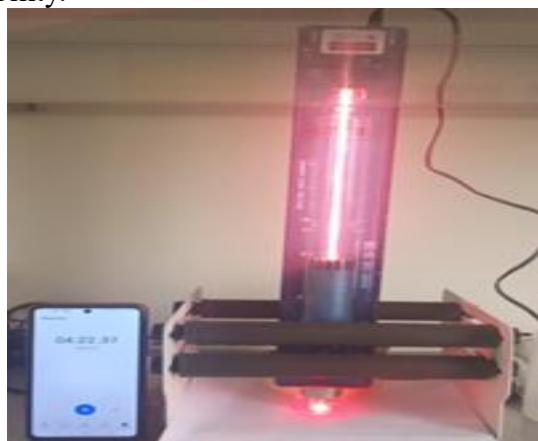
*Alien Non-Descript Cows with Korean Holstein Spermatozoa*



*Three-Day International Training Workshop*

**Nanotechnology-Enabled Improvement of Spermatozoa Cryopreservation Technique for Water Buffalos:** Inclusion of hydroxyapatite nanoparticles at dose levels 0.01 and 0.02%, in tris-citric acid cryo-diluent improved the post thaw quality of water buffalo spermatozoa. Exposure

helium-neon laser to buffalo spermatozoa with energy of 5.85 joules were found to enhance the post thaw sperm motility and viability.



*Helium-Neon Laser Exposure to Sperm Sample*

**Breed Improvement of Non-Descript Goat:** The high genetic cross bred progeny of Beetal (n=29), Saanen (n=08) and Boer (n=03) were obtained through Laparoscopic Artificial Insemination (LAI) by using frozen thawed spermatozoa.



*Saanen × Non-descript Goat Progeny*



*Boer × Non-descript Goat progeny*

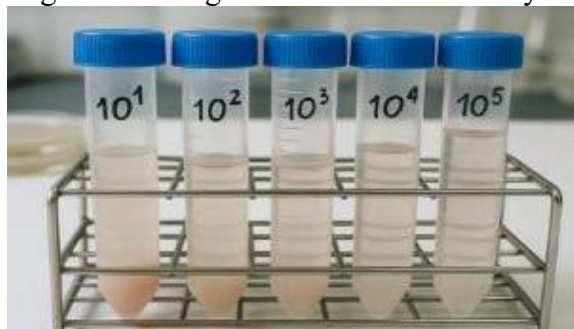
**Moving Further towards Formalized Goat Value Chain in Pakistan and Ethiopia through Business Oriented Breeder and Producer groups:** Conducted field survey of various villages in Talagang district and established agreements with 60 farmers for the Community-Based Breeding Program. 442 goats including 305 (69%) female and 137 (31%) male were enrolled and tagged in the program. A comprehensive database having detailed information about both the farmers and their enrolled animals was prepared.



*Registration of Goat Farms and Goats*

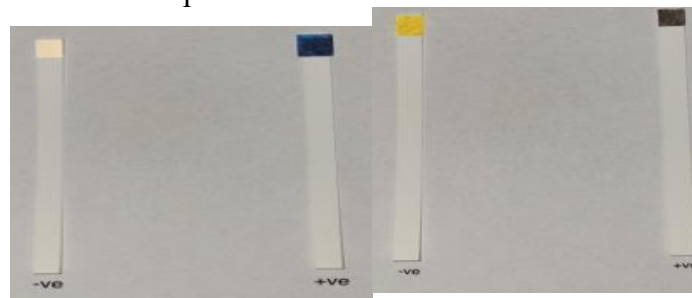
**ANIMAL PRODUCT IMPROVEMENT PROGRAM (APIP)**

**Effect of Nisin on the Shelf Life of Raw Meatballs:** Meatballs prepared from chicken minced meat and nisin was added at concentrations of 0g/kg (T1), 2g/kg (T2), 4g/kg (T3), 6g/kg (T4), and 8g/kg (T5). The result revealed that nisin at a minimum concentration of 4 g/kg is effective in controlling the bacterial growth during refrigerated storage of meatballs for 21 days.



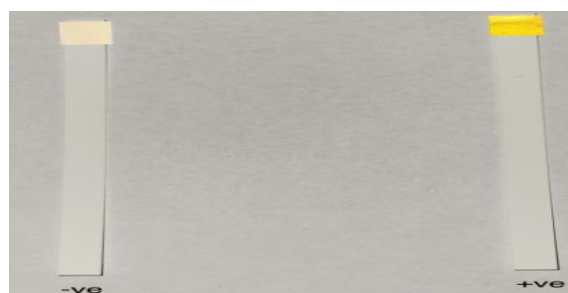
*Serial dilutions for TVC determination in fish meatballs*

**Development of Rapid Milk Testing Kit Exploiting Dry Chemistry for Detection of Common Adulterants in Market Milk:** Developed milk adulteration testing paper strips for neutralizers and starch detection. The minimum sensitivity level for these strips was found to be 0.1 % of adulterants when tested against spiked milk samples.



*Strips for bleaching agent and starch detection in milk*

**Quality Evaluation of Market Milk:** 134 milk samples were analyzed for total solids, fat and presence or absence of adulterants. Results indicated that 20% and 39.0% of the samples had total solids and solids-not-fat levels below the acceptable legal limit of 12% and 8.5%, respectively indicating adulteration with water. None of the sample was found adulterated with urea, neutralizer, starch, formalin, hydrogen peroxide, boric acid, added salt and cane sugar.



*Detection of adulterants in milk by strip*

## **AQUACULTURE AND FISHERIES PROGRAM (AFP)**

**Introduction of a High Value Fish *Channa striatus* (Saul) in Aquaculture System of Pakistan:** Achieved better growth rates of indigenous *C. striatus* about 27g/month in earthen ponds with optimum stocking densities @5000/acre. Achieved better growth performance of exotic *C. striatus* in earthen ponds i-e 36g/month as compared to raceways 27g/month. Developed brood stock of indigenous *C. striatus*. Successful artificial and natural breeding of the indigenous *C. striatus* was also carried out.



*Measurement of growth performance*



*Channa striatus acclimatization*

**Culture of Duckweed for the Development of High Protein and Cost-effective Fish Feed:** Duckweed germplasm was procured and stocked in the earthen ponds and produced biomass. The average yield of duckweed in wet weight basis was 200kg/2200 ft<sup>2</sup> while 60 kg/2200 ft<sup>2</sup> in dry matter basis, which is estimated to be 4.0 metric tons per acre (wet) and 1200 kg per acre (dry).

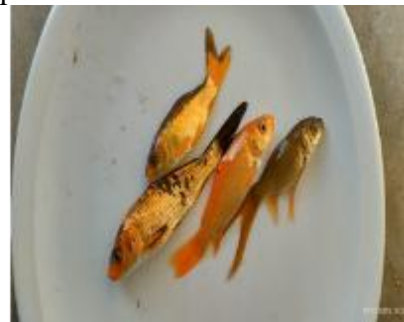


*Duckweed grown in earthen ponds*

**Role of Capsicum and Marigold in Pigmentation of Shubunkin:** The inclusion of marigold petals at levels of 4%, 8%, and 12% in fish feed enhanced the overall brightness of the ornamental fish but did not contribute to scale pigmentation. Marigold petals use in the diet was found harmless.



*Control group*



*Treated group*

**Prevalence of Antibiotic Resistance in Fish-born *E. coli* Aeromonas spp. from Punjab Province:** 20 Aeromonas isolates were subjected to antimicrobial susceptibility testing (AST). Results showed that 5 out of 20 isolates (25%) were resistant to tetracycline, while no resistance observed against gentamicin, cefotaxime, ceftazidime, ciprofloxacin, trimethoprim-sulfamethoxazole, and chloramphenicol. In the case of *E. coli*, AST was performed on 20 isolates. The highest resistance

observed against tetracycline, with 6 out of 20 isolates (30%) exhibited resistance while 20% in ampicillin, 15% in nalidixic acid, 10% in imipenem & 5% both in azithromycin and ciprofloxacin.



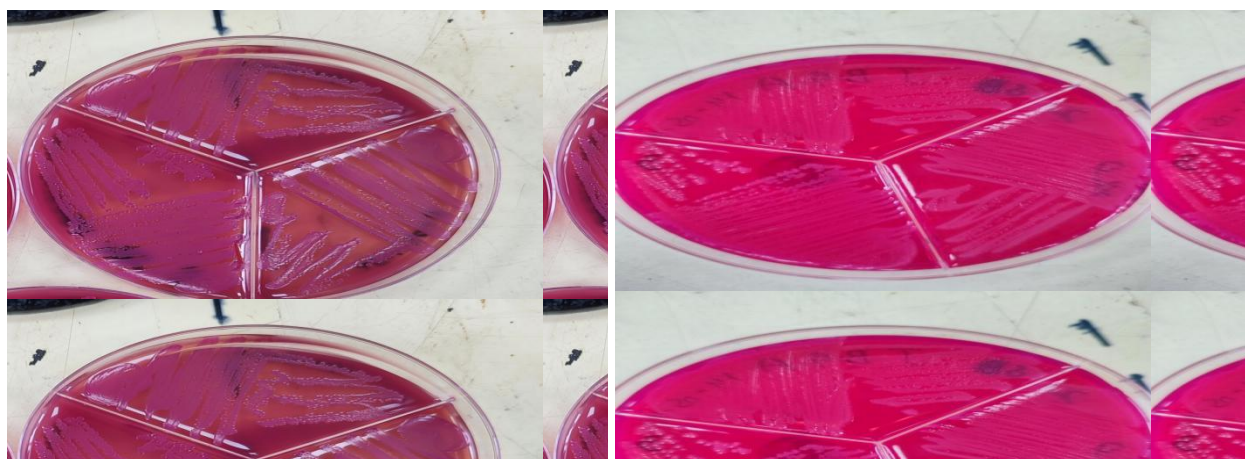
*Antibiotic susceptibility test for fish bacteria*

### **NATIONAL REFERENCE LABORATORY FOR POULTRY DISEASES (NRLPD)**

**Surveillance of Anti-Microbial Resistance (AMR) in Poultry:** *E. coli* (n=32) and *Salmonella* species (n=07) isolates were recovered from 35 cecal samples. The highest AMR was observed against tetracycline, nalidixic acid and streptomycin (100%) followed by trimethoprim (81%), chloramphenicol (62%), azithromycin and gentamicin (50%).

*Salmonella* species (n=53) isolates were recovered from 322 liver samples. The AMR was observed at different levels: 49% resistant to amoxicillin, ampicillin, and enrofloxacin; 62% to florfenicol; 71% to Doxycycline; and 100% to erythromycin.

*E. coli* (n=59) isolates were recovered from 66 liver samples. 67% A resistance rate was recorded for Florfenicol and Chloramphenicol, while 84% exhibited resistance to Doxycycline, Trimethoprim, Nalidixic Acid, and Tetracycline. Notably, complete resistance (100%) was observed against erythromycin, ampicillin, amoxicillin, and enrofloxacin.



*Pink colonies of E. coli on MacConkey agar      Pink with halo zone colonies of Salmonella species on Brilliant Green Agar*

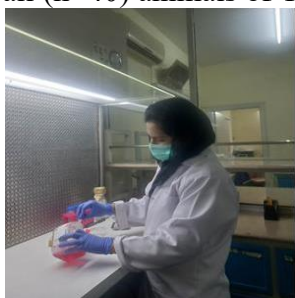
**Evaluation of Antigenic Variations among Infectious Bronchitis Virus in Commercial and Backyard Poultry:** The standardization and validation for molecular diagnosis (RT-PCR) of different subtypes of Infectious Bronchitis Virus (IBV) including IB -Massachusetts 41, IBV-(4/91), IBV- D274 and IBV strain -D388 (QX) were carried out. 22 poultry samples were received from PRI-Punjab and processed for molecular diagnosis through RT-PCR. 4 samples out of 22 were found positive for IBV and subtyped as M-41

**Prevalence of Food borne Antimicrobial Resistance in *E.coli* and *Salmonella* in ICT:** 501 samples of thigh meat were collected from live bird market for active AMR surveillance. *E. coli* (n=193) and *Salmonella* species (n=72) isolates were recovered. The isolates were confirmed through biochemical tests and MALDI-TOF and currently in process are undergoing PCR and AST.

#### **ANIMAL HEALTH PROGRAM (AHP)**

**One World-One Health: Holistic and Cost-effective approach to counter Brucellosis in sheep/goats in Pakistan:** Sheep (n=35) and goats (n=35) were selected for *Brucellamelitensis* Rev1 vaccine trial at two farms in Kahrora Pakka, Punjab. The vaccine was found safe to be used in sheep and goats. A one-day awareness seminar on "Brucellosis Control using One Health Approach "at Kahrora Pakka was also conducted on 25<sup>th</sup> February 2025.

**Field Validation of a Newly Developed Homologous Lineage Thermotolerant Peste des Petits Ruminants (PPR) Vaccine for Control of PPR:** A thermostable formulation of PPR vaccine was prepared and lyophilized using attenuated strain (PAK-LRS-13/NARC) on to Verocells and lactalbumin hydrolysate (LAH)-sucrose stabilizer in equal ratio. Field activities performed at Punjab and AJ&K. Total 59 animals at Muzaffarabad (AJ&K) and 400 animals at Talagang (Punjab) were vaccinated using thermo-tolerant PPR vaccine. Post-vaccination sero-monitoring after 21 days and 3 months showed that 53/59 and 27/27 animals at Muzaffarabad (AJ&K) were sero-converted and all (n=40) animals of Talagang (Punjab) tested by c ELISA sero-converted.



*Preparation of PPR vaccine*



*Vaccination at Talagang and Muzaffarabad*

**Development of models for control of Warble fly in Pakistan:** Warble fly prevalence survey involving 117 farmers (with 14987 goats, and 3621 cattle) was completed from 14 districts in Balochistan, AJ&K and Sindh. The warble fly larval prevalence trend during the 2024 showed lower (10.6%) than the previous ten years (13.02%). The prevalence was higher (between 2-27%) in goats from Balochistan followed by Sindh (10%) and AJK (1%). ELISA based sero-surveillance analysis of goats and cattle showed the antibodies of L<sup>2</sup> stage warble fly larvae during April to September 2024.



*Physical examination for warble fly and blood sampling for sero-surveillance*

#### **LIVESTOCK RESEARCH STATION (LRS)**

**Nutritional Enrichment of Maize Stovers as Feed for Ruminants through Physio-chemical Treatment and Ensilation:** A feeding trial was conducted on 16 calves with initial body weight of  $125 \pm 10$  kg to study the effects of feeding corn stovers ensiled with or without additives based diets on growth rate, nutrient utilization and economic performance of buffalo calves. Dietary treatments including (1) non-treated corn stovers (NCS; control), (2) urea-treated corn stovers (UCS), (3) molasses-treated corn stovers (MCS), and (4) urea-molasses-treated corn stovers (UMCS) ad libitum; and all of which were supplemented with concentrate feed mixture at 1.0% BW of calves (on DM basis). The feeding experiment lasted for 110-day period.

Calves on corn stover had highest average daily gain (0.75 kg/day), total dry matter intake (4.53 kg/day) and feed conversion ratio (6.04) than other treatments. Compared to diet NCS (control), the calves fed UMCS, MCS and UCS based diets, generated 32.08%, 19.79% and 11.98% additional economic benefits, respectively.

#### **ANIMAL NUTRITION PROGRAM (ANP)**

**Implementation of active biorisk management in agro-veterinary research institutions to meet Global Health Security Agenda (HSP):** Three workshops were organized in Rawalkot (AJ&K), Skardu (GB) and Tandojam (Sindh). Build the capacity of 60 stakeholders using lectures coupled with hands on training on use of PPEs, sample transport, safe use of BSCs, risk assessment during 2-days workshops in each place.



*Workshop at Skardu*



*Workshop at Rawalkot*

**Impact of Insect Chitin as Protein Supplement on Growth Performance of Broilers:** 96 birds were included in study with 4 treatments viz., control, 2.5% chitin, 5% chitin, and 7.5% chitin diets. Data on daily feed intake, weekly weight gain and FCR were recorded for 40 days. Results indicated a positive correlation between insect chitin supplementation and growth metrics of the bird. The highest body weight (2076 g) was observed under 5% chitin diet followed by 7.5% chitin diet. Cost of per kg weight gain was 9% lower with 5% chitin supplement compared to control.



*Birds feeding on different diets*

## **SOCIAL SCIENCES DIVISION**

**Baseline Survey for Fertilizer Right Pakistan Project:** The Fertilize Right Pakistan project is being executed to promote sustainable nutrient management through the 4Rs approach (Right Source, Right Rate, Right Time, Right Place). The baseline survey findings from five agro-ecological zones of Punjab (1. Rice-Wheat in Gujranwala, Rainfed Wheat in Chakwal, Cotton-Wheat in Khanewal, Maize-based in Sahiwal and Gender-focused Studies in Sahiwal/Khanewal/Chakwal) indicate that agriculture is the primary source of income, though farm sizes vary significantly. Most respondents own their land, especially in irrigated areas (~90%). Key findings show that fertilizer use is suboptimal due to financial constraints and a lack of awareness of the 4Rs framework. The dominant method is broadcasting, micronutrient use is low, and soil testing is rare. Women, while highly involved in livestock and eager for training, are largely excluded from fertilizer and marketing decisions. Challenges include high input costs, inefficient practices, water scarcity, and gender disparities. Recommendations include ability building on the 4Rs, promoting technologies like coated urea, providing policy support for soil testing, and developing programs to increase women's participation in decision-making.

**Evaluating Capital Asset Levels:** A Comparative Study of Farmer and Non-Farmer Households in Pakistan. This study, using data from the Pakistan Social and Living Standards Measurements and Household Integrated Economic Survey (PSLM/HIES) 2018-19, compared farmer and non-farmer households in Pakistan, revealing significant disparities in livelihood assets. They have poorer housing conditions, less access to utilities and internet, and almost no formal garbage collection. Economically, farmers have less valuable land but higher livestock value and rely more on firewood. They reported higher net savings but hold less valuable liquid assets and receive lower remittances. The overall livelihood index score for Pakistan is low (0.150). Farmer households scored slightly higher (0.156) than non-farmers (0.148), with strengths in natural and financial capital but weaknesses in human and physical capital. Significant regional and gender disparities persist, with women in farming households having extremely limited decision-making power. The study concludes that integrated policies addressing all capital areas are urgently needed for fair development.

