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EXPLORING PAKISTAN'S AGRICULTURE SECTOR (PESTICIDE INDUSTRY)

Center of Excellence in Competition Law (CECL)

Competition Commission of Pakistan (CCP)

2025

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Foreword

Agriculture remains the backbone of Pakistan’s economy, employing approximately 37% of the labour force, ensuring national food security, and contributing around 23.5% to the country’s GDP. It serves as a key driver of economic activity that supports key industries such as textiles, food processing, and fertilizers, while also providing the main source of livelihood in rural areas. The sector’s performance has far-reaching implications for poverty alleviation, export competitiveness, and overall socio-economic development.

The report on the Pesticide Industry of Pakistan examines a sector of strategic importance to agricultural productivity, rural resilience, and food system sustainability. As the country grapples with rising input costs, climate variability, and recurrent pest outbreaks, the urgency for a well-regulated, transparent, and competitive pesticide market has never been greater.

The report is prepared in line with the Prime Minister’s vision to reform agriculture through enhanced per-acre yields and reduced production costs, and reflects the Competition Commission of Pakistan’s broader mandate to identify anti-competitive practices, promote fair market dynamics, and support evidence-based policymaking across key economic sectors. Given the pesticide sector’s close linkages to public health, environmental sustainability, and agricultural efficiency, it warrants a thorough competition assessment to ensure that market distortions, regulatory gaps, and entry barriers do not inhibit access, innovation, or product integrity.

The study provides data-driven insights into the structure and conduct of the pesticide market, and identifies areas where policy reform and institutional capacity-building can strengthen competition, enhance regulatory compliance, and encourage responsible business practices. It further emphasizes the importance of aligning competition policy with Pakistan’s broader national development objectives, including commitments to the United Nations Sustainable Development Goals (SDGs).

The recommendations presented in this report are intended to serve as a resource for regulators, policymakers, industry stakeholders, academic institutions, and development partners committed to promoting a competitive, efficient, and environmentally responsible pesticide industry in Pakistan.

Dr. Kabir Ahmed Sidhu
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List of Acronyms

AI	Active Ingredients
APO	Agriculture Pesticide Ordinance
APTAC	Agriculture Pesticide Technical Advisory Committee
CLP	Crop Life Pakistan
CPEC	China Pakistan Economic Corridor
DPP	Department of Plant Protection
FAO	Food and Agriculture Organization
FIRs	First Information Reports
HEC	Higher Education Commission
IPEP	Institute of Plant & Environmental Protection
IPM	Integrated Pest Management
IPPC	International Plant Protection Convention
ISPMs	International Phytosanitary Measures
MNCs	Multinational Corporations
MNFSR	Ministry of National Food Security and Research
PARC	Pakistan Agricultural Research Council
PIC	Prior Informed Consent
POPs	Persistent Organic Pollutants
PQC	Pesticide Quality Control
SDGs	Sustainable Development Goals
SEZs	Special Economic Zones
SPS	Sanitary and Phytosanitary
VPMP	Vertebrate Pest Management Program

Executive Summary

Pesticides have been essential in crop protection since the beginning of agriculture. Over time, their use has become more advanced, helping farmers increase yields, protect crops from pests and diseases, and improve farm incomes. In Pakistan, agriculture is a major part of the economy, pesticides play a key role in meeting growing food demands. During 2024–25, the agriculture sector grew by 0.56%, contributing 24% to GDP and providing employment to 37% of the workforce. Pesticides are also used outside of farming, such as in controlling diseases like malaria. However, because they are designed to kill pests, they can be harmful if misused. The term “pesticide” covers many products, including insecticides, herbicides, fungicides, and more each targeting different threats to crops. The sector relies entirely on imports to meet domestic pesticide demand, with 80% of imports in technical-grade form for local formulation and the remaining 20% as finished products. In 2023 pesticides primarily sourced from China, South Korea, the U.S., Singapore, and Germany. Provisional data for 2024-25 (P) shows the import volume of insecticides at 20,885 tonnes with a value of 29,886 million rupees.

Prior to 1980, pesticide import and distribution in Pakistan were managed by the federal Plant Protection Department, primarily for public-sector programs such as locust and malaria control and aerial spraying of major crops. Pesticides were heavily subsidized and provided in bulk, often leading to handling accidents and logistical challenges for farmers. In 1980, the pesticide sector was privatized under the condition that products be sold in small packs, made available ahead of crop seasons, offered on credit (discontinued after 1988), and supported with farmer advisory services. Since privatization, pesticide availability and usage have steadily increased, contributing to agricultural productivity while shifting the responsibility for safe use and timely access to the private sector.

The use of the pesticides varies depending on the crop, pest pressure, and regional climate. Insecticides dominate the market, accounting for 74% of total pesticide use, primarily to protect crops like cotton, wheat, and vegetables. Herbicides and fungicides represent 14% and 9% respectively, helping in weed control and disease management. The remaining 3% comprises other pesticide types such as nematicides and rodenticides. Crop-wise, cotton is the largest consumer of pesticides, representing 69% of national usage, followed by rice (18%) and vegetables (10%), with the remaining 3% used on other crops.

On the global front, Brazil was the world's largest consumer of pesticides in 2022, with 801 kilotons (kt) applied for agricultural purposes. The figure was 70% higher than that of the United States (468 kt), which ranked as the second-largest user. A comparative analysis of the pesticide sectors in India, China, Bangladesh, Brazil, and the European Union has been conducted. Pesticide pricing is largely market-driven across these countries, with Bangladesh being an exception, where the government sets maximum prices and dealer commissions. Subsidies on pesticides are minimal in India and Bangladesh, while Brazil offers tax incentives, and the EU provides indirect support through sustainability-oriented subsidies to farmers. All regions exhibit a highly competitive market landscape, characterized by the participation of both domestic and multinational companies.

Pesticide regulation in Pakistan is governed by the Agricultural Pesticides Ordinance, 1971, and the Agricultural Pesticides Rules, 1973, which provide the legal framework for the import, manufacture, registration, distribution, and quality control of pesticides. The regulatory

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framework mandates licensing, strict packaging and labeling standards, safety protocols, and testing laboratories. However, Punjab have introduced their own amended legislation Punjab Agricultural Pesticides (Amendment) Act 2012 and Punjab Agricultural Pesticides Rules, 2018 to enhance oversight, including inspector networks and quality control labs. Khyber Pakhtunkhwa, Sindh, and Baluchistan continue to regulate under the federal APO 1971. Also Baluchistan have a separate law for the early detection of pest attack in the province.

The sector is managed by both federal and provincial departments with distinct but interrelated mandates. At the federal level, the Department of Plant Protection (DPP) under the Ministry of National Food Security & Research is the primary regulatory authority overseeing pesticide registration, import, and compliance with international standards. In Punjab, the Directorate General of Pest Warning & Quality Control manages pest surveillance, pesticide dealer regulation, and farmer training. Khyber Pakhtunkhwa and Sindh operate through their respective Agriculture Extension departments, which implement licensing, monitoring, and awareness programs at the district and tehsil levels. Baluchistan follows a similar model, focusing on inspections, licensing, and farmer education. Additionally, the Pakistan Agricultural Research Council (PARC), through its Institute of Plant & Environmental Protection (IPEP), drives research on sustainable pest control, integrated pest management (IPM), and pesticide residue monitoring, while also conducting training programs for stakeholders.

Quality control is enforced through pre-shipment inspection via accredited international agencies, and post-import quality control through federal and provincial laboratories. The Provincial labs and 660 inspectors oversee retail compliance, with penalties for substandard products. The market structure is competitive, comprising over 500 local firms and 14 multinational companies. Major players include Syngenta, FMC, Bayer, and several prominent domestic brands. Pricing is market-driven, with no direct subsidy in place. Distribution occurs through a network of licensed dealers and retailers, with provincial governments responsible for quality inspections at the retail level.

The pesticide sector in Pakistan faces multiple structural and regulatory challenges that restrict competitiveness and long-term sustainability. High capital requirements, technological complexity, and lack of skilled human resources make it difficult for new entrants to establish indigenous pesticide manufacturing facilities. As a result, the sector remains largely dependent on imports and local formulation, with limited investment in research, development, and local production. The import-reliant business model is further reinforced by the absence of supportive policy incentives. Regulatory limitations, such as the non-statutory two-year shelf-life restriction on pesticides, lead to unnecessary product wastage and financial burdens on importers and distributors, despite advancements in chemical stability that allow longer shelf life. Additionally, the sector suffers from market distortion from circulation of counterfeit and adulterated products, particularly in major cotton-producing regions.

The other issues include inadequate laboratory testing capacity and a shortage of trained manpower, which compromise product quality. Legal and institutional constraints further weaken oversight, particularly at the dealership level in province of Sindh, where pesticide inspectors lack sufficient legal support to prosecute violations. Following the 18th Constitutional Amendment, institutional ambiguity between federal and Punjab has created

overlapping regulatory requirements that cause delays, increased costs, and legal uncertainty for businesses. Additionally, the import of pesticide products not adapted to Pakistan's diverse climatic conditions undermines efficacy, stifles local innovation, and disadvantages domestic players. Compounding these problems is the indiscriminate usage of pesticides by farmers, driven by weak extension services, aggressive dealer-led marketing, and a lack of informed choices.

Around 70% of pesticide imports in Pakistan are made through Form-16 and Form-17 due to the overly complex and time-consuming Form-1 registration process, which can take over three years. The excessive use of pesticides is driven by lack of technical expertise and aggressive marketing that risks to public health, biodiversity, and fair competition.

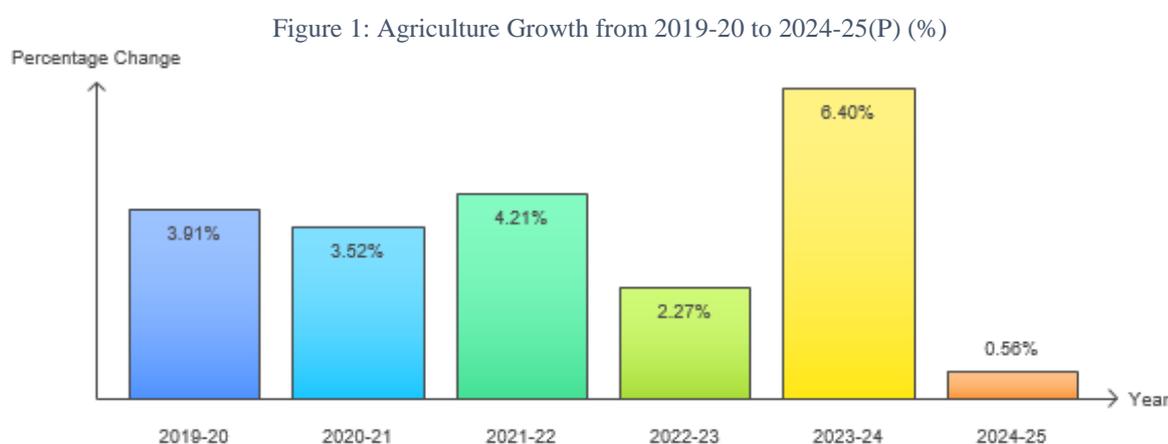
The report presents a set of targeted recommendations to promote a more efficient, transparent, and competitive pesticide market in Pakistan. The key recommendations include re-evaluating the two-year shelf-life restriction in light of modern chemical stability, which would reduce waste, operational costs, and pressure on foreign exchange reserves. It also emphasizes a strategy to combat the rising menace of counterfeit and adulterated pesticides through stronger enforcement, enhanced legal frameworks, public awareness, and the introduction of authentication and traceability system. Furthermore, the report underlines the need to upgrade pesticide quality assurance mechanisms by investing in laboratory infrastructure, technical staffing, and collaboration with academic institutions

The report also recommends to promote indigenous pesticide manufacturing by integrating research institutions, universities, and simplification of Form-1 application process for pesticide registration to reduce procedural complexity and administrative burden. To address unemployment and strengthen pesticide distribution, the report recommends empowering agriculture graduates through startup incubation and financial facilitation. Furthermore, a harmonized regulatory framework is proposed to eliminate administrative overlaps between federal and Punjab. The report stresses the importance of adapting pesticide products to Pakistan's unique agro-climatic conditions through mandatory localized field trials, which will not only improve product efficacy but also reduce overuse, enhance environmental safety, and support a more competitive domestic market. Lastly, to align pesticide policy and practice with Sustainable Development Goals.

Chapter 1: Introduction and Background of Sector

1.1 Overview and Importance of Pesticides

1. Since the earliest days of plant cultivation for food, crops have needed protection from pests and diseases. Over time, the methods of protection have become increasingly sophisticated. Pesticides are widely used, particularly in agriculture, where they enable higher food production from the same area of land, increases yields and improving farm revenues.¹
2. The predominance of agriculture in the economy of Pakistan indicates that agricultural growth is a critical driver of economic growth, employment, and poverty reduction, given its linkages with the other sectors. The agriculture sector in Pakistan witnessed mild growth in 2024-25(P), with an overall increase of 0.56 percent. During 2024-25 (P), agriculture sector contributed 23.5 percent in GDP and 37 percent in employment.² The past five years performance of the agriculture sector of Pakistan is shown in the figure below;



Source: Economic Survey of Pakistan 2024-25

3. All over the world, pesticides are used to protect crops from different diseases. The increasing demand for food can be met either by cultivating new areas, or by intensifying the use of the existing agricultural areas. As new areas are scarce, intensifying the use of existing land is necessary. Together with improvements in water management, fertilizer and new plant varieties, pesticides can play an important role in increasing the agricultural productivity. Pesticides kill the pests that are harmful to the crops and can therefore have a positive effect on crop yields. Furthermore, they are used in public health programs to control vector borne diseases, such as malaria. However, as pesticides are designed to kill living organisms, they are inherently toxic and can pose risks to humans and animals if not used responsibly.³

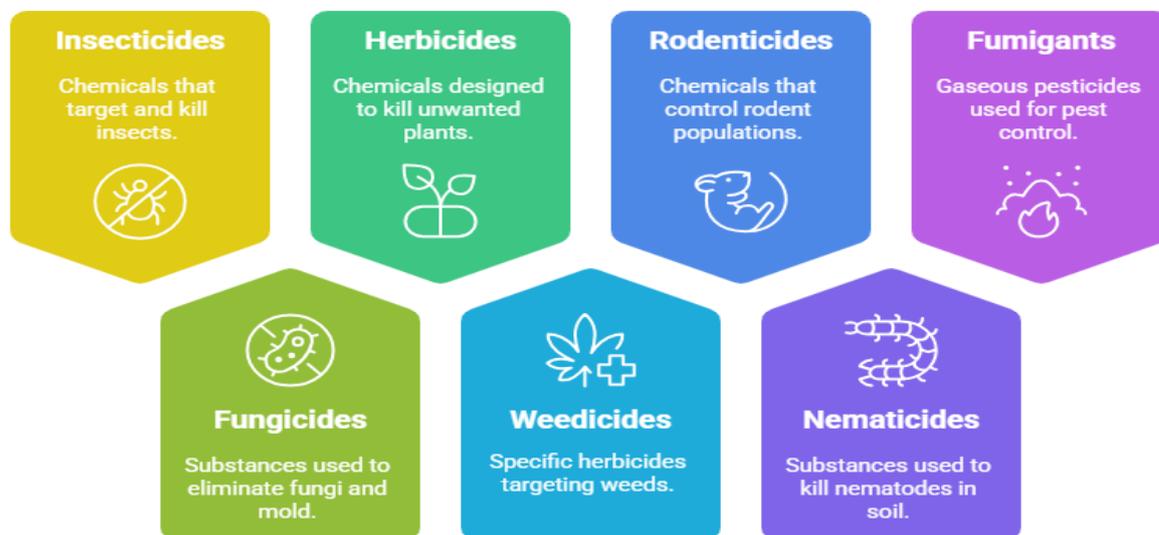
¹ Why do we need Pesticides, Accessed link on 19-9-2024, <https://www.pcs.agriculture.gov.ie/aboutus/aboutpesticides/whydoweneedpesticides/#:~:text=Farmers%20use%20pesticides%20to%3A,crops%20being%20contaminated%20by%20fungi>

² Economic Survey of Pakistan, Chapter 2. https://www.finance.gov.pk/survey/chapter_25/2_Agriculture.pdf

³ Pesticide Exposure, Safety Issues, and Risk Assessment Indicators. Accessed on 28-nov-2024. <https://pmc.ncbi.nlm.nih.gov/articles/PMC3108117/>

- The general term ‘Pesticide’ is used to describe all chemicals that destroy pests such as insects, fungi, rodents or nematodes. They can be divided into the categories of insecticides, fungicides, herbicides, weedicides, rodenticides, nematicides, and fumigants. The overview of the different pest control agents is given in figure 2 below.

