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CURRENT SCENARIO OF OILSEEDS IN PAKISTAN

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ABSTRACT

Edible oils are vital for human nutrition and play a crucial role in many physiological activities. Oils from plants, particularly from vegetables, are beneficial for health, offering energy, vital fatty acids, and vital nutrients. This review explores the importance of seeds producing oils, specifically emphasizing Pakistan's sector for edible oils. It tracks past shifts, studies current conditions, and foresees potential developments. A significant shortfall in domestic oil production for consumption exists in Pakistan, making the country largely dependent on external sources, subsequently inflating its import expenses. Comparing local output with imports shows a consistent growth in the latter in recent years, paralleled by an uptick in individual intake levels. This review further suggests methods to enhance the domestic production of oilseeds, encompassing considerations like agricultural land repurposing and assesses oilseed's economic implications in Pakistan. It also details obstacles encountered in the production of oilseeds, shedding light on issues like market barriers, seed caliber, and equipment concerns. Emphasizing the potential Pakistan holds for cultivating unconventional oilseeds, this research accentuates the need for a consistent and enduring strategy to boost local output. United initiatives throughout the sector are imperative to realize self-reliance in the oil domain, ranging from distributing superior seeds to ensuring equitable compensations for agriculturists.

Keywords: Edible Oils, Oilseed Production, Pakistan's Oil Imports, Agricultural Policy, Self-sufficiency in Edible Oils

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1. INTRODUCTION

The normal development and regulation of numerous biological functions depend on the consumption of edible oil, which is an essential component of the human diet (Micha et al. 2017).). To maintain good health, approximately one third of total caloric intake should ideally come from oils and fats (Burlingame et al., 2009). Vegetable oils are predominantly extracted from plants. Most of these are sourced from seeds, while oils like olive, coconut, and palm are procured from the fruit's endosperm (Gunstone, 2011). Oilseed crops are the primary sources of edible oil. In Pakistan, notable sources include Cottonseed, Rapeseed, Mustard, Canola, Sunflower, and Soybean (GOP, 2019). Following cereals and sugar crops, oilseed crops are vital in the country's diet, providing approximately 2.5 times more energy than proteins and carbohydrates (Emadi and Rahmanian, 2020). Furthermore, vegetable oils serve as the primary source of essential fatty acids and are critical for human nutrition, also supplying necessary components such as vitamin D and vitamin E (Trumbo et al. 2002).

2. Global Oilseeds Scenario

Oil seed crops are cultivated worldwide and are recognized as vital crops due to their economic significance (FAO, 2018). Oilseed crops play an integral role in agro-based industries and global trade (OECD/FAO, 2018). They are primarily cultivated for the production of edible oil. Moreover, the meal residue from numerous oilseeds serves as an indispensable source of high-protein feed for livestock, poultry, and fish. Recently, oilseeds have garnered increased attention due to a surge in demand for their healthful vegetable oils, livestock and poultry feeds, pharmaceutical applications, biofuels, and other oleochemical industrial utilities. This heightened interest has catalyzed an 82% expansion in oilseed cultivation areas and a staggering 240% increment in global production over the past three decades (USDA, 2023). Predominant oilseed crops on the global scale include soybean, brassica, sunflower, cotton, oil palm, and peanuts. However, diminished oilseed production can be attributed to the effects of assorted biotic and abiotic stresses (Embaye et al. 2018).

The above Fig. 1 demonstrated that the pandemic COVID-19, the locust attack, and other climatic factors caused a decrease in the overall global production of oilseed crops in 2019–20.



WORLD OILSEED PRODUCTION

Fig. 1: World Oilseeds Production: Source: Oilseeds - World Markets and Trade, a USDA Publication.



Fig. 2: Import Bill of Eidble Oil and Oilseeds: Source: Pakistan Bureau of Statistics, External Trade Division

3. History of Edible Oil Sector in Pakistan

Pakistan's edible oil sector has undergone significant transitions throughout its history. The Pakistan Oilseed Development Board (PODB), currently affiliated with the Ministry of National Food Security & Research (MNFS&R), has been pivotal in advancing oilseed crops in the nation. Provincial Ministries of Agriculture have also played essential roles, partnering with various stakeholders in this sector (Kamal et al. 2022).

Historically, population growth-induced edible oil demand instigated the founding of organizations dedicated to oilseed cultivation promotion. One such initiative was the establishment of the Pakistan Edible Oil Corporation (PEOC) in 1977 under the Ministry of Industries, symbolizing the initial significant government endeavor for oilseed crops (Javed et al. 2016). Nevertheless, by 1979, after PEOC's dissolution, the Ghee Corporation of Pakistan (GCP) inaugurated a Seed Division. This division managed crops such as sunflower, safflower, and soybean, promoting seed distribution and procuring produce for oil extraction (Momtaz et al. 2023). This era was especially successful for sunflower cultivation in Punjab and Sindh and soybean in Khyber Pakhtunkhwa.

