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Assessment of the olive value chain in Pakistan

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Abstract. The development of Pakistan's olive value chain requires a clear understanding of existing resources, institutional support, production trends, and territorial potential. This study analyzes the proposed olive value chain through a SWOT framework, highlighting the main strengths, weaknesses, opportunities, and threats affecting its development. It also examines available data on olive production and consumption to assess the current status and future prospects of the sector. Particular attention is given to public-sector services and facilities provided at federal and provincial levels, including government initiatives designed to support olive cultivation, processing, and value chain development. The study further maps existing services, facilities, and provincial interventions, while assessing wild olive resources with agronomic potential in suitable provinces. By combining value chain analysis, institutional mapping, and resource assessment, the study provides a basis for identifying gaps, improving coordination, and strengthening strategic planning. Overall, the findings support the development of a more structured, sustainable, and competitive olive value chain in Pakistan.

Keywords. Value chain analysis – SWOT analysis – Resources management – Wild olive resources.

Évaluation de la chaîne de valeur oléicole au Pakistan

Résumé. Le développement de la chaîne de valeur oléicole au Pakistan nécessite une compréhension claire des ressources disponibles, du soutien institutionnel, des tendances de production et du potentiel territorial. Cette étude analyse la chaîne de valeur oléicole proposée à travers une approche SWOT, en mettant en évidence les principales forces, faiblesses, opportunités et menaces influençant son développement. Elle examine également les données disponibles sur la production et la consommation d'olives afin d'évaluer la situation actuelle et les perspectives du secteur. Une attention particulière est accordée aux services et infrastructures du secteur public aux niveaux fédéral et provincial, ainsi qu'aux initiatives gouvernementales visant à soutenir la culture, la transformation et le développement de la chaîne de valeur oléicole. L'étude cartographie également les services, installations et interventions provinciales existants, tout en évaluant les ressources en oliviers sauvages présentant un potentiel agronomique dans les provinces adaptées. En combinant analyse de la chaîne de valeur, cartographie institutionnelle et évaluation des ressources, l'étude fournit une base pour identifier les lacunes, améliorer la coordination et renforcer la planification stratégique du secteur oléicole au Pakistan.

Mots-clés. Analyse de la chaîne de valeur – Analyse SWOT – Gestion des ressources – Oliviers sauvages.

I – Introduction

Agricultural growth is fundamental to Pakistan's economic stability and long-term financial sustainability. The agricultural sector plays a pivotal role in the national economy, contributing approximately 21% to the gross domestic product (GDP) and employing nearly 45% of the labor force (Pakistan Economic Survey, 2022; PBS, 2022). However, rapid population growth and the expansion of the middle-income class have significantly increased the demand for agricultural commodities, particularly edible oils.

Over the past two decades, agricultural growth has remained relatively modest, fluctuating between 1% and 4%, barely keeping pace with population growth. Consequently, Pakistan's dependence on imported food commodities, especially edible oils, has increased substantially. For instance, edible oil imports reached approximately USD 3.56 billion during the first 11 months of the fiscal year ending June 30, 2022, representing nearly 60% of the USD 6 billion loan agreement with the International Monetary Fund (Tribune Express, 2022). According to the Pakistan Bureau of Statistics, this marked a 44% increase compared to USD 2.47 billion recorded during the same period in the 2020-2021 fiscal year (PBS, 2022). This growing import bill, combined with rising global prices, has made edible oils increasingly unaffordable in domestic markets, necessitating government subsidies.

Edible oil constitutes a staple component of the national diet, and its demand is relatively inelastic. Pakistan ranks among the world's largest consumers of edible oil, with a per capita consumption of approximately 22 kg per year (SBP, 2022). Despite this high demand, domestic production remains insufficient. The country relies heavily on a combination of locally produced oilseeds and imported raw and refined oils. While cottonseed is largely sourced domestically, soybean is entirely imported, and rapeseed and sunflower are both locally produced and imported. Overall, the edible oil sector remains highly dependent on imported oilseeds and refined palm oil to meet national demand.

In this context, olive (*Olea europaea* L.) cultivation presents a promising alternative for enhancing domestic edible oil production. Over the past two decades, olive has been introduced and progressively promoted in Pakistan as a high-value crop suitable for marginal and rainfed areas. According to the Ministry of National Food Security and Research (MNFSR) and the Ministry of Climate Change, approximately 4.1 million hectares of land have been identified as suitable for olive cultivation across diverse agro-ecological zones (MCC, 2022; Tribune Express, 2022). Estimates suggest that up to 15.4 million hectares could potentially support olive cultivation, particularly in Punjab, Khyber Pakhtunkhwa, Balochistan, the former FATA regions, and parts of Sindh.

Government-led initiatives, supported by technical and financial collaboration with the Italian government, have accelerated the expansion of olive cultivation in recent years. Large-scale plantation efforts have been established in Balochistan, Khyber Pakhtunkhwa, and Punjab. These initiatives include the provision of subsidized planting material, drip irrigation systems, and olive processing equipment to farmers through publicly funded development programs. Despite these efforts, domestic production remains limited. As of 2020, Pakistan imported approximately 4,000 tons of olive oil, while local production has averaged around 1,500 tons of olive oil and 830 tons of table olives annually since 2010, with most of the output consumed domestically.

To reduce import dependency and enhance food security, Pakistan must significantly scale up olive cultivation and strengthen the entire olive value chain. This includes improving productivity, expanding processing capacity, and enhancing market competitiveness. The development of a sustainable olive sector will depend on supportive government policies, private sector engagement, and the creation of an enabling environment for investment and innovation. Furthermore, productivity gains will require the adoption of advanced agronomic practices, strengthened research and development, human capacity building, and improved marketing systems.

Currently, the olive and olive oil sector in Pakistan is in an emerging phase and faces several structural and institutional challenges. Addressing these constraints will require coordinated efforts from both public and private stakeholders to unlock the sector's full potential.

This chapter aims to provide a comprehensive overview of the olive value chain in Pakistan by synthesizing existing inter-institutional knowledge related to olive cultivation, germplasm resources, varietal adaptation, orchard establishment, production systems, processing, and market development. Particular attention is given to the distribution of wild and cultivated olive germplasm, the adaptation of local and imported ecotypes under different agro-climatic conditions, and agronomic strategies for converting wild olive stands into productive orchards. The analysis is based on an extensive review of available reports, scientific literature, online resources, and stakeholder consultations involving public institutions, private sector actors, and international organizations.

II – SWOT analysis of the proposed olive value chain

SWOT analysis is a well-established strategic assessment tool that has been widely applied for several decades in policy development, business planning, and sectoral evaluations. The acronym SWOT refers to Strengths, Weaknesses, Opportunities, and Threats, which are systematically organized into a four-quadrant framework to evaluate the viability and strategic positioning of a given initiative within a specific context. A robust SWOT analysis relies heavily on accurate contextual knowledge, making it essential to integrate sector-specific and region-specific information.

This analytical approach is commonly employed by policymakers, businesses, and development practitioners due to its simplicity and effectiveness in identifying key internal and external factors influencing a sector. In the context of the olive sector in Pakistan, strengths and weaknesses are considered internal factors, reflecting the current structural and operational conditions of the sector. In contrast, opportunities and threats are external factors, shaped by the broader economic, environmental, and institutional environment, and indicative of potential future developments.

By integrating these four dimensions, the SWOT framework provides a comprehensive overview of the sector and supports informed decision-making, strategic planning, and the effective implementation of development interventions.

The SWOT analysis of the Pakistani olive value chain presented in this study is structured across four thematic areas:

- a. Production and processing: encompassing technical, agronomic, and environmental aspects, including nurseries, cultivation practices, and oil extraction facilities;
- b. Marketing: addressing commercial dynamics, market access, value addition, and consumer demand;
- c. Legislation, certification, and policies: covering regulatory frameworks, quality standards, financial incentives, and institutional support mechanisms;
- d. Research, education, training, and extension services: including scientific research, capacity building, knowledge transfer, and technical assistance.

Enhancing commodity productivity is critical for improving the competitiveness of enterprises within the value chain. This requires the establishment of an enabling environment through effective government policies, including the provision of services, appropriate pricing mechanisms, and efficient policy implementation. Furthermore, value chain development is driven by technological adoption, a culture of innovation, human capital development, and improved management practices.

The present SWOT analysis of the olive value chain in Pakistan is based on a comprehensive desk review of past and ongoing project reports, peer-reviewed publications, and stakeholder consultations. These consultations involved researchers, scientists, technicians, olive growers, and olive oil processors operating in key regions, including Balochistan, Khyber Pakhtunkhwa, and Punjab.

The findings indicate that the olive value chain in Pakistan holds substantial potential for growth and expansion, particularly in light of recent public sector initiatives and increasing private sector engagement. The results of this analysis provide a strategic foundation to guide investment decisions by both government and private stakeholders, with the aim of promoting olive cultivation and strengthening the olive oil industry in the country.

A summary of the key findings is presented in the SWOT matrix (Table 1), which outlines the main factors influencing the development and future prospects of the olive and olive oil value chain in Pakistan.