Figure 2: Overview of Pest Control Agents



1.2 Historical Overview of Pesticides Usage in Pakistan

- Before 1980 the pesticide import and distribution was the responsibility of the Plant Protection department, Government of Pakistan. At that time the greatest imports were for the locust control program, malaria control program, aerial spray of cotton, sugarcane, rice, tobacco, etc. There was a subsidy on pesticides and aerial spraying was free. The pesticides were shipped in large packages or containers. A number of accidents occurred during transfer to smaller containers, handling and storage of left-over toxicant. Moreover, the farmers had to purchase pesticides on a pre-payment basis.
- In 1980 the pesticide business was transferred to private sector with the agreement that the pesticides will not be imported before the government stock is exhausted. Since then there has been a steady increase in the pesticide consumption and imports owing to the following factors: (i) pesticides are offered in small unit packs, (ii) these are available in time before the start of the crop season, (iii) these are provided to the farmers on credit and deferred payment basis (this practice has been discontinued since 1988)² and (iv) farmers were provided advisory service through the promotional campaigns about the time and mode of application.⁴

Table 1: Stages of Pesticide Usage in Pakistan

⁴ Economic perspectives of major field crops of Pakistan: An empirical study. <https://www.sciencedirect.com/science/article/pii/S2405883116300569#:~:text=The%20usage%20of%20pesticides%20increased,et%20al.%2C%202010>.

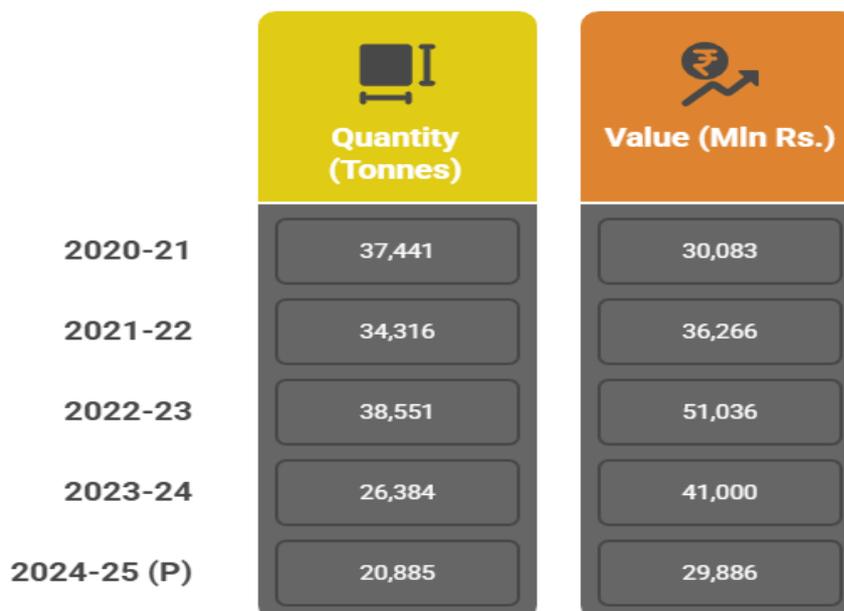
Period	Pricing	Mode of Distribution
1947-65	Free of Cost	Public Sector
1966-74	From a flat rate of Rs0.25/ltr to 75% subsidized price	Public Sector
1975-79	50% subsidy on *ECs/Wps, 75% subsidy on granules	Public Sector – 25% Private Sector – 75%
1980-85	Complete withdrawal of subsidy except in Baluchistan	Private Sector – 100% Punjab, Sindh & Public Sector in Baluchistan, FATA & AK
1986-91	Complete withdrawal of subsidy in all provinces except Baluchistan	Private Sector – 100%
1992-93	Duty and Surcharge exempted on imports of weedicides	Private Sector – 100%
1993	Duty exemption on pesticides	Private Sector – 100%
Note: *EC = Emulsifiable Concentrate, WP = Wettable Powder		
Source: https://sdpi.org/sdpiweb/publications/files/W19Pesticides%20and%20Environment%20Situation.pdf		

1.3 Current Import of Pesticides in Pakistan

7. Pakistan relies entirely on imported pesticides, as there is no domestic production in the country. The pesticide market comprises two types of imports: technical-grade (semi-raw material, which are then formulated locally into finished products) and finished products. Technical-grade pesticides account for approximately 80% of total imports, whereas the remaining 20% consists of finished products.⁵
8. The figure below presents data on Pakistan's insecticides imports over five fiscal years, from 2020-21 to 2024-25 (P) that shows both the quantity imported in tonnes and the value in millions of rupees (Mln Rs.). In 2020-21, Pakistan imported 37,441 tonnes of insecticides worth 30,083 million rupees, indicating a relatively high volume at a moderate cost. The following year (2021-22), the quantity dropped to 34,316 tonnes, but the value increased to 36,266 million rupees.
9. In 2022-23, imports rose to 38,551 tonnes, the highest volume in the period, with a sharp jump in value to 51,036 million rupees. However, 2023-24 saw a decline in quantity to 26,384 tonnes, while the value remained high at 41,000 million rupees. The provisional data for 2024-25 (P) shows the lowest import volume at 20,885 tonnes, with a corresponding drop in value to 29,886 million rupees, which may reflect reduced agricultural demand, stricter import policies, or economic challenges affecting purchasing power.

⁵ Information collected from Department of Plant Protection

Figure 3: Import of Insecticides from 2020-21 to 2024-25 (P)



Source: Economic Survey of Pakistan 2024-25

10. Pesticides in Pakistan come in different forms such as emulsifiable concentrates, powders, granules, and suspension concentrates. There are variety of products available, with differences in brands, formulations, and active ingredients. Many products also combine two or more active ingredients. The market includes both branded pesticides produced by multinational and local companies and generic (off-patent) options. Generic pesticides are usually more affordable and commonly used by small farmers, while branded ones are promoted as being of higher quality. All pesticide products before import must be registered with the DPP under the Agricultural Pesticides Ordinance of 1971.⁶
11. In 2023, Pakistan imported pesticides worth approximately USD 202 million, ranking 50th among 225 countries in global pesticide imports. In the overall imports of Pakistan, pesticides were the 41st most imported item out of a total of 1,174 products. The majority of pesticide imports originated from China (USD 92.2 million), followed by South Korea (USD 20.2 million), the United States (USD 18.7 million), Singapore (USD 12.6 million), and Germany (USD 12.4 million). Additionally, between 2022 and 2023, the fastest-growing sources of pesticide imports were Australia (USD 1.85 million increase), Singapore (USD 1.81 million increase), and Indonesia (USD 1.45 million increase).⁷

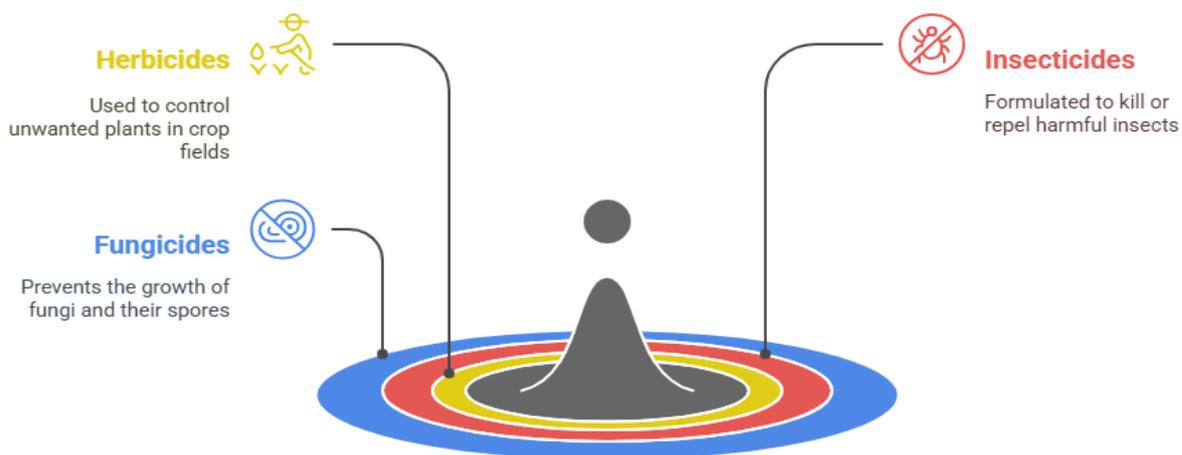
⁶ Insecticides and their Applications. Sarfraz Ali Shad. Department of Entomology, Faculty of Agricultural Sciences and Technology, Bahauddin Zakariya University, Multan, Pakistan. <https://pr.hec.gov.pk/jspui/bitstream/123456789/9540/1/INSECTICIDES%20AND%20THEIR%20APPLICATIONS%20%28UPDATED%209-13-18%29.pdf>

⁷ Pesticides in Pakistan. See online at <https://oec.world/en/profile/bilateral-product/pesticides/reporter/pak>

1.4 Types of Pesticides Used in Pakistan

12. Various types of pesticides are used to control pests, diseases, and weeds in agricultural production in Pakistan. The use of the pesticides varies depending on the crop, pest pressure, and regional climate, with the highest application rates in Punjab and Sindh due to their extensive agricultural activity. As depicted in below figure 3, the main types of pesticides used in Pakistan include insecticides, herbicides and fungicides.

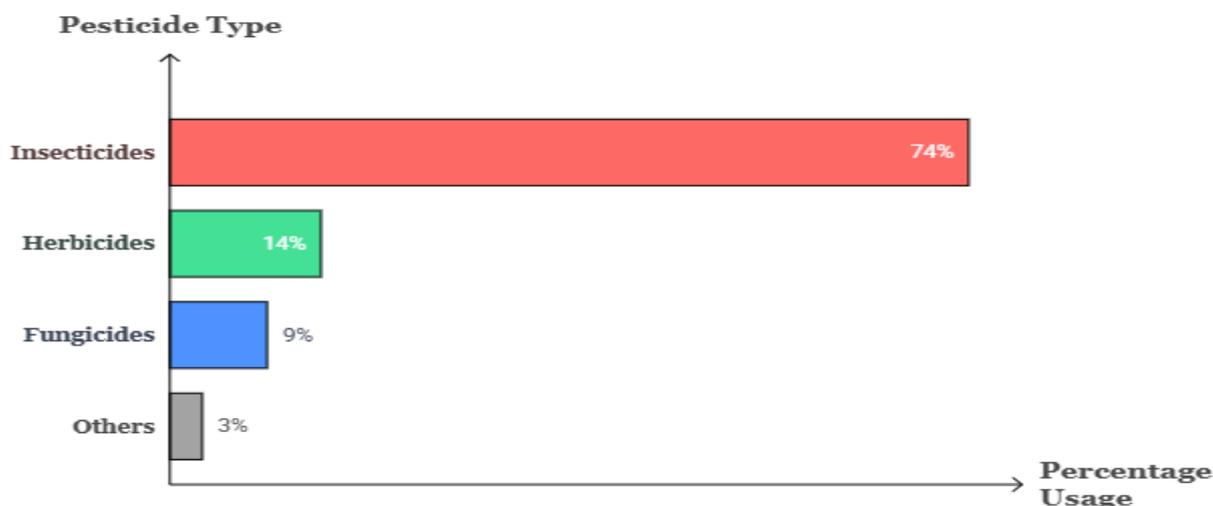
Figure 4: Major categories of Pesticides Usage in Pakistan



Source: PACRA

13. Furthermore, when analyzing pesticide usage by category, insecticides account for the largest share, comprising 74% of total pesticide consumption. These are primarily used to control harmful insect pests that threaten crops such as cotton, wheat, and vegetables. Herbicides make up 14%, playing a role in weed management to increase crop yields. Fungicides represent 9%, essential for preventing and treating fungal diseases that impact fruit, vegetable, and cereal crop production. The remaining 3% includes other pesticide types, such as nematicides and rodenticides, which are used for specific pest control needs.

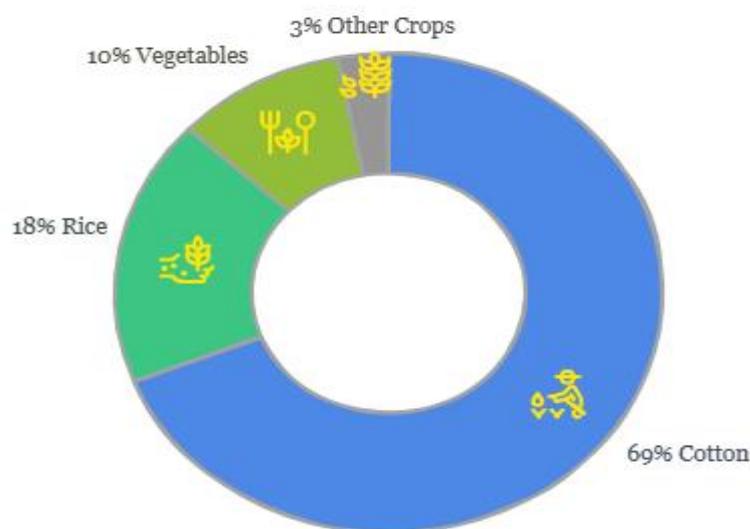
Figure 5: Pesticides Usage by Types



Source: Agriculture Department, Government of Punjab

14. Pesticide usage in Pakistan varies across different crops, with cotton being the largest consumer, accounting for approximately 69% of the total pesticide consumption. Rice follows, utilizing 18%, while vegetables make up 10%. The remaining 3% is used on other crops.

Figure 6: Pesticides Usage by Crops



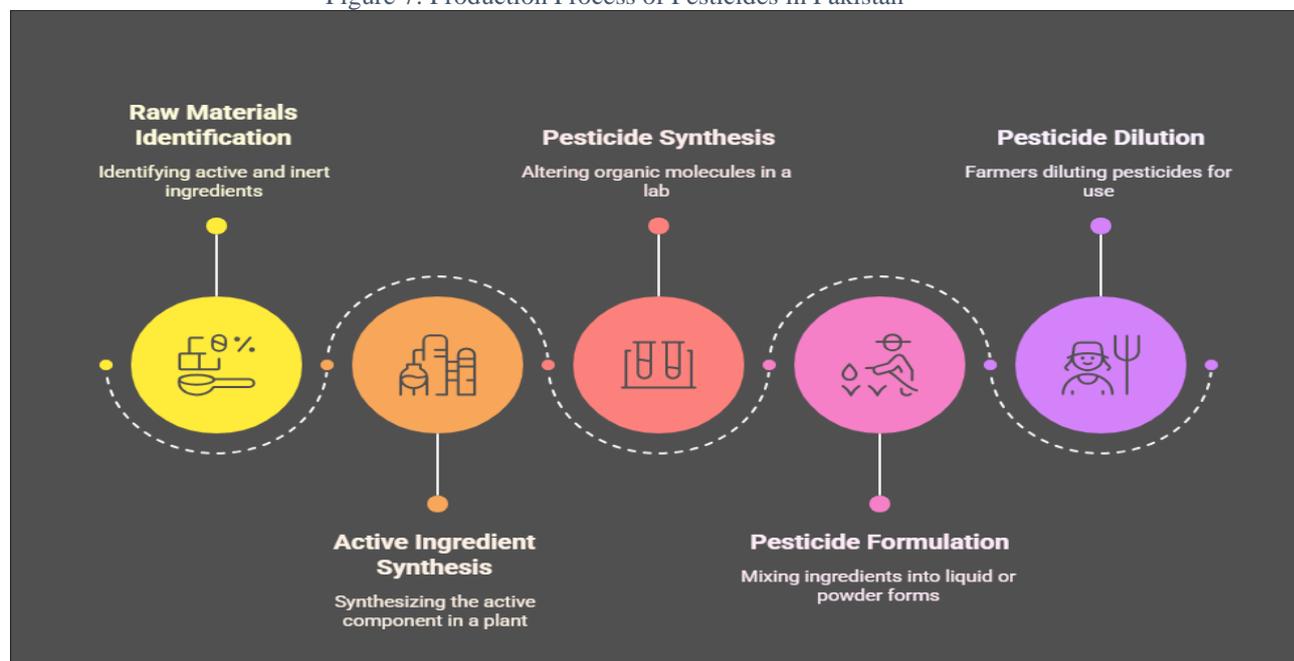
Source: Agriculture Department, Government of Punjab

1.5 Pesticides Production Process

15. **Step 1 (Raw Materials):** A pesticide consists of an active ingredient that kills pests and inert materials that aid in application and coverage. Most active compounds are lab-synthesized, while the composition of additional ingredients varies based on the target pest. Common elements in pesticides include nitrogen, sulfur, phosphorus, oxygen, bromine, and chlorine.
16. **Step 2 (Manufacturing Process):** Pesticide manufacturing involves three key steps: first, the active ingredient is synthesized at a chemical plant. It is then either processed on-site or sent to a formulator, who converts it into a liquid or powder formulation for application.
17. **Step 3 (Synthesizing the Pesticide):** This involves intricate chemistry and calls for a sizable, advanced laboratory as well as skilled chemists. To create a pesticide, the basic process involves altering an organic molecule. The active component is packed and sent to a formulator.
18. **Step 4 (Formulating the Pesticide):** To create a liquid pesticide, the formulator measures the active ingredient, mixes it with a solvent, and packages it in jugs or drums. Dry pesticides, such as granules or powders, are packed in plastic or plastic-lined bags and are ready for use.
19. **Step 5 (Diluting the Pesticide):** When ready for transportation, the farmers, through dealers, receive the expected quantity of insecticides, which they use to dilute the emulsified concentrate and make the required amount of pesticide.