**Knowledge Level of Onion Seed Growers about Recommended Seed Production Technology in Khyber Pakhtunkhwa:** Study conducted in Buner district of Khyber Pakhtunkhwa to provide empirical support for biological scientists, extension workers, policymakers, and other stakeholders. The main aim of the study was to assess the growers' knowledge level of recommended production technology; calculate the costs and revenues of onion seed production; find major constraints; and offer data-driven suggestions. The study found a direct link between a farmer's knowledge and their yield; those with high knowledge scored 82% and yielded 189 kg/acre, while low-knowledge farmers scored 29% and yielded only 89 kg/acre. Key knowledge deficiencies included disease identification, herbicide use, and storage techniques. Despite these challenges, onion seed production was highly profitable, with a net income of Rs. 588,562 per acre. Major constraints were high input costs, scarce machinery, water shortages, and poor market linkages with seed companies.

**Analysis of Farmers' Varietal Perception, Seed Sources and Availability of Wheat Seed in Khyber Pakhtunkhwa:** Reveals critical gaps in Pakistan's wheat seed system, hindering productivity. The average wheat farmer is 45 years old with 20 years of experience, yet 58% are unaware of their wheat variety, and most lack access to training or farming services. While demand for improved seeds is high (87%), access is a major barrier due to cost and unavailability. Consequently, farmers rely on informal sources which leads to severe yield disparities, ranging from 9.02 to 28.60 maunds/acre across zones. The study concludes that strengthening formal seed systems, improving farmer awareness, and ensuring affordable access to quality seeds are essential to enhance productivity and food security.

**Super Seeder:** A Viable Option for Resource Conservation and Productivity Enhancement of Wheat Crop. This study gathered and analyzed data from 61 farmers who received a subsidized Super Seeder mainly in the Wheat-Rice cropping system to assess the impact of using Super Seeder on wheat productivity, and to know farmers' perceptions about the adoption of technology. These farmers achieved a 10.29% higher wheat yield (4.34 maund/acre) and saved nearly Rs. 4000 per acre in tillage costs. They reported benefits like labor and time savings but cited the high machine cost and need for powerful tractors as major barriers to wider adoption. They mentioned adoption constraints such as inflated cost of machine & its maintenance, need for high-traction power tractors, and the inferior performance of other zero-tillage drills. The study recommends continued government subsidies, knowledge dissemination by extension departments, and more support to scale up adoption.

**Fodder Availability:** Repercussions of Competing Crops on Livestock Growth in Pakistan. Pakistan's livestock sector has grown substantially, but its fodder base has stagnated, creating a significant and worsening feed gap. This study investigated the imbalance between fodder availability and the nutritional needs of an expanding livestock population, using historical data, deficit analysis, and ARIMA modeling to forecast trends in fodder area from 2024 to 2027. Analysis shows that in 2022–23, local production met only 21.6% of the average practiced and 11.8% of the recommended nutritional needs of livestock. This imbalance is driven by the livestock population growing at a 2.3% CAGR, while fodder area expanded at only 0.92%, and actual fodder intake per head is 20–50% below recommendations. The expansion of major crops like maize, rice, and sugarcane has squeezed fodder out of limited arable land. Forecasts predict a continued decline in fodder area. This gap threatens livestock productivity and rural livelihoods. Policy recommendations include strategic land reallocation, improved fodder production and conservation, feed diversification, and balanced feed supplementation to stabilize the sector.

**Sesame Crop Situation Survey in Punjab for Year 2024:** This study was based on field observations from 43 sesame farmers from fourteen major sesame-growing districts of Pakistan and aimed to assess the crop situation, estimate production losses, identify challenges in production, and

formulate a strategy to prevent such losses in the future. The study found that the crops sown in May to mid-June was mostly damaged by floods. Early sowing (February-March) on ridges or raised beds allowed the crop to mature before adverse weather, avoiding significant loss. Agronomic practices were a major factor; most farmers used unapproved, mixed seed from grain markets, and only 2-3% applied a balanced combination of fertilizers. Disease (93%) and insect attacks (95%) further worsened losses. Key recommendations include short-term strategies like adjusting sowing times and using soil-specific zoning. Long-term solutions involve developing resilient varieties and ensuring access to certified seeds. Promoting planting on ridges, prompt plant protection measures, and mechanization (subsidized planters, harvesters) to reduce post-harvest losses are crucial. A robust extension campaign using social media is needed to educate farmers on smart production practices.

**Comparative Analysis of Classical and Modern Stability Approaches to identify Stable Wheat Genotypes in National Uniform Yield Trials:** This study, evaluating 70 wheat genotypes across 23 diverse environments, found significant genotype-by-environment interactions, which accounted for over half (53.4%) of the total yield variation. The research employed ten different stability analysis methods to find high-yielding and resilient varieties. Four genotypes including G58 (NBW-232), G42 (BF 1807), G29 (NR-546), and G50 (V-19347) consistently proven high yields and stable performance. The study concluded that integrating multiple classical and modern stability methods provides the most reliable approach for selecting adaptable genotypes. These findings offer valuable tools for wheat breeders to develop climate-resilient, high-yielding cultivars, ultimately contributing to sustainable production and enhanced global food security under variable environmental conditions.

**Adoption of Improved Production Technology of Groundnut in the Punjab:** Groundnut is a major kharif crop in Punjab's barani tract, but average farmer yields lag significantly behind potential. This study, conducted in four key districts, found that while the recommended BARI-2016 variety is planted on 32% of the area, the old "334" variety still dominates 39.3% due to the inflated cost and unavailability of certified seed. Adoption of improved practices is mixed. Most farmers (90.5%) use drill sowing, but seed rates are below recommendations, and seed treatment is rare. Fertilizer application is critically low, and weed management is inconsistent. The average yield was 11.6 maunds per acre. Most of the harvest (81.7%) is sold, primarily to village beopari traders. To close the yield gap, the study recommends ensuring affordable access to certified seeds and strengthening extension services to motivate adoption of full technology packages, especially for fertilization and plant protection.

**Exploring Economic Prospects of Water Energizer Technology for Improving Crop Yield at Farm Level in the Punjab:** To address water and soil salinity issues, technologies like the "Water Energizer" (WET), are being introduced. The present study aimed to explore the economic prospects of WET at the farm level, covering eight farmer cases in Punjab Province in 2024-25. Results showed promising results, including improved germination rates (over 80%) and successful cultivation of crops like wheat, cotton, and sugarcane on previously problematic soils. The device was found to be operational on soil with TDS levels up to 1200 dS/m. Farmers cited issues such as salinity, water scarcity, and low yields as reasons for adopting the technology. However, adoption is still limited due to a lack of understanding of how the device works. The study recommends further scientific validation by soil scientists and engineers, more case studies to simplify technical concepts for farmers, and greater transparency from the supplier such as providing before-and-after water analysis reports to build trust in the technology.

**Prospects of Production, Marketing and Value Addition of Soybean:** Soybean is gaining importance in Pakistan for enhancing food security and reducing the poultry industry's heavy reliance on imported feed. This study, gathering and analyzing data from 31 farmers in Punjab, found that

soybean is cultivated in both spring (irrigated areas) and autumn (rain-fed areas) seasons. Key findings show significant disparities: average yield was 20.6 maunds/acre, but spring yields (27.0 maunds/acre) were more than double those in rain-fed autumn (12.8 maunds/acre). Irrigated area farmers also received a higher price (Rs. 8,823.5 per maund) compared to rain-fed farmers (Rs. 8,000). Feed mills were the main buyers, and most farmers (71%) used soy domestically for animal feed or soy milk. The study concludes that strengthening local production through training, market access, and processing facilities is crucial to reducing import dependence and improving rural incomes.

**Wheat Varietals Adoption and Its Economic of Wheat Production in Sindh:** The study was conducted using data collected from primary and secondary sources. Primary data was collected from wheat growers in the Sindh province of Pakistan with the objectives to analyze patterns of varietal adoption, yield variation, and issues in adoption of recommended wheat varieties. Survey results showed that the main wheat varieties cultivated were TD-1, TJ-83, Abdul Sattar, and Kiran. These were grown at 46.71%, 23.65%, 4.43%, and 2.19% of the area, respectively. The average seed rate across all districts was 62.95 kg/acre. For the Rabi 2024-25 season, 34.70% of wheat growers used their own seed, while the remaining 65.30% bought seed from dealers. The yield of recommended varieties ranged from 20.00 to 38.26 maunds/acre in the province, compared to a yield range of 17.577 to 28.00 maunds/acre for non-recommended varieties. The survey results showed that wheat farmers faced several constraints in adopting new varieties. The primary factors were lack of credit facilities for input purchases, poor financial resource base, and lack of awareness and information

**Onion Production Potential, Limitations and Its Marketing in the Farming System of Sindh:** The study was conducted using data collected from various stakeholders to investigate the economics of onion production and find issues/constraints faced by onion growers in Sindh. The Phulkara and Nasarpuri varieties were found in all districts surveyed. Farmers reported disease and insect attacks from 2022 to the present. Viral diseases were found to be present across the entire study area. The study reveals widespread imbalances in fertilizer application and severe underutilization of the critical nutrients among growers. For urea, nearly 50% applied the recommended dose, but 38.5% applied more than the recommended dose. For DAP fertilizer, the situation is more critical: only 17.4% used the recommended dose, while a majority (56.9%) applied ed dose the recommended amount, and 18.4% used none. The use of NP and Nitrophos fertilizers is exceptionally low. A significant majority (81.65%) did not use Nitrophos at all, and only a small fraction (1.83% for each type) applied a below-recommended dose. Gross revenue was calculated by multiplying the physical productivity (yield) by the selling price. The survey results showed that the total revenue from the onion crop was Rs. 103,500 per acre, with growers receiving an average profit/net income of Rs. 30,996 per acre in the study area.

**Cotton Marketing Constraints in Kech Balochistan:** Pakistan's cotton sector is constrained by a complex array of interconnected challenges that undermine its competitiveness and the profitability of growers. A primary issue is an ineffective and unorganized marketing system dominated by numerous intermediaries, which inflates costs and reduces farmers' earnings. This problem is worsened by significant information gaps, where a lack of access to prompt market data prevents growers from making informed decisions. Compounding these structural issues are production challenges, including high input costs for seeds and fertilizers, susceptibility to pests and diseases, and obsolete agricultural practices that keep yields low. Furthermore, the quality of local cotton often suffers from lower recovery rates, making it less desirable than imported alternatives. The sector is also highly vulnerable to external pressures, such as volatile international prices, competition from synthetic fibers, and the severe impacts of climate change, including droughts and floods. Finally, a lack of consistent and effective government policies on pricing, subsidies, and trade creates an

environment of uncertainty, hindering the long-term planning and investment necessary for the sector's viability.

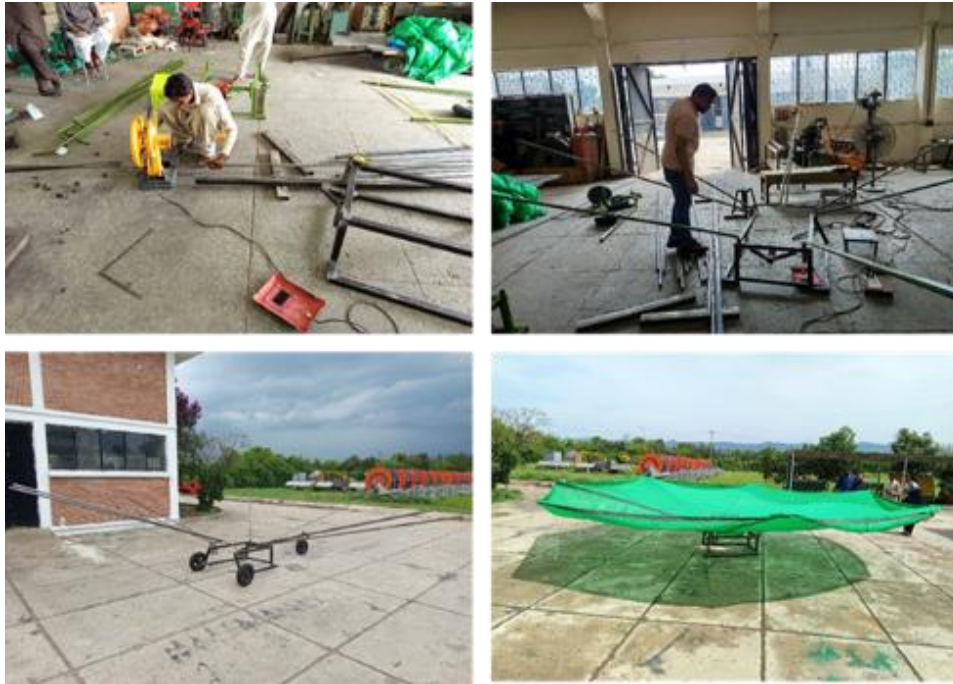
**Analyzing the Effects of Climate Change on Water Resources in Azad Jammu and Kashmir: Farmers' Perception, Awareness, and Adaptation Practices:** Pakistan faces severe and frequent climate change impacts, including glacial melt, extreme flooding, droughts, heatwaves, and water shortages, costing the nation an estimated \$7–14 billion annually. This review underscores the broad risks to key sectors like agriculture, forestry, livestock, and food security, and emphasizes the urgent need for adaptation and mitigation strategies. Key recommendations call for government-led policy reforms and a comprehensive national strategy for sustainable development. It also stresses the importance of community knowledge-sharing and coordinated efforts to reduce harmful human activities in vulnerable ecosystems. The review notes a critical gap in qualitative, in-depth studies and calls for more holistic, sector-specific research to fully understand and address the causes and consequences of climate change in Pakistan.

**Review Report on Determinants of Household's Willingness to Pay for Rainwater Harvesting for Agriculture in AJK:** Water scarcity in Azad Jammu and Kashmir (AJK) is a critical issue, with groundwater rapidly depleting threatening livelihoods and agriculture. The present review study found that while rainwater harvesting has historical roots and saw renewed efforts after the 2005 earthquake, current systems are inefficient and require maintenance. Based on national and international studies, the review concludes that factors such as age, education, income, training, extension services, and environmental awareness significantly influence household WTP. Collectively, 75.5% of households in the studies reviewed expressed their willingness to pay for rainwater harvesting and other natural resource conservation practices. To address the crisis, the study recommends that the regional government improve education, awareness, and income levels. It also calls for actively engaging communities through subsidized schemes, low-interest loans, and training programs to promote effective rainwater harvesting.

## **AGRICULTURAL ENGINEERING DIVISION**

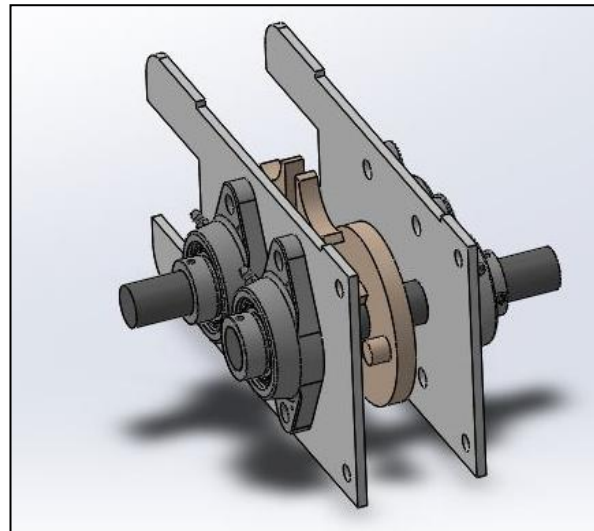
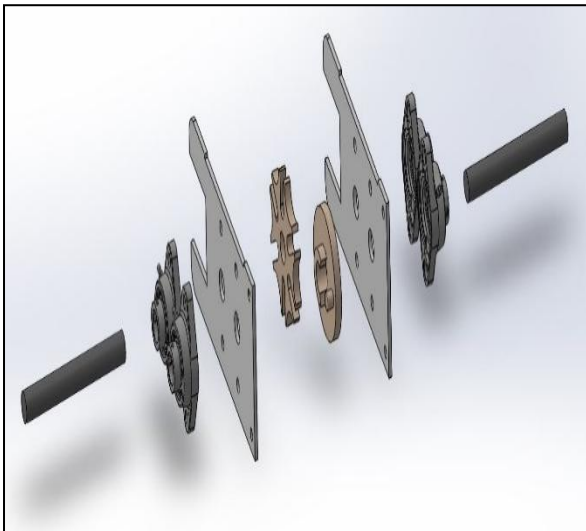
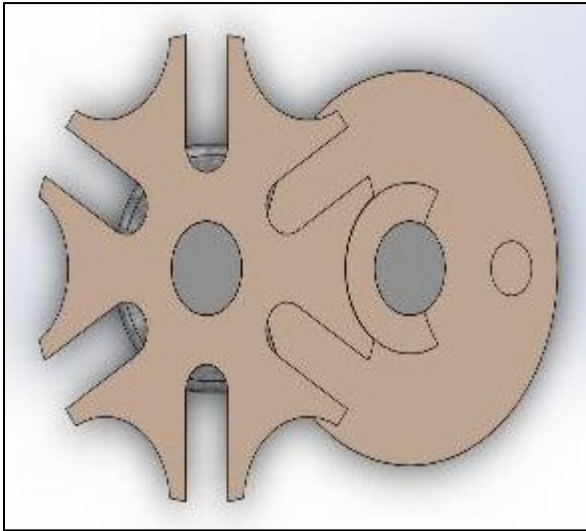
The Agricultural Engineering Division (AED) focuses on designing, developing and promoting energy-efficient agricultural machinery, with an emphasis on farm mechanization and postharvest technologies for cereals, fruits, vegetables and other crops.

**Design, Development and Adaptation of an Olive Harvester:** Olive cultivation is becoming increasingly important in Pakistan, particularly in the arid and semi-arid regions of Chakwal, Fateh Jang and parts of Khyber Pakhtunkhwa and Balochistan. Traditionally, olive harvesting has been a labor-intensive and time-consuming process, often resulting in delayed harvesting, reduced fruit quality and increased costs. AED of PARC developed a tractor-operated olive harvester, consisting of two locally fabricated components: a PTO-operated olive shaker and a spider-net-style olive collector. These components were designed specifically to accommodate varying trunk sizes of olive trees. A gripper clamp mechanism was integrated into the shaker to ensure secure attachment without damaging the trees. The olive harvester is scheduled for testing during the upcoming harvesting season. It is planned to conduct tests, make necessary design improvements based on field performance and launch awareness campaigns to promote the adoption of this new technology among olive farmers.