1. Strengths

- Pakistan possesses substantial agro-ecological diversity, with climatic zones ranging from hot and arid lowlands to cooler northern highlands. These conditions are suitable for cultivating a wide range of olive varieties. Additionally, naturally occurring wild olive populations indicate strong ecological adaptability and genetic resources.
- The country has extensive areas of cultivable waste and marginal lands. Out of a total land area of 79.6 million hectares, only 22.1 million hectares are currently cultivated, offering significant potential for expansion of olive cultivation.
- Approximately 30.9 million hectares (about 39.6% of total land area) are classified as arable land, where olives can be integrated into existing cropping systems.
- Nearly 16 million hectares of land are affected by soil erosion. Large-scale olive plantation could contribute to soil conservation, reduction of desertification, and sustainable land management, while generating economic returns.
- Expansion of olive cultivation can enhance biodiversity, increase carbon sequestration, and promote efficient water use, particularly through the adoption of micro-irrigation systems.
- Olive cultivation offers attractive economic returns. Studies indicate a high internal rate of return, estimated at approximately 31% at a 10% discount rate, suggesting strong investment feasibility.
- The government, particularly the Ministry of Planning, Development and Special Initiatives, has prioritized reducing dependence on edible oil imports, creating a favorable policy environment for olive sector development.
- National and provincial agricultural policies recognize oilseed crops, including olives, as strategic commodities for import substitution and value chain development.

- The Strategic Trade Policy Framework (2020-2025) supports agricultural mechanization, value chain integration, and agribusiness development, indirectly benefiting the olive sector.
- Infrastructure initiatives such as the China-Pakistan Economic Corridor (CPEC) may further enhance market access and logistics for olive production in corridor-adjacent regions (Ahmad, 2020).
- Locally produced olive oil demonstrates promising quality characteristics, with the potential to meet international standards and access export markets.
- There is significant potential for value addition and by-product development due to the availability of raw material and the possibility of increasing productivity through improved agronomic practices and expanding plantation areas.
- Pakistan has a large and cost-effective labor force, both skilled and unskilled, which can support the development of the olive value chain.
- Olive cultivation also carries cultural and religious significance, which may encourage adoption and long-term investment, given the longevity and sustainability of olive trees.

2. Weaknesses

- Limited agro-ecology-specific research and insufficient scientific data on varietal performance, adaptability, and best management practices constrain sector development.
- There is a lack of certified nurseries and standardized plant propagation systems, along with inadequate implementation of Good Agricultural Practices, leading to low orchard productivity.
- Post-harvest management practices are poorly developed. Inadequate knowledge regarding harvesting techniques, fruit handling, and quality preservation leads to reduced oil quality and increased losses.
- Value addition remains limited, with minimal development of processed products such as table olives, olive-based foods, and by-products.
- Inadequate infrastructure for packaging, storage, and transportation, particularly among smallholder farmers, results in post-harvest losses and reduced profitability due to the perishable nature of olives.
- The absence of a structured and regulated marketing system forces farmers to rely on intermediaries, leading to lower farm-gate prices, high transaction costs, and inefficient market access.
- Weak linkages between producers and processing industries reduce returns, especially for small-scale farmers.
- Olive orchards require several years (typically 3 to 4) to reach economic productivity, creating financial constraints for farmers without access to interim income sources such as intercropping.
- The number of modern olive oil processing units is limited, and existing facilities often have low capacity.
- Processing infrastructure is underdeveloped, particularly in terms of storage systems, bottling facilities, and compliance with standard operating procedures. Most units are publicly owned, which may limit operational efficiency.

- Limited awareness among producers, processors, and consumers regarding olive oil quality standards, certification, and regulatory requirements.
- Fragmented landholdings and dispersed production areas reduce economies of scale and discourage private sector investment in processing and value addition.
- The absence of comprehensive national and provincial strategies, data systems, and coordinated action plans for the olive sector contrasts with more developed oilseed sectors such as canola and sunflower.
- Weak legislative and regulatory frameworks, including the absence of specific laws on traceability, labelling, quality standards, and food safety (e.g., Olive Oil Act), hinder sector formalization.

3. Opportunities

- The availability of relatively low-cost labor provides an opportunity to reduce production costs while promoting rural employment, particularly for women and youth.
- National policies emphasize value addition in agriculture and highlight the need for public-private partnerships and innovative financing models for value chain development.
- Government support through the Strategic Trade Policy Framework (2020-2025) offers opportunities for mechanization, modernization, and integration into global value chains.
- Pakistan's heavy reliance on imported palm oil, despite unsuitable agro-climatic conditions for its cultivation, creates a strong opportunity to promote olives as a viable domestic alternative.
- The country's strategic geographic location, combined with infrastructure development under CPEC, can facilitate improved access to domestic and regional markets.
- Ongoing collaboration between federal/provincial governments and international donors provides financial and technical support for sector development, including rural development, agro-tourism, and market modernization.
- Policy initiatives from MNFSR aim to improve market intelligence, promote digital platforms, and enhance marketing systems, which can benefit olive producers.
- Growing domestic and international demand for olive oil presents a favorable market trend and opportunities for niche market development.
- National branding initiatives such as "Emerging Pakistan" provide opportunities for product differentiation, branding, and export promotion.
- The Geographical Indications (Registration and Protection) Act, 2020 offers the potential to protect and market region-specific olive products, enhancing competitiveness in international markets.
- Olive cultivation can be integrated into rural development strategies, particularly in marginalized areas where conventional crops are not viable, thereby improving livelihoods and land use efficiency.

4. Threats

- The absence of a comprehensive national policy and research framework for oilseeds, including olives, poses a significant constraint to coordinated sector development.

- A lack of integrated policy planning across the edible oil value chain, from production to processing and marketing, limits efficiency, value addition, and sustainability.
- Public sector investments are largely project-based (e.g., under the Public Sector Development Program), with limited continuity, coordination, and private sector engagement beyond project lifespans.
- Insufficient involvement of private sector stakeholders threatens the long-term sustainability and scalability of the olive value chain.
- Established edible oil industries favor imports over domestic processing due to past policy incentives (e.g., tariff reductions on oilseed imports), reducing incentives for local production.
- Market distortions caused by private intermediaries and traders can destabilize input and output prices, discouraging investment in emerging sectors such as olives.
- Climate change poses a significant risk, with increasing frequency of extreme events such as floods, droughts, irregular rainfall, and smog, potentially affecting olive productivity.
- Water scarcity, particularly groundwater depletion in regions such as Balochistan, represents a major constraint for sustainable expansion of olive cultivation.
- Political instability and inconsistent policy commitment may hinder long-term investments and institutional development in the olive sector.
- Weak farmer organizations and limited experience with cooperative or associative models reduce collective bargaining power and sector resilience.

Table 1. A summary of the key findings of the SWOT analysis.

Strengths	Weaknesses
1. Favorable agro-ecological diversity for the cultivation of a wide range of olive varieties. 2. Availability of vast cultivable wastelands and marginal lands suitable for olive cultivation. 3. Availability of arable land suitable for commercial olive plantations. 4. Large-scale olive plantations can contribute to reducing soil erosion and desertification while generating economic benefits. 5. Expansion of olive cultivation can enhance biodiversity and contribute to carbon sequestration. 6. Olive cultivation is economically profitable, with an estimated internal rate of return (IRR) of 31%, exceeding prevailing market interest rates. 7. Edible oil production, including olives, has been prioritized in the national development agenda by the Ministry of Planning, Development and Special Initiatives. 8. Promotion of oilseed crops, including olives, has been incorporated into federal food security policies and provincial agriculture and horticulture strategies. 9. Support from the Ministry of Commerce through the Strategic Trade Policy Framework (STPF) 2020–2025, promoting agricultural mechanization and integration into global value chains. 10. The China–Pakistan Economic Corridor (CPEC) can enhance the strategic importance of olive cultivation and olive oil production in corridor-adjacent regions. 11. Locally produced olive oil possesses distinct quality characteristics with potential to meet international standards and export requirements. 12. Potential availability of local raw materials for olive oil extraction, value addition, and by-product generation. 13. Availability of both skilled and unskilled labor to support olive value chain activities. 14. Olive trees hold religious and cultural significance in Pakistan and are regarded as a long-term beneficial crop.	1. Limited agro-ecological research, olive adaptability trials, and scientific and technological support for the olive value chain. 2. Lack of certified olive nurseries and insufficient knowledge regarding the implementation of Good Agricultural Practices (GAPs). 3. Limited technical knowledge and technologies related to post-harvest handling and management. 4. Limited development of olive-based value-added products. 5. Inadequate competencies in packaging, storage, and transportation systems. 6. Absence of an established and regulated marketing system with improved market infrastructure. 7. Reduced farmer income due to the dominance of intermediaries in fresh olive marketing channels. 8. Weak linkages between olive producers and agro-processing industries. 9. Lack of economic returns from olive orchards during the first four years after plantation. 10. Limited availability of modern olive oil extraction and processing units. 11. Limited administrative and consumer awareness regarding olive oil quality standards. 12. Low interest among processors and industrial investors due to the absence of concentrated olive production clusters. 13. Absence of a comprehensive olive policy, strategic action plans, and reliable sectoral data for sustainable development. 14. Insufficient extension services provided by federal and provincial institutions. 15. Weak coordination among public institutions and private sector stakeholders at federal and provincial levels. 16. Low productivity and unresolved pest and disease issues requiring research support. 17. Limited reliable and systematized local data on cultivation techniques, cultivar performance, and olive oil production costs. 18. Lack of legislation concerning traceability, labeling, quality standards, food safety requirements, and production and marketing regulations (e.g., Olive Oil Act).