20. The pesticides sector in Pakistan usually sees steps 2 to 5. Most of the Raw Materials are imported in Pakistan. The raw materials are then sent to formulation and packing where they go through steps 2 to 5. They are then marketed to farmers across Pakistan, via a network of dealers.

Figure 7: Production Process of Pesticides in Pakistan



Source: PACRA

1.6 Objective of the Report

21. The main objective of the report is to assess the level of competition within Pakistan's pesticide sector. To achieve this, the report sets out the following key objectives:
- To examine the overall structure and dynamics of the pesticide industry in Pakistan.
 - To evaluate the regulatory framework governing the pesticide market at federal and provincial levels, with a focus on identifying rules that may restrict competition.
 - To examine the structure of the pesticide market, including concentration levels, nature of firms (importers, formulators, manufacturers), and overall competitiveness.
 - To assess the extent and nature of barriers that may hinder new firms from entering or expanding in the pesticide market
 - To deliver actionable recommendations to policymakers aimed at removing unnecessary restrictions, improved regulatory design, and a more competitive, efficient, and fair pesticide market in Pakistan.

1.7 Rationale of the Report

22. The agriculture sector is a cornerstone of the economy of Pakistan that plays a key role in food security, employment generation, and contribution to the GDP. In line with the Prime Minister's vision for agricultural reform, efforts are being made to improve

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per-acre yield and reduce production costs through more efficient and sustainable practices. Recognizing the importance of agriculture to economic stability and consumer welfare, the Competition Commission of Pakistan (CCP) has actively examined various components of the agriculture sector to identify anti-competitive practices and recommend measures for promoting fair competition. Notable initiatives include:

- a) Pilot Study on the Supply Chain from Farm Gate to Retail - Tomato & Onion (2021)
 - b) Review of Essential Commodities to Identify and Address Market Distortions - 13 Commodities (2022)
23. The current report on the pesticide sector builds upon these earlier efforts, which aims to evaluate competition dynamics, regulatory issues, and market distortions within the pesticide industry while also aligning with broader agricultural reform and sustainability objectives.

1.8 Significance of the Report

24. The Competition Assessment Report on the Pesticide sector of Pakistan provides market related challenges which highlights the problems that limit fair competition in the market. The report examined how pesticides are registered, imported, made, and sold in the country. It identifies key challenges such as entry barriers for new businesses, overlapping regulations, fake or low-quality products, and a lack of support for research and development.
25. The report helps the government, regulators, and businesses understand what changes are needed to make the pesticide market more open and competitive. It provides practical suggestions to improve the system, better quality products for farmers, and reduce unfair practices. In the long run, this will support a stronger and more sustainable agriculture sector, which is essential for food security and economic growth in Pakistan.

1.9 Methodology of the Report

26. The report was drafted using a mixed-method approach that integrated both primary and secondary data sources. Primary data was gathered through structured interviews and focus group discussions, conducted with the standardized questionnaire. The focus group discussion involved stakeholders from both the public and private sectors. On the public sector side, consultations were held with representatives from the Department of Plant Protection (DPP), the National Agricultural Research Centre (NARC), the Ministry of National Food Security and Research (MNFSR), and the Agriculture Department of Sindh. From the private sector, major industry stakeholders such as Bayer Pakistan, FMC Pakistan, and Syngenta Pakistan were consulted. Additionally, structured questionnaire responses were obtained from Agriculture Department of the Government of Punjab, the University of Agriculture Faisalabad, and the Ayub Agricultural Research Institute Faisalabad. Secondary data was collected through an extensive review of existing literature and publicly available resources, which included open-access academic journals, policy papers, and official reports and publications

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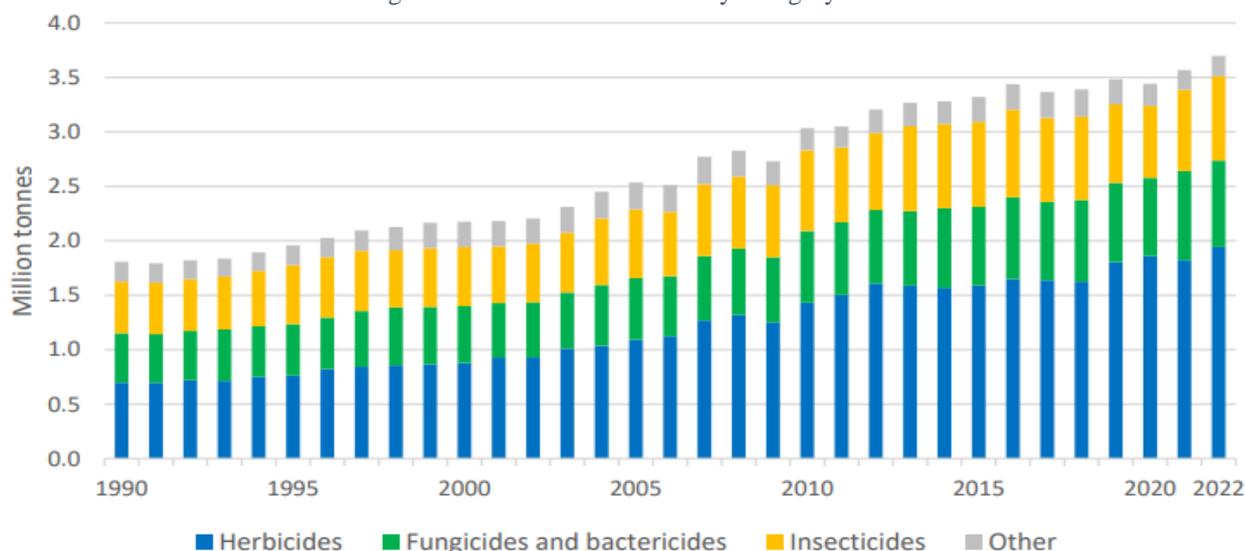
from organizations such as the Food and Agriculture Organization (FAO), the DPP, MNFSR, and data from the Economic Survey of Pakistan

Chapter 2: International and Regional Pesticides Markets

2.1 Global Statistics

27. Globally, Total pesticides use in agriculture in 2022 was 3.70 million tonnes of active ingredients (Mt), a 4 percent increase with respect to 2021, a 13 percent increase in a decade, and a doubling since 1990. Comparing the most recent decade with the 1990s, the global application of pesticides increased by 121 percent for herbicides, 54 percent for fungicides and bactericides, and 48 percent for insecticides. Over the same period, the breakdown of pesticides categories changed, with increases in the share of herbicides (from 40 percent to 50 percent of total pesticides use) and reductions in the share of insecticides (from 26 percent to 22 percent), and of fungicides and bactericides (from 25 percent to 22 percent).⁸

Figure 8: Global Pesticides use by Category



Source: <https://openknowledge.fao.org/server/api/core/bitstreams/a8a8c2c8-ee36-42e8-a619-7e73c8daf8a6/content?>

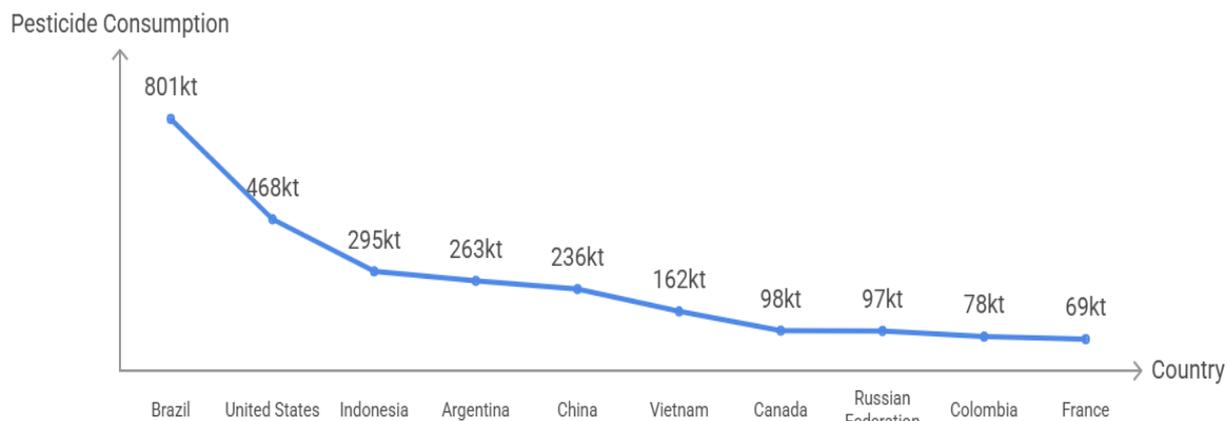
28. Pesticide usage intensities changed over time with different dynamics. Pesticides use per area of cropland in 2022 was 2.38 kg per hectare (kg/ha), an increase of 3 percent with respect to 2021; use per value of agricultural production was 0.90 kg per thousand international dollar (kg/1000 I\$) (+2 percent); and use per person was 0.46 kg per capita (kg/cap) (+2 percent). Between 1990 and 2022, these indicators increased by 94 percent, 5 percent, and 35 percent, respectively

29. Brazil was the world's largest consumer of pesticides in 2022, with 801 kilotons (kt) applied for agricultural purposes. This figure was approximately 70% higher than that of the United States (468 kt), which ranked as the second-largest user. The subsequent three countries, Indonesia (295 kt), Argentina (263 kt), and China (236 kt), reported comparable levels of pesticide applications. Following these were Vietnam (162 kt), Canada (98 kt), the Russian Federation (97 kt), Colombia (78 kt), and France (69 kt), rounding out the top ten global users.

⁸ Pesticides use and trade 1990-2022 FAOSTAT Analytical Brief 89.

<https://openknowledge.fao.org/server/api/core/bitstreams/a8a8c2c8-ee36-42e8-a619-7e73c8daf8a6/content>

Figure 9: Pesticides Use, Top Countries (2022)



Source: <https://openknowledge.fao.org/server/api/core/bitstreams/a8a8c2c8-ee36-42e8-a6197e73c8daf8a6/content>

2.2 Pesticides - International and Regional Comparison

30. This section provides a comparative analysis based on the pricing mechanism, subsidy policies and the overall competitive landscape of the pesticide sector. The comparison helps to get insights into the structure, dynamics, and regulatory environment of the pesticide industry that highlights the differences and similarities across various economies.

Table 2: International and Regional Comparison

Country	Pricing Mechanism	Subsidy	Market Competition
India	Primarily market-driven with no strict price control mechanism	No direct subsidy on Pesticides	Highly competitive with large number of local and multinational companies.
Bangladesh	The government is granted the power to set maximum sale prices and commission rates through official Gazette notifications	Do	Do
Brazil	Prices are largely determined by market forces rather than strict government controls.	Pesticides are eligible for a 60% reduction, when calculating Tax on Movement of Goods and Services and total exemption from the Tax on Industrialized Products	Do
EU	Pesticide pricing is primarily market-driven	The EU provides financial support to farmers to encourage the sustainable use of pesticides, especially those impacting natural resources and biodiversity	The EU pesticides sector is highly competitive, with competition steadily increasing.
Pakistan	Pesticide pricing is primarily market-driven	No direct subsidy	Pesticides sector is highly competitive, with both local and multinational companies.

Source:

India: Policy Brief, Pesticide Use in Indian Agriculture: Trends, Market Structure and Policy Issues.

Bangladesh: The Pesticides Ordinance, 1971. <http://bdlaws.minlaw.gov.bd/act-details-364.html>

Brazil: Pesticide Residues in Brazil: Analysis of Environmental Legislation and Regulation and the Challenge of Sustainable Production. <https://www.mdpi.com/2071-1050/17/6/2583> . Celebrated by the government and conservative politicians, tax reform expands fiscal incentives for pesticides.

<https://www.brasildefato.com.br/2024/12/19/celebrated-by-the-government-and-conservative-politicians-tax-reform-expands-fiscal-incentives-for-pesticides/>

31. The above analysis shows that pricing mechanisms for pesticides across countries are generally market-driven, with limited direct price controls. However, in Bangladesh, the government sets maximum prices and commissions. Subsidies on pesticides are largely absent in India and Bangladesh, whereas Brazil provides tax incentives, and the EU offers indirect support through sustainability-focused subsidies to farmers. In terms of market competition, all four jurisdictions show highly competitive pesticide markets with the active presence of both local and multinational companies.

2.3 Pakistan's commitment to global conventions and treaties

32. The Plant Quarantine and Pesticides Regulation Framework of Pakistan is also enforcing the International Plant Protection Convention and various Chemical Convention ratified by Pakistan. These International Obligations are: -
- i. **World Trade Organization - Sanitary and Phyto Sanitary Measures Agreement.** The Agreement on the Application of Sanitary and Phyto sanitary Measures sets out the basic rules for food safety and animal and plant health standards. All countries maintain measures to ensure that food is safe for consumers, and to prevent the spread of pests or diseases among animals and plants. These sanitary and phyto sanitary measures can take many forms, such as requiring products to come from a disease-free area, inspection of products, specific treatment or processing of products, setting of allowable maximum levels of pesticide residues or permitted use of only certain additives in food. Sanitary (human and animal health) and phyto sanitary (plant health) measures apply to domestically produced food or local animal and plant diseases, as well as to products coming from other countries.⁹
 - ii. **International Plant Protection Convention (IPPC).** IPPC is a multilateral treaty established under the framework of the Food and Agriculture Organization (FAO). IPPC aims to protect the world's plants, agricultural products and natural resources from plant pests. Ratified by 185 contracting parties, the IPPC develops, adopts and promotes the application of International Phytosanitary Measures (ISPMs) as the main tool to safeguard global food security, facilitate safe trade and protect the environment.¹⁰
 - iii. **Basel Convention on the Control of Transboundary Movement.** The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, adopted in 1989 and entered into force in 1992, is a global environmental treaty that aims to reduce the movement of hazardous waste between countries, particularly from developed to developing nations and to ensure environmentally sound management of such waste. Pakistan is a signatory and party to

⁹ Understanding the WTO Agreement on Sanitary and Phyto sanitary Measures. See Online at https://www.wto.org/english/tratop_e/sps_e/spsund_e.htm

¹⁰ International Plant Protection Convention. See Online at <https://www.ippc.int/en/>

the Basel Convention, and this has direct implications for how the country handles hazardous substances, including certain types of pesticides and their waste products.¹¹

- iv. **Rotterdam Convention on Prior Informed Consent (PIC) Procedure Pesticides.** The Rotterdam Convention is an international treaty designed to facilitate informed decision-making by countries with regard to trade in hazardous chemicals. It establishes a list of covered chemicals and requires parties seeking to export a chemical on that list to first establish that the intended importing country has consented to the import. It establishes a PIC procedure to ensure that certain hazardous chemicals are not exported to countries that do not wish to receive them. The PIC procedure does not ban or restrict any chemicals, nor does it mean that any individual country must automatically prohibit their import. Parties implement the PIC procedure through extensive information exchange, priority attention to national decisions on imports, and obligations related to export controls.¹²
- v. **Stockholm Convention on Persistent Organic Pollutants Pesticides.** The Stockholm Convention is a global treaty to protect human health and the environment from persistent organic pollutants (POPs). POPs are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms and are toxic to humans and wildlife. POPs circulate globally and can cause damage wherever they travel. In implementing the Convention, Governments will take measures to eliminate or reduce the release of POPs into the environment. Over 152 countries ratified the Convention and it entered into force, on 17th May 2004. The Stockholm Convention focuses on eliminating or reducing releases of POPs. It sets up a system for tackling additional chemicals identified as unacceptably hazardous. Ultimately, the Convention points the way to a future free of dangerous POPs and promises to reshape our economy's reliance on toxic chemicals.¹³

2.4 Anti-Competitive and Merger Cases in Pesticide Sector Globally

2.4.1 Cartelization Case in Germany (German Federal Cartel Office imposed fines totaling €154.6 million on seven companies for colluding on price lists)

33. In 2020, the Bundeskartellamt (German Federal Cartel Office) imposed fines totaling €154.6 million on seven companies for colluding on price lists, rebates, and retail prices for plant protection products from 1998 to 2015. Fines were also levied on individual employees involved in the illegal activities. Investigations revealed that the companies reached agreements on price lists for plant protection products every spring and autumn during the specified period, up until a dawn raid in March 2015. These agreements were based on joint calculations by the wholesalers, resulting in largely uniform price lists

¹¹ Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. See Online at <https://www.basel.int/default.aspx>

¹² Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. See Online at <https://www.state.gov/key-topics-office-of-environmental-quality-and-transboundary-issues/rotterdam-convention-on-the-prior-informed-consent-procedure-for-certain-hazardous-chemicals-and-pesticides-in-international-trade/>

¹³ United Nations Industrial Development Organization. See Online at <https://www.unido.org/our-focus-safeguarding-environment-implementation-multilateral-environmental-agreements/stockholm-convention>

for retailers and end customers. In the early years, some companies directly adopted the agreed price list as their own, adding only their company logo to the final version.

