



YEAR BOOK 2021-22



GOVERNMENT OF PAKISTAN
MINISTRY OF NATIONAL FOOD SECURITY & RESEARCH
ECONOMIC WING
ISLAMABAD



www.mnfsr.gov.pk



Message

Agriculture plays a central role in food security, poverty reduction and national growth. Its contribution in GDP is 22.7 percent and 37.4 percent of total labor force of the country is employed in agriculture sector. Pakistan is ensuring food security in production of staple foods, livestock and dairy, however, economic access and utilization persist as the major limiting factors for household-level food and nutrition security. Addressing these challenges has been identified as an area of prime focus by the Government. The growth in agriculture not only results in enhanced supply of raw material to agro-based industries like textile, sugar, food processing but also generates demand for industrial goods and services. The better performance of agriculture is due to various measures of Government to enhance agricultural products like support price for production, significant increase in credits, better arrangements for the provision of inputs like seeds, fertilizers, insecticides and better arrangements for marketing.

2. Present Government has accorded high priority to the development of agriculture to play a vital role in boosting national economy and ensuring food and nutritional security. The emphasis is also given to agriculture, livestock, research and development priorities with a focus on nutrient dense foods such as fruits, vegetables, legumes and animal source foods.

3. The yearbook 2021-22 describes comprehensive programmes and activities performed by various wings and attached departments of Ministry of NFS&R during the year to achieve the targets and objectives of the Ministry of National Food Security & Research.

Chaudhary Tariq Bashir Cheema

Minister for National Food Security and Research (NFS&R)

March, 2023



FOREWARD

The year Book 2021-22 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 information of Cabinet and the general public. The Year Book deliberates activities undertaken by the various Wings of the Ministry, its attached departments and autonomous setup, and accomplishments of the ministry during fiscal year 2021-22.

2. I hope this will serve as a useful information resource and reference document for the policy makers, researchers, planners and general public on matters relating to food and agriculture. I highly appreciate the efforts of officers and staff of economic wing, engaged in compiling the publication.
3. Comments and suggestions for improvement of the year book would be highly appreciated.

(Zafar Hassan)
Secretary
Ministry of National Food Security and Research (NFS&R)

March, 2023

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INTRODUCTION

Diversified agriculture systems across the country have an important role in boosting economic growth. The agro-based entrepreneurs, through exports of raw products such as rice, cotton, fruits, vegetables and semi-processed and processed products such as cotton yarn, cloth, carpets and leather production, provided opportunities to enhance foreign trade.

During 2021-22, agriculture sector recorded a remarkable growth of 4.40 percent and surpassed the target of 3.5 percent and last year's growth of 3.48 percent. This growth is mainly driven by high yields, attractive output prices and supportive government policies, better availability of certified seeds, pesticides and agriculture credit. Realizing the importance of agriculture sector, the Government encourage financial inclusion activities in the agriculture sector to adopt new approaches in order to boost the productivity and exports, thus enhancing a rural development-driven economic growth.

The COVID-19-related nationwide lockdown has effectively halted most non-agricultural economic activities, with a potentially detrimental impact on food supply chains. Pakistan relies largely on interprovincial movement of food to balance supply and demand across the seasons and to take advantage of the different agro-ecological zones. Wheat is a main commodity associated with food security.

To guarantee food security, it is necessary to enhance domestic agricultural production through increased productivity (increasing per acre yield). Although Pakistan has rich production potential in agriculture, livestock and fisheries, yet for sustainable economic growth and prosperity, the development of these sectors on long-term basis is of fundamental importance for country's growth and prosperity. This calls for efficient utilization of production resources by adopting modern technologies and establishment of realistic marketing system.

Food Security and Agriculture demand very comprehensive programs that aim to make measurable and sustainable improvements in agriculture production and resource utilization through instruction and skills improvement in the chain from production, processing and marketing practices till it reaches to the consumer. We have to provide direct technical assistance to farmers through field extension agents to promote changes in attitudes and systems involving various stake holders at provincial and national level.

OVERVIEW

The Ministry of National Food Security and Research (NFS&R) through its attached departments, autonomous organization and boards is focusing to ensure food security. Links between agriculture and food security have long been recognized and there is major shifts in understanding that have led to recognition that agriculture is one of the main contributor to food security. The M/o NFS&R since its inception, have been aiming to improve, coordinate and strengthening 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; and
 - 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.

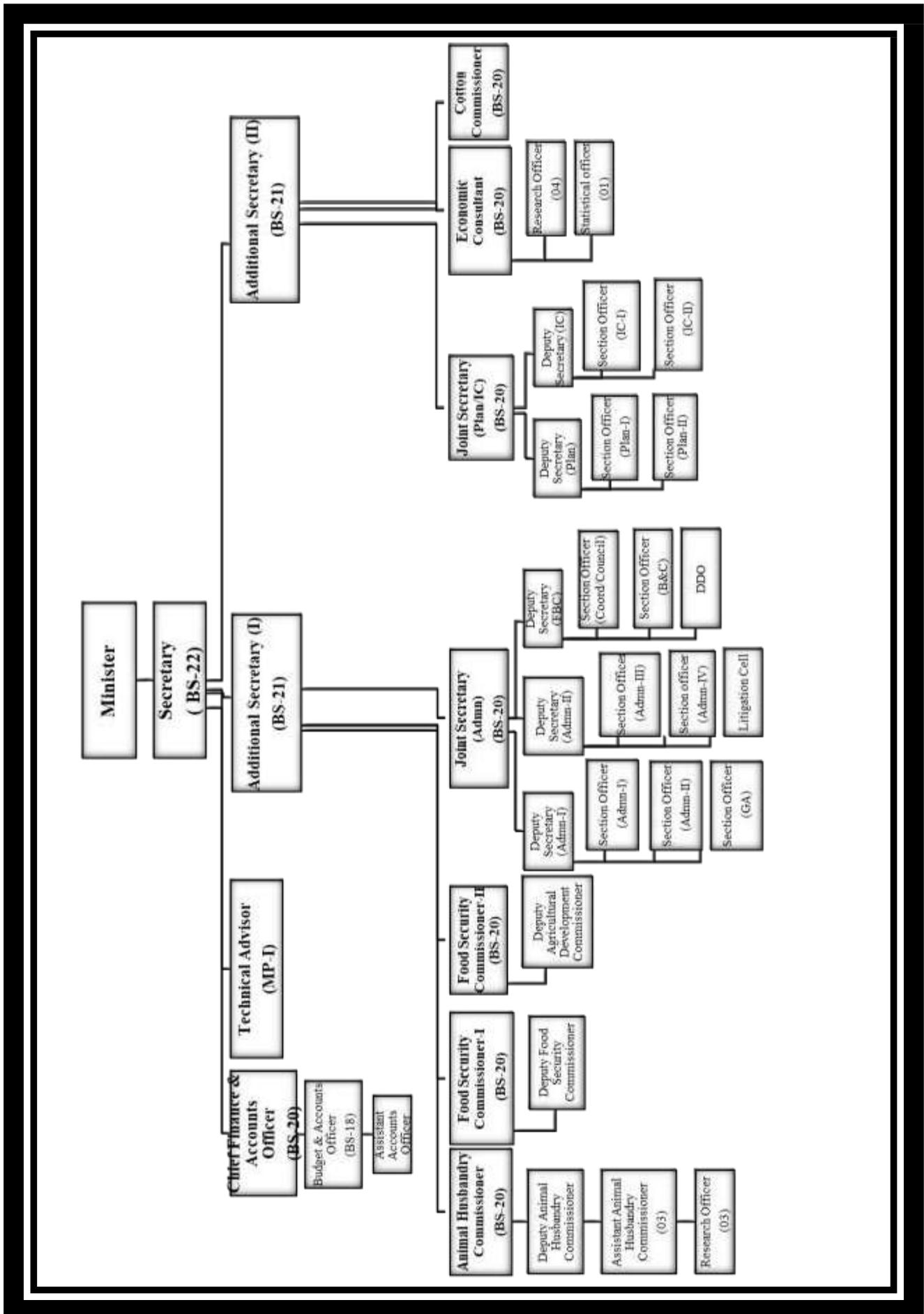
14. Price stabilization by fixing procurement and issue prices including keeping a watch over the price of food grains and foodstuffs imported from abroad or required for export and those required for inter-provincial supplies.
15. Agricultural Policy Institute.
16. Animal Quarantine Departments, stations 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 (LDDB).
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.

ADMINISTRATION WING

<u>Admin Wing</u> headed by Joint Secretary (Admn)	<u>D.S (Admn-I)</u>	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.
	<u>D.S (Admn-II)</u> 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.
	<u>D.S (FBC)</u>	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>Plan/IC Wing</u> headed by Joint Secretary Plan/IC)	<u>D.S (IC)</u>	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.
	<u>D.S (Plan)</u>	Supervision of work of Plan Section.
	<u>SO (Plan)1</u>	<p>All PSDP matters of main Ministry and attached departments/organizations. Policy matters pertaining to Development side including preparation of PC-IIs, surveys or analysis.</p> <p>All matter related to PSDP (preparation of PC-Is, approvals by DDWP/CDW/ ECNEC, implementation through departments, monitoring through M&E Cell etc)</p> <p>All matters related to foreign funded projects including grants, TCPs etc</p>

	<u>SO (Plan)2</u>	<p>DDWP secretariat Administrative section for all project employees</p> <p>Coordinating activities pertaining to National Coordination Committee (NCC) on Agriculture Transformation Plan (ATP) Processing of matters regarding PSDP+ Initiative</p> <p>Court cases including cases of regularization All matters related to liabilities of closed/developed projects Processing of PC-IV and PC-V after closure of the projects.</p>
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<u>Technical Wing</u>	<u>Commissioner Minor Crops /Food Security Commissioner-I</u>	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.
	<u>Wheat Commissioner / Food Security Commissioner-II</u>	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.
	<u>Cotton Commissioner</u>	Cotton Commissioner will deal with all technical matters pertaining to cotton crop besides technical matters of PCCC and PCSI.
	<u>Chief, NFDC</u>	Chief, NFDC along with officer under his supervision will deal with all technical matters pertaining to fertilizer besides administrative matters within NFDC.
<u>Livestock Wing</u>	<u>Animal Husbandry Commissioner</u>	AHC along with officer(s) under his supervision will deal with all technical matters pertaining to livestock sector besides technical matters of AQD, NVL, LDDB and FDB.
<u>Economic Wing</u>	<u>Economic Consultant</u>	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.



DEPARTMENTS / ORGANIZATIONS ETC. OF
MINISTRY OF NATIONAL FOOD SECURITY AND RESEARCH

Technical Section

1. National Fertilizer Development Centre (NFDC), Islamabad

Subordinate Offices

1. Federal Water Management Cell (FWMC), Islamabad
2. National Veterinary Laboratory (NVL), Islamabad

Attached Departments

1. Animal Quarantine Department (AQD), Karachi
2. Department of Plant Protection (DPP), Karachi
3. Federal Seed Certification and Registration Department (FSC&RD), Islamabad
4. Plant Breeders Rights Registry (PBRR), Islamabad
5. Pakistan Oilseed Department (POD), Islamabad
6. Agriculture Policy Institute (API), Islamabad

Autonomous Bodies / Corporations

1. Pakistan Agriculture Research Council (PARC), Islamabad
2. Pakistan Central Cotton Committee (PCCC), Multan
3. Pakistan Cotton Standard Institute (PCSI), Multan
4. Pakistan Agriculture Storage & Services Corporation (PASSCO), Lahore

Companies / Board

1. Livestock and Dairy Development Board (LDDB), Islamabad
2. Fisheries Development Board (FDB), Islamabad
3. Pakistan Tobacco Board (PTB), Peshawar

PLAN WING

The plan wing of Ministry of National Food security and Research is responsible to Coordinate with development activities with regard to Food Security through public sector development program(PSDP).This Wing analyses the project proposals /pc-1's initiated by the line Developments of the Ministry and processes those for approval of the competent forums such as DDWP,CDWP and ECNES etc as the case may be .Not only it releases 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 submits monthly and annual progress reports to planning commission and Finance Division.

Funds to the tune of Rs.12017.280 million were allocated in PSDP for execution of the following development projects under this Ministry: -

- Better cotton initiatives
- Cage Culture Cluster Development Project
- Calf Feedlot fattening in Pakistan
- Commercialization of Potato Tissue culture Technology in Pakistan
- Construction of Office & Laboratory Building of Animal Quarantine Department, Karachi
- Cotton productivity Enhancement through eco-friendly pink bollworm management and capacity building in Punjab under PM Emergency Program
- National Program for enhancing the command Area in Barani Areas of Pakistan
- Establishment of plant Breeders Rights Registry and Strengthening of D? US examination system
- Geospatial monitoring of Major and high value Crops
- National Oilseed Enhancement program
- National peste Des Petits Ruminants (PPR) Eradication Programme,Phase -1-risk based PPR control in sheep and Goats of Pakistan
- National Program for Improvement of watercourses in Pakistan –phase –II
- Pilot shrimp Farming Cluster Development
- Prime Minister's Initiative for Backyard Poultry

- Productivity Enhancement of Rice
- Productivity Enhancement of sugarcane
- Productivity Enhancement of Wheat
- Promoting Research for Productivity enhancement in Pulses
- Promotion of Trout Farming in northern Areas of Pakistan
- Sino-Pak Agricultural Breeding innovations project for Rapid Yield enhancement
- Strengthening /Up-gradation of Agriculture and Livestock Research System of Arid Zone Research Institute, Umerkot -Sindh
- Strengthening of /monitoring and /evaluation

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 2020-21

The Wing released and uploaded the publication on Ministry's website. The next publication 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 2020-21

The Wing released and uploaded the publication on Ministry's website "Fruit, Vegetables and Condiments Statistics of Pakistan 2020-21" containing province-wise data for the year 2016-17 to 2020-21. 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 in process.

Crops Area and Production (By Districts) 2020-21

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 in process.

Year Book 2020-21

In pursuance of Rule 25(2) of the Rules of Business, 1973, the Economic Wing published Year Book, 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.

Performance of Essential Agriculture Food Commodities (EAFC) Cell

- In order to strengthen the decision support system at the Ministry of National Food Security and Research (MNFS&R), there was an urgent need to establish a monitoring cell and a real time data system which can instantly help in policy feedback. The MNFS&R approved establishment of Essential Agriculture Food Commodities (EAFC) Monitoring Cell, being funded from Endowment Fund of the Economic wing.
- The objective of the EAFC was to keep watch on the supply, prices ad stocks of food commodities, assessment of the availability, provision of the feedback for timely intervention, analysis of the crop situation in the country and forecasting trends of demand for food and crops to ensure the “Food Secure Pakistan”. The team of well qualified monitoring officers (Econometricians, Agri-Economists, and Statisticians) was hired accordingly.
- The EAFC cell of the Economic Wing is providing policy feedback and generating reports on supply, prices and stocks 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 concerned departments.
- Further to this, the MNFS&R has established a web-based Food Security Portal (FSP) in Economic Wing which consists of the Dashboards for essential food commodities. At present the dashboards for wheat, sugarcane/sugar, pulses, rice and perishables are fully functional and reports are being generated on daily, weekly and monthly basis while, for other commodities the data uploading is in process. This provides the real time data for policy feedback to the MNFS&R. The portal can be accessed through the following URL: <http://www.fsp.gov.pk>

The Following Functions are performed by the EAFC CELL and FSP.

- 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.
- 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 of price trends, demand, import, export, stocks and area cultivated of 15 Essential Food Commodities.
- 5) Daily coordination with province to ensure data validity and availability.
- 6) Daily reports on wheat stocks & sugar at national and provincial level are being generated by EAFC cell from the Food Security Dashboard and being shared with PM Office and other stakeholders for policy feedback.
- 7) Maintaining the record of coordination between MNFSR and PM Office for the Policy suggestions of Food Security Dashboard.
- 8) Weekly and monthly reports on prices of essential commodity are being generated by the EAFC cell and potential supply and demand gaps identified and reported to the allied departments.
- 9) Cost benefit analysis of different government policies like Cotton, Wheat and pulses procurement to control prices.
- 10) Weekly and daily briefs are being prepared by the EAFC cell for Minister and Secretary MNFSR.

- 11) Monitoring officers monitoring dashboard on daily basis to ensure the data validation and frequency.
- 12) Suggestions/feedback to Economic Consultant/Secretary on front end development of dashboard and improvements of Graphic User Interface (GUI).
- 13) 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?
- 14) The EAFC cell has Established a separate IT cell, who is working on the further development of the portal.
- 15) At present the CELL is also serving as a secretariat to the Prime Minister Taskforce on agriculture.

3. FOOD SECURITY COMMISSIONERS

(i) FOOD SECURITY COMMISSIONER – I

The technical wing of M/o NFS&R designated as Food Security Commissioner-I is comprised of the Food Security Commissioner-I (FSC-I) and Deputy Food Security Commissioner-I (DFSC-I). This technical wing has been assigned to perform following functions;

1. Professional and technical aspects in the formulation of action programs and policies for high value food crops to ensure food security.
2. Production, price trends and marketing of high value crops as well as the problems faced by the food producers and processors in the chain from production to trade for high value crops.
3. Maintain coordination and liaison with Agricultural Research Institute and extension services at Federal and Provincial level to find out its effectiveness in ensuring the National Food Security focusing high value crops.
4. Formulation of development strategy and prices support policies concerning high value foodcrops 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 and other assigned jobs.
7. To provide all technical assistance to various wings of M/o NFS&R.
8. Any other duties assigned by the competent authority.

Achievements

- The meeting of Federal Committee on Agriculture for Rabi 2020-21 and Kharif 2020-2021 were convened in time to harness the opportunity created for a better Rabi and Kharif crops by the Technical Wing of (FSC-I).
- During 2020-21 the record production of Rice, Maize, Potato, Onion, Mung and Sugarcane and record export of agro products remained significantly higher as compared to last year. The export data tabulated on the basis of phytosanitary certificate indicate that Pakistan exported the largest

quantity of Kinnow, Mango and potato in its history without any interceptions as compared to last year.

- All Kinnow processing plants in the country were examined and 5 processing plants of Kinnow were made as per International standards and may be declared as state of the art, whereas Standard operating procedures (SOP) for Hot Water Plants, Kinnow processing plant and pack houses were also developed by DPP in consultation with Technical Wing of this Ministry. Agro-products exports are developing as an industry in the country.
- To ensure quality and standard of pesticides first time in the history of Pakistan a comprehensive and intensive technical audit of all formulation, refilling and re-packing pesticides plants were carried out. Resultantly a number of pesticides formulations, re-filling and repacking plants were cancelled and suspended. Resultantly the quality and standards were made up to the 4mark in the country.
- Pre-shipment inspection agencies responsible to ensure pesticide quality from manufacture to port of import country. The technical audit of these PSIA were also done and make them in order.
- A mechanism was established in DPP to ensure quality of pesticides.
- Regular meetings of Agriculture Pesticide Advisory Committee (APTAC) were convened and a number of issues were resolved.
- Much legislation were proposed for pesticides regulation and made new rules for pesticides in the country.
- All quarantine and pesticides matter of the country are duly addressing by the Technical Wing of Ministry though monitoring and advising to the attached departments.
- Plant Quarantine, Rules 1967 revamped after 53 years.
- Food Security Flow Information Ordinance drafted and promulgated.
- Brief/presentation regarding price and availability of essential food items furnished and present National Price Monitoring Committee (NPMC) every week.
- Single Window successfully launched (DPP, FSC&RD and AQD)
- After 40 years rational MIP of Tobacco approved in favor of farmers.
- PTB Ordinance, Rules and Bye Laws revamped.
- All the writ petition filed in different courts were addressed and won by the Government.
- The Technical Wing is giving full assistance and consultation to POD, Water Management Cell, PARC, PTB and DPP.
- During the year more than 50 Assembly and Senate Starred, Un-Starred, Motions and Briefs were furnished by the Technical Wing.
- National Action Plan was furnished for monitoring and surveillance of locust in 2019-2020.
 - Pakistan Agriculture secured against locust and more than 1.3 million hectares were treated and 56 million hectares were surveyed.
 - Robust information of locust and pilot testing of converting locust into compost.
 - Locust Emergency and Food Security (LEAFS) Project approved from World Bank for US\$ 200 million to establish and strengthen the DPP and Provincial Departments after its creation.
- During COVID-19 supply chain of all food commodities maintained.
- The Food Security policy is strategized resultantly 90% food requirement met through domestic production.
- Pakistan secured US\$ 129 million by producing more pulses through better strategy from

Pakistan; the Technical Wing of Ministry gives full assistance and support to DPP in developing a comprehensive work plan and its implementation with collaboration of entire stake holder. The salient features of the activities include:

(ii) FOOD SECURITY COMMISSIONER – II

FSC-II wing deals with the main issue of wheat crop and its production and other issues:-

Importance:

Wheat is the staple crop and it ensures food security of the country. Wheat is cultivated over 22 million acres and accounts for 8.9 percent of the value added in agriculture and 1.6 percent of the Gross Domestic Product (GDP). Self-sufficiency in wheat has been an objective of every Government and thus always challenges for the agriculture experts and policy makers to meet 80% of the dietary needs with 38% share in calorie intake.

SUPPORT PRICE MECHANISM:

As per Rules of Business, 1973 price stability, through demand and supply mechanism, is the main domain of the Ministry of National Food Security and Research. After the implementation of 18th Amendments of the Constitution, 1973, contact with the provinces is an integral part of the consultation. Federal Government only announces the Minimum Support Price (MSP) of wheat, in consultation with provinces. For ensuring food security and sustainability in wheat production, support price play an important role, MSP also plays a pivotal role in the rural economy. ECC of the Cabinet in its meeting held on 31-03-2021 approved and to enhance the MSP of wheat from existing Rs. 1,400/- 40 Kg to Rs. 1,800/- 40 Kg. Wheat MSP during last 13 years are given below:

Production Year	Support Price (Rs. /- 40 Kg)
2008- 09	950
2009-10	950
2010-11	950
2011-12	1050
2012-13	1200
2013-14	1200
2014-15	1300
2015-16	1300
2016-17	1300
2017-18	1300
2018-19	1300
2019-20	1400
2020-21	1800*

Production 2020-21:

High Powered Federal Committee on Agriculture (FCA) in its meeting held on 22nd October, 2020 fixed wheat production target at the tune of 27.00 million tons from an area of 22.393 million acres.

PRODUCTION V/S ACHEIVEMENTS FOR WHEAT CROP 2020-21

Province	Target 2020-21		Achievement 2020-21			
	Area (M. Acres)	Production (MMT)	Area (M. Acres)	%	Expected Production (MMT)	Productivity (Maunds/Acre)
Punjab	16.210	20.00	16.517	101.9	20.90	31.63
Sindh	2.842	4.000	2.993	100.9	4.00	33.41
KP	1.982	1.700	1.878	84.44	1.45	19.30
Balochistan	1.359	1.300	1.149	84.55	1.15	25.02
Pakistan	22.393	27.00	22.537	99.023	27.50	30.51

Source: Provincial Crop Reporting Services (CRS).

Note: Due to timely sowing, availability of certified seed and good weather conditions, provinces overachieved the target and reported wheat production at the level of 27.50 MMT.

Wheat Availability:

Overall availability of wheat is estimated at the level of 28.231 MMT, including carry-forward stock of 0.731 MMT and production of 27.50 MMT as compared to the national requirement of 29.27 MMT. Details are given below:

ANNUAL WHEAT CONSUMPTION 2020-21

Province	Population (Million)	Consumption (MMT)
Punjab	119.1	13.69
Sindh	51.8	5.96
KP	33.0	3.80
Balochistan	13.4	1.54
FATA	5.4	0.62
Islamabad	2.2	0.25
AJK	4.7	0.54
GB	1.7	0.19
IDP's	1.5	0.17
Total	232.8	26.77
Seed Requirement	-	1.20
Poultry/Wastage	-	0.30
Strategic Reserves	-	1.00
Grand Total:		29.27

Source: PBS census 2017 plus 2% growth.

Consumption rate @ 115 Kg/person/annum.

In order to build up strategic reserves, import of 4 MMT wheat has been allowed by the ECC through public (2 MMT), private (1 MMT) and through G2G arrangements (1 MMT).

Current Supply and Demand Situation:

On 30-08-2021 wheat stock was reported at the level of 6.165 MMT as compared to 5.952 MMT during the corresponding period of the last year. The public stock is sufficient to cater for the national requirement for 6.5 months.

WHEAT STOCKS POSITION

(Fig: MT)

Province/ Agency	Carry Forward 01/05/202	Procurement 2020-21 **	Imported Stocks	Total stocks (2+3+4)	Stocks Released	Bal. Stocks 03-09-2021 (5-6)
1	2	3	4	5	6	7
Punjab*	457,000	3,690,674	0	4,147,674	0	4,147,674
Sindh	50,000	1,197,771	0	1,247,771	0	1,247,771
KPK	22,339	100,000	0	122,339	0	122,339
B/Tan	0	85,925	0	85,925	0	85,925
PASSCO	201,234	814,105	62,720	1,078,059	510,095	567,964
Total:	730,573	5,888,475	62,720	6,681,768	510,095	6,171,673

*In order to provide the cheapest wheat flour in the province, Punjab has established 337 Sahulat Bazars. So far, 4,859,715 bags of wheat flour have been supplied to Sahulat Bazars at the subsidized rate of Rs. 430/- 10 Kg bag.

**Procurement was made in compliance with the ECC decision of 31-03-2021, duly ratified by the Cabinet on 13-04-2021 and notified by MNFS&R on 26-04-2021.

Wheat Prices:

PBS in its weekly PSI reported wheat flour prices @ Rs. 56.73/- Kg and wheat prices @ Rs. 52.41/- Kg. It's a slight increase over the prices reported in July, 2021. Details are given below:

A. Local Wheat Prices:

i. Wheat Flour Prices (Rs. /-20 Kg):

July, 2021

Week	Date	Punjab	Sindh	KP	Balochistan	Average	Rs. /Kg
1.	01-July	1082.82	1201.61	1099.71	1210.00	1125.22	56.26
2.	08-July	1079.63	1197.25	1094.76	1217.50	1122.72	56.14
3.	15-July	1084.29	1205.87	1105.82	1212.50	1128.00	56.40
4.	29-July	1096.79	1202.07	1106.37	1214.99	1134.58	56.73
	Average	1085.88	1201.7	1101.67	1213.75	1127.63	56.38

August, 2021

Week	Date	Punjab	Sindh	KP	Balochistan	Average	Rs. /Kg
1.	05-Aug	1095.32	1202.90	1104.72	1212.50	1133.46	56.67
2.	12-Aug	1093.37	1205.37	1104.72	1217.50	1133.53	56.68
3.	26-Aug	1095.99	1208.36	1119.75	1215.00	1137.08	56.85
	Average	1049.89	1205.54	1109.73	1215.00	1134.69	56.73

ii. Wheat Prices (Rs. /- 10 Kg)

July, 2021

Week	Date	Punjab	Sindh	KP	Balochistan	Average	Rs. /Kg
1.	01-July	510.46	536.25	511.56	547.50	520.42	52.04
2.	08-July	509.35	536.67	511.56	572.50	522.86	52.29
3.	15-July	508.27	536.67	506.56	572.50	521.86	52.19
4.	29-July	512.40	539.79	509.91	572.50	524.98	52.5
	Average	510.12	537.35	509.90	566.25	522.53	52.26

August, 2021

Week	Date	Punjab	Sindh	KP	Balochistan	Average	Rs. /Kg
1.	05-Aug	511.29	539.79	509.91	572.50	524.41	52.44
2.	12-Aug	511.29	537.29	509.91	572.50	523.83	52.38
3.	26-Aug	515.40	538.23	513.23	572.50	526.68	52.67
	Average	511.29	538.54	509.91	572.50	524.12	52.41

Source: Pakistan Bureau of Statistics (PBS).

B. International Wheat Prices:

International wheat prices also on its peak due to low production in USA, Canada and Russia, demand and supply situation and high crude oil prices escalated freight charges. IGC has reported wheat prices @ US\$ 299/- MT as on 01-09-2021.

Item	1 Sep	Daily \$ Change	Annual Change	52 Week Low	52 Week High
Argentina Grade 2, Up River	\$287	-2	17 %	\$242	\$291
EU France Grade 1 (Rouen) Black Sea *	\$299	-2	30 %	\$226	\$314
US No 2 Hard Red Winter (HRW)	\$323	+1	31 %	\$241	\$339
US No 2 Soft Red Winter (SRW)	\$305	+23	22 %	\$244	\$330
Wheat sub-Index	270	+2	42 %	190	272

*FOB prices of Black Sea wheat, with the addition of US\$ 60/-MT, are equals to Rs. 2,396/-40 Kg CFR at Karachi and @ Rs. 2,669/- 40 at Multan and Lahore.

CHRONOLOGICAL EVENTS OF THE IMPORT OF WHEAT 2021-22

Date	Event	Status
31-03-2021	Submission of the Summary to the ECC for import of 3 MMT wheat through public, private and through G2G basis.	Approved
13-04-2021	Federal Cabinet ratified the above decision and allowed import of 3 MMT.	Allowed
24-04-2021	MNFS&R issued notification in wake of the above decision of the ECC and thereby its ratification by the Cabinet.	Circulated among all stakeholders for implementation
03-05-2021	In the meeting of NPMC held on 03-05-2021, Finance Minister decided that in wake of COVID-19 and price stability in the local market, the strategic reserves of wheat may be enhanced from 1-2 MMT.	The decision was analyzed in the MNFS&R.
20-05-2021	The matter of exemptions of certain rules of PPRA was taken up with the Public Procurement Regulatory Authority (PPRA).	The matter pursued vigorously.

01-06-2021 14-06-2021 07-07-2021	The matter of PPRA exemptions of Rule-5, 13, 35, 38 and 40 was followed with the PPRA Board.	The matter was followed up.
16-06-2021	The ECC of the Cabinet enhanced the import quantum of wheat to the tune of 4 MMT.	2 MMT by the TCP (open tenders), 1 MMT through G2G and 1 MMT through the private sector.
18-06-2021	51 st meeting of PPRA Board was convened under the Secretary, Finance.	PPRA Board recommended the exemptions of PPRA rules required for the public wheat import of 3 MMT.
22-06-2021	Federal Cabinet ratified the decision of the ECC taken in its meeting held on 16-06-2021.	Import quantum of wheat was enhanced to the tune of 4 MMT.
25-06-2021	PPRA Board submit their recommendations to the Cabinet Division for obtaining formal approval of the Cabinet.	The matter was submitted to the Cabinet Division by the PPRA Board.
28-06-2021	MNFS&R notified the decision of the import of 4 MMT wheat into the country.	Notification of MNFS&R was circulated among all stakeholders, including M/o Commerce and TCP.
30-06-2021	Cabinet Division submitted the summary of the PPRA Board to the Federal Cabinet for soliciting their approval.	Submitted by the Cabinet Division and pursued by the MNFS&R.
07-07-2021	Federal Cabinet in Case No. 606/Rule-19/2021 dated 07-07-2021, approved the summary submitted by the PPRA Board for the exemptions of PPRA Rules- 5, 13, 35, 38 and 40 for import of 3 MMT wheat to build strategic reserves in the country.	Exemptions of PPRA Rules accorded.
08-07-2021	Through a letter, TCP was informed about the decision of the Cabinet about the exemption of PPRA Rules for the import of 3 MMT wheat by the public sector. The letter contained 2 previous summaries, 2 ECC decisions and Cabinet ratifications.	The information was accepted by the TCP.
08-07-2021	PPRA informed through a letter about the approval of the Cabinet on 07-07-2021 for exemptions of certain PPRA Rules required for the public wheat procurement.	The letter was sent to TCP for taking appropriate actions for the public wheat import.
09-07-2021	In compliance of the ECC decisions and Cabinet's ratifications and Cabinet's decision about the PPRA exemptions, TCP issued a Tender Notice for the procurement of 0.5 MMT wheat through open bidding process in staggering manner.	Tender Notice was issued by the TCP for import of 0.5 MMT (0.2 MMT arrival in Aug, 2021 and 0.3 MMT arrival in Sept-2021).

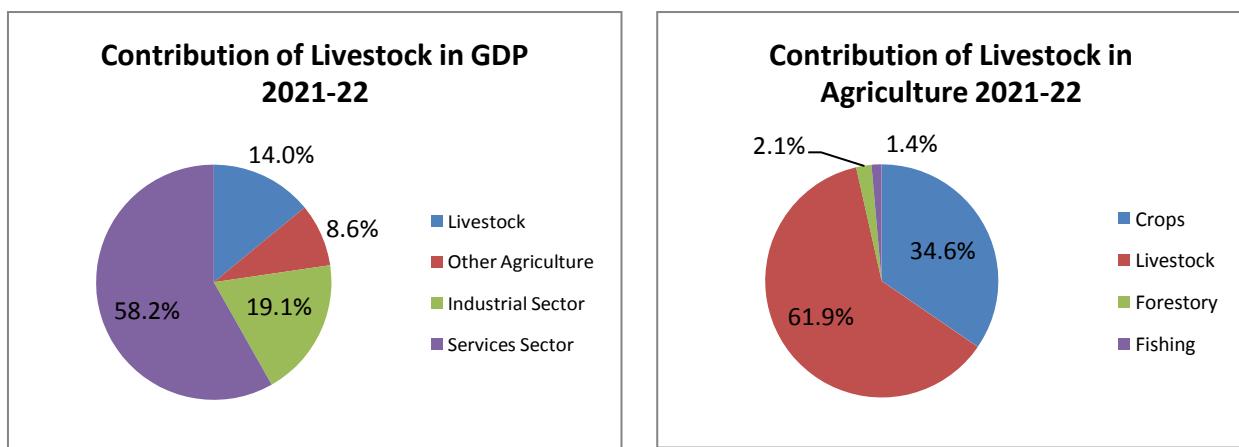
27-07-2021	In compliance of the above decision, TCP issued its first international tender for the import of 0.50 MMT in two shipment windows of August, 2021 (0.20 MMT) and September, 2021 (0.30 MMT). The tender was opened on 27-07-2021, wherein total eleven (11) international suppliers participated and quoted their rates for the two shipments windows.	The lowest Bid offer of USD 304/- MT for shipment window of September, 2021 was considered.												
29-07-2021	Board Procurement Committee and BoD of the TCP in their meetings held 29-07-2021 considered the lowest bid offers for shipment window of September, 2021 as per details given below:	Board Procurement Committee and BoD of the TCP in their meetings held 29-07-2021 award the tender for 220,000 MT (110,000 MT through matching by M/s. LDC)												
	<table border="1"> <thead> <tr> <th>Shipment window</th><th>Name of lowest bidder</th><th>Quantity offered (MT)</th><th>Lowest Rate offered (CFR/MT)</th></tr> </thead> <tbody> <tr> <td>Aug, 2021</td><td>LDC</td><td>100,000 MT</td><td>USD 316.87</td></tr> <tr> <td>Sep, 2021</td><td>CHS Inc.</td><td>110,000 MT</td><td>USD 304.00</td></tr> </tbody> </table>	Shipment window	Name of lowest bidder	Quantity offered (MT)	Lowest Rate offered (CFR/MT)	Aug, 2021	LDC	100,000 MT	USD 316.87	Sep, 2021	CHS Inc.	110,000 MT	USD 304.00	
Shipment window	Name of lowest bidder	Quantity offered (MT)	Lowest Rate offered (CFR/MT)											
Aug, 2021	LDC	100,000 MT	USD 316.87											
Sep, 2021	CHS Inc.	110,000 MT	USD 304.00											
03-08-2021	TCP issued its second international tender for the import of 0.40 MMT in the shipment windows ranging 15 th September to 30 th October, 2021.	Proceedings are awaited till the tenders opening on 23-08-2021.												
23-08-2021	Tender was opened on 23-08-2021. Overall 9 bidders participated in the bidding process; however, four (04) international suppliers were found responsive by the Bid Evaluation Committee of TCP.	The lowest bid offered by M/s. Falconbridge Resources for the quantity of 110,000 MT for shipment window of Sep. 15 th to October 31 st , 2021.												
24-08-2021	The matter was submitted to the ECC of the Cabinet on 24-08-2021 for decision on the urgent advice on tenders.	Summary was submitted by the MNFS&R.												
25-08-2021	The ECC of the Cabinet in its meeting held on 25-08-2021 solicit approval of the lowest bid price offered by M/s Falconbridge Resources for 110,000 MT @US\$ 355.99/- MT.	Accepted the lowest bi offer.												
26-08-2021	The matter was discussed in the meetings of Board of Directors of the TCP on 26-08-2021 and 28-08-2021	Further quantity of 50,000 MT was matched at the lowest tender price. Therefore, a total quantity of 160,000 MT was secured and tender was awarded.												

5. LIVESTOCK WING

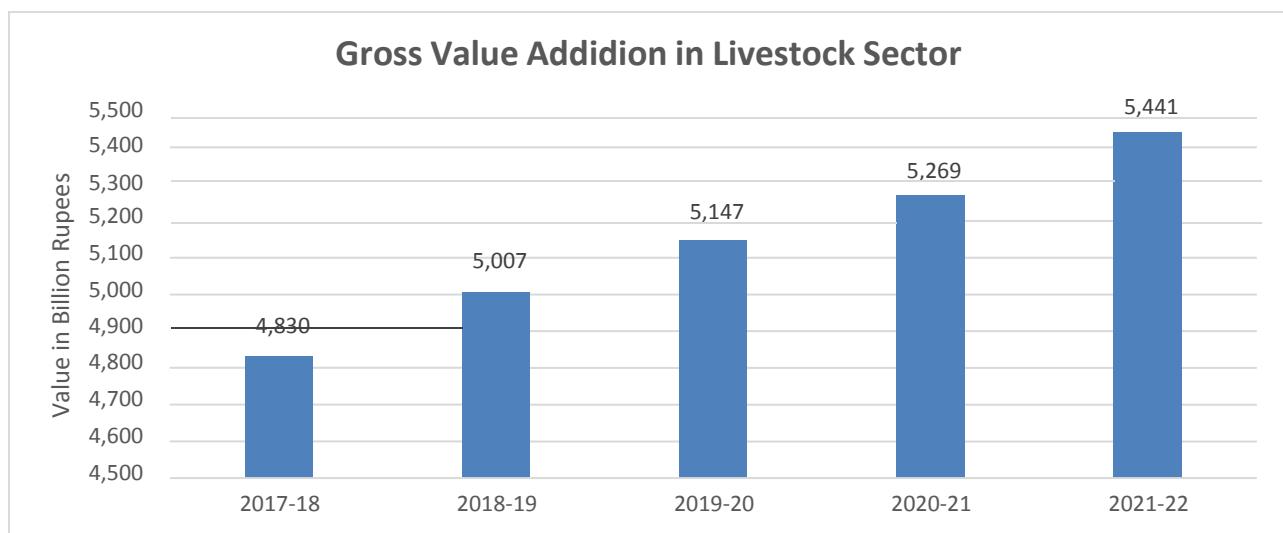
1. LIVESTOCK AND POULTRY

LIVESTOCK

Animal Husbandry is the most significant economic activity of the dwellers of rural areas of Pakistan. More than 8 million rural families are engaged in livestock production and are deriving around 35-40 percent of their income from this sector. Livestock over the years has emerged as the largest sector in agriculture by contributing approximately 61.9% of the agriculture value added and 14.0% to the national GDP during 2021-22 as shown in graphs below: -



The net foreign exchange earnings of livestock sector have also increased from Rs. 107.4 billion (2019-20) to Rs. 117.8 billion (2020-21), which is 2.9% of total exports in the country, showing an increase of 9.7% over last year. Gross value addition of livestock at constant basic price of 2015-16 is given in following graph that shows an increase of 3.3 percent for the year 2021-22 over the year 2020-21.



This reflects its inherent potential of generating economic activity and employment besides supplementing high value animal origin protein for human consumption. The government has therefore, focused this sector for economic growth, food security and poverty alleviation in the country. The overall livestock development strategy revolves to foster "private sector-led development with public sector providing enabling environment through policy interventions". The regulatory measures are aimed at enhancing per unit animal productivity by improving veterinary health coverage, husbandry practices, animal breeding practices, artificial insemination services, use of balanced ration for animal feeding, and controlling livestock diseases of trade and economic importance like lumpy skin disease (LSD), foot and mouth disease (FMD), Peste Des Petits Ruminants (PPR), avian influenza etc. The objective is to exploit the potential of livestock sector for economic growth, food security and rural socioeconomic uplift.

To address investment related issues in the value-added livestock export sector, government is considering to develop this sector in the shape of export meat processing zones, disease free zones (for FMD, PPR, HPAI etc.), facilitate setting up of modern slaughterhouses after assessing industry's requirements and provide various schemes through the financial sector for a limited period of time. The focus of present government is to enhance productivity per unit animal through breed improvement and other policy interventions, establishment of nucleus herd and identification of breeds well adopted to various agroecological zones of Pakistan besides importing high yielding exotic dairy/beef/mutton breeds and genetic materials.

The estimated livestock population, milk and meat production and other products for the last three years is given at Table –I, Table-II and Table-III respectively.

Table-I: Estimated Livestock Population (Million No)

Species	2019-20 ¹	2020-21 ¹	2021-22 ¹	GR %
Cattle	49.6	51.5	53.4	3.77
Buffalo	41.2	42.4	43.7	2.97
Sheep	31.2	31.6	31.9	1.18
Goat	78.2	80.3	82.5	2.71
Camels	1.1	1.1	1.1	1.30
Horses	0.4	0.4	0.4	0.58
Asses	5.5	5.6	5.7	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	2019-20¹	2020-21¹	2021-22¹
Milk (Gross Production)	000 Tons	61,690	63,684	65,745
Cow	"	22,508	23,357	24,238
Buffalo	"	37,256	38,363	39,503
Sheep ²	"	41	41	42
Goat	"	965	991	1,018
Camel ²	"	920	932	944
Milk (Human Consumption) ³	000 Tons	49,737	51,340	52,996
Cow	"	18,007	18,686	19,390
Buffalo	"	29,805	30,691	31,603
Sheep	"	41	41	42
Goat	"	965	991	1,018
Camel	"	920	932	944
Meat ⁴	000 Tons	4,708	4,955	5,219
Beef	"	2,303	2,380	2,461
Mutton	"	748	765	782
Poultry meat	"	1,657	1,809	1,977

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

Products	Units	2019-20¹	2020-21¹	2021-22¹
Eggs	Million No's	20,133	21,285	22,512
Hides	000 No's	18,139	18,751	19,384
Cattle	"	9,405	9,759	10,127
Buffalo	"	8,622	8,878	9,142
Camels	"	112	114	115
Skins	000 No's	59,460	60,837	62,250
Sheep Skin	"	11,807	11,947	12,088
Goat Skin	"	30,129	30,946	31,784
<u>Fancy Skin</u>	"	<u>17,524</u>	<u>17,945</u>	<u>18,377</u>
Lamb skin	"	3,507	3,548	3,590
Kid skin	"	14,017	14,397	14,787
Wool	000 Tons	47.3	47.9	48.4
Hair	"	29.4	30.2	31.0
Edible Offal's	"	440	452	465
Blood	"	73.1	75.0	77.0
Casings	000 No's	60,069	61,461	62,888
Guts	"	19,280	19,929	20,599
Horns & Hooves	000 Tons	64.3	66.2	68.2
Bones	"	961.0	990.3	1,020.7
Fats	"	304.5	313.6	322.9
Dung	"	1,362	1,405	1,448
Urine	"	413	425	437
Head & Trotters	"	274.6	282.4	290.4
Ducks, Drakes & Ducklings	Million No's	0.38	0.37	0.35

Notes

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

Poultry

Poultry sector is one of the most important vibrant segments of livestock that provides employment to more than 1.5 million people in country. With an investment of more than Rs750 billion, this industry is growing at an impressive growth rate of approximately 7.4% per annum over last decade that has enabled Pakistan to occupy eleventh position among the largest poultry producer in the world and has ample space for further improvement.

The poultry development strategy revolves around disease control, hi-tech poultry production in controlled environment, processing and value addition, improving poultry husbandry practices and diversification of products. Through farmer friendly policies interventions, Government of Pakistan has been encouraging rural as well as commercial poultry production. The estimated production of commercial and rural poultry and products for last three years is given at Table-IV.

Table –IV: Estimated Domestic/ Rural & Commercial Poultry

Type	Units	2018-19 ¹	2020-21 ¹	2021-22 ¹
Domestic Poultry	Million No's	89.84	91.22	92.62
Cocks	"	12.51	12.85	13.20
Hens	"	43.93	44.72	45.52
Chicken	"	33.40	33.65	33.90
Eggs ²	"	4393	4472	4552
Meat	000 Tons	124.72	127.22	129.76
Duck, Drake & Duckling	Million No's	0.38	0.37	0.35
Eggs ²	"	17.18	16.47	15.78
Meat	000 Tons	0.52	0.50	0.48
Commercial Poultry	Million No's	1,353.24	1486.09	1632.06
Layers	"	59.82	64.01	68.49
Broilers	"	1,279.76	1,407.73	1,548.51
Breeding Stock	"	13.66	14.34	15.06
Day Old Chicks	"	1,336.71	1,470.38	1,617.41
Eggs ²	"	15,723	16,797	17,944
Meat	000 Tons	1531.60	1681.64	1846.48
Total Poultry				
Day Old Chicks	Million No's	1,370	1,504	1,651
Poultry Birds	"	1,443	1,578	1,725
Eggs	"	20,133	21,285	22,512
Poultry Meat	000 Tons	1,657	1,809	1,977

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.

Ongoing Projects

The federal government has launched following programs under the Prime Minister's National Agriculture Emergency Program: -

Prime Minister Initiative for Backyard Poultry Project:

Under this project five million pre-vaccinated high laying backyard birds will be distributed among public across the country at subsidized rates in four years. This project is providing livelihood and adequate animal protein to undernourished population. The total cost of the project is Rs 1.6 billion and 30 percent will be contributed jointly by federal and provincial governments while rest of the cost is to be borne by the beneficiary. Since 2019 2,926,720 backyard poultry birds have been distributed by the 30th June 2022 in all over the Pakistan except Sind.