Opportunities	Threats
1. Availability of relatively inexpensive labor. 2. National Food Security Policy supports value addition in agro-based products. 3. Support from the Ministry of Commerce through the Strategic Trade Policy Framework (STPF) 2020–2025. 4. Increasing national demand for edible oils. 5. Significant potential for growth in olive cultivation and olive oil production in Pakistan. 6. Continued support from federal and provincial governments in collaboration with international donors for the development of the olive sector. 7. Policy measures by the Ministry of National Food Security and Research aimed at improving market systems in coordination with provincial governments. 8. Launch of the national brand-building strategy “Emerging Pakistan” by the Ministry of Commerce. 9. Existing legislation for the recognition and protection of geographical indications (GIs). 10. High investment potential in the processing sector following the promotion of olive plantation initiatives and the declaration of “Olive Valley” regions in Punjab and KP. 11. Opportunities for identifying and promoting climate-smart olive varieties through adaptability trials and genetic improvement programs. 12. Collaboration with federal and provincial departments and progressive farmers can enhance olive productivity and sector development. 13. Availability of medium- and long-term support from international donors. 14. Potential for rural development through the establishment of olive oil supply chains and value chain activities in economically disadvantaged districts.	1. Absence of well-established model nurseries supplying certified planting material and limited standardization and quality control systems. 2. Lack of a comprehensive research and policy framework focused on sustainable olive production and value chain development. 3. Absence of a national framework supporting all stages of the edible oil value chain, including value addition, nutritional profiling, and food safety compliance. 4. PSDP-funded projects are generally limited to defined project durations and often fail to ensure long-term coordination and investment from private stakeholders, raising sustainability concerns. 5. Low level of engagement and investment from private sector stakeholders. 6. Limited investment in olive processing facilities by major industrial actors. 7. Market instability caused by private sector traders affecting input supply and agricultural product prices. 8. Climate change-related events, including floods, droughts, heat waves, fog, smog, and irregular rainfall, may negatively affect olive productivity. 9. Water scarcity and declining water quality may reduce olive yields and orchard sustainability. 10. Political instability may negatively affect the development and sustainability of the olive and olive oil sector. 11. Domestic crushing and distribution sectors often prefer imported edible oils over locally produced oilseeds and olive oil. 12. Government policies facilitating imports of edible oils and oilseeds, including the elimination of tariffs and duties since 2005, may discourage local production.

III – Analysis of the available data on olive consumption and production

The development of the olive value chain, similar to other horticultural sectors, involves multiple stages from production to final consumption, each presenting specific technical, logistical, and economic challenges. These stages include pre-planting, cultivation, harvesting, post-harvest handling, processing, transportation, marketing, and export (Rana *et al.*, 2022).

In developing countries such as Pakistan, rapid urbanization, rising income levels, changing dietary patterns, and the expansion of information and communication technologies (ICTs) are transforming agri-food systems. Additionally, structural changes in retail markets and emerging export opportunities are driving a shift toward more integrated and market-oriented value chains. These dynamics are fostering increased private sector participation aimed at improving productivity, efficiency, product quality, and market competitiveness. Simultaneously, consumer demand for safe, high-quality, convenient, and affordable food products is reinforcing the importance of efficient and well-coordinated value chains.

1. Fresh olive supply/value chain

The olive value chain begins with producers, who constitute the primary actors in the system. From farm to consumer, fresh olives pass through several intermediaries, including pre-harvest contractors, commission agents, wholesalers, and retailers, forming distinct marketing channels (Table 2).

Currently, detailed analyses of profit margins across different actors within these channels are lacking. However, available evidence indicates that olive orchards begin generating economic returns approximately 5-6 years after planting. Break-even is typically achieved around 10 years, after which orchards can yield an estimated annual profit margin of approximately 25%, based on variable costs. These long gestation periods represent a critical economic consideration for farmers and investors.

Table 2. Fresh olive marketing channels.

Channels	Functioning Mechanism
Channel – 1	The farmers sell fresh olives to the pre-harvest contractor, and the pre-harvest contractor sells the olives to the wholesaler who auctions and deducts his commission and the produce is sold to the retailer whereas the retailers sell fresh olives to the consumers.
Channel – 2	The olive grower sells produce to the wholesaler who sells to the retailer and retailer sells the produce to the consumer
Channel – 3	The olive produced is sold by the growers to the retailer and from the retailer the produce is sold to consumers.
Channel – 4	The olive farmers sell olives to the pre-harvest contractor who directly sells produce to the olive consumers.
Channel – 5	The consumer directly purchases the fresh olives from the farmers at farm gate.

2. Imported olive oil supply/value chain

Pakistan relies heavily on imported olive oil, sourced primarily from major producing and exporting countries such as Spain, Italy, Turkey, Tunisia, as well as the United Arab Emirates, Denmark, the European Union, and China. Imports include both branded and non-branded products, ranging from extra virgin to refined and pomace oils.

The olive oil supply chain for imported products typically follows a linear structure:

Importers → Distributors → Retailers → Consumers

Pakistan imports edible oil worth approximately USD 3.5 billion annually (Piracha, 2022), with olive oil imports averaging around 3,700-4,000 tons per year. In some cases, non-branded olive oil is blended locally with other vegetable oils (e.g., canola oil) before being marketed.

The imported olive oil market is largely unregulated in terms of price control mechanisms. There is limited information available on profit margins across different actors in the supply chain, and retail prices vary significantly across regions. Over the period 2019-2022, olive oil imports fluctuated in both volume and value (Table 3), reflecting global market dynamics and domestic demand patterns.

3. Locally processed olive oil supply/value chain

Over the past decade, public sector initiatives have primarily focused on promoting olive cultivation across different agro-ecological regions. As a result, sufficient quantities of olives are now becoming available for commercial processing into olive oil. However, the processing segment of the value chain remains in a developmental phase.

To date, most olive oil extraction units have been imported, primarily from Italy, and installed through public sector projects at federal and provincial levels. Some initial efforts have also been made to develop local manufacturing capacity for processing equipment. The locally processed olive oil supply chain can be summarized as follows:

Olive marketing channels → Oil extraction → Value addition (by-product) → Consumers

A significant portion of the oil extracted is used for household consumption by farmers. Although public sector facilities often provide oil extraction services free of cost, logistical constraints can limit farmers' access to these units.

Initially, small-scale extraction units (approximately 50 kg/hour capacity) were distributed across key research and production centers, including the National Agricultural Research Centre (NARC), Barani Agricultural Research Institute (BARI) Chakwal, Agricultural Research Institute (ARI) Tarnab, and facilities in Balochistan. Currently, approximately 20 extraction units are operational in the public sector, alongside a small number of private and community-based units established with support from development programs.

Most processing infrastructure has been deployed under the federal initiative "*Promotion of Olive Cultivation on a Commercial Scale in Pakistan (Phase I & II)*" implemented by MNSFR in collaboration with provincial authorities.

According to a 2022 impact assessment, approximately 40% of olive growers have access to extraction facilities. Some processing units, such as those at BARI Chakwal, ARI Tarnab, and

ARI Quetta, are equipped with laboratories for oil quality analysis and value-added product development. Mobile testing units have also been introduced.

Despite these advancements, domestic production of olive oil remains relatively low. Estimates suggest that production reached approximately 1,400 tons in 2022, although this figure may be underestimated. The government has set an ambitious target of increasing production to 20,000 tons annually by 2027.

Interestingly, Pakistan also exports small quantities of olive oil (approximately 19 tons in 2021-2022), primarily through re-export of imported products as shown in Table 4. This apparent inconsistency between imports and exports reflects global trade practices, where major producing countries such as Spain and Italy both import and re-export olive oil to enhance value addition and market positioning.

A previous market study conducted in 2016 by the Punjab Economic Research Institute (PERI), supported by the Italian government “*Market Analysis for Value Chain and Olive Oil Consumption in Pakistan*”, aimed to investigate the dynamics of the market of olive products within the edible oil sector in the country, focusing on the product development, supply chain, consumer preferences and uses, demand and marketing prospects for local and regional markets. The study estimated that domestic consumption of locally produced olive oil was approximately 5 tons at that time.

Given recent sectoral developments, the OliveCulture project has deemed essential to update the study of 2016, to better understand evolving consumption patterns and inform future marketing strategies.

In terms of value addition, public sector initiatives have promoted the development of olive-based products such as pickles, jams, baked goods, syrups, vinegar, tea, confectionery, and cosmetics (POCCSP, 2022). These technologies have been transferred to local communities and small-scale entrepreneurs, resulting in limited but growing commercialization. However, the table olive sector remains underdeveloped due to limited investment, lack of appropriate processing technology, and low private sector engagement. Processing activities such as de-pitting and slicing are often carried out manually by small producers. Furthermore, critical aspects related to food safety, quality assurance, and compliance with international standards, such as Hazard Analysis and Critical Control Points (HACCP), have not yet been systematically implemented or evaluated across processing units and value-added product chains.

Table 3. Import of olive oil during 2019-2022.