34. The companies held multiple meetings each year to agree on (discountable gross) list prices. In later years, price coordination mostly occurred via written communication or telephone. The four leading wholesalers in the market, comprising two cooperatives and two privately-owned firms, initially coordinated the calculation of these prices. Subsequent coordination occurred within two distinct groups: cooperatives on one side and non-cooperatives on the other. The outcomes of these discussions, including the calculation schemes and finalized price lists, were distributed to all involved companies in both the spring and autumn seasons of each year.
35. All the implicated wholesalers cooperated with the Bundeskartellamt during the investigation by applying for leniency programs and aiding in the clarification of the matter. Six companies and the fined employees acknowledged the facts as determined by the Bundeskartellamt and agreed to a settlement. This cooperation and admission were taken into account when calculating the fines.¹⁴

2.4.2 Acquisition of Monsanto by Bayer

36. In 2018, the European Commission conditionally approved Bayer AG's acquisition of Monsanto Company (Case M.8084), which concluded that the concentration was compatible with the internal market and the functioning of the EEA Agreement, provided that specific commitments were fulfilled.
37. The Commission's investigation identified overlaps between Bayer and Monsanto in the areas of seeds, pesticides, and digital agriculture. To address the concerns, Bayer committed to a divestiture package valued at over €6 billion that included the sale of Bayer's global field crop seeds business, its R&D platform for hybrid wheat, its global vegetable seeds business, and its glufosinate-based herbicide business. Additionally, Bayer agreed to divest its digital agriculture assets and pipeline products to ensure continued competition in this emerging sector.
38. By requiring the divestiture of overlapping R&D activities and assets, the Commission aimed to preserve competitive pressure and innovation incentives in markets where Bayer and Monsanto were competitors. Given the global nature of the companies involved, the Commission coordinated with other competition authorities, including those in the United States, Australia, Brazil, Canada, China, India, and South Africa. The Commission concluded that, with the implemented remedies, the merger would not impede competition in the EEA. The divestitures were designed to enable a suitable competitor to replace Bayer's competitive constraint in the relevant markets.¹⁵

¹⁴ Wholesalers of plant protection products fined for anti-competitive agreements on price lists, discounts and individual prices.

https://www.bundeskartellamt.de/SharedDocs/Meldung/EN/Pressemitteilungen/2020/13_01_2020_Pflanzenschutzmittel.html

¹⁵ European Commission clears Bayer-Monsanto merger. See online at <https://www.world-grain.com/articles/9575-european-commission-clears-bayer-monsanto-merger?>

2.4.3 European Commission's decision on the Dow-DuPont merger

39. In 2017, the European Commission approved the merger between U.S.-based chemical companies Dow and DuPont under the EU Merger Regulation, with conditions to preserve competition. To address antitrust concerns, especially in the pesticide sector, DuPont was required to divest portions of its global pesticide business, including nearly its entire R&D division. The Commission's review concluded that the merger, as originally proposed, would have reduced price competition and stifled innovation in markets for herbicides, insecticides, and fungicides, as well as in petrochemical sectors like acid copolymers and ionomers.
40. To resolve these issues, Dow and DuPont committed to divesting DuPont's pesticide products and related R&D assets globally that included herbicides for crops like cereals and rice, and insecticides used in fruits and vegetables. Dow also agreed to sell certain petrochemical production assets in Spain and the U.S. to address concerns in that market. The remedies were designed for a viable competitor can replace DuPont's presence in the affected markets and continue innovating. The Commission worked closely with other global competition authorities, including the U.S. DOJ and agencies in Brazil, China, and Australia, during its assessment.¹⁶

2.4.4 China National Agrochemical Corporation (CNAC) and Syngenta Ag Merger by Competition Commission of South Africa

41. In 2017, the Competition Commission of South Africa reviewed and conditionally approved the proposed merger between China National Agrochemical Corporation (CNAC), a subsidiary of the state-owned China National Chemical Corporation, and Syngenta AG, a global agribusiness specializing in crop protection and seeds. The case involved a complex transaction that had implications for the crop protection and agrochemical sectors in South Africa. The Commission conducted an assessment to evaluate whether the merger would substantially prevent or lessen competition, particularly in the markets for herbicides, insecticides, fungicides, and seed treatments. Both parties had a presence in South Africa through subsidiaries and distribution arrangements, Syngenta via its direct operations and CNAC through its ownership of Adama Agricultural Solutions, which also had a distribution relationship with Villa Crop Protection, a local agrochemical company.
42. The Commission found that while the merger would not result in overlaps in most product markets, it raised competition concerns in the market for certain crop protection products due to vertical and horizontal integration, and the possibility of coordination among competitors. Furthermore, public interest considerations such as employment and the impact on local suppliers were taken into account. To remedy the concerns, the Commission imposed a set of behavioral and structural conditions on the transaction, including requirements related to continued supply and access to certain products in South Africa, as well as commitments to protect jobs. This case formed part of a series of global mergers in the agrochemical industry that required coordinated reviews by

¹⁶ Commission clears merger between Dow and DuPont, subject to conditions.
https://ec.europa.eu/commission/presscorner/detail/en/ip_17_772

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multiple jurisdictions due to their potential cross-border implications on market competition and food security.¹⁷

¹⁷ CNAC–Syngenta Merger by the Competition Commission of South Africa.
https://www.gov.za/sites/default/files/gcis_document/201702/40645gen155.pdf

Chapter 3: Regulatory Framework of Pesticides Sector in Pakistan

43. Pesticide regulation in Pakistan is governed under the Agricultural Pesticides Ordinance (APO), 1971, and Consolidated Agricultural Pesticides Rules 1973, that lay down the legal framework for import, manufacturing, formulation, distribution, sale, and usage of pesticides in the country. The Department of Plant Protection (DPP) under the Ministry of National Food Security and Research (MNFSR) is the federal authority responsible for overseeing pesticide registration and regulation, while provincial agriculture departments handle enforcement at the local level, particularly after the 18th Constitutional Amendment. The regulatory framework covers aspects such as:

- i. Product registration and evaluation
- ii. Quality control and laboratory testing
- iii. Licensing of dealers and distributors
- iv. Inspection, sampling, and compliance enforcement
- v. Monitoring of counterfeit or substandard products

3.1 Laws and Rules at the Federal Level

3.1.1 Agricultural Pesticides Ordinance (APO), 1971

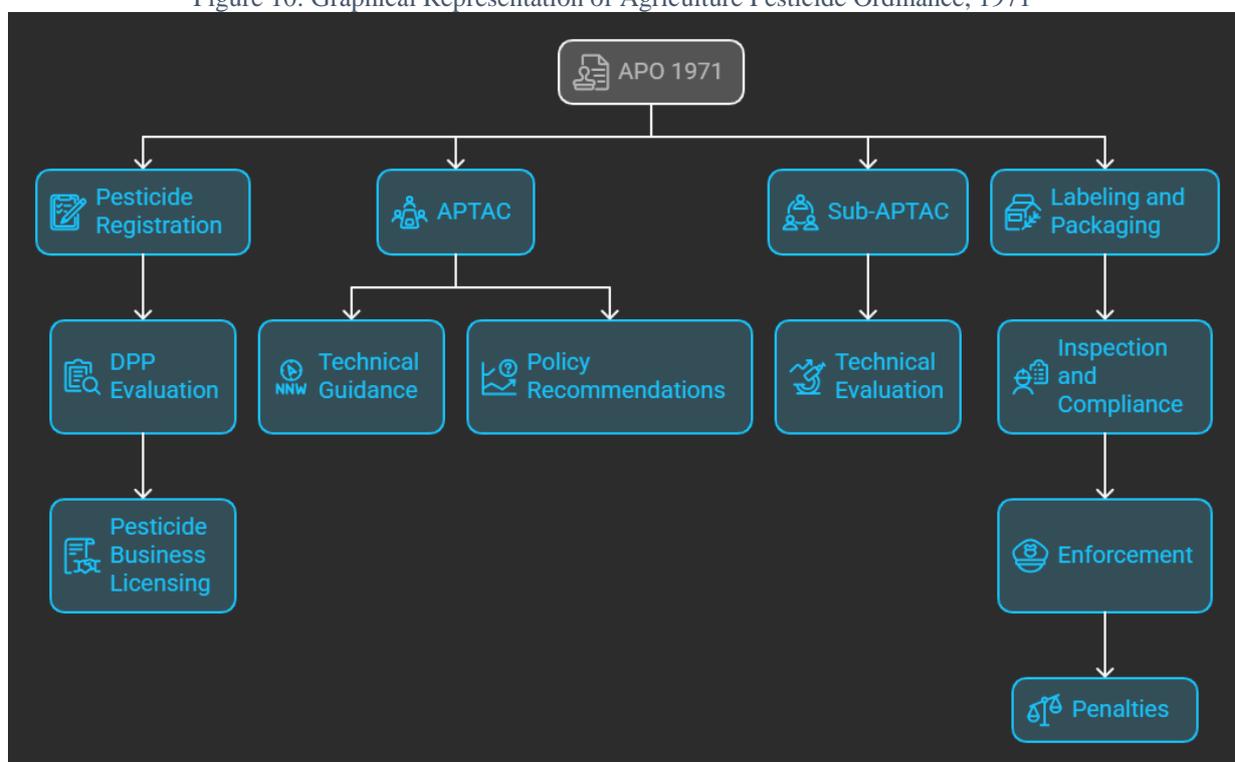
44. The Agricultural Pesticides Ordinance (APO), 1971 serves as the primary legal framework that govern the regulation, control, import, manufacturing, formulation, sale, distribution, and use of pesticides in Pakistan. The Ordinance provides the foundational structure for pesticide governance in the country. Its key features are as follows:

- i. The APO 1971 mandates that all pesticides must be registered with the DPP before they can be imported, manufactured, formulated, or sold in Pakistan. The registration process includes evaluation of efficacy, toxicity, and environmental impact. The Ordinance requires pesticide businesses including importers, manufacturers, formulators, distributors, and retailers to obtain licenses to operate. It also includes provisions for the registration of pesticide operators and formulation plants.
- ii. APO establishes the Agriculture Pesticide Technical Advisory Committee (APTAC) to guide the government on technical issues related to pesticide regulation. The committee assists in evaluating new pesticides, reviewing scientific data, and recommending policy changes. Additionally, APTAC carries out any other functions assigned under the Ordinance to support proper pesticide management in Pakistan. Its recommendations help shape decisions on pesticide registration, bans, and usage guidelines.
- iii. Under the APATC there is Sub-APTAC which is headed by the Director General of Plant Protection. The Sub-APTAC operates as a sub-committee under the APTAC, which assists in the technical evaluation, assessment, and

regulatory oversight of pesticides. The Sub-APTAC consists of technical experts, scientists, regulators, and industry representatives, who provide expertise to support APTAC’s decision-making process.

- iv. The APO includes provisions regarding the proper labeling, packaging, and branding of pesticide products for transparent and safe use by end users. The law empowers federal and provincial inspectors to conduct sampling and inspection of pesticides at warehouses, retail outlets, and during distribution to ensure compliance with quality standards and to detect substandard or counterfeit products.
- v. Violations of the Ordinance such as sale of unregistered, substandard, or adulterated pesticides can result in fines, license cancellation, or criminal proceedings, depending on the severity of the offense.¹⁸

Figure 10: Graphical Representation of Agriculture Pesticide Ordinance, 1971



3.1.2 Agricultural Pesticide Rules, 1973

45. The Agricultural Pesticide Rules, 1973, provide the operational framework for the implementation of the APO, 1971. They govern all aspects of pesticide regulation in Pakistan, including registration, import, formulation, licensing, distribution, sale, quality control, and enforcement.

- f) Part-II of the rules outlines that every pesticide (technical or formulation) must be registered with the DPP before importation, manufacturing, or sale. Applicants must provide toxicological, environmental, efficacy, and bio efficacy data as per prescribed formats. A Registration Committee reviews the

¹⁸ Agricultural Pesticides Ordinance, 1971. See online at <https://pakistancode.gov.pk/english/UY2FqaJw1-apaUY2Fqa-bpuUY2Fq-sg-jjjjjjjjjjjjjj>

applications and grants or denies approval based on scientific and regulatory evaluation. Re-registration is also required after the expiry of a product's registration period. The manufacturing or formulation plant shall also be registered with the DPP by making an application. Form-1 is the application form for registration of a pesticide. It is a mandatory document that must be submitted by manufacturers, importers, or formulators seeking approval for a pesticide before it can be sold or distributed in Pakistan.

- g) Part III of the rules specifically deals with the import of pesticides and no pesticide can be imported without registration. Also, no pesticide shall be imported and cleared by the customs authorities unless it is accompanied by a pre-shipment inspection certificate issued by international pre-shipment inspection and survey agencies listed with the DPP.
- h) Importers wishing to bring in pesticides without a trade name must apply to the DPP using Form 16, along with supporting documents. These include proof of having adequate storage facilities, retail packing facilities and post-import details. Form 16 is used to apply for permission to import a pesticide in its raw or technical-grade form (without a brand or trade name). These chemicals are later formulated and branded by local companies before being sold in the market. Form 16 allows importers to bring in such unbranded, technical-grade pesticides for further processing, formulation, or distribution in Pakistan.
- i) When importing pesticides that are registered in the manufacturing country but not registered in Pakistan under Form-1 or Form-16, importers must meet additional requirements under Form 17 to verify product quality. They must submit: (a) proof of the pesticide's registration in the country of origin, (b) evidence of its use in an OECD member country or China, and (c) documentation confirming its widespread application on relevant crops and pests in the originating country or any OECD nation/China. Form 17 is used to apply for permission to import pesticides that have already been registered and approved for use in another country. If a pesticide has been legally registered in a foreign country and meets international safety and efficacy standards, an importer in Pakistan can submit Form 17 to seek approval for its import and sale within Pakistan.
- j) Part-IV of the rules regulates the manufacturing, formulation, and sale of pesticides in Pakistan. For manufacturers and formulators, the rules mandate proper facilities, qualified staff, quality control labs, and batch-wise production records. They must allow inspections, report changes in operations, safe storage, provide worker safety gear, and regular medical check-ups.
- k) For sellers and dealers, a license is compulsory, requiring technical staff expertise, proper storage, and buyer sales records. Dealers must be trained in safe handling and storage, with valid licenses. Licenses can be revoked for violations such as adulteration or patent infringement. Importing firms must register their dealers with provincial authorities and remain accountable for their

conduct, while all dealers must prominently display their authorization certificates.