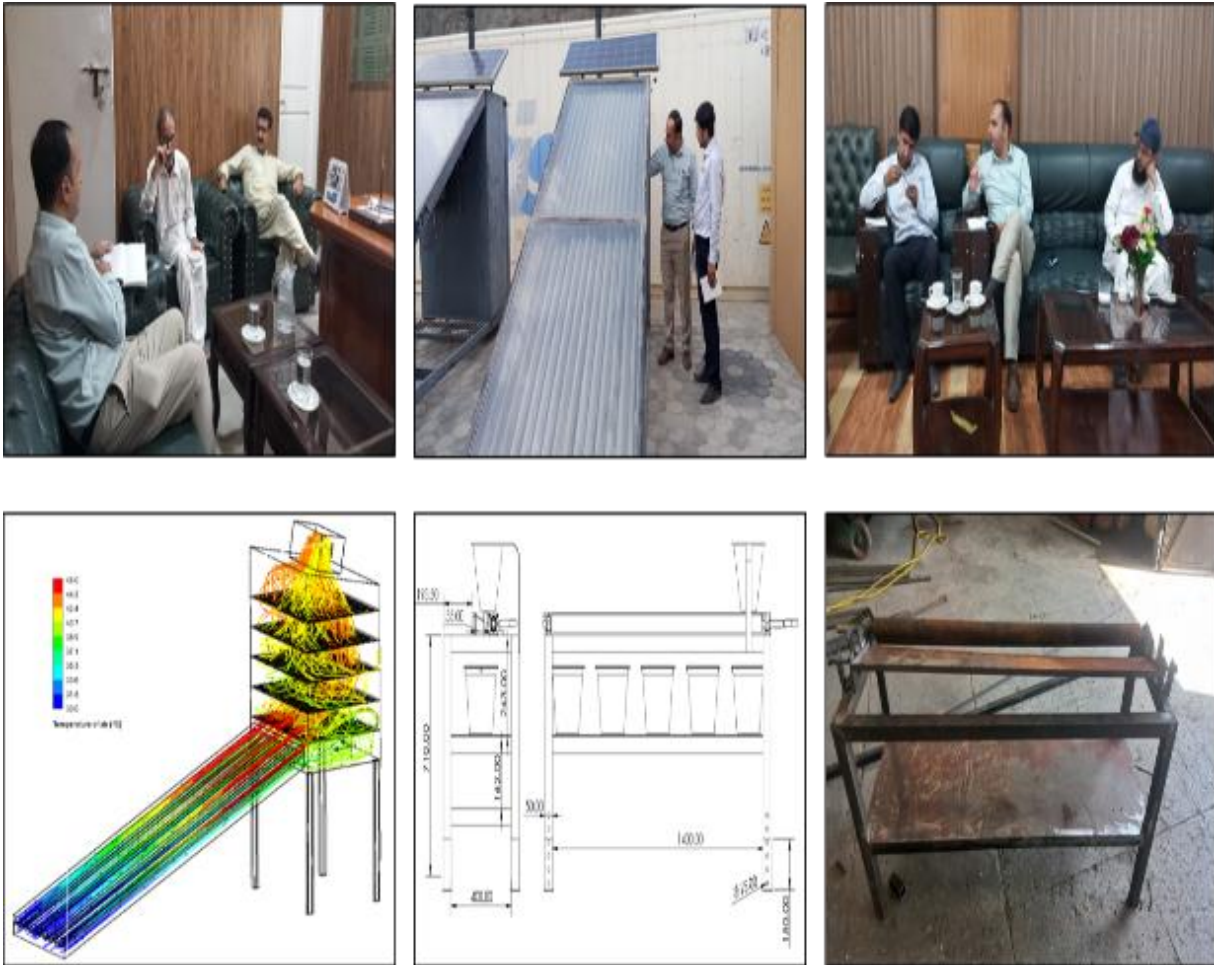
*Fabrication of indigenous olive harvester*

**Design and Development of Groundnut Precision Planter:** The manual sowing of groundnut is labor-intensive and results in inconsistent planting depths and spacing, which in turn affects crop yields and overall productivity. To overcome these challenges, PARC has developed high-precision seed metering units for the groundnut planter. Detailed production drawings were created using SolidWorks, followed by the fabrication and optimization of the seed metering system. A Geneva mechanism was designed and successfully fabricated with CNC machining, ensuring accurate and efficient seed metering. The production drawings for the main frame are in progress, and the required materials for fabrication have been procured. These advancements mark steady progress towards the completion of a fully functional precision groundnut planter.



*Design and development of Geneva mechanism for groundnut planter*

**On-farm Mechanized Postharvest Processing and Value Addition Technologies for Fruits:** In regions like Khyber Pakhtunkhwa, Balochistan and Gilgit-Baltistan, fruits i.e. apples, peaches, apricots plums etc are key agricultural products. However, these fruits are highly perishable, leading to significant postharvest losses due to spoilage and degradation. To address this issue, PARC has been working on the development of postharvest processing technologies, including desiccant-assisted solar dryers and fruit grading machines and developed a detailed 3D CAD models of a solar dryer and a fruit grading machine using SolidWorks. Computational Fluid Dynamics (CFD) simulations were conducted to optimize the airflow and heat distribution in the dryer, ensuring uniform drying performance. These simulations helped identify potential areas of improvement for the design. Fabrication of the fruit grading machine is underway, and it will undergo initial testing at NARC once completed.



*Field visits, computer aided design, simulation and fabrication of machinery*

**Rice Residue Management Machinery for Wheat Sowing:** The rice-wheat cropping system is prevalent in Pakistan, particularly in Punjab, where rice is harvested using combine harvesters. After harvesting rice, the leftover straw often becomes a major issue for farmers, who frequently prefer to burn the residue which contributes to environmental pollution and loss of soil nutrients. To address the issue, PARC has designed and developed the Pak seeder / combine seeder technology, which facilitates the direct sowing of wheat into fields with rice residue. This technology is designed to enhance soil health, increase wheat yields by up to 10% and reduce nutrient loss. Additionally, it provides an environmentally sustainable solution to the rice residue burning problem. Wheat planting trials and seminars were conducted at various locations in Punjab to evaluate the performance of the new technology, which resulted improved crop yields and environmental benefits.



*Field trials of Combine Seeder, Pak Seeder and demonstration to farmers*

**Promotion of Rice Production Machinery:** Promoting the use of mechanized rice production machinery, including rice nursery raising, mechanical transplanting technologies along with use of rice specific combine harvesters is our primary aim to enhance rice planting precision, increase yields, and ultimately improve farmers' income. To achieve this objective, PARC organized seminars and demonstrations in Sheikhpura and Hafizabad to promote the use of rice-specific machinery. These sessions targeted over 100 rice farmers, manufacturers and machinery service providers to raise awareness about the benefits of mechanized rice production including techniques to reduce grain losses during harvesting and methods to adjust combine harvester settings for optimal efficiency.



*Glimpses of field awareness seminars to promote rice mechanization*

## COORDINATION AND MONITORING DIVISION

Coordination and Monitoring Division consists of two Directorates and one Institute namely; (i) Directorate of Coordination, (ii) Directorate of Human Resource Development and (iii) PARC Institute of Advanced Studies in Agriculture (PIASA), each having its own mandate and objectives. Recently, regional coordinating units were established in PARC outstation establishments at Quetta, Peshawar, Faisalabad, Tandojam, Muzaffarabad and Juglote-Gilgit to coordinate with all the Agriculture Universities and Livestock Departments of provinces, at regional level.

## INTERNATIONAL COOPERATION

Provided proposals for cooperation, implementation of decisions for Joint Working Meetings, Joint Economic Cooperation meetings and Regional Cooperation meetings held under Ministry of National Food Security and Research, Economic Affairs Division, Ministry of Foreign Affairs and Board of Investment for China, Turkey, Belarus, Kazakhstan, Uzbekistan, Kingdom of Saudi Arabia, Kuwait, Qatar, Australia, USA and Russia.

**PARC and KOPIA, Korea:** Facilitated for processing and approval of following projects:

- Improving potato production machinery in Pakistan.
- Development of Italian Ryegrass variety and expansion of new oat variety to establish village base seed enterprise through Farmer's Participatory Approach.
- Efficient Artificial Insemination Services by using Korean Holstein Sexed Semen in Cattle.
- Establishment of Seed Potato Production and Supply Centre (SPPSC) at NARC Islamabad.
- Establishment of a Smart Agricultural Farm for Vegetable Production at NARC, Islamabad.
- Establishment of Korean Holstein Breeding Stock and Development of a Composite Dairy Cattle Breed.

**PARC and CABI:** Facilitated in signing of Plant-wise Plus program in Pakistan and Funding contract between PARC and CABI

**Visa Processing Facilitation:** PARC facilitated the visa processing of 15 foreign participants of Workshops/Seminars & Internationally Recruited Staff (IRS) of agricultural research organizations, posted in Pakistan.

**MOUs/Agreements:** Six (06) MOUs/ Agreements with international organizations have been signed for development and dissemination of research technologies. Following is the detail:

- Agreement between PARC and the Ministerial Standing Committee on Scientific and Technological Cooperation of the Organization of Islamic Cooperation (COMSTECH)
- Research Collaboration Agreement between ICARDA, PARC and PATCO
- Letters of Exchange for Juncao Cultivation Demonstration and Promotion Project
- MoU on agricultural science and technology cooperation between RDA Korea and PARC
- MOU between Pakistan Agricultural Research Council (PARC) and the Chinese Academy of Agricultural Sciences (CAAS)
- Research Collaboration Agreement (RCA) between ICARDA and PARC for Conducting Research Activities within Moving Further Towards Formalized Goat Value Chains in Pakistan and Ethiopia through Business-Oriented Breeder and Producer Groups

**Renewal of Membership:** Renewed the membership of CABI and Centre for Sustainable Agricultural Mechanization (CSAM).

**Meetings with Foreign and National delegates:**

- Pakistan – Turkmenistan Joint Working Group meeting
- Meeting of Federal Minister, NFS&R with Australian Ambassador
- Meeting of Federal Minister, NFS&R with UN Resident Coordinator

### **NATIONAL COORDINATION**

Coordination with National Agriculture Research System, academia and other Stakeholder is the main responsibility. Signing MoUs/Agreements with National Partners mentioned below:

- LOA b/w AZRC Umerkot- PARC & EDF, Export Development Fund for two years.
- LOA b/w SARC Karachi-PARC & HANDS for five years.
- LOA b/w BARDC, Quetta- PARC & EDF, Export Development Fund for five years.
- LA b/w MARC, Gilgit Baltistan-PARC & EDF, Export Development Fund for five years.
- MOU b/w PARC & BZU, Bahauddin Zakariya University, Multan for ten years.

### **HUMAN RESOURCE DEVELOPMENT (HRD)**

Total 255 Scientists exposed to short and long term training

<b>Training</b>	<b>Program</b>	<b>No. of Nominees</b>
Foreign long term	Ms/ M. Phil/Diploma	2
	Ph.D	14
	Post Doc	5
Local long term	MS/ M. Phil/ Diploma	18
	Ph. D	8
Foreign short term		39
Visits		127
Local short term		42

### **PARC INSTITUTE OF ADVANCED STUDIES IN AGRICULTURE (PIASA)**

PARC is promoting Higher Education in Agriculture through a unique postgraduate academic program at NARC and offering MPhil and Ph.D programs in the following disciplines:

- Animal Genomics & Biotechnology (AGB)
- Applied Economic (AE)
- Plant & Environmental Protection (PEP)
- Plant Genomics & Biotechnology (PGB)
- Natural Resource Management (NRM)

During the year, 3 PhD students of successfully completed their degree in their respective fields. Currently, 17 Ph.D students are enrolled and their relevant dealings are being catered. As the admission process was halted due to HEC policy limitation, various meetings were held with Chairman HEC and Vice Chancellor QAU for resumption of academic process at PIASA. HEC has allowed PIASA to resume its academic programs with Quaid-i-Azam University Islamabad, which is in process.

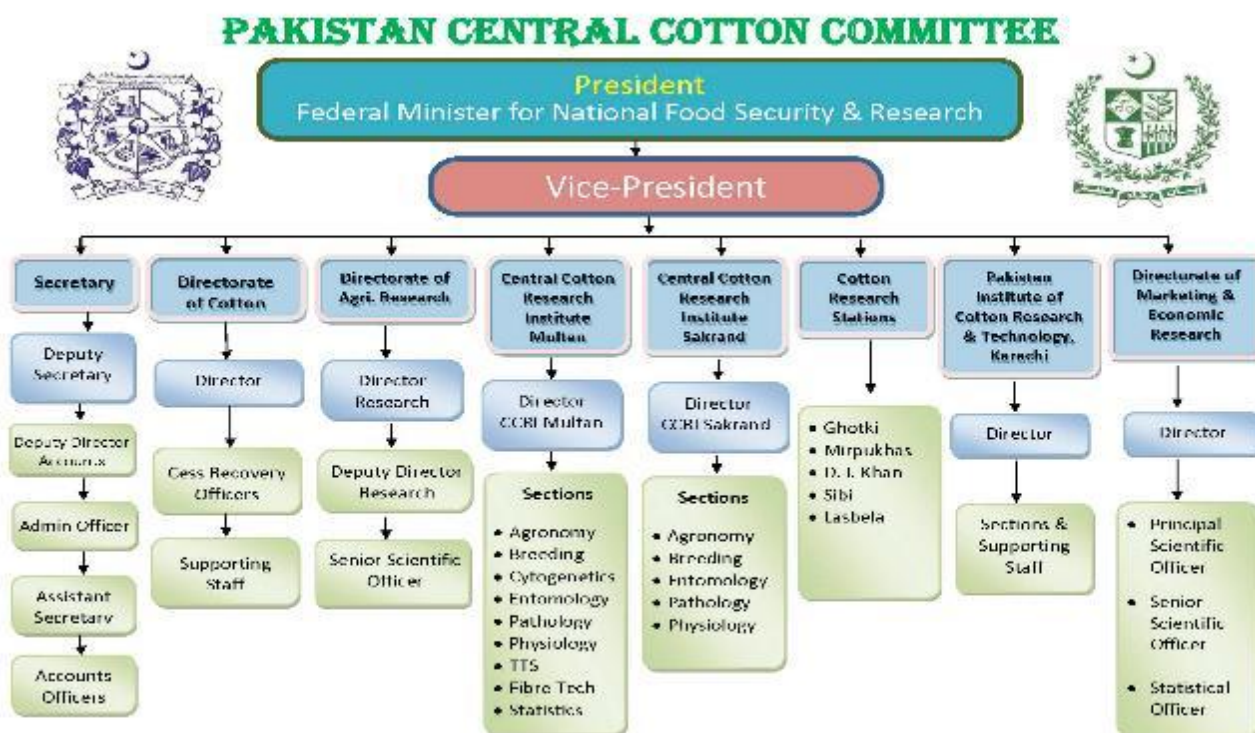
## **8. PAKISTAN CENTRAL COTTON COMMITTEE (PCCC)**

### **1. Overview of the PCCC**

Pakistan Central Cotton Committee is a body corporate established under cotton cess act 1923 with an objective "improvement and development of the growing marketing and manufacturer of cotton". The

Committee established its subordinate facilitates in the four provinces. PCCC relies solely from the Cess income, levied at Rs.50 per bale consumed in the country. PCCC played a leading role in cotton research & development at country level in varietal development, cotton policy making at national level, liaison with provincial government for cotton improvement programs, and effectively coordinated with international bodies.

### PCCC's Organogram



## 2. Directorate of Agricultural Research

Directorate of Agricultural Research (DAR) is one of the largest Directorate of the Pakistan Central Cotton Committee (PCCC) and charged with the task of coordinating the whole cotton R&D system at national level. Its mandate includes the development of crop agricultural-research policy, planning, program-of-research work, implementation, coordination, monitoring and evaluation, reviewing and reporting the progress of various activities, projects, program of various institutes and stations of PCCC. Directorate of Agricultural Research is also responsible for high-level coordination with public and private sector stakeholders at federal and provincial levels and with ever expanding the private sector as well. The key responsibilities of the Directorate of Agricultural Research include the following.

- **Meetings of Agricultural Research Sub-Committee (ARSC):** The Directorate of Agricultural Research organizes each year the meeting of the ARSC with the main objectives of cotton research policy, planning and their implementation at national level. This committee also reviews the status of implementation of the suggestions and recommendations provided in their sessions and their proper follow-up in letter and spirit. PCCC's cotton research system comprises of two research institutes and five research stations working under DAR's headquarters based at Multan since November 2014.
- **Cotton Research Plan and Progress:** Through Agricultural Research Sub-Committee (ARSC), DAR accomplishes the assignment of development of Research Program of Work for proceeding crop year and also developing the Annual Summary Progress Report for the past year.

**National Coordinated Varietal Trials (NCVTs):** National Coordinated Varietal trials are conducted by Directorate of Agricultural Research, PCCC with the objective of testing promising breeding material/strains developed by various cotton breeders of Federal and Provincial institutes as well as private sector seed companies for adaptability under various agro-environmental conditions of different ecological zones under the supervision of Director-Research. After comprehensive coordinated testing the lines meeting the field, seed and lab standards are recommended for general cultivation in the country. During the cotton crop year 2024-25, Directorate of Agricultural Research evaluated 88 new cotton strains of various research organizations and private sector companies.