Prime Minister Initiative for Save the Calf Project:

Under this project, 380,000 male calves have been projected to be saved from early slaughtering in 4 years period by giving financial incentive of Rs 6,500 per calf to farmers. Reducing mortality is also expected with improved nutrition and husbandry practices. This intervention is providing stock for feedlot fattening besides enhancing productivity and quality of beef which ultimately expected in high return of profit margins for the farmers and in reduced rural poverty. The total cost of the project is Rs 3.4 billion. The federal government is contributing 20 percent of total cost while the remaining is shared by participating provincial governments. Since 2019, 167175 calves have been saved by the 30th June 2022 in Punjab and KPK provinces. Sindh and Balochistan are not the part of this project.

Prime Minister Initiative for Calf Feedlot Fattening in Pakistan:

Under this program Rs. 4,000 for each calf has been allocated as financial incentive to persuade farmers to produce healthy and nutritious beef in the country. In Baluchistan Rs. 1500 cash incentive is given for each fattened sheep/goat. The intervention is expected to promote feedlot fattening business in the country. The total cost of the project is Rs 2.4 billion. Since 2019, 191,757 calves have been fattened in Pakistan except Sind and Balochistan and 240,000 kid/lamb will be fattened in Balochistan by the 30th June 2022.

Antimicrobial Resistance (AMR).

The Fleming Fund Country Grant with the support of U.K. Department of Health and Social Care programme to help low- and middle-income countries fight antimicrobial resistance (AMR) has initiated a program in collaboration of Government of Pakistan with the following objectives:

- Improved policy environment for managing AMR – Data review and analysis.
- Enhance quality and quantity of sites reporting on antimicrobial resistance.
- Strengthening Reference Laboratories to strengthen AMR surveillance networks.
- Improve AMC and AMU data at country level.
- Support One Health approach among Human, Livestock and Environment sectors.

The activities of Fleming Fund in Pakistan include: -

- Use an evidence-to-action approach that builds on existing assessments to enable a nuanced understanding of the antimicrobial resistance and use (AMR/AMU) challenges and opportunities, entry points, and policy constraints.

- Foster a data for decision-making mindset, where decision-makers demand evidence for policy and stakeholders are empowered to hold those decision-makers accountable.
- Build a national-level multi sectoral coordination mechanism to effectively address the complexities of AMR/AMU, strengthening information-sharing and coordination across public and private sectors and catalyzing political commitment and leadership to drive the AMR agenda.

In the animal health sector, the Fleming Fund Country Grant is providing support for strengthening AMR surveillance in food animals, diagnostic harmonization, capacity development of animal health laboratories, field surveys for antimicrobial usage (AMU) and Knowledge, Attitudes and Practices (KAP) surveys. Fleming Fund through AHC office, MNSFR has identified strategy to identify the resistant organism to antibody and to maintain the use of anti-bacterial use in animal health sector.

In order to implement the strategy two National Reference points namely National Veterinary Laboratories (NVL), Islamabad and nine Sentinel Labs from all provinces of Pakistan have been identified to work with. The Fleming Fund has also provided capacity building, staff trainings and laboratory equipment specifically MALDI TOFF and BD Phonex to National Reference labs in order to enhance their bacteriology related capacities.

Furthermore, in order to better coordinate AMR and AMU activities in the animal health sector alongside Human Health, the Ministry of National Food Security and Research (MoNFSR) has established the AMR Coordination Unit (AMR-CU) at the Animal Husbandry Commissioner (AHC) office which is functional now.

Support development and piloting Pakistan Animal Identification and Traceability System (PAITS).

Pakistan currently does not have a reliable animal identification and traceability system to manage livestock identification and movements in the country. Lack of such a system poses significant challenges for Pakistan, specifically in export of livestock and their products, in the wake of limited resources and capacity of the animal health services to deliver effective animal health programs. This project is therefore, conceived with the help of FAO and is under execution with the technical and financial support of FAO-Pakistan.

The aim of this project is to develop and pilot a plan with a suitable methodology for animal identification for traceability that can enhance / support existing disease control efforts in Pakistan. The project will be used as pilot demonstrations in cattle and buffaloes in limited geographic region in smallholder livestock farming, and selected feedlot fattening dairy farms. An agreement for the development of software has been signed and is expected to be piloted at the end of the year. After successful piloting the Animal Identification System shall be replace across country.

National Pestedes Petits Ruminants (PPR) Eradication Programme:

In lieu of international community committed to eradicate “Peste des Petits Ruminants (PPR)” disease by 2030, National Veterinary Laboratory is executing the PSDP funded project titled “National Peste des Petits Ruminants (PPR) Eradication Programme; Phase-I, Risk Based PPR Control in Sheep and Goats of Pakistan”. PPR is a viral disease of sheep and goats with high morbidity and mortality rate. Consequently, this disease leads to devastating effect on animal health, livestock trade and causes economic loss to farmers.

The completion of National PPR Eradication Program will lead Pakistan to be PPR disease free and eligible for World Organization for Animal Health (WOAH) Certification. Under the said

programme the vaccine against the PPR disease has been purchased and disturbed to the Provinces/Regions at National level.

The overall objective of the project is to improve the socioeconomic conditions of small ruminant's producers by ensuring livelihood, poverty reduction and achieving food security through progressive control leading to eradication of PPR. The specific objectives of the project are:-

- a) Enhance capacity for laboratory diagnosis of PPR at federal and provincial levels
- b) Strengthen the surveillance system for PPR and develop a rapid response mechanism to control disease emergencies
- c) Strategic vaccination for the progressive control and eradication of PPR
- d) Upgrade legal framework to manage PPR and other TADs in the country
- e) Promote a more intensive involvement of stakeholders' on PPR control and eradication
- f) Research and development in the epidemiology, diagnosis and control of PPR to facilitate eradication program

The total cost of the project is Rs 1.8 billion and is currently under execution throughout the country in collaboration with federal and provincial livestock authorities. Under this project, the training in respect of sample collection, sample storage and deliverance to the central and provincial laboratories has been provided to Veterinary Officer and Veterinary Assistants. Additionally, the said officials were also provided with the training on vaccination. Likewise, the provincial and regional lab personals were given the training on diagnosis of PPR disease. Furthermore, the said lab personals were additionally equipped with the requisite Lab Equipment's during the Year 2021 – 2022.

A total of 17 million doses of PPR vaccine were procured and distributed to the provinces and regions in accordance with their demands. The preventive vaccination against the PPR disease has been started from May, 2022. Moreover, in case of any outbreak or emergency, provinces kept the emergency reserve of 10% of their distributed vaccines quota and PPR project reserved 2% of the total vaccines procured. The awareness material (fliers, broachers and panaflex) for the facilitation of farmers is under printing at Printing Corporation of Pakistan for further distribution.

Enhancement of Foot and Mouth Disease (FMD) Control Program in Pakistan:

The government of Japan provided 2.85 million USD to the Food and Agriculture Organization of the United Nations (FAO) to improve surveillance of FMD outbreaks, strengthen laboratory capability for diagnosis and develop rapid response mechanism to control reported outbreaks across Pakistan. The project was implemented from 27 February 2018 to 31 December 2021.

Under this project capacity building of the stakeholders including veterinarians, veterinary assistants and dairy farmer was undertaken, awareness among farmers is imparted to protect their animals from FMD by using biosecurity and use of good quality vaccine and veterinary assistants were trained for sample collection from FMD out breaks in order to improve reporting of such outbreaks. The National Veterinary Laboratory (NVL) and ten provincial diagnostic labs were made functional for FMD diagnosis as well as stereotyping of the virus. NVL is now also undertaking molecular diagnosis and virus isolation. Twenty-two new vaccine banks were established in different

location of the provinces making a total to thirty-two such banks in total to facilitate easy access to vaccine in emergencies.

Ultimately, the project developed a successful outbreak surveillance system and builds the capacity of the different stakeholders to control FMD outbreaks in the country. Importantly, it also increases awareness and understand among farmers of the need for FMD control and investing in preventive vaccination and other bio security measures.

Pipeline Projects

National Program on Animal Disease Surveillance and Control in Pakistan

The overall objective of the program is the establishing robust Animal Health Surveillance System entailing collection, collation and analysis of animal disease data for appropriate action by various actors and sharing with international organizations and trading partners under obligations of WTO's SPS agreement.

The total cost of the project is Rs. 4,000.060 million and has the following specific objectives:

- a) Developing national program, policy and regulatory framework on the control of trade limiting animal diseases;
- b) Strengthening national/international networks and provincial coordination for real-time bio-surveillance and control measures for trade limiting animal diseases;
- c) Strengthening national preparedness to respond to events of trade limiting, economic and public health significance.
- d) Capacity building to enhance capacity and competence of national, provincial and district veterinary services for control and eradication of TADs.

Strengthening Food Security through Improved Genetics of Cattle and Buffaloes in Pakistan

The overall objective of the program is productivity enhancement of indigenous breeds, non-descript and cross bread cattle and buffaloes in the country. The project has a total cost of Rs9.420 billion and has the following specific objectives:

- a) Developing national program and policy for genetic improvement of cattle and buffaloes;
- b) Strengthening national coordination to improve cattle and buffalo breeds in the country;
- c) Strengthening national competence and capacity of professionals, associations and private sector to improve animal genetics to enhance productivity for food security and to produce exportable animal product surplus.

Implementation of Codex standards to Support Containment & Reduction of Food Borne Antimicrobial Resistance (AMR)

The FAO will implement this project with a total cost of 10 million USD that has the following specific objectives:

- a) To assess the use and impact of codex standards specially those related to the containment and reduction of food borne AMR
- b) Create awareness, implementation and demonstrate the value of codex standards specially those related to the containment and reduction of food borne AMR
- c) Support data collection and analysis to inform risk assessments and management of food bone AMR

Establishing Disease Free Zone in Southern part of Balochistan in Pakistan-Feasibility Study

In order to establish the Disease free Zone in the Southern part of Balochistan a feasibility study is proposed with the total cost of 13.1 million and with following objectives:

- a) To conduct a survey to design the architecture of disease-free zone based on World Organization for animal Health (WOAH)'s requirements in Makran division;
- b) To identify clear cut demarcation of provincial and federal functions for effective implementation of various activities in the identified zone;
- c) To conduct socio-economic analysis and economic feasibility for establishing the disease-free zone in the Makran division and also determine the export potential form this zone in quantifiable terms.
- d) Assessing the feed, fodder and water requirement and availability in short, medium and long term for livestock operations such as feedlot fattening and dairy processing etc expected to be established by foreign and local investors.
- e) To prepare a PC-I titled "Establishing FMD/PPR Free zone in Makran Division in Pakistan" based on feasibility study entailing architectural design of zone and economic costs for design and operations.

Other Policy Measure

Livestock Wing with its redefined role under the 18th Constitutional Amendment allowed the following:

- a) Import of calf milk replacer and cattle feed premix by the corporate dairy/meat sub sectors at concessional tariff.
- b) Import of high yielding dairy cattle breeds of Holstein Friesian and Jersey for enhanced milk production
- c) Semen and embryos of high yielding animals for the genetic improvement of indigenous low producing animals,
- d) Import of high-quality feed stuff / micro ingredients for improving the nutritional quality of animals & poultry feed

FUTURE PLANS

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, Zoonotic diseases) of trade and economic importance through provincial participation,
- d. Bringing more investments in livestock sector
- e. Exploring new markets for export of meat and dairy products with focus on Global Halal Food Trade Market and
- f. Development of National Livestock Breeding Policy, 2021
- g. Development of National Poultry Policy
- h. Development of Export Policy for livestock Products health Law

PART -II

ATTACHED /AUTONOMOUS DEPARTMENT OF M/O NFS&R

6. NATIONAL FERTILIZER DEVELOPMENT CENTRE(NFDC)

Achievements:

- Urea manufacturing plants located on SNGPL were facing shut down due to shortage of natural gas after August 2017. Liquified Natural Gas (LNG) was available but it was not cost effective. Therefore, idle capacity of these two urea manufacturing plants was utilized by supply of subsidized LNG after recommendation by subcommittee Chaired by National Fertilizer Development Centre (NFDC) resulting in increased availability of fertilizer along with saving in foreign exchange and thus saving around Rs. 32 billion during 2021-22 to national exchequer in the form of subsidy. About 587 thousand tonnes of urea has been produced from LNG from July 01, 2021 till 31st May 2022 resulting in improved availability at peak demand time.
- Assisted Economic Consultant for formulation and implementation of subsidy plan on fertilizer (Rs. 1000 per bag of DAP) as prices of phosphate and potash fertilizer have gone beyond reach of small farmers. Subsidy amounting to around Rs. 10 billion has been disbursed through provincial agriculture departments of Punjab and KP under Rabi(2021-22) Package.

Routine Activities:

- i. Fertilizer Review 2020-21 has been finalized and is in process for publication. It is a regular activity of NFDC and is a comprehensive document on fertilizer use covering details regarding domestic production, imports, offtake (national, provincial and district level), domestic and international price trend, economics of fertilizer use and fertilizer demand estimates for next five years.
- ii. Published 12 monthly fertilizer reviews from July-2021 to June-2022 containing short-term as well as season wise perspective of fertilizer related indicators.
- iii. Website of NFDC (www.nfdc.gov.pk) was updated. It contains time series data regarding fertilizer production, import, offtake and domestic and international price trend since 1989-90. Data pertaining to area, production and yield of major crops are also updated for facilitation in analysis.
- iv. Briefed higher ups i.e. National assembly/Senate on questions and queries related to fertilizer issues forwarded by Ministry of Industries & Production and Ministry of National Food Security & Research on regular basis.
- v. NFDC regularly provided technical comments on fertilizer related policy issues and agronomic matters to both public and private sector of country.
- vi. NFDC has provided information and technical support to Ministry of National Food Security & Research with the purpose to ensure timely availability of fertilizer at affordable prices.

- vii. 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.
- viii. NFDC regularly/timely forecast the fertilizer demand estimates on short as well as long term basis to keep abreast the future requirement and mitigate the shortages and in this regard projections up to 2029-30 have been finalized.
- ix. NFDC participated and contributed in the meetings convened by Federal Committee on Agriculture (FCA), Fertilizer Review Committee (FRC), Cabinet Committee on Cotton, Pakistan Standard and Quality Control Authority (PSQCA) and Agriculture Policy Institute (API).
- x. NFDC regularly 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 the United Nations).
- xi. Contributed and provided regular information/data in the form of briefs and position papers to national organization 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. Provision/contribution of fertilizer related statistics including price and offtake and write up on fertilizer industry on regular basis to Ministry of Finance for Economic Survey and to Ministry of National Food Security and Research for “Agriculture Statistics of Pakistan” every year.
- xiii. The NFDC provided timely input regarding availability of fertilizer and anti-smuggling of fertilizer to “Taskforce on Agriculture” constituted by the Prime Minister of Pakistan.
- xiv. NFDC regularly responded/resolved the complaints/suggestions regarding fertilizer issues registered on NFDC dashboard, assigned by PMDU portal.
- xv. Accomplished the tasks assigned for formulation of Fertilizer Policy 2022 as per direction of PM office. This center support M/o Industries and Production in contouring the roadmap for new Fertilizer Policy keeping in view the economics and technological dynamics of new era, the same is under deliberation for getting stakeholders inputs before finalization.

7. Federal Water Management Cell (FWMC);

- i)Coordinating with ECO Secretariat, Tehran for Establishment of “ECO Centre of Excellence for Efficient Water Utilization in Agriculture” in Islamabad. Third Working Group Meeting (WGM) was conversed on 09-02-2021 through virtual mode.
- ii) FWMC in the wake of Government’s 100 days Agenda continued implementation process in consultant/ coordination with the Provincial Government and other Federating Units (AJK, GB and ICT).
- a) The project “**National Programme for Improvement of Watercourses in Pakistan: Phase-II**” envisages to improve, reconstruct/renovate 59, 427 watercourses up to 50% of the total length

of a watercourses and construction of 16,932 water storages tanks. In addition, 16,610 Laser Land Levelers will be provided to the beneficiaries at 50% cost sharing basis (maximum govt. share not more than Rs. 250,000 per beneficiary). The total project cost of Rs.154,542 billion over a period of 5 years. The project is being implemented in the provinces of Punjab, Khyber Pakhtunkhwa, Balochistan including, GB, AJ&K and ICT.

GoP Share	RS. 47,175.504 million
Prov. Govt. Share	Rs. 59,084.565 million
Farmers' Share	Rs. 48,282.287 million

The key objectives of the project are:

- Social mobilization through capacity building of WUAs/FOs.
- Minimization of conveyance and field application losses.
- Reduction in water logging and salinity.
- Equity in water distribution
- Reduction in water disputes/thefts/litigation
- Motivation/participation of farmers.
- Poverty reduction through employment generation.
- Increase in crops yield/sufficiency in food.

During CFY 2021 -22 Progress, so far until May, 2022 (CFY 2021-22) improvements of 5,732 watercourses and construction of 5,525 has been completed. Similarly, 747 Laser Land Levelers distributed amongst the beneficiaries.

Cumulative Progress: Since the commencement until May, 2022 (FY 2019 TO 2022) improvement of 9,219 watercourses and has been construction of 3,993 has been completed similarly, 4,431 Laser Land Levelers distributed amongst the beneficiaries.

- b) The project titled” **National Programm for Enhancing Command Area in Barani Areas of Pakistan**” envisage construction of farm ponds, dug wells, watercourses, installation of solar pumping systems, provision of laser land levelers, fruit plantation, oilseed plantation and fodder plantation in barani areas of Pakistan. The total cost is Rs. 25.346 billion over a period of 05 years with following financial arrangements:

GOP Share	Rs, 9,358.533 million
Prov. Govt. Share.	Rs, 10,377.274 million
Farmer's Share.	Rs, 5,609.865 million

The project has the following objectives as pr approved PC-I:

- i) Development of Command Areas
- ii) Improved Land and Water Productivity
- ii) Poverty Reduction through Employment Generation
- iv) Motivation/ Participation of farmers
- v) Increase Areas under crops and sufficiency in food
- vi) Improved Economic Condition of Barani Areas farmers
- vii) Build capacity of farmers to adjust with changing environment and for practicing resources efficient and profitable irrigated agriculture

- viii) Enhance crop productivity through developing land and water resources using modern irrigation methods/ techniques
- ix) Promote cultivation of high value cash crops using efficient irrigation systems and agricultural practices for enhancing water productivity to cope with the effects of climate change
- x) Increase farm income/profitability of small land holder's to improve livelihood.
- xi) Create job opportunities in rural areas by introducing high value irrigated agriculture
- xii) Promotion of fruit crops, oilseeds/pulses and fodder in the barani areas.

The following are the achievements of the project during 2021 -2022

Interventions	PC-I Targets 2021-22	Cumulative since commencement
Farm Ponds	135	171
Solar Pumping Systems on Farm Ponds (7 kW)	134	136
Dug Wells	232	175
Solar Pumping Systems on Dug Wells (5kW)	236	101
Watercourses	223	268
Laser Land Levers	72	50
Fruit Plants (Acres)	3569	1438
Oilseeds/ Pulses Crops (Acres)	7859	4821
Fodder/Forages/Range Crops	5718	4474
Rough Land Leveling (KP)- Acres	8000	386
Total	26177	12020

The cumulative achievements of the project until 31st May, 2022

Interventions	Cumulative Targets 2020-21 & 21-22	
Farm Ponds	261	278
Solar Pumping Systems on Farm Ponds (7Kw)	238	254
Dug Wells	329	452
Solar Pumping Systems on Dug Wells (5Kw)	325	304
Watercourses	513	538
Laser Land Levelers	124	144
Fruit Plants (Acres)	4652	2993
Oilseeds/Pulses/Range Crops (Acres)	8509	7740
Rough Land Leveling (KP)-Acres	13000	2511
Total	34710	21674

- c) The Project titled “**Water Conservation in Barani Areas of Khyber Pakhtunkhwa**” envisages construction of water ponds, check dams water reservoirs, stream banks stabilization, terracing, sand-dune stabilization, installation and solarization of tube wells etc in barani areas of Khyber

Pakhtunkhwa. The total project cost is Rs. 14.177 billion over a period of 5 years with following financial arrangements:

GoP Share	Rs. 5,090.431 million
Prov. Govt. Share	Rs. 6,765.536 million
Farmer's Share	Rs. 2,321.901 million

The objectives of the project are as under:

- To conserve land and water resources through various interventions for supplemental irrigation, livestock, farm forestry and fish farming.
- To increase cropping intensity and per unit of land and water productivity.
- To improve livelihood standards of poor farmers.
- To improve socio-economic stability.

The project would have following likely outcome:

- a) To induce aquifer/ground water recharge by pounding water in > 300 water storage reservoirs.
- b) To convert 15,032 acres of culturable wastelands into productive agriculture lands through development of 70 micro-watersheds.
- c) To reduce soil erosion by containing flash floods through provision of soil & water conservation structures and check gully erosion by plugging gullies through 3,000 check dams.
- d) Minimize the adverse effects of drought by maximizing the irrigation water supplies through exploitation of sub-surface water from tube wells.
- e) Conservation of around 43,225 acres of rain fed land into irrigated land through installation of 300 agricultural tube wells and solarization of 700 existing/ new tube wells.
- f) To enhance the capacity of the stakeholders in water harvesting and for sustainable use of land and soil resources for increased agriculture production.
- g) To improve the socio-economic status of the farmer community.

So far during the period from July, 2021 to May 2022 following interventions have been completed under the project in Barani Areas of Khyber Pakhtunkhwa.

S.No.	Activities	Targets As per Allocation		Achievements During 2021-22
		UNITS		
1,	Water Ponds	No	370	241
2.	C Check dams	No	229	88
3.	Wa Water Reservoir	No	25	16
4.	Str Stream bank stabilization	No	176	209
5.	Gat Gated field Inlet Outlet/Spillway	No	70	77
6.	Ter Terracing	Acres	28	39
7.	Mic Micro-Watershed Development	No	3	01
8.	Wa water Seepage harvesting Galleries	No	26	10

9.	Agr Agronomic Low-Cost interventions	No	70	82
10.	Sa Sand Dunes stabilization	Acres	18	06
11.	Ca Capacity Building	No	35	41
12.	Ins Installation of Tube Wells	No	21	63
13,	So Solarization of Tube Wells	No	49	86
	Total		1120	962

Accumulative progress under the project” Water Conservation in Barani areas of KP is “since commencement of the project is as under:

S.NO	Activities	Targets As per Allocation	Achievements Since start of the project
		Units	
1.	Water Ponds	No.	1204
2.	Check dams	No.	705
3.	Water Reservoir	No.	80
4.	Stream-bank stabilization	No.	623
5.	Dated field Intel Outlet/Spillway	No.	249
6.	Terracing	Acres	87
7.	Micro- Watershed Development	No.	36
8.	Water Seepage harvesting Galleries	No.	91
9.	Agronomic Low-Cost interventions	No.	207
10.	Sand Dunes stabilization	Acres	55
11.	Capacity Building	No.	124
12.	Installation of Tube Wells	No.	73
13.	Solarization of Tube Wells	No.	174
	Total		3708
			3494

Check DAMS



Water Ponds



Terracing, Protection Bund and SBS



ROD –KOHI Gated structures



ROD-KOHI Gated structures



Cemented Gated Spillway (D.
I. Khan)

Salrization of tube well



8. National Veterinary Laboratories (NVL)

The National veterinary laboratory (NVL) of National Food Security & Research is a National Reference Laboratory for Livestock Diseases in the country. It caters for service and support to National Livestock. The objective is to achieve greater profitability for livestock farming through disease control. The main functions of NVL are:

- Serve as National Reference Laboratory for Transboundary Animals Diseases (TADs)and diseases of Zoonotic, trade and economic importance.
- Carry out residues analyses in livestock and poultry products and by-products to meet EU& WTO Sanitary & Phytosanitary (SPS) conditionality's.
- Quality testing of veterinary drugs and vaccines for their safe and effective use in animals
- Provide technical support to provincial/regional livestock departments to contain highly pathogenic emerging animal disease as they arise.
- Offer trainings and refreshers in cutting edge diagnostic technologies.
- Coordinates and collaborate with provincial/regional livestock departments and international organizations World Organization of Animal Health (WOAH), Food & Agriculture Organization (FAO), world Health Organization (WHO) for the improvements of animals and public health.

The NVL is a National Reference Lab for PPR (Peste des Petits Ruminants) and FMD (Foot & Mouth Disease) virus typing, an economically important animal disease having impact on Food Security and Trade. The NVL consists of four divisions namely Diagnostic & Surveillance (D&S), Vaccine Quality Control (VQC), Drug Residue & Testing (DR&T) and Emerging Disease (ED).

In the year 2021-22, the Diagnostic & Surveillance (D&S) section remained significant and strategically important for providing a work platform for controlling highly contagious Transboundary Animal Diseases (TADs) such as Foot & Mouth Disease (FMD), Lumpy Skin Disease (LSD) and Peste des Petitis Ruminants (PPR) in Pakistan. The D&S section worked closely with provincial /regional livestock departments and international partners such as Food & Agriculture Organization of the United Nations and World Health Organization for the control of livestock disease that are potentially devastating for the economy, food security and wellbeing of animals and humans. Its collaborative work with FAO and WRL-UK on molecular characterization of the FMD virus yielded valuable information on FMD virus subtypes and vaccine matching strains. This information enabled Pakistan to address the formulation of country specific effective FMD vaccine. The section is also coordinating with WHO and Fleming Fund UK for the implementation of animal health-related activities of the National Action Plan on Anti-Microbial Resistance (NAP-AMR



Anti-Microbial Resistance (AMR)Training Certificate Distribution Ceremony at NVL



Training on LSD Course; 2022

- The Vaccine Quality Control (VQC), Section is a unique and exclusive facility, provides Veterinary Vaccine Quality testing to the provincial/regional livestock departments upon their request. It also keeps vigilance of important and strategic vaccines like Avian Influenza, FMD and PPR to support disease control in the country.
- The Drug Residue and Testing (DR&T) activity of NVL remained available for provincial/regional livestock departments during the year to ensure the confidence of consumers and exporters in livestock and its value-added products.
- The Emerging disease (ED) section aims to protect animals and human being from domestic and global health threats, by identifying, diagnosis and control of new disease outbreak all over the Pakistan.
- NVL offered advanced diagnostic technology, training and refreshers during 2021-22 and supported internship programs besides supporting M.Sc., M.Phil and Ph.D. studies in line with the objectives.
- During 2021-22 NVL has started the PSDP project titled “National Peste des Petits Ruminants (PPR) Eradication program: Phase 1- Risk-Based PPR Control in Sheep and Goats in

Pakistan” amounting to Rs.1787.71 million for five years (2020-25). This project will help to eradicate PPR in Sheep and Goats all over Pakistan. Moreover, Diagnostic Services for detection of antimicrobial resistant pathogen have been started. NVL is serving as the focal point for AMR in the country. In this regard coordinating different activities which is identified and being implemented by Fleming Fund.

- During 2021-22, following PSDP project of national importance is ongoing in NVL “National Peste des Petits Ruminants (PPR) Eradication program: Phase 1- Risk-Based PPR Control in Sheep and Goats in Pakistan” amounting to Rs.1787.71 million for five years (2020-25)

ACHIEVEMENTS:

- National veterinary Laboratories is served as national reference lab for the diagnosis & Surveillance of Transboundary Animal diseases (FMD & PPR).
- Carried out BSE (Mad Cow Disease) surveillance in Pakistan. Dossier submitted (August, 2017) to World Animal Health Organization (OIE) for declaration of status of “Negligible Risk Country for BSE”
- Confirmed Bovine Leukemia virus (BLV) in cattle first time in Pakistan.
- Diagnostic services provide to all Provisional / Regional livestock departments.
- Awareness and diagnostic services provided to 5300 livestock farmers from all over the country.
- Accredited (ISO/ IEC 17025: 2017) for E. coliIsolation and identification& FMDV diagnosis & Stereotyping.
- Key partner of FMD, PPR and all control programs currently executed in the country and Pakistan is at stage 2 of PCP for FMD and PPR at international level.
- Established eight ELISA labs in collaboration with FAO, at strategic location for diagnosis of Transboundary Animal diseases (FMD & PPR) in all the provinces / regional of the Country.
- Technical backstopping and support to international labs in Afghanistan, Tajikistan, Uzbekistan and Turkmenistan.
- Annual refresher training courses for Lab workers on FMD & PPR diagnosis from all relevant provisional / regional labs.
- Provided Veterinary Drugs and Vaccine Quality Control services to all province / regional Livestock departments.
- NVL participated in Proficiency Testing of(FMD, E. coli& Enterococcus)
- NVL participated in Proficiency Testing different Bacterial samples (NEQAS Program NIH)
- Established FMD Virus repository (100 Fully Characterized FMD Virus isolated from Pakistan).
- More than 250 Internees, B.Sc, M.Sc, M. Phil and Ph. D students hosted and trained.
- Collaboration with FAO, WHO/ WOAH regarding Implementation of international Health Regulation -2005 Activities in Veterinary sector of Pakistan.
- Established National Veterinary Lab Working Group.
- 150 Researches/ Publications (Impact factor >50).
- 200 Vet Officers / Para Vets trained in 50training programs.
- ISO-9001:2015 certification achieved.

Table: The Examination and Analyses Offered and Performed at NVL during 2021-2022.

Section	Activities	Samples Analyzed (No.)
Disease Diagnosis & Surveillance	<u>VIROLOGY & MOLECULAR LAB:</u>	
	FMD Antigen Detection ELISA	253
	SP ELISA for FMDV Serotypes	2103
	PPR Antigen Detection ELISA	96
	PPR Competitive ELISA	296
	Bovine Leukosis Virus ELISA	140
	Brucella Abortus ELISA	120
	Cell Culture Virus Isolation	72
	Lumpy Skin Disease Conventional PCR	235
	Lumpy Skin Disease Rt-PCR	55
	PCR FMD	185
	PCR PPR	43
	FMD Sequencing	45
	LSD Sequencing	25
	Total	3668
	<u>BACTERIOLOGY LAB:</u>	
	Hematological analysis (CBC) of blood samples	256
	Microbiological examination of Milk samples	172
	Microbiological examination of Water samples	45
	Microbiological examination of tissues & others culture samples	127
	Microbiological examination of Fecal samples	1377
	Biochemical Examination of Milk using Commercial Strips	186
	Mastitis Test	186
	RBPT Test for brucellosis. (Surveillance Samples)	37
	Antibiotic Culture Sensitivity	850
	Microbiological examination for ESBL E.coli * Salmonella spp from chicken samples	320
	EQASIA Proficiency Testing Samples	60
	NEQAS NIH Proficiency Testing Samples	10
	Total	3626
	<u>PARAHISTO LAB:</u>	
Vaccine quality Control Section	Faecal examination for Endoparasites	370
	Blood Smear examination for Haemoparasites	360
	Histopathological Samples	70
	Postmortem	15
	Total:	821

		<u>Vaccine Quality Control Lab:</u>
Drug Section	Residue	Total Test performed (Sterility Bacterial Testing, Sterility Fungal Testing & Safety Testing)
		1063
		Maintenance of Animal house (Mice, Rabbits & Poultry)
		229
		Total:
		1292
<u>Residue & Drug Testing Lab:</u>		
		Total Test performed (Antimicrobial drug Residue Testing, Drug Quality Testing & Heavy Metal Testing.)
		1528
		Grand Total
		10953
<u>Other Activity:</u>		
		ISO-9001:2005 certification
		Completed
		ISO-17025-2017 certification (Selected Tests)
		Completed
		Internees
		56
		Post Graduate students
		11
		Training course conducted in NVL
		08

9. Animal Quarantine Department (AQD):

AQD is an attached Department of Ministry of National Food Security and Research (MNFSR) and is executive veterinary authority of the Federal Government. The AQD was established in 1980 to implement the Pakistan Animal Quarantine (Import and Export of Animals and animal Products) Act, 1979 and the Pakistan Animal Quarantine (Import and Export of animals and animal Product) Rules 1980.

Executive Veterinary Authority:

The AQD being an executive veterinary authority has the prime responsibility to regulate import and export as well as quarantine of animals and animal products in order to prevent the introduction and spread of exotic diseases, The AQD is not only safeguarding the domestic livestock of Pakistan but also has a pivotal role in protecting human health from zoonotic diseases of exotic origin.

WTO-SPS Enquiry Point:

The AQD is declared as the National Sanitary and Phyto Sanitary (SPS) Enquiry point for animals and animal products under WTO-SPS agreement to address the Queries of member states.

AQD Presence: The AQD has a country-wide network of its offices cum laboratories with the head office at Karachi and subordinate offices at Lahore, Islamabad, Peshawar, Quetta, Multan, Sialkot, Khunjrab, Ghulam Khan, Kharlachi and Gawadar.

Services rendered: The AQD provides following services to importers and exporters of animals and animal products.

- I. Health certification Service for export of animals of all kinds.
- II. Health certification Service for export of animal products of all kinds.
- III. Health certification Service for import of animals of all kinds
- IV. Health certification Service for import of animals products of all kinds.
- V. Registration of export-oriented animal products processing units/plants/establishments like slaughter houses, animal casing units, bone processing units, poultry /poultry products processing units etc.
- VI. Inspection and management of quarantine facilities for animals.

Risk Assessments: The AQD is the part and parcel with the livestock wing of MNFSR in conducting the risk assessment for the imports of animals and animal products like sheep, goats, cattle, horses, animal fat, hides, skins, boneless meat, casing and semen to be imported from Germany, South Africa, Brazil, USA and Italy during the year 2021-2022.

Declaration of Temporary Quarantine Houses and Processing Units: The AQD has inspected and approved approximately 115 temporary Quarantine Houses during the year 2021-2022 in private sector for Keeping the live animals imported during the said year. The AQD has inspected and approved approximately 18 Processing Units for different animal products during the year 2021-2022 in private sector.

Export/Import of Animal Origin: The salient animals and animal products exported from Pakistan during the year 2021-2022 were poultry birds, fancy birds, day old chicks, chilled/frozen mutton/beef, leather, wool, Bovine bone chips, honey, milk products, hatching eggs, table eggs, frozen chicken meat, frozen chicken feet, offal, casing etc. The prominent items of animals and animal products imported include the live and frozen fish, eggs, processed food items, day old chicks, dairy animals etc.

Meat Export:

The AQD is monitoring the export of meat from Pakistan to the destinations like UAE, Saudi Arabia, Bahrain, Muscat, Kuwait etc. Altogether, there are 34 export-oriented slaughterhouses registered with AQD. A total of 81742.669 M. tons of meat (including mutton and beef) was exported from Pakistan and earned 420.898 million US dollars during the reported period

Live animals imported:

During the year under report 14463 live animals were imported. These animals were temporarily quarantined, monitored and released to the importers after completing the codal formalities as required under Pakistan Animal Quarantine act 1979 & rules 1980.

Fish & Dairy Products Import:

The AQD monitored and released import of 12258.02 M. tons of milk and dairy products. The AQD monitored and released import of 5708 452 M tons of frozen Fish Meat and fish products during the year under report. The food safety and SPS monitoring is exhibited through obtaining the samples of these commodities testing from the independent and accredited laboratories like PCSIR and HEJ Laboratory of University of Karachi.

Volume of Health Certificates issued:

The AQD issued a total 40463 number of Health Certificates to the exporters and importers of animals and animal Products and collected a Non-Tax Receipt of Rs. 160.348 Millions during the period from July 2021 to June 2022. The volume of Export Health certificates was 37679 whereas the import Health Certificates was 2784. The details of Health certificates issued for animals and animal products exported and clearance of reported cases of animals and animal product imported during the year 2021-2022 are provided in the following tables.

ACHIEVEMENTS AND TARGETS IN RESPECT OF ANIMAL QUARANTINE DEPARTMENT DURING LAST ONE YEAR

<u>YEARS</u>	<u>NO.OF HEALTH CERTIFICATES ISSUED (CONSIGNMENTS)</u>			<u>FOREIGN EXCHANGE EARNED IN MILLION USD</u>	<u>NON-TAX RECEIPT IN MILLION RUPEES</u>	<u>TARGET RECEIPT IN MILLION RUPEES</u>
	<u>EXPORT</u>	<u>IMPORT</u>	<u>TOTAL</u>			
<u>2021-2022</u>	<u>37679</u>	<u>2784</u>	<u>40463</u>	<u>651.720564</u>	<u>160.352</u>	

Development Projects:**1. Up-gradation and establishment of Animal Quarantine stations in Pakistan Phase-1**

The project has been approved by DDWP to complete the remaining works of Phase-1 with a budget of Rs. 68.85 millions on 28-10-2021. The main objectives of the project are to strengthen and to complete the remaining infrastructure of AQD at Islamabad, Sialkot and Multan to regulate the trade of animals and animal products. These stations are providing health certification services to exporters and importers of animals and animal products to meet the international trade requirements.

2. Construction of office and laboratory building of Animal Quarantine Department, Karachi

The project has been approved by DDWP with a budget of Rs. 128.295 millions with implementation period of 3 years from 2020-2023. The work on the project has been started and almost 60% completed.

Future plans:

1. Strengthening of existing infrastructure including building and equipment of AQD through PSDP funding.
2. Enhancing the working sphere of AQD by ensuring the presence at all the notified points of entry or exit of Pakistan.
3. Updating of Animal Quarantine laws and regulations to meet the new SPS challenges in international trades.

A. Export: ISSUANCE OF HEALTH CERTIFICATE FOR EXPORT OF ANIMALS/ANIMAL PRODUCTS

	Name of Animal Products	Quantity		Packin g	Weight in M.Tons	No of Health Certificate Issued	Receipt in Pak Rupees	Foreign Exchange Value in (Million) \$
a)	Live Animals							
1	Live Cattle & Calves	571	Nos	N/A	N/A	3	294 200	0.1998
2	live Camel	25	Nos	N/A	N/A	1	12875	0.015
3	Live Goat/ Sheep	1093	Nos	N/A	N/A	3	289750	0.0749
4	Rabbit	3	Nos	3-Cage	N/A	3	245	N.C. Value
5	Live Fur Seals	2	No.	N/A	N/A	1	1000	0.002
6	Pet Animals	645	Nos	645-Cage	N/A	645	112875	N.C.V
b)	Live Birds & Eggs							
1	Fancy Birds	445707	Nos	19720-Cagcs	N/A	211	688170	0.771622
2	Live poultry	1991150	Birds	79646-Cnge	N/A	1498	2787610	1.99115
3	Day old chicks	3014700	Nos	83670-Boxc*	N/A	280	1524900	0.16734
4	Live lloney Bees	13105	Boxe s		N/A	170	35850	0.163812
5	Table Egg	36374867	Doze ns	177788 8-Ctns	N/A	1409	722300	4.616782
6	Hatching eggs	1950600	Doze ns	65022-Ctnj	N/A	146	68575	6.53774

c)	Meat							
1	MUTTON CHILLED	443877	Carc ass	Cotton Cloth	4019.42	6497	17780560	31.195636
2	CHILLED BONELESS MUTTON(V	10	Ctns	Ctns	0.2	1	100	0.00337
3	DRIED MU LION EARS/BEEF TAI	4	Ctns	Ctns	0.035	4	400	0.000014
4	FROZEN MUTTON MEAT BONE 1	481	Ctns	Ctns	5.113	8	1825	33448
5	BEEF CHILLED	2136912	QtrP cs	Cotton Cloth	69728.046	16099	128214720	319.804374
6	CAMEL MEAT CHILLED	19363	QtrP cs	Cotton Cloth	561.269	666	1161780	2.610524
7	Chilled Came! Meat Boneless	524	Ctns	Ctns	13.55	4	1400	0.056994

8	BEEF /MUTTON OFFAL CHILLED	70156	Ctns	Ctns	1247.226	4845	1087880	1.87713
9	CHILLED BEEF BONELESS	10057	Baskets	Basket s	202.655	105	26195	60.667739
10	Chilled Beef Skin Meat (Vacuum Pac	815	Cart on	Carton	17.745	92	18600	0.037003
11	CHILLED BEEF BONE-IN	1798	Clns	Ctns	36.622	15	15000	0.140549
12	DRIED BEEF PIZZLE MEAT	517	Ctns	Ctns	5391	5	1100	0.013535
13	Dry Salted Beef	150	Bugs	Bags	3	1	500	0.005
14	FROZEN BEEF MEAT BONE IN	96509	Cins	Cins	1309.075	93	225545	4.867567
15	FROZEN BEEF MEAT BONELESS	21847	Cins	Ctns	429.79	22	10650	1.348485
16	FROZEN CAMEL MEAT BONELESS	999	Cins	Cins	25.146	4	1850	0.113903
17	FROZEN BEEF OFFALS VACUME	10463	Cins	Cins	230.844	13	10650	0.421536
d)	Food Produtes RTE / RTC							
1	Spicy Mutton Brown	2	Ctns	Cins	0.01	1	100	0.00012
2	Frozen Food Stuff Items With Meat A	80936	Cins	Cins	877.283	120	52974	4.124907
3	Honey	171029	P.Cans	P.Cans	4,748,012	495	108425	9.665965
e)	Animal Products							
1	Collagen	1000	Bags	Bags	12.5	1	700	0.0575
2	Industrial Grade Mixed Oils	6	Contain e	Container	120	1	1000	0.2622
3	Ox Bile	47	Dru ms	Drums	8.086	3	1500	0.095673
4	Salted Beef Caps	8	Barr els	Barrels	1.1	1	200	0.003433
5	Salted Beef Casing Weasend , Bladder	44878	Dru m / B	Drum / Bald	75.014	20	3900	4.852877
6	Salted Sheep Casing	4986619	Hank s	Hanks	1422.831	656	269075	38.40296
7	Salted Sheep Serosa Ribbons (Dried)	24	Dru ms	Drums	1.104	2	200	0.006625

8	Frozen Sheep Fat Tail	1240	Boxe s	Boxes	25	1	525	0.15
9	Dried Bully Sticks	239	Cart on	Carton .	5.669	7	1600	0.133175
10	Frozen Mutton tripe	745	Bags	Bags	29.8	1	700	0.0596
11	Frozen Beef Tripe Frozen Beef Intesti	200358	Bags	Bags	2562.028	102	59400	4.543664
12	Beef Intenstine Dried	19	ctns	ctns	0.225	14	2900	0.005015
13	Frozen Salted Beef Omasum	208206	Bags	Bags	4934.465	218	122675	11.060153
f)	Animal by Products							
1	Organic Fertilizer / Soil Manager (Hy	500	Bags	Bags	25	1	325	0.02675
2	Oven Dried Cooked Deboned Chicken	500	Ctns	Ctns	5	1	325	0.002
3	OX Bile Concentrated Solid	350	Pail	Pail	7	1	300	0.049
4	Mixed Oils (From heat Treated Poultr	29	Tank	Tank	536	3	1775	0.554921
5	Wool	15503	Bale s .	Bales	2448.683	101	40850	1.260396
6	Goat Hair	2693	Bale s	Bales	131.79	17	8550	0.325572
7	Leather	5438780	Pcs	Pcs	29191.16	1262	407625	52.330423
8	Leather Grist		in Bulk	in Bulk	3007	12	18700	0.58661
9	Buffalo Leather Hide & Skins	241882	Pcs	Pcs	2018.5	16	5500	0.194334
10	Meat And Bone Meal	7937	Bags	Bags	396.479	5	5025	0.14708
11	Chicken feather Lace	3	Bale s	Bales	0.055	1	400	0.000414
12	Washed Duck Down	33361	Pkgs	Pkgs	2021.505	175	61100	6.819748
13	Peafowl Feather	6	Ctns	Ctns	0.095	1	200	0.0015
g)	Bone & Bone Products							
1	GELATIN	138785	Bags	Bags	3737.068	192	96500	17.234031
2	Buffalo Horns	62092	Bags	Bags	2147.828	66	60750	6.851837
3	Bovine Bone Chips	445244	Bags	Bags	33612.763	232	371350	27.736762
4	OSSEIN	45202	Bags	Bags	2324.2231	107	57250	6.345935
5	Trophies	71 Nos	71 Boxe s	Boxes		71	10550	0.01

6	Jiggles Crunch (Jellies)	1905	Cins	Ctns	15.714	5	1550	0.03284
h)	Chicken Meat & Products							
1	Frozen Chicken Meat	1800	Carton	Carton	21.6	1	1000	0.07604
2	Frozen Chicken Feet	107436	Ctns	Cins	2065.268	74	42050	0.609336
3	Pasteurized Whole Egg Liquid (Froze	11250	Cins	Cins	112.5	5	3825	0.179915
4	Poultry Meal	O	in Bulk	in Bulk	1.895	1	675	0.034001
I)	Dairy Milk & Milk Products							
1	Baby / Infant Formula	8935	Carton	Carton	113.937	6	3800	0.501407
2	CAMEL MILK POWDER	104	Carton	Carton	0.15	2	700	0.002828
3	Biscuits / Rusk / Cake Rusk /	349592	Cins :	Cins	1783.373	274	146100	4.110926
4	Frozen Tandoori Naan / Sheermal / Ki	102561	Cins	Cins	1021.503	190	105735	2.351015
5	Mix Sweets	112055	Cins	Cins	857.748	130	80470	3.890791
6	Cadbury Chocolate	62346	Cins :	Ctns	345.686	39	23725	1.647942
7	Butter	7088	Cins	Cins	136.236	8	4550	0.832328
8	CREAM	95358	Carton	Carton	441.238	31	20050	1.098646
9	Desi Ghee	3425	Ctns	Cins	35.273	18	4875	0.246978
10	Milk Powder	80710	Cins .	Cins	443.281	21	21425	1.351842
11	EVERYDAY TEA WHITENER	43226	Carton	Carton	569.152	54	26450	2.816887
12	Condensed Milk Solid	276	Ctns	Cins	4.808	5	1000	0.017097
13	Dried Yugart Stone Form	20	Cins	Cins	0.4	1	100	0.001
14	UHT Milk	81056	Ctns	Cins	369.034	14	23125	0.278934
J)	Miscellaneous							
1	Animal lab samples .	4115	Samples	7 - Box	N / A	7	1800	N.C.V
2	Sample Miscellaneous Products	123	Pack ings	0.7995 5	N / A	41	12100	0.001678
3	Goat Serum	1320	Samples	300 - Boxes	N / A	1	400	0
	TOTAL					37679	15739155 9	651.710564