- l) Part-V says on strict standards for packaging, repackaging, refilling, and labeling of pesticides that include:
 - Packing Requirements: Pesticide containers must be durable, chemically resistant, and suitable for storage/transportation to maintain product integrity. Manufacturers, importers, and formulators must supervise packing/repacking at registered facilities with lab testing capabilities.
 - Labels must display information, including: Product name, manufacturer details, registration number, and expiry date. Active ingredient percentage, usage directions, and safety warnings (e.g., "POISON," skull-and-crossbones symbol). Antidote instructions and disposal guidelines for empty containers.
 - Quality Assurance: Distributors/retailers must reject improperly packed, unsealed, or unlabeled pesticides. Importers/manufacturers must provide warranties confirming product composition (weight/volume ratios of ingredients).
 - Advertising Control: Pesticide ads require prior approval from a government sub-committee before appearing in print/electronic media.
 - Prohibitions: Labels cannot include misleading claims, and pesticides banned in the EU, USA, China, Japan, or OECD cannot be imported/manufactured without certification
- m) Part VI uses for strict safety protocols for handling pesticides to prevent health and environmental hazards. It mandates that pesticide storage facilities must be well-ventilated, secure, and clearly marked with warning signs (e.g., "NO UNAUTHORIZED ENTRY," skull-and-crossbones symbols). The rules require fire safety measures, proper electrical installations, and sealed storage when not in use.
- n) Part VII of the rules sets up the Agriculture Pesticide Technical Advisory Committee (APTAC) and defines its main roles. The committee's job is to review how well the pesticide regulations are working and recommend changes to improve them. The committee approves the technical standards for registered pesticides, whether they're bought locally or imported, to maintain proper quality control.
- o) Part-VIII of Pakistan's Pesticide Rules 1973 establishes the Pesticide Laboratory's role, procedures, and confidentiality protocols for pesticide testing and analysis. The laboratory's key functions include (a) analyzing pesticide samples submitted under the Ordinance and rules, and (b) performing additional duties assigned by federal or provincial governments.
- p) Part IX of the rules explains the qualifications, responsibilities, and working procedures of Government Analysts and Inspectors who are involved in

regulating pesticides in Pakistan. It specifies that a Government Analyst must hold at least a Master’s degree in relevant fields such as Chemistry, Entomology, Toxicology, Plant Pathology, or Plant Protection, along with a minimum of five years’ experience in pesticide analysis. Their primary responsibility is to test and analyze pesticide samples submitted by inspectors or buyers and report results according to prescribed formats and procedures. The rules also detail the steps analysts must follow upon receiving samples, including verifying seals and documenting test methods.¹⁹

Figure 11: Graphical Representation of Agriculture Pesticide Rules, 1973



3.2 Laws and Rules at the Provincial Level

3.2.1 The Punjab Agricultural Pesticides (Amendment) Act 2012

46. Prior to the 18th Constitutional Amendment, the business of pesticides was regulated under the federal law, the APO 1971. However, after the Concurrent Legislative List was abolished through the 18th Amendment, the Government of Punjab adopted the same federal law, with some minor amendments, through the Punjab Agricultural Pesticides (Amendment) Act 2012. However, the import and registration of pesticides remains under the purview of the federal government through the DPP.

47. The Punjab government was empowered to register, monitor, and regulate pesticide businesses, manufacturing, and usage through designated officers. Stricter punishments and penalties were introduced for the manufacture, sale, or distribution of substandard

¹⁹ Consolidated Agricultural Pesticide Rules, 1973 Amended and updated. See online at <https://faolex.fao.org/docs/pdf/pak4115.pdf>

or adulterated pesticides. Detailed provisions were included for licensing pesticide dealers, distributors, and manufacturers.²⁰

48. The Punjab government created a dedicated team of 176 pesticide inspectors from the Agriculture Department's Pest Warning & Quality Control of Pesticides (QCP) Wing. These inspectors work at the Tehsil, District, and Provincial levels. Additionally, Punjab established four ISO-certified Pesticide Quality Control (PQC) Labs and one Reference Pesticide Testing Laboratory to independently test the quality of pesticide products across the province.²¹

3.2.2 Punjab Agricultural Pesticides Rules, 2018

49. The Punjab Agricultural Pesticides Rules, 2018 were introduced under the Punjab Agricultural Pesticides (Amendment) Act, 2012, following the devolution of certain legislative functions through the 18th Constitutional Amendment. The rules provide legal framework for the regulation, monitoring, and control of pesticide activities within the province of Punjab.
50. The rules explain how to register pesticides, including how to apply, what documents to submit, and how they will be evaluated. They also describe the standards for setting up and running pesticide production units, including infrastructure, machinery, and safety measures. Additionally, the rules list the requirements for registering pesticide sellers and suppliers, such as their qualifications, storage facilities, and record-keeping duties.
51. The rules allowed inspectors to enter and inspect any premises, collect pesticide samples for testing, examine storage and sales records, and initiate legal action in case of violations. Offences under the rules includes sale of unregistered or counterfeit pesticides, mislabeling, adulteration, or tampering of samples, operating without a valid license. Penalties include fines, imprisonment, and suspension or cancellation of licenses.²²

3.2.3 Khyber Pakhtunkhwa (KP)

52. In KP, the pesticide sector is currently regulated under the APO, 1971, which is a federal law. The KP government is responsible for implementing and enforcing the law within the province, especially when it comes to the distribution, sale, and use of pesticides. The Khyber Pakhtunkhwa Pesticides Act, 2014 was introduced in the KP Provincial Assembly. Although the bill was initially passed, its implementation is currently on hold. According to the Chief Minister's KP Office, the reason for the delay is that a similar version of the bill was also forwarded by the Federal Government to the National Assembly, and further approval is pending at that level.²³

²⁰ The Agricultural Pesticides Ordinance, 1971, <http://punjablaws.gov.pk/laws/1211a.html>

²¹ Government of Punjab, Agriculture Department

²² Punjab Agricultural Pesticides Rules, 2018. See online at <https://www.agripunjab.gov.pk/system/files/The%20Punjab%20Agricultural%20Pesticieds%20Rules%202018.pdf>

²³ Khyber Pakhtunkhwa Pesticides Act, 2014. 2014-12-24. https://cmkp.gov.pk/agriculture_details.php?nId=13

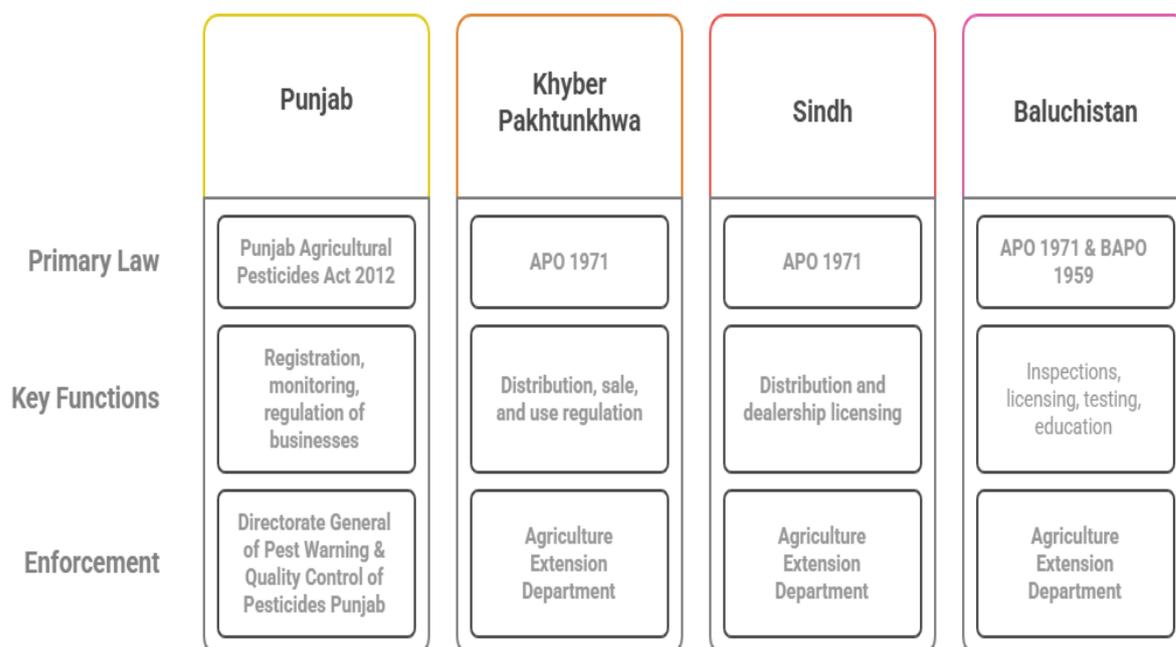
3.2.4 Sindh

53. In Sindh, the regulation of the pesticide sector is based on the APO, 1971. The Agriculture Extension an attached department of Agriculture, Supply & Prices Department, government of Sindh is involved in regulating pesticide distribution at the provincial level. The department is responsible for issuing distribution and dealership licenses to businesses and individuals involved in selling pesticides. Provincial pesticide inspectors of Sindh Agriculture Department conducts inspections of retail outlets, warehouses, and distribution points to monitor the counterfeit and adulterated pesticides.²⁴

3.2.5 Baluchistan

54. In Baluchistan, there are two laws governing the pesticide sector, the APO 1971 and Baluchistan Agricultural Pests Ordinance (BAPO), 1959. APO 1971 provide framework for the inspections mechanism, licensing of pesticide dealers and distributors, testing of pesticide and farmer education and awareness campaigns to promote the safe use of pesticides. BAPO 1959 allows the government to declare any area as "pest-affected" and take necessary steps to control or eliminate the threat. Under this law, farmers and landowners are required to carry out pest control measures on their lands as instructed by the authorities. If they fail to do so, the government can step in, carry out the operations, and recover the cost from the responsible person. The law helps in the early detection and control of pests to minimize crop damage and protect the livelihoods of farmers across Baluchistan.²⁵

Figure 12: Pictorial Depiction of Regulatory Framework at Provincial Level



²⁴ Information gathered from representatives of Agriculture Department Sindh.

²⁵ The Baluchistan Agricultural Pests Ordinance, 1959. <https://balochistancode.gob.pk/lawdir/822bddfc-b980-46f8-946d-4ffccc1087fa.pdf>

3.3 Institutions involved in the Pesticide sector of Pakistan

3.3.1 Department of Plant Protection (DPP), Ministry of National Food Security & Research (MNFSR)

55. DPP is an attached department of the Ministry of National Food Security & Research (MNFSR). DPP functions as the primary regulatory authority that manage the pesticide sector in Pakistan. It is responsible for regulating and overseeing plant protection measures in Pakistan through the APO, 1971 and Consolidated Agricultural Pesticides Rules 1973. DPP is in charge for pesticide registration, plant quarantine, pesticide standardization and import, aerial spraying, and the enforcement of pesticide regulations. Its mandate extends to pest control and plant quarantine measures to ensure food security, environmental safety, and compliance with international trade standards.²⁶

3.3.2 Directorate General of Pest Warning & Quality Control of Pesticides Punjab

56. The Directorate General of Pest Warning & Quality Control of Pesticides performs a number of functions for pest management and regulation in Punjab. These include conducting pest scouting and surveys across various crops, vegetables, and orchards, and developing pest forecast models using ICT-based interventions. The Directorate also works on the capacity building of farmers by providing them with technical training. It oversees the pesticide business through 176 appointed pesticide inspectors under the Agricultural Pesticides Ordinance, 1971 (amended in 2012), and the Punjab Pesticide Rules, 2018. Additionally, it is responsible for the registration of pesticide distributors, inspecting their infrastructure and operations, and registering and training pesticide dealers on the safe handling of pesticides. Other functions include screening and standardizing pesticides for registration and conducting research trials to address pest-related issues faced by farmers.²⁷

3.3.3 Directorate of Agriculture Extension, Khyber Paktunkhwa (KP)

57. Plant Protection Services under the Directorate of Agriculture Extension KP regulates the pesticide business at provincial and district level through implementation of acts (APO 1971, Pesticide Rules 1973). It provides advisory services on plant protection through district-level extension services and monitors pesticides and micronutrients. The directorate conducts pest scouting surveys in coordination with research institutions for major crops, and it trains pesticide dealers, farmers, and extension workers. It also issues licenses to dealers and promotes IPM technologies and other agricultural practices through demonstrations, farmer gatherings, field days, workshops, seminars, and training sessions. Furthermore, the directorate supervises the sales and R&D activities of pesticide companies operating in the province. It manages the documentation and registration of these companies.²⁸

²⁶ Department of Plant Protection – Pakistan. About Us. <https://plantprotection.gov.pk/about-us/>

²⁷ Directorate General of Pest Warning & Quality Control of Pesticides. See online at <https://pestwarning-agripunjab.punjab.gov.pk/functions>

²⁸ Plant Protection, Directorate of Agriculture Extension, Khyber Paktunkhwa (KP). https://agriext.kp.gov.pk/page/plant_protection

3.3.4 Agriculture Extension under Agriculture, Supply & Prices Department, Sindh

58. The Agriculture Extension Department, Government of Sindh is engaged in the implementation of pesticide-related activities across the province. The core responsibilities include the registration of pesticide dealers and distributors, issuance of licenses for retail and distribution, and the monitoring of pesticide sales and usage at the field level. Through field demonstrations, face-to-face advisory services, and the use of mass and electronic media, the department trains farmers in modern pest control techniques, including the use of pesticides, insecticides, and weedicides. Pesticide Inspectors, appointed under the APO 1971, operate at both the district and tehsil levels to enforce these regulations. They carry out field visits and inspect pesticide outlets to identify and address issues related to counterfeit or substandard pesticides.²⁹

3.3.5 Agriculture Extension Department under the Government of Baluchistan Agriculture & Cooperative Department

59. Pesticide management in Baluchistan implemented through the Agriculture Extension Department under the Government of Baluchistan Agriculture & Cooperative Department. The main functions include issuing licenses to pesticide dealers and distributors, to conduct field-level inspections raids to detect counterfeit or adulterated pesticides, and compliance with pesticide quality and safety standards. Additionally, the directorate plays role in organizing training sessions and awareness programs to educate farmers and pesticide sellers on the safe and effective use of pesticides.³⁰

3.3.6 Pakistan Agricultural Research Council (PARC)

60. The Institute of Plant & Environmental Protection (IPEP) is one of the research institutes under the National Agricultural Research Centre (NARC), which operates through PARC. The role of IPEP is plant protection and pesticide management in Pakistan that focused on research & development, and implementation of safe, sustainable, and environmentally friendly pest control strategies. The key functions of the IPEP are;

- q) IPEP develops and promotes Integrated Pest Management (IPM) based solutions that reduce dependency on chemical pesticides. These include biological control, pest-resistant crop varieties, and ecological methods. IPEP monitors pesticide residues in crops and the environment to assess the impact of pesticide use.
- r) Through its Vertebrate Pest Management Program (VPMP), the institute researches cost-effective and safe methods for managing rodents, birds, and other vertebrate pests that cause crop damage.³¹

²⁹ Agriculture Extension, Agriculture, Supply & Prices Department, Government of Sindh.

<https://agri.sindh.gov.pk/departments-wings/47>

³⁰ Agriculture Extension, Government of Baluchistan Agriculture & Cooperative Department.

<https://agriculture.balochistan.gov.pk/directorate-general-of-agriculture-extension/>

³¹ Vertebrate Pest Management Program (VPMP).

<https://parc.gov.pk/Detail/MWYwODFkZGIYzgxNi00ZGJLThhOWMtM2I5OGVkJmNiMTY4>

- s) Insect Pest Management Program (IPMP) is one of the program that focuses on the classification, biology, toxicology, and behavior of insect pests and their natural enemies, which offers science-based solutions for control.³²
 - t) IPEP conducts training workshops, farmer field schools, and awareness programs for farmers, extension workers, and pesticide dealers on safe and effective pest management.³³
-

³² Insect Pest Management Program – IPMP.

<https://parc.gov.pk/Detail/NDk3NDQzN2EtODk5Ny00M2UzLTkwZDMtM2NhMjcyZTU3MGUy>

³³ Institute of Plant & Environmental Protection (IPEP).

<https://www.parc.gov.pk/Detail/MDBmYmJjZDEtMDlhOS00NWlzlThiNzYtZTBkN2U2MWJkNDkz>

Chapter 4: The Structure of Pesticides Market in Pakistan

61. The analysis of market structure is a main component of any competition assessment report, as it provides insights into the level of competition within a given industry. Market structure defined by factors such as the number and size of firms, market shares, barriers to entry and exit, product differentiation, and the degree of vertical integration, influences the conduct and performance of market participants. Understanding whether a market is characterized by perfect competition, monopolistic competition, oligopoly, or monopoly helps assess the likelihood of anti-competitive behavior, such as collusion, abuse of dominance, or coordinated effects following a merger. A well-defined market structure analysis enables competition authorities to identify vulnerabilities in the market, evaluate the potential impact of firm behavior on consumer welfare, and design appropriate regulatory or enforcement interventions to preserve and promote effective competition.

4.1 Pesticide Product Market

62. The product market of the pesticide sector refers to the categorization of pesticides based on their use, formulation, and mode of action. In Pakistan, the pesticide product market is primarily segmented into three main categories.