Yet, in 1993, the Seed Division's operations ceased, paving the way for the National Oilseed Development Project (NODP) — a World Bank-approved program from 1987. The NODP undertook a comprehensive study, culminating in the "Oilseeds Development Strategy" report in 1995. Despite its ambitions, this phase failed to achieve the anticipated growth in oilseed cultivation due to seed supply and procurement challenges (World Bank, 1997).

The subsequent era, commencing in 1995, was characterized by the PODB's inception, which championed projects on perennial oil-bearing trees like olive and oil-palm, besides introducing crops such as Canola to marginal terrains. Their endeavors bridged farmers with the private sector and streamlined procurement for the solvent industry. The hosting of major international seminars and initiatives on crops such as Rapeseed and Mustard manifested their commitment to the sector (State Bank of Pakistan, 2021). However, following the 18th amendment Act in 2011, PODB's role was curtailed (Senate of Pakistan, 2010).

4. Status of Oilseeds in Pakistan

Pakistan's domestic edible oil production is notably insufficient. Edible oil holds the position as the top food import commodity in Pakistan, following only petroleum, petrochemicals, and machinery in the import hierarchy (GOP, 2018). Historically, Pakistan achieved self-sufficiency in edible oil up to the early 60s. The 1963 commencement of palm oil imports witnessed modest figures in the subsequent two decades. However, from the mid-90s, edible oil imports surged, positioning Pakistan as the third-largest global importer, surpassed only by China and India (USDA, 2019). The edible oil/oilseeds import bill has escalated from US\$ 615 million in 2006 to US\$ 3.068 billion in 2020 (OECD-FAO Agricultural Outlook, 2021).

In the fiscal year 2019-20, Pakistan's edible oil availability totaled 4.316 million tons, with domestic production only fulfilling 0.554 million tons, which is 13% of the demand. Consequently, Pakistan needed to import 3.765 million tons, accounting for 87% of domestic requirements, incurring an expense of Rs.474.77 billion (US\$ 3.068 billion). The volume of edible oil/oilseeds imports did not exhibit an increment from 2018-19, but the dollar price surge inflated the total expenditure. In 2019-20, oilseed crops' cultivation in Pakistan expanded, predominantly in the Punjab province. Canola and Mustard cultivation reached 795,700 acres, generating 482,000 tons. Concurrently, Sunflower and Sesame were cultivated on 90,512 acres and 301,000 acres, respectively, in Punjab (DCRSP, 2020).

4.1. Soybean Status in Pakistan

Soybean was first introduced as a type of oilseed in Pakistan in the early 1960s, but farming remained limited until the 1970s, when adaptation and production studies carried out throughout country imparted encouraging results. Based on the results from these studies, the large expanses of Khyber Pakhtunkhwa (KP, formerly NWFP), Punjab, and Sindh were determined to be the best for commercial soybean growing. In Pakistan, soybean oil enhanced 260 tonnes in 2017 from 240 tonnes in 2016. As it is known, soybean is a legume crop that has the capability of boosting soil fertility by fixing nitrogen in the soil and can be utilized in crop rotation patterns to improve soil quality for the next crop by replenishing depleted nitrogen. Soybean industrialization has been hindered primarily by challenges such as an absence of commercialization for product and after-products, a lack of appropriate knowledge, expertise, and cultivation technologies, and an inadequate return on investment. The absence of high-yielding, climate-suitable, and pest-resistant soybean cultivars is a significant barrier to crop adoption. Adaptation of this golden bean in Pakistan can lower import costs, but it has a number of limitations, Photoperiod sensitivity, heat stress, herbicides, insect assault, alkaline soil, and viral infections are the key concerns. Mosaic virus is one of the leading causes of viral infections, causing a decline in oil content, a reduced seed germination rate, poor seed quality, and approximately 35% yield losses in soybean, But in certain cases, it has been observed that the yield is reduced by 94%. Photoperiod is an important factor specifically at flowering time. It is controlled by the relationship of internal circadian rhythms and external day length, which varies with geographical latitude. Soybean (Glycine max L.) flowering and maturity times are essential reproductive characteristics of agronomic significance. These characteristics are useful in the development of soybean cultivars with a broader geographical adaption.