B. Import: ISSUANCE OF HEALTH CERTIFICATE FOR IMPORT OF ANIMALS/ANIMAL PRODUCTS

	Name of Animal Products	Quantity		Packing	Weight in M. Tons	No of Health Certificate Issued	Receipt in Pak Rupees	Foreign Exchange Used in (Million) \$
a)	Pet animals	268	Nos .	71 - Cage	N / A	119	42700	1.743468
1	Dairy Cattle	13906	Heads	N / A	N / A	18 .	1392785	16.684981
2	Live Arabian Oryx	55	Heads	N / A	N / A	3	5500	0.0125
3	LIVE Zoo Animals .	96	Nos .	26 - Cages	N / A	19	9200	0.019062
4	LIVE HORSE	107	No.	N / A	N / A	23	61525	0.521806
5	LIVE RABBIT	31	No.	4-Cage	N / A	3	600	0.000393
b)	Live Birds & Eggs							
1	Live Fancy Birds	42485	Nos .	2173 - Cage	N / A	192	109830	0.317666
2	Live Houbra Busterd	3806	No.5	N / A	N / A	3	22,400	NCV
3	Live poultry	8161	No.s	410 - cage	N / A	61	17310	0.034471
4	Live Day Old Chicks	701686	Nos .	11288 - Boxe	N / A	35	108490	11.217238
5	Hatching Eggs	1104542	Nos .	3077 - Boxes	N / A	23	6850	1.267729
6	Silkworms Eggs	1638	Nos .	638 - Cards	N / A	3	900	0.706498
7	Duck Egg	200	Cins	Ctns	1.188	I	250	0.0006
8	Trout / Talapia Fish Eggs .	31200	Nos .	24 - Boxes	N / A	9	1595	0.016502
c)	Meat / Meat Products							
1	Beef Boneless , Beef Peppeoni	9379	Cins	Ctns	96.1	15	5525	0.580876
2	Beef Liver (Offals)	9496	Cins	Ctns	156.2	7	3925	0.210145
3	Fat of Sheep	1239	Cins	Cins		1	525	0.000563
4	Frozen Beef Trotte	10496	Cins	Cins	176.81	8	4325	0.050758
5	Salted Animal Stomach	8883	Bags	Bags	1045.3	45	14825	0.034987
d)	Ready to Eat Products							
1	Frozen Filet - O - Fish Beef / Chicken / Pat	37591	Ctns	Ctns	586.22	188	115575	3.589214
2	Beef Short Ribs , Brisket & Chicken Ja	\$997	Cins	Ctns	56.962	8	3275	0.209926
3	Chicken Franks	1133	Cins	Cins	9.245	1	500	0.031029

4	Fish Sandwich	820	Cins	Cins	4.1	1	425	0.014965
e)	Animal Feed							
1	Dog & Cat Food	561839	Beg / Cins	Beg / Cins	2963.0	148	166450	3.242911
2	Birds Feed	1427	Bag / Ctn	Bag / Ctn	15.45	4	475	0.003188
3	Meat & Poultry Meal (Feed Grade)	2979	Bag / Cin	Bag / Ctn	546.0	19	2300	0.238004
4	Fish Feed	922	Bag / Cin	Bag / Ctn	38.5	5	1850	0.059714
5	Feed Additive / Supplement / Ingredien	761	Bag / Ctn	Bag / Ctn	3.023	21	10900	0.30636
f)	Chicken , Meat & Products							
1	Chicken Tail	15430	Cins	Cins	163.48	6	5100	0.06334
2	Poultry Breast Edge & Beef Philly Ste	1012	Cins	Cins	13.56	3	1075	0.037312
3	Granulated Chicken Bouillon	1100	Cins	Cins	9.98	1	475	0.095884
4	Egg Yolk Powder	18	Bags	Bags	14.5	4	900	0.10525
5	Roy Cheese , Cooked Salted Duck Egg	350	Cins :	Ctns	3.23	1	300	0.017675
g)	Animals Products :							
1	Animals Products .	3	Pkgs	Pkgs	0.276	3	300	0.001381
2	Salted Cow Stomach (Omasum)	58	Bags	Bags	58.0	1	950	0.01523
3	Sheep Casing (Sheep Green Runners)	700	Bales	Bales	15.71	1	350	0.0308
4	Honey	73876	Cins / Car	Ctns / Cans	271.4	32	26375	1.347038
h)	Animal by Products .							
1	Deer Horn	I	1Pkgs	Pkgs	4.0	1	250	0.006
2	Wool	6646	Bales	Bales	1018.1	66	17775	0.929777
3	Goat / Sheep Hair	1387	Bales	Bales	139.97	9	2.55	0.066765
4	Dear Skin / Bison Skin	400	02.pal let	pallet	N / A	1	400	0.020571
I)	GOAT SKINS CALLIGRAPHY	14	Pcs	Pcs	0.26	1	100	0.002794
1	Lanoline (Pharmaceutical Ra Material	330	Drum s	Drums	16.5	6	1125	0.273777
2	Cow , sheep Hide & Skins .	2577936	Pcs / SFT	Pcs / SFT	20258. 756	738	219760	13.858961
3	Tallow Inedible	2104	Drum s	Drums	397.60 2	6	2275	0.619142

4	CASTOREUM	6	Cins	Cins	0.111	1	100	0.0007
5	Beaver scent pods	9	Pkgs	Pkgs	0.135	3	575	0.002052
6	Beeswax	503	Cins	Cins	10.075	4	950	0.02515
7	Bovine Sement	1464069	Doses	62 - cylinder	N / A	65	15450	0.931821
8	Bio Polish N Conc	7	Pkgs	Pkgs	4.567	I	250	0.011634
j)	Bones and products							
1	Hunting Trophies	6	No.	No.	N / A	1	200	0.001071
2	Gelatine Food Grade	13	Pkgs	Pkgs	12.1	4	850	0.12485
3	Animal Waste Bones	34044	Bags	Bags	2497.8 54	51	24950	0.108611
4	Ossein Mineral Complex	4	Drum s .	Drums	3.5	2	400	0.01925
k)	Milk & Milk Products							
1	Butter	5697	Cins	Cins	45.843	2	1850	0.289837
2	Ice Cream (Assorted Flavours)	6110	Cins	Ctns	39.687	2	1950	0.199469
3	Pascual Flavour Yogurt	2772	Ctns .	Cins	8.316	1	900	0.014282
4	Versilac Dairy Produc	2000	Cins	Cins	50	3	1130	0.0483
5	Cheese	134699	Cins	Ctns	741.47 2	40	43425	2.502643
6	Desi Ghee	500	Ctns	Cins	7.5	1	325	0.09
7	Rennet Casein	26424	Bags	Bags	683.97	32	13350	4.715817
8	Full Cream Milk Powder	14588	Bags	Bags	332.56	41	16250	2.008226
9	UHT Full Fat & Low Fat Milk	3300	Ctns	Cins	40.892	1	1025	0.021252
10	Non Fat Dry Milk Powder (Skimmed)) 137052	Bags	Bags	3375	57	46385	9.980222
11	Calf Milk Replacer	13855	Bags	Bags	346.37 5	13	6100	0.689437
21	Milk Powder (Balka / Nolibil	30720	Bags	Bags	744	22	12375	1.02252
13	Milk Powder (Coconut Flavour)	135	Bags	Bags	0.81	1	250	0.00234
14	Fresh Milk .	2330	Ctns	Cins	23.3	1	800	0.035
15	Curd Doogh .	6100	Ctns	Ctns	24.705	1	1725	0.0335
16	Whey Powder	229337	Bags	Bags	5775.9 5	141	86750	6.834015
17	Sweetened Condensed Milk	882	Cins	Cins	17.64	1	425	0.020286
L)	Fish & Fish Products							
1	Frozen Fish Meat (Pangasius)	615665	Ctns	Ctns	5623.0	281	207300	8.535696
2	Squid Tube	2150	Ctns	Cins	7.525	1	750	0.009782

3	Sea Shells Sadaf & Cowries	743	Cins	Ctns	19.31	5	1200	0.032284
4	Flake Light Tuna Fish	578	Cins :	Cins	4.23	2	550	0.00536
3	Live Fish	\$75,068	Nos .	1069 - Boxe	N / A	83	57,850	1.501434
6	Frozen Sea Food	4754	Ctns	Cins	54.348	44	14520	0.229424
7	LIVE BABY SHRIMPS	720000	Nos .	80 - Ctns	N / A	2	400	0.001458
m)	MISCELLANEOUS							
1	Sample Miscellaneous Products	2	Pkgs	Pkgs	0.038	2	400	0.000425
2	Earth Worm (Dry Herbs)	\$15	Bags	Bags	5.207	2	550	0.01468
3	Dried Meleworms Synonyms	20	Cins	Cins	0.2	1	100	0.000456
4	Bumblebees Live	7	Box	Box	0.35	2	275	0.0003
5	Honey Bees	3145	Boxes	Boxes	742.65	14	3800	0.029205
	Total					2784	2,957,305	98.70004

C. NUMBER OF ANIMALS & ANIMAL PRODUCTS SUBJECT TO LABORATORY EXAMINATION & NO OF CASES REJECTED WITH REASON

Total No.s.2277 of Samples were Processed and Subjected to Laboratory examination for disease Transmission point of view in the Public Health Food Analysis Laboratories of Government of Pakistan during the period under report.

D. MISCELLANEOUS ACTIVITIES

In order to inspect and clear the consignments of animals/animal products, visits were made at airports. dry-ports, sea-ports and land-routs. Efforts were made to prevent unauthorized import/export of birds, animals/animal products from air-port, sea-port and across the land-routes.

E. DISEASE OUT BRAKE SITUATION IN THE PROVINCES

Provincial Governments can provide the disease outbreak situation in Provinces

F. TOTAL RECEIPT & EXPENDITURE

Total receipt deposited amounting to Rs.160.348 Million in National Bank Of Pakistan. These were collected as Certificate/Laboratory Examination fees of Animals and Animal Products Exported & Imported during the Year 2021-22

The Non-Development expenditure of this organization during the Year,2021-22

were **RS.128.226-Million**

*N.C.V (No Commercial Value)

10. DEPARTMENT OF PLANT PROTECTION(DPP)

1 PLANT QUARANTINE:

The Department of Plant Protection (DPP), the NPPO of Pakistan play its regulatory, advisory and R&D roles as per its mandate in exportation of plant and plants material under the provision of Pakistan Plant Quarantine Act, 1976 and Rule 1967 and the International Standard for Phyto sanitary Measures (ISPMs) developed under the WTO-SPS negotiated International Plant Protection Convention (IPPC) of 1997.

To further boost the export of plant and plant materials steps have been taken by the Department of Plant Protection with trading partners in the light of MOUs signed with different countries.

Market Accesses

European Union

- Pakistan is successfully exporting agro-commodities to EU member countries by meeting their Phyto sanitary, import requirements, thus DPP is striving hard to keep the level of interception of agricultural goods at minimum level. Besides rice and mango, the department has also exported citrus to some EU countries. In 2021-22, Pakistan has successfully exported 586.50 metric tons citrus to UK value \$332058.22.

Australia

- Pakistan has been exporting a number of agro-commodities to Australia, after conducting pest risk analysis particularly rice and mango etc.
- Due to continuous efforts and successful negotiations the Department of Agriculture, Water and the Environment (DAWE)/ NPPO – Australia has approved 02 more hot water treatment facilities for export of mango from Pakistan to Australia, whereas negotiations for approval another one is in pipeline. In 2021, Pakistan has successfully exported 83.77 metric tons mango from Pakistan to Australia.

Russia

- Pakistan is exporting agricultural goods from Pakistan to Russian Federation. Currently Russia has allowed only four Rice establishments to export rice from Pakistan to Russia. To further enhance the export of rice from Pakistan to Russian Federation, the department with the collaboration of Rice Exporters Association of Pakistan (REAP) has commenced technical audit of rice establishments/ facilities of the potential rice exporters. As soon as the audit process is finalized the department will share name of the successful/ recommended rice facilities with the NPPO – Russia for virtual/ video inspection and approval.
- To further increase exports of potato to Russian Federation, DPP has registered 31 more potato exporters. Since January, 2022, we have exported 18554.59 metric tons potato, (value \$M6.867), and 48829.62 metric tons citrus, (value US\$M 24.543) to Russian Federation.

Mexico

- The Department with cooperation of Pakistan Mission to Mexico is negotiating with SENASICA/ NPPO - Mexico for lifting ban on export of rice from Pakistan to Mexico.

China

- Pakistan is exporting a number of agro-commodities to China after conducting pest risk assessment, particularly rice, citrus and mango.
- So far GACC/ NPPO – China has approved 53 rice establishments for export of rice from Pakistan to Russian Federation. To further increase export of rice DPP has recommended 5 more rice facilities to GACC/ NPPO – China for approval.
- After successful negotiations with GACC/ NPPO – China, a protocol for export of Onion from Pakistan to China has been signed on 23-11-2021.
- For grant of market access for export of cherries from Pakistan to China, DPP has currently shared its views/ comments with GACC/ NPPO – China on revised draft of protocol.

- China has also agreed to grant market access to Pakistan for export of Rhodes grass to China and conveyed a protocol on sanitary and phyto sanitary requirements for views/ comments. DPP has conveyed its comments for finalization and signing of the protocol.
- Since November, 2021, DPP has successfully registered manufacturers of Sesame seed, -----manufactures of pine nuts, and 07 manufacturers of dried beans with GACC for export of these goods from Pakistan to China.

USA

- Pest Risk Assessment (PRA) for grant of market access for export of fresh dates from Pakistan to USA is being finalized between DPP and APHIS/ NPPO – USA. After finalization of PRA, DPP will start exporting fresh dates to USA.
- APHIS/ NPPO – USA has allowed import of dry onion bulbs (i.e. bulb with dry parchment like skin) from Pakistan.
- DPP is negotiating with APHIS for pre-clearance program to export mangoes by using the facility of Pak Electron Beam Irradiation facility, Karachi.

South Africa

- To initiate export of mango from Pakistan to South Africa, DPP has finalized technical audit of mango orchards, hot water treatment facilities and pack houses. The same have been shared with the NPPO – South Africa for virtual inspection. After video inspection of the facilities, orchards and pack houses, mango export from Pakistan to South Africa may be initiated.

Kenya

- Kenya has granted market access for import of mango and citrus from Pakistan and accordingly signed Agreements regarding conditions for importation of citrus and mango fruits from Pakistan to Kenya.

Japan

- Bilateral trade of agro-commodities with Japan is being continued smoothly. Like previous year this year too, Japan has agreed to allow mango fruits without pre-clearance programme. In 2021 Pakistan has successfully exported 167.58 metric tons mango (value US\$M 0.80).

Iran

- Bilateral trade between Pakistan and Iran is being continued smoothly, however, efforts are underway to further enhance export of agro-commodities to Iran and also to prevent illegal trade of plant and plant materials between Pakistan and Iran to safeguard the domestic crop of Pakistan. In 2021 Pakistan has successfully exported 42459.59 metric tons mango (value US\$ 26.50) to Iran.

Uzbekistan

- To finalize Pest Risk Analysis (PRA) for grant of mango export from Pakistan to Uzbekistan, DPP is compiling the requisite technical information and is being shared with NPPO – Uzbekistan. After finalization of PRA with Uzbekistan export of mango will be started.
- DPP is registering potato exporters to further enhance export of processed table potato from Pakistan to Uzbekistan. Since January, 2022 to April 23rd 2022, Pakistan has exported 2049.82 metric tons potatoes (value US\$M 0.305). Whereas export of citrus stands at 7977.08 metric tons (value US\$M 1.277

GCC countries

- Pakistan has been exporting almost most of the agro-commodities to GCC member states by meeting their SPS requirements.

Establishment of new DPP outposts

- DPP has also set up four more outposts at Karachi, Ghulam Khan, Ango raddar at Pak – Afghan border, and Panjgor at Pak – Iran border to facilitate export of agro-commodities with Afghanistan and Iran.

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 Phyto sanitary (SPS) regime/ International Standard for Phyto sanitary 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. 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.
 - c. Pakistan has exporting rice to more than 150 countries, mango to more than 50 countries, citrus to more than 40 countries, potato to more than 40 countries, onion to more than 20 countries and dates to more than 25 countries.
 - d. DPP has conducted one month training program to the treatment operator/ Entomologist for effective fumigation operations with Methyl bromide, Aluminum phosphide and other fumigants or quarantine treatments.
 - e. Provide an internship to 05 students from University of Agriculture Faisalabad and 08 students from Department of Agriculture and Agribusiness, University of Karachi.

Liaison with Pakistan Customs

- **Implementation of E-phyto** – DPP currently is integrated with standardized Pakistan Single Window (PSW) system to replace the existing regulatory operations with paperless digital certification in order to ensure ease of doing business, reduces risk of fraudulent certificates, accuracy, sustainability and authenticity of the legal documents under the provisions of ISPM-12 of IPPC.
- Consignments of plant and plant materials being imported into Pakistan without mandatory documentation are being reshipped/ destroyed.

Regulations of trade

- To prevent entry of exotic and invasive pests, the Department is preparing phytosanitary import requirements after evaluation of the biosecurity risks of the imported goods from various trading partners.

ii. Major activities/ millstones to be achieved in the next financial year 2022-23

- Constructions of infrastructure at various outposts of Pak-Afghan, Pak-Iran and Pak – China border terminals to facilitate bilateral trade with China, Afghanistan and Iran for which the department needs hands amount.
- Further strengthen Sanitary and Phyto sanitary (SPS) system to prevent entry of exotic and invasive pests.
- Quarantine pests are the main hindrance and non-tariff barriers to trade, therefore, for mitigation of the quarantine pests and creation of pest free areas, particularly in citrus growing areas is imperative to export pest and disease free citrus to high end markets.

Export targets

- In 2021-2022 the department has issued 141258 phytosanitary certificates for export of agricultural goods which surpasses previous year targets i.e 114194 phyto sanitary certificates.

Import targets.

- The department successfully decreases the import of goods by issuing 16141 import permits in comparison to previous year i.e. **24479** import permits to support dwindling economy of the country.

EXPORT STATISTICS OF AGRICULTURAL GOODS

MONT H	RICE	WHEAT	FOOD GRAINS	FRUITS VEGETABLES (FRESH / DRY)	SEEDS & OTHERS	RAW COTTON	WASTE COTTON	MISCELLANEOUS
	MT	MT	MT	MT	MT	MT	MT	MT
July	310007.90	-	125735.0	96196.86	29752.15	68089.9 4	48.56	106167.3
August	300643.70	-	91021.99	268008.5	13358.27	-	5974.01	338982.3
Sept	337619.0	-	82031.60	109710.8	17779.93	91.26	1998.20	172732.5
Oct	451510.9	-	311386.0	351766.0	77906.75	1439.76	873.90	165071.2
Nov	726985.4	-	16302.16	1742760. 0	40108.63	20482.2 0	-	131028.5
Dec	635752.1	-	20805.99	3846997. 0	6831.32	2635.39	-	195806.0
Jan	604398.7	-	11417.25	497774.4	12551.68	3449.07	-	159626.8
Feb	688758.1	-	22378.84	279353.7	11618.34	3663.28	-	293578.9
March	605009.3	-	115134.6	132417.7	11236.07	-	1597.64	312516.4
April	4911430	-	144946.3	163614.1	13396.67	-	2938.61	528360.2
May	461001.8	-	80800.71	92814.8	7419.27	-	1913.48	382171.2
June	693420.0	-	142153.5	119824.6	7315.68	-	2865.33	227634.8
TOTAL M.TON S	6306250.0		1164114.0	7701238. 0	249274.8	99850.9	18209.7	3013676.0

IMPORT STATISTICS OF AGRICULTURAL GOODS

MONT H	RICE	WHEAT	FOOD GRAINS	FRUITS VEGETABLES (FRESH / DRY)	SEEDS & OTHER S	COTTON /FIBER	RAW COTTON	MISCELLANEOUS
	MT	MT	MT	MT	MT	MT	MT	MT
July	0.00	0.00	403653.80	17915.83	53078.96	85095.11	2078.18	43240.25
August	0.00	0.00	487736.80	22218.85	4740.518	65718.40	2397.00	9926.86
Sept	0.00	0.00	712955.70	48232.28	8604.694	93016.24	4533.99	34279.78
Oct	0.00	0.00	577509.80	45042.82	7950.266	85704.28	7131.42	34700.68
Nov	0.00	0.00	471998.70	71893.64	10797.62	97533.21	5378.11	184103.2
Dec	0.00	0.00	531245.10	43546.25	14188.01	87190.09	12605.51	9556.57
Jan	0.00	347758.86	303299.03	39680.39	11675.11	72751.01	6168.20	10865.24
Feb	0.00	385533.2	272691.50	53947.27	6669.16	79699.72	2973.54	36067.85
March	0.00	111996.5	193003.90	43150.54	8348.10	108364.40	5269.47	7877.45
April	0.00	0.00	196497.20	18503.82	8091.73	134093.70	2575.35	6583.73
May	0.00	0.00	391844.10	14895.51	10057.00	137441.80	2790.02	9158.91
June	0.00	0.00	299759.30	12044.27	5910.56	97856.18	3654.42	9995.08
TOTAL M.TONS	0.00	845288.6	4842195.0	431071.5	150111.6	1144464.0	57555.2	396355.6

REVENUE STATISTICS

MONTH	RELEASE ORDER		PHYTOSANITARY CERTIFICATE		IMPORT PERMIT		EXAMINATION CHARGESRs	ANCHOR PERMIT		TOTAL (Rupees)
	Nos	Amount in Rs	Nos	Amount in Rs	Nos	Amount in Rs		Nos.	Rs	
July	3802	19010000	9044	22610000	1818	9022500	215000	397	19850	50877350.0
August	3482	17410000	9121	22802500	1282	6410000	160000	348	17400	46799900.0
Sept	4789	23945000	16419	41047500	1577	7885000	190000	498	24900	73092400.0
Octr	3759	18795000	10021	25047500	1411	7055000	247500	464	23200	51168200.0
Nov	4249	21245000	11164	27910000	1242	6210000	210000	358	17900	55592900.0
Decembe r	3944	19720000	14918	37295000	1526	7630000	424500	320	16000	65085500.0
January	3285	16425000	14561	36402500	1295	6475000	245000	378	18900	59566400.0
February	3574	17870000	15026	37565000	1246	6230000	252500	338	16900	61934400.0
March	3865	19325000	8555	16763000	1200	6000000	320000	519	25950	42433950.0
April	2965	14825000	10969	27437500	819	4095000	300000	693	34650	46602150.0
May	2926	14630000	9065	22682500	1059	5400000	157500	470	23500	42893500.0
June	2935	14675000	12395	30990000	1666	8330000	125000	425	21250	54141250.0
Total	43575	217875000	141258	348553000	16141	80742500	2847000	5208	260400	650187900.0

1. REGISTRATION OF PESTICIDES:

Registration Section of this Department has registered / permitted the following pesticides under different scheme during July, 2021 – June, 2022.

SCHEME	FORM – 1	FORM – 16	FORM – 17	TOTAL
Registered/ Permitted Fresh	41	619	414	1074
Renewal	174	1447	650	2271
Total:	215	2066	1064	3345

2. Registration of Formulation & Refilling / Repacking Plants:

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

SCHEME	FORMULATION PLANTS (FORM – 18A)	REFILLING / REPACKAGING PLANT (FORM – 19A)	TOTAL
Registered/ Permitted Fresh	4	6	10
Renewal	4	4	8
Total:	08	10	18

Revenue:

A revenue of Rs. 90,704,500/- was collected through treasury challans on account of registration / import permission, renewal / revised fee, sample analysis fee and registration of formulation and repacking / refilling plants.

**3. FEDERAL PESTICIDE REFERENCE AND TESTING LABORATORY:
YEARLY LAB WORKING REPORT DURING 01.07.2021 TO 30.06.2022**

MONTH	Registered Sample Analyzed	Seaport Sample Analyzed	Sample Failed	Pesticide Granules Analyzed by PCSIR
July	25	09	0	13
Aug	35	10	01	13
Sep	18	09	01	04
Oct	44	05	0	05
Nov	10	03	0	0
Dec	35	-	0	04
Jan	74	02	0	04
Feb	44	08	01	05
Mar	28	03	02	12
Apr	24	04	0	12
May	22	10	0	07
June	02	19	0	03
Total	361	82	05	82

4. LOCUST SURVEY AND CONTROL

DESERT LOCUST SURVEILLANCE AND CONTROL ACTIVITIES IN PAKISTAN

Summer-Monsoon Breeding Areas (July– Dec, 2021)

The routine fortnightly Desert Locust surveys were carried out in Tharparkar and Nara desert in Sindh and Cholistan desert in Punjab from July – December, 2021. During the survey, an area of 424,500 hectares was checked and no gregarious as well as solitarious locust was observed anywhere in both provinces.

Winter-Spring Breeding Areas (Jan-June, 2022)

The routine fortnightly desert locust surveys were conducted in locust prone areas i.e. Lasbela, Khuzdar, Nushki, PAnjgor, Turbat, Gwadar and Pasni of Balochistan from Jan-June, 2022. During the survey, an area of 254,900 hectares was checked and no gregarious as well as solitarious locust was seen in the province. Routine locust surveys were also undertaken in Cholistan, Nara and Tharparkar desert in the month of June, 2022, where no gregarious or solitary locust was found during the survey.

- Pak-Iran Joint Locust Survey 2022**

23 days Pak-Iran Joint Locust Survey in the spring breeding areas of Balochistan was undertaken separately by both the countries in their own territories w.e.e. 02.04.2022 to 24.04.2022, under the auspices of Food and Agriculture Organization (FAO) of UN. During the survey no gregarious locust activities were observed both countries. However, low density mature / immature solitary adults with a density of 6-50 adults / hectare were seen as four places in coastal area of Jiwani and Pasni on 16.04.2022. After completion of survey, a joint meeting between the country locust heads and team leaders of both survey teams as held at Karachi w.e.f. 28-29 April, 2022 to compile a single Joint Survey report for onward submission to FAO.

- Training Workshops on Desert Locust Biology, Surveillance and Control Techniques**

The Food and Agriculture Organization (FAO) in collaboration with Department of Plant Protection (DPP) organized two training workshops on Desert Locust Surveillance, Control and Techniques, one each at Bahawalpur on 5-7 July, 2021 and Quetta 4-6 February, 2022 to train newly appointed Entomologists and other DPP staff. 25-30 Entomologists were trained in each training by the DPP.

11. FEDERAL SEED CERTIFICATION & REGISTRATION DEPARTMENT (FSC&RD)

Seed is basic input for agriculture sector and has imperative role in enhancing agriculture productivity, food security and poverty alleviation. Certified seed is the starting point to a successful crop as well as an important risk management tool. Production of certified seed is carefully controlled under a quality assurance and regulation system right from the very beginning. Seed certification is a legally sanctioned system for quality control of seed multiplication and production. The purpose of seed certification is to maintain and make available to the public, through certification, high quality seeds and propagating materials of notified and registered varieties. It has been reckoned that countries round the world have focused on use of certified seed for enhancing agriculture productivity owing to its better profitability coupled with application of internationally acceptable quality parameters. In order to improve the availability of quality seed to farmers the importance of provision of certified seed needs to be emphasized and the services of this sector need to be revitalized in accordance to the requirements of local and international challenges.

Federal Seed Certification & Registration Department (FSC&RD) is an attached department of Ministry of National Food Security & Research, Government of Pakistan has mandate of assuring the quality of seed through seed certification and variety registration. FSC&RD is a third-party regulatory department which provides seed certification services as and when requested by public and private seed agencies and has annual plan for field crop inspection and seed testing. The prime goal of FSC&RD is to protect the farmer's interest. After the enactment of Seed Act Amendment, 2015-16, FSC&RD has initiated comprehensive awareness campaign / training for the various stakeholders so as to enhance the provision of quality seed to the farmers. FSC&RD is working on track and traceability of certified seed and simplification of procedures, ease of doing business for variety registration and certification services so as to promote varieties developed by local research institutes and enhance availability of certified seed.

Brief activities performed by the department for the year 2021-22, are as followed:

ACHIEVEMENTS /ACTIVITIES OF FSC&RD

1. REGISTRATION OF SEED COMPANIES AS LOCAL SEED PRODUCER:

The Seed Business Regulation Committee (SBRC) recommended the acceptance of applications of Sixty-five (**65**) Seed Companies on the basis of fulfillment of notified terms and conditions. Now these companies shall be asked to sign a performance contract and to submit performance bond as per Rule 4 (8) (a) & (b) of amended rules for issuance of registration certificate to do seed business as local seed producer for five years (2022-2027).

2. REGISTRATION OF SEED COMPANIES AS LOCAL + SEED IMPORTER:

The SBRC recommended the acceptance of application of one (1) seed company on the basis of fulfillment of notified terms and conditions, now the company shall be asked to sign a performance contract and to submit performance bond as required und Rule 4 (8) (a) & (b) of amended rules for issuance of registration certificate to do seed business for five years (2022-2027).

3. REGISTRATION OF SEED COMPANIES AS SEED IMPORTER:

The SBRC recommended the acceptance of applications of (53) seed companies on the basis of fulfillment of notified terms and conditions, now these companies shall be asked to sign a performance contract and to submit performance bond as required under Rule 4 (8) (a) & (b) of amended rules for issuance of registration certificate to do seed business for five years (2022-2027).

4. REGISTRATION OF SEED COMPANIES AS SEED EXPORTER:

The SBRC recommended to register **(03)** Seed Companies as seed exporter for five years (2022-2027) on the basis of fulfillment of notified terms and conditions.

5. CANCELLED SEED COMPANIES (LOCAL SEED PRODUCER):

The SBRC under Section 22 (B) (8) of Seed (Amendment) Act, 2015 and Rule 4 (18) of amended Seed (Business Regulation) Rules 2016 cancelled the registration of 140 seed companies who were reported dormant for three or more years.

6. RENEWAL OF REGISTRATION OF SEED COMPANY M/S. MINAR SEED CORPORATION, MULTAN AS LOCAL SEED PRODUCER:

SBRC decided to renew the registration of seed company for five year (2022-2027) subject to provision of documents/information as per rule 4 (14) (b) and (e) within three months.

7. FINAL OPPORTUNITY TO SHOW SATISFACTORY PROGRESS TO SEED COMPANIES APPLIED FOR GRANT OF RENEWAL OF REGISTRATION OF SEED COMPANIES AS LOCAL SEED PRODUCER:

SBRC decided to give a time period of Kharif 2022 and Rabi 2023 to (14) seed companies as a final opportunity to show satisfactory progress otherwise registration shall be cancelled in the forth coming meeting of SBRC without any notice.

8. SEED COMPANIES APPLIED FOR GRANT OF PERMISSION TO PRODUCE BASIC SEED:

SBRC accepted the applications of (51) seed companies submitted for grant of permission to produce basic seed with condition to be counter verified physically by committee comprising of Regional Director of concerned province, Officer In-charge of respective field office and Dir (SR) along with DD (Plan) from FSC&RD headquarter within two months.

9. REGISTRATION OF SEED PROCESSING UNITS:

SBRC accepted the applications for grant of registration of (47) processing units subject to provision of calibration certificate from certified engineer within two months.

10. SEED ACT VIOLATION:

SBRC decided to suspend FSC&RD services to M/s. Hexon Enterprises (Pvt) Ltd, R. Y. Khan (reported/involved in distribution of misbranded canola seed in various districts of Baluchistan

through Agriculture Extension Department, Baluchistan) till final outcome of enquiry. Further it was also decided that Provincial Government should also be informed for not entertaining the company in case of any tender.

11. FIELD CROP INSPECTION

A total of 876217 acres of different crops (cotton, paddy, maize, pulses, oilseeds, vegetables and fodders) offered by the public and private seed agencies were inspected for certification purposes.

12. SEED SAMPLING & TESTING

A total quantity of 467172.32 mt locally produced seed of major and minor crops was sampled and tested for purity, germination and seed health purposes.

13. SEED QUALITY MONITORING IN THE MARKETS

During 2021-22, under the seed act enforcement, a total number of 483 cases were filed in different Courts of Law against the seed dealers found selling substandard seeds and a quantity of 52.62 mt seed of different crops was seized. Progress report in respect of seed act enforcement is in progress as all field offices have not submitted their reports so far.

14. IMPORTED SEED CONSIGNMENTS

A total quantity of 72721.67 mt of imported seed (with a worth of 35957.22 million rupees) of various crops/hybrids (maize, paddy, sunflower, canola, fodders, potato, vegetables etc.) was tested under Seed (Truth in Labeling) Rules, 1991 at the port of entries i.e. Lahore and Karachi.

15. CENTRAL SEED TESTING LAB, ISLAMABAD

CSTL provides seed sampling and seed testing services to Food and Agriculture Organization (FAO) and 40 samples for wheat seed and vegetables seed were sampled and tested. CSTL received 1334 seed samples of different crops i.e Wheat, Paddy, Cotton, Pulses and vegetables which were tested for seed purity, seed germination, seed moisture and other components.

Second regular international audit of CSTL was done by two member international team of ISTA on 28-29 April, 2022. The audit was successful and compliance report of ISTA queries has been submitted to ISTA.

16. TRAININGS

Federal Seed Certification & Registration Department in collaboration with FAO, Pakistan arranged two training programs for capacity building of 33 newly appointed officers. First training on Seed sampling and testing was arranged at FSC&RD, Rahim Yar Khan on 26-28 January, 2022. Training on Crop Inspection was held at FSC&RD, Multan and Khanewal on 28-30 March, 2022

17. INTERNATIONAL COLLABORATION

For seed sector development in Pakistan, FSC& RD International Cooperation section was in the process of deliberations during the period July 2021-June 2022 through different cooperation proposals with the following countries and international organizations; D-8, SAARC, ECO, Turkey

Netherlands, Germany, UK, Middle East, Azerbaijan, USA, Japan, Russia, Korea, , China, Turkmenistan, FAO, Azerbaijan and Germany.

18. SEED HEALTH TESTING LAB. ISLAMABAD

A total number of 20 samples comprising of 6 basic and 14 certified categories of samples were tested respectively. Wheat varieties TD-1, TJ-83, Benazir, Sindhu, Imdad-5 and Kiran-95 were tested for Black point, Kernal bunt and Common bunt diseases by using Dry Inspection and microscopic identification methods. Overall, only black point disease was detected in all seed samples. Out of 20 seed samples, 8 samples were found within the prescribed seed standards while 12 seed samples were rejected due to high percentage of black point infection.

19. DUS EXAMINATION

A total of about 252 new candidate lines of oilseeds, vegetables, pulses, fruits, paddy, fodder & forage, medicinal plant, maize, wheat & cotton have been examined for Distinctness, Uniformity and Stability (DUS) trials during the subject period. DUS examination is in progress.

20. ENLISTING DATA

A total of 840 challans fee received on behalf of enlisting in the head of account C03139 during the period the period under report.

i) Issuance of National register of Enlisted varieties:

National register of enlisted varieties with 5716 entries was circulated on 07-12-2021.

ii) Coding of NUYT entries:

A total of 1086 entries were coded for NUYT/adaptability trials:

Sr. No.	Crop	No. of entries coded during July 2021-June 2022
1	Oilseed	189
2	Pulses	88
3	Rice	196
4	Fodder	60
5	Vegetable	36
6	Potato	51
7	Wheat	69
8	Sugar beet	7
9	Maize	337
10	SSG	53
Total		1086

21. TRACK AND TRACEABILITY OF CERTIFIED SEED

In order to check the flow and distribution of certified seed a total of 540 companies involved in Cotton seed production and distribution were inquired to submit traceability data starting from Cotton crop inspection, procurement, sampling, testing, issuance of tags, distribution till seed dealers and farmers, declaration of undistributed quantity and return of tags to FSCR&RD. The information was collected from each station variety wise and district as well as province wise lists were maintained. A total of 46 seed companies have been shortlisted which failed to complete their traceability trail as

required and have been proposed for necessary action as per law. As per data collected, 27828 MT of certified seed went to the farmers i.e 78% of total seed availability.

22. FRUIT PLANT CERTIFICATION SYSTEM

- i) During FY 2021-22, FSC&RD registered 226 horticultural nurseries to document and streamline nursery plant production and dissemination.
- ii) Certification was carried out for 275843 nursery plants to promote production and dissemination of disease free and true to type nursery plants.

23. DEVELOPMENT INITIATIVES

i) PSDP INITIATIVES

Following three PSDP projects were being implemented by FSC&RD during FY-2021-22:

- a. **“Establishing Seed Certification Laboratories at Khuzdar and Turbat”, with Objectives:**
 - Establishment of Seed Testing Laboratories for provision of seed certification services in the southern region of Balochistan.
 - Development of better and effective liaison with provincial and federal counterparts through establishment of FSC&RD infrastructure in the region.
 - Providing support in food security system of the region through enhancing local seed supply and monitoring of seed quality.
 - Helping in evaluation and testing of high yielding crop varieties, adaptable to local climatic conditions.
- b. **“Establishment of Plant Breeders' Rights Registry and strengthening of DUS Examination System” with objectives:**
 - Provide structural and functional arrangements for PBR Registry.
 - Develop technical material for the PBR Registry.
 - Establish digital data base of existing plant varieties to improve registration process of new varieties.
- c. **“Establishment of Consumer Sourcing Seed Authenticity System and Strengthening of Labs of FSC&RD” with objectives:**
 - Establish a system of traceability of seed for the end user through “SMS verification service” for the farmers.
 - Create a centrally linked Management Information System (MIS) for effective seed quality regulation service.
 - Up-gradation of the existing selected labs of FSC&RD.

ii) REVIVAL OF EARLY GENERATION SEED

- Following measures were taken to improve availability of Early Generation Seed (EGS) to produce certified seed.
- Liaison between breeders of registered varieties and commercial seed companies was created to streamline production of the EGS according to demand and supply.
- Facilitated initiation of Basic category seed production by private sector.

iii) IMPROVEMENT IN DUS EVALAUTION

- Establishment of a state-of-the-art testing facility has been initiated to improve field trials evaluation for registration of plant varieties.
- A Plant Varietal Protection (PVP) laboratory has been established support molecular profiling of registered and candidate plant varieties.

24. COORDINATION WITH ACEDEMIA

Liaison with academia is being improved to support education and research activities. Seed Sciences education at Arid Agriculture University, Rawalpindi is being supported through a MoU.

25. GRIEVANCE ADDRESSAL AT PMDU

A total of 400 have been received at PMDU out of which 395 have been resolved and 5 are in process. According to the instructions of PMDU tasks a total of 54 posts including 2 posts of Deputy Director (BS-18), 24 posts of Seed Analyst (BS-17) and 7 posts of Seed Testing Assistant (BS-17) have been filled. Similarly, 35 posts of non-gazetted staff have also been filled in compliance with PMDU tasks.

Area, Seed Requirement and Seed Availability 2022-23

Kharif 2022 and Rabi 2022-23

Crop	Area (000 Ha)	Total seed requirement MT	Seed Availability (M.T)			
			Public	Private	Imported	Total (Loc+Imp)
* Wheat	8923	1101991	49329.93	462048.86	0.00	511378.79
			4.48%	41.93%	0.00%	46.41%
** Cotton	2330	46041	448.93	41722.44	0.00	42171.37
			0.98%	90.62%	0.00%	91.60%
** Paddy	3070	44148	2752.33	53112.08	11443.58	67307.99
			6.23%	120.30%	25.92%	152.46%
Maize	1331	32868	183.47	3751.00	24351.96	28286.43
			0.56%	11.41%	74.09%	86.06%
Pulses	1185	42674	370.11	5823.33	0.00	6193.44
			0.87%	13.65%	0.00%	14.51%
Oilseeds	830	10790	324.21	4044.49	366.75	4735.45
			3.00%	37.48%	3.40%	43.89%
Vegetables	280	8400	1.47	1338.15	3248.61	4588.23
			0.02%	15.93%	38.67%	54.62%
Fodders	2038	61140	33.10	18562.87	20276.50	38872.47
			0.05%	30.36%	33.16%	63.58%
Potato	166	415000	0.00	0.00	13400.74	13400.74
			0.00%	0.00%	3.23%	3.23%
Total	20440	1798496	53444	590403	73088.13	716934.90
			2.97%	32.83%	4.06%	39.86%

- Pulses:** include gram, mungbean, mashbean, lentil and others etc.
- Oilseeds:** include rape & mustard, canola, sunflower, groundnut, sesamum and others etc
- Fodders:** include different Rabi and Kharif fodders.
- Vegetables:** include different Rabi and Kharif vegetables.

* Wheat Seed Testing Data is provisional (On the basis of before processing seed testing)

and final figures will be available by 25th October 2022 (On the basis of After processing Testing)

Expected after processing losses are 10 % and rejection factor of seed lost is around 3%

Number of tags issued to any company depends on after processing seed quantity and market driven demand of seed

** The seed availability for Kharif season 2023 will be available in January 2023.

Crop is at field inspection stage

12.

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 2021-22 are as under:

MAJOR ACTIVITIES FOR THE YEAR 2021-22:

- POD in consultation with all provinces prepared the working paper on Oilseed crops viz Canola, Sunflower and Rapeseed & Mustard and presented in the Federal Committee on Agriculture (FCA) meetings on Rabi and Kharif seasons 2021-22.
- POD's experts participated in the following technical meetings/trainings session arranged by the M/o National Food Security &Research.
- Preparation of a presentation for Prime Minister on import substitution and National Self Sufficiency in edible oil with Food Security Commission-I.
- A study on oilseed sector strategy is under process local consultant hired by FAO.
- Progress review of oilseed promotion activities and future strategies.
- Meeting with seed companies for the availability of canola sunflower and sesame seed.
- Contributed material for Pakistan Economic Survey 2021-22 on oilseed crops.
- Awareness campaigns regarding sunflower, canola and olive cultivation were carried out at different locations for promotion of these crops.
- Two mega projects titled "National Oilseed Enhancement Program" and "Promotion of Olive Cultivation on Commercial Scale in Pakistan Phase-II" are in progress

ACTIVITIES OF “NATIONAL OILSEED ENHANCEMENT PROGRAM” (NOEP)

Targets for the FY- (2021-2022)

No.	Particulars	Punjab		Sindh*		KP		Balochistan	
		Targets	Achiev:	Targets	Achiev:	Targets	Achiev:	Targets	Achiev:
1.	Subsidy on seed								
	Canola	36,531	36,531	18,000	00	10,000	2563	14,000	14,000
	Sunflower	52,114	52,114	80,000	00	4,000	9092	14,000	14,000
	Sesame	57,600	57,600	9,000	00	1,000	2541	6,000	7,680
	Total	146,245	146,245	107,000	00	15,000	14,196	34,000	35,680
2.	Demo plots								
	Canola	30	30	25	00	05	05	12	12
	Sunflower	30	30	25	00	05	05	12	12
	Sesame	15	15	10	00	02	02	08	08
	Total	75	75	60	00	12	12	32	32
3.	Mega farmer gatherings	45	200 (Smart gathering)	36	00	14	14	14	14

*Sindh component has not come on board so far.

- Internal meeting of Federal Project Monitoring Unit (FPMU) of National Oilseeds Enhancement Program and Provincial Directors was held on 21-12-2021 at POD, HQ Islamabad. On agenda items (i) Discuss progress and issues in project implementation. (ii) Release of funds and utilization. (iii) Achievement of targets in project interventions. (iv) Slow progress in farm machinery component. (v). Pre-qualification of seed companies and farm machinery manufacturing firms. (vi). Planting of demo plots with true spirit and objective. (vii). Subsidy disbursement mechanism. (viii). Others if any by the Project Components.
- A meeting with seed companies was held on 16-06-2022 at POD, HQ Islamabad to ensure the availability of seed for achievements of allocated sunflower sowing targets under the Project.
- The focal Person for Punjab, KPK and Balochistan regularly monitored the canola sunflower and sesame crop fields under NOEP project.

Pakistan Oilseed Department activities at a glance.



Meeting with Provincial Project Directors and seed companies.



Monitoring team visit to the sunflower and sesame field at Balochistan and KP.

PROMOTION OF OLIVE CULTIVATION ON COMMERCIAL SCALE IN PAKISTAN PHASE-II

MAJOR ACHIEVEMENTS YEAR 2021-22

Plantation of Olive:

Procurement of 0.80 million olive nursery plants of different exotic and local varieties for distribution among the farmers completed. Olive cultivation completed on 5985.18 acres all over Pakistan. These plants were cultivated on public and private farms as per Stranded operating procedures given in the PC-I.



Installation of Drip Irrigation System:

During this year drip irrigation system was installed on 1383 acres on olive orchards on public and private land at Punjab, Khyber Pakhtunkhwa, Baluchistan and Sindh Provinces.



Plant Propagation:

Local olive plants production is a prime objective of the project. Nursery production and its management remains a major focus of all project's components. Propagation of 0.641 million sapling through cutting and air layering has been done. Propagated cutting will be ready for distribution of farmers after one and half year.



Olive value chain development:

Value addition is an important process for sustaining value chain and productivity of any crop. Preparation of different olive by-products i.e. Olive soap, Olive leaf tea, olive pickle, olive jam, olive cookies at different components of the project.



Capacity Building:

Thirty six (36) Nos. trainings were conducted for capacity building of olive growers and farmers on different aspects of olive main focus was given to i.e. Olive Cultivation, Orchard and Nursery management, pruning and training of olive crop and on value added products. About 1600 people from different areas of life i.e students, farmers and stakeholder were trained in these trainings sessions. 3rd National Olive Festival was held on 11th&12th November, 2021 at National Agricultural Research Centre, Islamabad. Stalls of olive related products from private and government institute were arranged to create awareness among public and private sector. One day National Seminar on "**Integrity, Sustainability and Future Prospective of Olive in Pakistan**" was held on 26th December 2021, at University of Chitral.

Targets and Achievements for the FY-(2021-2022)

Sr.#	Particulars	Targets	Achieved
1	Plantation (acres)	16000	5985.18
2	Drip Irrigation (acres)	1500	1383
3	Plant Propagation	1.079 m	0.641 m
4	Training/ Seminar	36	37
5	Adaptability Trial	13	22
6	Equip. for certification labs (05 nos.)	02	02
7	Nursery infrastructure (50:50) 10 nos.	05	02
8	Harvesting and Pruning kits (50:50) 500 nos.	500	500
9	Recruitment of project's staff	11	11

Overall Annual Progress 80%

13.