Country	2019-2020		2020-2021		2021-2022	
	US\$ (000)	Quantity (Ton)	US\$ (000)	Quantity (Ton)	US\$ (000)	Quantity (Ton)
<i>Olive Oil (Others) HS Code 15099000</i>						
Spain	5989.1	2278.1	7813.8	2868.8	7516.1	2586.9
Italy	885.0	248.6	555.7	187.3	2170.9	404.0
Turkey	659.5	260.4	783.3	284.9	632.4	247.3
Tunisia	155.4	69.7	363.8	200.5	148.5	117.0
UAE	1.8	0.4	0.2	0.0	106.2	25.7
Denmark	0.0	0.0	0.0	0.0	44.0	18.5
European Union	24.9	99.8	0.0	0.0	35.0	6.0
China	0.0	0.0	0.0	0.0	31.1	7.5
Portugal	0.0	0.0	25.6	5.8	14.2	3.2
Sweden	0.0	0.0	0.0	0.0	5.1	0.7
United Kingdom	0.9	0.0	0.6	0.0	0.5	0.0
Germany	0.0	0.0	0.0	0.0	0.0	0.0
Greece	0.6	0.1	0.0	0.0	0.0	0.0
Malaysia	0.3	0.1	0.0	0.0	0.0	0.0
Sub Total	7717.6	2957.4	9543.1	3547.4	10703.9	3416.8
<i>Olive Oil (Virgin) HS Code 15091000</i>						
Spain	1637.5	419.8	2818.7	788.6	2471.6	593.2
Italy	34.0	8.8	198.6	39.5	185.3	33.6
Tunisia	47.8	13.0	227.2	59.3	116.9	28.0
Turkey	58.3	17.0	121.6	27.6	76.4	17.8
European Union	4.2	0.2	3.3	0.2	24.6	5.0
China	0.0	0.0	0.2	0.0	7.5	1.7
United States	7.9	2.0	0.1	0.0	4.9	1.2
UAE	0.1	0.0	6.2	1.1	2.7	0.3
Sweden	0.0	0.0	0.0	0.0	2.5	0.1
United Kingdom	0.0	0.0	0.1	0.0	1.4	0.1
Germany	0.0	0.0	2.3	0.0	0.0	0.0
Egypt	0.0	0.0	8.4	2.1	0.0	0.0
Sub Total	1789.8	460.7	3386.8	918.5	2893.6	681.0
Grand Total	9507.4	3418.1	12929.8	4465.9	13597.6	4097.9

Source: Federal Board of Revenue. <https://www.fbr.gov.pk/>.

Table 4. Olive oil exports during 2019-2022.

Country	2019-2020		2020-2021		2021-2022	
	US\$ (000)	Quantity (Ton)	US\$ (000)	Quantity (Ton)	US\$ (000)	Quantity (Ton)
<i>Olive Oil (Virgin) HS Code 15091000</i>						
Malaysia	-	-	-	-	0.56	0.06
Trinidad and Tobago	-	-	-	-	0.45	0.04
United Arab Emirates	-	-	-	-	0.34	0.04
United States	0.38	0.01	-	-	3.40	0.39
Sub Total	0.38	0.01	-	-	4.75	0.53
<i>Olive Oil other Fractions HS Code 15099000</i>						
Canada	0.68	0.04	5.16	0.98	-	-
Hong Kong, China	0.12	0.01	-	-	-	-
Mozambique	4.78	3.85	11.43	7.33	50.16	17.98
Oman	19.09	0.31	-	-	-	-
South Africa	1.26	0.21	-	-	-	-
United Arab Emirates	0.22	0.04	-	-	-	-
United Kingdom	-	-	0.22	0.12	-	-
United States	0.81	0.49	0.96	0.05	-	-
Sub Total	26.96	4.95	17.77	8.48	50.16	17.98
Grand Total	27.35	4.96	17.77	8.48	54.91	18.51

Source: Federal Board of Revenue. <https://www.fbr.gov.pk/>.

IV – Public sector (federal and provincial) services and facilities to develop olive value chain

This section aims to assess the current status of public sector resources, institutional structures, infrastructure, equipment, and inputs supporting the development of the olive value chain in Pakistan. An important starting point for evaluating the availability and effectiveness of public sector services is the spatial distribution of olive orchards. The current extent and distribution of olive plantations across Pakistan are presented in Table 5, providing a baseline for understanding regional development patterns and infrastructure needs.

Table 5. Olive trees plantation in Pakistan by public and private sector (in number of plants).

Provinces/ Territories	PIDSA (2012- 2016)	PSDP (2014-2020)	Olive Valley (2015- 2020)	5 million olive (2013- 2019)	Private sector plantation	Total plantation
Baluchistan	159,379	865,447	-	-	2,500	1,027,326 8,381 acres
Khyber Pakhtunkhwa	265,273	431,465	-	590,000	2,500	1,289,238 12,134 acres
Punjab	116,772	316,527	1,210,411	-	10,000	1,653,710 12,687 acres
Islamabad Capital Territory	35,768	48,465	-	-	-	84,233 726 acres
Azad Jammu & Kashmir	421	36,624	-	-	-	37,045 291 acres
Gilgit Baltistan	2,545	14,207	-	-	-	16,752 131acre
	580,158	1,712,735	1,210,411	590,000		
Total	5,802 acres	13,306 acres	8,966 acres	5,900 acres	15,000 375acre	4,108,304 34,349 acres

Source: Ministry of National Food Security and Research.

The areas currently identified as suitable for olive cultivation are summarized in Table 6.

Table 6. Olive cultivation/plantation areas in Pakistan.

Olive cultivation ecologies	Administrative region/Districts
Islamabad Capital Territory	Islamabad, Rawalpindi
Punjab	(Olive Valley) Chakwal, Attock, Jhelum, Soon Valley, Mianwali and Khushab
Khyber Pakhtunkhwa (KP) and Newly Merged Districts	Peshawar, Mardan, Swabi, Swat, Karak, Dir, Bajur, Mohmand, Kurram, South Waziristan, North Waziristan, Abbotabad, Haripur, Mardan, Battagram, Kohat, D.I.Khan, Mansehra, Noshara, Laki Marwat, Wana
Olive Cultivation Ecologies	Administrative Region/Districts
Balochistan	Quetta, Loralai, Qila SaifUllah, Zhob, Musa Khel, Barkhan, Zhob, Khuzdar, Makhlar, Barkan, Dukki, Pashin, Sherani,
Azad Jammu & Kashmir (AJK)	Bagh, Poonch, Kotli, Jhelum Valley, Muzafarabad, Bhimber, Mirpur, Rawala Kot, Neelam Valley, Sudhanoti
Gilgit Baltistan (GB)	All GB

Source: Various reports published by national/international Projects and internet

It is necessary to highlight that the provision of resources, structures, equipment and implements are fundamentally essential to develop state of an art olive value chain on a leading-edge basis; following criteria need to be considered as an integral part of the value chain;

- Olive cultivation using research-based modern technologies and an agronomic tactical management support system;

- Development of qualified human resources in the value chain perspective;
- Provision of technical assistance to value chain clients;
- Ensure quality, sanitary and phytosanitary (SPS) safety standards;
- Establish reference laboratories for oil quality certification;
- Promotion of establishing modern oil extraction units on a public-private partnership as well as encouraging private sector alone/independently availing SME approach (Small and Medium-sized Enterprises);
- A vibrant marketing system in place enables the provision of essential services and facilities;
- Feasible financial assistance, particularly to stakeholders having a meagre resource.

A key driver of olive sector development has been the government-funded megaproject “*Promotion of Olive Cultivation on a Commercial Scale in Pakistan*” (POCCSP). Phase I (2014-2021) established the foundational elements of the olive value chain, including plantation development, nursery establishment, and initial processing infrastructure. Phase II (2022-2024) aimed to consolidate these achievements and further expand the sector.

This initiative is implemented by the Pakistan Oilseed Department (POD) under the Ministry of National Food Security and Research (MNFSR), with coordinated activities across federal and provincial levels. The project operates through multiple components implemented in major regions, including Balochistan, Khyber Pakhtunkhwa (KP), Punjab, Gilgit-Baltistan (GB), and Azad Jammu and Kashmir (AJK), ensuring a geographically inclusive approach.

In addition to federal initiatives, provincial governments are implementing their own targeted programs to support olive growers, further strengthening the value chain at the local level. These programs provide services such as technical support, input provision, and infrastructure development. Furthermore, donor-funded initiatives, such as the GRASP project in Balochistan, are contributing to olive sector development, particularly by supporting SMEs involved in production and processing.

Overall, these projects aim to engage all stakeholders across the olive value chain, from production to processing, through coordinated efforts at national, provincial, and international levels. Key areas of focus include research and development, capacity building, planning, and monitoring of project activities.

The development of the olive sector in Pakistan is therefore the result of integrated efforts combining public sector investments, international technical cooperation, particularly with the Government of Italy, and collaboration among various institutional actors. These coordinated interventions are gradually establishing the technical, organizational, and commercial foundations necessary to strengthen and sustain the olive value chain in the country.

V – Mapping provincial government initiatives for services and facilities to develop olive value chain

1. Balochistan

Balochistan is widely regarded by researchers and practitioners as one of the most suitable provinces in Pakistan for olive cultivation, particularly in its ecologically favorable zones. The province offers significant potential for transitioning from traditional, water-intensive crops to olives, which are considered a climate-resilient and low-water-demand crop. This transition provides an opportunity to enhance farm incomes, promote sustainable land use, and support poverty reduction.

Olive cultivation also generates multiple socio-economic and environmental benefits, including improved ecosystem services, enhanced biodiversity, development of rural entrepreneurship, employment generation, and increased income through value addition. Furthermore, it contributes to reducing dependence on imported edible oils (GRASP Pakistan). However, given the long gestation period of olive trees before reaching full productivity, sustained government support remains essential to promote the olive value chain effectively.