- **National Technology Testing Trials:** New technologies with promising impacts on cotton production, developed by multi-national and national sector are also tested by the Directorate under prescribed SOPs.
- **National Chemical Testing Trials:** Various new candidate chemistries in pesticides, herbicides and fertilizers, etc. are tested and on the basis of testing results these candidate pesticides are registered by Federal Department of Plant protection (DPP).
- **Cotton Breeders Tour:** The Directorate is supposed to conduct a Cotton Breeders Tour every year where the main or second-line cotton breeders are given an opportunity to evaluate the performance of their new lines under various environmental conditions of the cotton belt. Breeders from both public private sectors participate in it.
- **Cotton Travelling Seminar:** The Directorate organizes cotton travelling seminar each year with the main objective to impart in-service like training/visit to all cotton R&D system of the country in a highly coordinated way.
- **Strengthen of Cotton Breeding Programs of private sector:** Special coordinated efforts are made by the DAR on regular and sustained basis to strengthen the breeding, varietal-development, early generation system of seed and Commercial seed production system of this rising sector.
- **Cotton R&D Projects/Programs:** DAR is also responsible for developing and running various small, medium and large-scale cotton R&D and extension programs and projects funded by government and international donors.
- **Linkages with academia:** DAR works with almost all Agricultural universities/faculties for external thesis cotton research; external thesis-exam, working in Board of studies and various committees of the Universities with the objective to strengthen education in cotton.
- **Publications:** DAR deals with all sorts of publications for cotton. Main publication is the Annual Online Research Journal titled “International Journal for Cotton Research and Technology (IJCRT) available at [www.ijcrt.pk](http://www.ijcrt.pk).

## **These research institutes and stations of PCCC are focused on the following main aspects of Cotton.**

- Study of cotton plant from botanical, genetical, physiological, production, entomological, pathological and other relevant facets in a coordinated manner.

- To develop the cost-effective production technology.
- To undertake research work of national importance and handle problems of inter-regional nature.
- Advance knowledge of cotton plant responses to environment with a view to better cope with adverse impacts in the changing climatic scenario.
- Provide education and training on cotton production technology to the Agricultural Research, Extension, teaching staff and other stakeholders.
- Identify problems of cotton growers and advocate remedial measures.
- Promote mechanization in cotton production system.
- Transfer production technology to cotton growers.
- Educate and motivate cotton growers and monitor research outcomes.
- Provide technical support to the Pakistan Central Cotton Committee in coordinating and developing a national program for cotton research and development.
- Training manpower across the country and other cotton growing countries on Cotton Research and Development.
- Facilitation and research guidance to students at graduate and higher level degree courses.
- Coordinate with the International cotton Researchers Association through ICRA Secretariat Multan.
- Economic studies and Marketing Investigations.

## **This research of PCCC resulted in the development of 65 cotton varieties which are given below.**

**Varieties developed by PCCC from 1985 to 2025 along with their fiber characteristics.**

S No.	Variety	Year of release	Lint %	Staple length (mm)	Mic( $\mu\text{g inch}^{-1}$ )	Strength (tpsi/g tex <sup>-1</sup> )
1	SKD-10/19	1984	40.6	15.5	10.1	80.0
1	SLH-41	1985	36.0	26.4	4.4	95.8
2	CIM-70	1986	31.5	29.0	4.2	92.5
3	CIM-109	1990	35.3	27.2	4.7	92.0
4	CIM-240	1992	36.5	27.5	4.4	93.7
5	CRIS-9	1992	34.5	26.5	-	97.0
6	BH-36	1992	38.7	28.0	4.3	100.3
7	CIM-1100	1996	38.0	29.0	3.9	94.0
8	CIM-448	1996	38.0	28.5	4.5	93.8
9	CIM-443	1998	36.7	27.6	4.9	96.0
10	CIM-446	1998	36.2	27.0	4.7	97.4
11	CIM-482	2000	39.2	28.5	4.5	98.0
12	BH-118	2000	38.7	27.6	4.6	96.2
13	CRIS-5A	2001	35.5	26.8	-	97.5
14	CIM-473	2002	39.7	29.6	4.3	95.2
15	CIM-499	2003	40.2	29.6	4.4	97.3
16	CIM-707	2004	38.1	32.2	4.2	97.5
17	CIM-506	2004	38.5	28.7	4.5	98.9
18	CIM-496	2005	41.1	29.7	4.6	93.5
19	CRIS-134	2004	36.5	27.5	-	97.5
20	CRIS-467	2004	37.0	27.5	4.6	97.2
21	CIM-534	2006	40.1	29.0	4.5	97.2

22	CRIS-121	2006	36.8	27.5	4.9	98.5
23	CIM-554	2009	41.5	28.5	4.7	96.8
24	CRIS-342	2010	38.5	28.4	4.3	95.5
25	CIM-573	2012	39.3	31.6	4.6	90.2
26	CIM-598	2012	41.8	29.0	4.3	94.8
27	BH-167	2012	41.1	29.1	4.7	92.7
28	SLH-317	2012	38.0	29.8	4.4	96.7
29	CIM-595	2013	39.5	29.0	4.7	97.5
30	CIM-599	2013	41.6	28.9	4.6	95.0
31	CIM-602	2013	40.3	29.1	4.2	94.8
32	CIM-608	2013	41.1	28.5	4.6	93.9
33	CRIS-129	2014	38.5	28.5	-	98.5
34	CYTO-124	2016	42.6	30.3	4.4	92.4
35	CIM-620	2016	40.2	28.9	4.6	93.0
36	SLH-8	2016	39.0	29.0	4.6	-
37	CYTO-178	2016	40.8	29.0	4.3	105.2
38	CIM-600	2017	40.3	29.0	4.7	94.8
39	CYTO-177	2017	40.0	29.0	4.3	99.9
40	CYTO-179	2017	40.2	28.2	4.2	107.6
41	CIM-598	2017	40.0	29.5	4.6	96.0
42	CRIS-508	2017	40.5	28.7	4.7	99.4
43	CRIS-510	2017	39.0	28.2	4.0	92.8
44	CRIS-533	2017	40.5	28.8	4.0	97.8
45	CIM-610	2018	40.2	28.8	4.3	101.9
46	CIM-632	2018	41.6	28.8	4.3	100.4
47	CRIS-585	2020	39.6	28.8	4.3	-
48	CRIS-543	2020	40.5	28.3	4.3	-
49	CIM-678	2021	40.0	28.6	4.0	29.9
50	CIM-785	2021	40.0	29.0	4.6	31.2
51	CYTO-533	2021	41.0	28.1	4.2	-
52	CYTO-535	2021	41.2	28.8	4.1	28.8
53	CYTO-226	2021	41.0	30.5	4.6	28.5
54	BH-221	2021	38.0	29.1	4.6	-
55	CIM-343	2023	40.0	28.2	4.3	33.5
56	CIM-537	2023	41.0	28.3	3.8	31.5
57	Cyto-511	2023	38.5	28.8	4.1	29.2
58	CIM-775	2023	39.2	28.4	4.2	29.3
59	Bt. Cyto-537	2023	39.8	28.5	4.4	55
60	Bt. CIM-775	2023	42.3	28.5	4.2	50
61	Bt. Cyto-511	2023	38.0	28.2	4.5	50
62	Bt. CRIS 644	2024	40.5	28.4	4.6	50
63	Bt. CRIS 674	2024	38.5	28.2	4.5	50
64	CRIS-682	2024	38.5	28.0	4.8	45
65	Bt. CIM-990	2025	38.2	28.9	4.7	50

### **3. Directorate of Marketing and Economic Research**

Established in 1979, the Directorate of Marketing and Economic Research (DMER) is dedicated to analyzing the demand for Pakistani cotton, identifying market opportunities, assessing production capacity, and assisting authorities in production planning, policymaking, program implementation, and monitoring of economic initiatives. DMER continuously evaluates the cotton situation by monitoring ginning operations, tracking cotton movement throughout the season, and closely observing trends in prices, consumption, exports, and stocks. The insights generated provide vital support to policymakers and authorities in formulating and executing cotton production strategies. In addition, DMER's research and data services benefit growers, ginners, exporters, and researchers by helping them optimize their efforts and maximize returns. Its activities have highlighted the economic significance of cotton, offering valuable direction to researchers and industry stakeholders. The Directorate also undertakes specialized studies in marketing research and cotton development programs, covering aspects of production, trade, and utilization.

#### **Functions of DMER**

The Directorate of Marketing and Economic Research (DMER) undertakes studies and analyses on the economic and marketing dimensions of cotton, covering both fundamental and applied aspects. Its primary objective is to understand the underlying economic factors influencing the cotton sector and to propose suitable remedial measures.

DMER regularly compiles and supplies data, facts, and figures on all facets of cotton to various divisions of the Pakistan Central Cotton Committee (PCCC), the Ministry of National Food Security & Research, other relevant ministries and departments, research institutions, and trade associations. This information is also shared with international bodies such as the International Cotton Advisory Committee (ICAC), Food and Agriculture Organization (FAO), World Bank, and the Japan Cotton Spinners Association.

For wider dissemination, DMER publishes the following on a regular basis:

1. Daily Market Report
2. Monthly Cotton Review
3. COTISTICS: Annual Cotton Statistical Bulletin

The following section provides a concise overview of the cotton crop situation and prevailing prices in domestic and international markets during 2024-2025.

#### **A. Cotton Crop (2024-25) in Pakistan**

The cotton crop for the year 2024-25 fell significantly short of its planned targets in both area under cultivation and production output across all provinces, with the exception of relatively better performance in Sindh and yield efficiency in Balochistan.

At the national level, against the target of 3.118 million hectares, only 2.043 million hectares were brought under cotton cultivation, representing 66% of the area target. Similarly, the overall cotton production target of 10.874 million bales could not be achieved, with actual production standing at 7.084 million bales, translating to 65% achievement. This reflects a dual challenge of reduced sowing area as well as lower yields in major producing regions.

**Table: Targets & Achievements of Cotton Crop 2024-25  
(Bale=170Kg)**

Province	Area (Million Ha)		Production (Million Bales)		% age Against Target	
	Target	Achievement*	Target	Achievement**	Area	Production
Punjab	1.680	1.304	6.500	3.838	78%	59%
Sindh	0.630	0.582	3.900	2.823	92%	72%
KPK	0.00030	0.000045	0.00093	0.00036	15%	39%
Baluchistan	0.808	0.157	0.473	0.423	19%	89%
<b>Total</b>	<b>3.118</b>	<b>2.043</b>	<b>10.874</b>	<b>7.084</b>	<b>66%</b>	<b>65%</b>

**Source:**

\* Provincial Agriculture Department & Crop Reporting Service.

\*\* Provincial Crop Reporting Services and Pakistan Bureau of Statistics

**Punjab:**

Punjab, being the main cotton-growing province, had a cultivation target of 1.680 million hectares, but only 1.304 million hectares were sown, achieving 78% of the area target. In terms of production, the province achieved 3.838 million bales against the target of 6.500 million bales, which is only 59% achievement. This substantial production shortfall indicates yield losses due to adverse climatic conditions, pest pressures, and possibly delayed sowing in some areas.

**Sindh:**

Sindh performed relatively better compared to other provinces. Out of the target of 0.630 million hectares, 0.582 million hectares were achieved (92%). Production stood at 2.823 million bales against a target of 3.900 million bales, showing 72% achievement. Sindh's higher percentage compared to Punjab suggests more stable yields, although still below expectations due to floods in certain districts and crop management issues.

**Khyber Pakhtunkhwa (KPK):**

Cotton cultivation in KPK remained negligible. The province achieved only 0.000045 million hectares against the target of 0.00030 million hectares, which is just 15% achievement. Production reached 0.00036 million bales compared to a target of 0.00093 million bales, i.e., 39% achievement. KPK's contribution remains marginal at the national scale.

**Balochistan:**

The province recorded a sharp gap in cultivated area, with only 0.157 million hectares sown against a target of 0.808 million hectares, representing 19% of the target area. However, production achievement was relatively high: 0.423 million bales compared to the target of 0.473 million bales, achieving 89%. This indicates significantly better yield performance in Balochistan, suggesting that cotton in this province was less affected by external pressures compared to Punjab and Sindh.

The cotton crop in 2024-25 underperformed, achieving only two-thirds of the national targets for both area and production. Punjab, the backbone of the cotton economy, lagged severely in production despite moderate area achievement, highlighting yield-related challenges. Sindh performed better in both area and production but still fell short of its targets. Balochistan, despite very low area coverage, demonstrated high yield efficiency, partially compensating for national losses. KPK's role remains insignificant.

## B. Cotton Rates in Pakistan during 2024-25

Across Pakistan, Seed Cotton prices varied from 7543 PKR per 40 kg in August 2024 to 8538 PKR per 40 kg in February 2025, with an annual average price of 8138 PKR per 40 kg. The table below summarizes the monthly rates for Lint and Seed Cotton in Punjab, Sindh, and Pakistan as a whole:

Average Rates of Cotton Commodities in Season 2024-2025 (Rupees/40kg)				
Month	LINT	SEED COTTON		
		PUNJAB	SINDH	PAKISTAN
Aug-24	19051	7792	7293	7543
Sep-24	19743	8052	7821	7937
Oct-24	19105	8363	7990	8177
Nov-24	19007	8479	8118	8299
Dec-24	18230	8493	7643	8068
Jan-25	19553	9025	7269	8147
Feb-25	18929	9400	7675	8538
Mar-25	18331	9000	7800	8400
Annual Average	18994	8576	7701	8138

Source: KCA, Market Committees

### Lint Prices:

The average lint price during the season stood at Rs. 18,994 per 40 kg.

- Prices were highest in September 2024 (Rs. 19,743), reflecting strong initial demand from spinners coupled with limited arrivals.
- After September, prices fluctuated, dropping to Rs. 18,230 in December, the lowest level of the season, due to increased arrivals in the market and international bearish trends.
- Prices rebounded in January 2025 to Rs. 19,553, showing renewed buying interest from mills, but again eased to Rs. 18,331 in March 2025 as supplies balanced with demand.
- Overall, lint prices remained relatively stable in the range of Rs. 18,200–19,700 per 40 kg, with seasonal volatility tied closely to arrival patterns and global market signals.

### Seed Cotton Prices (Phutti):

- The national average seed cotton price for the season was Rs. 8,138 per 40 kg.
- Provincial trends showed some variation:

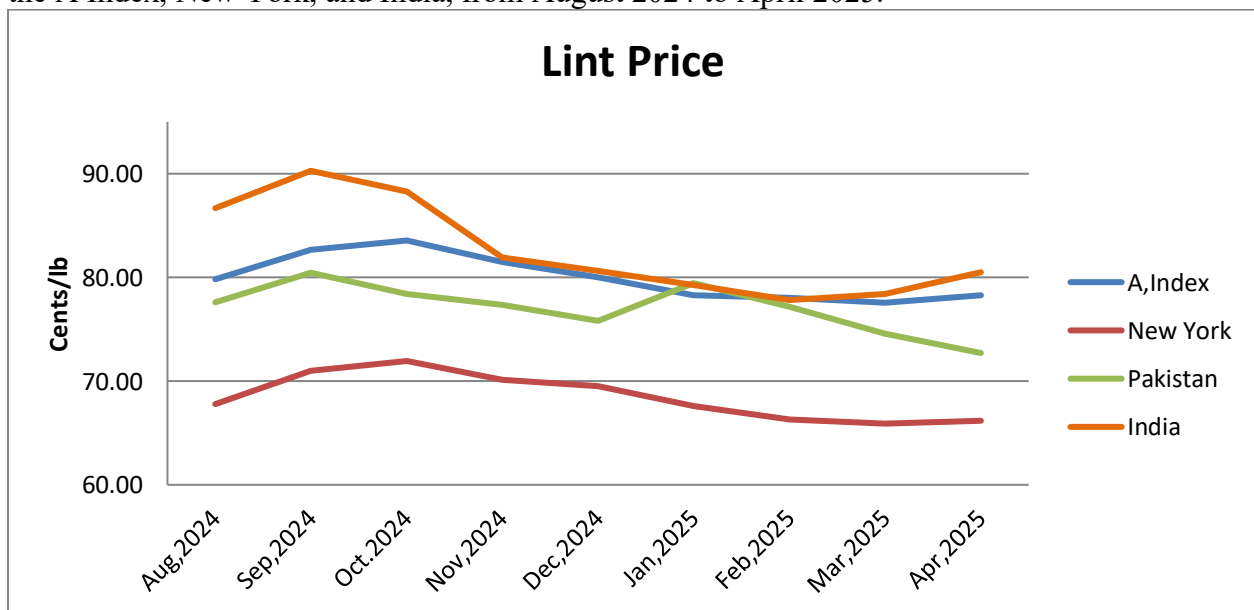
- Punjab: Annual average of Rs. 8,576, consistently higher than Sindh due to better quality and relatively lower moisture content in arrivals. Prices peaked at Rs. 9,400 in February 2025, indicating late-season demand.
- Sindh: Annual average of Rs. 7,701, lower than Punjab, largely due to quality differences and seasonal supply pressure. Prices ranged between Rs. 7,269 in January 2025 (lowest of the season) and Rs. 8,821 in October–November.
- Pakistan Overall: National average was Rs. 8,138, with prices generally following Punjab’s stronger trend, given its larger share in national production.

### Monthly Trends & Observations:

- **August–September 2024:** Prices were relatively strong at the start of the season due to tight supplies and anticipation of lower arrivals.
- **October–November 2024:** A rising trend in seed cotton prices was noted, with Punjab reaching Rs. 8,479 in November, reflecting active mill buying.
- **December 2024:** Both lint and phutti prices eased, as peak arrivals put downward pressure on the market.
- **January–February 2025:** A sharp upward correction occurred, with Punjab phutti reaching Rs. 9,400 and lint recovering to Rs. 19,553, reflecting short supply concerns and mill demand.
- **March 2025:** Prices softened again with lint falling to Rs. 18,331 and national phutti average at Rs. 8,400, aligning with global cotton weakness and balanced local supply.

### C. Comparative Analysis of Cotton Prices in Pakistan and the World (2023-24)

The chart illustrates the comparative rates of Lint in Pakistan alongside global benchmarks, including the A Index, New York, and India, from August 2024 to April 2025.



#### Trends Observed:

1. A Index (International Benchmark)

The A Index began at around 80 cents/lb in August 2024, peaked near 83 cents in October, and then trended downward. By February–March 2025, it had fallen below 78 cents, before recovering slightly to end near 79 cents/lb in April 2025. This reflects the overall softness in international cotton trade, though the Index remained more stable than individual country prices.

## **2. New York Futures**

New York futures started at 68 cents/lb in August 2024 and showed persistent weakness throughout the period. Prices briefly touched 71 cents/lb in October 2024, but then entered a downward phase, hitting the lowest point of 66 cents/lb by February–March 2025. The recovery in April was marginal, ending near 67 cents/lb. This performance highlights bearish sentiment in U.S. cotton futures, possibly due to adequate domestic supplies and lack of strong export demand.