- u) **Insecticides:** Insecticides dominate the pesticide market of Pakistan, accounting for approximately 70% of total usage. They are primarily used to protect crops like cotton, rice, maize, and vegetables from insect pests such as bollworms, whiteflies, and aphids. It includes both synthetic and biological insecticides, available in liquid, powder, and granule forms.
- v) **Herbicides:** It is the second-largest segment, with increasing adoption among farmers, especially in wheat, maize, and rice cultivation. It is used to control weeds and unwanted plants that compete with crops for nutrients and sunlight. The use of selective and broad-spectrum herbicides has risen in recent years due to labor shortages and cost-effectiveness compared to manual weeding.
- w) **Fungicides:** This is a smaller part of the pesticide market, but it plays an important role in protecting high-value crops like vegetables, fruits (such as mangoes and citrus), and potatoes. It helps prevent or treat fungal diseases like rust, mildew, and blight. These products are also used in storage areas, warehouses, and fields to control rats and other rodents that can damage stored grains and crops.

4.1.1 Pre-Shipment Inspection of Pesticides

63. Five Pre-Shipment International Inspection Agencies Registered with DPP. The product quality is ensured by obtaining an original analysis report from the international accredited/GPL Laboratory. DPP undertakes 10% random sampling of pesticides consignments at arrival on port for test in the FPTRL-DPP.

Table 3: Pre-Shipment Inspection Agencies Registered with the DPP

Sr. No	Name of Registered PSIA	Principal
1.	Baltic Control Pakistan I.I. Chundrigar Road, Karachi	Baltic Control Ltd, Aarhus, Denmark

2.	NMCI Pakistan (Pvt) Ltd. Jamaluddin Afghani Road Karachi	NMCI, USA
3.	Inspectorates Corporation International (Pvt) Ltd. Nisar Road, Lahore Cantt.	Control Union, Germany
4.	M/s. Control Union Pakistan (Pvt) Ltd. I.I. Chundrigar Road, Karachi	Control Union Group of Companies, Netherlands.
5.	M/s. Inspectorates Pakistan (Pvt) Ltd., Sabir Beg Shaheed Road Karachi	Cotecna Group of Companies, Switzerland
Source: https://www.slideshare.net/slideshow/presentation-on-pesticides-registration-amp-regulation-in-pakistan/168962091		

4.1.2 Pesticides Laboratories in Pakistan

64. Pesticide testing labs in Pakistan help make sure that the pesticides used in the country are safe, effective, and of good quality. The Federal Pesticide Reference Testing Laboratory (FPRTL) in Karachi operates under DPP serves as the main reference laboratory for testing the quality of pesticides across Pakistan. The main function of this laboratory is

- a) Testing Samples for Registration, sent by importer.
- b) Testing Samples for Appeal, sent by importer.
- c) Samples acquired at the time of imports of pesticide for quality control.
- d) Sample testing of officially purchased chemicals.
- e) Training of provincial Chemists.
- f) Testing samples on farmers request.

65. Associated Labs are also established in consultation with the provincial agricultural department by the federal government and are declared as provincial pesticide laboratories to carry out the functions entrusted under Agricultural Pesticide Act. 1997. A list of the existing associated pesticides laboratories are given below:

- a) Pesticides Testing Laboratory, Department of Agriculture, Lahore, Punjab.
- b) Pesticides Testing Laboratory, Plant Protection Institute, Faisalabad, Punjab.
- c) Pesticides Testing Laboratory, Department of Agriculture, Multan, Punjab.
- d) Pesticides Quality Control Laboratory, Bahawalpur, Punjab.
- e) Pesticides Quality Control & Testing Laboratory, Hyderabad, Sindh.
- f) Pesticides Testing Laboratory, Department of Agriculture Rohri, Sindh.
- g) Pesticides Testing Laboratory, Mirpur Khas, Sindh.
- h) Pesticides Testing Laboratory, Agricultural Research Institute, Tarnab, Peshawar.
- i) Pesticides Quality Control and Research Laboratory, Quetta, Baluchistan.³⁴

³⁴ Federal Pesticides Reference & Testing Laboratory. <https://plantprotection.gov.pk/services/pesticide-registration/federal-pesticides-reference-testing-laboratory/>

4.1.3 Market Players and Shares in the Pakistani Pesticide Industry

66. In the pesticide market of Pakistan, competition is driven by a combination of both multinational corporations (MNCs) and local companies. With over 500 members in the Pakistan Crop Protection Association (Local Companies Association) and 14 members in the Crop Life Pakistan (CLP) Association (Multinational Companies Association), the market seems highly competitive. Some of the key factors that influence competition include market forces such as grain prices, inflation rates, forex rates, weather patterns, and supply and demand dynamics on both local and international levels. Additionally, the economic considerations for various crops plays a role. The table below provides data on the pesticide sector importers, formulation plants and refilling and repacking plants in Pakistan.

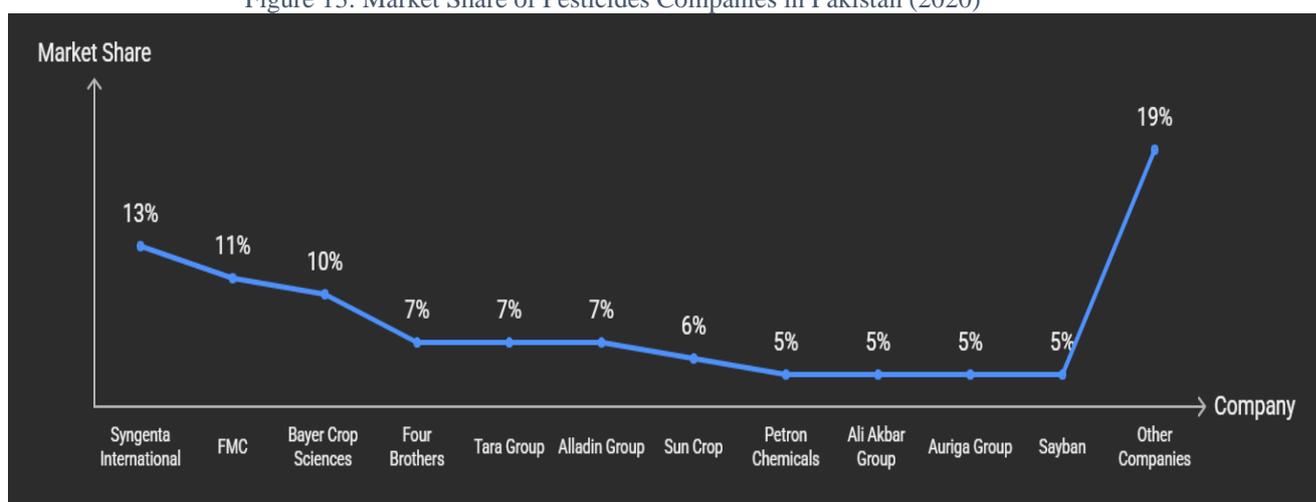
Table 4: Pesticide sector importers, formulation plants and refilling and repacking plants in Pakistan

Particulars	Pakistan	Punjab
Importers	272	147
Formulation Plants	183	140
Refilling/Repacking Plants	218	160

Source: Agriculture Department, Government of Punjab

67. As per the PACRA report in 2020, the market share of distribution of pesticide companies in Pakistan highlights the presence of both multinational and local companies within the sector. Syngenta International leads the market with the largest share at 13%, followed by FMC at 11% and Bayer Crop Sciences at 10%. Other notable players include local companies like Four Brothers, Tara Group, and Alladin Group, each holding a 7% share. Sun Crop has a 6% share, while Petron Chemicals, Ali Akbar Group, Auriga Group, and Sayban each account for 5% of the market. The remaining 19% is held collectively by various other smaller companies, reflecting a moderately fragmented segment beyond the top firms.³⁵

Figure 13: Market Share of Pesticides Companies in Pakistan (2020)



Source: Pesticides Sector Analysis, 2020, PACRA

³⁵ Pesticides Sector Analysis. 2020.

https://www.pacra.com/sector_research/Pesticides%20Sector%20Feb20%20Upload%20Version_1582895472.pdf

4.1.4 Pricing Mechanism of Pesticides

68. The prices of pesticides in Pakistan are determined by market forces and are set by manufacturers and distributors. Manufacturers determine a base price based on factors like the cost of raw materials, production costs, exchange rates, and research and development. Distributors then add their own profit margins to the price. The government does not directly control pesticide prices, but it oversees the sector by enforcing quality standards and pesticide regulations. Occasionally, the government steps in to place price caps or offer subsidies on certain products to help farmers afford them. However, such measures are limited and do not apply to all pesticide products.³⁶ There is no significant difference in pesticide pricing across regions in Pakistan, as prices remain relatively consistent with slight variations between multinational companies and generic products. Multinational companies often price their products higher due to their established brand reputation, advanced formulations, and perceived reliability. In contrast, generic products are priced lower but remain competitive in quality.³⁷

4.1.5 Disposal Mechanism of Pesticides in Pakistan

69. Disposing of pesticides requires careful handling due to their toxic, hazardous, and potentially persistent nature. Improper disposal can lead to health risks, environmental contamination, and long-term damage to soil and water systems. In Pakistan, National Hazardous Waste Management Policy, 2022 recommends to appropriately incinerate date-expired pesticides either through dedicated incinerators of individual industries or through incinerators available with common integrated facilities.³⁸ Furthermore pesticide registration under Form-1, Form-16, and Form-17 requires the submission of an agreement between the applicant company and an incineration service provider, which must be registered with the Environmental Protection Agency (EPA). The DPP also requires companies to submit annual incineration data to monitor compliance with safe disposal standards.³⁹

4.1.5 Distribution Mechanism of Pesticide and Quality Oversight in Pesticide Retail Chain

70. In Pakistan, the distribution of pesticides primarily operates through a network of authorized dealers and retailers. These dealers obtain pesticide products directly from registered distributors who are officially licensed to operate in the country. Moreover, many pesticide manufacturers enter into exclusive agreements with specific distributors. These agreements often grant the distributors exclusive rights to sell and

³⁶ Information collected from Agriculture Department, Government of Punjab.

³⁷ *Ibid*

³⁸ National Hazardous Waste Management Policy, 2022. See online at <https://mocc.gov.pk/SiteImage/Misc/files/National%20Hazardous%20Waste%20Management%20Policy%202022.pdf>

³⁹ Information collected from DPP

promote certain brands or formulations within defined geographic regions. The pesticide distribution system in Pakistan is both organized and competitive.⁴⁰

71. The quality control at distribution and sale stage is done by the provincial governments. The checking of the pesticide quality is executed through the network of inspectors and pesticide laboratories notified by the Federal Government under APO 1971. The provincial agriculture departments have 9 pesticide labs and 645 inspectors. The inspection of pesticides is carried out by inspectors by visiting stores and shops to ensure sale of high quality, effective and approved pesticides. Samples of pesticides are taken and analyzed in the provincial pesticide laboratories. One portion of the sample is handed over to the vendor and the other is sent to the Federal Testing & Reference Laboratory, DPP-Karachi. In case sample is declared unfit by the Provincial Laboratory, an FIR against the culprit is registered and case in court is processed for trial. However, the vendor has right to submit appeal to the DPP within one month for retest of the other sealed portion of the sample.

Table 5: Number of Provincial Quality Control Inspectors

Province	Number of Inspectors
Federal (DPP)	15
Punjab	266
Sindh	151
KPK	136
Balochistan	92
Total	660

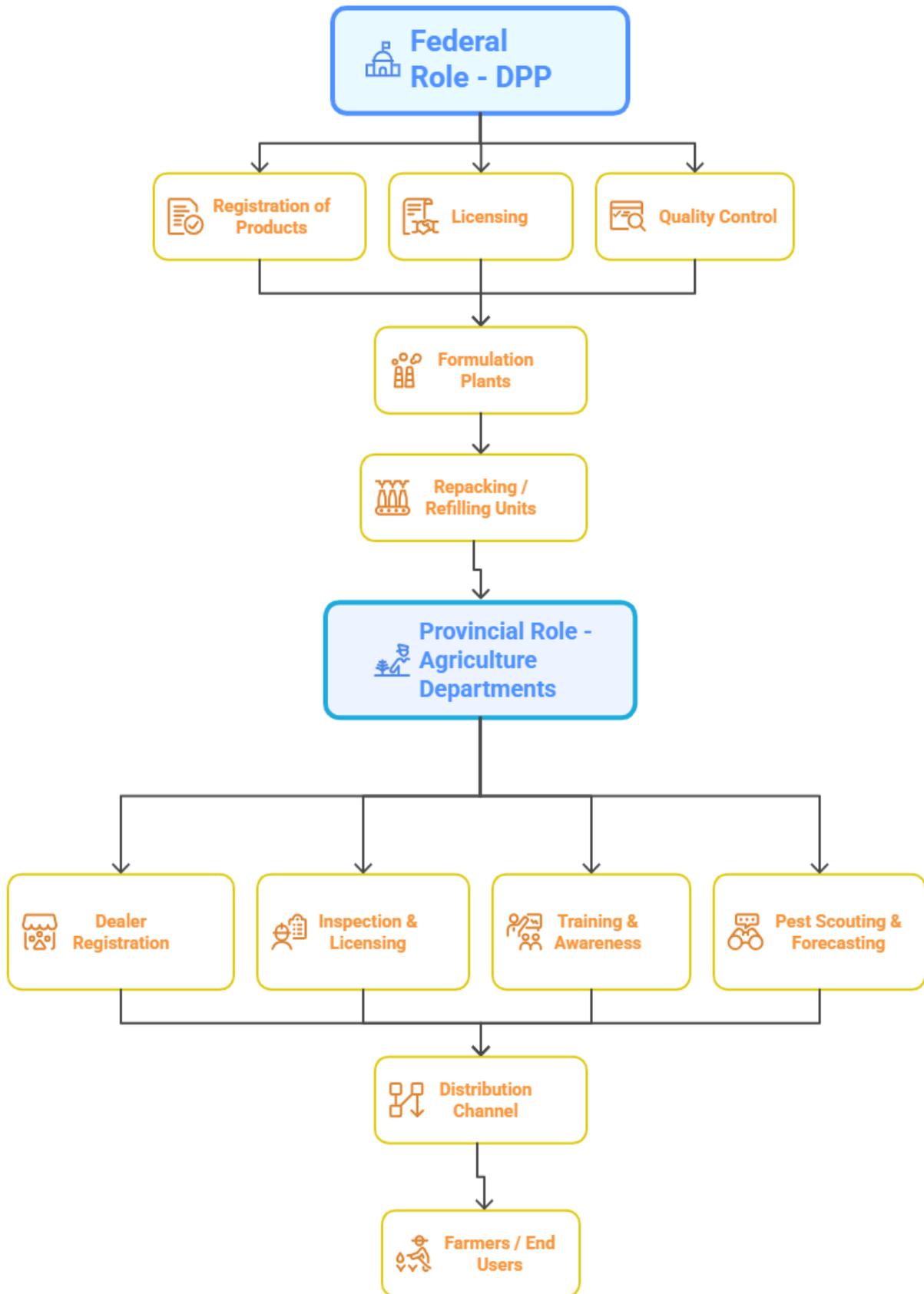
Source: <https://www.slideshare.net/slideshow/presentation-on-pesticides-registration-amp-regulation-in-pakistan/168962091>

4.2 Pesticides’ Geographic Market

72. The geographic market for pesticides in Pakistan refers to the regions or areas within which pesticide products are marketed, distributed, and consumed, and where conditions of competition are relatively uniform. In the context of a competition assessment, defining the geographic market is important to evaluate market dynamics, pricing, access, and regulation across different regions.
73. Pakistan is considered to be a single national market for pesticides due to the centralized nature of regulation, supply, and distribution. The registration of pesticide products is managed by DPP, which ensures that products are approved for use across the country. Large manufacturers and importers supply pesticides to all provinces, and the distribution networks and logistics systems function across provincial borders without restrictions. As a result, pesticide prices remain relatively stable throughout the country, with only slight regional differences due to factors like transportation costs or local demand. Moreover, advertising and marketing campaigns by pesticide companies are usually conducted on a national scale, reinforcing a unified market presence. The overall structure supports the view that Pakistan functions as a single geographic market for pesticide products.