The Board of Investment and Trade (BIT, 2020) has highlighted that olives produced in Balochistan are characterized by high nutritional value and oil content, making them economically attractive for both smallholders and large-scale (corporate) farming. Within Balochistan, Loralai area is the largest olive oil producer, having more than one million olive trees, mainly Spanish and Italian varieties.

According to the Balochistan Forest Department, wild olive forests cover approximately 41,000 hectares in the Sherani district, of which around 6,000 hectares are state-owned, while the remainder is under community management. Several districts, including Quetta, Pishin, Loralai, Killa Saifullah, Khuzdar, Zhob, Musakhel, Barkhan, Harnai, Mastung, and Qalat, have been identified as highly suitable for olive cultivation in terms of both yield and oil quality.

Recognizing the province's agro-climatic advantages and increasing water scarcity, the Government of Balochistan has prioritized olive cultivation as a drought-resistant, high-value crop. Over the past two decades, the provincial government, in collaboration with federal institutions and international partners, has implemented multiple initiatives to develop the olive value chain by providing services, infrastructure, and technical support. The key projects and interventions are summarized below:

A. Development of olive production and processing in Balochistan

This project, implemented with a budget of PKR 190 million over three years, aimed to introduce olives as a climate-resilient crop and expand vegetative cover. The project focused on standardizing propagation and cultivation techniques, thereby enabling large-scale plantation development and increasing farmers' incomes. Key achievements include:

- Establishment of nurseries producing approximately 675,000 olive plants;
- Plantation of around 6,000 acres of olive orchards on farmers' fields;
- Development of three mother plant blocks for propagation of quality planting material.

B. Promotion of olive cultivation for economic development and poverty alleviation (PIDSA-funded)

This federally supported project, financed under the Pakistan-Italy Debt Swap Agreement (PIDSA) and implemented between 2012 and 2015, targeted five districts: Loralai, Zhob, Musakhel, Barkhan, and Killa Saifullah. The project aimed to:

- Utilize marginal lands, forest areas, and sub-mountainous regions for large-scale olive cultivation;
- Promote employment generation and poverty alleviation;
- Strengthen public-private partnerships for olive cultivation and oil extraction;
- Establish new orchards and processing facilities with community participation;
- Provide oil extraction units through collaborations with community-based organizations (CBOs), NGOs, and farmer groups;
- Conduct training programs, technical studies, and awareness campaigns to promote olive cultivation.

C. AFNEPAK Project

The AFNEPAK (Afghanistan, Nepal and Pakistan) project complemented the PIDSA initiative by providing technical assistance, capacity building, and training to support olive cultivation and processing activities.

D. Promotion of olive cultivation on a commercial scale in Pakistan

This major federal initiative (2014-2021), implemented by POD under MNFSR, included a significant component for Balochistan. Key achievements in the province include:

- Distribution of certified, true-to-type olive plants (accounting for approximately 56% of total national distribution);
- Installation of drip irrigation systems for approximately 45% of beneficiary farmers;
- Establishment of nursery infrastructure, including shaded tunnels in Quetta, Loralai, and Khuzdar;
- Organization of 17 training programs for 1,462 stakeholders, covering orchard management, pruning, nursery techniques, processing, packaging, and marketing;
- Upgradation of olive value-addition laboratories at ARI Quetta;
- Installation of weather stations (e.g., at ARI Quetta, UET Khuzdar, and Loralai) to provide agro-meteorological data and advisory services to farmers.

E. Growth for rural advancement and sustainable progress (GRASP)

The GRASP project (2019-2024), funded by the European Union and implemented by the International Trade Centre, focuses on poverty reduction and inclusive rural development through support to SMEs. In Balochistan, the project targets ten districts, including Zhob, Pishin, Quetta,

Nushki, Kharan, Khuzdar, Panjgur, Kech, and Lasbela, with olive identified as a priority climate-smart crop. The project adopts an integrated value chain approach, including:

- Enhancing agricultural practices and productivity;
- Supporting value addition and processing capacities;
- Promoting food safety standards among SMEs;
- Strengthening market linkages through private sector partnerships;
- Improving access to market information and financial services;
- Promoting gender-inclusive participation, particularly for women in farming and processing activities.

F. Additional initiatives and support measures

Various national and international organizations have contributed to the development of the olive sector in Balochistan through targeted interventions, including:

- Grafting of natural olive forests using improved Italian and Spanish varieties with support from conservation and development partners;
- Installation of drip irrigation systems through collaborations with development agencies and provincial departments;
- Plantation of approximately 50,000 olive saplings in Zhob district;
- Support to academic institutions such as the Balochistan University of Engineering and Technology, Khuzdar, including provision of plants, nursery infrastructure, and weather monitoring systems under national afforestation programs;
- Financial support from Zarai Taraqati Bank Limited (ZTBL), which recognizes olive cultivation as a viable agribusiness and provides loans for orchard development, drip irrigation systems, and olive oil extraction equipment. The bank also supports farmer training and capacity building in production and value addition.

2. Punjab

The Government of Punjab recognizes the olive value chain as a sector with significant potential to contribute to socio-economic development and employment generation, particularly in the Potohar region. This region has been identified as highly suitable for olive cultivation and has been designated as the “Olive Valley” under a sector development approach aimed at creating an enabling environment aligned with international standards.

Although Punjab does not yet have a fully dedicated olive research institute, BARI, Chakwal has been conducting olive research since 1991 through a specialized research team, achieving notable progress in varietal evaluation and orchard management practices. Since 2011, government attention toward the olive sector has increased substantially, leading to the implementation of projects that provide technical support, infrastructure, and inputs for olive cultivation across suitable agro-ecological zones.

A. Key achievements and current status

- More than 1,000 farmers have been registered with BARI as beneficiaries of olive development programs, with projections to reach 2,000 during the project lifecycle;
- Approximately 750 farmers have received certified, disease-free, true-to-type olive plants free of cost, resulting in the establishment of plantations over 7,888 acres (as of April 2019);
- Financial incentives and technical support have been provided for water resource development and the installation of drip irrigation systems;
- A pilot-scale technical assistance program is being implemented under the Olive Valley initiative, with management support from a national private sector service provider; however, further strengthening through multidisciplinary expertise is required;
- Mechanization support has been enhanced through the provision of 30 tractor-mounted post-hole diggers (2.5 ft diameter), supplied on a loan basis to facilitate orchard establishment;
- Certified planting material has been distributed with subsidies, both directly and through private corporate growers such as Izhar Farms;
- Value addition remains limited, with less than 5% of total production processed into products such as pickles and preserves. Recently, Unique Value established the first commercial olive food processing unit in Chakwal;
- The marketing system is still underdeveloped. Currently, a few private entities, such as Unique Value Pakistan, Bagh-e-Zaitoon, Izhar Farms, and Olive Foundation Pakistan, are engaged in domestic marketing of olive oil and table olives;
- Only one olive oil extraction facility is operational at BARI Chakwal (established in 2017), providing free processing services to farmers. The facility currently has sufficient capacity to handle production in the short term (2-3 years).

B. Key constraints and gaps

- Most olive growers are small- to medium-scale farmers who face financial constraints due to the long gestation period (up to 8-9 years for full productivity);
- There is a lack of certified nurseries. Although private nurseries exist, they are largely uncertified, and the regulatory framework for plant certification remains underdeveloped;
- Limited development of the domestic nursery industry has resulted in continued dependence on imported planting material;
- Production challenges persist, particularly during flowering and fruit set stages, along with pest and disease pressures, including outbreaks such as anthracnose (notably reported in 2022);
- Insufficient availability of olive oil extraction units and processing enterprises limits value chain development;
- Table olive processing infrastructure is minimal, with only one processing system installed as of 2022;
- Packaging and bottling technologies remain inadequate to meet international quality and certification standards.

The Government of Punjab has realized that the research and development (R&D) arena of olive value chain expansion is not moving at its real potential due to several above-identified gaps and challenges that need to be addressed in future endeavors for improvement. Hence, launched a project for 2019-2023, allocating total funds of PKR 283.121 million (Agriculture Department, 2019). The primary emphasis is establishing the Centre of Excellence for olive Research and Training (CEFORT) at BARI Chakwal, to study olive adaptability in Potohar, Thal and Southern Punjab, including the Cholistan.

C. Government response and future strategy

Recognizing these challenges, the Government of Punjab has initiated a major project (2019-2023) with a total allocation of PKR 283.121 million to strengthen research, innovation, and capacity building in the olive sector.

A central component of this initiative is the establishment of CEFORT at BARI Chakwal. This center aims to support the sustainable development of the olive value chain by generating locally adapted technologies and data for key agro-ecological regions, including Potohar, Thal, and Southern Punjab (including Cholistan). The key objectives of the project are the following:

- Strengthen capacities in olive cultivation, orchard management, post-harvest handling, processing, and value addition;
- Develop and adapt technologies through both experimental (on-station) and participatory (farmer-based) research;
- Establish a repository of olive genetic resources and support their conservation and management;
- Conduct socio-economic research to support value chain development.