## **3. Pakistan Market**

Pakistan's lint prices started at 78 cents/lb in August 2024 and moved close to 80 cents in September–October. However, after November, prices consistently trended downwards, reaching around 73 cents/lb by April 2025. The decline reflects domestic supply improvements, subdued textile demand, and higher raw cotton imports, which kept local lint prices under pressure.

## **4. India Market**

India maintained the highest lint prices throughout the period. Prices began near 88 cents/lb in August 2024, peaked at over 90 cents in September, and then declined sharply after November. By January 2025, prices converged with global levels, dropping below 80 cents, before recovering again to 80 cents/lb in April 2025. India's higher price level reflects domestic market interventions, local mill demands, and government procurement policies, which tend to keep its lint prices relatively firm compared to others.

The general trend across all markets shows a decline in lint prices from late 2024 into early 2025, with only marginal recovery toward April 2025. India remained the strongest market, while New York futures were the weakest, indicating divergence between physical market dynamics and speculative futures. Pakistan's prices followed the international pattern but stayed slightly below the A Index, reflecting local supply-demand realities. The global decline suggests a mix of factors: moderate textile demand, ample cotton availability, and cautious trading behaviour in the face of economic uncertainties.

## **4. Central Cotton Research Institute, Multan**

### **I. Introduction**

Central Cotton Research Institute (CCRI), Multan, the prime research facility of Pakistan Central Cotton Committee (PCCC) was established in 1970. By the grace of Allah, the Institute has completed 53<sup>rd</sup> year after its establishment. The Institute is equipped with different research disciplines including Agronomy, Plant Breeding & Genetics, Cytogenetics, Entomology, Plant Pathology, Physiology/Chemistry, Fibre Technology, Transfer of Technology and Statistics. The research work has been focused on the following main aspects:

1. Study cotton plant from botanical, genetical, production, physiological, chemical, entomological, pathological and other relevant aspects in a coordinated manner.
2. Undertake research work of national importance and handle problems of inter-regional nature.
3. To develop cost-effective cotton production technology.

4. Advanced knowledge of the cotton plant responses to environment with a view to better cope with adverse impacts in the changing climate scenario.
5. Provide education and training on cotton production technology to the agriculture research, extension, teaching staff and other stakeholders.
6. Identify problems of cotton growers and advocate remedial measures.
7. Promote mechanization in cotton production system.
8. Transfer production technology to the cotton growers.
9. Educate and motivate cotton growers and monitor research outcomes.
10. Provide technical support to the Pakistan Central Cotton Committee in coordinating and developing a national program for cotton research.
11. Training manpower across the country and other cotton growing countries on “cotton research and development”.
12. Facilitation and research guidance to students at graduate and post graduate studies.

The Institute has so far developed 38 elite cotton varieties since its inception. Developments have been made in earliness, heat tolerance, drought tolerance, disease resistance and fiber quality traits. CCRI, Multan pioneered in developing cotton leaf curl virus (CLCuV) resistant varieties when the country suffered a huge loss in cotton production during 1993-94. In addition to the varietal development, the scientists of the Institute developed water-saving planting techniques, pest scouting models and Economic Threshold Levels (ETLs) for various pests, evaluate nutritional requirement of cotton varieties and addressing soil health issues. Since its establishment, CCRI, Multan has made tremendous progress in cotton R&D in various aspects of cotton crop.

## II RESEARCH ACTIVITIES

### i) Research Experiments

The research experiments conducted during 2024-25 by various sections are as follows:

#### Agronomy Section

Sr.#	Title of Study/Experiment
1	Effect of time of sowing on production of transgenic cotton
2	Yield and growth responses of high density cotton planting to various sowing times and mepiquat chloride application
3	Comparative performance of glyphosate tolerant genotypes
4	Agro-economic feasibility for cotton based intercropping systems.

#### Plant Breeding & Genetics Section

Sr.#	Title of Study/Experiment
1	Testing of New Strains Developed at CCRI, Multan
2	Micro Varietal Trials
3	Coordinated Variety Testing Program
4	Testing of Commercial Varieties
5	Development of new Breeding materials for variety evolution
6	Maintenance of Genetic Stock of World Cotton Collection
7	Early Generation Seed Production of Commercial Varieties

#### Cytogenetics Section

Sr.#	Title of Study/Experiment
1	Collection and maintenance of <i>Gossypium</i> germplasm
2	Chromosomal Studies
3	Hybridization
4	Selection from Breeding Material
5	Performance of New Cyto-strains in Micro Varietal Trials
6	Coordinated Variety Testing Program
7	Evolution of Recombinant Inbred Line (RIL) for Fiber Quality
8	Early Generation Seed (EGS) System

### Entomology Section

Sr.#	Title of Study/Experiment
1	Monitoring of population dynamics of different lepidopterous pests
2	Impact of cotton sowing period on sucking insect pests and their natural enemies' population tendency
3	National Coordinated Varietal Trials
4	Insecticide resistance monitoring
5	Screening of new and commercially available insecticides

### Plant Pathology Section

Sr.#	Title of Study/Experiment
1	<b>Studies on seed borne mycoflora of cotton</b>
2	<b>Screening of Breeding Material against CLCuD</b>
3	<b>Evaluation of National Coordinated Varietal Trial against Different Diseases</b>
4	<b>Incidence and severity of cotton leaf curl virus disease on different BT Cotton Strains</b>
5	<b>Boll Rot of Cotton</b>
6	<b>Cotton Wilt</b>
7	<b>Cotton Blue Disease</b>

### Plant Physiology/Chemistry Section

Sr.#	Title of Study/Experiment
1	Genotype-Environment Relationship
2	Soil health and plant nutrition
3	Plant-water relationships

### Transfer of Technology Section


Sr.#	Title of Study/Experiment
1	Human Resource Development
2	Meetings
3	MoU among CCRI, CABI & MG
4	Inauguration ceremony of Eddy Covariance Flux Tower
5	Seminar
6	Participation in Workshop
7	Visits
8	Social Media Activities
9	Multimedia Presentations

### Fibre Technology Section

Sr.#	Title of Study/Experiment
1	Testing of lint samples
2	Testing of commercial Samples
3	Effect of Different Intercrops in Cotton on Fibre Characteristics
4	Quality survey of lint collected from ginning factories
5	ICA-Bremen cotton round test program
6	Survey of spinning industry of Pakistan

ii) **Approval of Cotton Varieties**

The Punjab Seed Council (PSC) in its 60<sup>th</sup> meeting held on 25.02.2025 accorded approval of cotton variety (*Bt.CIM-990*) for commercial cultivation.

	Ginning out- turn (%)	38.2
	Staple length (mm)	28.9
	Micronaire value ( $\mu\text{g inch}^{-1}$ )	4.7
	Fibre strength ( $\text{g tex}^{-1}$ )	27.7
	Uniformity ratio (%)	46.9

The variety has cleared all their regional and adaptability trials and has excellent fibre quality traits with high yield potential. The approval and cultivation of this variety will pave the way for enhancing cotton productivity in the country.

vi) **Cold Room for Storage of Cotton Germplasm**

The Institute has developed sub-zero cotton seed storage facility for long-term storage that comprises more than 6,143 accessions (Local: 1,290 and Exotic: 4,853) that have been collected from various national and international resources. The seed of different varieties is preserved on short (25 years), medium-term (50 years) and long term (100 years) basis and is in hand to be used by researchers to develop new varieties. The germplasm is shared with various local / international organizations / universities for breeding purposes.



vii) **Activities under Cotton Project “Better Cotton Initiative (BCI) for Sustainable Cotton Production in Pakistan”**

To support and strengthen the implementation and success of the Better Cotton Standard System (BCSS), an MoU was signed among BCI, Mahmood Group, and CCRI-Multan on 14.09.2024 to produce Better Cotton at the farm level for the period 2024-27.



The following activities have been carried out under the project:

- Registration of 12,000 Cotton farmers in district Multan.
- Training of BCI Field staff and farmers on BCI principles & criteria.

### III COTTON PROMOTION & DEVELOPMENT ACTIVITIES

#### i) OIC Cotton Capacity Building Program (COTTON-CAB)

Central Cotton Research Institute Multan in collaboration with SESRIC Turkey organized 2 training courses under the OIC Cotton Capacity Building Programme (COTTON-CAB) for the benefit of National Cotton Institutions in OIC Member Countries. The training courses were coordinated by Islamic Development (IsDB), Food & Agriculture Organization (FAO) of the United Nations and African Association. Cotton experts from CCRIM/PCCC delivered lectures on various aspects of Cotton production. Participants appreciated the resourcefulness of experts.

Date	Topic	Resource Person	Participants
October 30-31, 2024	Disease Control, Pesticides, Spray Pumps and Fertilizers in Cotton”	Ms. Sabahat Hussain Dr. Rabia Saeed Dr. Muhammad Tariq Dr. Noor Muhammad	41 participants from African countries including Nigeria, Togo, Uganda, Cote-D’Ivoire, Mozambique, Namibia, and from Turkey & Azerbaijan
March 11-12, 2025	Innovations in Cotton Genetics Enhancing Yield and Resilience	Mr. Muhammad Saffar Mr. Abdul Razaque Channa Dr Farzana Ashraf, Dr Khezir Hayat, Dr Adeel Ahmad	OIC Member States

#### ii) CCRIM/PCCC-FAO Collaboration in Cotton Research

CCRIM/PCCC and the Food and Agriculture Organization (FAO) of the United Nations initiated a collaborative program aimed at revolutionizing cotton research activities, promoting agricultural innovation, and driving sustainability within Pakistan's cotton sector. During a meeting with Ms. Florence Rolle, FAO Representative in Pakistan, and Ms. Imelda Bergina, Senior Technical Advisor and

Head of FAO Punjab, Dr. Yusuf Zafar, Vice President PCCC highlighted the critical importance of this partnership. He stated, "The collaboration between FAO and CCRIM/PCCC will open new avenues for research and development, ultimately contributing to the growth and sustainability of Pakistan's cotton industry." The partnership is set to focus on developing and implementing climate-resilient agricultural practices, enhancing cotton research and development, promoting agricultural innovation and technology transfer, and strengthening capacity-building and training programs.

A new regional FAO office is being established at the CCRI Multan, which will serve as a hub for joint initiatives and projects. This office will facilitate collaboration and knowledge sharing between the two organizations, fostering a conducive environment for innovation and development in the agriculture sector.

At the inaugural ceremony of the "Eddy Flex Tower" at the Central Cotton Research Institute (CCRI) in Multan, Secretary of Agriculture Punjab, Iftikhar Ali Sahoo, expressed his support for the joint research projects between CCRIM and FAO. He underscored the importance of such collaborations in advancing agricultural research and development. FAO Representative Ms. Florence Rolle also emphasized the role of the "Eddy Flex Tower" in strengthening mutual cooperation in modern agricultural projects and research activities between FAO and CCRIM.

Dr. Muhammad Naveed Afzal, Director, CCRI Multan assured full support for FAO's agricultural development programs and emphasized the importance of mutual collaboration in promoting sustainability and growth within Pakistan's agriculture sector. He highlighted that these collaborative efforts are designed to enhance resilience and sustainability, which are crucial for the future of agriculture in the region.



### iii) Training Sessions at Eddy Covariance Flux Towers

FAO organizes two days of hands-on Training Sessions at Eddy Covariance Flux Towers (June 26-27, 2024) held at CCRI Multan. Ms Feehana Jamil, Director OFWM; Mr. Jiro Ariyama, Technical Officer (Water Management), FAO; Mr. Mudassar Maqsood, Water Management & Hydrology Specialist, FAO; Mr. Muhammad Muzzammil, Director Technical Buraq Integrated Solutions attended the program. The training session was attended by participants from CCRI Multan; MNS University of Agriculture Multan; ONWM Punjab Irrigation Department; Pakistan Meteorological Department and FAO Multan (Punjab) Team. Dr. Muhammad Naveed Afzal, Director CCRI Multan chaired the training session.



ii) **World Cotton Day** The Central Cotton Research Institute (CCRI), Multan celebrated the World Cotton Day (WCD) on October 7, 2024 with great enthusiasm and in a befitting manner. The day is being celebrated with reassurance for the betterment of cotton crop in the country. The following major activities were carried out:

- Cotton Walk for commemorating importance of cotton crop in economy
- Exhibition of farm machinery and stalls of companies
- Seminar challenges confronting cotton production, measures for its revival
- Perspectives of stakeholders (Farmers, ginning, textile, pesticide, seed and fertilizer)

The event highlighted the issues in cotton production and trade and recommended measures for boosting cotton production in the country. The collaborative and joint efforts by the government functionaries, stakeholders and cotton trading bodies will bring back the momentum of cotton production to the level where it was a few years before and prosperity for the nation at large. The year 2019 led to launch the initiative of declaring World Cotton Day by the ICAC and WTO, followed by events and celebrations around the world commemorating the importance of cotton crop. The United Nations has also declared 7<sup>th</sup> October as the UN World Cotton Day in 2021. Pakistan being a leading cotton producing country holds responsibility to showcase solidarity with world cotton community. Cotton is not only the lifeline for Pakistan's economy but also has a unique association with mankind.

iii) **Website & Social Media**

The Institute also initiated highlighting of cotton research and development activities carried out during crop season 2024-25 utilizing social media tools ([www.fb.com.pk/CCRIM.PK](http://www.fb.com.pk/CCRIM.PK)). This has attracted cotton farmers, researchers, and students very effectively. The followers and members appreciated the activities carried out by the Institute. The Institute has also upgraded the website ([www.ccri.gov.pk](http://www.ccri.gov.pk)) of the Institute highlighting major cotton research and development activities, brief programs of various disciplines, cotton market rates, weather situation and other related activities.

## **5. Central Cotton Research Institute, Sakrand Sindh**

The Central Cotton Research Institute, situated in Sakrand, Sindh, was established in 1976 by the Pakistan Central Cotton Committee (PCCC) under the Ministry of Food, Agriculture, and Cooperatives, Government of Pakistan. As a dedicated research institution focused on cotton, the institute's overarching goal is to develop high-yielding, early-maturing cotton varieties that are resilient to heat and drought, as well as resistant to prevalent insect pests and the cotton leaf curl virus (CLCuV) disease. Additionally, the varieties are expected to exhibit desirable fiber characteristics. To achieve these objectives, the institute engages in both basic and applied research across several disciplines, including Plant Breeding and Genetics, Agronomy, Plant Physiology and Chemistry, Plant Pathology, and Entomology. Through collaborative and multidisciplinary research efforts, the institute strives to innovate new cotton varieties alongside recommended production technologies. These advancements are communicated to the farming community in partnership with the Agriculture Extension Department of the Government of Sindh. Despite its limited landholding of approximately 50 acres, the farm is utilized effectively for conducting experiments, establishing demonstration plots, and multiplying the institute's developed cotton varieties.

### **GOALS**

- To develop climate resilient cotton varieties
- Developing high yielding, high GOT % with improving the fiber quality parameters to suit the requirement of ginning factories and textile sector
- To develop early maturing & short duration varieties
- Developing of Biotic and a-biotic stress resistant varieties
- Monitor and document the prevalence of major cotton diseases.
- Evaluate breeding material for disease resistance under field and controlled conditions.
- Examine the role of plant growth regulators (PGRs) in reducing CLCuD and improving yield.
- Determining the optimum sowing time, appropriate plant-to-plant spacing, and essential agronomic requirements such as inorganic fertilizer application, irrigation scheduling, and integrated weed management for increasing cotton yield.
- Assessing seed viability, enhancing soil productivity through cultural practices, and recording meteorological data to understand environmental influences on crop performance.
- Disseminating the technologies to farmers through on farm and demonstration on farmer's field.
- 

### **ACHIEVEMENTS**

The CCRI, Sakrand has so far developed 17 cotton varieties consisting of 14 conventional and 03 Bt. Cotton varieties.

Developed early maturing cotton varieties (CRIS-134, CRIS-342, CRIS-644)

Developed drought tolerant cotton varieties (Marvi, CRIS-613 & CRIS-543)

Developed CLCuV resistant varieties (CRIS-467, Bt.CRIS-682), high GOT percentage and medium to long staple length varieties (CRIS-129 & CRIS-A.R. Halipoto)

Developed short duration and climate resilient variety (Bt. CRIS-682)

Over 52 strains, including both Bt and non-Bt varieties, are in the pipeline, characterized by climate resilient, short duration, high yield potential, high ginning out-turn %, medium-long fiber, and tolerance to cotton leaf curl virus (CLCuV).

Maintained a comprehensive cotton germplasm collection comprising 322 and 3227 exotic accessions which are employed in the hybridization program

Research is underway to enhance naturally colored cotton lines including brown, dark brown, and green to improve their yield potential and fiber attributes, especially staple length.



In 2024, three cotton varieties viz., CRIS-644, Bt.CRIS-674 and Bt. CRIS-682 developed by CCRI Sakrand approved from Sindh Seed Council for general cultivation in Sindh.

### **ACTIVITIES**

**On 07-08-2024**, Exposure visit of Islamic Relief Pakistan with Agriculture Extension official and small farmers of District Mirpurkhas on dated 07-8-2024 for learning and practicing climate-smart agriculture practices. Dr. Rehana Anjum Head Plant Breeding & Genetics Section Welcomed to the participant on behalf of the Director CCRI Sakrand and briefed about the research and development activities of the institute.

### **MEETING/TRAINING/ WORKSHOPS /CONFERENCES**

**On 09-09-2024**, 2024, Dr. Muhammad Idrees Khan, Director CCRI-Sakrand and Dr. Rehana Anjum, Senior Scientific Officer/Head Plant Breeding & Genetics section attended 36<sup>th</sup> meeting of Provincial Seed Council at Sindh Secretariat, Karachi for approval of new crop varieties. Dr. Rehana Anjum presented the cases of three cotton varieties viz., CRIS-644 (Non-Bt), Bt. CRIS-674 and Bt.CRIS-682 and all three were approved for general cultivation in Sindh.

**On 29-01-2025**, Better Cotton (BC), in collaboration with the Pakistan Central Cotton Committee (PCCC), successfully organized the National Conference on Cotton Revival: The White Gold of Pakistan—From Challenges to Opportunities at the Marriott Hotel, Karachi. The conference gathered key stakeholders, including government representatives, policymakers, academia, research institutions, and private sector organizations, to address the decline in cotton production and explore strategies to revitalize the sector. Dr. Rehana Anjum Director CCRI Sakrand and Mr. Abdullah Keerio Head Plant Physiology/Chemistry and Agronomy Sections attended the conference.