⁴⁰ Information collected during meetings with public and private sector

4.3 Pesticide sector Value Chain in Pakistan



Chapter 5: Market Contestability and Competition in the Pesticide Sector

74. A market that has no entry and exit barriers for firms and has limited sunk costs, is known to be a contestable market. Market contestability analysis is critical for economic regulation and competition policy. To assess the level of competition in the pesticide sector, this chapter identifies and evaluates the entry barriers and market contestability. In Pakistan's pesticide sector, while structural entry barriers do exist, the more challenges are related to inefficiencies in regulatory planning, institutional coordination, and operational execution. The systemic inefficiencies not only dampen innovation and reduce consumer choice but also perpetuate market distortions that affect pricing, quality, and accessibility of pesticide products for farmers. Issues are highlighted below;

5.1 High Capital and Infrastructure Requirements for Indigenous Production and Import-Focused Business Model of Pesticides in Pakistan

75. For setting up pesticide formulation or manufacturing plant involves substantial upfront investment in land, machinery, infrastructure, safety and environmental control systems, and a skilled workforce. In addition, the pesticide industry demands a strong understanding of agricultural chemistry, toxicology, environmental science, and legal compliance. Firms must also be equipped to handle regulatory documentation, safety assessments, and international quality standards. Many potential entrants struggle to access such specialized human resources or the institutional capacity needed to manage these complex requirements for local production. Developing a new pesticide formulation is not only costly but also technically demanding. It involves rigorous research, multiple stages of laboratory and field testing, and regulatory trials. The field efficacy trials can take several growing seasons to complete, depending on the crop and pest type. Such long lead times and financial investment give a significant competitive edge to existing firms that already possess well-established research and development (R&D) infrastructure and scientific expertise.

76. Pesticide companies in Pakistan operates primarily as importers and formulators, rather than full-scale manufacturers which means they import ready-to-use pesticide products and import active ingredients (technical grade pesticides), which they then formulate, brand, and package locally for sale. The approach allows companies to reduce costs associated with infrastructure investments, regulatory compliance, and technical requirements involved in full domestic production. One of the reasons behind the import-based model is the lack of supportive policy incentives such as tax relief, import duty exemptions on raw materials, subsidies, or public-private partnership schemes that would make it more attractive for companies to set up manufacturing units within Pakistan. Without these enablers, the risk and cost of domestic production outweigh the potential benefits, especially in a market where imported products are readily available and accepted. As a result, the current business model favors gains through importation and branding rather than long-term investment in local manufacturing infrastructure, research and development, or technology transfer. The situation leads to continued

dependence on foreign suppliers, limits technological advancement, and no domestic production.

5.2 Two-Years' Shelf-Life Restriction on Pesticide Products

77. Currently, the Agricultural Pesticides Ordinance (APO), 1971 and subsequent amendments do not specify any legally mandated shelf-life for pesticides use in Pakistan. However, the APTAC, through one of its meeting decisions, has adopted a two-year shelf-life limit for pesticides. The decision, though not codified in law, is being implemented in practice. After the two year period, the products are automatically deemed expired and unfit for use, irrespective of their actual potency or manufacturer-declared expiry date. Many modern pesticide formulations, due to advancements in chemical stability and preservation technologies, maintain their effectiveness well beyond two years commonly up to three to five years. The enforced two-year limit leads to premature disposal of viable pesticide stocks, resulting in unnecessary product wastage, financial losses for importers and distributors. Moreover, such disposal places an added burden on the country's foreign exchange reserves, as fresh imports are needed to replenish the discarded stock.⁴¹

5.3 Market Distortion from Counterfeit and Adulterated Pesticide Products

78. The presence of counterfeit and adulterated pesticides are a serious problem for agriculture sector of Pakistan that adversely impacts productivity, farmer incomes, environmental sustainability, and fair market competition. Since all pesticides are imported in bulk containers and repacked locally for commercial sale, this stage of the supply chain becomes vulnerable to adulteration. During this process, pesticides are mixed with substandard or diluted materials to increase volume or by substituting them with cheaper, less effective chemicals. These counterfeit products are often packaged in a way that closely imitates genuine brands, misleading farmers and disrupting the market. The issue is particularly prevalent in the cotton-growing regions of Punjab and Sindh, where the use of low-quality pesticides leads to poor pest control, reduced crop yields, and growing resistance among pests. Farmers bear the financial burden of the losses, while genuine companies face unfair competition. Moreover, adulterated pesticides may contain harmful substances that pose serious risks to human health and contribute to soil and water pollution. Some of the instances have recently been reported;

- a. In January 2025, Agriculture Department seized 3,540 litres of fake agricultural pesticides worth over Rs 10.8 million and arrested an accused during a raid in Multan. The raid uncovered hundreds of pre-printed labels bearing the names of various companies, empty bottles, sealing machines, packing materials, pre-packaged bottles, and empty drums. The suspect was involved in mixing counterfeit pesticides and labeling them under the names of reputable companies to sell in the market.⁴²

⁴¹ Issue raised during meetings with Stakeholders from the private sector pesticide companies in Pakistan

⁴² Agriculture Department seizes fake pesticides. See online

<https://www.urdupoint.com/en/agriculture/agriculture-department-seizes-fake-pesticides-1905737.html>

- b. In 2024, the Federal Investigation Agency (FIA) and DPP conducted a raid at a facility owned by M/s. Crop Life International located in Karachi. As per documents available with this scribe, the raid resulted in the seizure of a large quantity of deleterious pesticides worth millions of rupees.⁴³
- c. The district agriculture department of Narowal has registered FIRs against pesticide dealers after samples of products manufactured by 46 companies proved fake after laboratory tests.⁴⁴
- d. Between early 2016 and February 2022, the Directorate General for Pest Warning and Quality Control of Pesticides tested around 61,000 pesticide and herbicide samples, of which 2,000 were found substandard. Authorities also seized counterfeit products worth Rs. 513.42 million and filed cases against 2,300 individuals involved in their sale.⁴⁵

5.4 Limited Testing Capacity and Manpower Constraints

79. One of the challenges facing the pesticide sector is limited testing and quality assurance mechanism, due to inadequate laboratory capacity and shortage of trained manpower. Although pesticide testing laboratories exist at both federal and provincial levels, their number is inadequate relative to the volume of pesticide imports and domestic formulations. Most of these labs are under-resourced that lacks modern equipment, standardized protocols, and sufficient operational budgets for timely and accurate testing of pesticide samples. In addition to infrastructural limitations, there is a shortage of qualified technical staff, such as chemists, toxicologists, and laboratory technicians, needed to conduct quality analysis.⁴⁶ As a result, many pesticide products inadequately assessed before reaching the market. The limited testing capability also creates bottlenecks in pre-shipment inspections and post-market surveillance.

5.5 Lack of Legal Resources for Pesticide Inspections at Dealership Level in Sindh

80. An enforcement issue identified during stakeholder consultations in the province of Sindh is the lack of adequate legal resources to effectively pursue actions against adulterated and counterfeit pesticides at the dealership level. Pesticide inspectors are responsible for quality monitoring, conducting inspections and raids, and initiating legal proceedings against violators, their ability to take such cases to their logical conclusion is constrained by limited legal support. In many cases, inspectors are required to register First Information Reports (FIRs), manage court proceedings, and respond to legal defenses without the assistance of professional legal counsel. The lack of legal representation weakens the prosecution process, often leading to delays, case dismissals, or ineffective legal outcomes. As a result, offenders particularly those

⁴³ FIA, DPP joint operation targets adulterated pesticide manufacturers. See online at <https://www.pakistantoday.com.pk/2024/03/29/fia-dpp-joint-operation-targets-adulterated-pesticide-manufacturers/>

⁴⁴ Fake fertilizers, pesticides scam: Cases against 29 dealers as wheat crop on 2,173 acres ruined in Narowal. See online at <https://www.dawn.com/news/1832221>

⁴⁵ The recipe for an agricultural disaster: How influential companies get away with peddling substandard agro-chemicals. See online at <https://loksujag.com/story/pesticides-suppliers-and-manufacturers-in-pakistan-eng>

⁴⁶ Information accessed from meetings with government departments.

involved in the adulteration, counterfeiting, or misbranding of pesticides frequently escape with minimal penalties or no accountability. As a result, genuine pesticide manufacturers and dealers face an uneven playing field, while farmers are exposed to substandard and harmful products.

5.6 Institutional Ambiguity in Pesticide Oversight Following Devolution

81. Following the 18th Constitutional Amendment in 2010, the responsibility for agriculture was devolved from the federal government to the provinces. In response, the Government of Punjab enacted the Punjab Agricultural Pesticides (Amendment) Act, 2012⁴⁷, with the aim of streamlining and deregulating pesticide business operations within the province. However, instead of simplifying the regulatory framework, the new act introduced legal and procedural ambiguities that have complicated compliance for stakeholders. Under the new Act, pesticide products are required to be separately registered with both the DPP at the federal level and the Directorate General of Pest Warning & Quality Control of Pesticides, Government of Punjab.
82. The overlapping jurisdictions have not only increased the administrative burden on manufacturers, delay product approvals and have become subject to litigation due to ambiguities in registration requirements. Litigation arising from overlapping jurisdictions has a negative impact on the private sector. The ambiguity over whether product registration falls under federal or provincial jurisdiction leads to duplicative compliance obligations, inconsistent interpretations of the law, and potential legal challenges, all of which increase the cost of doing business. Although the Directorate General of Pest Warning & Quality Control of Pesticides, Punjab official response is that product registration legally remains within the purview of the federal government, however the provincial legislation contains provisions that mandate registration at the provincial level as well. Many of the private stakeholders also raised this issue during the meetings. The contradiction has resulted in interpretational conflicts between provincial and federal departments and contributed to confusion among stakeholders.

5.7 Climatic Differences and the Need for Customization: Implications for Pesticide Efficacy and Market Competition in Pakistan

83. An issue was raised in the sector during discussion and interviews with stakeholders from the direct import and use of pesticide formulations that are often developed and tested under climatic conditions different from those prevailing in Pakistan. Many of these products are manufactured in temperate regions or tropical climates with different pest pressures, humidity levels, soil types, and cropping patterns. Such products are mainly imported on Form 16 and 17. As a result, such pesticides may not perform optimally under Pakistan's agro-ecological conditions, particularly in arid, semi-arid, or high-temperature zones like South Punjab, Sindh, and Baluchistan. The lack of climate-specific customization can lead to reduced efficacy, resistance among pests, and overuse or misuse of chemicals that pose risks to crop yields, environmental, and human health. From a competition policy perspective, the dominance of imported,

⁴⁷ The Punjab Agricultural Pesticides (Amendment) Act 2012. See online at https://punjablaws.punjab.gov.pk/uploads/articles/PUNJAB_AGRICULTURAL_PESTICIDES_%28AMENDMENT%29_ACT_2012.doc.pdf

standardized products restricts the development and market entry of locally customized or climate-adapted solutions. It discourages domestic R&D, innovation, and limits the ability of local players to compete effectively against multinational or import-based firms.

5.8 Cumbersome Documentation and Delayed Approvals under Form-1

84. The data from the below table 6 indicates that approximately 70% of pesticide imports in Pakistan are processed through Form-16 and Form-17, while only 30% are handled via Form-1, suggesting that importers mainly rely on the former. One of the main reasons for avoiding Form-1 is the complex and time-consuming registration process it entails. The Form-1 registration requires submission of over 17 documents and multiple forms, which places an administrative burden on businesses. On average, the process can take more than three years that leads to delays in business operations and opportunity costs. The inefficiency contributes to increased costs and discourages investment.
85. In contrast, global best practices offer more streamlined approaches. For instance, the Australian Pesticides and Veterinary Medicines Authority (APVMA) uses a fully digital registration system that enable applicants to submit documents electronically. The registration process is typically completed within 90 days, with real-time tracking with enhanced transparency and reduced delays. Similarly, the European Union’s Pesticide Registration and Licensing System (PRLS) offers a harmonized and efficient approval process across member states, completing most registrations within 120 to 180 days. Countries like China, India, the United Kingdom, and Canada also offer more efficient systems, with most pesticide registrations completed in less than a year.

Table 6: Pesticides Import Data from January 2024 to December 2024

(M. Tons)					
S.NO.	Description	FORM-1	FORM-16	FORM-17	TOTAL
1	Finish Form	5,563	12,825	4,767	23,154
2	Locally Formulate	65,000	102,349	44,495	211,844
TOTAL		70,562	115,174	49,262	234,999
Source: Department of Plant Protection					

5.9 Indiscriminate Usage of Pesticides by Farmers and its Impact on Market, Climate and Biodiversity

86. The indiscriminate use of pesticides in Pakistan has emerged as a concern with implications for public health, agricultural sustainability, biodiversity, and climate resilience. Farmers, particularly smallholders, often face pressures including unpredictable climatic conditions, pest infestations, lack of timely technical support, and the fear of crop failure that compel them to resort to excessive pesticide application. In the absence of agricultural extension services, farmers rely on informal advice from pesticide retailers and dealers, many of whom are motivated by sales targets rather than agronomic considerations, which leads to overuse, misuse, and sometimes the application of unregistered or counterfeit products. An example is the EU issued an

increased number of alerts in 2023 regarding the detection of pesticide residues in rice shipments, especially basmati, originating from Pakistan and India. The shipments did not comply with the maximum residue limits (MRLs) the permissible thresholds for pesticides set by the EU. In 2024, rice shipments from Pakistan have triggered more alerts than those from India.⁴⁸

87. The environmental impact of such practices is profound. Pesticides not only target harmful pests but also adversely affect beneficial organisms such as pollinators, soil microbes, and natural predators. The disruption in the ecological balance leads to a decline in biodiversity, which make agro-ecosystems more vulnerable to pest outbreaks and less capable of natural regeneration. Moreover, the leaching of chemical residues into soil and water bodies contributes to long-term soil degradation, water contamination, and a decline in aquatic life.⁴⁹

5.10 Health and Safety Hazards of Unreasonable Usage/Method of Applying Pesticides

88. Inhalation, ingestion, or skin contact with pesticides during mixing or spraying can cause immediate health effects such as nausea, headaches, dizziness, skin rashes, eye irritation. In severe cases, it may even cause seizures or respiratory failure. Farmers, pesticide sprayers, and factory workers are at higher risk due to lack of protective equipment, poor handling practices, and inadequate training. A study of about ten years on cancer and occupational exposure to pesticides (insecticides, herbicides, and fungicides) based on 62 papers selected from the Scopus database suggest that the principal classes of pesticides investigated in relation to their role in intoxication and cancer. The types of cancer reported most frequently were multiple myeloma, bladder cancer, non-Hodgkin's lymphoma, prostate cancer, leukemia, and breast cancer.⁵⁰

89. Some studies relating to Pakistan indicate wide-spread usage of pesticides in Pakistan has controlled the pests, but like other countries, it has started causing health and environmental problems in the area. In some areas of Punjab and Sindh groundwater has been found contaminated and is constantly being under the process of contamination due to pesticide use. There is considerable evidence that farmers have overused and misused pesticides especially in cotton-growing areas. It is evident from the biological monitoring studies that farmers are at higher risk for acute and chronic health effects associated with pesticides due to occupational exposure. Furthermore, the intensive use of pesticides (higher sprays more than the recommended dose) in cotton areas involves a special risk for the field workers, pickers, and of an unacceptable residue concentration in cottonseed oil and cakes.⁵¹

⁴⁸ Rice exports at risk. See online <https://www.dawn.com/news/1843121>

⁴⁹ The Environmental Impact of Pesticides: Understanding the Risks and Seeking Sustainable Solutions. See online at <https://www.interestjournals.org/articles/the-environmental-impact-of-pesticides-understanding-the--risks-and-seeking-sustainable-solutions.pdf>

⁵⁰ Cancer and occupational exposure to pesticides: a bibliometric study of the past 10 years. See online at <https://pmc.ncbi.nlm.nih.gov/articles/PMC8525621/>

⁵¹ Pesticides exposure in Pakistan: A review. See online at https://www.researchgate.net/publication/6074422_Pesticides_exposure_in_Pakistan_A_review

Chapter 6: Conclusion and Recommendations

90. Pesticides have long played a vital role in global agriculture by protecting crops from pests and diseases, increased yields and improved food security. In Pakistan, where agriculture contributes approximately 24% to GDP and employs over 37% of the workforce, the importance of crop protection is even more pronounced. The country rely on intensifying production on existing farmland to meet growing food demand. Pesticides, alongside improved water management, fertilizers, and better seed varieties, are essential tools for productivity. They not only safeguard crop output but also support public health initiatives by controlling vector-borne diseases like malaria. However, since pesticides are inherently toxic substances designed to kill living organisms, their responsible and regulated use is to minimize risks to human health and the environment. Prior to 1980, the import and distribution of pesticides in Pakistan were managed DPP to support programs like locust and malaria control, as well as aerial spraying of key crops such as cotton, sugarcane, rice, and tobacco. During this period, pesticides were subsidized, and aerial applications were provided free of charge, but logistical challenges, including unsafe repackaging and storage practices, posed risks. In 1980, the government shifted the pesticide business to the private sector, which became available in smaller, user-friendly packaging, were distributed ahead of the crop season, and initially offered on credit or deferred payment terms. Promotional campaigns and advisory services also played a role in guiding farmers on the appropriate use of pesticides.
91. Pesticide regulation in Pakistan is governed by the Agricultural Pesticides Ordinance, 1971, and the Agricultural Pesticides Rules, 1973, which provide the framework for import, manufacture, registration, distribution, and quality control of pesticides. The regulatory framework mandates licensing, strict packaging and labeling standards, safety protocols, and testing laboratories. However, Punjab have introduced their own amended legislation and rules to enhance oversight, including inspector networks and quality control labs. Khyber Pakhtunkhwa, Sindh, and Baluchistan continue to regulate under the federal APO 1971. Also Baluchistan have a separate law for the early detection of pest attack in the province. The sector relies entirely on imports to meet domestic pesticide demand, with 80% of imports in technical-grade form for local formulation and the remaining 20% as finished products.
92. The market structure is competitive, comprising over 500 local firms and 14 multinational companies. Major players include Syngenta, FMC, Bayer, and several prominent domestic brands. Pricing of the pesticides are market-driven, with no direct subsidy in place. Distribution occurs through a network of licensed dealers and retailers, with provincial governments responsible for quality inspections at the retail level. The sector is managed by both federal and provincial departments with distinct but interrelated mandates. At the federal level, DPP under the Ministry of National Food Security & Research is the primary regulatory authority overseeing pesticide registration, import, and compliance with international standards. In Punjab, the Directorate General of Pest Warning & Quality Control manages pest surveillance, pesticide dealer regulation, and farmer training. Khyber Pakhtunkhwa and Sindh

operate through their respective Agriculture Extension departments, which implement licensing, monitoring, and awareness programs at the district and tehsil levels. Baluchistan follows a similar model, focusing on inspections, licensing, and farmer education.