To achieve these objectives, the project includes the following interventions:

- Establishment of three state-of-the-art laboratories, namely, Olive Oil Quality Laboratory, Value Addition/Product Development Laboratory and Disease Diagnostic and Integrated Pest Management (IPM) Laboratory;
- Conduct field diagnostic surveys to identify key constraints faced by stakeholders;
- Implementation of adaptability trials in Thal and Southern Punjab regions;
- Development of a demand-driven research program with continuous expert evaluation (including approximately 20 research trials);
- Strengthening linkages with national and international research institutions;
- Establishment of olive multiplication blocks in collaboration with the private sector;
- Import and evaluation of promising olive germplasm (including genetic characterization);
- Training of trainers (approximately 100 master trainers and extension agents);
- Organization of national olive festivals and scientific conferences/workshops;
- Provision of advisory services to farmers, including the use of ICT-based tools.

The value chain development component is expected to be implemented in subsequent phases, in consultation with stakeholders and under the guidance of the proposed Olive Advisory Board. This approach aims to facilitate commercialization, enhance technology adoption, and integrate

market intelligence into the research and development system, thereby improving responsiveness to private sector needs.

3. Khyber Pakhtunkhwa

Khyber Pakhtunkhwa (KP) possesses substantial agro-ecological potential for olive cultivation, particularly in regions such as the Malakand Division, Peshawar Valley, the merged districts of the former Federally Administered Tribal Areas (FATA), and areas located on the right bank of the Indus River. These zones are characterized by suitable climatic conditions and soil profiles conducive to olive production.

The province has approximately 880,000 hectares of cultivable wasteland that could be utilized for olive cultivation. Recognizing this potential, the Government of KP has adopted a proactive approach over the past two decades by implementing multiple projects, often in collaboration with federal institutions and international partners, to promote olive cultivation and develop the associated value chain. These initiatives aim to enhance rural livelihoods, generate employment, and support sustainable agricultural development.

The major initiatives undertaken in the province are summarized below:

A. Promotion of the production and marketing of olive oil in Pakistan (2008)

This project, funded by the Italian Government with an allocation of PKR 39.185 million, was implemented by the Istituto Agronomico per l'Oltremare in collaboration with the Pakistan Oilseed Development Board. The project focused on promoting olive cultivation in districts including Charsadda, Bajaur, Bannu, Buner, Lower Dir, Malakand, Mardan, Swabi, Swat, Kurram, North and South Waziristan, Tank, and Khyber. Key achievements include:

- Training of approximately 1,000 smallholder farmers in olive cultivation and grafting techniques;
- Establishment of demonstration orchards in Malakand and Mardan (Sangbatti), with documented oil production outputs;
- Installation of an olive oil extraction unit at Tarnab with a capacity of 500 kg/hour;
- Capacity building of approximately 30 technical staff through training conducted by the Pakistan Council of Scientific and Industrial Research.

B. Distribution of olive saplings

The KP Agriculture Department has distributed approximately 9,300 olive saplings free of cost among farmers in Bajaur and other tribal districts to promote olive cultivation and expand plantation areas.

C. Provision of oil extraction facilities

Olive oil extraction units have been installed in key producing districts, including Bajaur, Dir, Mardan, Nowshera, and Abbottabad. These facilities support local farmers by enabling on-site oil extraction and reducing post-harvest losses.

D. Expansion of olive cultivation

Approximately 50% of the tribal districts, such as Bajaur, Kurram, North and South Waziristan, are considered suitable for olive cultivation. Currently, olive trees are being cultivated in Dir, Swat, Abbottabad, Mardan, Peshawar, Nowshera, and southern districts. Increasing farmer interest has led to a growing market for fresh olives, with farm-gate prices ranging from PKR 20 to 100 per kilogram.

E. Promotion of olive cultivation on a commercial scale in Pakistan (POCCSP – Provincial Component)

Under the federal POCCSP initiative, the KP component has been implemented through the provincial Department of Agricultural Research. The project aims to provide comprehensive support, including infrastructure, inputs, and technical services, for olive value chain development. Key achievements under Phase I include:

- Plantation of approximately 431,465 olive trees over 12,000 acres across districts such as Dir, Nowshera, Swat, Abbottabad, and Mardan;
- Introduction of drip irrigation systems to enhance water-use efficiency and expand cultivable land;
- Designation of the Agriculture Research Institute (ARI) Tarnab, Peshawar, as a Centre of Excellence for olive research, and recognition of Sangbatti (Mardan) as an “Olive Valley”;
- Establishment of olive oil extraction units;
- Initiation of registration processes for private olive nurseries;
- Development of model olive orchards in locations such as Manki Sharif (Nowshera), Bajaur, Dir Lower, and Malakand;
- Provision of matching grants to farmers for nursery development and establishment of processing and extraction facilities.

F. Ten billion tree Tsunami program (Phase I: 2019-2023)

Under this national afforestation initiative led by the Ministry of Climate Change, olive cultivation has been integrated as a key component in KP. Key outcomes include:

- Plantation of approximately 8,000 olive trees over 27 hectares in suitable areas;
- Survival rates exceeding 95% over the first two years;
- Estimated future production of approximately 112,000 liters of olive oil annually once full maturity is reached;

- Expansion of plantations in areas such as Amangarh (near Peshawar);
- Identification of over 70 million wild olive trees, with ongoing grafting programs implemented jointly by forestry and agriculture departments to convert them into productive orchards.

G. Provincial olive development initiative

The Agriculture and Livestock Departments have proposed a five-year olive development project (valued at PKR 2,000 million) under the Prime Minister's National Agriculture Emergency Program. The project aims to expand olive cultivation across all seven tribal districts in a phased manner.

H. Phased expansion strategy

In the first phase, large-scale olive cultivation is being initiated in Bajaur district, with planned expansion to South Waziristan, North Waziristan, Kurram, Orakzai, Khyber, and Mohmand districts. An initial allocation of PKR 80 million has been designated for the first phase (2021-2022).

4. Azad Jammu and Kashmir

The Government of Azad Jammu and Kashmir (AJK) recognizes olive cultivation as a promising opportunity to enhance rural livelihoods and improve economic conditions. Provincial leadership has emphasized the importance of promoting olives as a commercial crop to support farmer prosperity and regional development.

Under the federal project POCCSP (Phases I & II), the Department of Agriculture AJK has been actively supporting the development of the olive value chain. This support includes the provision of planting material, training, and technical assistance across various agro-ecological zones of the region.

Farmers are being encouraged to establish olive orchards through the distribution of olive saplings and participation in training and awareness programs focused on cultivation practices, orchard management, and post-plantation care. Efforts are also underway to strengthen local nursery development to reduce dependence on external suppliers.

A. Key achievements

- Distribution of 44,676 olive saplings to farmers free of cost under Phase I;
- Under Phase II, approximately 30,000 saplings distributed on a 33% cost-sharing basis;
- Survey and identification of wild olive trees in districts including Muzaffarabad, Bagh, Poonch, Sudhnoti, and Kotli;
- Establishment of olive plantations over approximately 400 acres;
- Implementation of adaptability trials for exotic olive varieties at Ghathor and Danna (Muzaffarabad);

- Support for the establishment of olive mother blocks and germplasm units;
- Organization of training programs for farmers and stakeholders, covering best practices in cultivation, pruning, nursery management, processing, packaging, and marketing.

B. Key constraints

- Absence of public sector olive oil extraction facilities;
- Lack of drip irrigation systems to support water-efficient cultivation;
- Limited development of local plant propagation systems and nursery infrastructure;
- Absence of upgraded laboratories for value addition and quality analysis;
- Lack of weather stations and agro-meteorological services to support decision-making by farmers.

5. Gilgit-Baltistan

Gilgit-Baltistan (GB) offers considerable potential for olive cultivation, particularly in districts such as Diamir, Gilgit, Ghizer, and the sub-divisions of Darel/Tangir and Chilas. Recognizing this potential, the federal project POCCSP has initiated activities to promote olive cultivation and lay the foundation for the development of the olive value chain in the region. These efforts have focused on plantation development, varietal adaptability testing, and capacity building of farmers and stakeholders.

A. Key achievements

- Establishment of olive plantations covering approximately 267 acres;
- Conduct of adaptability trials for exotic olive varieties at the Mountain Agricultural Research Centre (MARC), Juglot, and Paeen Nagar;
- Support for the establishment of olive mother blocks and germplasm units;
- Training of approximately 222 farmers and stakeholders in olive cultivation practices, nursery development, processing, packaging, and marketing.

B. Key constraints

- Absence of olive oil extraction facilities in the public sector;
- Lack of drip irrigation systems to support efficient water use;
- Limited development of local nurseries and plant propagation systems;
- Absence of value-addition laboratories and facilities for quality analysis;
- Lack of weather stations and technical advisory services for farmers.

VI – Assessment and sampling of wild olives with agronomic potential in suitable provinces

Olive has been identified as a highly promising crop for expansion due to its low water requirements and adaptability to a wide range of ecological conditions, including marginal environments with limited water resources. Across different ecological zones of Pakistan, diverse morphological and ecological types of wild olive have existed for centuries. These wild olives can be readily distinguished from cultivated varieties based on their smaller fruit size and lower oil content, which is sometimes negligible.