**On 04-02-2025**, The First National Conference on the Revival of the Cotton Sector was successfully organized by the Pakistan Central Cotton Committee (PCCC) in collaboration with Cotton Connect at Ramada Multan. Representing CCRI Sakrand, Dr. Rehana Anjum (Director, CCRI) and Abdul Razzaque Channa (SO, PBG Section) participated in this significant event. Prominent experts and policymakers shared their insights

### **LIST OF PUBLICATION**

**Nargis Shah**, Jamal-ud-din Hajano, M. A. Abro, A.M. Lodhi. 20225. Influences of Planting Date on Cotton Leaf Curl Virus Disease (CLCuD). Submitted in International Journal of Phytopathology.

**Soomro A.W.**, Rehana Anjum, Saira Bano, Muhammad Saffar Majeedano, Faiz Hussain Panhwar, Abdul Razaque Channa. 2024. Assessment of genetic diversity among upland cotton for earliness, fibre quality and yield related traits using correlation, principal component and cluster analysis. International Journal of Cotton Research and Technology. Vol 6, pp:13-18.

**Asif Ali Mastoi**, Ghulam Murtaza, Muhammad Umair Mubarak, Syed Shahid Hussain Shah, Muhammad Yasir Khurshid, Saleem Maseeh Bhatti, Abdullah Keerio and Sajjad Shah. 2024. Improving nitrogen use efficiency and fiber quality of cotton through commercial value-added fertilizer. Agricultural Sciences Journal. Vol (2024) 6-(3):40-51.

## **9. PAKISTAN COTTON STANDARDS INSTITUTE (PCSI)**



Preparation of standards boxes



Demonstration in pcsi, cotton fiber testing lab



Demonstration in Ginning Factory with



Demonstration in Ginning Factory with KCA



Training on Classing and Grading



Demonstration at Cotton Farmhouse



Working with TCP Official's visit at PCSI

## 1. Introduction

Pakistan cotton is inherently of good quality. But, lack of quality control measures, improper marketing and as well as non-existence of a quality based pricing system subject to premium and discounts leads to depreciation of the value of raw cotton and the resulting textile products. Being cognizant of these problems, the Government decided to introduce standardization of cotton and bring it at par with the internationally accepted standards for improving the competitiveness of Pakistan's raw cotton as well as ensuring better returns to cotton growers, ginners, spinners, exporters and the national economy.

PCSI is functioning under Cotton Standardization (Amendment) Act, 2009 that include providing cotton sample testing services to various stakeholders of cotton, conduct cotton selectors training courses, prepare seed cotton grade and lint cotton standard boxes, provide trainings to female master cotton pickers, organize demonstrations at field and ginning factories, distribution of informative literature among growers and ginners in regional languages, arrange technical workshops and seminars and perform other related activities. Further PCSI has also been providing training to members of KCA at their premises for the last several years at their request.

Presently PCSI is operating with its Head office at Karachi, two Regional offices at Multan & Sukkur and 10 cotton fiber testing laboratories (CFTLs) i.e Karachi, Sanghar, Mirpurkhas at Sindh and Rahim Yar Khan, Bahawalpur, Multan, Faisalabad, Vehari, Sahiwal and DG Khan at Punjab.

## 1. Policy Frame Work:

Realizing the importance and role of cotton sector in National economy the Government is making serious and continuous efforts to meet the up-coming challenges which the international competition has forced for doing things properly and up to the International standards.

Textile sector of the country on which National economy heavily relies is demanding upon to control costs, reduce wastages and improve productivity levels in terms of quality, for attaining a valuable and sustainable position in the Global cotton market. Pakistan Textile sector direly needs for standardized and clean cotton.

Keeping in view the emerging competitive global market and the grant of GSP plus status to Pakistan by European Union, Pakistan has accordingly reorganized its policies focusing quality in order to fetch the real share from the international cotton market.

Henceforth in order to address the problem Government framed a policy to upgrade the Pak. cotton quality to bring it at par with international standards and in the light of government policy PCSI prepared a frame work to achieve result oriented goals through the implementation of cotton standardization system.

## 3. Vision/Mission and Goal :

### **Vision:**

- i. Enhancement of Pak cotton quality through cotton standardization program.
- ii. To bring Pak cotton as par international standards.
- iii. To ensure real intrinsic value of Pak cotton and its made-ups from the international market.

### **Mission:**

- i. Education/ Awareness Campaigns for implementation of standardization system.
- ii. Human Resource Development.
- iii. Proper picking and handling procedures better cotton quality.
- iv. Improved ginning practices to standardized and clean cotton.
- v. To produced contamination-free cotton.
- vi. Incentive Based Marketing System to all stake holders.

### **Goal:**

For the production of high quality standardized and clean cotton following goals have been set:

- i. Improvement of Picking/Handling/Ginning practices.
- ii. Instrumental Evaluation of Cotton.
- iii. Human Resource Development.
- iv. Incentive based marketing system.

## **4. Progress/ Activitiesduring2023-2024**

### **Training Programs:**

#### **COTTON SELECTORS TRAINING COURSE:**

Cotton Selectors Training Course is one of the popular programs and has significant response from public & private sector. This is a four week training program conduct at PCSI Head Office Karachi and Regional offices Sukkur and Multan (two courses each). One of the main objective of PCSI is to train new generation of skilled persons in the skills of Cotton Classing and Grading. PCSI is regularly conducting training programs in Cotton Grading/Classification and instrumental evaluation of cotton. The program provides opportunity to the participants to get training in the basic skills of cotton grading and classification. Till date over **2760** personnel have been trained through this program. Recently **36** participants benefited from the training program which was widely acclaimed by the cotton sector.

### **5. Cotton Fiber Testing Services to public & private Sector:**

The Cotton Fiber Testing Laboratories established by PCSI in the districts of Sindh at **Karachi, Mirpurkhas, Sanghar** and Punjab at **Rahimyarkhan, Bahawalpur, Multan, Vehari, D.G. Khan, Sahiwal, and Faisalabad** are fully operational and providing high quality testing services to the stakeholders of cotton. This has laid a strong foundation for developing cotton quality culture in the country and help in shifting over the present cotton marketing system to a quality based marketing system on the basis of grade, staple length and other cotton fiber properties subject to premium and discount. These labs provide comprehensive range of testing facilities under one roof.

### **6. Cotton Fiber Testing Services to National Textile University, Faisalabad:**

The Ministry of National Food Security and Research is committed to facilitate the textile research institutions of the country through modernizing infrastructure and logistic support to undertake research and development work in the sector. PCSI Cotton Fiber Testing Laboratory, Faisalabad equipped with HVI 1000 classing & Shirley Analyzer Machines MK II UK is providing test house facilities to National Textile University, Faisalabad to facilitate researchers, scientists of the university beside its routine commercial testing services to the public and private sector.

## 7. Targets and Achievements during the year 2023-24

Targets and the achievements made during the year 2023-24 is as follows:

### (i) Education awareness campaigns:

Education and awareness campaigns are being regularly held to create quality culture in the cotton sector. For the purpose in the year 2023-24 informative literature regarding proper picking, handling and ginning practices have been prepared in regional and national languages and provided/ distributed to the stakeholders of cotton & cotton trade.

### (ii) Cotton Selectors' Training Course:

1

### (iii) Cotton Sample Tested at PCSI Laboratories:

Cotton Fiber Testing facilities have been provided to public and private sector and about 5004 samples have been tested at the Cotton Fiber Testing Laboratories of PCSI during 2023-24. In order to increase the testing capability PCSI is planning to upgrade its labs through Funding of PSDP.

### (vi) Seed Cotton Grade and Lint Cotton Grade Boxes:

280 boxes of seed cotton grades and 450 Lint cotton standards boxes were prepared for the cotton season 2023-24. The said boxes have been provided to the stakeholders of cotton on demand.

S.No	YEAR	Seed Cotton Boxes	Lint Cotton Boxes
1.	2023-24	280	450

### (vi) On Farm/ Cotton Ginning Factory Demonstration:

In order to increase proper ginning practices 20 on ginning factory demonstrations and 22 on Farm demonstration are carried out at district level by PCSI Technical staff posted at cotton fiber testing laboratories at Sindh and Punjab.

#### (a) Purpose of Demonstrations :

To improve the cotton quality /grade by implementation PCSI Standardization system.

#### (b) Suggestion/Recommendation provided to the ginning factory management

1. To apply the PCSI standardization/grading system.
2. Advised to make grade wise heaps of seed cotton and before ginning properly drying the seed cotton, Dandary and Khalary system must be applied.

3. The mash of the ginning machine must be properly clean after every 15 minutes.
4. Moisture must be contained up to 8.5% in lint cotton etc.

**(vii) PCSI and TCP Joint Working Relationship:**

PCSI and TCP are jointly working to support the growers and ginners to control the cotton market price.

**8. Organizational Resources:**

As per provision of Cotton Standardization Ordinance 2002 PCSI must acquire self-financing status and for the purpose MINTEX in compliance of cabinet decision vide S.R.O. No.1013(1)/2006, dated 29-09-2006 has fixed the Cotton Standardization Fee (CSF) at the rate of Rs.5 per pressed bale at the ginning stage. From 2006-2007 ginners paid Rs: 6,657,773/- till June 2023 against CSF and an amount of Rs: 992.00 million is still outstanding. During 2021-22 & 2023-24 ginners did not deposit the CSF. PCGA filed writ petition in Lahore High Court Multan Bench Multan, petition was dismissed in 2017. PCGA Intra court appeal filed in Sep-2017 in Lahore High Court Multan Bench Multan which was also dismissed on April-2019. Despite the dismissal the PCGA is not depositing amount against CSF.

It is important to mention that during **2023-24** the Institute generated around **RS.1,438,320 (Fourteen lac thirty-eight thousand three hundred twenty only)** as annual income.

The above-mentioned income is quite insufficient for meeting establishment and operational expenditure. Thus, PCSI is being granted annual budget to meet its establishment and operational charges.

**9. Issues and Challenges:**

- Implementation of the amendments made in Provincial Cotton Control Act, 1966/ Rules by the agriculture departments, governments of Sindh and Punjab to control contamination in cotton.
- Non-Collection of Cotton Standardization Fee @ Rs.5/- per pressed bale from the ginners. Till date an amount of Rs.6.570 million has been deposited by the ginners since 2006-07 whereas approximately Rs. 992.000Million is still outstanding.
- Non availability of sufficient Funds for up-gradation of Cotton Fibre Testing Laboratories in Sindh and Punjab.
- Post of Regular Director (BS-20) vacant since 1998.
- Shortage of technical and other staff.
- Implementation of Pension or Gratuity as per PCSI Service Rules, 1995

**10. Future Out-look/Plans:**

1. Implementation of amended Cotton Control Act, 1966 to control contamination in cotton and mandatory marking of grade and staple length on each bale by the ginners.
2. To shift over the present cotton marketing system to a quality-based marketing system on the basis of grade, staple length and other fibre properties subject to premium and discount.
3. Upgradation of Cotton Fiber Testing Laboratories Equipped with HVIs.
4. Production of Standardized and Clean Cotton subject to premium/discount to growers/ginners.
5. Strengthening of PCSI with men and machine.
6. Launch education/awareness campaigns in all cotton producing districts to develop a quality culture in the country through print/Social media and by conducting increased number of training courses.
7. Arrange Farm /Factory demonstrations / Seminars/ Workshops /Training programs in various cotton producing districts.
8. Organize other activities related with enhancement of cotton quality.

## **10. PAKISTAN AGRICULTURAL STORAGE & SERVICES CORPORATION LTD(PASSCO)**

### 1. GENERAL

- PASSCO is a commercial entity registered as a Public Limited Company (unlisted) under the Companies Act, 1913 (now Companies Act, 2017). PASSCO is an autonomous body notified by Federal Cabinet and working under the administrative control of Ministry of National Food Security & Research, Government of Pakistan, Islamabad. Its 75% paid up capital is held with 6 scheduled banks and remaining 25% is held with Federal Government. Its 3 Directors out of 9 are appointed by Federal Government. Secretary M/o NFS&R is Ex-Officio Chairman of the Board and Managing Director, PASSCO is CEO / Ex-Officio Member of the Board of Directors. PASSCO is declared as strategic SOE by Cabinet Committee on SOE on 0-07-2024 and ratified by the Federal Cabinet on 10-07-2024.
- PASSCO is a self- sustained organization, it does not get any budgetary allocation /grant from the Federal Government to run its operations. It has maintained standard norms of excellence in performance, operating efficiency, credit worthiness, marketing achievements and observance of best financial practices. It's all operations are undertaken through cash credit limits financed by bank borrowings, and it has progressively developed strong financial base and resilient functional capacity over the years.

### 2. MISSION OF PASSCO

- a) Facilitate the Federal Government in its quest to ensure national food security by maintaining strategic reserves of different food grain commodities, providing the same to deficit provinces / areas and armed forces.
- b) Ensure implementation of support price to stabilize the prices and extend state welfare to farmer community.

### 3. FUNCTIONS

- a) Provision of food security at National Level, by maintaining 2.0 Million Ton of Strategic Reserves of Wheat (including 0.08 Million Ton as SARRC Wheat Reserve).
- b) Extending state welfare to farmers by providing support price and stabilize prices by intervening in domestic market.
- c) Release wheat to deficit provinces/ recipient agencies as well as Armed Forces.

### 4. ACTIVITIES / ACHIEVEMENTS RELATED TO WHEAT PROCUREMENT 2024-25

- a) Activities related to wheat procurement operation during the year 2025 are as under:
- b) PASSCO was not assigned to the procurement target in year 2025 and accordingly procurement was not made by PASSCO in said year.
- c) The stock released to agencies from 01-04-2024 till 31-03-2025 was 603,049 MT and carryover stock on 01-04-2025 was 2,448,408 MT.

### 5. STORAGE CAPACITY

- a) PASSCO has total covered storage capacity of 572,482 MT and remaining quantity is being stored in open through Gunjjs.
- b) During fiscal year 2024-2025, PASSCO has spent an amount of Rs.4,855,187/- on account of repair/maintenance & rehabilitation of PASSCO godowns, silos and other allied structure for smooth & efficient functioning of infra-structure.

### 6. WINDING UP OF PASSCO

PASSCO is in process of winding up as per direction of the Prime Minister of Pakistan.

## **11. Livestock and Dairy Development Board (LDDDB)**

**Livestock and Dairy Development Board (LDDDB) is a company registered under section 42 of the Companies Act, 1984. LDDDB has been declared autonomous organization by the Cabinet Division vide letter no.4-11/2019-Min-I dated 14th April, 2020 under the administrative control of Ministry of National Food Security and Research. Inclusion of Board of Directors of LDDDB in the light of State Owner Enterprises (SOE) Act-2023 is in progress. The main**

**objectives of Livestock and Dairy Development Board are promotion and facilitation for accelerated development and investments in the livestock, poultry, and dairy sector in Pakistan. In the year 2023-24, under the directions of honorable IHC Mr. Aqib Anwar, CA was appointed Administrator LDDDB. During above mentioned period five project concept notes as well as four PC-I submitted to the Ministry for consideration and release of funds through PSDP. Information was gathered from provincial as well as regional collaborators of Prime Minister's Initiative projects for submission of PC-IV to the concerned quarters. Efforts were made to functional Livestock Business Resource Centre (LBRC). Three concept notes were also submitted to Ministry to seek funding through TIKa.**

### **Achievement During the Last One Year (2024-25)**

During the year 2024-25, the Livestock and Dairy Development Board (LDDDB) continued to deliver key sectoral interventions despite being placed under wind-up process pursuant to the Cabinet decision. Notwithstanding institutional constraints, LDDDB made tangible progress in meat and dairy development, including formulation of the Islamabad Slaughterhouse and Wholesale Meat Market proposal, development of a national Butcher Training and Skill Certification framework, promotion of hygienic meat production and halal export standards, support to dairy producer clusters, and awareness initiatives on breed improvement and sexed semen. In addition, LDDDB extended targeted support to farmers in the Islamabad Capital Territory (ICT) through distribution of approximately Rs. 2 million subsidies to feedlot fattening participants, which not only enhanced livestock productivity and farmers' incomes but also contributed to preventing early slaughtering of calves, thereby supporting sustainable herd growth and long-term meat supply.

## **12. FISHERIES DEVELOPMENT BOARD (FDB)**

### **Structure:**

Fisheries Development Board is a Guarantee limited Company established in 2007 under Section 42 of the Companies Act. (1984) and is working under Ministry of National food Security and Research

### **Objectives:**

The FDB to serve as a bridge between the government and the private sector and is mandated for the following tasks:

- i.** Coordination of national and provincial activities with relation to fisheries and aquaculture.
- ii.** Promotion of investment in fisheries and aquaculture sector.
- iii.** Promote joint ventures between foreign and local investors.
- iv.** Help the government to create an enabling environment, establish a regulatory framework, and enforce total quality management and other related areas for promotion of fisheries across the value chain.
- v.** Prepare and implement plans for awareness development and capacity building both in the public and private sector relating to fisheries and aquaculture.
- vi.** Prepare and implement plans according to regional specific requirements.

vii. Play a due role and development of market infrastructure and improvement of marketing of fisheries products.

viii. Explore and enable export markets for Pakistani fisheries products.

### **Membership of the Board of Directors**

#### **Federal Government:**

Secretary MNFSR

#### **Provincial Government:**

- Four provincial secretaries dealing Fisheries Departments.

#### **Private Sector:**

- Six representatives including: one from research organizations/universities, five fish farmers/fishers from Punjab, Sindh, KP, Balochistan and AJK/GB.

### **Achievement During the Last One Year (24-25)**

## **KEY ACHIEVEMENTS OF FDB**

### **1. Aquaculture Development**

- Establishment and renovation of trout hatcheries in Gilgit-Baltistan, Azad Jammu & Kashmir, and Khyber Pakhtunkhwa (Swat, Mansehra, etc.).
- Development of 47 new fish farms, 23 trout farms, and 24 warm-water farms in AJ&K.
- Cold storage and post-harvest preservation facilities set up in Ghizer and Skardu.
- Marine & saline water aquaculture promoted via Model Shrimp Farm in Punjab and establishment of Initial infrastructure for a shrimp hatchery in Balochistan (Miani Hor Creek, Lasbela).