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.

Performance 2021-22

The following are the activities/achievements during the financial year 2021-22:

1. Providing technical input for support price of wheat based on economic analysis of major determinants.
2. Providing technical input to the M/o NFS&R on indicative price of sugarcane, based on economic analysis of major determining factors.
3. Providing technical input to the M/o NFS&R on intervention price of seed cotton based on

- economic analysis.
4. Data and briefs on major crops i.e. wheat, cotton, rice and sugarcane has been prepared for the purpose of submission of summary to the Cabinet for determination/announcement of support/intervention price.
 5. Prepared annual Policy Analysis Report on seed cotton, sugarcane, rice paddy and wheat for 2021-22 crops.
 6. Carried out annual input-output field surveys in the main producing areas of cotton, sugarcane, wheat and rice crops.
 7. As consultative mechanism, Annual meeting of API committee of all stakeholders before the formulation of price policy for wheat, Seed cotton, crops were conducted.
 8. Providing Technical input and participation in thee meetings of Senate and National Assembly Committee meetings.
 9. Provided technical input to Pakistan Citizen Portal (PMDU) complaints and PMDU special tasks.
 10. Responded to the Senate and National Assembly Questions regarding food security, hike in input prices and emerging policy issues in respect of food security in the country.
 11. Provided technical assistance to the Ministry on analysis of emerging policy issues in respect of food security in the country.
 12. Prepared technical input as brief/comments on various issues/studies/papers/letters etc.
 13. Provided information on bilateral, multilateral and WTO agreement and other challenges related to trade.

Processing of Surveys Data

- Field Survey data was processed to update Cost of Production estimates for the following major crops:
 - i. Wheat, (Punjab & Sindh,
 - ii. Cotton (Punjab and Sindh),
 - iii. Sugarcane (Punjab and Sindh) and
 - iv. Rice (Punjab and Sindh).

International Trade

- Analysis of International Trade related to agriculture.
- Meeting with International Agencies/Ministries/Provincial Departments

Special Assignment

- Assisted the Ministry in coordination of the meeting of Federal Committee on Agriculture (FCA) for Rabi and Kharif Season.
- Prepared draft report on Food Supply Committee on Defence Planning
- Coordinated meeting of Food Supply Committee on Defence Planning

14. PAKISTAN AGRICULTURAL RESEARCH CENTRE (PARC)

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:

Wheat:

- 676 advance lines under station yield trials and national regional (multi-location) yield trials, 20 advance lines to the Provincial Uniform Wheat Yield Trials, 06 advance bread wheat lines & 02 durum lines were contributed for testing and further evaluation.
- Characterized and assessed 1485 test entries for yield potential, diseases resistance and high zinc content. About 750 crosses were attempted to develop diverse recombinants.
- Maintained 1130 populations at different filial generations.
- Speed Breeding Facility (Greenhouse) has been constructed and it has started functioning.
- 15 experiments were conducted to find out the most suitable planting time, seeding density, fertilizers levels, Biofertilizers, Nano particles, zinc application, Biochar, growth promotors etc. to find out the best management practices.
- Spot examination of an advance line NR 533 has been done.
- 125 demo plots were planted on farmer fields/ research centers on zero tillage planting, planting of wheat on beds & ridges, improved wheat varieties etc in different ecologies.
- 15 Field Days /Trainings conducted in different ecologies of Pakistan.
- 10 students from various universities completed their internships.
- 325 tons of wheat seed of different categories i.e. 2.0 tons BNS, 25 tons Pre-Basic 180 tons Basic and 100 tons certified seed of varieties i.e. Pakistan-2013, Borlaug-2016, Zincol-2016, Markaz-2019 and AZRC Dera.

Rice:

- 03 advanced Yield Trials (AYT-I 2021, AYT-II & AYT-III) at 16 locations evaluated
- 01 Preliminary Yield Trial with 65 lines screened and 20 high yielding lines selected.
- 69 entries comprising of IRRI INGER nursery have been evaluated.
- 15 genotypes acquired from different public and private sources, planted for evaluation and utilization in breeding program.
- 20 GSR lines & commercial hybrids screened against drought stress by the application of PEG at 3 different levels (10%, 15% & 20%), 08 of them were tolerant.
- A set of 35 promising lines planted for the evaluation of potential to withstand the higher water level in case of floods. 10 lines found to exhibit significant level of tolerance.
- Testing of Filial generations has been done as F1 (50 genotypes), F2 (32 genotypes), F3 (Reverse breeding from commercial hybrid) lines.
- F3 (Reverse breeding from commercial hybrid) lines. 103 lines for Off-season generation advancement also practiced at RRI Dokri Sindh.
- Crossing Block comprising of 95 genotypes (old and new rice varieties, GSR lines and hybrids etc.) planted. 250 fresh crosses attempted, out of which 64 harvested successfully.
- Marker Assisted selection has been performed where 80 parental lines have been tested against BLB resistant genes by using SSR markers.

- 21 rice genotypes i.e. hybrids, landraces, varieties and GSR, examined at varying water availability (100%, 50% less and 75% less than normal).
- PK-1121 a promising commercial variety planted by three methods. Mechanical transplanting method found most efficient with enhanced productivity and profitability.
- 05 MS & 01 PhD researchers conducted research.

Maize, Sorghum & Millet (MS&M):

- 02 maize varieties i.e. NARC 2 and NARC 3 recommended by VEC.
- 03 maize elite varieties CZP132001, MSMOPV2, and MSMOPV3 characterized and also completed the DUS data for the 2nd year
- An experiment on three maize OPVs (Haq Nawaz Gold, CZP132001, MSMOPV3) with 4 fertilizer treatments. 5-7% yield increase recorded in treatment with Biozote combination.
- 250 maize inbred lines (local and exotic sources) evaluated under glass house for various roots architectural parameters.
- 100 pearl millet accessions planted for assessment of grain yield and some of the accessions were selected for second year evaluation.
- 03 NUMYT trials, Maize Hybrid Trial Year 1(129 entries), Maize Hybrid Trial Year II (63 entries) and Maize OPVs (07) evaluated.
- 04 NUYTs i.e. 2 Maize hybrids with 183 and 102 entries, 01 Sorghum with 14 entries and 01 pearl millet with 52 entries conducted
- 6 tons of maize, sorghum and millet seed was produced
- 03 MS and 06 BS students conducted research.

Pulses:

- 05 Promising advance genotypes contributed to NUYTs (2 Mung, 1 chickpea & 2 lentil).
- 18 disease resistant lines identifies i.e. 07 chickpea lines against *Ascochyta* Blight and 11 lentil lines against stem rot identified as resistant.
- Identified and selected 11 genotypes in lentil and 33 genotypes in mash having erect plant type suitable for machine harvesting.
- 68 lentil and 26 chickpea lines identified as tolerant against Lectofen herbicide.
- 13 new cross combination were developed in chickpea, lentil, mung and mash to create genetic variability through hybridization.
- 639 germplasm genotypes evaluated for genetic diversity i.e. chickpea (175), lentil (130), mung (120), Mash (50), Fababean (80), Red kidney bean (59) and cowpea (25).
- 200 demo plots of chickpea, mung, Mash and lentil planted in Potohar region and Jafferabad to disseminate improved production technology of pulses.
- 05 Farmer field days, 03 awareness seminar and 2 training courses conducted at Chakwal, Attock, Bhakkar, Karak and Jafarabad with total of 1000 participants.
- 20 tons of quality pulses seed produced (Mung 12 , Mash 01 , Lentil 1.6 & Chickpea 5)

Oilseeds:

- Four (04) oilseed varieties (Two groundnut i.e. NARC-2021 and NARC-ORP-1, one Tili,e, PARC-Til and one soybean i.e. NARC-Soy-2021) recommended by VEC.
- 48 sunflower and 245 rapeseed inbred lines (A, B & R) and 276, 265, 100 and 100

accession/lines of groundnut, soybean, rapeseed-mustard and sesame were planted for screening, purification, maintenance and seed increase.

- Thirty one (31) sunflower and 30 rapeseed hybrid combinations were made.
- Spot examination of three varieties i.e. PARUSN-3, SMH-0927 (Sunflower) and NARC-Soy-2021 (Soybean) planted at different ecologies was done.
- 14 advance lines/ hybrids included in NUYT trials that included 02 Sunflower hybrids, 05 rapeseed-mustard lines, 02 Soybean lines, 03 Sesame lines and 02 Groundnut lines.
- 12 BS students facilitated for internship training.
- 107.9 tons of quality seed i.e. Soybean (100 tons), NARC Sarson (7.5 ton) and Groundnut (0.4 ton) produced and given to farmers.

Fodder & Forage:

- 04 oat, 05 vetch and 05 millet advance lines were contributed in national uniform yield trials (NUYT). Conducted adaptability trials of 05 Korean rye grass lines i.e. GF, GF2, GC, GC2 and IR604 with one local check.
- DNA profiling of PARC Oat for Distinctness, Uniformity and Stability (DUS) completed.
- 764 germplasm/lines i.e. Sorghum 170 lines, Millet 130 lines, Sudan grass 21 lines, oats 400 lines, barley 30 lines and vetch 13 lines were evaluated and 70 lines were selected for further testing.
- 02 PhD, 04 MS and 08 BS students conducted research.
- 72 ton of quality seed i.e. Oats 70, Millet 0.5, Mott grass cuttings (1.24 tons) produced.
- 05 farmer field days for 350 Farmers conducted at five different ecologies with demo plots.

Plant Physiology:

- 12 NUWYT lines and 08 commercial wheat varieties showed heat stress tolerance (35-40 °C) at reproductive stage i.e. Ghazi-19, Anaaj-2017, AZRC Dera-19, Bhakkar Star-2019, Pasina-2017, Akbar-2019, Sindhu-2016, NIFA Awaz-19, NRP-21 and NRP-05.
- 18 NUWYT, 04 advance lines and 08 wheat varieties were observed drought tolerant at (35% FC) i.e. Bhakkar-Star-2019, Pakistan-2013, Barani-2017, Sindhu-2016, Pasina-2017, NRP-21& 05
- 04 NUWYT and 06 commercial wheat varieties were found salt tolerant i.e. Zincol-2016, Bhakkar-Star-2019, Sindhu-2016, Pasina-2017 and NRP-05
- 08 wheat lines (CIMMYT material) proved climate adapted with better yield
- 03 sunflower lines i.e. SF-2, SF-10 and SF-11 proved drought tolerant at germination and seedling stage under PEG (20%) induced drought stress.
- 04 maize lines i.e. HNG, ILC-314, ILC-88 and C2P132001 identified as salt tolerant
- 09 green super rice (GSR) lines i.e. NRP C-1, NRP C-2, NRP C-4, NRP C-5, NRP C-6, NRP C-16, NRP C-17, NRP C-18 and IR-6 proved salt tolerant.
- 06 BS and 05 M.Phil students conducted research.
- Published 02 research articles in refereed journal

Fruits & Vegetables:

05 fruit varieties developed and approved by the KP Seed Council for general cultivation in their respective ecologies.

- 1. NARC-Avocado-2,
- 2. NARC-Avocado-1.
- 3. NARC-Fuerte,
- 4. NARC-cyclone purple,
- 5. NARC Mexican Lime.
- NARC-Avocado-2 is an early maturing, cold resistant with strong disease/pest resistance. It has an upright canopy having production of $8100 \text{ kg acre}^{-1}$
- NARC-Avocado-1 is an early maturing, cold resistant with strong disease/pest resistance. It has Upright canopy having production of $7150 \text{ kg acre}^{-1}$.
- NARC-Fuerte is mid seasoned maturing variety, spreading canopy with planting density of 70 plants acre^{-1} with $6300 \text{ kg Production acre}^{-1}$.
- NARC-Cyclon Purple is early maturing, cold hardy, can be grown from subtropical to mild Temperate climate with strong disease/pest resistance. The plants attain spreading canopy with 70 plant acre^{-1} with $5600 \text{ kg Production acre}^{-1}$. NARC-Mexican Lime is seedless variety, mature in summer having mild acidic taste, plant canopy is spreading type and production is $5808 \text{ kg acre}^{-1}$.
- 02 seedless grape varieties i.e. Superior seedless and Razaki were examined for DUS and Spot Examination by FSC&RD.
- *Fruit load optimization in early maturing peach:* 02 Peach cultivars i.e. Early Grand and Florda King were examined and found promising in terms of yield and early maturing and escape fruit fly attack if timely harvested. Fruit thinning spaced at 10 cm after 05 days of fruit set is recommended for quality fruit production
- *Evaluation of Citrus and Kiwi varieties:* 18 exotic citrus varieties and 07 exotic citrus rootstocks and 08 varieties of Kiwi are being evaluated at NARC.



NARC-Avocado-1



NARC-Avocado-2



NARC-Fuerte



NARC-Cyclone



NARC-Mexican Lime



Peach load management



Evaluation of exotic citrus & Kiwi



- Out of 123 round fruit shape advance lines of indeterminate tomato; 20 round fruit shape advance lines yielding from 42.41 to 64.35 t/ha were found at par with high performing check Saalar-F₁ (59.08 t/ha) and out of 116 oblong fruit shape advance lines of indeterminate tomato; 03 oblong fruit shape advance lines yielding from 79.53 to 116.67 t/ha showed significantly maximum fruit yield, while 18 oblong fruit shape advance lines yielding from 44.60 to 68.47 t/ha were found at par with the high performing check Sunder-F₁ (60.43 t/ha).



Fruits of Advance lines of

- A promising onion strain “NARC Onion-05” selected on the basis of high bulb yield (16 t/ha) as compared to cultivated varieties (Swat-1 & Phulkara) completed its 2nd year visits for DUS.
- International Potato Centre (CIP), Lima, Peru provided 32 potato which were multiplied by tissue culture techniques for micro tuber production. 27 clones were selected and through seed multiplication 800 kg basic seed produced.
- 400 kg potato mini tubers of 105 clones were produced from local crosses and 600 kg mini tubers of 51 local crosses were produced for further multiplication. 400 kg basic seed of 32 CIP clones produced for further multiplication.
- Seed of 03 potato varieties i.e. NARC-Potato-I, NARC-Potato-II and NARC-Potato-III were produced in ample quantity which will be sent for DUS and NUYT.
- Two research articles published in reputed scientific journals



NARC-Onion-5

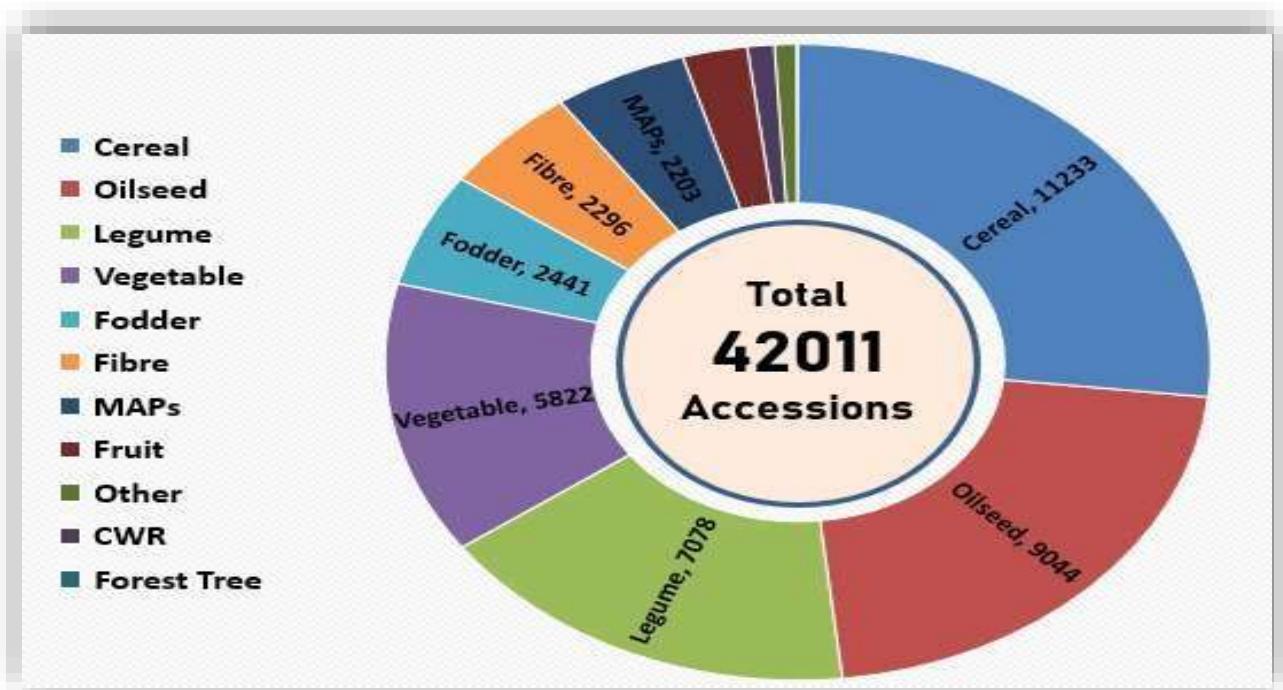


Exotic Potato trial

Plant Genetic Resources:

- The mandate of the National Genebank of Pakistan (NGP) is to capture maximum crop diversity, conserve it for longer periods and make it available for research and development. The latest status of the germplasm at NGP has been reached to 42011 accessions.
- *Germplasm acquisition:* 95 entries (Cereals 43, MAPs 43, legumes 5, vegetables 2, and oilseeds 2) acquired from different sources and banked after allotting accession numbers.
- *Germplasm distribution:* 6371 accession of diverse crops provided to breeders, researchers across the country for utilization in their breeding programs. 35.5% germplasm shared with Punjab followed by KP (22.4%), Sindh (3.4%), Baluchistan (0.7%) and AJK&GB (1%).
- *Viability testing:* 3722 conserved germplasm accessions were tested for its viability.
- *Safe-guarding breeder's material:* Services were provided to various stakeholders for temporarily storing of their valuable germplasm. NUYT entries of soybean stored

- **Evaluation and Characterization of Germplasm:** Germplasm accessions of various crops i.e. brassica oilseeds, rice, wheat, maize, lentils, Quinoa, cowpea, Soybean, mashbean, fennel, linseed, kalwanji and coriander were regenerated and characterized for traits of interest.
- **Biochemical & Molecular Evaluation of PGRs:** Biochemical evaluation using SDS-PAGE of total seed storage proteins and molecular analysis using SSR markers carried out for genetic diversity assessment & discrimination of carrot, radish, cereals and pulses.
- **In-vitro propagation and preservation of vegetatively grown Germplasm:** In vitro cultures of different varieties of potato, sweet potato and sugarcane germplasm established. Fruit germplasm of various crops, established at clonal repository.
- **Studies on plant adaptations under local environment:** Investigations have been initiated in the field on selected herbs such as *Thymus vulgaris*, *Apiumgraveolus*, *Plectranthus* sp., *Aloe vera*, *Stevia*, *Coriandrum* sp., *Origanum vulgare*, *Artemisia annua*, *A. absinthium*, *Menthaarvensis* (China), Cool mint, *Menthapiperata* (Japan), Lavender (Syria), *Ammaranthus* for adaptation under local condition.
- Native medicinal/aromatic, edible and ornamental plants and herbarium specimens were collected from Kohistan, Baltistan, Lehtrar, Havelian, Margalla hills, Nakial (Kotli, AJ & K), Bannu, Waziristan. Herbarium specimens of native flora (445 specimens) collected from different areas were accessioned.
- Over 250 native plants collected from different ecologies are being maintained in the Botanical Conservatory and a similar number of exotic plants are also being maintained.
- Seeds of endemic monotypic genus *Sulaimaniaotostegioides* were acquired from northern Balochistan. A new species of *Cicer* from Zhob, *Cicerappozaicum* was described.
- A new species of *Nepeta* from Takht-e-Sulaiman, *Nepetasulaimanica* was described. *Glossocardiabosvallia*, *Anrederacordifolia*, *Dentellarepens* and *Oenotheralaciniata* have been recorded as new to Pakistan.
- Provided plant identification services to visitors, scientists, BS, MS and PhD students.
- 10 research articles published in reputed journals.



Latest status of the germplasm at National Genebank of Pakistan.

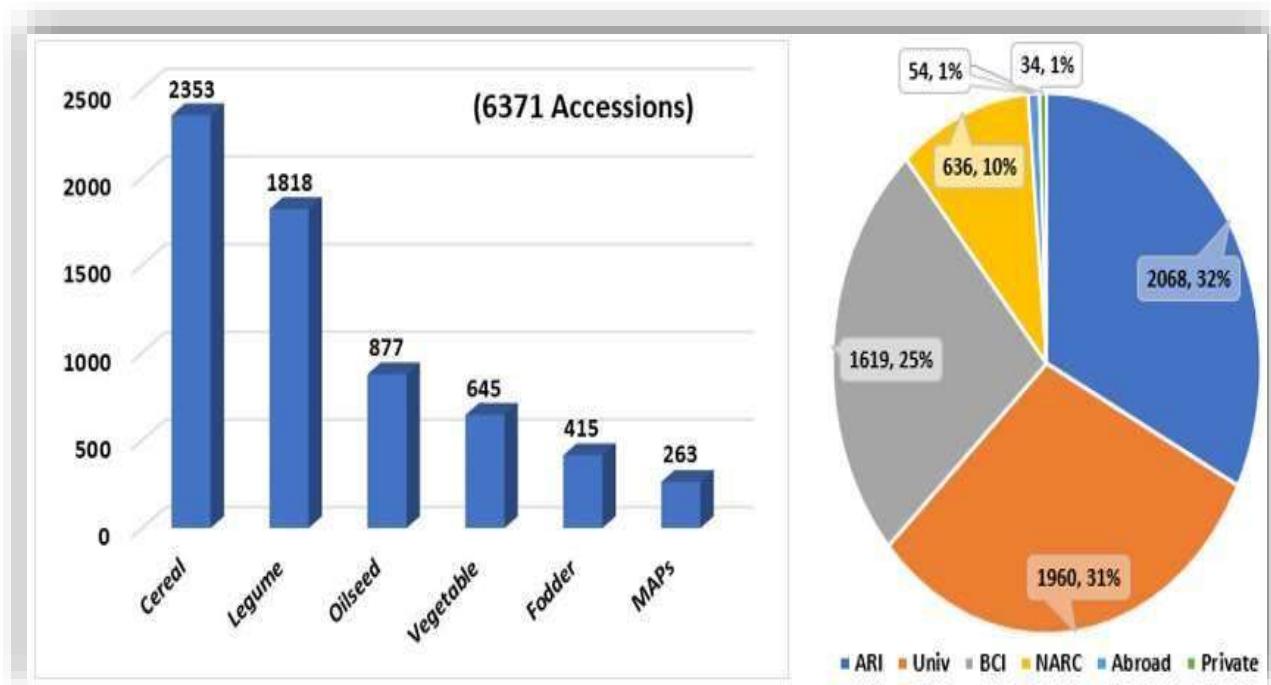
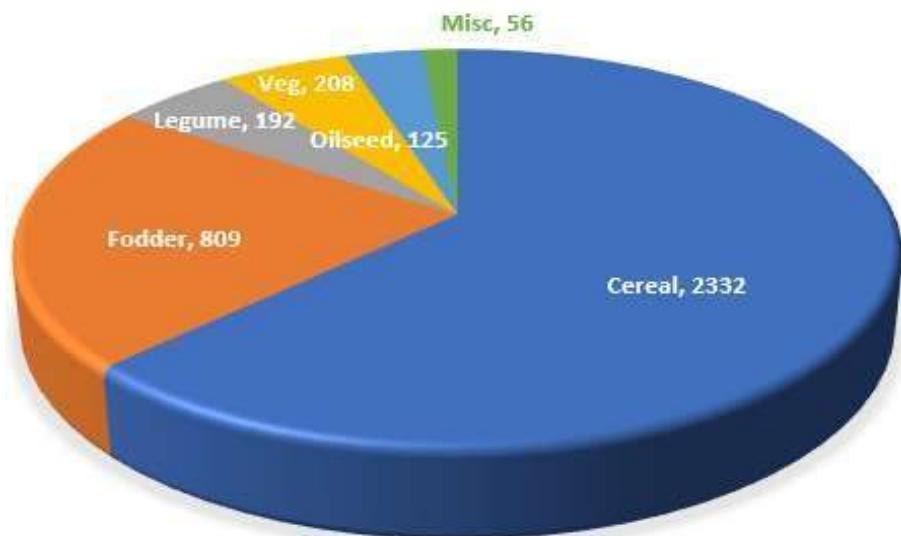


Fig: Distribution of crop germplasm entries to various stakeholders in the country by crop groups as well as Institute wise



Number of germplasm entries shared with stakeholders in different provinces.

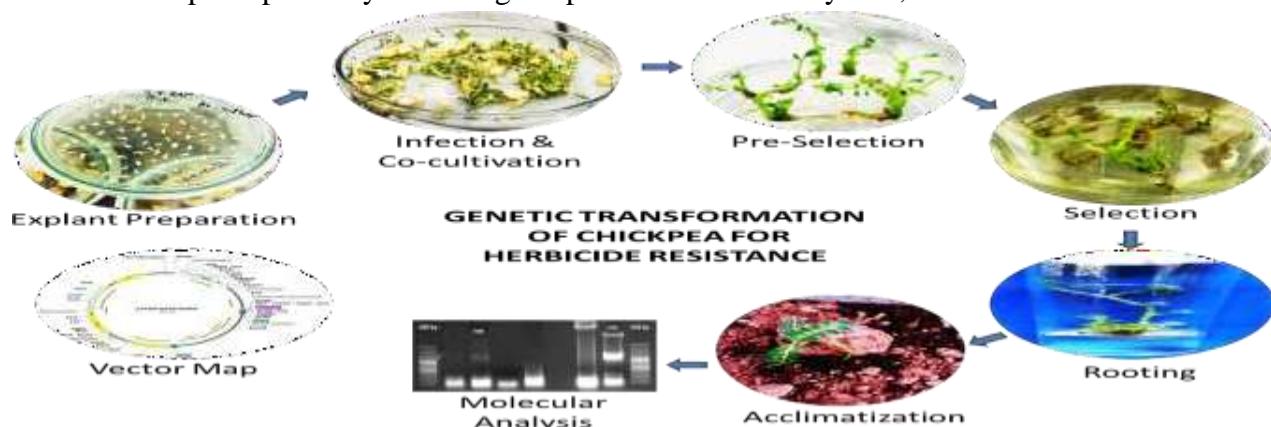


Viability tested of the conserved germplasm through standard germination tests

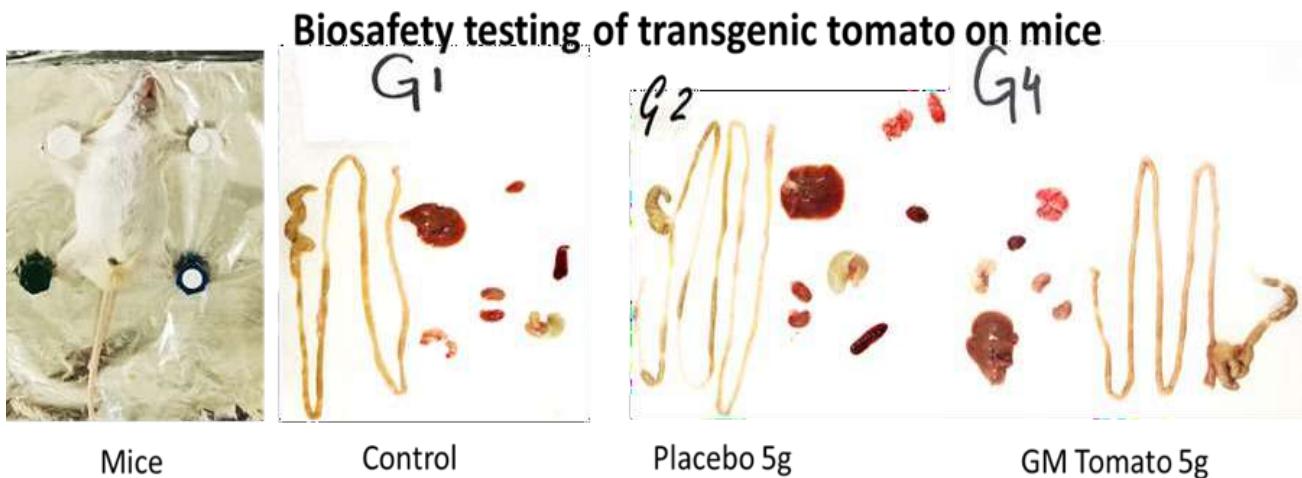
Genomics & Advanced Biotechnology:

Transgenic Research

- Transformation of cold tolerant gene (DREB1A) into 13 tomato lines/ 04 transgenic events and the resultant transgenic lines were advanced to T-8 generation.
- Biosafety testing trials of transgenic cold tolerant tomato on environmental and health related aspects were performed for assurance to ascertain their safety prior to commercialization.
- 50 crop samples tested for GMO through PCR with specific 35S and NOS primers.
- In Maize glutamine synthetase gene family was identified through genome wide identification of drought responsive genes and their validation was also done.
- Tested 08 cotton pink bollworm resistant varieties through ImmunoStrip Assay for the detection of CryIAc, Cry2A and CP-4/EPSPS.
- 25 cases of Intellectual Property Rights (IPRs) from various institutes of NARC were collected. Out of 25 cases, 11 cases fall in patent, 01 in trademark and 11 in PBRs.
- Genetic transformation of lectin gene in potato varieties (Asterix, Lady Roseta). Initially, GUS experiment was conducted to confirm the protocol reproducibility.
- Developed double haploid system in wheat having manual emasculation of wheat spikes, hybridization with fresh maize pollens, hormonal treatment, embryo rescue for production of more haploid plants by following the protocol of Maluszynska,2003.



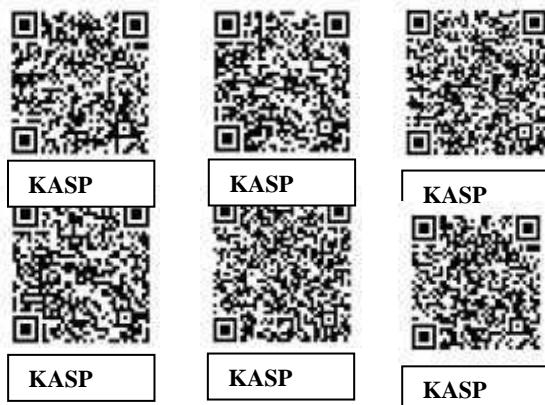
Representative diagrammatic steps of EPSPS gene transformation into chickpea.



Biosafety data of transgenic tomato (Mice health data)

Functional Genomics And Bioinformatics:

- Developed 18 hybrid rice combinations between Thermo-Sensitive Genic Male Sterility (TGMS) and elite GSR lines.
- Submission of 9 elite GSR lines to National uniform Yield Trial (NUYT) and Distinctness, Uniformity and Stability (DUS).
- DNA and total RNA of 06 tomato varieties were extracted, reverse transcribe the RNA, CDS and full length sHSP20 (Vis1) gene was isolated and cloned from *Solanum chilense*, *S. lycopersicum*. Positive clones were sequenced and submitted in NCBI database under accession No. OM908765.1and ON938177.
- Maintained the germplasm repository of 58 sugarcane varieties and lines



QR codes (Barcodes) of validated sugarcane variety specific KASP SNP genotyping markers.

- Acquired 347 rice germplasm lines including 268 from IRRI and 79 from CAAS China. Performed experiments on gene expression under salinity and genome editing using CRISPR/Cas9.
- Evaluated and multiplied 45 rice lines including 20 Backcross population, 11 salt tolerant population, 8 grain quality and yield and 6 bacterial blight resistant lines.

- Acquired 96 sugarcane varieties/lines, their parents, and close relatives' samples' 100K SNP. Developed protocol for designing of KASP SNP genotyping markers from array Data for DNA fingerprinting. 88 crosses of sugarcane lines acquired from China.
- SNP-based genome fingerprinting of 80 sugarcane varieties/lines performed.



Sugarcane fuzz growth at glasshouse as well as in the fields at NARC

- *Genomic selection of indigenous livestock:* Survey of sheep & goat production farms situated in Punjab & KPK province for genomic analysis related to the traits of economic importance. Blood collection & phenotypic data collection. Genomic DNA extraction and its analysis. SNP based genotyping / whole genome sequencing for genome wide SNPs identification related to economic traits (growth & diseases etc).
- Acquired an ultra-high throughput DNBSEQ-T7RS NGS platform which is the biggest in South Asia. DNBSEQ-T7RS harbors wide range of applications including Whole Genome Sequencing, Whole Exome Sequencing, Transcriptome Sequencing, WGBS Agriculture, Plant and Animal Genome etc



Tissue Culture:

- 100 meristems of Potato variety "Lady Rosetta" were initiated after Virus indexing through ELISA for invitro multiplication. Produced 25000 *in vitro* plants and shifted for tuber production. Harvested 190000 mini-tubers (G0).
- Germplasm of 28 parent potato varieties collected from Potato Research Institute Sahiwal, Gansu Agricultural University Lanzhou, China and planted for breeding at Babusar GB. 25 Combinations of crosses among 16 potato varieties were made and



4000 seeds were harvested from mature barriers to get F1 hybrid. Total 26,343 tubers were harvested from these crosses.

- In micropropagation of elite ginger germplasm, seed of two ginger varieties (Chinese and Thailand) were selected for Tissue culture and field plantation. Protocols of invitro multiplication has been optimized. Rhizome sown for sprouting.
- In micro propagation of elite banana germplasm, four new banana varieties were introduced in



Pakistan through tissue culture. Two Banana varieties NIGAB-1 and NIGAB-2 has been submitted case for Plant Breeder Rights in FSC&RD.

- 10,000 in vitro plants of NIGAB-1 and NIGAB-2 are ready to transfer in the field

Marker Assisted Breeding:

- DNA markers linked with 27 yellow rust resistance genes, 23 leaf rust resistance genes, 19 stem rust resistance genes and eleven linked DNA markers with Karnal bunt resistance are used.
- An advanced line with good rust resistance and low gluten content for celiac disease patients is in advanced wheat yield trials at wheat program NARC.
- About 210 Chinese wheat lines are crossed with CIMMYT lines. In first year's, experiments, 51 lines showed higher yield potentials. About 2000 F5 head rows are being evaluated for high yield, salt tolerance and resistance to rust disease. 89 lines showed immune reaction to yellow and leaf rust.
- DNA fingerprinting of following crop varieties has been done; NARC Super, Markaz-19 (Wheat), NR533 (Candidate wheat variety), NARC HG1 (Garlic), NIGAB 1 to 4 (Banana varieties)
- 22 research articles published in reputed scientific journals.

Natural Resource Division:

Adaptability Trials of Seeds of Summer and Winter Grasses:

Grass seeds imported from different countries of the world namely Australia, Thailand by private companies and 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. Different varieties of grasses and forages were evaluated which includes 03 varieties of *Chloris gayana*, 02 varieties of *Lolium multiflorum*, comparison of forage blend with barseem 02 alfalfa varieties and 04 varieties of clover. As a result of adaptability trials *Chloris gayana* has been cultivated over 27000 acres of area in Punjab, Sindh, Balochistan for forage/fodder production. Farmers have been generating foreign revenues by exporting Hay. Similarly, *Lolium multiflorum* has been cultivated over an area of 3500 acres in various provinces of Pakistan including Azad Jammu and Kashmir and Gilgit-Baltistan. The specific activity is supported by PARC Agrotech Company Pvt Ltd (PATCO).



Chloris Gayana (Tolgar-II)



Lolium multiflorum (Coaster)



Vicia sativa (Red clover)

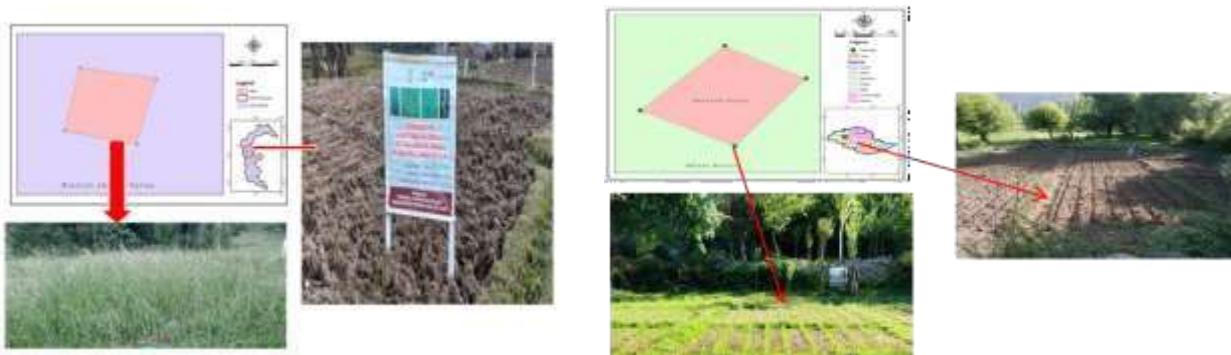


(Mixed grasses and forbs) Forage Blend

Adaptability Trials of Grasses and Forages at RRI Field, NARC

Adaptability Trials of Italian Rye Grass in Mountain Grazing lands:

The activity adaptability trials of rye grass are under progress on grazing lands in Azad Jammu and Kashmir (AJK) and Gilgit Baltistan (GB) under KOPIA- Pakistan program. Two sites were selected for evaluation of rye grass varieties in mountain grazing lands of Pakistan. The sites were selected purely in adjacent to grazing pastures in AJK and GB. The data recording on various parameters is in progress. The details of the experimental sites are Noon Bagla Site in District Jehlum Valley, AJK and Gahkuch Village site in Ghizer District, GB.



Adaptability Trials of Grasses and Forages at RRI Field, NARC

Multipurpose Tree Species Nursery:

Rising 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. Approximately 36,000 plants (MPTS) of more than 25 species were raised in agro-forestry nursery, RRI, NARC. The following MPTS were grown in agro-forestry nursery, details are given below:

Details of the sapling planted during 2021-22 at RRI nursery are given below:

Sr #.	Name	Local name	No. saplings raised in bags/cuttings	Mortality (%)	Total Sapling stock
1	<i>Leucaenaleucocephala</i>	Ipil ipil	2000	08	1840
2	<i>Bauhinia variegata</i>	Kachnar	2000	05	1900
3	<i>Morus alba</i>	Toot	1000	07	930
4	<i>Populus deltoides</i>	Poplar	2000	05	1900
5	<i>Pongamia glabra</i>	Sukh Chain	1000	06	940
6	<i>Albizia lebbek</i>	Siris	800	10	720
7	<i>Moringa oleifera</i>	Sohajna	2000	08	1840
8	<i>Grevillea robusta</i>	Silver oak	1500	05	1425
9	<i>Acacia albida</i>	kikar	2000	03	1940
10	<i>Terminalia arjuna</i>	Arjun	600	04	575
11	<i>Sepium sebiferum</i>	China Tali	300	06	282
12	<i>Jacaranda mimosifolia</i>	Jacaranda	1000	04	960
13	<i>Acacia modesta</i>	Phulai	600	20	480
14	<i>Pinus roxburghii</i>	chir	2000	20	1600
15	<i>Salix babylonica</i>	Weeping willow	2000	05	1900
16	Misc.		20677	15	17575
	Total				36807.00

Introduction, Evaluation and Multiplication of Hybrid MPTS (Express willow and *Tubrorobnia*) in Field Area of RRI, NARC:

Pakistan Agricultural Research Council (PARC) agreed on a beneficial cooperation in agricultural research development with the Hungarian National Agricultural Research and Innovation Centre (NAIK) by signing a memorandum of understanding at PARC HQs, Islamabad. With this agreement PARC/NARC and NAIK will jointly work in the fields of agroforestry research and development in the suited different eco zones of Pakistan.



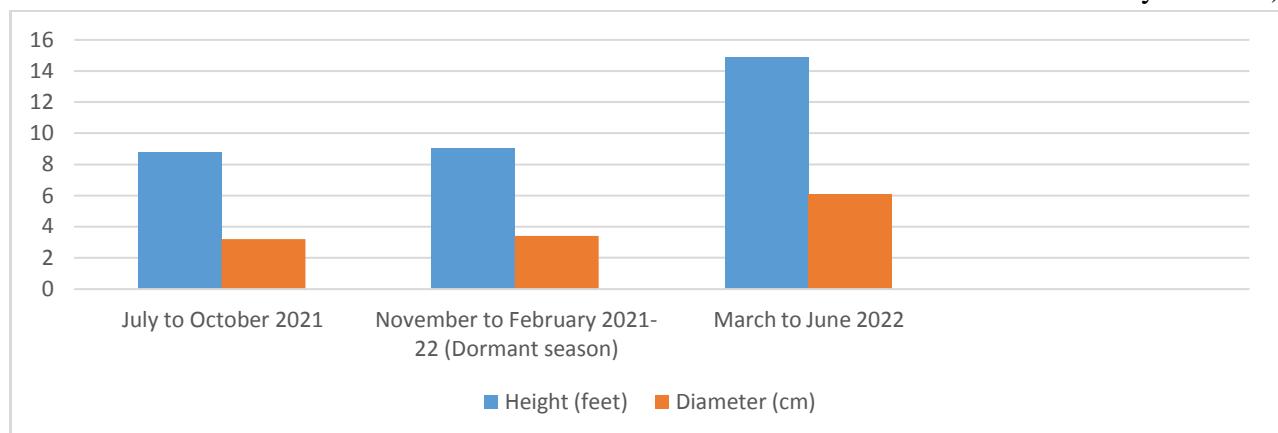
Hungry officials at Salix field site Turbo Robinia

Table 2: Growth data was recorded for heights and diameters of TurboRobiniaduring June 2021 to June 2022.

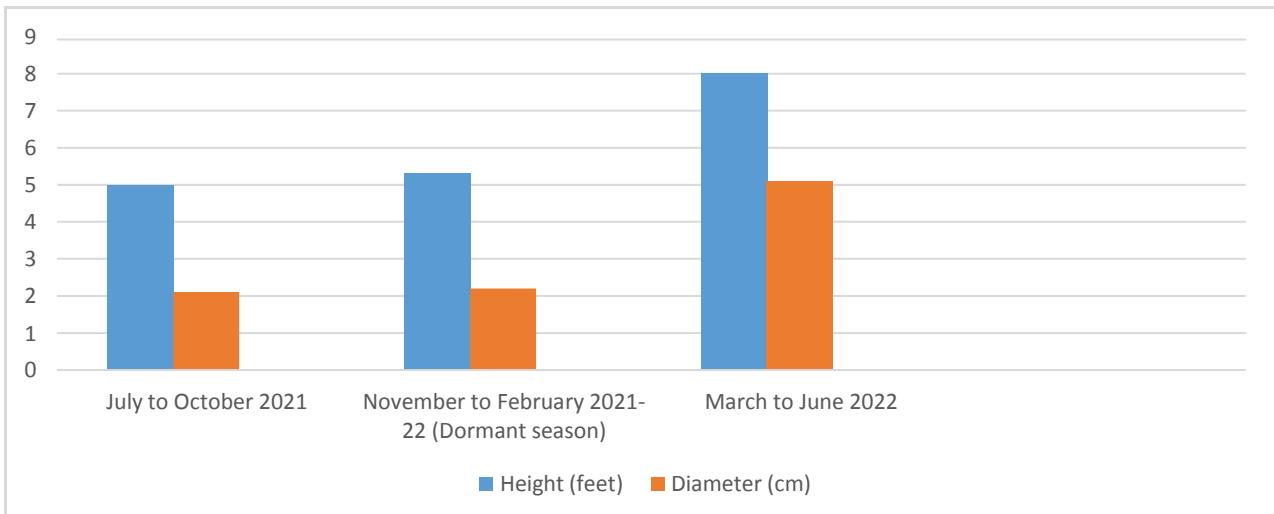
Plants Name	July to October 2021		November to February 2021-22 (Dormant season)		March to June 2022	
	Height feet	Dia cm	Height feet	Dia cm	Height feet	Dia cm
Robinia	8.8	3.2	9	3.4	14.9	6.1
Willow	5	2.1	5.3	2.2	8	5.1

The result revealed that during the monsoon maximum growth of height and diameters of both the species recorded, but *Robinia* was more significant in height and in diameters than willow in rain fed condition. Total 66 plants have been planted in 7x12 sq. ft. spacing and no mortality was observed in the previous year.

Insect attacked: The only insect was observed Lepidopterous insects on black locust (spray of chemical of Lambda Cyhalothrin).



Bar diagram of *Robinia* turbo (June 2021-June2022)

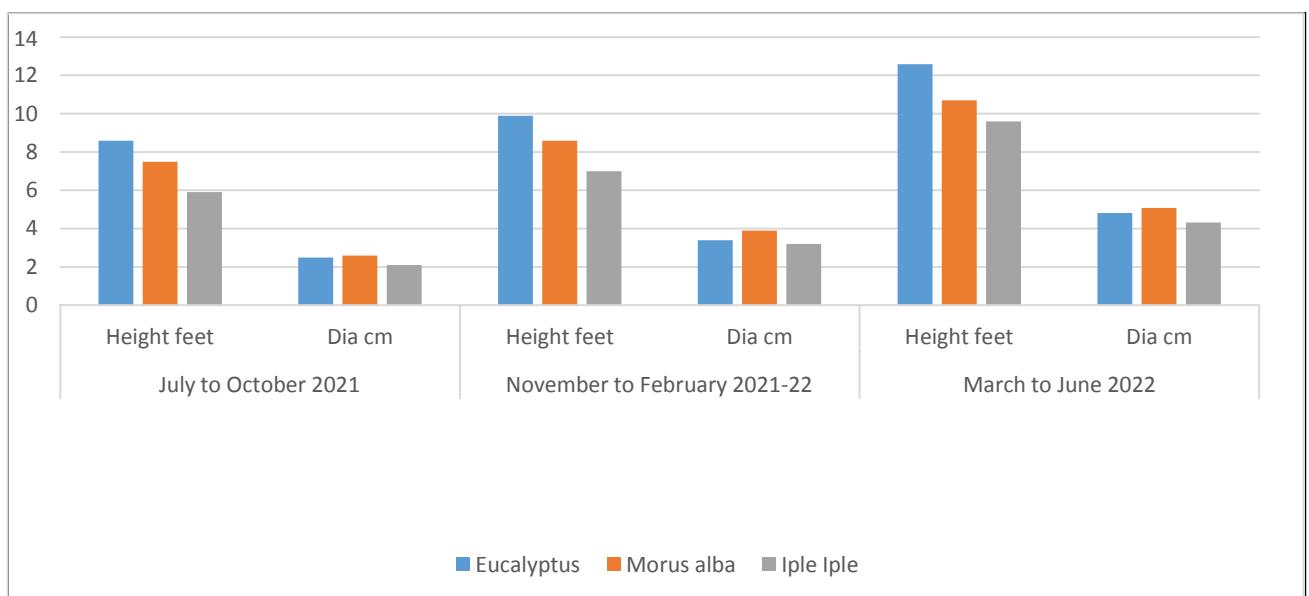


Bar diagram of *willow* (June 2021-June2022)

Urban Forestry Model (Miyawaki Model):

Air pollution is a growing environmental problem in most major cities of Pakistan. The inefficient use of energy, an increase in the number of vehicles used daily, an increase in unregulated industrial emissions and the burning of garbage and plastic have contributed the most to air pollution in urban areas. Long term effects include lung cancer, cardiovascular disease, chronic respiratory illness, and developing allergies. Air pollution is also associated with heart attacks and strokes.