93. During the course of this research, it was observed that despite a seemingly competitive landscape, the pesticide sector in Pakistan faces several barriers to effective market contestability. The challenges hinder fair competition and contribute to inefficiencies across the value chain:

- a) Indigenous production requires substantial capital, technical expertise, and compliance with stringent regulations, favoring incumbent firms. An import-focused business model further discourages local manufacturing due to a lack of policy incentives.
- b) An unwritten two-year shelf-life rule for pesticides leads to premature disposal of viable products, increasing costs and foreign exchange pressures.
- c) Adulteration and counterfeit pesticides distort the market, harm farmers, and damage the environment. Recent enforcement actions highlight the scale of the issue, but weak prosecution persists.
- d) Limited testing capacity, manpower shortages, and inadequate legal support hinder effective quality control and enforcement, particularly in Sindh.
- e) Post-devolution ambiguities between federal and provincial jurisdictions, especially in Punjab, create compliance burdens and delays.

Recommendations

94. Following recommendations are for the improvement and more competitive pesticide market of Pakistan

6.1 Re-Evaluation of the Two-Years' Shelf-Life Limitation in Light of Technological Advancements

95. It is recommended that the current two-year shelf-life restriction be re-evaluated. The review should be conducted in consultation with industry stakeholders, scientific experts, and government departments. Advancements in chemical formulation and preservation technologies have enhanced the stability of modern pesticide products, which enable them to remain effective beyond two years. The shelf-life policy leads to the unnecessary disposal of still-effective pesticide stocks, which results in increased operational costs for importers and formulators, disruption in supply chains, and financial losses across the distribution network. Furthermore, premature disposal of viable products necessitates fresh imports that places an additional pressure on the country's foreign exchange reserves. It is also recommended that before making any amendments in the APO 1971 or 1973 rules and guidelines government also review the practices of other countries such as the USA, Canada, Australia, and the European Union to see whether they allow extended shelf life for pesticides. If these countries do not follow such practices, then Pakistan should ensure that the import and formulation of pesticides match its own safety and quality requirements. To support this, past data

on pesticide usage should be carefully reviewed before approving future imports. Therefore, a science-based, flexible approach should be adopted, whereby the shelf-life of pesticide products is determined according to manufacturer-declared expiry dates backed by validated stability data and aligned with international best practices.

6.2 Improvement of Various Measures to Control Counterfeit and Adulterated Pesticides

96. To curb the growing problem of counterfeit and adulterated pesticides in Pakistan, a coordinated approach is needed. The fake products reduce crop yields, harm farmers' incomes, and create risks for human health, the environment, and fair market competition. It is recommended that federal and provincial departments, along with representatives of the pesticide industry, work together to develop a uniform policy for ensuring the quality of pesticides sold across the country. The government should also increase the capacity of field inspection teams by providing more staff, better equipment, and logistical support especially in high-risk areas such as Punjab and Sindh. At the same time, existing regulations should be strengthened to introduce tougher penalties, including higher fines, cancellation of licenses, and imprisonment. To support enforcement, dedicated legal support units should be set up to help inspectors file FIRs, prepare legal documents, and follow cases in court so that prosecutions are timely and effective. Finally, strengthening the capacity of provincial pesticide laboratories is essential. Well-equipped laboratories with trained experts are critical for detecting counterfeit and adulterated products and ensuring proper regulatory control.
97. Moreover, a national pesticide authentication and traceability system may be introduced which shall include the mandatory use of QR or barcode-based labeling on all pesticide containers.⁵² Additionally, pesticide manufacturers may be encouraged to adopt tamper-proof packaging⁵³, monitoring of dealer networks, and cooperation with federal and provincial departments to identify and report violations. In addition, public awareness campaigns should be regularly conducted to educate farmers and rural vendors on identifying genuine products and reporting suspicious activities. Outreach through radio, SMS alerts, farmer field schools, and extension services will be vital to building trust and reducing market vulnerability.

6.3 Enhancing Pesticide Quality Assurance through Strengthened Laboratory Infrastructure and Human Resource Development

98. The present laboratories infrastructure do not match the growing pesticide use in the country. To ensure the quality, efficacy, and safety of pesticides is a central component of a well-functioning and competitive pesticide market. Weaknesses in quality assurance lead to the circulation of substandard or counterfeit products that result in reduced agricultural productivity, environmental harm, and health risks to farmers and

⁵² QR Code on Labels for Agrochemical Industry – How to Ensure Quick, Easy, and Guaranteed Compliance. See online at <https://qodenext.com/blog/qr-code-on-labels-for-agrochemical-industry-how-to-ensure-quick-easy-and-guaranteed-compliance/>

⁵³ Pesticides Packaging Market. Pesticides Packaging Market Growth & Industry Forecast 2025 to 2035. See online at <https://www.futuremarketinsights.com/reports/pesticides-packaging-market>

consumers. Therefore, it is recommended that both the federal and provincial governments prioritize the strengthening of pesticide testing infrastructure and the development of human resource capacity as part of a broader institutional reform agenda. The main prospects includes the up-gradation of existing pesticide testing laboratories with modern, internationally compliant and of global testing standards and protocols. Also, the advent of new pesticide chemistry like bio-pesticides (microbial, botanical) require updated human resources. Furthermore, operational budgets of testing facilities should be increased to ensure regular and uninterrupted testing activities. DPP should be equipped with adequate permanent technical staff to improve service delivery and reduce delays. It needs the recruitment and professional development of skilled personnel such as chemists, toxicologists, and laboratory technicians. In addition, the government should promote partnerships and Memorandums of Understanding (MoUs) with academic and research institutions to build technical expertise, enhance innovation, and ensure the long-term sustainability of laboratory services.

6.4 Enabling of Local Production of Pesticides, especially Active Ingredients (AI) in Pakistan

99. Pakistan's heavy reliance on pesticides for major crops like cotton, rice and vegetables underscores the need to promote domestic production of pesticides and their active ingredients. The lack of local manufacturing not only leads to foreign exchange outflows but also exposes the agricultural supply chain to global market disruptions. To overcome, government may develop a National Pesticide Manufacturing Policy focused on the local production of active ingredients, starting with those most used in high-demand crops such as cotton. Importantly, domestically produced pesticides can be tailored to suit Pakistan's specific agro-climatic conditions, making them more effective and environmentally compatible than generic imported formulations.
100. For indigenous production, Pakistan may consider to adopt a phased approach, starting from research. For this, the Higher Education Commission (HEC) may introduce competitive research grants to promote local R&D in agricultural universities and research institutes, particularly in synthetic chemistry, green pesticide alternatives, and cost-effective production methods. As a next step, commercial production may be introduced through designating Special Economic Zones (SEZs) under the China-Pakistan Economic Corridor (CPEC) or other industrial frameworks specifically for agrochemical and active ingredient manufacturing. These SEZs should offer incentives such as tax breaks and duty exemptions, infrastructure support including utilities and waste management, and facilitate technology transfer through international partnerships.
101. The Prime Minister of Pakistan recently visited agricultural universities and research institutions in China, where he observed their advanced agricultural practices. In line with his directive to benefit from China's expertise, a short-term training program on scholarship has been initiated to send 1,000 agricultural graduates to

China.⁵⁴ Given Pakistan's complete reliance on imported pesticides, it is recommended that this initiative also include research on the local production of active ingredients. As China is one of the leading global producers of pesticide chemicals, this collaboration could provide valuable insights and technical support to help Pakistan develop its own production capabilities.

102. Also, Pakistan may also consider the example of European Green Deal, which sets environmental and public health goals for the agricultural sector. One of its key targets is to reduce both the use and risk of chemical pesticides by 50% by the year 2030, with a particular focus on minimizing the use of the most hazardous substances.⁵⁵ The approach emphasizes a shift toward safer, more sustainable alternatives, such as biological control methods and integrated pest management (IPM). By adopting similar long-term targets, Pakistan can not only improve environmental safety and human health but also encourage innovation in the agrochemical sector that will reduce reliance on imports, and align its pesticide policy with global sustainability standards

6.5 Promoting Agri-Entrepreneurship: Incubating Startups for Agriculture Graduates in the Pesticide Distribution Sector

103. To address the dual challenges of youth unemployment and pesticide distribution in Pakistan, it is recommended that the government may launch a targeted initiative to empower agriculture graduates particularly plant pathologists, entomologists, and agronomists through start-up incubation and financial facilitation in the pesticide distribution sector. Despite possessing specialized knowledge essential for responsible pesticide use and crop protection, many of the graduates face entry barriers in establishing businesses due to high initial capital requirements for inventory procurement, licensing, and operational costs.
104. To establish incubation centers in collaboration with agricultural universities, research institutions, and provincial agriculture departments can nurture the graduates into successful agri-entrepreneurs. The centers should offer training in business planning, regulatory compliance, product knowledge, and advisory services. To further reduce financial barriers, the government can provide interest-free loans or microfinance schemes specifically tailored for agriculture graduates to set up licensed pesticide distribution units.
105. The approach would not only generate employment for skilled youth but also strengthen last-mile distribution networks, improve farmer outreach, and the quality of agrochemical usage. Graduates with technical expertise are better positioned to advise farmers on appropriate pesticide selection, safe application practices, and integrated pest management (IPM). In the long run, the initiative would contribute to pesticide stewardship, rural economic development, and improved agricultural productivity in line with national goals for food security and climate resilience.

⁵⁴ Short term Trainings (03-06 Months) of 1,000 Agricultural Graduates under China G2G Cooperation. See online at <https://www.hec.gov.pk/english/scholarshipsgrants/TAG/Pages/default.aspx>

⁵⁵ Green Deal: Halving pesticide use by 2030. See online at <https://ec.europa.eu/eip/agriculture/en/news/green-deal-halving-pesticide-use-2030.html>

6.6 Harmonization of Federal and Provincial Pesticide Regulation Frameworks

106. It is recommended that the registration of pesticide products remain solely under the jurisdiction of the federal government, specifically the DPP. A centralized system for pesticide registration would prevent the growing administrative complexities currently faced by manufacturers and importers due to overlapping federal and provincial requirements. The duplication not only delays product approvals but also increases compliance costs and legal ambiguities. A harmonized federal-provincial framework will bring clarity and consistency to regulatory procedures, coordination between stakeholders, and align Pakistan's system with global best practices, where Federal typically handle technical assessments, registration, and risk management of pesticides. Under this approach, provincial agriculture departments should focus on implementation and enforcement responsibilities within their jurisdictions. These include issuing No Objection Certificates (NOCs) to distributors, monitoring product availability and distribution, field-level compliance, and reporting violations. Such a division of roles will allow each tier of government to function efficiently without encroaching on the other's mandate. To operationalize the reform, existing provincial laws that currently create overlaps or contradictions with DPP particularly in areas of product registration should be reviewed, amended, or repealed.

6.7 Simplification of Form-1 Registration Process

107. The Form-1 application process for pesticide registration in Pakistan should be simplified to reduce procedural complexity and administrative burden. Streamlining of the process will enhance overall efficiency and facilitate quicker access to the market for safe and approved products. The reforms should include the elimination of redundant documentation requirements, simplification of application forms, and a reduction in processing time. A critical step in this direction is the decentralization of approval authority, allowing for quicker decision-making at relevant departmental levels. Furthermore, the removal of mandatory approvals from APTAC and Sub-APTAC committees, which currently serve as bottlenecks would accelerate the registration timeline. Implementing the changes will not only ease the burden on applicants and regulators but also bring pesticide registration framework closer to international benchmarks. It will also contribute to more climate adoptive pesticide making in Pakistan.

6.8 Promotion of Climate-Adapted and Locally Customized Pesticide Solutions

108. To enhance the effectiveness, safety, and competitiveness of the pesticide sector in Pakistan, it is recommended that the regulatory framework prioritize the development, registration, and commercialization of climate-adapted and locally customized pesticide products. A challenge currently observed is the importation and direct distribution of pesticide formulations that are developed and tested under agro-climatic conditions different from those in Pakistan. These products may originate from regions with distinct environmental variables such as humidity, temperature, rainfall patterns, pest behavior, and soil types. As a result, their performance in Pakistani conditions can be inconsistent or suboptimal that leads to pest resistance, excessive use

of chemicals, and ultimately, reduced agricultural productivity and higher input costs for farmers.

109. It is recommended that the DPP, in collaboration with relevant provincial agriculture departments and research institutions, mandate region-specific field trials and performance evaluations for imports under Form 16 and 17 as part of the pesticide registration process. The trials should reflect Pakistan's agro-ecological zones and that only those products that demonstrate efficacy under local conditions are approved for commercial use. Encouraging such localization would not only improve product efficacy and environmental concerns but also promote market competition by enabling smaller domestic firms and researchers to develop alternatives to standardized imported products. The shift would reduce over-reliance on imports and support the creation of inclusive pesticide market that aligns with Pakistan's agricultural and climate realities.

6.9 Align Pesticide Policy and Practice with Sustainable Development Goals

110. The sustainable regulation and use of pesticides in Pakistan can play role in advancing the United Nations Sustainable Development Goals (SDGs), particularly in the context of agricultural growth, public health, and environmental conservation. SDG-2 (Zero Hunger)⁵⁶ is supported through pesticide use that enhances crop protection and increases productivity, especially for key crops such as wheat, cotton, and rice. SDG-3 (Good Health and Well-being)⁵⁷ can be addressed by mitigating health risks associated with pesticide exposure through improved training of farmers, protective equipment, and proper labelling practices. SDG-6 (Clean Water and Sanitation)⁵⁸ emphasizes the need to prevent pesticide runoff and contamination of water bodies by promoting safer storage, disposal, and application methods. SDG-12 (Sustainable consumption and production patterns)⁵⁹ supports rational pesticide use, discourages over-application, and calls for the regulation of counterfeit products while promoting user awareness. In response to SDG-13 (Climate Action)⁶⁰, the report highlights the need for climate-resilient pest control strategies, including the use of bio-pesticides and Integrated Pest Management (IPM). SDG-15 (Life on Land)⁶¹ supports the importance of eco-friendly alternatives to protect biodiversity, including pollinators and other beneficial organisms. Lastly, SDGs-16⁶² and 17⁶³ underline the need for strong institutions, transparent regulatory mechanisms, and enhanced collaboration among government agencies, research institutions, and the private sector to support sustainable innovation and enforcement within the pesticide sector.

⁵⁶ Zero Hunger. See online at <https://sdgs.un.org/goals/goal2>

⁵⁷ Good Health and Well Being. See online at <https://sdgs.un.org/goals/goal3>

⁵⁸ Clean Water and Sanitation. See online at <https://sdgs.un.org/goals/goal6>

⁵⁹ Ensure sustainable consumption and production patterns. See online at <https://sdgs.un.org/goals/goal12>

⁶⁰ Climate Action. See online at <https://sdgs.un.org/goals/goal13>

⁶¹ Life on Land. See online at <https://sdgs.un.org/goals/goal15>

⁶² Peace, Justice and Strong Institutions. See online at <https://sdgs.un.org/goals/goal16>

⁶³ Partnership for the Goals. See online at <https://sdgs.un.org/goals/goal17>

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