### **2. Human Resource Development**

- Training provided to 668 farmers and 25 extension workers in shrimp farming.
- Training provided to 871 farmers and extension workers in cage fish farming technology
- Total trained: 1,479 individuals, including a specialized 15-day international training program.

- Development and dissemination of a Shrimp Farming Manual and other extension materials.

### **3. Policy Advocacy and Regulatory Support**

- Formulated and submitted for approval of “National Policy & Strategy on Aquatic Animal Health (2025–2030)”.
- Drafting of the National Aquaculture Development Strategy (2023–2033) underway for approval by MOMA.
- Drafting of the National Residue Monitoring & Control Plan, under implementation by Marine Fisheries Department and provincial fisheries departments.

## **PSDP FUNDED PROJECTS OF FDB**

### **1. Pilot Project for Development of Shrimp Farming Cluster**

<b>1. Project Cost:</b>	6381.86 M (Federal Component 1350.33 M)
<b>2. Gestation Period:</b>	5 years
<b>3. Project Areas:</b>	Punjab, Balochistan
<b>4. Expenditure 24-25:</b>	72.263 M

### **Achievements in FY: 2024-25**

1. Model Shrimp Farm, Civil work completed for Earthen Pond and concrete ponds. Tube wells installed and functional.
2. The civil work of nursery complex is completed, 10 concrete nursery tanks and treatment ponds completed, shed over the nursery ponds completed along with room for laboratory. 546,300 shrimp seeds have been stocked in the pond. Harvested stocked shrimp.
3. The 6 circular tanks along with HDPE liner completed. The office cum training building is completed. Electricity installation work is also completed at shrimp farm.
4. 6 Seminar/workshops have been conducted at Karachi, Lahore, Muzaffargarh and Islamabad on promotion of shrimp farming and export development in Pakistan.
5. The 130 Farmers have been trained in shrimp farming practices.
6. National Residue Control Plan (NRCP) is implemented, amendments in "Pakistan Fish Inspection and Quality Control Rules 1996" have been made and shared with provinces for the implementation.

## Pictorial View of Project





# Shrimp Farmers Training Program



## **2. Promotion of Trout Farming in Northern Areas of Pakistan**

<b>1. Project Cost:</b>	2355.13(Federal Component1554.98 M)
<b>2. Gestation Period:</b>	5 Year
<b>3. Project Areas:</b>	Khyber Pakhtunkhwa, AJK & GB
<b>4. Expenditure 24-25:</b>	196.69 M

### **Achievements in FY: 2024-25**

- The civil work for the Office building of ADF at Blind Lake Shigar is completed.
- Renovation of old hatcheries, in GB no. 7 hatcheries are completed.
- The ADF Office building in Mirpur, AJ&K is completed and staff is shifted.
- The construction of Civil works of two Cold Storage at Ghizer is completed. The cold storage at Skardu, civil work completed. But site is under litigation with local community.
- Establishment of Trout Hatchery at Mansehra, KP the Civil Work is completed.
- Establishment of Cold-Water Fisheries Research Centre at Swat, KP. The Civil work is completed.
- New Fish Farms, 133 no. are completed.
- Establishment of 02 New Hatcheries, (Niaslo & Soga) the civil work is completed and the hatcheries are functional.
- For the Rehabilitation of old hatcheries, the civil work is completed in AJ&K.
- Civil work for the establishment of Directorate office in GB is completed.
- Trout farms: In AJ&K, 23 trout farms are established and functional.
- Warm water farms: In AJ&K 24 Warm water farms are completed

### **Pictorial view of Project Activities**

**Trout Fish Hatchery Mansehra-KP**



**Construction of New Trout Farms in KP**



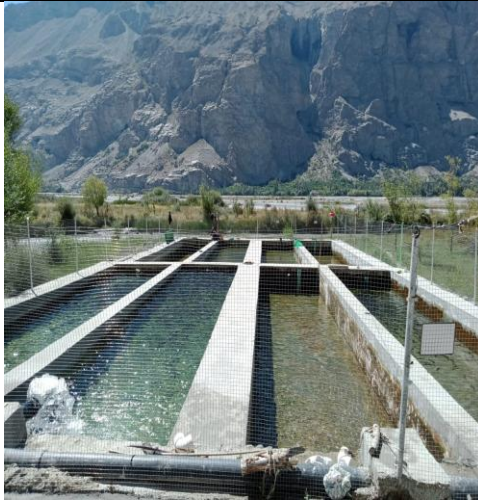
**Construction of research and training center, Swat, KP**



**Construction of Trout Hatchery, Compound wall and Protective gabion Sogha Village Ghanche**



**Sogha Trout farm Ghanche**



**Construction of Trout Hatchery Niaslo Shigar & supervisor office.**



**Renovation of warm water Chikar Hatchery**



**Fishing and Angling tournament in GB**



**Capacity building & Training activities**



**Distribution Of Fish Feed And PPE.S To Private Farmers In District Gilgit**



### **13. PAKISTAN TOBACCO BOARD**

#### **Overview**

Pakistan Tobacco Board is a statutory body set up in 1968 through an Ordinance (Ordinance No. 1 of 1968) by the Federal Government mainly to promote tobacco cultivation on scientific lines to meet domestic and export demand. Since its establishment, PTB was placed under the administrative control of Ministry of Commerce. However, the Federal Government placed the organization under the administrative control of Ministry of National Food Security & Research (NFS&R) in December 2019. The Board is a regulatory-cum-research body and is not engaged in any commercial or trading business.

#### **STAFF STRENGTH**

S. No	Basic Pay Scale	Sanctioned Strength	Working Strength
1.	22/21	01	01
2.	20	-	-
3.	19	03	01
4.	18	18	14
5.	17	51	30
6.	16	11	09
7.	15	11	09
8.	14	08	05
9.	13	18	16
10.	12	02	02
11.	11	17	11
12.	10	-	-
13.	09	23	21
14.	08	-	-
15.	07	01	01

16.	06	05	04
17.	05	11	08
18.	04	14	09
19.	03	06	06
20.	01/02	92	84
Total		292	231

**ACTIVITIES OF RESEARCH & DEVELOPMENT WING, PTB DURING  
THE YEAR 2024-25**

Vision of Research and Development (R&D) wing of Pakistan Tobacco Board (PTB) is “Improving the yield & quality of tobacco for the benefit of growers/farmers and enhancing exports”.

Activity chart of the R&D wing of PTB is as under:

Sr. No	PERIOD		ACTIVITIES
1	January	February	Field days/workshops, Preparation of Annual Technical Report, Meeting with fertilizer and pesticide companies,
2	March	April	Demonstration plots/nurseries at farmers’ field regarding land preparation, ridge making & transplantation.
3	May	June	Topping/ De-suckering, Data collection, Repair of Curing Barns.
4	June	July	Picking/Harvesting, Curing, Sample Collection for physio-chemical analysis
5	August	September	a) Grading, Bailing, Marketing of tobacco. b) Monitoring the marketing of tobacco in various tobacco growing areas to check marketing malpractices and ensuring that the growers get prices above Minimum Indicative Price (MIP).
6	October	November	a) Leaf, Soil analysis for recommendations, Preparation of Research & Development Plans (Research Trials), meeting of Annual Research Co-Ordination Committee to approve the plan. b) Conduction of the Cost of Production (COP) survey all over the tobacco growing areas in the country.
7		December	a) Preparation of Seed beds, Layout of nursery trials, Sowing of tobacco seeds for nursery preparation.

	November		b) Physical verification of burnt barns in different tobacco growing areas /districts of Khyber Pakhtunkhwa.
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- Every year various trials/experiments are proposed for the improvements of tobacco as per the needs of growers and tobacco industry. Meeting of Research and Co-Ordination Committee was arranged and 17 No. of trials were approved with the vision to carry out research with successful strategies/lines so that tobacco production may be enhanced meeting Country consumption and export as well
- On the other hand Development staff carried out various activities to disseminate technical assistance at all stage of tobacco crop comprising of Corner Meetings, Tobacco Workshops, Survey of barns etc from seedbed preparation to curing.
- Arranged fertilizer Meeting with fertilizer and tobacco companies regarding recommendation and availability of fertilizer.

#### **BUDGET ALLOCATED DURING THE YEAR 2024-25**

#### **ACHIEVEMENTS OF RESEARCH AND DEVELOPMENT WING, PTB DURING THE YEAR 2024-25**

Crop Research/Extension Work (Budget allocated 2024-25)	Laboratory Budget (Budget allocated 2024-25)
Rs. 21.02 Million	Rs. 5.49 Million

Activity	2023-24
No of Research Trials	17
Tobacco Leaf Analysis	209
Soil Analysis	593
Water Analysis	23

Fertilizer/Mineral	16
Cigarettes	23
Assisted Students in MSc/BSc Research	11
<b>Workshops:</b>	
a) Mega Workshops	14
b) Corner Meetings	90
Model Nurseries	46
Model Plots	41
Radio Talks	12
Articles Published in Zaraat Nama, KP	03
Documentary on Tobacco Production	01

Performance of the R&D wing of PTB during the period 2024-25 is summarized as follows:

- Previously, with the collaboration of tobacco companies and FSC&RD, PTB has enlisted 10 hybrid varieties having good yield potential after successful trials and adaptability in our environment.
- Following hybrid were under testing at our Stations but as per new protocols for seed import, Department of Plant Protection (DPP) requires a certificate from Post Entry Quarantine (PEQ) facility testing where seed will be grown, before general recommendation/cultivation. Due to this obligation, this year hybrids cannot be imported. However, now PTB intends to develop its own PEQ facility at Tobacco Research Station, Mardan, therefore the following hybrids will undergo testing process for two years before general recommendations.

1. **GLR 20443001**
2. **GLR 20443003**
3. **GLR 20443005**

Published Annual Technical Report 2023-24 and Research & Development Plan 2024-25

**ACTIVITIES/ACHIEVMENTS OF ZONAL OFFICE, LAHORE.**

Activities of Zonal Office, Lahore Pakistan Tobacco Board (PTB) during the period 2024-2025 are summarized as below: -

S.No.	Period		Activities
1.	January	February	Field days/workshops, preparation of Annual Technical Reports.  Verification of agreement issued by Tobacco Companies to tobacco grower
2.	March	April	Meeting with fertilizer and pesticide companies.  Inspection of Research Trials in Sindh Province  Inspection of Research trials of Jampur area  Lay out of Research trials according to Research & Development plan in Punjab.
3.	May	June	Layout of Demonstration plots at Farmers field for education of tobacco Growers.  Inspection of research trials and model plots laid out by research and field staff in Punjab.  Recording of Physical data of Rustica tobacco in Sindh and Jampur.  Stock verification of Tobacco Companies.  Physical data collection of Huqqa tobacco at TRSS, Kunjah & Okara.  Harvesting of Wheat crop at Research stations.  Completion of Nursery sowing in Balochistan.  Collection and submission of statistics of Huqqa tobacco.

			<p>Compilation of data for the award of cess collection rights of Punjab &amp; Balochistan.</p> <p>Preparation of Budget pertaining to Zonal Office.</p>
4.	June	July	<p>Topping of DAC tobacco, Data collection.</p> <p>Constitution of Vigilance committees to look after the marketing of DAC/FCV tobacco.</p> <p>Picking/Harvesting, Curing of tobacco and sample collection for physiochemical analysis.</p> <p>Inspection of research trials laid out by ADO in Baluchistan.</p> <p>Meeting for commencement of marketing season.</p> <p>Marketing of DAC, SCV &amp; FCV tobacco in Punjab supervised by Zonal Office.</p> <p>Auction of cess collection rights for Punjab &amp; Balochistan.</p>
5.	August	September	<p>Supervision of marketing Tobacco in various tobacco growing areas to check marketing malpractices and ensure that the growers get prices fixed by Federal Government.</p> <p>Compilation of tobacco purchase data.</p>
6.	October	November	<p>Preparation of Script of Research &amp; Development Plan for the coming year.</p> <p>Notification of requirements of tobacco companies.</p> <p>Meeting of COP Committee to recommend the price of tobacco for coming season.</p>
7.	November	December	<p>Preparation of seed beds, Layout of nursery trials, sowing of tobacco seeds for nursery preparation.</p> <p>Arrangement of field days in DAC/FCV tobacco growing areas of Punjab for growing of healthy nursery of DAC &amp; FCV tobacco.</p> <p>Meeting of Annual Research Co-Ordination Committee to approve the Research &amp; Development plans.</p>

			<p>Inspection of Nursery beds of DAC &amp; FCV tobacco in Punjab.</p> <p>Layout of Model nurseries at growers field.</p>
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### **ACHIEVEMENTS**

- Conducted 09 (Nine) Research Trials at tobacco Research Sub-Stations of Punjab & Balochistan.
- Layed out 29 Model nurseries,
- Layed out 29 Model plots of tobacco crop.
- Conducted 03 workshops and 20 corner meeting to educate tobacco growers to increase the production and quality of tobacco crop.
- PG 5360 hybrid tobacco variety has been enlisted with Federal Seed Certification & Registration Department (FSCRD) having good yield potential after successful trials and adaptability in our environment with collaboration of Pakistan Tobacco Company.
- Presently following hybrid are under testing at the research station of Punjab.

1.	PGH	5360
2.	PD	7309

- Published annual technical report 2023-2024.
- Published Annual Research and Development 2024-2025.
- Prepared Budget pertaining to Zonal Office and it Sub-ordinance offices for the year 2024-2025.
- Auction of Tobacco Cess Collection rights for Balochistan Province.
- Auction of Tobacco Cess Collection rights for Punjab Province.
- Self collection of cess in Sindh Province.
- Surveyed of tobacco crop for estimation of crop in coming year.

### **MARKETING**

Pakistan Tobacco Board recommends Minimum Indicative Price (MIP) for various types of tobacco to the Federal Government every year and then regulates marketing of the crop during the purchase season. Major functions of PTB with respect to marketing of tobacco crop are as follows;

- i. Announcement of yearly requirements to Tobacco Companies/Dealers.
- ii. Verification of Agreements between growers and purchasers.
- iii. Distribution of Spilled over Leaf (SOL) fund among tobacco growers affected due to burning of their Barns.
- iv. Cost of Production determination for fixation of Minimum Indicative Prices (MIP) of tobacco.
- v. Fixation of grades for quality control of tobacco.

- vi. Tripartite meetings with growers, dealers and tobacco companies to discuss and resolve the issue.
- vii. Announcement of dates for commencement
- viii. Supervision of Marketing.
- ix. Constitution of Vigilance Committee
- x. Regulation and Promotion of export tobacco and its products.

### Calendar Year Activities (Marketing Section)

No	Activity	Month
1	Fixation of MIPs	September/October
2	Requirement submission	31st October
3	Announcement of requirement	November
4	Execution of agreements with Farmers	31 <sup>st</sup> day of December
5	Agreement list submission to PTB	15 <sup>th</sup> January
6	Agreement Verification	February/March
7	Intimation regarding purchase points	31 <sup>st</sup> May
8	Vigilance committees and Governor Inspection Teams constitution	June
9	Tripartite meeting	June
10	Commencement of date for purchase	June
11	Purchase of Tobacco	July/August/September

### MINIMUM INDICATIVE PRICES FOR THE LAST FIVE YEARS

S.No	Year	FCV		DAC	WP	Burley
		Plain	Sub-Mountainous			
1	2021	214.75	243.67	108.09	123.01	187.50
2	2022	245	281.13	149.09	123	187.50
3	2023	310	351	190	146	223
4	2024	505	573	378	245	295
5	2025	545	615.9	388.9	262.6	316

### EXPORT OF TOBACCO AND TOBACCO PRODUCTS

Year	Quantity Exported		Value realized		Total value (M.US\$)
	Tobacco (M.Kg)	Cigarettes (M.Sticks)	Tobacco (M.US\$)	Cigarettes (M.US\$)	
2020-21	15.49	2,243	37.68	14.38	52.05
2021-22	22.39	1,737	65.27	12.06	77.34
2022-23	31.99	1,552	70.47	11.07	81.54
2023-24	19.81	1,283	66.42	10.69	77.12

2024-25	46.88	1,498	180.31	11.24	191.55
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**FEDERAL EXCISE DUTY AND SALES TAX COLLECTION FROM TOBACCO COMPANIES BY FEDERAL BOARD OF REVENUE**

(Rs. Million)

Year	Federal Excise Duty	Sales Tax	Total
2019-20	89658	25891	115549
2020-21	107415	30964	138380
2021-22	117321	35028	152349
2022-23	142091	41121	183212
2023-24	237226	65502	302728

Source: **Federal Board of Revenue**

**Finance & Accounts**

Statement of income and expenditure of Pakistan Tobacco Board during the periods is as given below

(Rs. Millions)

Period	Income Rs	Expenditure Rs	Surplus/Deficit Rs	% Increase/Decrease
FY 2019-20	524.11	321	203	38.80%
FY 2021-22	606.21	646	(40)	(6.62)%
FY 2022-23	742.10	347	395	53.21%
FY 2023-24	907.79	588	320	35.28%
FY 2024-25	1582.12	632.85	949.26	60%

Source: **Pakistan Tobacco Board**

**CESS AUCTION BY PTB FROM 2023-24**

(Rs. Millions)

S. No.	Year	Khyber Pakhtunkhwa	Punjab	Baluchistan	Total	Increase
1.	2021-22	136	66	142	2162	12.17%
2.	2022-23	158	70	145	242.50	
3.	2023-24	28.28	82.18	145	Rs.379.50	75.53%
4.	2024-25	465.40	202	31.85	Rs.6992.50	84.26%

**ACHIEVEMENTS**

- Several meetings between representatives of tobacco companies, representatives of tobacco growers, dealers & Board Members regarding Cost of Production were held in PTB Head office

Peshawar. The results were shared with the Ministry of National Food Security & Research and on the basis of meeting's results; MIP was finalized by the Federal Government on June 24, 2025 for tobacco crop 2025.