The Miyawaki afforestation especially in urban areas is a solution which can rapidly and efficiently restore degraded land, absorb carbon dioxide emissions and preserve and enhance biodiversity creating dense multi-layer native forest in the process.



Bar diagram of dominant MPTS species (June 2021-June2022)



A view of Miyawaki Model at agro-forestry fields area

Growth data was recorded for heights and diameters of dominant MPTS during June 2021 to June 2022 at RRI field area of NARC.

Plants Name	July to October 2021		November to February 2021-22		March to June 2022	
	Height feet	Dia cm	Height feet	Dia cm	Height feet	Dia cm
<i>Eucalyptus</i>	8.6	2.5	9.9	3.4	12.6	4.82
<i>Morus alba</i>	7.5	2.6	8.6	3.9	10.7	5.08
<i>Iple Iple</i>	5.9	2.1	7	3.2	9.6	4.31

In this model, sixteen indigenous MPTS were introduced and planted in spacing of 2x2 sq. ft. of an area of 2,720 sq. ft. The layout was laid down in such a way that contained twenty-one in numbers rows horizontal and twenty lines were drawn vertically. The result revealed that among the sixteen species *Eucalyptus camaldulensis* attained the maximum height and diameter and followed by the plant species *Morus alba*. No mortality have been observed and maintained the experiment without any fertilizers and irrigation depending upon the saver drought condition in field area of agro-forestry.

Agroclimatic Zonation of Pakistan:

Agroclimatic characterization and zoning was performed using climate data of 30-years period (1990-2019). The results indicated arid zone over 55.6% area, semi-arid over 14.9% area and hyper-arid over 12% area, whereas sub-humid and humid zones exhibited 5.8% and 3.1% coverage in the country respectively. Most of the southern Punjab, eastern Balochistan, northern G-B and whole Sindh province lies in the arid zone. The hyper-arid zone was found in Chaghi, Washuk, Kech and Gwadar, Panjgur and Awaran districts of Balochistan only. The semi-arid zone was observed mainly in parts of Hunza, Ghizar, Skardu, Mianwali, Khushab, Sargodh districts and central KPK, whereas sub-humid zone was found in parts of Astore, Gujranwala, Narowal, Chakwal, Kohat and Attock districts. The humid zone was found in parts of the Astore, Swat, Mansehra, Abbottabad, Haripur, Islamabad, Rawalpindi and most of the Kashmir area.

Spatio-Temporal Analysis of Rainfall pattern in Pakistan:

Knowledge of the broad-scale changes in rainfall can provide information on shifts in the potential for crop production in the country under climate change. In the present study, changes in rainfall pattern of Pakistan were investigated using 30-year normal data of 1960-1989 and 1990-2019 periods. The monthly rainfall data was developed on annual and then on 30-year normal databases. An explicit change in rainfall pattern was observed in Pakistan during the 1960--2019 period. The

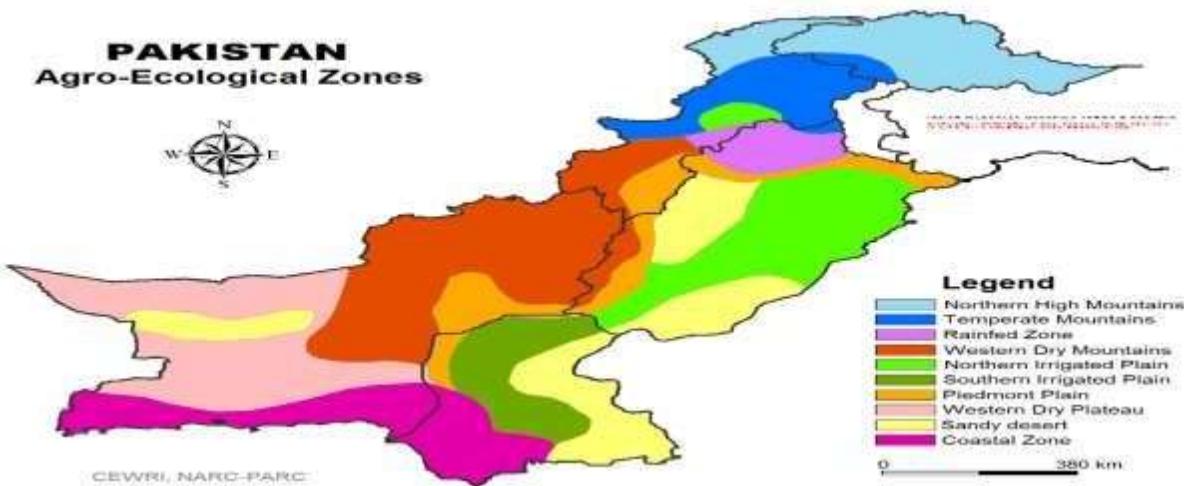
rainfall zone >1500 mm indicated a reduction from 0.8% to 0.2% during 1960-1989 and 1990-2019 periods. The rainfall zone 1000–1500 mm indicated an increase from 2.9% to 5.4% during the two periods. In Kashmir, 1000–1500 mm zone increased from 41% to 71%, e.g. Muzaffarabad, Haitian and Bagh have come under this zone during the recent normal. The rainfall zone 750–1000 mm decreased from 3.7% to 3.5%, while the rainfall zone 501–750 mm has increased by 1.6%, i.e., from 6.2% to 7.8% area during the two periods. The average rainfall zone 250–500 mm indicated an expansion from 22.2% to 24.3%, while the rainfall zone 101–250 mm decreased from 53.8% to 46.0% during the two periods. The rainfall zone 0-100 mm exhibited an increase from 10.5% to 12.3% mainly in the south-western part of Balochistan comprising of Chaghi, Washuk, Panjgur, Awaran, Kech, Gwadar districts.

Table 4: Percentage changes in extent of different annual rainfall classes in Pakistan during 1960-1989 and 1990-2019 periods

Rainfall class (mm)	1960-1989 (%)	1990-2019 (%)	Difference (%)	Status
0–100	10.5	12.8	2.3	Increase
101–250	53.7	46.0	-7.7	Decrease
251–500	22.2	24.3	2.1	Increase
501–750	6.2	7.8	1.6	Increase
751–1000	3.7	3.5	-0.2	Decrease
1001–1500	2.9	5.4	2.5	Increase
>1500	0.8	0.2	-0.6	Decrease

Updation of Agro-ecological Zones of Pakistan:

The growing food requirements of Pakistan are exerting tremendous pressure on the agriculture sector and the natural resources like land and water, which are the medium of food production. During the last several decades, major changes have been occurred in natural resources and environment owing to regional and global changes in climate and urban developments. In the present study, agro-ecological zones of Pakistan were updated based on recent changes in agro-climate and land use to promote climate smart resource management and sustainable agriculture in the country. Northern high and temperate mountain zones were observed over 9.2% and 5.9% area, whereas rainfed zone, northern and southern irrigated plains, western dry mountains and dry plateau were found over 3%, 11.3%, 5.8%, 19.1% and 14.4% areas of the country, respectively (Figure 1). Specialized programs of intervention per agro-ecological zone are needed based upon comparative advantages. Potential exists for sustainable fish production and improvement of livestock and rangeland resources in the coastal zone (9.9%) and desert ecologies (14%), whereas rainwater harvesting system offers potential in the piedmont plain zone (7.4%) to sustain agriculture and provide resilience against high risks of climate induced hazards like droughts and floods. However, future studies should be focused on assessment of water resource potential under variable scenarios of climate change in different agro-ecological zones of the country.



ied agro-ecological zones of Pakistan

Drip Irrigation System for Rice:

Designed, developed and introduced drip Irrigation System for Growing Rice in Pakistan. The rice crop 2020 and 2021 was successfully grown under drip irrigation at NARC under loam soil by maintaining soil moisture at around 60% to 80% de-saturation level without inundating the land, thus broke the myth of reduced rice production without standing water in the rice field. The drip irrigation was successful in producing comparable yield with the conventional flood irrigation method but saved around 73% of irrigation water and increased 283% water productivity. Wheat crop on raised beds with drip irrigation after rice crop was also successfully established and increased yield was attained.

Development of Optical portable device Fluorosensor for honey adulteration Monitoring:

The Optical portable device **Fluorosensor**, being developed Under ALP Project entitled “Superior Quality Honeybee Queens production through Non-Traditional Techniques”, Honey Bee Research Institute (HBRI), in collaboration with National Institute of Lasers and Optronics (NILOP), NILORE is an innovative technology and also need of time, as its new and modern techniques to be used for identification of honey. In order to enhance the honey export from Pakistan such value-able techniques for monitoring the honey quality assurance are vital. Fluorescence spectroscopy in tandem with chemometrics could potentially be used as a rapid analytical tool to identify Sidr honey and its sugar adulteration.

Dr. Ghulam Muhammad Ali, Chairman PARC is being briefed about the optical portable device Fluorometer to identify adulteration in Sidr honey jointly developed by Honey Bee Research Institute (HBRI), NARC and National Institute of Lasers and Optronics (NILOP), NILORE, during one day workshop for honey industry partners at HBRI, NARC. (08th December 2021)



National Consultative Dialogue on “Livelihood Improvement Interventions for Expansion of Quality Honey Production in the Country, a way forward

Organized a one-day national-level workshop on Honeybee Farming in Pakistan at PARC-NARC, on 22 February 2022. The workshop, titled 'Livelihood Improvement Interventions for expansion of Quality Honey Production in the country - a way forward' is to foster the practice of honeybee farming in the country, to learn from experiences of experts in the field and to devise a plan to improve it collectively in the future. Beekeepers also showcased their unique honey produced by *Apis cerana* species indigenous to Asia. Various experts on honeybee farming from the commercial industry, university professors, research doctors, scientists and project implementation specialists attended and shared their unique experiences. 28 Recommendations were compiled to uplift the industry in the country.



Artificial Insemination of Queen Bees:

Artificial insemination is incredibly important to continuing to make genetic improvements in our bees. Whilst no importation has yet occurred, introduction of semen containing favorable traits (such as VSH) can help to safeguard the industry against *Varroa* mite incursions. It is important to consider the biosecurity risks of semen importation, though: some diseases may be able to be passed from drone to queen in semen. Use of artificial insemination is not currently widespread within the industry, however some apiarists are using it to produce genetically favorable breeder queens or to make specific crosses. The facility was developed under ALP NR-047 project entitled "Superior Quality honeybee queens' production through nontraditional techniques" Produced 350 queens and distributed to progressive beekeepers.

Micronutrient Improvement Technology for the Enhancement of Kinnow Production and Fruit Quality:

The challenges to Kinnow orchards in Pakistan are:

- Low average yield of kinnow orchards.
- Poor quality leads to 48% low price of exported kinnows in the international markets.
- Low use of nutrients in kinnow orchards causes low yield and poor quality
- Micronutrient management in the orchards is highly neglected
- There is a dire need to generate annual recommendations for fruit trees according to their age



Interventions

- Land Resources Research Institute, NARC, Islamabad Zinc and Boron nutrient management field trials on Kinnow orchards in Sargodha area.
- PARC has developed one year nutrient package for kinnow trees having age of 9 year or more

Outcomes

- An increase of 27% in yield, Enhanced quality of fruits
- PARC Technologies Display Centre is aiming to launch a product named "Kinnow Power" containing one year nutrition package for Kinnow orchards.

Composting (Organo-Zote) Technology for Sustainable Organic Agriculture:

The organic matter of Pakistani soils is decreasing day by day and it reached at lowest level i.e 0.5 %, due to excessive use of agro chemicals in high yielding exhaustive crops, burning of crop residue in the field to increase cropping intensity (>300 percent) divert the bio-diversity as well as the organic matter is declining.



Interventions:

- PARC has established composting unit at NARC and developed a commercial product with a trade name "Organo-Zote".

Outcomes

- The Organo-Zote product improves soil health (physical, chemical, biological) by increasing organic matter contents of soils which improved crop production and reduced the use of chemical fertilizer.

Heavy Metals Health Risks Assessment Technology for Food Chain Derived:

Improper management of effluents causes environmental pollution. Solid and liquid discharges become rich source of heavy metals, and possess great potential to pollute water bodies, land, vegetation, food chain. Use of the effluents to agricultural land without bothering about their quality and quantity causes adverse health effects. To assess the health risks, it is necessary to identify the potential of source to introduce risk agents into the environment.

Interventions:

- Samples of irrigation waters were collected from all the three sources of irrigation water in peri-urban areas of Gujranwala. soil samples with two depths 0-15cm and 15-30cm were collected from sites of Gujranwala.
- 10 selected vegetables were randomly collected from the selected fields from different locations
- Samples of cereal crops grain and straw and fodders crops were collected and analyzed for HM contents.
- Animal and human blood samples were collected and analyzed for HM content

Outcomes:

- The untreated effluent used for irrigation to crops had toxic levels of various heavy metals like Pb, Cr, Ni, As etc.
- Translocations of heavy metals in vegetables above permissible limits have been recorded

- Cereal crops like wheat and rice have also heavy metals concentration above the permissible limit both in grain and straw.
- Fodder of different types grown under untreated industrial effluent contained some of the HMs above the permissible limit.
- Some of the HMs were detected in shallow drinking water above the permissible limit where untreated industrial effluent is continuously used for irrigation. However, generally the deep water was potable.
- Heavy metals translocation into the animal and human blood was detected above the permissible limit in some areas, showing carcinogenic and non-carcinogenic risk



Industrial effluent used for irrigation



Vegetable grown with industrial effluent



Animal blood sampling



Survey and discussion

Medicinal Plants:

Pakistan is endowed with the wealth of medicinal plants. The sandy soil of Cholistan desert has enormous potential for natural and cultivated native medicinal plants. The institute is conducting research for cultivation, promotion, value addition through research-based technology development and dissemination to farmers for better yield and production of medicinal plants.

Effect of Different Soil Fertilizing System for Seed Yield of Ispaghول (*Plantago ovata*):

The Ispaghول (*Plantago ovata* Forsak) is an important medicinal plant, valued for its seeds and husk which is used in indigenous medicine. The experiment was carried out to investigate the effects of chemical fertilizer include N and P (chemical fertilizing system), animal manure (organic fertilizing system), combined use of manure and chemical fertilizer (integrated fertilizing system) on clay loam soil of AZRI, Bahawalpur during 2021-2022. The following treatments including control (0) chemical fertilizer, C1 (30 P+50N), C2 15 (P+25N), organic matter; M1 (Cow Dung 20 t/ha), M2

(Cow Dung 10 t/ha) and integrated 1N1 (C1 10 P+20 N+20 Cow dung) and 1N2 C1 (5 P+10 N+10 Cow dung) were tested. The results showed that the highest seed yield of 500.5 kg/ha was obtained from the treatment (1N1) integrated fertilizer, followed by seed yield of 371.8 kg/ ha in treatment (IN2), whereas the lowest seed yield of 297.1 kg/ ha was obtained in control.

Response of Ispaghhol (*Plantago ovata*) under Different Water Deficit Levels at Various Critical Growth Stages:

The field experiment was conducted to find out the optimum irrigation level for growth and yield quality of Ispaghhol on sandy soil of Cholistan Farm of AZRI, Bahawalpur during 2021-22. The following treatments including (T1) Irrigation from emergence to harvest available 50% soil water at plant densities (m)² D1=40, D2=70 and D3=100, (T2) Irrigation termination at the start of flowering with complementary irrigation at the start of seed formation at plant densities (m)² D1=40, D2=70 and D3=100 and (T3) Irrigation termination at the start of flowering at plant densities (m)² D1=40, D2=70 and D3=100 have been tested in this trial. The results showed that the highest seed yield of 954.95 kg/ha was obtained in (T2), followed by seed yield of 918.36 kg/ ha in (T3). Whereas the lowest seed yield of 441.61kg/ ha was obtained from (T1).

Germplasm Screening of Ispaghhol against Biotic and Abiotic Stress for Better Yield Under Arid Climatic Conditions of Cholistan Desert:

Improved yield is one of the important goals of Ispaghhol cultivation for domestic and economic needs. The field experiment was conducted AZRI, Bahawalpur during rabi season 2021-22, to determine the genetic diversity and to evaluate the performance of different genotypes of Ispaghhol (*Plantago ovata* Forsk.) under arid climatic condition of Cholistan desert of Bahawalpur. The results showed that the accession 22008 produced maximum seed yield of 867.6 kg/ha followed by accession 21988 (558.4 kg/ha), 21941 (495.8 kg/ha), 21444 (492.5 kg/ ha), 20667 (486.9 kg/ha), respectively, whereas the accession 20640 produced the lowest yield (7210.5 kg/ha).



Field view of research trials on germplasm screening of Ispaghhol at AZRI, Bahawalpur

Performance of Ispaghhol on Different Textural Classes of Soil:

A field experiment was conducted at experimental farm of AZRI, Bahawalpur on 10-11-2021, having following treatments including (T1) 50% loam soil +50% Bhal, (T2) 100% loam + P solubilizer Bacteria and (T3) 50% sandy soil+ 50% loam + P Solubilizer. The results also showed that the highest seed yield of 618.46kg/ha was obtained from the (T3) followed by seed yield of 614.46kg/ ha in treatment (T2), whereas the lowest seed yield of 388.74 kg/ ha was obtained from T1.

Growth and Yield Response of Different Advance Lines of Wheat for Drought Tolerance:

The wheat trial comprises (5) genotypes/advance lines genotypes to test their growth and yield under the agro climatic conditions of Bahawalpur. Five (05) genotypes of wheat (screened out of CIMMYT Yield Trial) has been compared during Rabi-2021-22 at AZRI, Bahawalpur. The Advance of AZRI, Bahawalpur AZ-W-08 has produced 5345.7 kg/ha, which was followed by the AZ-W-04 that produced the 4748.9 kg/ha. The Check variety Zincol-2016 produced 4576 kg/ha. While lowest seed yield of 2586.7 kg/ha was obtained in case of AZ-W-2.

High Density True-to-Type Mother Orchard of Arid Horticultural Plants at AZRI:

The arid horticultural crops have enormous potential to perform under arid climatic conditions and the good source of income for the farmers of the area. By keeping the importance of fruit plants in arid region the research on various aspects have been conducted to promote arid horticultural crops to increase fruits production for better income and food in the region. The True to type high density mother orchards of arid horticultural crops including Ber, Guava, Fig, Pomegranate, Date palm and falsa has been established at Arid Zone Research Institute, Bahawalpur to raise the quality nursery plants for the farmers of the area. The institute has pooled thirteen high yielding and good quality genotypes of grafted ber i.e.; Kerala, soofan, kalidas, sherin, dehlwhite, hyderabadigola, waqar-1 and ajooba for multiplication at farmer fields in Cholistan desert for provision of good quality and true to type buds and cuttings to the farmers of the area. The Clean Nursery of Fruit Plants has been established at the institute to produce the good quality seedlings for research needs and provision to farmers and other researchers.



Field view arid fruit orchards at AZRI, Bahawalpur

Integrated Pest Management:

The experiment was conducted during kharif 2021 to investigate the efficacy of biopesticide and chemical insecticides on mung crop. The following treatments (T1) Dhatura (*Datura metel*) @ 3% aqueous extract, (T2) Kortumma



(*Citrullus colocynthis*) @3% aqueous extract, (T3) imidcalopride @250 ml, (T4) Flonicamid @80g/acre and (T5) control were tested in this trial. The results showed that (T4) Flonicamid given best results with

71% of mortality rate of whitefly followed by (T1) 3% Datura aqueous, extract with 67% of mortality rate. The lowest 13% mortality was observed in (T5).

Role of Foliar Nutrition of NPK on the growth & yield components on Mungbean:

The field experiment was conducted at experimental farm of AZRI, Bahawalpur, during Kharif-2021, having 04 treatments levels of NPK (20:20:20) i.e. T₁=0, T₂= 0.75 liter/ha T₃=1.25 liter/ha, T₄=2.0 liter/ha. The results showed that the T3 produced the highest seed yield of 1857.9 kg/ha, followed by T4 that produced the seed yield of 1690.1 kg/ha, while the lowest seed yield of 1130.6 kg/ha was obtained from control treatment.

Farmers Capacity Building through Field Demonstration and Technical Sessions Seminars:

A national seminar has been conducted at AZRI's Bahawalpur on 4th March 2022 ALP project for the promotion, awareness, value addition and economic importance of cultivation of Ispaghul crop on sandy and marginally less productive soils of Cholistan. A large number of researchers from different organization, NGOs, farmer associations and academia participated the seminar. More than 100 local farmers participated and keenly shown their interests for cultivation of this medicinal crop. Different resource persons delivered various lectures on their fields of expertise to promote and enhance the production the Ispaghul crop. The PI of the Ispaghul project delivered the comprehensive lecture, regarding the cultivation & promotion of Ispaghul, value addition and marketing of the Ispaghul produce.



Fig-2. Pictorial view of Ispaghul seminar at AZRI's Bahawalpur

AZRI Bahawalpur also organized another National Seminar organized at farmer field at Khankah Sharif Bahawalpur on 19th March 2022 under the ALP project of Ispaghul in which 68 local farmers participated and given the technical skills for cultivation of Ispaghul. The basic aspire of this intervention is to improve the knowledge and skills of the farmers. Different resource persons



Pictorial view of Ispaghul seminar at Khankah Sharif Bahawalpur

delivered various lectures on their fields of expertise to promote and enhance the production of Ispaghhol at farmers' fields. The PI of the Ispaghhol project, delivered lecture productivity improvement and motivated farmers to provide the good Quality Ispaghhol seed and will facilitate with technical guidance during crop season. The participants of the field also visited the demonstration block of Ispaghhol and witnessed the crop performance in field conditions.

Developed Different Crop Varieties:

Wheat, AZRC, Dera; Low yielding varieties in the area and non-availability of disease resistant varieties in wheat were the main challenges

Interventions

- PARC, AZRC, D.I.Khan has developed Wheat variety i.e. AZRC Dera and released from Provincial Seed Council, KP during 2020.



Outcomes:

- High yielding, potential of 80 monds acre⁻¹.
- Resistant to stripe rust & leaf rust.
- Resistant Streak mosaic virus & aphid's attack.
- Best suited for barani and irrigated areas, KP.
- High yielding of straw production as compared to other varieties.
- Seed multiplied at AZRC, Farm and distributed to Agriculture Extension Department, Government of KP, seed dealers, progressive farmers of the area. Also provided seed to PATCO, PARC for sale purpose.

Guar Variety:

Non-classified low yielding verities in the areas and non-availability of disease resistant varieties were the main challenges.

Interventions:

- PARC, AZRC, DIKhan has developed Guar variety i.e AZRC Guar and released from Provincial Seed Council, KP during 2021.



Outcomes:

- High yielding, potential of 20 monds acre-1.
- Drought & heat tolerant
- Resistant to cercospora leaf spot disease.
- High yielding of straw production as compared to other varieties.
- Plant Height, 110 cm with uniformity.
- Seed multiplied at AZRC, Farm and distributed among progressive farmers of the area.



Turmeric Variety:

The challenges were non-availability of spice crop in the area and non-availability of disease resistant varieties

Interventions:

PARC, AZRC, D.I.Khan has developed Turmeric variety i.eBaDerHaldi and released from Provincial Seed Council, KP during 2021.

Outcomes

- High yielding, potential of 158 monds acre⁻¹.
- Resistant against insect / pest.
- Seed multiplied at AZRC, Farm and distributed among progressive farmers of the area.

Varieties under Development:

PARC, AZRC, D.I.Khan has developed Wheat variety i.eAZRC-84 and completed its procedure for registration from Provincial Seed Council, KP during 2022-23. This variety is high yielding, potential of 70 monds acre⁻¹ resistant to Yellow Rust and Leaf Rust, best suited for rainfed and irrigated areas of KP, heighted, 95-105 cm with uniformity and DUS of 2 years completed



Release of Varieties at BARDC:

BARDC Crops Sciences Research Directorate is working on breeding of field crops as well. Since the establishment of the center Crop Sciences Research Directorate has released 03 wheat, 02 barley and 01 lentil varieties. However, during the reported period BARDC released 03 new varieties (Ejaz-21 (durum wheat), JE-21 (barley) and Dasht-21 (lentil) from Provincial Seed Council. These varieties will be further disseminated on large scale in the province.



Durum Wheat Line



Barley Line



Lentil Line

Promoting Research for Productivity Enhancement in Pulses (PSDP funded project):

- Through PSDP pulses project entitled “Promoting Research for Productivity Enhancement in pulses” lentil plantation on 400 acres and chickpea plantation on 10 acres has been carried out in the province at farmer’s fields successfully.
- The total lentil seed of 100 ton was produced by the farmers and will be further disseminated on farmer-to-farmer basis in Balochistan.



Chickpea at ARI, Turbat



Lentil trials at Mastung

Establishment of Olive Orchards at BARDC and on Farmer Fields in Balochistan:

Balochistan is known as fruit basket due to its different ecological conditions. Several fruit crops are grown in the province but few most important fruits crops are Apple, Cherry, Almond, Apricot, Plum, Peach, Pistachio, date and Olive.

Due to scarcity of water in the province, Agriculture sector, working in the province, planned to divert farmers towards low delta fruit crops cultivation. As olive is one of the same, therefore, need of time is to bring this fruit crop on top to save precious water of the area as climatic conditions of about 22 districts of the province is suitable for olive cultivation. In this contest BARDC is working on it since 2013 and till 2022 about 8000 acres were brought under olive cultivation through BARDC. During the year about 100000 (for about 750 acres) olive plants were distributed to 16 districts (Quetta, KillaSaifullah, Zhob, Khuzdar, Surab, Noshki, Washuk, Musa Khel, Barkhan, Bolan, Chaghi, Duki, Kharan, Mastung, Kohlu and Punjgoor under Olive (PSDP) project.



Olive mother block plantation at BARDC



Olive plantation on farmers field in KilaSaifullah

Installation of Olive Oil Extraction Mill at PARC-BARDC Quetta:

- Olive oil extraction mill was installed and functionalized at BARDC by Italian mill engineer (Mr. Stefano) under Olive PSDP project at PARC-BARDC Quetta.
- Honorable Governor of Balochistan (Syed Zahoor Ahmad Agha) Inaugurated Olive Oil Extraction Mill on dated: 24th January, 2022. Worthy Chairman PARC & M.D POD were also present at the time of Inauguration.
- During the year 2021-22 about about 10250 kg of olive fruit was processed.



Olive Oil Extraction Mill at PARC-BARDC Quetta

Introduction and installation of High Efficiency Irrigation System in Balochistan:

- Balochistan is largest province of Balochistan but lowest yield and production. The major reason for this is shortage of water, only 2 districts of Balochistan are irrigated through canal water, rest of the province is using underground water. Underground water level is going down about 10 feet during each year. Keeping in view the water situation of the province, BARDC is focusing on introduction/promotion of HEIS in Balochistan to save precious water source for upcoming generations. Since 2014-15 BARDC installed about 900acres of Drip Irrigation System for newly established Olive orchards in Balochistan. During the reported year, about 447 acres of High Efficiency Irrigation (Drip) System was installed on olive orchards in Balochistan.
- Introduced pistachio plantation on drip irrigation system on one acre at BARDC, Quetta.



Drip irrigation system at UET, Khuzdar



Drip irrigation system at farmers field in Noshki



Olive plantation on Drip irrigation using gravity

Products Developed by BARDC:

- BARDC is working on medicinal herbs since 2004. Medicinal herbs play very important role in human health. Medicinal herbs cultivation is also another important sector to enhance livelihood of the farmers of the area. BARDC have about 52 different medicinal herbs in its medicinal herbs garden. Its maintenance and expansion are one of the major goals of BARDC. BARDC also working on marketing aspect of medicinal herbs in local market and in other major cities of Pakistan through PATCO.

Products developed by BARDC are as under:- Thyme, Rosemary, Oregano, Saffron, Chamomile, Mint, Lemon Grass, Cumin, Essential oil of rosemary.

Seed/Nursery Plants Produced:

Seed/Nursery plays major role in enhancement of yield/production/livelihood and export of the Pakistan. Keeping in view its importance, BARDC it focusing on production of high yielding disease free true to type seed/nursery plants. During the current year BARDC produced & distributed:

- Seeds of crops wheat (Shalkot-2014, 550 kg; Tijaban-2010, 250 kg)
- Seed of barley (Sanaber-96, 300 kg and Rakhshan-10, 300 kg).
- Seed of Lentil (Shiraz-96, 28 kg)
- Demonstration block of different arid fruits (Olive, fig, pomegranate, almond and grapes) on 30 acres.
- One acre of Saffron (3 varieties)
- Saplings of Olive (15000), Pistachio & Wild Pistachio (2000) and grapes (1000).
- Produced 14.5 kg of rosemary.
- Produced 3.5 kg of Oregano.
- Produced 3 kg of Thyme.
- Produced 16 kg chamomile.
- Produced 3 kg Cumin.



**Olive nursery at
BARDC**



**Saffron block at
BARDC**



**Essential oil extraction
unit**



Saffron (Stigma)



**Dried Chamomile
flowers**



Dried leaved of thyme

Interventions of MARC-PARC in Gilgit Baltistan:

- **Native species of medicinal plants /Herbs characterized and inventoried;** MARS Astor collected 5 new species of native herbs and planted under field conditions to generate new knowledge and development of area specific crop management and production technologies for medicinal herbs in Astor valley.
- **Potato Seed Production:** 30000 mini tubers produced.
- **Production of High-Quality Trout Seed;** Two hundred, twelve thousand disease free fry were produced against the target set of two hundred thousand fry production at TRMS for the year 2021-22. Out of total, two hundred and seven thousand fry have been issued to the farmers on approved subsidized rates and five thousand fry and fingerlings are kept at TRMS for developing brood stock.
- **Selection and promotion of Vegetables;** Seven (7) varieties of tomato were evaluated in replicated trial in MARC Juglote. The selected high yielding varieties of tomato i.e. Nagina (SAARC), Roma, Nayyab and Riogrand (28.79, 27.46, 27.06 and 24.93 t/ha.) respectively. Four (4) varieties of Chili were evaluated in replicated trial at MARC Juglote. To selected the high yielding varieties of chili i. e. China Red, Local, Kathmandu and Kuneri, 3.90, 3.73, 3.59 and 2.77 t/ha. Respectively.
- **Enhancement of Maize Productivity;** Evaluation of 18 maize varieties with three replication were conducted at MARC, Juglote i.e. Pharri, Azam, QPM-C, Kaptan, Jalal, Malhan, Edhi, Iqbal, Pirsabak new-1, NARC-B, Cimmytpak, Shiwal gold, Shiwal sweet-1, Gohar-19, Haqnawaz gold, SG-2002, NARC-C and NARC-D. Produced 1100 kg seed of Maize variety (i.e. Azam 425kg, QPM 275 kg and Pahari 400 kg) and issued 1000 kg to farmers.
- **Productivity Enhancement of Wheat;** Evaluation of GB Uniform Wheat Yield Trial developed by NARC breeders from previous trial were conducted at MARC, Juglote, MARS Chilas and FCRS, Basin. The trial consists of 10 entries/lines with three replications were sown in three locations. Entry 10 (6850Kg/hac) at MARC, Juglote, Entry-5 (2845Kg/hac) at FCRS, Basin, Entry-4 (4818.3Kg/hac) at MARS, Chilas.
- **Development of Mother Block of Fruit Plants and Fruit Plant Nursery;** Eight thousand (8500) true to type deciduous fruit plants (apricot, apple, cherry, pear, plum, fig, walnut and almond) were provided to farmers, NGOs and Government organization. Six thousand deciduous fruit plants root stock of apricot, apple, pear, peach and cherry were grafted.
- **Promotion of Olive Cultivation on Commercial Scale Gilgit Baltistan;** Sixteen thousand and seven hundreds (16700) olive plants were cultivated at farmers and Government land.

Animal Sciences Division, PARC:

Objectives of Animal Sciences Division:

The approved objectives of the ASD are as follows:

- To set the priorities of research according to the need of provinces and relevant stakeholders. To develop, monitor and evaluate research projects being conducted at federal and provincial level.
- To find solutions to burning issues confronting livestock, poultry and inland fisheries sector in country.

- To undertake, aid, promote and coordinate livestock, poultry and fisheries research and other activities as per all PARC-mandated functions.
-

Research Coordination, Monitoring and Evaluation Activities:

Animal Sciences Division, PARC is involved in research coordination, monitoring and evaluation in respect to various disciplines of animal sciences. Following are the salient outputs:

S. No.	Funding sources	Completed	On-going	Total
1.	Agricultural Linkages Program	8	28	36
2.	International Cooperation	1	0	1
	Total	9	28	37

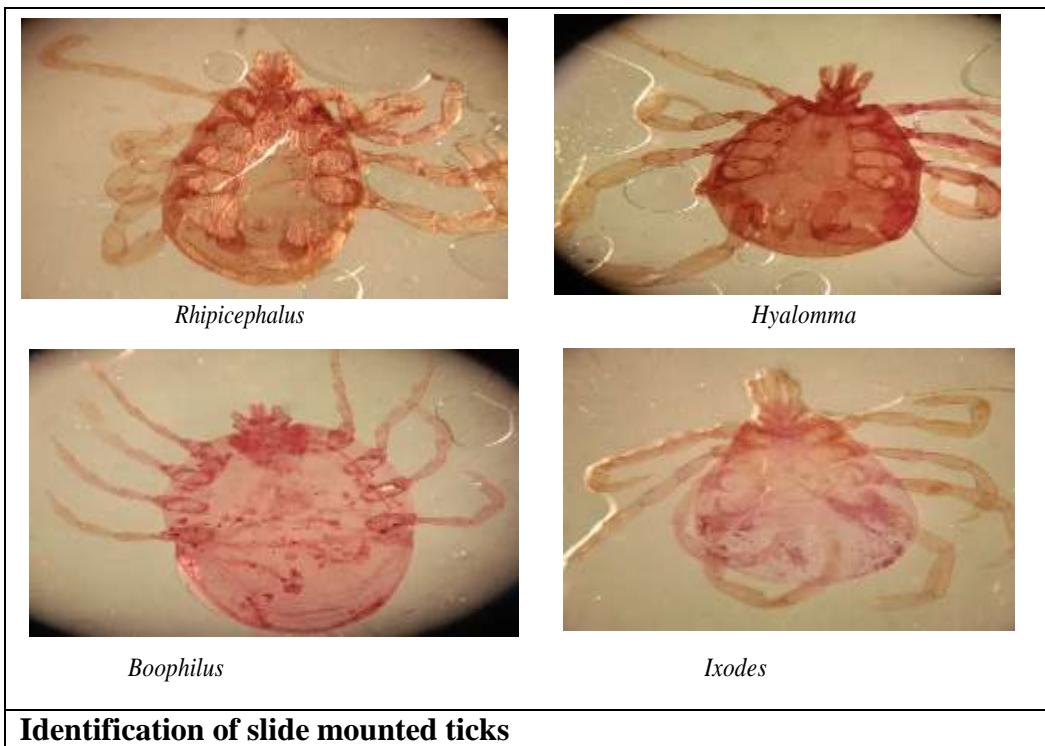
Research Achievements

Animal Health Program: The Animal Health Program (AHP) aims to improve animal health of livestock to achieve food safety and security in Pakistan. The theme is persuaded by research on better understanding of animal pathogens and disease mechanisms through epidemiological, conventional and molecular tools for the diagnosis and control of animal diseases.

Salient achievements:

- **Foot and Mouth Disease (FMD):** It is an infectious and sometimes fatal viral disease that affects cloven-hoofed animals. The virus causes a high fever lasting two to six days, followed by blisters inside the mouth and on the feet that may rupture and cause lameness. The FMD has very severe health implications for livestock farming, since it is highly infectious and can be spread by infected animals comparatively easily through contact. Epithelial samples (n=93) were collected from suspected FMD cases in cattle and buffaloes from various regions of Baluchistan. Among 93 samples, 70% were found positive for FMD. A total of 10 FMD viruses strains were recovered from ELISA positive epithelial samples on LFBK cell line.
- **Brucellosis:** Brucellosis is an endemic bacterial zoonosis in Pakistan and has been identified as a priority disease for Pakistan. Brucellosis is an occupational hazard for livestock workers, veterinarians, butchers and households. A total of 14.06% milk samples (n=256) collected from cattle and buffaloes of peri urban dairy farms in Islamabad were found positive for brucellosis. Two isolates of *Brucella abortus* i.e., Strain-19 and RB-51 were revived from Animal Health repository and cultured.
- **Crimean Congo Hemorrhagic Fever (CCHF):** The tick population is present round the year leading to problem of TBDs in livestock in Pakistan. The CCHF is a viral zoonotic disease and is asymptomatic in animals but fatal for humans. Its prevalence in animals is a good indicator for local virus circulation. An overall sero-conversion of 20.5% and 20.8% was observed against CCHF in small and large ruminants of Punjab, respectively. The highest sero-conversion against CCHFV was observed in cattle (26.3%) followed by sheep (23%), goats (16.7%) and buffaloes (13.6%). The highest tick infestation was observed in cattle (41.9%) and lowest in goats (14.8%), whereas,

identified tick species belonged to *Rhipicephalus*, *Hyalomma*, *Boophilus* and *Ixodes* species. The highest number of blood smears was found positive for theileria (9.4%) in cattle.



Identification of slide mounted ticks

Animal Nutrition Program:

The Animal Nutrition Program (ANP) focuses mainly on nutritive evaluation of feedstuffs, economical feed development using non-conventional feed resources, development of nutritional technologies for efficient livestock production and feed safety issues including mitigation of mycotoxins problem in feeds.

Salient achievements:

- **Aflatoxins in Cotton:** Aflatoxins are carcinogenic in nature and commonly contaminate food and feeds. These can be transferred to milk and eggs and posing health risks to consumers. Cottonseed cake is identified as main contributor of aflatoxin residues in milk. The production and marketing chain of cottonseed cake is being studied for identifying the risk points regarding origin of aflatoxins and their progressive development. In this regard, 100 samples of soil, cottonseeds and cake were collected from different regions of Punjab and Sindh. Over 50 isolates of *Aspergillus flavus* were obtained from these samples and examined morphologically. Two more atoxigenic isolates have been identified with a tally of eight atoxigenic isolates up till now.
- **Distribution of Poultry for Poverty Alleviation:** Poultry production in Pakistan is mostly dependent on exotic commercial lines. Contrarily, backyard poultry contribute 24% share to our national requirement of eggs and 9% share to meat production. However, the production potential of indigenous poultry is very low (70-80 eggs/year and 1.5-2kg body weight). This needs to be improved and can be achieved by crossing indigenous breed(s) with high producing exotic breeds and propagating these birds to rural community. In this regard, more than 600 sets (5 hens + 1 cockerel)

i.e., 3,600 birds of 3 months age were handed over to Livestock and Dairy Development Board (LDDB) and distributed among farmers.

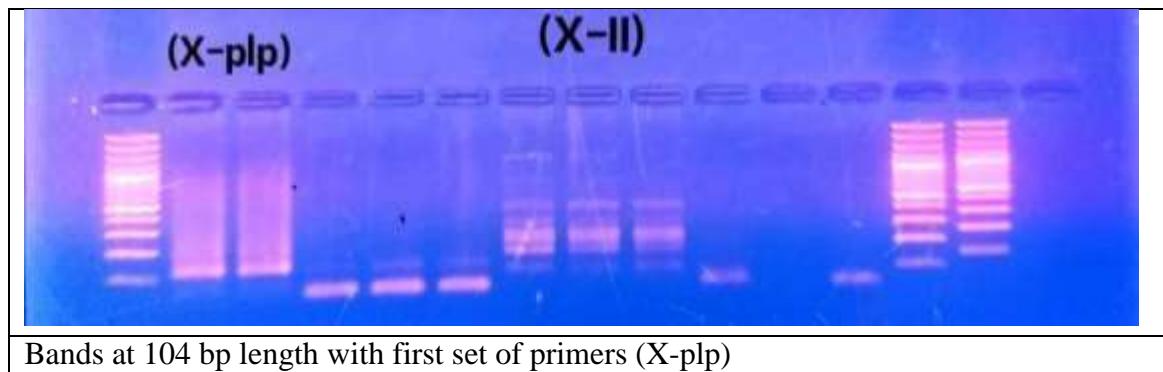
	
Rearing of parent stock	Brooding of young chicks

Animal Reproduction And Genetics Program:

The main focus of this program is to improve reproductive efficiency and exploit genetic potential of food animals. In this regard, major reproductive tools/techniques i.e. artificial insemination (AI)/laparoscopic AI; controlled breeding, sperm sexing & cryopreservation, ultrasonography and selective breeding are being used for genetic up-gradation of local breeds of cattle, buffalo and goat.

Salient achievements:

- **Laparoscopic AI in Goats:** The quality of semen strongly affects the reproduction in livestock. The optimization of cryopreservation techniques is pivotal for the improvement of semen quality. The Laparoscopic AI in estrus synchronized Beetal goats during the Peak Breeding Season was recorded higher (86%) with biostimulation compared with non biostimulation (79%). Similar pattern of pregnancy rates were also found (67% and 45%) with biostimulation and non biostimulation, respectively. Trans-cervical intrauterine technique is found to be better than cervical AI technique for achieving optimum pregnancy per AI in Beetal goats during the low breeding season.
- **Semen Sexing:** Semen having X or Y bearing sperm to produce progenies of a desired sex either female or male (with about 80-90% accuracy) is known as sexed semen. The use of sexed semen in dairy and beef farms ensures the production of animals of the desired sex, resulting in a reduction of costs. Different techniques for sperm sexing are under evaluation. The effect of different incubation tube diameter and placement angle on semen quality after sperm sexing through modified swim-up technique has been evaluated. Amplification of X-PLP gene was optimized at 54°C.



Animal Product Improvement Program:

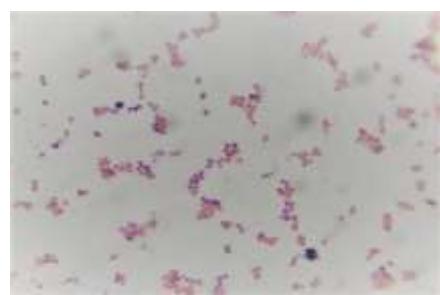
Animal Sciences Institute (ASI) Has Carved The Animal Products Improvement Program (APIP) with a mandate of quality evaluation and value addition through improved handling and processing technologies of animal products which is the prime purpose of animal husbandry.

Salient achievements:

Nutraceutical Yogurt: Riboflavin is an essential vitamin found in green leafy vegetables, cereals, eggs and meat but often lost during milling or cooking. Bio-fortification of Riboflavin, through utilization of synthesizing bacteria in fermented products is an economical and viable option. For bacterial isolation, 45 samples of milk and yogurt were analyzed for biochemical tests. Results showed 30 and 35 isolates of *Streptococcus* and *Lactococcus* spp, respectively. The riboflavin concentration was found to be 6.38 mg/L, which was more than double when compared with market yogurt samples, showing its potential as riboflavin overproducer in yogurt.



Lactobacilli bacteria



Streptococci/Lactococci

Livestock Research Station:

The Livestock Research Station (LRS) was established in April, 1988 with an objective to improve, preserve and supply superior breeds of cattle and buffaloes to the progressive farmers.

Salient achievements:

- In the sub-project of PM initiative calf feedlot fattening in Pakistan under LDDB a fattening trial on buffalo calves (n=15) is underway. The treated group attained 675 gm/day Vs. 605 gm/day in control group during the reporting period
- **Angora Rabbitry at Gilgit:** The Angora rabbit is one of the oldest types of domestic rabbit and is bred for its long fibers, known as Angora wool. Angora rabbitry has been established at Juglote and Sakardu, PARC Mountainous Research Centre (MARC). The Angora rabbits (n=5) pairs have been shifted at Juglote from NARC and their breeding is underway in order to increase the flock size. A Workshop for community mobilization was organized at Gilgit.

Aquaculture and Fisheries Program:

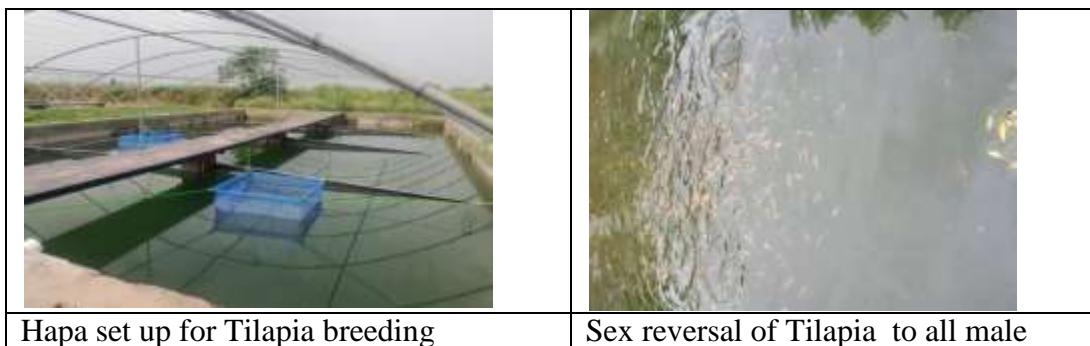
The mandate of Aquaculture and Fisheries Program (AFP) is to undertake research on inland aquaculture to increase per unit fish production by applying modern aquaculture practices, intensive fish culture and introduction of new and high value fish in culture system.