Despite their abundance, limited efforts have been made, both in Pakistan and globally, to comprehensively explore the diversity and divergence between wild and cultivated olive populations. However, this genetic diversity represents a valuable resource for breeding programs, particularly for the introgression of desirable agronomic traits and resistance to biotic and abiotic stresses. For instance, Naz *et al.* (2019) demonstrated significant divergence between cultivated and wild olive genotypes, highlighting the potential of both local and exotic germplasm for genetic improvement. Overall, the high level of diversity within wild olive populations offers substantial opportunities for the development of improved cultivars through targeted breeding and genetic manipulation. To fully exploit this potential, extensive sampling and the application of advanced genotyping tools are required to better characterize the population structure of wild olives in Pakistan.

Until the 1980s, no systematic efforts were made to utilize wild olives for research or commercial purposes. A major initiative began in 1986, when the Pakistan Oilseed Development Board (PODB) launched a program to promote olive cultivation by grafting wild olive trees. Approximately 5.5 million wild plants were grafted using unidentified olive varieties; however, the outcomes were not particularly successful.

Subsequent efforts, particularly from the early 2000s onward, focused on converting wild olives into productive trees using improved and scientifically validated grafting techniques. Research indicated that “T-grafting” could achieve success rates of 80-90% (POD, 2021). Similarly, Mukhtar *et al.* (2001) compared T-grafting and bark grafting techniques throughout the year and found that both methods achieved peak success rates (up to 100%) between August and mid-September, with negligible success during other periods.

Building on these findings, the government launched a pilot project (2004-2008) titled “*Rapid Conversion of Wild Olives into Bearing Species*”, targeting regions such as KP, FATA, Balochistan, and AJK. The project also emphasized farmer training in proper grafting techniques. According to the PERI report, converting approximately eight million wild olive trees into productive varieties could potentially generate up to US \$1 billion annually.

Farmers have largely adopted budding and T-grafting techniques due to their high success rates and the relatively short time required for trees to begin fruiting (3-4 years) (Shoaib and Shehbaz, 2022). Data provided by POD on grafting activities across provinces are summarized in Table 7.

Table 7. Number of wild olive trees grafted into productive trees.

Province	Number of trees grafted
Khyber Pakhtunkhwa	3.50 million
Baluchistan	2.70 million
Punjab (Potohar)	1.80 million
Total	8.00 million

Source: Pakistan Oilseed Department (POD)

Over the past two decades, coordinated efforts involving public and private sector investments, strategic planning, and farmer participation, supported by training programs, media outreach, workshops, and technology transfer initiatives, have yielded tangible results. Approximately eight million wild olive trees have been successfully converted into productive ones, significantly increasing farmer interest across Punjab, Balochistan, KP, tribal areas, GB, and AJK.

From an agro-economic perspective, farmers report that grafted olive trees require relatively low input costs, including minimal land preparation, irrigation, fertilizers, and pesticides. Detailed contributions of various stakeholders in promoting wild olive grafting are presented in Table 8.

Table 8. Contributions of various stakeholders to the promotion of wild olive grafting.

Province/ Agro-ecology	Organization/ Project	Wild olive trees found and grafted
KP	Forest & Agriculture Departments 10 billion trees afforestation project	70 million wild olive trees found 40 million wild olive trees grafted
Bajaur, Kurrum, KP, Orajzai, Waziristan districts	10 billion trees afforestation project	35 million wild olive trees found 500,000 wild olive trees grafted
Punjab, Baluchistan, KP	Rapid conversion of wild olives into bearing species 2004- 2008 PODB	About eight million wild olive plants found 3.5 million olive trees grafted More than 4,000 trees had started bearing fruit since 2004-2005
Bajaur District	DAO, Agriculture Extension Department Bajaur (GOP funded)	400,000 wild olive trees grafted 30,000 wild olive trees grafted are bearing fruits
Tribal Areas	Shah Khalid, a tribal elder and farmer	36,000 million wild olive trees growing in mountainous tribal areas
Bajaur	Director Agriculture Bajaur (GOP funded)	400,000 wild olive trees grafted
Different provinces	Greenfield project	8 million wild olive trees grafted
Punjab, Balochistan KP, Sindh, AJK, GB, ICT	Olive Promotion Cultivation on Commercial Scale in Pakistan MNFSR	Pilot intervention for conversion of 5 million wild olive plants
AJK	Al-Khidmat Foundation	114,000 wild olive plants grafted 22,000 are bearing fruits

Source: Various project reports of POD

Historically, wild olive trees, despite their abundance, had limited commercial value and were primarily used for timber and firewood. However, government-led initiatives and technological support have transformed these resources into economically viable assets. Currently, fruits from grafted trees are increasingly being processed for oil extraction and other value-added products, marking a significant shift in the utilization and economic importance of wild olives in Pakistan.

VII – Mapping of existing services and facilities

1. Mapping of registered olive plant nurseries and registered olive varieties

Regarding olive plant nurseries supplying plantlets to growers, a total of eight nurseries is currently registered with the Federal Seed Certification and Registration Department (FSC&RD), while four additional nurseries are in the process of registration (Table 9).

Under the POCCSP project, eleven double-shaded nursery tunnels have been established across various project components: two at BARI Chakwal, two at ARI Tarnab, one at NTHRI Mansehra, two at BARDC Quetta, two at the sub-station Loralai, one at ARI sub-station Baghbana (Khuzdar), and one at ARI Quetta. These nurseries are equipped with integrated irrigation, heating, and cooling systems (temperature control), along with other essential facilities, enabling large-scale production of high-quality olive saplings.

The FSC&RD has also designated BARI Chakwal as a mother orchard hosting 86 olive varieties, and Izhar Farms (Kallar Kahar) with 38 varieties. The olive varieties registered for commercial cultivation include: Gemlik, Koroneiki, Hamdi, Pendolino, Jerboui, Ascolana, Manzanilla, Picual, Hojiblanca, BARI Zaitoon-I, BARI Zaitoon-II, ZAR Bratica, Tarnab Picual, and Cherat Zaitoon.

Table 9. Nurseries registered or in the process of registration with the Federal Seed Certification and Registration Department.

Name of the Nursery	Status
Barani Agricultural Research Institute, Chakwal	Registered
Izhar Farms Pvt. Ltd., Kallar Kahar, Chakwal	Registered
Al Atta Farm, Bikhari Kalan, Chakwal	Registered
The Farms Nursery, Neela Dhulla, Chakwal	Registered
Sehgal Farms, Kallar Kahar, Chakwal	Registered
Agricultural Research Institute, Peshawar	(in process)
Shah Gulab Nursery, Nowshera	Registered
Munawar Afreedi Nursery, Khyber Agency	(in process)
Zaitoonkhwa Nursery Farm, Talash, Lower Dir	Registered
Zaikor olive nursery, Kohat	Registered
Balochistan Agri. Res. & Dev. Centre, Quetta	(in process)
Agriculture Research Institute, Loralai	(in process)

2. Mapping of olive oil extraction units

Olive oil extraction facilities have been established across various provinces through the POCCSP project as well as through provincial development initiatives. In total, twenty-five extraction units are currently operational within major olive-growing clusters (Table 10). These units operate under different service models: some provide extraction free of charge, while others retain approximately 10% of the extracted oil as a service fee. During the 2022 harvesting season, however, the POCCSP project directed all units to process olives free of cost in response to the exceptional flood-related challenges faced by farmers, with operational expenses covered by the project.

At present, private sector participation in olive processing remains limited. However, it is anticipated that increased production volumes and growing consumer demand will encourage greater involvement from industry stakeholders in the near future.

3. Mapping of olive processing/table olive value addition units

Globally, a wide range of value-added products are derived from olives, olive oil, and pomace. While olives are typically categorized for oil production or table consumption, certain varieties can serve dual purposes, reflecting the versatility of the crop.

In Pakistan, table olives represent a particularly promising segment for value addition. To support this, the POCCSP project has established three table olive processing units at BARI Chakwal, ARI Quetta, and ARI Tarnab. These units operate under the supervision of trained personnel. Additionally, a laboratory has been set up to standardize processing methods and recipes for various value-added products. As a result, several products have been developed and standardized, including olive soap, pickles, biscuits (cookies), jam, olive chutney, olive syrup, liquid handwash, balms (with shea butter, cocoa butter, and beeswax), olive leaf tea, pomace pellets, medicated oil, and olive paste products. Although these products are being marketed, their distribution remains limited.

Recognizing the high market potential of table olives, the OliveCulture Project organized a training workshop in October 2022, in collaboration with national counterparts. The training, titled *“Table Olive and Value Addition Processing Protocols and Hygiene Safety,”* was delivered by an Italian expert across three provincial sites. It aimed to operationalize newly established processing units and standardize olive handling procedures across different scales, from semi-industrial to household levels. Participants included plant managers, operators, food technologists, laboratory technicians, farmers, processors, youth, women, and government officials. An additional training session was conducted at a facility managed by civil society and PPAF in Lower Dir (KP).

Despite these efforts, most olive varieties currently grown in Pakistan, including those suitable for table use, are primarily utilized for oil extraction. This trend is largely driven by government subsidies for oil extraction, while no comparable incentives exist for table olive production.

Table 10. Mapping of olive oil extraction units.