- Announced yearly requirements of Tobacco Companies/Dealers in daily newspapers on December 25, 2024.
- Distributed Rs. 13,774,500/- from Spilled over Leaves (SOL) fund of Swabi, Mardan, Charsadda, Buner and Mansehra to 214 tobacco growers affected due to burning of their Barns after proper verification.
- Verification process to evaluate genuineness of agreements was performed by 10 committees constituted by PTB.
- Requested Secretary, Agriculture, Department for Constitution of Governor Inspection Teams.
- Letter sent to DC Mansehra and Buner for imposition of section 144 on June 19, 2025.
- Separate meetings with Tobacco Companies, Dealers and Growers for identification of marketing problems for tobacco crop 2025.
- Tripartite meeting on June 26, 2025, to solve the sorted issues.
- Constitution 112 Vigilance Committees on July 26, 2025, for supervision of tobacco purchase season 2025.
- Announced early date for commencement of purchase w.e.f. 30 June 2025.

#### **14. SPACE AND UPPER ATMOSPHERE RESEARCH COMMISSION** **(SUPARCO)**

##### **Attachment-1**

##### **Performance of SUPARCO during the Financial Year (2024-25)**

1. Satellite Remote Sensing plays a vital role in mapping and monitoring of agricultural resources. Remote sensing technology with its capability to repetitively acquire synoptic images can be employed to classify various types of crops, estimate crop area, monitor crop health/crop growth and assist in crop production and yield estimation. Satellite derived information coupled with field validation provides reliable geospatial information on comparative crop production situation well in advance of crop harvest. Moreover, in case of natural, calamities, damage to crops can be easily assessed.

Timely, frequent and accurate information on crop situation forms the basis of reliable food security policy. The need for reliable and timely information on area and production of

major/minor crops and improvement in existing agricultural data collection system in the country is imperative.

Under satellite-based crops monitoring activity, keeping in view crop calendar of various crops in different cropping zones, SUPARCO acquires multi-resolution, multi-date satellite images for complete coverage of the country. Field validation surveys are carried out in different cropping zones for collection of spectral signatures. Besides, satellite derived products/indices, information on agro-met conditions (rainfall, humidity, sunshine, etc) and crop inputs (fertilizer, irrigation water supply, etc) are also acquired from allied departments.

Using geospatial techniques and ground-based information, a series of temporal satellite images are processed for extraction of crop layers (spatial information) and area estimation. Crop yield forecasting is carried out using crop health indices, agro-met parameters and crop inputs. In case of any natural calamity, satellite-based crop damage assessment is also carried out and the same is incorporated in final crop estimates.

2. Ministry of National Food Security & Research (MNFS&R) approved SUPARCO's project, "Geospatial Monitoring of Major and High value Crops" in September 2020 for 03 years. The main objectives of the project were:
  - a. Satellite based system development for estimation of crop areas, yield and production of major seasonal crops i.e. Wheat, Rice, Sugarcane, Cotton and Maize
  - b. R&D for satellite-based estimation of minor and high value crops such as Mungbean, Chilies, Rapeseed Mustard, Banana, Mango and Citrus
  - c. Capacity building of Provincial Crop Reporting Services (CRSs) through:
    - Organizing training courses on application of satellite technology in crop estimations
    - Strengthening of nucleus labs through provision of hardware/software
  - d. Sharing of satellite-based information on crops

Component-wise activities carried out by SUPARCO under this project are as follows:

### **1. Satellite based Estimation of Major Crops**

Using satellite-based crop monitoring system, SUPARCO worked out crop estimations for Kharif and rabi crops for cropping seasons from 2020-21 to 2023-24 and shared with MNFS&R. These estimates were presented in meetings of Federal Committee on Agriculture (FCA) held

during October and April of respective cropping seasons. The province-wise estimates and maps showing country-wide spatial distribution of crops are as follows:

## **2. Capacity building of Project Stakeholders**

### **1. Organizing Training Course**

SUPARCO under the project objective organized 04 training courses on “Geospatial Monitoring of Crops” for officials from stakeholder departments of the project. These training courses covered lectures on application of satellite technology in the field of agriculture, satellite-based area estimation, yield modeling and hands-on exercise using different satellite data processing softwares. Besides these activities, the training also provided an opportunity to discuss collaborative activities of the project.

### **2. Strengthening of Nucleus Labs**

As per project objective, to strengthen nucleus labs established in HQs. Of provincial Crops Reporting Services, SUPARCO procured necessary hardware/software including workstations, laptops, tablets, cameras, printers, remote sensing software, etc. These items were distributed among the project stakeholders.

**3. Publishing of Monthly Bulletin:** As per project objective, SUPARCO under satellite-based crops monitoring activity, published monthly crop situation bulletin on regular basis. This bulletin covered: crop situation for the respective month, agro-meteorological condition, availability of irrigation water supply, fertilizer condition, recommendations for farmers and damage assessment to crops due to any natural calamity (if any).



### 3. Performance of SUPARCO during (2024-25)

#### 1. Satellite based Estimation of Major Crops

Using satellite-based crop monitoring system, SUPARCO worked out crop estimations for Kharif (2024-25) and Rabi (2024-25). These estimates were presented in meetings of Federal Committee on Agriculture (FCA) held during October, 2024 and April, 2025 and shared with Economic wing, MNFS&R. The province-wise estimates and maps showing country-wide spatial distribution of crops are as follows:

#### Sugarcane (2024-25)

SUPARCO Sugarcane Crop Estimates: 2024-25			
Province	Area	Yield	Production
	000 ha	Tons/ha	000 Tons
Punjab	702.1	77.0	54031.5

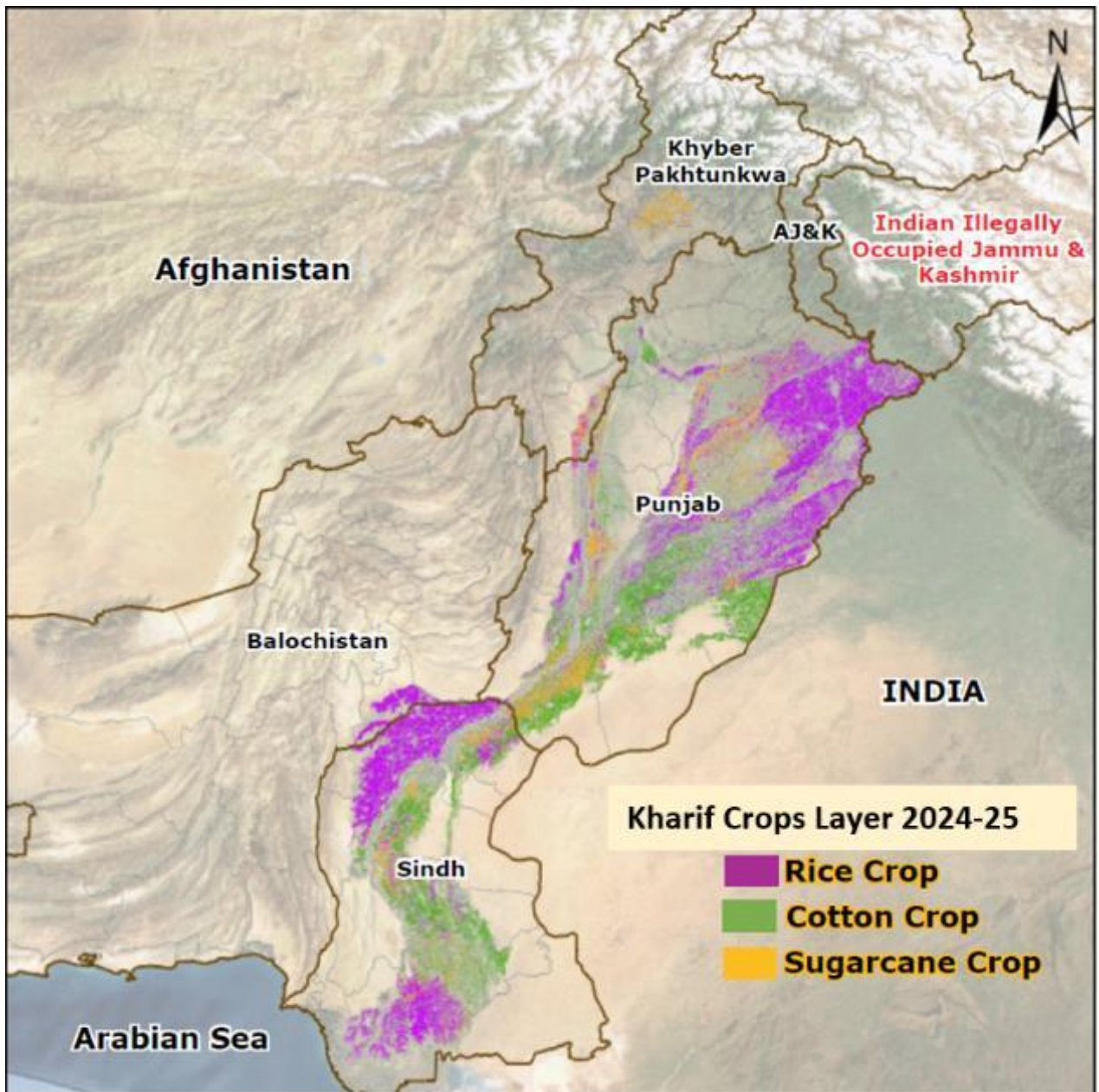
Sindh	262.3	65.7	17242.7
Khyber Pakhtunkhwa	88.7	56.2	4986.7
<b>Pakistan</b>	<b>1053.2</b>	<b>72.4</b>	<b>76261.0</b>

### Cotton (2024-25)

<b>SUPARCO Cotton Crop Estimates: 2024-25</b>			
<b>Province</b>	<b>Area</b>	<b>Yield</b>	<b>Production</b>
	<b>000 ha</b>	<b>Kg/ha</b>	<b>000 Bales</b>
Punjab	1295.5	610	4644.5
Sindh	705.3	740	3070.4
Balochistan	26.2	501	77.2
<b>Pakistan</b>	<b>2026.9</b>	<b>654</b>	<b>7792.1</b>

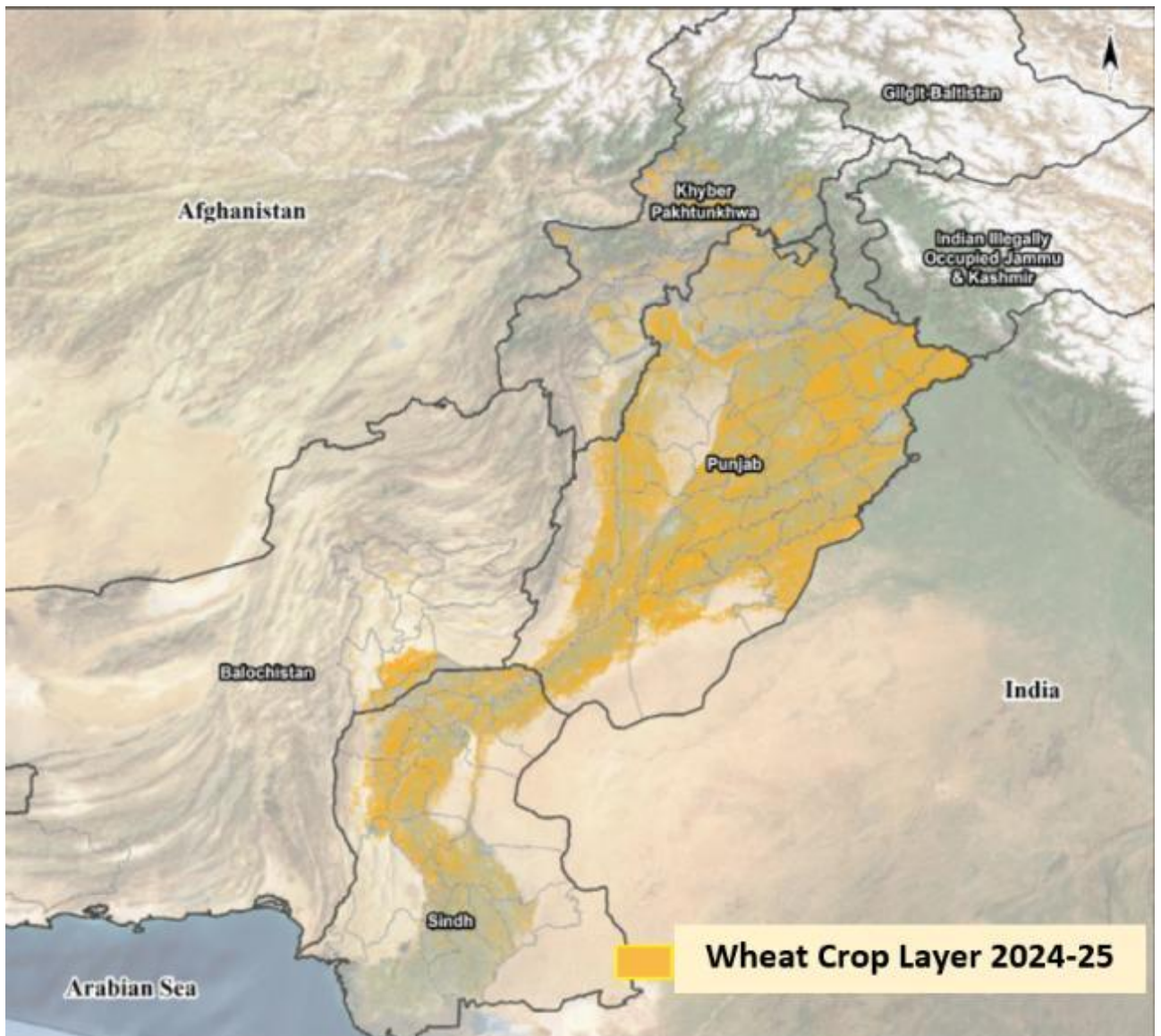
### Rice (2024-25)

<b>SUPARCO Rice Estimates: 2024-25</b>			
<b>Province</b>	<b>Area</b>	<b>Yield</b>	<b>Production</b>
	<b>000 ha</b>	<b>Kg/ha</b>	<b>000 Tons</b>
Punjab	2662.6	2308	6144.2
Sindh	1569.6	3459	5429.4
Khyber Pakhtunkhwa	64.1	2529	162.0
Balochistan	171.5	3012	516.7
<b>Pakistan</b>	<b>4467.8</b>	<b>2742</b>	<b>12252.3</b>



### Wheat (2024-25)

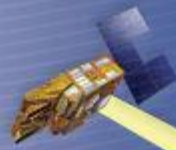
SUPARCO Wheat Estimates: 2024-25			
Province	Area	Yield	Production
	000 ha	Kg/ha	000 Tons
Punjab	6532.7	3146.8	20557.1
Sindh	1764.6	3014.4	5319.2
Khyber Pakhtunkhwa	720.1	1829.2	1317.2
Balochistan	458.3	2697.2	1236.1
<b>Pakistan</b>	<b>9475.7</b>	<b>3000.3</b>	<b>28429.6</b>



2. **Publishing of Monthly Bulletin:** Under satellite-based crops monitoring activity, SUPARCO published monthly satellite based crop situation bulletin on regular basis. This bulletin covered: crop situation for the respective month, agro-meteorological condition, availability of irrigation water supply, fertilizer condition, recommendations for farmers and damage assessment to crops due to any natural calamity (if any).



SUPARCO



# PAK-SCMS

## BULLETIN

PAKISTAN: SATELLITE BASED CROP MONITORING SYSTEM

Volume XV, Issue 7, Serial No. 175 1-July 2025

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SUPARCO, the National Space Agency of Pakistan, started the program on "Monitoring of Crops through Satellite Technology," during the year 2005. This is a perpetual study encompassing all growing seasons around the year. The purpose of this initiative is to reinforce support for policy makers, planners and private sector for food security, stocking, marketing, trade and industrial management. The final crop estimates are released by end of March for Rabi crops and mid of October for Kharif crops.

Food and Agriculture Organization of United Nations, (FAO-UN) provided technical backstopping for analytics and transfer of technology. Wheat, cotton, rice, sugarcane, maize and potato crops are being covered under this program. In addition, large scale geospatial applications of satellite remote sensing technology have been made for monitoring/mitigation of natural disasters (floods, flash floods, and drought) and providing reconnaissance detailed information ordained for the uplift of agriculture and allied pursuits.

### CROP SITUATION: JUNE 2025

#### Summary

By the end of June 2025, the Satellite based Normalized Difference vegetation Index (NDVI) values shows start of Kharif season crops.

In this month, mean temperatures were observed to rise notably across the country, especially in the northern regions of Khyber Pakhtunkhwa, as well as in Gilgit Baltistan and Kashmir.

Rainfall in most regions of the country, including Sindh, Balochistan, and Punjab, were observe normal to elevated levels. In contrast, the central and northern areas of Khyber Pakhtunkhwa, as well as Azad Jammu & Kashmir and Gilgit Baltistan, were experienced slightly below normal precipitation.

MNFS&R, in its meeting of Federal Committee on Agriculture (FCA) held on 24<sup>th</sup> April 2025 set the targets of Kharif (2025-26) crops. Cotton crop production targets was fixed at 10181.00 (000 bales) from an area sown 2260.3 (000 ha). Sugarcane

crop production targets was fixed at 80320.00 (000 tons) from an area sown 1146.49 (000 ha). Rice crop production targets was set at 9170.00 (000 tons) from an area sown 3039.39 (000 ha).

As per report of Indus River System Authority (IRSA) for June 2025, the irrigation water supply was 11.50 MAF against the last year's supply of 13.74 MAF, decreased by 16.34 percent.

As per report of National Fertilizer Development Centre (NFDC), total availability of Urea in May 2025 was 1711 thousand tons whereas total availability of DAP was 333 thousand tons.

Pakistan Satellite based Crop Monitoring System Bulletin is a joint monthly publication of SUPARCO and FAO, UN.

### 3.3. Development of GEO-AI Platform

Recently SUPARCO has made advances in incorporating AI and digital technologies to advance Pakistan's agricultural monitoring and assessment capabilities. To disseminate up-to-date data on crops, SUPARCO has developed a comprehensive GEO-AI platform. Credentials for accessing this platform have been shared with MNFS&R and PBS. The above-mentioned estimates alongwith crop digital layers are available on this portal. A primary example of this innovation is the development of crop masks and the availability of digital crop layers that are readily accessible to stakeholders, enabling informed decision-making at both macro and micro levels. These advancements will facilitate the accessibility of crop information and enhance the accuracy efficiency of agricultural data analysis.