Salient achievements:

- **Rice Cum Fish Culture:** This system can provide additional food and income by diversifying farm activities and increasing yields of both the rice and fish crops. A pilot study conducted at rice field

(40 x 50 sqft) stocked with 100 all male tilapia fish. The average weight gain was 60g per fish in the period of three months.

- **Tilapia Fish in Re-circulating Aquaponics System:** Re-circulating aquaculture systems that incorporate the production of plants without soil. A set up for the lettuce was also arranged below every aquarium and Fish (12 No) was stocked in each aquarium. An increase of average 32g/ month in fish growth along with increase of 22cm in size of lettuce was observed during trial as compared to control group (average growth of fish 22g and 15 cm size of lettuce).
- **Intensive Production Packages for High Value Fisheries:** An experiment was conducted to determine the optimum stocking density for obtaining maximum net profit from the polyculture system for major carps and Chinese carps with American channel catfish. Highest growth of major Carps, Chinese Carp, American Channel catfish and Tilapia was recorded in an earthen pond having stocking density of 1800 per acre fish.
- **Seed Production & Rearing of High Value Fish Species:** One hundred thousand fry of all male tilapia and 2000 fingerlings of American channel catfish were produced. Fingerlings of different ornamental fish species were provided to local public for home aquarium purpose.

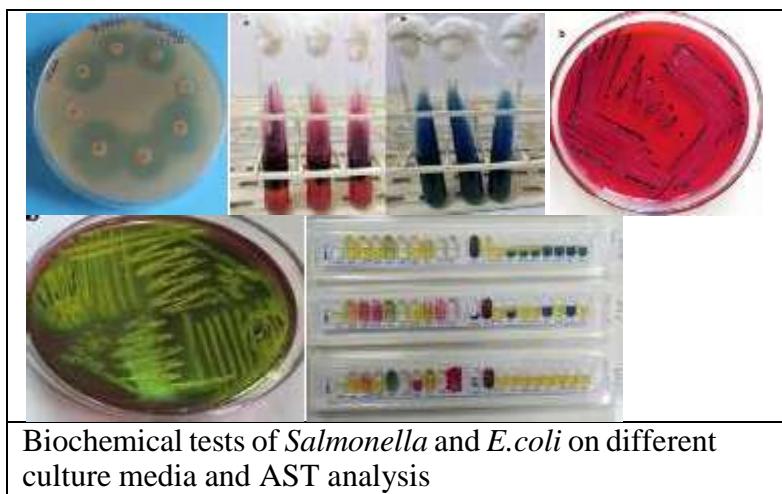


National Reference Laboratory For Poultry Diseases: The National Reference Laboratory For Poultry Diseases (NRLPD) is an apex Laboratory for avian disease diagnosis and surveillance. The NRLPD is designated as Regional Leading Diagnostic Laboratory (RLDL) for Highly Pathogenic Avian Influenza (HPAI) for SAARC countries by FAO. In 2014 the laboratory was accredited for ISO/IEC 17025:2017 by Pakistan National Accreditation Council (PNAC), Islamabad. This laboratory is also a reference laboratory for Anti-Microbial Resistance for poultry.

Salient achievements:

- **Diagnostics to the Referral Samples from Field:** Infectious diseases are imposing significant impacts on the poultry sustainability and productivity around the globe. The NRLPD has been playing role of referral lab and coordinating with provinces by providing timely diagnosis of infectious diseases since 2004. In this regard:
- Under the L&DD project “PM initiative for Back yard poultry” 849 backyard poultry samples received and analyzed for Avian Influenza and Newcastle Diseases through serology, molecular diagnosis and culturing.
- A total of 319 different pathogens (*E.coli* 170; *Salmonella* 29; *Staphylococcus* 27; *Pseudomonas* 23; *Enterococcus spp.* 9; *Sheigella spp.* 19; *Klebsiella* 36; *Proteus spp.* 6) were recovered from 290 samples collected from diseased birds.

- **Antimicrobial Resistance in Poultry:** AMR is an emerging public health challenge posing serious threats to human and animal health, as well as affecting food security. It threatens millions of humans and animals lives globally. In this regard:
- *E.coli* (n=721), *Salmonella* (n=90) and *Enterococcus* (634) isolates were recovered from 803 samples collected from commercial broiler live bird market.
- Most of the isolates were resistant to Tetracyclines, Nalidixic Acid, Quinolones, Penicillins, Streptomycin, Quinopristin/Dalforsin, Erythromycin, Trimethoprim and Sulfonamides. The most sensitive antibiotics observed were Gentamycin, 3rd and 4th generation Cephalosporins, Azithromycin and Carbapenems.



Extension, Trainings, Publications, Seminars, Workshops:

- Animal Nutrition Program, NARC prepared 11,400 bags of livestock feeds, 1,800 kg milk booster and 2,000 urea-molasses blocks and sold to farmers, apart from experimental feeds for different programs of ASI.
- A total of 130 samples of feed, fodder, silage, grasses, dung and milk from farmers, students, research organisations and industry were analysed for nutrient composition and toxins.
- More than 4,000 chicks of different breeds were sold to poultry farmers.
- One day National Training Workshop was conducted on Laparoscopic AI in Goats under ALP project at ARGP, ASI, NARC on March 16, 2022.
- The total of 40 Livestock Assistants from North Waziristan has been trained on reproductive management and use of modern reproductive techniques in ruminants.
- Approximately 0.12 million liters of milk was processed (under a joint venture with PATCO). The compositional analysis of the milk showed that fat percentage varied between 3.6 – 5.8% with a mean value of 4.75% while total solids ranged between 12.11–14.80% with a mean value of 13.45%.
- Visit of officials from Centre of Excellence in Bovine Genetics (CEBG), Vice Chancellor (NUST), Member of National Assembly Ms. NafeesaKhatak, Dr. AbidSuleri, Convener Agriculture Transformation Plan, Ambassadors and Senior anchor persons (media personnel)
- All male tilapia fish seed (100,000) was provided to local farmers.
- Ornamental fish (1,000) was sold to local farmers/households.

The summary of research publications, MPhil/PhD students supervised, internees trained, visitors and training (imparted/obtained) both local and international are summarized below:

Publications		Post Graduate students		Internees	Visitors	Trainings	
Research papers	Abstracts	M. Phil	PhD			Imparted	Obtained
30	0	8	4	125	186	1	0

Detail of Budget 21-2022

Program	Project Title	Budget 21-22 (Rs. millions)	Source of funding
Animal Health Program	Epidemiology and diagnosis of Tick borne Diseases of cattle and buffaloes with special reference to development of diagnostic capacity for the detection of Crimean Congo Haemorrhagic Fever at NARC, Pakistan. Epidemiology of brucellosis in Pakistan. One World-One Health: Holistic and Cost-effective approach to counter Brucellosis in sheep/goats in Pakistan Control of Foot-and-Mouth Disease Viruses Vaccine Matching and Genotyping for the Prediction of Candidate Strains.	0.252 1.616 1.468 1.931	ALP,PARC ALP,PARC ALP,PARC PSF
Animal Nutrition Program	Evaluation of crop residue based total mixed fermented ration for ruminants.	1.112	ALP,PARC
Animal Reproduction and Genetics Program	Optimization of artificial insemination techniques with cryopreserved spermatozoa in Beetal goats. (ARGP) Investigations and Optimization of Sperm Sexing and Cryopreservation Techniques in Water Buffalo (ARGP)	1.63 3.539	ALP,PARC ALP,PARC
Animal Product Improvement Program - Dairy Technology Section	Isolation, Characterization and Utilization of Riboflavin (Vitamin B2) Producing Lactic Acid Bacteria for Preparation of Neutraceuticals Yogurt	3.436	ALP,PARC
Livestock Research Station	Establishment of Angora Rabbitry at Juglot and Skardu, PARC Mountainous Agricultural Research Centre	2.812	ALP,PARC
Aquaculture and Fisheries Program	1. Validation and establishment of intensive production packages for high value fisheries 2. Introduction of a High Value Fish <i>Channastriatus</i> (Saul) in Aquaculture System of Pakistan.	12.842 0.814	ALP,PARC ALP,PARC
Animal Biotechnology Program	Development of monoclonal Antibodies against local strains of PPR virus in sheep and goats".(ABP) Exploring genomic architecture and improving selection prediction for milk Production traits in potential cattle breeds. (ABP)	1.959 7.582	ALP,PARC ALP,PARC

Social Sciences Division (SSD):

The salient activities of SSD during 2021-22 are as under:

- During 2021-22, SSD conducted around 20 research studies and assignments. These studies were pertained to feedback on cost of production of various crops, production related problems of various crops, their training needs assessment, issues pertaining to small farmers, etc.
- Social Sciences Division also provided price analysis support to MNFS&R on daily, weekly and monthly prices of various agricultural commodities to keep the PM Office update on food inflation.
- SSD is also part of PSDP Projects of Wheat, Rice, Sugarcane and Pulses under Prime Minister's Agriculture Emergency Programme.
- SSD has prepared Medium Term Research Plan (2020-23), in which Pakistan's food security management related issues are given top priority.
- Developed Food Security Action Plan and draft report on Crop Insurance for MNFS&R
- Played the lead role in the development of county report for UN Food System Summit,
- Developed 3 years Rolling Growth Strategies for MNFS&R.
- SSD played its role in local and foreign projects. Under ALP 3 Projects were executed while 3 projects were funded by ACIAR & CABI.

Some SSD research studies are finalized while the other are at various stages of their execution. In the following paragraphs, some of the completed studies are briefly described. For further details on SSD Research Activities, see attached Annexure-1.

Capacity Building of NARS Scientists in Advance Analytical Techniques:

On-the-job training contributes to upgrading the skills of the staff in accordance with the job specificity, specific work environment and capacity building to cope with future challenges. This project was approved to conduct training across seven sites of Pakistan namely BARDC, Quetta, NARC Islamabad, AARI Faisalabad, ARI Tarnab, Peshawar, Agriculture Extension Gilgit, Agriculture complex, Gojra, and SARC Karachi. The objectives of training were to: To train agricultural scientists in various statistical, econometric methods and techniques for enhancing the quality of their research output by using various computing software such as R programming, Minitab, STATA, Statistix and SPSS and to develop training manuals for facilitating scientists in the use of statistics and econometric tools and techniques. Overall, 178 NARS scientists benefitted from the training courses. Participants were trained in the analysis of basic experimental designs, factorial experiments, multivariate analysis, regression and correlation, stability analysis, augmented design using R programming, Minitab and Statistix. Participants showed enthusiasm towards learning and applying R programming for the analysis of their experimental data. Moreover, emphasis was laid on practical sessions and interpretation of data analysis so that trainees could make their research meaningful and presentable. In the end of each training course a post evaluation of training was conducted through a well-developed evaluation proforma to assess participant's views about the training. Duration of these courses was one week. Target audience was drawn from National Agriculture Research System (NARS), and universities. Resource persons were the scientists from Social Science Research Institute, NARC. However, in some training courses, resource persons were invited from University of Balochistan Quetta, University of Agriculture Faisalabad, Pakistan

Institute of Development Economics (PIDE) Islamabad, and university of AJK, Muzaffarabad. Participants acknowledged that the instructors were knowledgeable in their subject areas, also, they found course content to be relevant. Most of the participants declared that they learned everything expected and confirmed that group activities and hands on practice improved their knowledge and skills. Similarly, participants were contented with regards to the quality of training. Participants also showed enthusiasm in learning new software R programming for the analysis of data. Participants suggested to increase duration of the course from one week to two weeks and demanded to repeat such training courses in future.

Feasibility of ginger cultivation in Punjab-Pakistan:

Ginger is an important condiment used as a spice in daily diet in Pakistan. It is produced on very small scale in Sindh province only. There is a large gap in local production and consumption in the country. The country is spending precious foreign exchange on the import of ginger in order to fulfill the supply and demand gap. The present study is mainly designed with the objective to ascertain the major factors inhibiting its production at Punjab level. It is found through Key Informant Interview (KII) and Focus Group Discussion (FGD) with various stakeholders including agricultural scientists, extensionists, farmers and private personnel that the major factors impeding ginger production are unfavorable climatic conditions (temperature, rainfall, humidity), inappropriate soil conditions, unavailability of suitable varieties and lack of awareness about ginger production practices among farmers etc. Further, the study reveals that net benefit per acre of ginger cultivation is about Rs. 4,75,200 if grown for market purpose. A success story of ginger cultivation is found in the area of Balaksar, Chakwal where one farmer named Abad-ur-Rehman cultivating ginger successfully at his farm for seed purpose. He cultivated it on one Kanal in during year 2020 and increased the ginger area to one acre during 2021. He intercropped bitter gourd with ginger during the current season. He planned to increase its area upto 2 acres in coming year based on higher returns in the last two years. He opined that ginger can be grown successfully in the Punjab Province subject to semi-controlled conditions in the form of tunnel cultivation supported with drip irrigation including intensive crop management practices as well. Many farmers of nearby areas visited his farm and shown interest in the cultivation of ginger. It is suggested that government should provide support to ginger growers in terms of production technology package and subsidized inputs.

Assessment of Socio-economic Benefits of Hermetic Storage Technology in Punjab:

The air tight (vacuum-based) hermetic storage technology (HST) has been reported to drive agricultural commodity storage losses down to less than 1% per year in certain countries while also substantially suppressing the growth of aflatoxins in high-value crops, major staple crops as well as spices and silage crops in the developed world. Even in Pakistan, the promoters of hermetic storage bag technology claim it an effective alternative for the protection of stored maize against insect pests for the farming community. However, potential demand for a technology requires a careful analysis of the local market to determine if the technology is profitable to the farmers. Therefore, present short case study was designed to explore adopters of HST and economic benefits as well as constraints in the adoption of HST technology for crops in order to solve problem of aflatoxins in storage and produce safer, healthier food supplies while promoting public health. Really few farmers have been identified adopting the technology; therefore, a check list was designed to get preliminary information in the context of Punjab Province. The findings are based on qualitative and quantitative data obtained from 3 progressive farmers using HST for storing maize grain and dried red chilli.

Farmer from Bhakkar district (operational land of 400 acres) was mainly growing maize (150 acres), pulses and chillies but stored maize of 150 acres and dried chillies of 3 acres through indoor HST technology bearing 40 ton capacity and 40 kg capacity HST bags respectively for the first time during year 2021-22. Results reveal that maize for consumption can be successfully stored on room temperature at a relative humidity of 12% by creating vacuum under HST technology up to 8 months with negligible (0.5%) storage losses, keeping quality and color of the commodity intact in contrast to traditional storage technique where loss of maize grain due to fungus was 150-200 Kg for 1600 Kg packing (loss equivalent to 9.4 to 12.5 percent). Moreover, at the time of harvest, maize grain price was Rs.950 which reached to Rs.1650 after indoor hermetic storage up to 8 months, thus a bumper price of Rs.1650 in year 2021 was realized. This farmer purchased long life HST technology having 40 ton (indoor storage) and 1000 tons outdoor storage capacity for prices of Rs.75000/- and Rs.3 million respectively. The tenant of the same farmer used hermetic single layer bags with 40 Kg storage capacity costing Rs.300 for trial basis on the dried chillies but the profit figures were not available with the owner of the land. However, good chances of HST's success on dried chillies were also expected. The other two farmers belonging to Lodhran district were of medium category farmers with land holding less than 12 acre but they were professional vegetable growers. Each farmer on average sold more than 500 maund dried HST stored chillie in the year 2021. Farmers reported the success of HST for dried chillies to a large extent but little success on storing maize in small bags over last two years. In both crops of maize and chilli, a single layer-based polythene hermetic bag (re-usable bags) with 40 kg storage capacity costing Rs.300 was used. Based on comparative economics on storage bags, farmer concluded that local, simple (desi) polythene plastic bags available on little cost of Rs.20-30/40 kg capacity were also seen giving the same results (without affecting quality and color) as of costly hermetic bags of Rs.300/40 kg capacity (from Haji Sons Company) for around 2-3 months of storage of maize and chillies at his farms. An additional profit of over Rs.1500 was realized after HST technology for dried chilli. In the nutshell, average profit in the range of 30% to 50% of the original harvest season price of chillies as well as maize could be realized with HST upon average storage duration of 2 to 6 months. Availability of certified HST (small and large capacity bags) was a big constraint whereas problems of aflatoxin, grain weight loss and poor quality of stored products in traditional ways may lead to the adoption of hermetic technology for storage of maize and chillies in Punjab. Therefore, information dissemination parallel to cheap availability of the certified HST bags is suggested. A deeper analysis of the HST based on more number of cases is also desired to draw any valid conclusion.

Comparison and efficiency analysis of different sowing and harvesting methods of rice in rice-wheat zone of Punjab:

Mechanized agriculture plays a key role in the overall socio-economic development in terms of food security, value addition, employment, poverty alleviation and export earnings. Due to the migration of agricultural labor in non-farm sectors and increasing climate vulnerability, it is a great challenge to keep pace of food production for the population growing exponentially, especially in the developing countries. Therefore, the main aim of this study was to examine the present status and farmer's perception about new rice sowing and harvesting technologies in contrast to traditional sowing and harvesting methods. Popular rice producing districts of Hafizabad and Sheikhupura were selected for the study of aromatic rice. Comparative results regarding sowing of paddy rice shows that rice nursery and seed cost is less in mechanical transplanter while fertilizer and irrigation cost is

higher in mechanical as compared to manual transplanter due to recommended plant population. Mechanical transplanter maintains sufficiently fulfills the recommended plant population of 80000 (here it is 87000) compared to traditional transplanting method (Manual) giving 40000 plants per acre. Moreover, in mechanical transplanter, yield also reported higher as 44 monds compared to manual transplanting yielding 38 monds per acre. Farmer's perception regarding adoption of mechanical sowing, majority of the farmers adopted this technology due to higher yield as compared to traditional transplanting, attaining target of recommended plant population, proper ventilation, saving ploughing/water costs, high straw value, labour and time saving as compared to manual transplanting of rice. Paddy harvesting technologies results show that majority of the farmers adopted paddy specialized harvester cobota due to less post-harvest losses 5-7 monds per acre as compared to traditional wheat harvester-based machine, higher straw value , premium price of paddy due to clean harvesting, save ploughing cost and tough working in extreme weather conditions. Despite many drawbacks, wheat- based harvester (Traditional) is still popular in rice-wheat system due to its significant features i.e. ability to harvest fallen crop, time saving as a result of fast working and easy available in local market. Keeping in view the comparative economics and farmer's perceptions, it is concluded that mechanical transplanting and Kabota harvesting technologies are more efficient as compared to traditional methods. It is recommended that information dissemination for adoption of appropriate rice harvesting and sowing technology is urgently needed to increase the cropping intensity, crop productivity and economic emancipation through less inputs in terms of time, labor wages and other costs.

Prospects of soybean crop in Punjab-Pakistan:

Soybean is an important oil seed crop as it contains 20% oil content and 40% protein. Although the country has suitable agro-climatic conditions for soybean cultivation but the absence of varieties with high yield potential pushed its cultivation towards the marginal areas. In Pakistan, the demand for soybean oil and meal has increased many folds as a raw material for industry in the country. However, soybean cultivation is very less in the country and as a result precious foreign exchange is spent on its import. Pakistan is the 24th largest importer of soybean oil in the world despite possessing favorable conditions for its production. Keeping all this in view, the present study was designed to analyze the prospects of soybean cultivation in Okara/Sahiwal in Punjab because of joint venture of AARI and Nestle Company. According to the survey results, majority of the respondents sowed the soybean crop in July-August and majority harvested soybean in November-December during 2021. Further, almost 100 percent farmers adopted ridge sowing for the soybean crop. The study revealed that only two varieties of soybean were sown by the respondents in study area. The respondents perceived that AARI-soybean variety has more yield than Faisal-soybean variety. It was estimated that benefit cost ratio with land rent was 1:1.07 while the net income was Rs. 4890.68 per acre. The respondents of the study area sold all the produce to Nestle Company at the rate of Rs.3760 per maund. No germination problem was reported by the majority of respondents (85%). The majority of respondents (85%) were planning to grow more soybean in future @ 4 to 5 acres in study area. For the promotion of soybean cultivation, a comprehensive and applied soybean production and procurement policy through public-private partnership should be developed and implemented to promote local supply of soybean.

Feasibility of Tomato Paste for Small Scale Agribusiness Programme in Pakistan:

Tomato is a rich source of vitamin A & C and is cultivated over vast area of land in Pakistan. The price of tomato is fluctuating in Pakistan due to seasonal perishable nature of fruit. The production of tomato was 147317 tons in Punjab during 2020-21. According to Agriculture Department, 30% of vegetables/fruits are wasted due to negligence and lack of processing facilities, which could be converted into non-perishable forms thus permitting its transportation and storage without wastage. To save this wasted tomato, this prefeasibility study was planned so that excess production could be saved in form of tomato pulp, puree and paste in canes, glass jars and polythene bags. At the time of shortage, value added tomato paste and puree can be used at household level instead of costly fresh tomato. Its value addition can be feasible and profitable business opportunity that is yet to be fully exploited. A tomato paste processing plant can be designed with a wide range of optimal processing capacity. Processing plant used for the purpose of this prefeasibility study has an annual production capacity of 400 tons of tomato paste and 9120 tons of fruit pulp. It is assumed to run the plant at 40% of the full capacity in a year. A detailed financial model has been developed to analyze the commercial viability of the proposed unit. All the figures in this financial model have been calculated for installed capacity of processing 6,400 tons of tomato for tomato paste. Income statement, cash flow statement and balance sheet was done to find Internal Rate of Return (IRR) and Payback Period and Net Present Value (NPV) i.e. 23%, 4.75, Rs. 174,064,844 respectively. The project is proposed to be financed through 50% debt and 50% equity. Value added products of tomato should be displayed on all general and grocery stores to aware people about its technology and use because its nutrition value is same as fresh tomato. This type of agri. business plan will save wasted product and provide employment opportunities to people including owner manager.

Poverty Alleviation through Health Improvement of Rural Female Involved in Cotton Picking:

Cotton picking is considered an important source of income generation for the women of the country. During cotton picking, females have to face many health related issues arising from direct contact with cotton sprayed fields as maturity of cotton is highly pesticides-based. Cotton picker females (girls and adults) of the country rarely use any protective measures such as gloves, caps, face mask and field shoes during cotton picking. Even the farmers don't apply pesticides judiciously as per recommendations, thus applying sprays up to 14 per acre. To find solutions to these pesticides and their after effects on female cotton pickers, current project at PARC (SSRI) Faisalabad was launched with the funding from UNESCO during year 2022. The main objectives were to create awareness among males regarding judicious use of pesticides and the females regarding use of protective measures (comprehensive kit) duly looking after their and children's personal health and hygiene while working in the cotton fields. The objectives were met through arranging informative training/meeting sessions both for the cotton farmers and female cotton pickers. Four major sites from Multan, Khanewal, Vehari and Lodhran districts among cotton belt of the Punjab Province were selected in consultation with relevant stakeholders including agriculture extension department. In total, 4 face-to-face trainings (one in each district) were organized at selected sites to impart awareness among farmers through brochures and visuals from various sources on cotton crop to avoid over use of pesticides. For female cotton pickers, 11 face-to-face trainings were organized at selected sites to impart awareness among cotton pickers through brochures, displaying kits and visuals from various sources on cotton crop to lessen the side effects of pesticides on females and to plan better livelihood without compromising on health and hygiene of relevant stakeholders of Punjab Province. Based on findings of Participatory Rural Appraisal (PRA) conducted by project team, concerned

resource persons/trainers imparted trainings covering almost all sectors from cotton crop management to harvesting such as proper selection of insect/pest resistant cotton varieties, judicious use of pesticides, use of protective kits, eating healthy diets and kids management during cotton picking activities. To see the effectiveness of the trainings, pre and post training, cotton pickers' awareness and use of protective measures were taken. None of the female cotton pickers were using protective measures kit but almost 7 percent pickers were aware of the use and benefits of adopting protective measures. All female participants (100 percent) acknowledged the benefits of holding training for them and they showed positive attitude towards wearing protective kits in future to save their as well as kid's life from any side effects of pesticides. Even they gestured improving their eating and hygiene sustaining habits before, during and after cotton picking activities. Based on project findings, it is suggested that such type of informative trainings should remain in vogue till message reaches to large community working in the agricultural fields. Agriculture extension department should hold joint field visits with public sector nutrition experts while disseminating latest knowledge on use of pesticides as well as health and hygiene related issues in order to have more realistic application of solutions for sustained livelihood of females in the agriculture sector of the country.

Farmers' Knowledge and Pest Control Practices in Peach Orchards of Swat District, Khyber Pakhtunkhwa:

Peach is the prominent stone fruit of district Swat, Khyber Pakhtunkhwa. Insect pests are the major problems with regard to production, fruit quality, economic losses, and export purposes. Farmers are constantly applying pesticides for insect pests' control, which cause serious harmful effects on fruits and ecosystem. For this reason, a field survey was carried out during the year 2022 in four tehsils of district Swat of Khyber Pakhtunkhwa i.e. Barikot, Kabal, Matta and KhwazaKhela. A total of 80 peach growers from four main peach growing tehsils were interviewed with the objectives to find the farmers knowledge, pest control practices and to identify the challenges faced by the peach growers in pest control.

The salient findings of the study revealed that mean irrigated operational landholding of the peach growers was 8.94 acres and allocated 85.23 percent of operational land to peach orchards. The sample peach growers were grown thirteen peach cultivars such as early, medium and late season varieties. Majority (76%) of the growers cultivated more than one peach variety on farms. The most popular varieties were Indian blood with yield of 10,022 kg per acre, NJC 84 with yield of 9,821 kg per acre, early grand with yield of 9,488 kg per acre, Suance with yield of 9,339 kg per acre and Maria delisa with yield of 12,609 kg per acre. The findings exhibited that 38.8% and 35% of the sample peach growers obtained information regarding improved agricultural production technologies from agricultural extension department and input dealers, respectively. Four-fifth of the sample growers were practicing intercropping in mature peach orchards. The results also show that more than half (51%) of the growers were unable to identify the types of insect's attack on their peach orchards. The data further reveals that majority (70%) of the peach growers could not differentiate between beneficial and non-beneficial insects. It was remarkable that incredibly majority (96%) of the peach growers were aware about pheromone traps whereas 43% and 41.5% of the growers got first-hand information about pheromone traps from agricultural extension department and fellow farmers, respectively. Use of Pheromone traps is the most key technique adopted by 60% of the sample peach growers while 40% of the growers did not install pheromone traps in their peach orchards for control of fruit fly. Peach growers installed on average 8.90 numbers of pheromone traps per acre while some

sample growers also installed on an average 14.54 numbers of various sizes of plastic bottles pheromone traps per acre. June and July were the prominent months where fruit fly infestation was more in peach orchards reported by 36% and 25% of the sample peach growers. The findings exhibited that 35% and 22.5% of the sample growers installed pheromone traps in the months of June and July. Majority (76%) of the peach growers reported that fruit fly was a major insect that attacked on peach orchards whereas 45% of the growers accounted that leaf curl was the most common disease attacked on peach orchards. More than half of the sample peach growers had no knowledge about the pesticides application in their peach orchards and 72.5% of the peach growers did not know about the application of recommended doses of insecticides/pesticides. About two-third of the sample peach growers changed pesticides due to ineffectiveness and spray of another chemical of pesticide for control of insects/pests in peach orchards. Mean number of chemical sprays applied by the sample growers on their peach orchards was 7.75 numbers. The findings also reveal that fruit fly is a dilemma and causing significant loss in peach fruits in the study area. Furthermore, mean fruit fly losses noted in Maria delesia variety was 19.97% followed by Indian blood 19.52%, Elberta 16.64%, Suance 14.65%, Flam crest 11%, NJC 84 9.05% and Coronetto 7.72% losses were reported by the sample peach growers in the study area. Cleaning of peach orchards from weeds, ploughing, pruning of plants, proper disposal of infected fruits and pheromone traps were the major eco-friendly pest management techniques adopted by the majority of the sample peach growers. High prices of inputs, lack of knowledge, adulteration in pesticides and fruit fly control were the main challenges faced by the sample growers in the study area. The study suggested that agricultural departments and other private organizations involved in agricultural development may organize awareness and training programs in the context of integrated pest management techniques (IPM), motivate the farmers to adopt pheromone traps, develop fruit flies control techniques, control the prices and quality of agricultural inputs and also provide subsidy on inputs, develop pest resistant peach varieties, ensure the availability of advanced fruit fly traps. Agricultural research department are required to develop a system and mechanism for regular monitoring and to identify fruit fly species availability and its infestation in fruits and vegetable growing area of Khyber Pakhtunkhwa.

Research Studies 2021-22:

- Assessment of on-going technology testing and promotion under PSDP PEP-Rice
- Status and Market Prospects of Medicinal Plants (MPs) in Pakistan
- Prospects of Value Addition of Apricot in Gilgit-Baltistan
- Issues and Challenges in Citrus Supply Chain in Punjab
- Prospects of Adoption and Up-scaling of NARC-G1 Garlic Variety
- Exploring the Potential Pockets and Linkages of Organic Agriculture in AJK
- Comparative Economic Analysis of Chickpea and Lentil Improved Production Interventions at Farmers Fields in Pakistan
- Monitoring process variation in NARC bakery for improving product quality
- Assessing the yield stability of Chickpea and Lentil Genotypes across Environments
- Changes in Socio-socio-economic indicators in rural areas of Pakistan
- Farmers' knowledge and pest control practices in peach orchards of Swat District, Khyber Pakhtunkhwa
- Agroforestry as a source of rural livelihood improvement: Evidence from central Khyber Pakhtunkhwa, Pakistan

- Diffusion possibilities of chip plant technology in sugarcane
- Prospects of soybean Cultivation in Punjab
- Prospects of Ginger cultivation in Punjab available
- Assessment and feasibility of Hermetic storage facility for different crops
- Comparison and efficiency analysis of different sowing and harvesting methods of rice in rice-wheat zone of Punjab.
- Feasibilities Studies for Small Scale agribusiness for KamyabNojwan Program
- Developing competitive and inclusive value chains of pulses in Pakistan
- Farmers Knowledge and Adaptation to Climate Smart Agriculture in Sindh
- Production and Marketing of Jujube in Sindh
- Climate Change Adaptation and mitigation strategies in Baluchistan

Ongoing Research Projects:

- Understanding the drivers of successful and inclusive rural regional transformation: Sharing experiences and policy advice in Bangladesh, China, Indonesia and Pakistan
- Recommended technologies, farm practices of Major crops, decreasing profitability in Khyber Pakhtunkhwa
- End line survey for the Project “Increasing Productivity and Profitability of Pulses in Cereal Based Cropping System in Pakistan
- Assessment of Consumer Preferences, Perceptions and Willingness to Pay for Pulses & Pulses Products in Pakistan (Market Survey) ACIAR Funded Project titled “Developing Competitive and Inclusive Value Chains of Pulses in Pakistan (ADP/2017/004)
- Gender Inclusive Community Engagement: Capacity Building of SVVCP Project team
- Crop-Livestock Integrated Farming Systems in Irrigated Punjab: Livelihood, Employment and Food Security Linkages.

Planning & Development Division:

The progress of PSDP for Annual Report 2021-22 is as under:

- **One** project was completed titled, “Up-gradation of Arid Zone Research Institute (AZRI) D.I. Khan” during FY 2021-22.
- **Twelve (12)** New project proposals were submitted to M/o NFS&R for approval of competent forum (CDWP, DDWP) (Annex-A).
- **One** project titled” Mainstreaming of Mountain Agricultural Research Centre (MARC) for the Promotion of High Value Agriculture in Gilgit-Baltistan” was approved for an amount of Rs 288.200 million (Annex-B).
- **One** project titled “Strengthening, up-gradation and accreditation of National Labs in compliance with national and international standards on food quality, safety and SPS requirements” was dropped due to budgetary constraints (Annex-C, S.No. 9/761).
- Prepared/ approved online Cash Plans & Work Plans of **08** On-going PSDP funded projects (Annex-C, S.No. 1-8).
- Conducted **Five (05)** Steering Committee meetings during FY 2021-22

New Proposed Projects/Concepts for 2022-23

Sr.#	Name of Projects	Proposed Duration	Proposed Cost
1.	Genetic Improvement of Livestock for Productivity Enhancement	5 Years	1482.685
2.	Promotion of Quality Honey Production Technologies Under Different Ecological Regions	5 Years	1107.593
3.	Cluster based Transformation Program for High Value Horticultural Crops.	5 Year	8135.000
4.	Establishment of Arid Zone Research Centre Bahawalpur to Support Food Security and Poverty Alleviation in the Desert Area of Southern Punjab	5 Years	1198.520
5.	Enhancement of Plant Genetic Resources Conservation Facility at BCI, NARC for Food Security	5 Years	1086.400
6.	Mainstreaming Climate Resilient, Water Smart and High-Value Agriculture in Thal Desert	5 Years	1610.500
7.	Research and promotion of Organic Agriculture in Pakistan	5 Years	3500.000
8.	Tea Cultivation and Promotion in Potential Growing Areas	5 Years	1717.952
9.	Thar Community Actions for the Management of sustainable Ecosystem, Livestock, Land and Livelihood (Thar Camell)	5 Years	1352.048
10.	Transforming Agriculture through Climate Resilient and Water Smart Solutions in Thal Region, Punjab	5 Years	1610.500
11.	R & D of High Value Horticultural Crops in Various Ecologies for Diversified Agriculture	5 Years	8135.000
12.	Establishing Agro-Nano-Biotechnology Research Program For Agro-Food Sector.	5 Years	600.000

Note: All amounts are in Rs. Million.

New Approved Project

Sr.	Name of projects	Approval Status Forum/ Date	Duration	Approved Cost (Federal)	Remarks
1	Mainstreaming of Mountain Agricultural Research Centre (MARC) for the	DDWP 25.05.2021	5 Years	288.200	DDWP minutes issued Admin Approval is awaited.

Note: All amounts are in Rs. Million.

Annex-C
On-Going PSDP Projects for FY 2021-22

Sr/ PSDP No.	Name of projects	Approving Forum/ Date	Execution Period	Approved Cost (Federal)	Exp. Up to 30.06.2021	Allocatio n 2021-22	Remarks
1/731	Commercialization of Potato Tissue Culture in Pakistan	DDWP 04-02-2020	2020-21 to 2024-25	158.830	43.661	33.170	--
2/743	Productivity Enhancement of Rice	CDWP 06.05.2019 ECNEC 29-8-2019	2019-20 to 2023-24	15789.402 (3750.660)	632.386	527.421	--
3/744	Productivity Enhancement of Sugarcane	CDWP 06.05.2019 ECNEC 29-8-2019	2019-20 to 2023-24	4937.225 (1003.773)	233.035	107.278	--
4/745	Productivity Enhancement of wheat	CDWP 06.05.2019 ECNEC 29-8-2019	2019-20 to 2023-24	30455.353 (5632.774)	1061.101	900.000	--
5/746	Productivity Enhancement in Pulses	DDWP 29-11-2019	2019-20 to 2023-24	1437.358	252.708	261.843	--
6/748	Sino-Pak Agricultural Breeding Innovations	DDWP 24-02-2020	2020-21 to 2023-24	433.936	253.940	68.890	--
7/749	Strengthening/Up-gradation of Agri. And Livestock Research System of Arid Zone Res. Institute, Umerkot, Sindh	CDWP Revised 24.05.2018	2017-18 to 2021-22	528.592	237.456	225.786	Project will be completed on 30.06.2022
8/752	Updation of Agro ecological Zones of Pakistan Through Satellite and In-Situ Data Mapping	DDWP 24-02-2020	2020-21 to 2022-23	60.450	20.921	33.050	--
9/761	Strengthening, up-gradation and accreditation of National Labs in compliance with national and international standards on food quality, safety and SPS requirements	DDWP 25.05.2021	2021-22 to 2025-26	1620.589	New	324.118	The project was dropped in 2022-23.
				55,421.735 (10367.210)	2,735.208	2,481.556	--

Note: All amounts are in Rs. Million.

Agricultural Linkages Program:

During the year 2021-22, two meeting of Board of Directors were convened in which 40 projects were approved for funding.

- In year 2021-22, 138 projects are ongoing under ALP with approved total cost of Rs737.499 million.
- Under ALP in year 2021-22, 55 projects have been completed amounting Rs. 294.971 million under National Agri. Res. System in disciplines of plant sciences, natural resources, animal sciences, agricultural engineering and social sciences.

Table: Discipline-wise Completed Projects under ALP During 2021-22:

S#	Discipline	No. of Projects	Total Cost (Rs. millions)
i.	Plant Sciences	24	105.23
ii.	Animal Sciences	08	38.573
iii.	Natural Resources	12	70.922
iv.	Agri. Engineering	11	80.246
	Total	55	294.971

Table: Discipline-wise On-going Projects under ALP during 2021-22:

S#	Discipline	No. of Projects	Total Cost (Rs. millions)
i.	Plant Sciences	76	369.381
ii.	Animal Sciences	31	181.500
iii.	Natural Resources	22	128.850
iv.	Social Sciences	02	5.840
v.	Agri. Engineering	07	51.928
	Total	138	737.499

Table: Discipline-wise newly started Projects under ALP during 2021-22:

S#	Discipline	No. of Projects	Total Cost (Rs. millions)
	Plant Sciences	21	159.335
i	Animal Sciences	02	12.965
ii	Natural Resources	03	19.102
iii	Agri. Engineering	01	3.161
	Total:	27	194.563

Research Agreement (MoU type) Projects:

Overall 23 research agreement projects (MoU type) were ongoing during the 2021-22. The MoU section of PM&E has processed and revised administrative approval of 18 projects for revision/re-appropriation of budget breakup and extended the project duration of different MoU projects as desired by the NARC/PARC scientists for smooth implementation of projects. In which some of the major contributing donors were Australian Center for International Agriculture Research (ACIAR), International Development Research Center (IDRC), Global Crop Diversity Germany through ICARDA, Royal Botanical Garden (RBG) Kew UK, CABI-Pakistan, International Atomic Energy Agency (IAEA), Punjab Agricultural Research Board (PARB), NSLP (PSF) etc.

List of MoU type Projects implemented in 2021-22

Plant Sciences	Animal Sciences	Natural Resources	Social Sciences	Agricultural Engineering	Total
12	02	03	06	0	23

The MoU section has also processed 30 project proposals and concept papers to the different local and international donors like FAO-Turkey, JICA, NSLP (PSF), German Academic Exchange Service (DAAD) KOICA, D-8 Turkey etc. As the council has privilege to compete for financial assistance from the local and international donors. Therefore scientists of the council have won different project from national and international donors of the world. Some of the research agreements with international organization are underway for implementation in the future.

Agricultural Engineering Division:

Manual and Tractor-Mounted Precision Planters for Maize Crop:

Introduction

Maize is the third most important cereal crop in Pakistan after wheat and rice. Maize is cultivated on an area of 1.65 million hectares with a total production of 10.64 million tonnes. Two maize crops are grown in the Punjab (spring and autumn), whereas one crop is grown in other provinces. About 97% maize is cultivated in the Punjab and Khyber Pakhtunkhwa provinces. Maize planting on raised beds or ridges is predominantly done by manual labour force, which very laborious and time-consuming practice. Maize has become the third most important cereal crop of the country after wheat and rice. Grain maize can be grown on flat soils as well as on ridges mainly on irrigated lands. However, to save irrigation water, ridge sowing or bed planting has been practised for many years now. Precision planters can be used to plant seeds of hybrid maize at required depth and spacing at ridges or beds. In this regard, a project was initiated to develop or introduce manual and tractor-mounted maize planters for ridge sowing or bed planting of maize crop. The project was funded from Agricultural Linkages Programme (ALP), Pakistan Agricultural Research Council (PARC), Islamabad.

Progress and Salient Achievements:

A manual precision planter was designed and developed at AEI, which has very good precision more than 90%. Three other manual planters (roller type, inclined plate type and dibbling type) were identified and procured for maize planting. The performance of all manual planters was evaluated by establishing maize trails. Data were collected on planting depth, seed to seed distance, seed separation accuracy, seed damage, seed placement accuracy, planting precision, planting capacity and efficiency of each planter. Seed separation and seed placement accuracy of all planters ranged from 80 to 97 %. Seeding depth was up to 3 cm with an error of ± 1.5 cm. Field capacities of manual planters ranged from 0.16 to 0.18 ha/h with an efficiency of 78.4 to 88.2 %. The operating cost of manual planters ranged from Rs. 800 to 900 per hectare. Based on their performance, the dibbling-type manual planter was propagated for development of a tractor-mounted maize planter. The field performance of tractor-mounted maize planter was evaluated at NARC, Chiniot, Faisalabad, Sheikhupura, Multan and Vehari districts. The average field capacity of the machine was 1.0 acres per hour with a planting efficiency of more than 80%. The operating cost of tractor-mounted maize planter was Rs. 946 per

acre, whereas the manual dibbling cost was Rs. 2,700 per acre. A net benefit of Rs. 1,754 per acre can be achieved by using tractor-mounted precision planter. A field demonstration was organised at Vehari district for maize growers of the region. Field testing and demonstration of tractor-mounted maize planter .



Testing and demonstration of tractor-mounted maize planter.

Rice Residue Management Machinery for Wheat Sowing:

Introduction:

Farm mechanisation is an important farm input, which enhances the efficiency of all other inputs. Wheat crop is a highly mechanised as compared to other crops. Rice-wheat cropping area in Pakistan is 2.2 mha, out of which 1.25 mha is in the Punjab province. In the Central Punjab, rice crop is mainly harvested using combine harvesters. Handling of combine-harvested rice residue is a big issue, which is frequently bunt in the field by farmers. This gives rise to environmental pollution and loss of soil nutrients is also the major consequence of straw burning.

Progress and Salient Achievements:

For sowing of wheat in combine harvested paddy fields is a challenge due to handling of heavy rice residue to avoid delay in crop sowing. Agricultural Engineering Institute (AEI) has developed rice residue management technologies called as Pak Seeder and Combine Seeder that can plant wheat crop directly in combine-harvested paddy straw. These technologies not only improve soil biological and physical health, but also increase wheat and rice yield. These resource conservation technologies can enhance crop yield up to 10%, reduce nutrients loss of the soil and save environment from smoke pollution. These technologies will help reduce the SMOG problem in the country.

During the year 2021-22, wheat planting trials were carried out at different locations in the Punjab to see the performance of the machine. Results were compared with the conventional wheat sowing practices. Field seminars and demonstrations were also arranged to provide awareness and promote these technologies among farming community.

These activates were performed under PSDP funded project for productivity enhancement of wheat. The field activities performed during this year.



Field trials of Combine Seeder and demonstration to farmers.

Adaptation of Groundnut Digger-Inverter:

Introduction:

Groundnut is a major *kharif* crop of rain-fed (*baranior Pothohar*) areas of the Punjab province of Pakistan. It is also cultivated in irrigated areas of Khyber Pakhtunkhwa and Sindh provinces. But, about 90 % groundnut is grown in rain-fed areas of the upper Punjab. Groundnut is a cash and an oilseed crop and is a major source of income of *barani* areas. Groundnut digging-inverting is a big problem for the groundnut farmers of the country. In Pakistan, more than 95% farmers used digging blade to harvest the groundnut crop and after digging the crop, labour is required to invert the crop manually. Almost 5-6 persons are involved for picking, shaking and inverting the crop in 3-4 hours per acre. This is a very labour-intensive and time-consuming operation, also high cost is paid due to non-availability/shortage of labour. The inefficient digging of groundnut crop also results in financial loss to farmers as 30-40% pods remained underneath the soil. Lack of appropriate technology and efficient harvesting are the factors resulting in lower productivity and high labour cost, ultimately reducing the profit of farmers. An Agricultural Linkages Program (ALP) funded project was initiated to introduce an efficient groundnut digger inverter, which could effectively dig and invert the crop. Due to this reason, the area under groundnut production has been decreasing every year. Lack of appropriate technology and efficient harvesting are the factors resulting in lower productivity.

Progress and Salient Achievements:

Agricultural Engineering Institute, NARC has addressed the issue of harvesting the groundnut crop and introduced a tractor-mounted groundnut digger-inverter in 2020 to reduce the pod losses and reduce the labor requirements. This machine performs four functions simultaneously i.e. digging, shaking, conveying and inverting. The new machine was extensively tested at farmer's field for its performance evaluation and different field days / seminars were arranged at different groundnut growing areas to demonstrate this technology to farmers. The machine is being commercialized through local machinery manufacturers. The economic impact of this machine is very significant as it reduces digging losses up to 20-30% and increases yield up to 10%. The economic benefit of this

machine is huge, which saves Rs. 10,740 per acre. Field snaps of the conventional and new machines



Field snaps of conventional and new machines (groundnut digger-inverter).

Tractor Operated Bed Planter for Onion Seeds Sowing:

Introduction:

Onion (*Allium cepa L*) is one of the important condiments widely used in all households throughout the year. Onions may be eaten raw, fried and pickled. There are two cropping season of onion in Pakistan i.e., spring and autumn. Various methods prevail in the country to sow onion crop in a field. In spring cropping, first nursery of onion is sown, then this nursery is transplanted in field and on maturity crop is harvested in the month of June. For off season/autumn crop nursery raising is too difficult due to hot month of June.

This off season/autumn crop had some limitations. The most important one of the limitation is nursery raising for this off season crop during hot month of June, July, and August. Normally farmers brought onion seedlings from Sindh province causing 40-50% mortality during transportation. Therefore, by raising onion seedlings under these hard conditions farmers would be able to get onion seedlings at their farms in spite of importing from Sindh. In case nursery raising is not successful under hot summer conditions, a better substitute to seedlings are onion sets. In Balochistan, onion cultivation is done by broadcast direct seeding method. All these methods, nursery sowing, set sowing and broadcast method are manual. These manual onion seed planting methods are laborious and more time-consuming practice which results in a lower plant density and low yield.