Khyber Pakhtunkhwa				
N°	Unit Model	Capacity	Location	Working condition
1	ALFA LAVAL	500kg/hr	Agriculture Research Institute Tarnab, Peshawar	No
2	OLIMIOGOLD	100kg/hr	Model Farm Service Center, Lower Dir	Yes
3	MoriTem FORMA	250kg/hr	PPAF Associated Community, Lower Dir	Yes
4	KOCAKMAZ	200kg/hr	Israr Farm, Dherai Thalash, Lower Dir	Yes
5	KOCAKMAZ	200kg/hr	Agriculture Research Institute, Mingorra, SWAT	Yes
6	MoriTem FORMA	250kg/hr	ARS - Kohat	Yes
7	OLIMIOGOLD	100kg/hr	Model Farm Service Center Bajaur	Yes
8	OLIMIOGOLD	100kg/hr	Agriculture Extension Orakzai	NA
9	MoriTem FORMA	500kg/hr	CCRI – Pir Sabak, Nowshera	Yes
10	MoriTem FORMA	500kg/hr	Olive Model Farm Sangbatti, Mardan	Yes
11	OLIMIOGOLD	100kg/hr	National Tea & High Value Crops Research Institute, Mansehra	Yes
12	MoriTem FORMA	250kg/hr	HARS - Abbottabad	NA
Balochistan				
N°	Unit Model	Capacity	Location	Working condition
13	PIERALISI	600kg/hr	Balochistan Agricultural Research and Development Centre, Quetta	Yes
14	PIERALISI	600kg/hr	Agriculture Research Institute, Loralai	Yes
15	MoriTem FORMA	250kg/hr	PPAF Associated Community, Zhob	NA
16	OLIMIOGOLD	100kg/hr	Agriculture Officer, Zhob	Yes
17	MoriTem FORMA	250kg/hr	PPAF Associated Community, Muslim Bagh	NA
18	OLIMIOGOLD	100kg/hr	Agri. Res. Station, Khuzdar	Yes
19	OLIMIOGOLD	100kg/hr	Panjgoor	NA
Punjab				
N°	Unit Model	Capacity	Location	Working condition
20	OLIMIOGOLD	100kg/hr	National Agriculture Research Centre, Islamabad	No
21	OLIMIOGOLD	100kg/hr	Barani Agriculture Research Institute, Chakwal	Yes
22	PIERALISI	600kg/hr	Barani Agriculture Research Institute, Chakwal	No
23	Alfa Laval	500kg/hr	Allah Ditta Unique Values, Chakwal	NA
24	PIERALISI	600kg/hr	Barani Agriculture Research Institute, Attock	Yes
25	NA	NA	Zahid Iqbal Allied Foods, Faisalabad	NA

Source: OliveCulture – POCCSP

4. Mapping of research and development institutes involved in olive promotion

Numerous public and private organizations, companies, and academic institutions are actively engaged in research and development related to olive cultivation. Their work focuses on enhancing the socio-economic and environmental benefits of the sector. A detailed list of these institutions is provided in Table 11.

Table 11. List of the research and development institutions involved in olive promotion.

Name of institute/Organization	Activity focus
Pakistan Oilseed Department, Islamabad	At national and international level; i) Policy formulation, ii) Coordination, iii) Research, iv) Project development, v) Data compilation at national and provincial level
National Agricultural Research Centre, Islamabad	Research on varieties; i) Development, ii) Selection, iii) Evaluation, iv) Genetic markers
Barani Agricultural Research Institute, Chakwal and CEFORT	i) Diagnostic field survey, ii) Adaptability trials, iii) Stakeholder consultations, iv) Research experiments /Trials, v) Establishment of olive multiplication blocks in private sector, vi) Collection and import of olive Germplasm, vii) Organize training of trainers, viii) Olive festival, ix) Conference, x) workshops/seminars, xi) Olive advisory services to olive stakeholders
Mountain Agriculture Research Center GB	i) Promotion of olive plantation, ii) Olive orchards development and management
Agricultural Research Institute, Tarnab (ARI), Peshawar	i) Diagnostic field survey, ii) Adaptability trials, iii) Stakeholder consultations, iv) Research experiments /Trials, v) Establishment of olive multiplication blocks in private sector, vi) Collection and import of olive germplasm, vii) Organizing trainings, viii) Olive festival, conference, workshops/seminars, ix) Olive advisory services to olive stakeholders
National Tea & High-value Crops Research Institute, Mansehra	NA
Agricultural Research Institute (ARI), Sariat, Quetta	i) Olive cultivar adaptability study, ii) Promotion of olive plantation, iii) Olive orchards development and management
Baluchistan Agricultural Research & Development Centre, Quetta	i) Olive Cultivar Adaptability study, ii) Promotion of olive plantation, iii) Olive orchards development and management
Agriculture Extension Department, Muzaffarabad, AJK	i) Promotion of olive plantation, ii) Olive orchards development and management
Institute of Biotechnology and Genetic Engineering, The University of Agriculture, Peshawar KP	i) Molecular diversity and associated phenotypic and biochemical divergence in olive gene pool
University of Agriculture Peshawar	i) Evaluation of olive cultivars in varied environments, ii) Olive oil quality, iii) Molecular divergence
Pir Mehr Ali Shah Arid Agriculture University Rawalpindi	i) Morphological characterization, ii) Phenological characterization, iii) Adaptability of Olive Cultivars

VIII –Considerations and recommendations

The available information on efforts and activities undertaken by public, private, and national and international organizations to strengthen the olive value chain in Pakistan has been comprehensively reviewed. The current assessment of resources, infrastructure, equipment, and inputs supporting olive-related activities is based on an extensive analysis of reports, scientific publications, online sources, and consultations with multiple stakeholders.

It is important to note that, prior to 2000, provincial government initiatives in olive cultivation were not systematically documented or quantified, except for plantation efforts initiated in collaboration with the Italian government during the mid-1980s. The structured development of the olive sector effectively began in 2000, with a strong focus over the following decade on large-scale plantation

establishment using improved agricultural practices, including the introduction of exotic olive varieties and the grafting of wild olive trees.

Current progress indicates that over 4 million olive saplings have been planted across approximately 15,000 hectares in diverse agro-ecological zones. Significant efforts have been made in stakeholder capacity building, supported in part by the OliveCulture Project. Several local and internationally standardized nurseries have been established, along with oil extraction units and value-addition laboratories to facilitate processing. Public-private partnerships are also being encouraged to ensure long-term sustainability.

Based on GIS-based assessments by PARC, several regions have been identified as suitable for olive cultivation and value chain development. However, further adaptive research is required to validate these findings and expand the crop's potential.

Despite the progress achieved, there remains a strong need to expand access to services, infrastructure, equipment, and inputs to further strengthen the olive value chain. Adoption of drip irrigation systems is particularly critical to address water scarcity. Given that many stakeholders are resource-constrained and relatively new to the sector, continued government financial support, particularly through subsidies, is essential. Sustainable development will also require comprehensive training in good agricultural practices, processing techniques, value addition, and oil extraction aligned with international standards.

The continued expansion of the olive sector is expected to generate significant socio-economic benefits, including employment opportunities. It is estimated that, within 4-5 years, olive plantations could produce approximately 12 million Liters of oil annually, valued at around PKR 18 billion. However, this projection depends on achieving average yields of 20-50 kg per tree and the adoption of effective management practices across the value chain.

Stakeholder consultations, field visits, and discussions with researchers and farmers indicate that public sector investments and technological interventions have been commendable. However, several key recommendations have been identified to ensure sustained growth and development of the olive sector:

- A comprehensive national policy is essential to address production, processing, marketing, and trade-related challenges. Current project-based approaches may not ensure long-term sustainability. A coordinated policy framework, developed in consultation with provincial governments and industry stakeholders, should define clear implementation strategies, institutional roles, and support mechanisms, including farmer cooperatives and market integration systems.
- Provincial governments should align their initiatives with federal strategies and integrate olive sector development into their core budgets and institutional mandates to sustain progress beyond project cycles.
- An integrated approach is needed to expand olive cultivation, focusing on high-yielding, stress-tolerant cultivars validated through standardized adaptability trials. Climate change impacts, pest pressures, and yield variability highlight the need for improved crop management and effective technology transfer to farmers.
- Enhanced coordination among federal and provincial agencies, research institutions, private sector actors, and NGOs is crucial. Establishing a national advisory body would facilitate

policy planning, data management, quality control, certification systems, and alignment with international standards, while strengthening linkages across the value chain.

- Since smallholder farmers represent over 70% of olive producers, access to affordable credit and subsidies is critical. Incentive-based policies and market stabilization measures can encourage adoption of olive cultivation. However, organizing smallholders into functional groups or cooperatives remains a key challenge.
- Promoting olive cultivation through agro-ecological clusters can enhance efficiency and impact. These clusters should be supported with infrastructure, market linkages, targeted subsidies, and tailored agronomic practices. Engagement of civil society organizations can further strengthen these initiatives.
- Additional oil extraction units are needed in key olive-growing regions such as Potohar and Sangbatti. Feasibility studies developed by SMEDA (2017) can guide potential investors and entrepreneurs in establishing such facilities.
- Limited availability of registered nurseries is a major constraint. Existing nursery clusters, particularly in Pattoki (Kasur District), Peshawar, and Mardan, should be further developed to supply certified olive planting material. Leveraging their expertise can significantly improve nursery standards and plant quality.

Based on stakeholder consultations and sector analysis, olive cultivation represents a highly viable alternative oilseed crop for Pakistan. The country's agro-ecological conditions, particularly marginal and underutilized lands, are well suited for olive production. With appropriate policy support, infrastructure development, financial incentives, and awareness campaigns, the olive sector has strong potential to replace a portion of imported edible oils and promote a healthier domestic alternative, *i.e.*, olive oil.

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