Progress and Salient Achievements:

A project funded by Agricultural Linkages Programme was initiated to design, developed and test a tractor operated onion seed planter. This machine will sow onion seeds on beds using unique cavity type seeding. The machine will sow seed simultaneously in 7 rows with row spacing of 3 inches for onion set production while it could also be used for direct sowing. In direct sowing machine will sow 3 rows with spacing of 6 inches on raised bed of same specification (21 inch). By adoption of this technology farmers will get a better substitute (in the shape of onion sets produced) for onion nursery to produce off-season onion crop and with the development of machine precise sowing of

onion seed and bulbs production will be achieved. Development of onion planter was carried out at AEI workshop. After fabrication of machine, lab testing was done to evaluate the seed metering precision. Data was analysed, and necessary improvements were incorporated. The final version of the onion planter was tested at farmers' fields (Soon Valley, Multan and NARC) and collected the necessary data. The field demonstration/seminar was conducted in the field area of Multan to promote this technology among end users, manufacturers and stakeholders. Field testing and demonstraiton of onion seed planter.



Field testing and demonstraiton of onion seed planter.

Commercialization of Ispaghul Processing Technologies for Value Addition:

Introduction:

A project entitled “Commercialization of ispaghul processing technologies for value addition” was initiated to commercialise the newly deployed ispaghul processing technology in the country under financial support of Agricultural Linkages Program. The Ispaghul is a medicinal herb which provides many health benefits to humans. Conventionally, its processing is carried out using manual techniques, which require lot a labor force and time. The husk produced by these conventional techniques is of poor quality.

Progress and Salient Achievements:

A mechanized processing line for processing of ispaghul was developed by Agricultural Engineering Institute (AEI), NARC, Islamabad. The processing line includes machinery for seed cleaning, de-husking and winnowing and husk classification. An MoU was signed with a private machinery manufacturer to develop and commercialize the machinery. A new ispaghul processing plant of small capacity consisting of four de-husking units was installed at NARC under this project for indigenous processing and promotion of ispaghul processing machinery in the country. This process of this plant was shown to ispaghul growers, processors and other stakeholders. The demonstration of ispaghul processing machinery at NARC



Demonstration of ispaghol processing machinery.

Productivity Enhancement of Rice – Rice Mechanisation:

Introduction:

Pakistan is the world's 10th largest producer of rice. Pakistan's exports make up more than 8% of world's total rice trade. It is an important crop in the agriculture economy of the country. In Pakistan, rice is grown manually by sowing rice seedlings and then transplanted manually in the puddled soil using labour force. The plant population achieved by manual transplanting is around 35-000-40,000 plants per acre while recommended plant population is around 80,000-85,000 plants per acre. This difference in plant population results in low productivity of rice crop in Pakistan. Promotion, awareness and training regarding rice production machinery was provided to farmers under PSDP funded project for productivity enhancement of rice.

Progress and Salient Achievements:

Agricultural Engineering Institute (AEI), NARC is currently training the farmers/ service providers, provide awareness and promote rice production machinery for productivity enhancement of rice. Training and awareness seminar were arranged in rice production areas to promote mechanized production of rice. The benefits of using rice machinery in contrast to manual production was compared and results were shared with farmers and service providers. Different meetings were conducted with farmers and service providers who are involved in mechanized nursery raising and transplanting business. Technical guidance was provided to them about proper use and calibration of the rice nursery and transplanting machinery for acquiring recommended plant population at proper spacing and depth in the field. Rice planting trials were conducted using DSR drill as well as rice transplanter for comparison of results. The field modification and field trials of DSR drill and rice transplanter are shown below.



Field trials and seminar on rice production machinery

Postharvest processing of peach:

Introduction:

Peach occupy the most important place in the stone fruits and is temperate in nature. Swat and Peshawar valleys enjoy the central position in KPK in supplying peach fruit of high quality and grade. Peach produced in NWFP is marketed immediately after harvesting. High temperature and humidity, however, cause high postharvest losses. Estimates suggest that losses are ranged 20 -30%. Peach supplied to various cities of the country by the growers themselves and through Beoparies (middlemen). Agricultural Engineering Institute (AEI), has adopted and introduced postharvest processing and packing machinery for peach fruit under ALP funded project.

Progress and Salient Achievements:

The rapid cooling of peach after harvest is very important to remove field heat of the produce. Currently in Pakistan, the peach is marketed without any washing. Agricultural Engineering Institute has imported postharvest processing machinery for peach, which will be tested and demonstrated in the fruit growing clusters in the Khyber Pakhtunkhwa province. About 10-15 % losses of the peach fruit would be reduced and the shelf life of fruit will be increased. A seminar/demonstration was arrange at Agriculture Research Institute (ARI), Swat. A large number of farmers, agriculture extension officials and other stakeholders participated in the event. The machinery was demonstrated to the participants and its performance was appraised. The glimpse of field activity at Swat area is shown in figure 7.



Demonstration of peach postharvest processing and packaging machinery

Regenerative agriculture:

The climate-smart production system that requires significantly less cost outlay and far less inputs is applied to regenerative agricultural practices. This production system is based on natural process of soil fertility. Main elements of this production system include growing crops on raised beds, zero or far less tilling, sowing of crops with precision planter and mulching of sown crop. The system is well known and has been practiced globally for decades, but individually and sporadically. For proper application of regenerative agricultural practices, all these cultural practices should be integrated in the field in a sequence by using proper mechanisation and implements. This production system has already been practiced by many individual farmers in the country and have reported impressive results in higher yields, significantly reduced use of irrigation water and virtually no application of chemicals. However, the one of public sector research and development institutions has experimented this system.

Progress and Salient Achievements:

Agricultural Engineering Institute with active support of Ministry of National Food Security and Research (MNFS&R) and Planning Commission of Pakistan has conducted field trials on wheat crop and found encouraging results (Figure 8). The bottlenecks in implementation of regenerative agriculture system is the availability of customised agriculture machinery suited to this system from planting to harvesting. Regenerative agricultural machinery will help to enhance the soil organic matter, reduction in chemical fertilizers and weedicides application and 10-15 % improved yield of the crops.



Field testing of regenerative agricultural machinery.

Coordination & Monitoring Division:

Salient Achievements of Coordination and Monitoring Division, PARC (2021-22):

1	Areas of bilateral cooperation with National Agricultural Research System (NARS) of friendly countries	Identified areas of cooperation with the following countries: Korea China Turkey Hungary Bulgaria Uzbekistan
2	MOUs/Agreements	International Organizations = 03 Korea (1), Hungary (1), IWMI (01) National = 05
3	Facilitation in organizing National and International Conferences/Meetings	Rural Development Administration (RDA) Korea and PARC management for establishment of Korea Program on International Agriculture (KOPIA) Center in Pakistan Inter Provincial Agricultural Research Coordination Committee (IPARCC) meeting Second Meeting of Pak-China Joint Working Group (JWG) on Agriculture Chinese experts from Gansu Fisheries Research Institute, to establish laboratory at MARC, Juglote, Gilgit-Baltistan

4	Talking Points/Briefs	Brief for the meeting of Secretary, MNFS&R with Senior Management of FAO, IFAD and UNIDO Brief/ Speeches/ Messages of the honorable Minister and Secretary, MNFS&R for World Food Day.
5	Paid PARC's Memberships Fees of various International Organizations	Asia-Pacific Association of Agricultural Research Institution (APAARI) CAB International (CABI) Centre for Sustainable Agricultural Mechanization (CSAM)
6	Processing of Research proposals/ MOUs with various countries, National/International organizations	Korea = 03 Turkey = 01 CABI = 01 IWMI = 01
7	Visa Processing Facility provided to the participants to attend meetings/seminars of different fora	05 scientists/employees and Internationally Recruited Staff (IRS)
8	New Interventions	Processed cases for establishment of: National Coordination Directorate Regional Coordination Units in all provinces including AJK
9	Human Resource Development	Trainings from Overseas/National Organizations Local Short Term Training = 105 Local Degree Training = 19 Short Term Training Abroad = 54 Foreign Degree Training = 05 Foreign Visits = 63
		Degree awarded through PIASA, PARC AE = 02 M.Phil AGB = 05 M. Phil PEP = 01 PhD PGB = 15 M. Phil; 02 PhD Total = 25
		Miscellaneous Academic Activities Public Defence of 02 PhD scholars (01 PEP, 01 PGB) External Board of Studies (BOS) of Synopsis of 05 PhD scholars (04 PEP, 01 AE) Thesis of 20 students (05 AGB, 15 PGB) of M.Phil (Batch 2019) was submitted to QAU. Internal Board of Studies of 03 PhD students (02 AE and 01 PGB) and 01 M.Phil student (AE) of UAP was held. External Board of Studies of Thesis of 02 Ph.D scholars (01 AE, 01 PGB) of UAP held. Himalayan University Consortium (HUC) meeting (Pakistan Chapter) was hosted by PIASA, ICIMOD in collaboration with HUC Secretariat (Nepal) on December 29-30, 2021 at NARC to review activities of Thematic Working Group & cross Cutting Work groups.

15. PAKISTAN CENTRAL COTTON COMMITTEE (PCCC)

The Pakistan Central Cotton Committee, constituted under the Pakistan Cotton Cess Act 1948 in the year 1949, with its Headquarters at Karachi (later onshifted at Multan in 2014). Its mandate is to bring about “Improvement and development of growing, marketing and manufacture of cotton.” The Committee is semi-autonomous, with the Federal Minister for National Food Security & Research as its President, and Vice-President as its Chief Executive. The PCCC operates through the following sub-committees.

1. Executive Sub-committee
2. Agricultural Research Sub-committee.
3. Technological Research Sub-committee

The sub-committee at No 2 and 3 is headed by a Chairman, nominated for term of three years. The Executive Sub-committee is chaired by Vice-President.

2. EXISTING INFRASTRUCTURE:

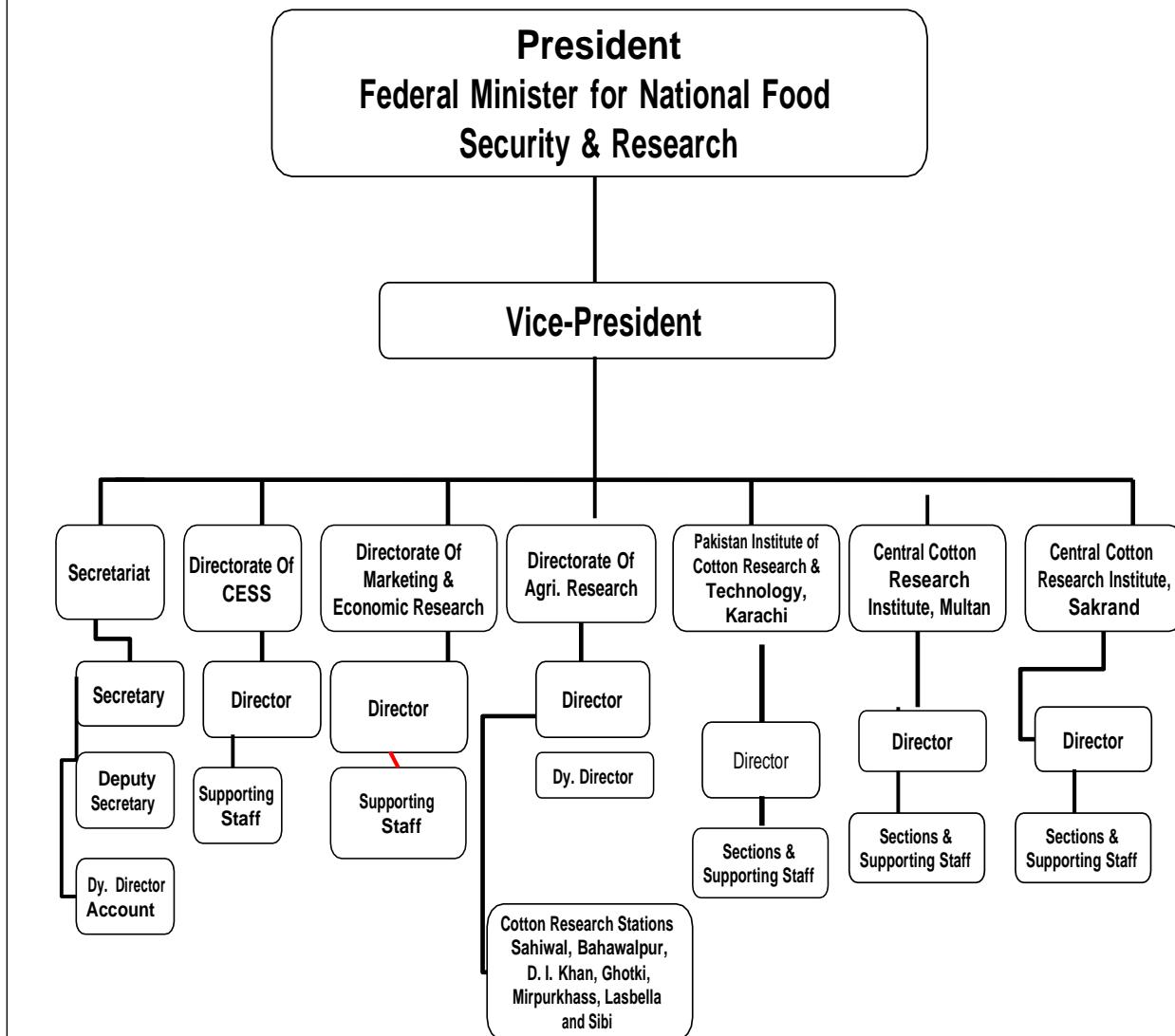
Following are Main Directorates of PCCC.

- PCCC Secretariat at Multan.
- Pakistan Institute of Cotton Research & Technology, Karachi
- Directorate of Agricultural Research, Multan
- Directorate of Marketing & Economic Research, Multan
- Directorate of Cess Management, Lahore.

COTTON RESEARCH INSTITUTES AND STATIONS:

- Central Cotton Research Institute, Multan
- Central Cotton Research Institute, Sakrand
- Cotton Research Station, Bahawalpur
- Cotton Research Station, Sahiwal
- Cotton Research Station, Mirpurkhas
- Cotton Research Station, Ghotki
- Cotton Research Station, D.I.Khan
- Cotton Research Station, Sibi
- Cotton Research Station, Lasbella.

Organogram



For the purpose of an extensive program of Research and Development (R&D) in all conceivable aspects under the Cotton Cess Act, a chain of Research Institutes/Stations have been set up by PCCC all over the country to undertake research into cotton production. The PCCC has developed more than 50 cotton varieties (Bt.Varieties and non Bt.Varieties). A number of new Bt.varieties, namely Bt.CIM-598, Bt.CIM-599, Bt.CIM-600, Bt.CIM-602, Bt.CIM-632, Bt.CYTO-177, Bt. Cyto-178, Bt. CIM-179 and Bt.CRIS-508 and non Bt.Varieties namely, Cyto-124, CIM-620, CIM-610, CIM-632, CRIS-510, CRIS-533, CRIS-585 and CRIS-543 have been evolved and approved. The Punjab Seed Council in its 55th meeting held on 20.09.2021 approved 15 cotton varieties for commercial cultivation. Out of these, 05 cotton varieties of CCRI Multan, highest ever from any public sector institution were approved for general cultivation. The varieties included Bt.CIM-663, Bt.CIM-678, Bt.CIM-785, Bt.Cyto-535, and Cyto-226 (Non-Bt). The CIM varieties covered 9 percent area in the cotton zone of Punjab and Sindh provinces during the crop season 2021-22. (Source: CRS Departments of Provincial Governments). Farmers liking for the CIM varieties is

rising substantially and it is hoped that CIM varieties will cover >20 percent cotton area during the forthcoming cotton season.

Bt Varieties			
Bt.CIM-663	Characteristics	Bt.CIM-678	Characteristics
	Lint % age: 40.0 Staple Length : 28.43 Micronaire: 4.28 Strength: 29.17		Lint % age: 40.0 Staple Length : 28.6 Micronaire: 4.01 Strength: 30.6
Bt.CIM-785	Characteristics	Bt.Cyto-535	Characteristics
	Lint % age: 40.0 Staple Length : 29.0 Micronaire: 4.61 Strength: 31.96		Lint % age: 41.0 Staple Length : 28.2 Micronaire: 3.8 Strength: 28.2
Non Bt Varieties			
Cyto-226	Characteristics		
	Lint % age: 40.3 Staple Length : 29.79 Micronaire: 4.6 Strength: 29.5		

These varieties meet spinner's requirements for fineness and strength. The staple length has also been improved to 32 mm, as per the Cotton Breeding Standard's requirement. The varieties developed by the PCCC from 1985 to 2021 and their fiber characteristics are as follows:

2.3 VARIETIES DEVELOPED BY THE PCCC FROM 1985 TO 2020 AND THEIR FIBRE CHARACTERISTICS ARE AS FOLLOWS:-

Sr. No.	Variety	Year of Release	Lint % age	Staple length (mm)	Micronaire (ug inch-1)	Strength (tppsi/gtex ⁻¹)
1	SLH-41	1985	36.0	26.4	4.4	958
2	CIM-70	1986	31.5	29.0	4.2	92.5
3	CIM-109	1990	3531	27.2	4.4	92.0
4	CIM-240	1992	36.5	27.5	4.7	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
Sr. No.	Variety	Year of Release	Lint % age	Staple length (mm)	Micronaire (ug inch-1)	Strength (tppsi/gtex ⁻¹)
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	Marvi 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	Bt 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	Bt CIM-595	2013	39.5	29.0	4.7	97.5
30	Bt CIM-599	2013	41.6	28.9	4.6	95.0
31	Bt 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	Bt.Cyto-178	2016	40.8	29.0	4.3	105.2
38	Bt CIM-600	2017	40.3	29.0	4.7	94.8
39	Bt Cyto-177	2017	40.0	29.0	4.3	99.9
40	Bt.Cyto-179	2017	40.2	28.2	4.2	107.6
41	CIM-598	2017	40.0	29.5	4.6	96.0
42	BT 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	BT.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	BT- CIM-678	2021	40.0	28.6	4.0	-
50	BT-CIM-785	2021	40.0	29.0	4.6	-
Sr. No.	Variety	Year of Release	Lint % age	Staple length (mm)	Micronaire (ug inch ⁻¹)	Strength (tppsi/gtex ⁻¹)
51	BT-Cyto-533	2021	41.0	28.1	4.2	-
52	BT-Cyto-535	2021	41.2	28.8	4.1	-
53	Cyto-226	2021	41.0	30.5	4.6	-
54	BH-221	2021	38.0	29.1	4.6	-

3. RESEARCH ACTIVITIES OF THE PCCC

The research work has been focused on the following main aspects:

- Study the cotton plant from botanical, genetical, production, physiological, chemical, entomological, pathological and other relevant facets in a coordinated manner.
- Undertake research work of national importance, handle problems of inter-regional nature.
- To develop cost-effective cotton production technology.
- Advance knowledge on the cotton plant responses to environment with a view to better cope with the adverse impacts in the changing climate scenario.
- Provide education and training on cotton production technology to the agriculture 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 the 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 programme 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.

In addition to the varietal development, the scientists have 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.

Activities under Cotton Research & Development Projects

Pink bollworm Project: Cotton Productivity Enhancement through Eco Friendly

Pink bollworm Management and Capacity Building in Punjab under PM Emergency Program

Pink bollworm has been a serious pest management issue for the last several years. To address this issue, CCRI Multan organized the first national seminar on pink bollworm management in 2015 and the activity remained continue every year until 2021. In the year 2021, an international seminar was arranged in which foreign researchers were also invited to share their findings to understand the Pink bollworm and its management more holistically. The seminar earned heavy attendance and the recommendations placed before provincial and federal governments for implementation and policy formulation.

The Institute has also fabricated Mechanical Boll Picker called “Pink bollworm Manager” for eradication of leftover bolls that host Pink bollworm larvae during winter. This machine proved to be very effective in eradicating Pink bollworm at CCRI, Multan. Consequently, the demonstrations of the PBW Manager were carried out successfully at various locations (Multan, Bahawalpur, Khan Pur, Sahiwal and Faisalabad) during the season. Farmers and Agriculture Extension workers participated in these demonstrations.

BCI Project: Better Cotton Initiative (BCI) for Sustainable Cotton Production in Pakistan.

The project “Better Cotton Initiative (BCI) for Sustainable Cotton Production in Pakistan” is in operation in Punjab and Sindh provinces for management of cotton in line with the BCI principles. The project objectives include use of quality seed of approved varieties, adoption and promotion of better management practices (BMPs), implementation of Integrated Pest Management (IPM) practices, optimized use of pesticides, fertilizers, irrigation water, soil health improvement, and adoption of descent work practices by farm and farmers, and promotion of Clean Cotton production and picking practices through training of women pickers. The project aims to reduce the cost of production by up to 20-25% by ensuring the sustainability of production resources (soil, water and environment).

The project activities were carried out partially due to limited release of funds and COVID-19 restrictions. The major activities included registration of 22,731 farmers for BCI practices, 06 farmers training programs, 08 Better Cotton Knowledge Network (BKN) meetings with BCI officials and 24 monthly meetings with BCI staff during the period.

Farmer's Registration (2021-2022)

District	Number of Farmers		Covered Area (Acres)	
	2020-21	2021-22	2020-21	2021-22
Shaheed Benazirabad	1,498	2,201	8,768	11,297
Noshero Feroze	1,177	0	4,858	0
Multan	9,001	3,148	14,832	7,107
DG Khan	3,123	2,583	10,733	8,732
TOTAL	14,799	7,932	25,842	27,136

In addition, technical material in Urdu and Sindhi languages were also printed for distribution among the farmers during training programs conducted at CCRI Multan and in the project areas.

4. COTTON PROMOTION & DEVELOPMENT ACTIVITIES

i) World Cotton Day

The Central Cotton Research Institute (CCRI), Multan celebrated the World Cotton Day (WCD) 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 national economy

Exhibition of Farm Machinery and Stalls of Companies displaying products and their activities.

Seminar highlighting challenges confronting cotton production and measures for its revival.

Perspectives of related Stakeholders (Farmers, Ginning, Textile, Pesticide, Seed, Fertilizer, & NGOs).

The event highlighted the issues in cotton production and trade, and recommend 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 back to the level where it was few years before and will bring 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 7th 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.

ii) Supply of Cotton Germplasm to Tanzania and Zimbabwe

The CCRI of PCCC continued cooperation with national and international organizations for distribution of cotton germplasm of varied characters to help in cotton varietal development. In this context, the Institute provided 700 grams cotton seed each for Tanzania Cotton Board and Cotton Research Institute Zimbabwe. The germplasm included short & compact, earliness, good fibre properties for medium and long staple, pest tolerance against Jassid&Mealybug, disease resistance against Verticillium wilt & Bacterial blight, and high cotton yield features.

iii) Website & Social Media

The Institute also initiated highlighting of cotton research and development activities carried out during crop season 2021-22 utilizing social media tools (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 PCCCalong with CCRI Institute has also upgraded the website (www.pccc.gov.pk) &(www.ccri.gov.pk) highlighting major cotton research and development activities, brief program of various disciplines, cotton market rates, weather situation and other related activities.

5. SEMINARS / WORKSHOPS / TRAINING PROGRAMS / MEETINGS SEMINARS

i) International Seminar on Pink bollworm Management

CCRI of PCCC Multan organized the international seminar on pink bollworm management on 17.11.2021 in which foreign researchers Dr. KeshavKranthi from ICAC, USA and Prof. Dr. A.G. Sreenivas from India were also invited to share their findings for the management of Pink bollworm. The recommendations formulated were placed before provincial and federal governments for implementation and policy formulation.

ii) National Workshop on "Sustainable Solutions for Revival of Cotton in Pakistan

One Day National Workshop on "Sustainable Solutions for Revival of Cotton in Pakistan" held at Ramada Hotel Multan under the Chairmanship of Syed HussainJahaniaGardezi, Agriculture Minister, Government of Punjab. Dr. Khalid Abdullah, Cotton Commissioner, Ministry of National Food Security & Research, Islamabad and Dr. ZahidMahmood, Director CCRI Multan attended the workshop. Measures for revival of cotton crop in the country deliberated.

iii) 6th National Seminar “Pink Bollworm Management”

CCRI Multan organized the 6th National Seminar on Pink Bollworm Management on 22.06.2021. Mr. Saqib Ali Ateel, Secretary Agriculture South Punjab Secretariat Multan; Mr. Bilal Israel, Chairman Punjab Cotton R&D Board; Dr. ZahidMahmood, Director CCRI Multan addressed the farmers. Dr. Muhammad Ali Talpur, VP, PCCC; Dr. Khalid Abdullah, Cotton Commissioner, MNFS&R; Dr. Shah Nawaz Khuro attended the program via zoom link. Cotton Researchers, representatives of pesticide companies, and farmers attended the seminar.

6. ACHIEVEMENTS OF PCCC

The PCCC, Multan has made tremendous progress in cotton R&D in various aspects of cotton crop. Some of which are given below:

- Hosting World Cotton Gene Pool comprising 6143 entries in medium and long term storage facilities, and characterizing them for heat, drought and CLCV tolerance.
- Developed short-duration varieties (210 to 150 Days; CIM-506).
- Developed CLCuV resistant varieties (CIM-1100 & CIM-443), high lint percentage (34% - 45%) and staple length (27.0 - 33.0 mm) varieties.
- Developed 11 Genetics Male Sterile (GMS) lines at Breeding & Genetics.
- Maintained living herbarium of 33 species of *Gossypium* germplasm.
- Hosting facility for Karyotypic analysis of interspecific hybrids (21 hybrids).
- Established a Biotechnology Lab with limited resources.
- Developed 54 varieties (40 Non Bt. & 14 Bt.)
- Developed production technology for various regions and IPM strategies for different pests.
- Providing Fibre Testing Services at Faser Institute, Germany recognized standards.
- Providing Training of farmers, extension workers, academia and industry.

In addition to the above mentioned achievements, the ongoing research work carried out by the scientists of the PCCC are summarized below:

- Characterization of germplasm for CLCuV resistance, insect-pest and disease resistance, heat tolerance and fiber quality traits.
- Endeavoring to break photo period sensitivity of 52 accessions identified as CLCuV resistant through screening.
- Development of extra-long staple (ELS) strains through introgression of fiber linked genes.
- Development of Mapping population for fibre quality
- Preliminary lab work in progress for transformation
- Ideotype varietal development for mechanical cotton picking
- Screening of advanced material for heat, drought, duration inputs response, and adaptability
- Development and improvement of natural color cotton varieties

At the international fronts CCRI of PCCC, Multan has been nominated as “Center of Excellence in Cotton Research and Development” by the Ministry of National Food Security & Research, Government of Pakistan under the China-Pak-Economic Corridor (CPEC)’s Agricultural Development Projects.

The CCRI of PCCC, since its establishment, remained associated with various international organizations for cotton research and development programs as mentioned below:

- Asian Development Bank (ADB)
- CERA USA (Biosafety Research in Pakistan Grant Program)
- Common Fund for Commodity (CFC) UK
- Economic Cooperation Organization (ECO)
- Faser Institute (Bremen Fibre Institute), Germany
- Food & Agriculture Organization (FAO) of the United Nations
- International Cotton Advisory Committee (ICAC) USA
- International Cotton Researchers Association (ICRA)
- Japan International Cooperation Agency (JICA)
- Natural Resources Institute UK
- Organization of the Islamic Conference (OIC)
- Overseas Development Agency UK

- South Asian Association for Regional Cooperation (SAARC)
- United Nations Development Program (UNDP)
- University of Hubei, China
- USDA (USAID PL-480, Pak-US ICARDA Cotton Project)
- Fellowships & Trainings
- Borlaug Fellowships
- Chinese Government Trainings
- Islamic Development Bank Fellowship

7. HIGH LEVEL MEETINGS

i) Meeting “Future of Cotton Research”

Meeting regarding "Future of Cotton Research" chaired by Syed Fakhar Imam, Federal Minister for National Food Security held at CCRI Multan on 23.08.2021. The meeting deliberated improvement in cotton research programs for revival of cotton crop in the country. In addition, matters related to production of quality cotton, grading, premium and issues of ginning industry discussed.

ii) Meeting “Revival of Cotton Crop”

Revival of cotton crop meeting held at CCRI Multan on 09.08.2021 under the chairmanship of Mr. JamshedIqbalCheema, Special Advisor to the Prime Minister on Food Security. The meeting was also attended by Dr. Khalid Abdullah, Cotton Commissioner MNFS&R; Mr. Saqib Ali Ateel, Secretary Agriculture South Punjab Secretariat; Dr. Muhammad Anjum Ali, DG Agri Ext Punjab; Mr. Khalid Khokhar, Chairman Pakistan KissanItehad and representatives of Irrigation, MEPCO; PCPA, APTMA, PCGA attended the meeting. The meeting deliberated the current cotton crop situation and measures to be taken in the coming weeks for fertilizer and pesticide application to manage the cotton crop effectively.

8. TRAINING PROGRAMS

i) Training Program on “Pink Bollworm Management”

CCRI Multan organized a series of training programs on “Pink Bollworm Management” for the Field Staff of Agriculture Extension Department, Punjab; Pest Warning & Quality Control of Pesticides Punjab and Technical Officers of Adaptive Research Farms of the Extension Department. The training programs were conducted on December 14-16, 21-23 and 28th December 2021. Dr. ZahidMahmood, Director CCRI Multan briefed the participants about research activities carried out by the Institute for management of Pink bollworm. Dr. RabiaSaeed, Head, Entomology gave a detailed presentation about Pink bollworm management. The topics included Current Scenario & Offseason Management of Pink Bollworm in Punjab; Biological Control of Insect Pests of Cotton; Bio-Pesticides for Cotton Insect Pests Management; and Insecticide Resistance Management in Cotton Pests. Later the participants also reviewed field demonstration of pheromone trap installation and mechanical boll picker.

ii) Training Program on “Cotton Plant Mapping”

Training program was organized on "Cotton Plant Mapping" for the field officer of Crop Reporting Service Department Punjab on 24.06.2021. Dr. Fiaz Ahmad, Head, Plant Physiology Section gave the training on the subject. Around 30 Assistant Directors and Statistical Officers from the Department of Crop Reporting Services Department attended the program.

iii) Training Program on “Better Cotton Production” for Lead Farmers in Punjab

CCRI Multan organized training program on better cotton production for cotton farmers at DG Khan under the BCI Project on 23.06.2021. Dr Zahid Mahmood, Director; Dr Fiaz Ahmad, Head Plant Physiology and Mr. Sajid Mahmood, Head Technology Transfer and Mr. Kumail Fiaz, Producer Unit Managers gave the training on different aspects of cotton production technology.

iv) Training Program on “Better Cotton Production” for Lead Farmers in Sindh

CCRI Multan organized training program on better cotton production for cotton farmers at Sakrand under the BCI Project on 19.06.2021. Dr Zahid Mahmood, Director; Dr. Muhammad Naveed Afzal, Head Agronomy; Dr Fiaz Ahmed, Head Plant Physiology and Mr. Abdul Wahab Soomro, BCI Coordinator (Sindh), contributed in the program.

v) Training Program on “Better Cotton Production” for Lead Farmers from Multan

Central Cotton Research Institute Multan organized one-day training for lead cotton farmers from Multan on principles and criteria of better cotton production for PSDP BCI Project. The program was organized on 07.06.2021. Around 100 farmers including three female workers of BCI team participated in the program. Dr. Zahid Mahmood, Director CCRI Multan imparted training on different aspects of cotton production like cotton variety selection, judicious input use, weed management in line with the six BCI principles. Dr. Fiaz Ahmad, Head, Plant Physiology/Chemistry delivered lecture on soil health improvement. Later, the farmers were also visited cotton fields of Low Expenditure and Environmental Friendly technique for cotton sowing which saves the plant from excessive heat, provides ample moisture, save the crop from weeds and add to the soil fertility.

vi) Refresher Course on Cotton Production Technology

Following the regular practice, the Institute organized refresher course on “Cotton Production Technology” on March 03, 2021 for the field staff of pesticide/seed companies, and NGOs working on cotton crop development. More than 100 technical officers from various organizations attended the program. The course was specifically designed keeping in view the current cotton production problems and measures for improvement. The training included topics of Agronomy of the Cotton Crop, Soil Health and Nutrient Management, Production Technology of High Yielding Cotton Varieties, Cotton Diseases and their Management, Integrated Pest Management, Mechanical Boll Picker: An Effective Way of Managing Pink bollworm and Fibre Properties and Fiber Testing.

vii) Internships at the Institute

The Institute being equipped with latest infrastructure (laboratories, advanced instruments, glasswares/chemicals, farm machinery and the experimental area) remained attraction point for the university students to complete their graduate/post-graduate internships. The highly qualified scientific staff provides updated information, guidance and training on various aspects of research disciplines (agronomy, plant breeding, biotechnology, entomology, plant pathology, plant physiology) to the visiting internees from various agriculture universities all around the country.

9. FUTURE PROSPECTS

Genetic Manipulation of the cotton crop to improve abiotic stress tolerance abilities such as water scarcity and sucking insect (whitefly) is the major factor that affects the cotton yield. To cope with this situation, the biotechnology lab currently working on genetic transformation of synthetically developed drought resistance and sucking pest resistance-conferring genes in the commercial cultivar. Dehydration responsive element binding proteins (DREB) are members of a larger family of transcription factors, many of which have been reported to contribute to plant responses to abiotic stresses in several species. A sequence of 438bp transcribes the mRNA that translates 146 amino

acids. The other one (Cry2A) transcribed insecticidal proteins. The gene sequence got from NCBI, the origin of this protein is from *Bacillus thuringiensis* that constitute the active ingredient in many biological insecticides and biotech crops expressing *B. thuringiensis* genes (Bt crops). For the control of lepidopteran pests, *B. thuringiensis* Cry1 and Cry2 class proteins are being used either in sprayable products or in transgenic plants. A sequence of 1905bp transcribes the mRNA that translates 1635 amino acids.

i) Cold Room for Storage of Cotton Germplasm

The Institute has developed sub-zero cotton seed storage facility for long term storage that comprises of more than 6143 accessions (Local: 1290 and Exotic: 4853) that have been collected from various national and international resources. The seed of different varieties is preserved for 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 purpose.



ii) Blackening of Cotton Leaves / Sooty Mold

Sooty molds become a serious problem on cotton from last few years. Sooty mold was found on cotton crop that have previously or contently been fed by sucking insects. The mold grow son honeydew, a sticky sugary secretion that is dropped by sucking insects. The scientists of CCRI Multan conducted a survey of different farmers' fields to record the data, collect the samples and identify the cause. The samples of cotton leaves showing blackening of the leaf surfaces were collected from Mohammad Arshad farm, MouzaWahibakhar, Tehsil Shuja Abad. The infected leaves were observed carefully to identify the presence of insects /pests. Whitefly nymphs and honeydew secretion on the lower side of cotton leaves and the upper side of the leaf was covered with black soot like fungus i.e. alternaria confirmed with microscopic examination. For best control, use pesticides which control whitefly adult and nymph and spray fungicide three days after pesticide spray. Never use mixture of insecticide, fungicide and sulfer, it can cause stress. 80% sulfer @ 2kg/ace also inhibit sooty mold spores to reproduce.



iii) LEEF Technology

The changing climatic conditions (rising temperatures, rains and drought) and rise in the cost of production is greatly affecting the cotton cultivated area and its production. The cotton production and yield improvement is becoming a big challenge under the current scenario. The cost of production is continuously increasing with reduced profitability over time. The Institute has thus introduced a new eco-friendly technology named "Low Expenditure & Environment Friendly (LEEF)" for sustainable cotton production. The LEEF technology uses mulches from crop-based residues placed on the beds after planting cottonseeds. The plant residues applied included straws, husks, grasses, compost, and manures. This technology not only saves seedlings from scorching sunlight, maintains moderate soil temperatures, conserves moisture, prohibits weed emergence, and improves microbial

activities. Moreover, the mulches after decaying add up to the soil health in the form of organic matter and nutrients.



iv) Demonstration of “Pink bollworm Manager”, a mechanical tool to control Pink bollworm

Pink Bollworm (PBW), an insect that feeds on cotton flowers and seed inside the bolls. The insect overwinters as larvae inside the damaged bolls, which remain attached to cotton plants stored to be used as kitchen fuel, year round, in rural area. Emerging moths from such cotton sticks invade early sown cotton and built population high enough to infest normal cotton crop. The massive infestation of PBW caused considerable damage and ranked as one of the top three production constraints.

CCRI-Multan with indigenous resources has developed a machine that picks the leftover bolls (damaged or unopened) once cotton picking is over. The machine will be a landmark in PBW management and hopefully bring to end the debate of early sowing; storing cotton sticks for fuel purpose etc. The machine picks up more than 95% of left over bolls mostly infested with PBW and collects in a bin. Since PBW is a monophagous pest and can be easily controlled with this machines instead of chemical sprays. The collected bolls also give 2-3 maunds of additional lint, which is more than enough to trade off the running cost of the machine.

CCRI Multan has successfully demonstrated the operation of this machine at Rahim Yar Khan (Nov 01, 2021), Multan (Nov 02), Bahawalpur (Nov 03), Sahiwal (Nov 11) and Faisalabad (Nov, 24) to farmers and various other visiting groups for feedback during the month. CCRI Multan also plans to optimize machine and fabricate few more for demonstration purpose in different cotton growing areas of the country, before going for mass production by the private sector.



9. PUBLICATIONS:

- COTISTICS' Annual Cotton Statistical Bulletin.
- Cotton Review – (Monthly Cotton Statistical Bulletin).
- The Pakistan Cotton (Biannual Research Journal)
- Quality Survey of Pakistan Cottons
- Annual Summary Progress Reports (Yearly basis)
- Annual Research Plan (Yearly basis)
- The Pakistan Cotton grower (quarterly basis)
- Newsletter (monthly basis)
- Booklets (Cotton Production Technology)
- Training Guide (Need basis)
- Research Papers
- General Articles (Newspapers, Journals)
- Variety Proposals
- Brochures (Varieties, Production Technology, Pests & Disease Management)
- Cotton Update (Weekly)
- Cotton Market Update (Daily).
- Website of PCCC has been launched and being updated on daily basis. All the current publications are being uploaded on regular basis.

16. PAKISTAN COTTON STANDARDS INSTITUTE (PCSI)

1. Introduction

Pakistan cotton is inherently of good quality. But, absence of quality control measures, improper handling and ginning practices non existence of a pricing system based on premium and discounts, non-implementation of recognized grading system leads to depreciation of the value of raw cotton and the resulting textile products and country is not getting real intrinsic value of its silver fibre from the international market.

Being cognizant of these problems, the Government decided to introduce standardization of cotton to bring it at par with the internationally accepted standards for improving the competitiveness of Pakistan's cotton as well as ensuring better returns to cotton growers, ginners, spinners, exporters and the national economy. Cotton Standardization Ordinance 2002 was promulgated to establish Pakistan Cotton Standards Institute and to promote the quality control of cotton.

2. Policy FrameWork

Government of Pakistan realizing the importance and role of cotton sector in National economy 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, reducing wastages and improving 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 GPS 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. Goal/ Vision and Mission:

I. Goal:

Enhancement of Pak Cotton Quality through the implementation of Cotton Standardization System to meet the challenges and requirements of quality in the national/ international market. 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.

II. Vision:

- i. Enhancement of Pak cotton quality through cotton standardization program.
- ii. To bring Pak cotton at par with international standards.
- iii. To ensure real intrinsic value of Pak cotton and its made-ups from the international market.

III. Mission:

- i. Education/ Awareness Campaigns.
- ii. Human Resource Development.
- iii. Proper picking and handling procedures.
- iv. Improved ginning practices.
- v. Minimizing contamination.
- vi. Incentive Based Marketing System.

4. Progress/ Activities during 2020-2021

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. 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 ample opportunity to the participants to get training in the basic skills of cotton classification and grading. Till date over **2657** personnel have been trained through this program. During 2020-21, **24** participants benefited from the training programs. In the light of the directives of PCSI Board of Directors the number of training programs has been increased from two to six.

5. Cotton Fiber Testing Services:

The Cotton Fibre 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 fibre 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 Commerce is committed to facilitate the textile research institutions of the country though modernizing infrastructure and logistic support to undertake research and development work in the sector. PCSI Cotton Fibre 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 sectors.

7. Targets and Achievements during the year 2020-21

Target set and the achievements made during the year 2020-21 for the production of standardized and clean cotton and to bring the Pak cotton at par with international standards are 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 2020-21 informative literature regarding proper picking, procedures, handling and ginning practices have been prepared in regional and national languages and provided/ distributed to the stake holders of cotton & cotton trade.

(ii) Cotton Selectors' Training Course:

During 2020-21 Two Cotton Selectors Training Courses have been held at PCSI. Regional Office, Multan in the months of October. 2020 & March. 2021, **while Karachi & Sukkur course postponed due to Pandemic COVID-19.** Through these courses 24 personnel from public and private sector have been trained in the skills of cotton classing and grading.

KARACHI	MULTAN	SUKKUR	TOTAL	UP-DATED
Nill	24	Nill	24	2657

Since the introduction of these training courses **2657** personnel have been trained till date.

(iii) Cotton Sample Tested at PCSI Laboratories:

PCSI Cotton Fibre Testing facilities provided to public and private sector and about **2691 samples** have been tested at the Cotton Fibre Testing Laboratories of PCSI during 2020-21.

NO. OF LINT COTTON SAMPLES TESTED											
YEAR	Karachi	Multan	Sahiwal	Mirpur Khas	Sanghar	RYK	D.G. Khan	BWP	Vehar	Faisalabad	TOTAL
2020-21	805	127	172	04	194	347	00	753	00	289	2691

8. PCSI & KCA Collaborative Training Program:

PCSI arranged Two Calendar week Cotton Grading and Classing Course at Cotton Exchange Building, Karachi in collaboration with KCA every year. This year from 1ST March 2021 to 12TH March, 2021. Stakeholders across the board, particularly Textile value chain, Exporters, Ginners, Buyers, Brokers from all over the country participated in the course. PCSI technical officers (Cotton Classers) imparted the training. During the course there were practical as well as theoretical classes arranged for the trainees besides a visit each to a textile mill and PCSI Cotton Fibre Testing Lab, Karachi to facilitate the participant for acquiring enhanced knowledge on the spot. 28 participants from public and private sectors attended the Course. In total 135 participants have attended the course in last four years.

9. Organizational Resources

As per provision of Cotton Standardization Ordinance 2002 PCSI has to 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.

It is important to mention that during **2020-21** the Institute generated around **RS.18,81,685.00 (Eighteen Lac, eighty one thousand, six hundred and eighty five)** as annual income through:-

- i. Cotton Sample Testing Fee.
- ii. Training Courses Fee.
- iii. Cotton Standardization Fee.(CSF)

S.NO.	Income generated	Amount in RS.	Total(Rs)
1.	PCSI Head Office, Karachi.		
	• Cotton Sample Testing Fee.	199800	
	• Training Course Fee.	NIL	
	• CSF	87205	
	• Miscellaneous	NIL	
			287005
2.	PCSI Regional Office, Sukkur.		
	• Cotton Sample Testing Fee.	138150	
	• Training Course Fee.	NIL	

			138150
3.	PCSI Regional Office, Multan.		
	• Cotton Sample Testing Fee.	311200	
	• Training Course Fee.	120000	
	• Sale Standard Boxes	34500	
	• Miscellaneous	100740	
			566440
	Grand Total in Rupees.		RS.10,11,595

The above collected income is quite in-sufficient for meeting its establishment and operational expenditure. PCSI is being granted annual budget.

10. Issues and Challenges:

Pakistan Cotton is inherently of good quality but due to contamination and non implementation of cotton standardization system the commodity is not fetching its real intrinsic value from the international market. To achieve the same the only methodological approach is the implementation of Cotton Standardization Ordinance 2002 along with the amended cotton control Act, 1966 for the production of high quality clean cotton with letter and spirit across the board. This has direct impact and immediate bearing on the entire chain of value addition till the final made-ups, thus providing substantial boost to the national exchequer.

11. 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. Establishing a network of Cotton Fibre Testing Laboratories Equipped with HVIs at district level.
4. Production of Standardized and Clean Cotton.
5. Strengthening of PCSI with men and machine.
6. Launching of education/awareness campaigns to develop a quality culture in the country through print/Social media and by conducting increased number of training courses.
7. Arrange more on Form / on Factory demonstration / Seminar/ Workshops.

17. PAKISTAN AGRICULTURAL STORAGE & SERVICES CORPORATION LTD (PASSCO)

1. GENERAL

- i. PASSCO is a Public Limited Company incorporated under Companies Act 1913,(now Companies Act 2017). PASSCO is placed under the administrative control of Ministry of NFS&R vide SCHEDULE II [Rule 3 (3)] of the Rules of Business, 1973.
- ii. PASSCO is a self-sustaining concern, applying the standard norms for commercial performance i.e. profitability, operating efficiency, credit-worthiness, marketing achievements and

various financial parameters. The Company has progressively developed strong financial base and resilient functional capacity, over the years. Since all operations undertaken by PASSCO are through borrowing, therefore, PASSCO does not get any budgetary allocation from the Federal Government for its operations.

2. MISSION OF PASSCO

On the directions of the Federal Government, PASSCO is committed to:-

- 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. Ensuring **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 Strategic Reserves of Wheat (0.92 million tons).
- b. Maintaining SAARC Wheat Reserve (0.08 million tons).
- c. Extending state welfare to farmers by providing support price and stabilize price by intervening in domestic market.
- d. Releasing Wheat to deficit provinces as well as Armed Forces.

4. ACTIVITIES / ACHIEVEMENTS RELATED TO WHEAT PROCUREMENT 2021-22

Activities related to wheat procurement operation during the year 2022 are as under:-

- a. Wheat Procurement Target of 1.2 Million Metric Ton was given by the Government of Pakistan to PASSCO for the crop 2022. The given target of 1.2 Million Metric Ton was successfully achieved within a span of 20 days by 30th April 2022 through concerted efforts and sound planning.
- b. Later on, an additional target of 0.5 Million Metric Ton was given by the Prime Minister during the Consultative Meeting in the PM House on 06.05.2022. Since the issue of Bardana to the farmers for acquiring the original target of 1.2 Million Metric Ton was completed by 21st April and the additional target allocation was given on 6th May, 2022 after Eid-ul-Fitr, the farmers had already committed their produce to other prospective buyers in the market and open market price of Wheat surpassed the MSP announced by the Government. Resultantly despite our best efforts, PASSCO could only procure 0.067 Million Metric Ton @ Rs. 2,200/40Kg MSP against the additional target.
- c. A quantity of 1.681 Million Metric Ton wheat was imported for PASSCO through TCP. 0.703 Million Metric Ton was dispatched to Provinces/ Recipient Agencies and 0.977 Million Metric Ton was carried forward to the crop 2022.

5. STORAGE CAPACITY

i. Construction/ Repair of Godowns

- a. Since 2015, PASSCO has constructed from its indigenous funds 51 Godowns having storage capacity of 69,524 Metric Tons thus increased its total storage capacity from 502,958.4 Metric Tons to 572,482.4 Metric Tons.

b. Since 2017, PASSCO has expended an amount of Rs.61/- Million on account of Repair/Maintenance & Rehabilitation of PASSCO Godowns, Silos and other allied structures including PASSCO Plaza for smooth & efficient functioning of the infrastructure.

18. Livestock and Dairy Development Board (LDDB)

Livestock and Dairy Development Board (LDDB) was established under Agriculture Development & Diversification Project funded by Asian Development Bank and was under administrative control of the then Ministry of Food, Agriculture & Livestock. Presently LDDB is under the aegis of Ministry of National Food Security and Research. LDDB is registered with Security Exchange Commission of Pakistan (SECP) under Section 42 of the Company's Ordinance 1984 as "not for Profit Company" and it is obliged to follow regulations and provisions of the Companies ordinance 1984 along with its Article of Association and Policy Manual.

Livestock plays an important role in the economy of the country and is at the heart of the rural socioeconomic system. It is a net source of foreign exchange earnings contributing significantly in this vital area. Most importantly, more than 8 million rural small and landless farmers raise livestock, making it an ideal sector for attacking rural poverty in the country. Livestock is the most potential agri-business sector contributing about 14.04 % of national GDP and 61.89 % of the agriculture value added. Overarching goal of agriculture policy of the current government is to make Pakistan 's agriculture productive, profitable and competitive. We have to be compliant with international trade requirements, have to manage our natural resources in a sustainable manner and should aim for holistic development covering entire value chain. Establishment of Livestock and Dairy Development Board (LDDB) as a Company under Section 42 of the Companies Ordinance has been undertaken to fast track the development in this vital sector.

Objectives of Livestock & Dairy Development Board

Livestock and Dairy Development Board (LDDB) envisage the creation of linkages among stakeholders of livestock value chain for facilitation of sector related business and B2B linkages. Core Objectives of the company are:

- To plan, promote, facilitate and coordinate the accelerated development and investments in Livestock, Poultry and Dairy sectors.
- To Promote and facilitate marketing of Livestock & Livestock related products.
- To Promote and facilitate producer-owned & controlled organizations
- To undertake capacity building of all stakeholders
- To facilitate, promote and support the development and dissemination of improved technologies.

Livestock and Dairy Development Board (LDDB)

Financial Year 2021-2022

PROGRESS OF LIVESTOCK & DAIRY DEVELOPMENT BOARD

Livestock and Dairy Development Board executing three livestock projects under National Agriculture Program i.e., Save the Calf, Calf Feedlot Fattening & Backyards Poultry.



These PSDP projects are aimed to increase the quality beef & mutton production in Pakistan and capacity building of livestock farmers on calf rearing and feedlot business and also to reduce the mortality in baby calves. It also aimed to improve strengthening of backyard poultry through the provision of high producing birds and addressing protein deficiency and malnutrition throughout the country which also reflects the vision of Prime Minister of Pakistan.

A) PM INITIATIVE FOR SAVE THE CALF (STC)

Livestock Development Project Save the Calf is aimed to save 380,000 male dairy calves from early slaughtering and will be supported up to the age of 90-120 days. The project is providing technical support to the farmers along with capacity building and financial assistance of Rs.6500/- on each calf registered under this scheme. LDDB is executing this project throughout Pakistan. Save the Calf project is costing 3,401.699 million Rupees having federal share of 1,103.382 million and 2,298.320 million of Provincial share. In addition to this, capacity building of more than 53 thousand farmers on calf rearing business has also been done so far. The 3rd year of project is completed and at the end of 3rd year, farmers registered with scheme saved 65426 buffalo/cow calves. During three years more than One Lakh Sixty thousand(160000) baby calves have been saved resulting an increase of approximately 12000 metric tons of meat throughout the country.

S. N	PROVINCE/REGION	TARGETS 2021-22	ACHIEVEMENT 2021-22
1.	PUNJAB	40000	39225
2.	KPK	20000	20082
3.	GB	1900	2043
4.	AJK	2800	2224
5.	ICT	1600	1852



B) CALF FEEDLOT FATTENING (CFF) IN PAKISTAN

Calf Feedlot Fattening in Pakistan is aimed to increase the quality meat production for local consumption as well as for export purpose. This program mainly focused on providing incentives to the farming community to vertically expand the national production of meat by adopting the appropriate production and health technologies at farm level. This project is specially aimed to fatten the male cow/buffalo in whole country (goat/sheep in Baluchistan province) to increase value added quality meat production on cost effective basis for inland consumption and for export. During four years' project will fatten 375000 calves and 320,000 sheep/goats in Baluchistan. Calf feedlot fattening project is supporting the farmers for 90-120 days to fatten their calves. The project also providing technical support along with capacity building and financial assistance of Rs.4,000/- to farmers on each calf registered with the project and Rs 1500 for each kid/lamb registered in Baluchistan only. Total cost of CFF is Rs. 2385.139 million including PSDP share 680.410 million (20 %) and Punjab, Baluchistan and KP ADP shares are 1704.729 million (80 %). Project is executing on demand driven basis in Punjab, KP, Baluchistan (kids/lambs) Islamabad Capital Territory (ICT), Azad Jammu & Kashmir (AJK), and Gilgit Baltistan (GB). During Financial Year 2021-22 almost 84,067 animals has been fattened against the planned target of Eighty thousand animals & almost One Hundred & Forty thousand sheep goats are fattened in Baluchistan against the planned target of One Lakh Forty thousand sheep/goats which is 100% achievement against the target of Financial Year 2021-22.

During three years almost 195,684 animals have been fattened to produce premium quality beef and more than 240,000 lambs are fattened to produce quality mutton throughout the country. In addition to this Capacity Building of 39,843 Farmers has been done so far on modern Feedlot Farming and Entrepreneur business models.

S. N	PROVINCE/REGION	TARGETS 2021-22	ACHIEVEMENT 2021-22
	PUNJAB	40,000	39,292
	KPK	29,606	35,821
	GB	3,750	1,455
	AJK	3,484	2,750
	ICT	3,300	1,239
	TOTAL CALF FATTENED	80140	84,067
	BALUCHISTAN KID LAMB FATTENING	140,000	140,000

C) PM INITIATIVE FOR BACKYARD POULTRY (BYP)

PM Initiatives for Backyard Poultry is a 04-year project designed to cope with malnutrition and protein deficiency to reduce stunted growth in Pakistan through distribution of poultry birds and rearing of Poultry units to established small entrepreneurship business opportunities to small-scale farmers in the provinces of Punjab, Baluchistan, KP and the regions including ICT, GB and AJK. The initiative is aimed at addressing stunted growth in poor households, providing nourishment, supplementing family incomes through sale of organic eggs, besides creating job and making women to participate in poverty alleviation. Under this project a set of poultry birds is being distributed among the registered families on 30% government subsidy. Implementing Livestock Departments also provide training to beneficiaries to gain maximum benefit from the scheme as well. Total cost of this project is Rs. 1635.471 million including PSDP share 279.331 million (20 %) and Punjab, Baluchistan and KP ADP share 349.30 million (30 %) whereas beneficiary share is about 1006.8 million (70%). Project is being executing on demand driven basis in Punjab, KP, Baluchistan, Islamabad Capital Territory (ICT), Azad Jammu & Kashmir (AJK), and Gilgit Baltistan (GB). Under Backyard Poultry project five million pre-vaccinated high laying birds will be distributed throughout the country in four Years. During Financial Year 2021-22 almost 1,169,618 Birds have been distributed against the planned target of 1,018,498.

In three years,a total of almost 3,077,840 Poultry birds already have been distributed throughout the country. In addition to this, capacity building of 232,103 beneficiaries have been done on Backyard Poultryrearing and best management practices.

S. N	PROVINCE/REGION	TARGETS 2021-22	ACHIEVEMENT 2011-22
1.	PUNJAB	500,000	396,018
2.	KPK	319,998	525,684
3.	GB	20,500	34,410
4.	Baluchistan	125,000	159,000
5.	AJK	41,000	45,506
6.	ICT	12,000	9,000



Initiative for Digitization of Livestock Sector

LIVESTOCK BUSINESS RESOURCE CENTER (LBRC)

The livestock sector has huge potential for providing the employment opportunities to educated and skilled youth of rural Pakistan. Livestock sector of Pakistan is contributing 14.04 % in national GDP. However, such a huge segment of economy is still operating in very primitive and non-documented in nature. There is very little and mostly informal use of digital technologies in livestock sector. Despite the fact that in recent years there has been a marked advancement observed in use of mobile phones and internet technologies in rural areas of Pakistan, there is little effort made in digitalization of livestock sector. Livestock and Dairy Development Board has established a “Livestock Business Resource Center (LBRC) to facilitate the actors/stakeholders of livestock sector for creating B2B and B2C linkages and investment in the sector to generate employment in private sector, increase milk and meat production and raise livestock products export. The core Objectives of this Digital Platform are:

- To facilitate the actors/stakeholders of livestock sector for creating B2B and B2C linkages.
- To facilitate the sharing of information among stakeholders through collection, filtration and storage of stakeholder data.
- To provide a digital platform and dashboard to actors and stakeholders.
- To share service provider's information, contact details through one window to investors.

Livestock Business Resource Center (LBRC) is comprised of two main components

- **Livestock Business Resource Center Web Portal**
- **Livestock Business Resource Center Help Desk**

LBRC is a user-friendly Digital platform which can be accessed easily on <https://lbrc.org.pk/>. It can also be used on Mobile devices just by installing its application (LBRC) from Google play store. LBRC gives easy access to users regarding Add Posting, Buying and selling, technical services, Information access and or other services related to livestock sectors. LDDB also regularly upload the technical material for users' guidance. It is a free of cost online platform for user to get information, grow their business and linkages creation. LBRC is aimed to support the process of formalization and digitalization of livestock sector in Pakistan.

The screenshot shows the LBRC website homepage. At the top, there is a navigation bar with links for Home, About Us, Publications & Reports, Farmers, Processor, Input Supplier, Traders, Technical Services, and Beneficiaries. Below the navigation bar is a search bar with the placeholder "What Are You Looking For?". To the right of the search bar are "SEARCH" and "POST AN AD" buttons. A large banner in the background features a photograph of cattle and the text "Livestock Business Resource Center An Ideal Sector for Investment". Below the banner, there is a section titled "What are you looking for ?" with fields for Title, Select Category (set to "Calf rearing"), Location (set to "Islamabad, Pakistan"), and a green "SEARCH" button. In the bottom left corner, there is a "POST FREE AD" button. The bottom half of the page displays two news clippings from local newspapers: "DAILY EXPRESS" and "JANG", both featuring articles related to the LBRC and the livestock sector.

ADD & News Published In National Media

FUTURE PLANNING OF LIVESTOCK & DAIRY DEVELOPMENT BOARD

Chickens Project
Chickens Project for Commercial
U.P.
Government, Islamabad
PKR 200,000

Livestock Project
Project
Government, Islamabad
PKR 100,000

Livestock Project
All types of livestock investment
Government, Islamabad
PKR 2,000,000

Cow Breeding Project
Cow breeding for investment
Government, Islamabad
PKR 1,500,000



VALUE ADDED LST PRODUCTS FOR RURAL INDUSTRIALIZATION OF PAKISTAN

At national level as well at GB and AJK, having a comparative advantage livestock animals like yak, zho, zhomo, Kail sheep and goats. The livestock remained a major source in providing basic food in the form of milk and meat for inhabitants. those 1.79 million animals are also famous for production of high value of mohair /hair and wool. Unfortunately, they are remained undervalued for the last many decades. In ancient time the communities of Gilgit Baltistan and AJK has been exercising small scale traditional practices to come out of poverty and hunger. But with the passage of time, the utilization of this raw material for products has declined because of manual processing demands tiresome method. Due to this the natural product replaced by synthetic ones. Livestock and Dairy Development Board has prepared a PC-1 to use mohair /hair and wool for LST Products. The project through its multi-disciplinary approach will facilitate to bring properly the raw material into rural industrialization, aiming to boost up the economics of mountainous and marginalized communities involving women and men of both GB and AJK regions. This project is focused on following core interventions;

Establishing collection units (raw material), Formation of spinning units, Establishment of regional weaving units, Establishment of stitching centers for production, Capacity building of farmers and processors and promotion of LST Products at national and International Level.

Livestock & Dairy Development Board has already submitted the PC-I of the project which has been approved by competent Forum, soon this National Level project will be launched.

GENETIC IMPROVEMENT OF NON-DESCRIPT CATTLE IN PAKISTAN THROUGH AI

Pakistan has diversity of animal genetic resources (AnGR) in the form of several breeds of livestock, which contribute towards milk & meat production in the country. Still the productivity of local animals of Pakistan is quite low; this may be due to poor inherent genetic potential. To overcome this situation Livestock and Dairy Development Board in partnership with Animal Science Institute of National Agriculture Research Center has developed a concept paper for PSDP project, namely "Coordinated National Program for the Genetic improvement of non-descript cattle in Pakistan through Artificial Insemination (AI). Livestock & Dairy Development Board has already submitted the PC-I of this project to the concerned Forum, soon this National Level project will be launched after approval from competent forum.





19.

FISHERIES DEVELOPMENT BOARD

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
- Fisheries Development Commissioner or any rep. of federal government

Provincial Government:

- Four provincial secretaries dealing with Fisheries Developments.

Private Sector:

- Nine representatives including: one from research organizations/universities, one from Bank, Five fish farmers/fishers from Punjab, Sindh, KPK, Baluchistan and GB, one fish processor and one fish trader.

General Membership

General body of Fisheries Development Board consists of 32 members from public and private sector.

Achievement During The Last One Year (21-22)

1. Pilot Project for Development of Shrimp Farming Cluster

Pilot Shrimp Farming Cluster Development Project FY 2021-22

- I. Proposed Project Cost: 6381.86 million
- II. Gestation Period: 5 years
- III. Project Areas: Punjab, Sind & Baluchistan

Achievements:

Federal Component

- 1. Recruitment of Project staff for PIU established.
- 2. Land acquired for Model Shrimp Farm. BOQ in process and work will be started soon.
- 3. Land of Shrimp Hatchery Acquired at Daamb Baluchistan. Funds were transferred to Pak-PWD and the shrimp hatchery site handed over to Pak PWD for civil work. Civil work started.
- 4. 2 workshops have been conducted in Karachi and Lahore on the “promotion of shrimp farming and export development in Pakistan”.
- 5. Training manual prepared, printed and distributed in the farmers.
- 6. The 293 Farmers and 25 extension workers have been trained in shrimp farming
- 7. National Residue Control Plan (NRCP) has been prepared.

Punjab Component

- 1. Civil work for the construction of Saline Water Aquaculture Research Center is in progress in Muzaffargarh.
- 2. Civil work almost completed for up gradation of the training center and hostels at Rawalpindi and Bahawalpur.
- 3. PC1 revision in process for some changing.

Targets for Forthcoming Fiscal Year 2022-23

1. 500 farmers and extension workers will be trained for shrimp farming.
2. A Multipurpose Shrimp Hatchery will be established along the cost of Balochistan which will provide shrimp seed to the farmers
3. A model shrimp farm will be established in Punjab for demonstration of technology and for training of farmers.
4. A Saline water Aquaculture Research Center will be established in Punjab to utilize saline lands for production purpose

Pictorial View of Project:

TRAINING OF TRAINER (TOT) PROGRAM” at Karachi from 20th to 29 September



FARMERS TRAININGS



Construction of Saline Aquaculture Research Center Muzaffargarh Punjab



Demarcation of Site of Shrimp Hatchery in Damb Balochistan



Site of Model Shrimp Farm at PD Khan, District Jhelum Punjab along with foreign consultant



MoU Signing bwBaluchistan Fisheries Department and FDB regarding shrimp hatchery site



2. **Cage Culture Cluster Development Project**
 - i. **Proposed Project Cost:** 4965.50 million
 - ii. **Gestation Period:** 5 years
 - iii. **Project Areas:** Punjab, Sind & Baluchistan

Achievements

Federal Component

1. PMU established
2. Establishment of three model cage farms completed.
3. Demonstration of Cage Fish Farming practices to the farmers.
4. 50 Master Trainers trained.
5. 377 fish farmers, fish farm workers and stockholders has been trained.

Punjab Component

1. PIU established
2. Subsidy for 1000 cage units, completed.
3. Civil Work of three (03) Fish Health Labs in Punjab completed at Multan, Gujranwala and Sargodha.
4. Fish extension services in place.

Targets for Forthcoming Fiscal Year 2022-23

Federal Component

1. PMU in operation
2. Demonstration of cage fish farming practices to the farmers.
3. 423 farmers will be trained
4. Conference/Seminar of Cage Fish Farming
5. Monitoring of PIU, Punjab

Punjab Component:

1. PIU in operation
2. Tender for installation of 540 cage units on subsidy in public waters of Punjab.
3. Award of tender to lowest bidder through an open competitive bidding procedure.
4. Applications invited from potential cage fish farmers for the provision of subsidy.
5. Selection of successful farmers through open balloting.
6. 540 cages installed on selected water bodies all over the Punjab.
7. Provision of extension services to cage fish farmers throughout the Punjab.

Model Cage Farm Dharabi Dam Chakwal



Model Cage farm Keenjhar Lake, District Thattha, Sind



Model Marine Cage farm at Damb District Lasbella, Balochistan



Training Of Trainer (Tot)



Farmers Training Program



FISH HEALTH LABS At Multan, Gujranwala and Sargodha.





3. Promotion of Trout Farming in Northern Areas of Pakistan FY 2021-22

- i. **Proposed Project Cost:** 2355.130 million
- ii. **Gestation Period:** 5 Year
- iii. **Project Areas:** Khyber Pakhtunkhwa, AJK & GB

Achievements:

- 1. 15 Days Training program was conducted on 14th Feb, 2022 to 28th Feb 2022 on Topic “**Intensive Trout Farming And Modern Seed Production Technologies**” at behrain, Swat.Two Russian experts were speakers. Total No. of participants were 44 from three difference provinces of Pakistan i.e KP, GB and AJ&K.
- 2. Renovation of 6 No. Old Existing Hatcheries in GB is completed. For the Remaining 1 No Hatchery i.e. MTC Goro Juglote the 50% of civil work completed.
- 3. Civil work for establishment of **02 New Trout Hatcheries** in Sakardu. New trout hatchery at Ghanche is completed and functional while 80% of civil work for new trout hatchery at Niaslo is completed. GB, 95% of Civil work is Completed.
- 4. Establishment of **02 No.** Cold Storage Center in Sakardu and Gilgit is in progress 100% of Civil work is completed.
- 5. Construction of Directorate Building at center Gilgit, Tender has been completed. Civil work has started.
- 6. Inclusion of 200 Nos Fish Farms against the target 73 Nos, and **now 325** No. Fish Farms has been registered and operational.
- 7. Establishment of trout farms (civil work has been initiated through GB-PWD) protective gabion for cluster trout village Birgal (40 Nos) and Minor work, new ponds, water supply system for 325 fish farms has been initiated.
- 8. Eco-Based Tourism, Annual event Calendar for fishing Tournament has been Developed. 12 sites have been selected for the said events.
- 9. Supply of subsidized Fish Seed among farmers, 1.4 million fish seed has been distributed and total 2.8 million for the last 2 years.
- 10. Capacity Building program under PSDP project, Training is provided to **290 Nos** farmers and extension workers in Sakardu, Ghanche and Gilgit.
- 11. Supply of imported starter feed and local feed, imported feed (France) 5 MT FY 2021-22 and Local Feed (10 MT) in FY 2020-21 have been distributed amongst trout farmers.
- 12. Establishment of Research and Training Center, Swat, Civil work is in process 50% work is completed.
- 13. Establishment of New Hatchery in KPK. 60% work is completed.
- 14. Civil work is in progress for 182 new trout farms in KP. Overall, 40% of Civil work is

- completed.
- 15. Rehabilitation & Repair work of hatcheries (**06Nos**) is Completed. and Chakkar fish hatchery Rehabilitation is in progress.
 - 16. Establishment of New Trout Farms, Civil work of 8 trout farms is in progress (near to complete) and Sites has been selection process for 5 more trout fish farms.
 - 17. Establishment of Trout Fish Hatchery in chikar Village, Neelumvalley, Muzaffarabad, Site has been selected for trout fish hatchery and the process of land acquisition is completed.
 - 18. Designing of the hatchery is completed and preparation of estimates with PP&H, Mzd is in progress.
 - 19. Establishment of warm water fish ponds, Civil work of 8 warm water farms is near to complete and Sites has been selection process for 7 more warm water fish farms.
 - 20. Establishment of one Trout Hatchery at MARC-PARC, Juglot, Gilgit is completed.

Targets for Forthcoming Fiscal Year 2022-23

- 1. Renovation of No. 01 Old Hatcheries in GB 100% of Civil work will be completed.
- 2. Establishment of Cold Storage Center in Sakardu and Gilgit, GB, Civil work is completed. The procurement of equipment for Cold Storage will be done.
- 3. Establishment of 01 New Trout Hatcheries is in progress, in Mansehra, KP. The 80% of Civil work will be completed.
- 4. Establishment of Research and Training Center, Swat, Civil work is in process 80% work will be completed.
- 5. Construction of Trout Fish Farms, construction on 240 trout farms out of 287 will be initiated in KP.
- 6. Establishment of 01 New Trout Hatchery in Jhelum Valley, AJK, 30% work will be completed.
- 7. Establishment of 05 new trout farms and 05 warm water fish farms will be in progress on cost share basis in AJ&K.
- 8. A 15-18 days Training program will be conducted in GB, on “intensive Trout Farming and Modern Seed Production technologies”

Pictorial View Of Project Activities

TROUT FISH HATCHERY MANSEHRA-KP		
		
<u>Construction of New Trout Farms In KP</u>		
		
Cold Storage Center At Sakardu-GB		
		
Model Trout Hatchery Goro, Juglot		
		
<u>Training Program / Session For Private Fish Farmers At District Ghanche</u>		



Technical & Financial Assistance To Private Fish Farms



Cage Culture Practice At Blind Lake Shiger



Stocking Of Trout Fingerlings In Cages



Angling Tournament At Hundrap Lake Ghizer



Capacity Building & Training Activities



20.

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 administrative control 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	04	02
4.	18	18	14
5.	17	51	32
6.	16	11	07
7.	15	08	08
8.	14	08	03
9.	13	-	-
10.	12	02	02
11.	11	18	17
12.	10	-	-
13.	09	41	31
14.	08	-	-
15.	07	01	01
16.	06	05	01
17.	05	10	08
18.	04	12	11
19.	03	06	06
20.	01/02	105	98
Total		301	242

ACTIVITIES OF RESEARCH & DEVELOPMENT WING, PTB DURING THE YEAR 2021-22

Activities of the Research and Development (R&D) wing of Pakistan Tobacco Board (PTB) during the period 2021-22 are summarized as below:

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	August	Picking/Harvesting, Curing, Sample Collection for physio-chemical analysis
5	July	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	November	December	a) Preparation of Seed beds, Layout of nursery trials, Sowing of tobacco seeds for nursery preparation. b) Physical verification of burnt barns in different tobacco growing areas /districts of Khyber Pakhtunkhwa.

- Meeting of Research and Co-Ordination Committee was arranged to approve Research and Development Plan (R&D Plan).
- Development staff conducted Cost of Production (CoP), Burnt Barn Verification surveys and supervised marketing of tobacco crop.
- Arranged fertilizer Meeting with fertilizer and tobacco companies regarding recommendation and availability of fertilizer.
- Arranged pesticide meeting with pesticide and tobacco companies to discuss the availability and distribution of effective pesticides.

BUDGET ALLOCATED DURING THE YEAR 2021-22

Crop Research/Extension Work (Budget allocated 2021-22)	Laboratory Budget (Budget allocated 2021-22)
Rs. 11.72 million	Rs. 5.84 million

ACHIEVEMENTS OF RESEARCH AND DEVELOPMENT WING, PTB DURING THE YEAR 2021-22

Performance of the R&D wing of PTB during the period 2021-22 is summarized as follows:

Activity	2021-22
No of Research Trials	34
Tobacco Leaf Analysis	401
Soil Analysis	275
Water Analysis	244
Fertilizer/Mineral	310
Assisted Students in MSc/BSc Research	09
Workshops:	
a) Workshops	08
b) Corner Meetings	103
Model Plots	31
Radio Talk	31

- PTB previously completed Turbo barn modification project successfully to save fire wood. In continuation of the same, a project of Automation of Barns is under trial which will further reduce the use of fire wood.

Detail	Conventional Barn	Turbo Barn	Automated Barn
Firewood consumption per Barn	1235 Kg	1035 Kg	925 Kg
Days to Cure	07	06	05
Off-grades	06%	04%	03%
Uniformity in Grades	NIL	Nil	Yes
Skilled Labour	Required	Required	Not Required

- Introduced new tobacco growing area i.e. Layyah, Mianwali for cultivation of Sun Cured Virginia tobacco (SCV) which cure without the use of firewood.
- Introduced float tray system of nursery raising for healthy and disease-free seedlings with ease of transplantation.
- Introduced drought tolerance lines of tobacco for cultivation in water deficient areas.
- With the collaboration of tobacco companies and FSC&RD, PTB has enlisted PVH-1600 hybrid variety having good yield potential after successful trials and adoptability in our environment during 2021-22 and 08 other were also enlisted previously.
- Presently Following hybrid are under testing at our Stations:

1. RJR 603	4. RJR 215
2. RJR 602	5. RJR 902
3. RJR 213	6. RJR 217

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 performed by marketing section of PTB are as under:

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 st day of December
5	Agreement list submission to PTB	15 th January
6	Agreement Verification	February/March
7	Intimation regarding purchase points	31 st 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

Calendar Year Activities (Marketing Section)

MINIMUM INDICATIVE PRICES FOR THE LAST FIVE YEARS

S.No	Year	FCV		DAC	WP	Burley
		Plain	Sub-Mountainous			
1	2018	176	202	87.50	76.50	139
2	2019	190.63	218.77	94.76	82.85	150.54
3	2020	203.50	233.52	101.14	88.43	160.69
4	2021	214.75	243.67	108.09	123.01	187.50
5	2022	245	281.13	149.09	123	187.50

EXPORT OF TOBACCO AND TOBACCO PRODUCTS

Year	Quantity exported			Values realized			Total value (M.US\$)	Total value (M.Rs.)
	Tobacco (M.Kg)	Cigarettes (M.Piece)	Cigars (M.Piece)	Tobacco (M.Rs.)	Cigarette (M.Rs.)	Cigars (M.Rs.)		
2017-18	7.29	2.7	5.96	25.539	0.05	0.15	25.735	2697.80
2018-19	9.71	1.81	-	3335.86	3.79	-	25.973	3339.67
2019-20	12.8	510.5	2.07	5620.56	1077.45	4.346	43.552	6702.36
2020-21	15.49	2243	-	5916	2258	-	52.05	8174
2021-22	22.39	1737	-	13054	2412	-	77.34	15466

Source: Federal Board of Revenue

FEDERAL EXCISE DUTY AND SALES TAX REALIZATION FROM TOBACCO COMPANIES BY FEDERAL BOARD OF REVENUE

(Rs. Millions)

Year	Federal Excise Duty	Sales Tax	Total
2017-18	66923	20527	87450
2018-19	90166	23109	113275
2019-20	88665	23231	111896

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 Rs	% Increase
FY 2017-18	407.1	284.2	122.9	
FY 2018-19	475.9	286.9	188.9	53.68%
FY 2019-20	524.1	320.7	203.3	7.6%
FY 2020-21	530.2	324.5	205.5	1.8%
FY 2021-22	590.9	371.6	219.3	11.45%

Source: Pakistan Tobacco Board

CESS AUCTION BY PTB FOR 2020-21 AND 2021-22

S.No .	Year	Khyber Pakhtunkhwa	Punjab	Baluchistan	Total	Increas e
1.	2020 -21	Rs.100,500,000/-	Rs.61,120,000/-	Rs.11,200,000/-	Rs.172,820,000/-	+7.99%
2.	2021 -22	Rs.136,000,000/-	Rs.66,000,000/-	Rs.14,200,000/-	Rs.216,200,000/-	

GOALS AND ACHIEVEMENTS OF PAKISTAN TOBACCO BOARD

- **Goal:** The goal of Pakistan Tobacco Board was to work on accurate detection and estimation on tobacco crop and its expected yield using multispectral satellite imagery analysis.
- **Achievements:** Pakistan Tobacco Board has launched a joint program with collaboration with NCBC “National Center for Big Data & Cloud Computing” and worked on the design & development of an advanced system for improved tobacco detection and its yield estimation using state-of-the-art image processing techniques while utilizing remotely sensed multispectral satellite imagery for accurate detection and estimation of tobacco crop and its expected yield estimation which will benefit not only the government but also the nation at large.

PERFORMANCE OF THE PTB DURING THE PERIOD 2020-21 IS SUMMARIZED AS FOLLOWS

- 1) Cost of Production Survey for tobacco crop 2022 from 12-10-2021 to 06-11-2021.
- 2) Federal Government fixed Minimum Indicative Prices (MIPs) on the recommendations of Price Grade Revision Committee of PTB on January 25, 2022 for the year 2022.
- 3) Announced yearly requirements of Tobacco Companies/Dealers in daily newspaper on February 6, 2022.
- 4) Distributed 4543000 rupees of Spilled over Leaf (SOL) fund of Swabi, Mardan, Charsadda and Buner to 201 tobacco growers affected due to burning of their Barns after proper verification
- 5) Verification process to evaluate genuineness of agreements was performed by 11 committees constituted by PTB.
- 6) Requested Secretary, Agriculture, Livestock & Cooperation Department for Constitution of Governor Inspection Team.
- 7) Letter sent to DC Mansehra and Buner for imposition of section 144 on June 16, 2022.
- 8) Separate meetings with Tobacco Companies, Dealers and Growers for identification of marketing problems for tobacco crop 2022. Tripartite meeting on June 21, 2022 to solve the sorted issues.
- 9) Constituted 63 Vigilance Committees on June 22, 2022 for supervision of tobacco purchase season 2022.
- 10) Announced early date for commencement of purchase w.e.f. 1st July 2021.
- 11) Due to excessive production of FCV tobacco crop in KP during 2021, PTB allocated 10 million Kg tobacco to all quota holders as a surplus crop.

21. SPACE AND UPPER ATMOSPHERE RESEARCH COMMISSION (SUPARCO)

Performance of SUPARCO during the Financial Year (2021-22)

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 provide reliable geospatial information on comparative crop production situation well in advance of crop harvest. Moreover, in case of natural, calamities, damages to crop can be easily assessed.

Timely, frequent and accurate information on crop situation forms the basis of reliable food security policy. The need of 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. Ministry of National Food Security & Research (MNFS&R) approved SUPARCO's project, "Geospatial Monitoring of Major and High value Crops" in September, 2020 at a cost of Rs. 129.609 Million for 03 years. The main objectives of this project are:

- a. Satellite based system development for estimation of crop area, 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

Under this project, 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. Progress of the Project: Component-wise progress of the project for fiscal year 2021-22 is as follows:

a. Satellite based Estimation of Major Crops

Using satellite based crop monitoring system, SUPARCO worked out crop estimations for Kharif (2021-22) and Rabi (2021-22). These estimates were presented in meetings of Federal Committee on Agriculture (FCA) held during October, 2021 and March, 2022 and shared with Economic wing, MNFS&R. The province-wise estimates and maps showing country-wide spatial distribution of crops are as follows:

Sugarcane (2021-22)

SUPARCO Sugarcane Crop Estimates: 2021-22			
Province	Area	Yield	Production
	000 ha	Tons/ha	000 Tons
Punjab	775.6	62.8	48715.4
Sindh	309.5	63.2	19562.9
Khyber Pakhtunkhwa	148.8	56.2	8362.6
Pakistan	1233.9	62.1	76640.9

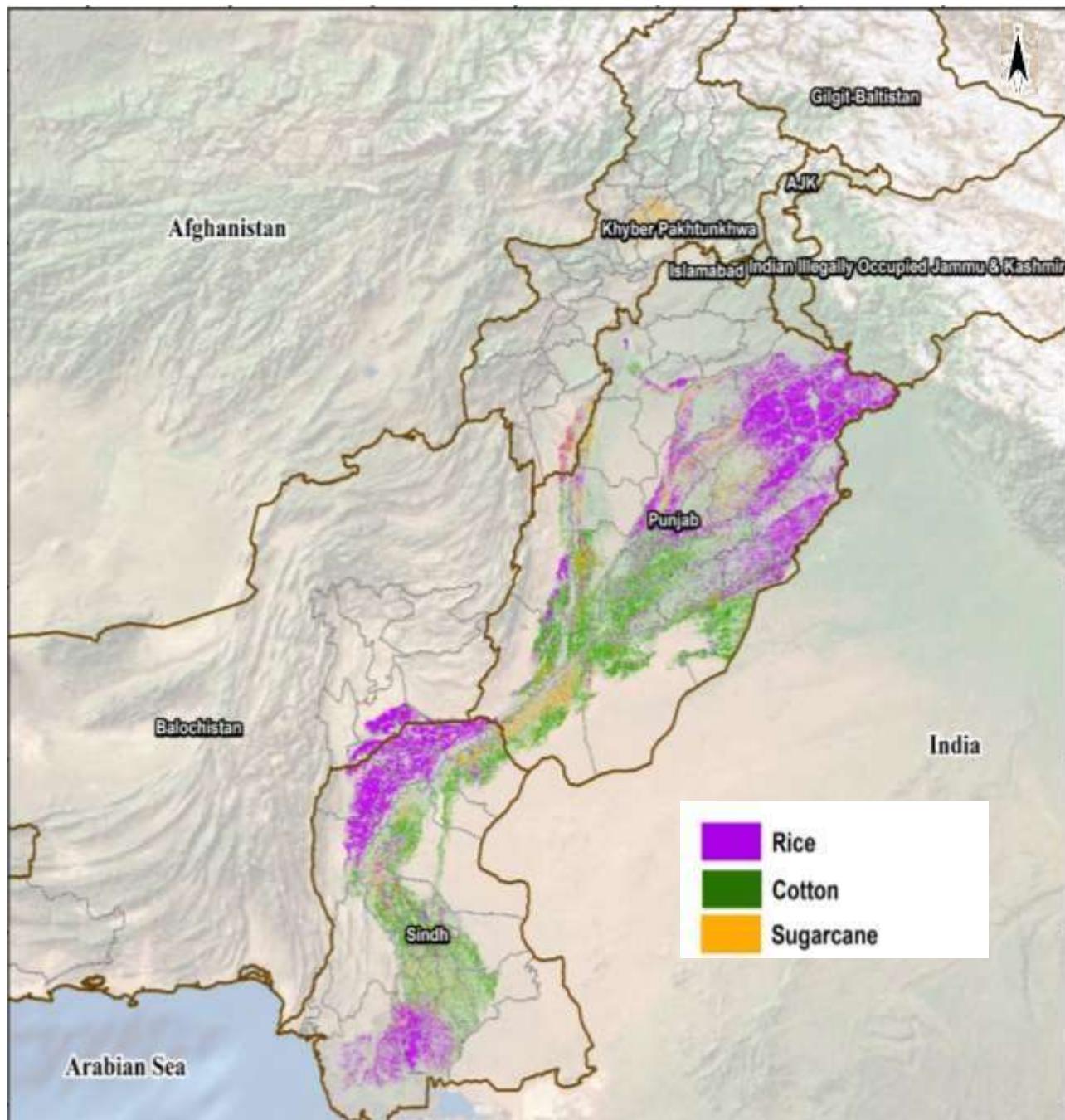
Cotton (2021-22)

SUPARCO Cotton Crop Estimates: 2021-22			
Province	Area	Yield	Production
	000 ha	Kg/ha	000 Bales
Punjab	1226.8	671	4841.0
Sindh	716.3	773	3255.9
Balochistan	26.7	486	76.3
Pakistan	1969.8	706	8173.2

Rice (2020-21)

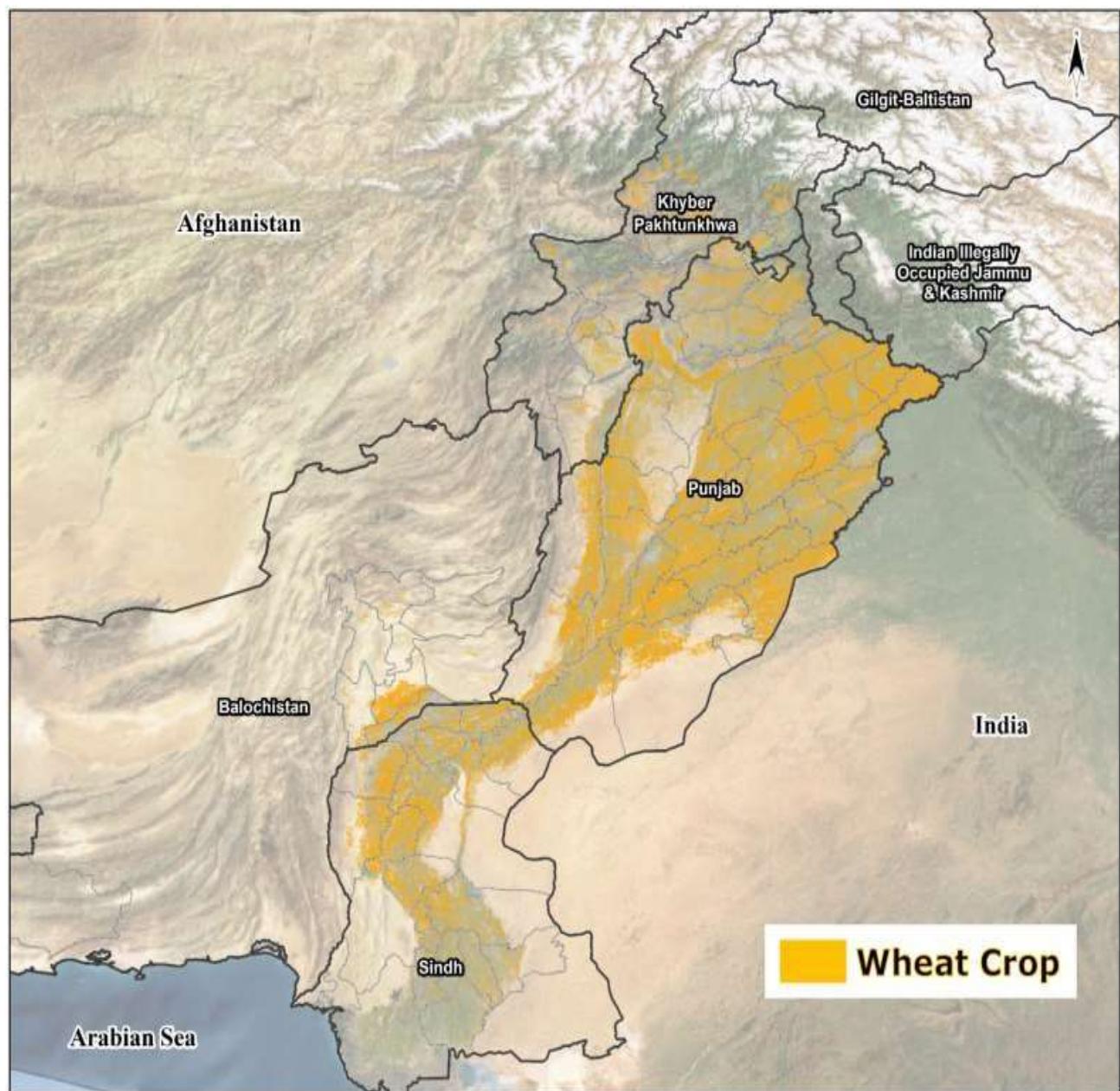
SUPARCO Rice Estimates: 2021-22

Province	Area	Yield	Production
	000 ha	Kg/ha	000 Tons
Punjab	2335.9	2126	4966.0
Sindh	1406.5	3413	4800.5
Khyber Pakhtunkhwa	63.4	2593	164.4
Balochistan	198.0	3397	672.6
Pakistan	4003.8	2648	10603.5



Wheat (2021-22)

SUPARCO Wheat Estimates: 2021-22			
Province	Area	Yield	Production
	000 ha	Kg/ha	000 Tons
Punjab	6413.2	2969	19040.8
Sindh	1780.5	2665	4745.0
Khyber Pakhtunkhwa	748.7	1829	1369.4
Balochistan	444.8	2190	974.1
Pakistan	9387.2	2784	26129.3



b. Capacity building of Project Stakeholders

i. Organizing Training Course

In continuation to the 1st training course conducted during the financial year: 2020-21, SUPARCO under the project objective organized the following 03-5-days training courses on “Geospatial Monitoring of Crops” during the year: 2021-22. 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. Training-wise details are as follows:

2nd Training Course: 2nd training course on “Geospatial Monitoring of Crops” was conducted from 06-10 September, 2021 at SUPARCO Islamabad office. As per below distribution table, fourteen officials from different stakeholder departments participated in this training course.

Stakeholder	No. of Trainees
CRS, Punjab	01
CRS, Sindh	02
CRS, Khyber Pakhtunkhwa	02
CRS, Balochistan	02
Agriculture Department, AJ&K	01
Agriculture Department, GB	01
MNFS&R	02
Pakistan Bureau of Statistics (PBS)	01
National Fertilizer Development Centre (NFDC)	01
Others (PMD, Islamabad)	01
Total	14

3rd Training Course: 3rd training course on “Geospatial Monitoring of Crops” was conducted from 13-17 December, 2021 at SUPARCO Islamabad office. As per below distribution table, thirteen officials from different stakeholder departments participated in this training course.

Stakeholder	No. of Trainees
CRS, Sindh	03
CRS, Khyber Pakhtunkhwa	02
CRS, Balochistan	02
Agriculture Department, AJ&K	01
Agriculture Department, GB	01
MNFS&R	02
Pakistan Bureau of Statistics (PBS)	01
National Fertilizer Development Centre (NFDC)	01
Others (IRSA, Islamabad)	Nomination Received but the nominee did not attend the course due to his illness
Total	13



4th Training Course: 4th training course on “Geospatial Monitoring of Crops” was conducted from 16-20 May, 2022 at SUPARCO Islamabad office. As per below distribution table, fifteen officials from different stakeholder departments participated in this training course.

Stakeholder	No. of Trainees
CRS, Sindh	03
CRS, Khyber Pakhtunkhwa	02
CRS, Balochistan	03
Agriculture Department, AJ&K	01
Agriculture Department, GB	01
MNFS&R	03
Pakistan Bureau of Statistics (PBS)	01
National Fertilizer Development Centre (NFDC)	01
Total	15

ii. Procurement of Hardware/Software

As per approved PC -1 of SUPARCO PSDP funded project, the following items were procured and distributed among the project stakeholders for strengthening their nucleus labs.:

Items as Per PC-1	SUPARCO	Sindh	KP	Balochistan	AJK	GB	NFDC
Workstations (09)	03	01	01	01	01	01	-
Computers (08)	01	01	01	01	01	01	01
Laptops (08)	02	01	01	01	01	01	-
Printer B&W (08)	01	01	01	01	01	01	01
Field Cameras (08)	02	01	01	01	01	01	-
Data Collection Tab (08)	02	01	01	01	01	01	
Software (ArcGIS & Erdas)	ArcGIS	-	01	01	-		-
	Erdas Imagine (Intergraph)	-	01	01	01	-	-

Publishing of Monthly Bulletin:

SUPARCO under satellite based crops monitoring activity, publishes monthly crop situation bulletin on regular basis. This bulletin covers: 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).

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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 2022

Summary

By the end of June 2022, increasing values of satellite based Normalized Difference Vegetation Index (NDVI) show start of Kharif season. Generally, above normal temperatures were observed in most parts of the country. Normal to above normal rains in most parts of agricultural plains were observed.

Federal Committee on Agriculture in its meeting held on 31st March, 2022 fixed Kharif crops targets. Cotton crop production target of 11,034 million bales was fixed from an area of 2,533.3 thousand hectares with an average yield of 740.4 kg per ha. Similarly rice crop production target of 8,611 million tons was fixed from an area of 3,069.9 thousand hectares with an average yield of 2,804.9 kg per ha. Sugarcane production target of 78,588 million tons was fixed from an area of 1,181.9 thousand hectares with an average yield of 66.492 tons per hectare.

Cotton crop sowing has been completed during the month in Punjab and Sindh and is at varying growth stages from germination to boll formation depending on sowing time. As per reports of Pakistan Central Cotton Committee (PCCC), upto 30th June, 2022, the total area sown at National level is 2,000 million hectares, approximately 6.9 percent more than the same period of last year. Punjab has achieved 81.5 percent of its targets with sowing of 1,485 million hectares of cotton. In Sindh, area sown is 0.592 million hectares resulting in achievement of 80.5 percent of the target. Due to prevailing weather conditions increased pest/disease infestation has been observed during June 2022, especially white fly, jassid and CLCV.

In local market, average ex-gin cotton price during June 2022 was higher by about 40.15 percent compared to June 2021. Approximate average ex-gin price during June 2022 was Rs. 22195.5 per 40 kg against Rs. 13283.4 during June 2021 showing an increase of Rs. 8912.2 per 40 kg.

Sugarcane crop growth was generally satisfactory and insect pest situation was also under control by end of month.

Pakistan Satellite based Crop Monitoring System Bulletin is a joint monthly publication of SUPARCO and FAO, UN.

3. Activities to be undertaken in the fiscal year 2022-23

- a. Satellite based estimation of crops for Kharif (2022-23) and Rabi (2022-23) and sharing with MNFS&R
- b. Organizing around 03 training courses for project stakeholders

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

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