4.2. Soybean as a Dire need of Time

Soybean is a highly diverse leguminous as well as an oilseed crop. It has an exceptional nutritional profile containing 38-42% protein, 18-22% oil, 25-30% carbohydrates, and is enriched with vital minerals and vitamins. This bean is a source of vegetable oil, animal, and poultry feed, and bio-diesel production. Pakistan is spending over US \$1000 million per annum on soybean imports to meet poultry feed requirements and US \$3000-3500 million per annum on edible oil and oilseeds imports. The import of soybean has dropped from 2.5 to 1.2 million tonnes due to regulatory and legal issues. The lower soybean meal for poultry feed has caused an increase in poultry prices. Current cropping systems in Pakistan are exhaustive and deteriorating soil productivity rapidly. Soybean adds 15-25 kg nitrogen/ acre and therefore, is considered the best choice for crop rotation to restore/ improve soil fertility (Shahrajabian et al. 2019). The inclusion of one crop "soybean" will revamp Pakistan's agriculture, seed, and feed industries, uplift farmers' socioeconomic status, and reduce 5.0 billion dollars in imports. Despite the fact that the bulk of the Pakistani soybean germplasm collection has been characterised for agro-morphological traits, molecular characterization of this collection is missing. The molecular characterisation of germplasm collections can aid in the identification of various genotypes as well as provide sources for unique and unusual alleles that are extremely important for molecular mapping, genotype identification, and gene introgression into cultivated soybean.

However, the Directorate of Crop Reporting and Services Punjab's preliminary estimates indicate a 48% decline in Canola and Mustard's cultivation during 2020-21. Factors such as the substantial rise in wheat prices and uncertainty about oilseed pricing deterred farmers from opting for oilseed crops, enhancing wheat cultivation instead (Final Rabi Crops Estimates 2021). The 2019-20 fiscal year observed significant palm olein and palm oil imports, collectively valued at Rs.279.88 billion. This imported oil, unfortunately, is of lesser quality, contributing to health concerns across the population (USDA, 2020). Pakistan also imported Olive oil, vegetable oil, and oilseed types like Soybean and Canola for extraction and meal production purposes. Estimations indicate that industries such as cosmetics and paints consume 10-15% of the total edible oil availability (GOP, 2018). Furthermore, over 200,000 tons of edible oil and vanaspati ghee are primarily exported to Afghanistan, excluding the unrecorded quantities smuggled across borders (OECD-FAO Agricultural outlook, 2021).

4.3. Trends in Local Oilseeds Production Vs Edible Oil Import during Last Two Decades

Pakistan has consistently experienced a shortfall in oilseeds production. Over 80% of the nation's edible oil needs are addressed via imports. Beginning in the early 1970s, imports witnessed an annual growth rate of 12.5%, a trend that is projected to persist in tandem with the population surge (GOP, 2018). Initiatives have been launched to amplify domestic production. A comparative analysis of local edible oil production versus imports spanning from 2000 to 2020 can be found in Table 2. Fig. 1 encapsulates the financial implications of these imports over the past decade. Local oilseed yield has largely plateaued with minor deviations over the two-decade period (Chaudhry et al. 1998). Several determinants have catalyzed these fluctuations, with the procurement pricing for farmers being paramount. Given their status as minor crops, oilseeds often miss out on robust policy support, guaranteed procurement prices, and effective market strategies, leading to a stagnation in cultivated areas. Favorable governmental strategies coupled with competitive market prices for oilseed products can substantially impact the edible oil and oilseeds' import bill. In 2017-18, the Punjab government initiated the Oilseeds Promotion Initiative, underscoring the significance of oilseed cultivation (GOP, 2018). The repercussions of this initiative manifest in Fig. 1, which depicts a downtrend in the import bill.

4.4. Increasing Trend in Per Capita Consumption

Over the past two decades, the per capita consumption of edible oil has increased from 6 kg annually to 18 kg because of the country's growing population and shifting dietary habits. (Agriculture, Economic Survey of Pakistan, 2019). Factors such as accelerated urbanization, increased income levels, a heightened preference for roasted fast food, and an emerging trend in dining out have contributed to this shift (FAO, 2020). Owing to its cost-effectiveness and resilience during deep frying, palm oil has become a favored choice in fast-food establishments. This, unfortunately, has led to notable health risks, including hypertension and cardiovascular complications, even among younger demographics (Ganguly and Pierce, 2012).

5. Strategies to Enhance Oilseeds Production in Pakistan

To ensure food security for the nation, it is paramount to estimate local requirements for every agricultural commodity. This approach will inform decisions about how best to allocate agricultural land in potential regions on a national scale (FAO, 2017). A successful implementation of this strategy relies on strengthening Agricultural Research and Extension. This involves increasing awareness among the farming community, mechanizing agricultural processes, implementing policies favorable to small landholders, and restructuring the current market system (Albore, 2018).

In the fiscal year 2019-20, a growth of 2.90% in significant crops was documented (Economic Survey of Pakistan, 2020). Regarding the edible oil situation in the same fiscal year, the nation relied heavily on imports. To address self-sufficiency in edible oils, land currently used for wheat and sugarcane could be transitioned to oilseed cultivation (GOP, 2019).

5.1. Total Area Needed in Pakistan for Self-Sufficiency in Edible Oil

There were 4.316 million tons of edible oil available in the nation in 2019–20. The importation of oil and oilseeds allowed for the fulfillment of the 3.765 million tons of edible demand. Oilseeds (canola, mustard, sunflower, and sesame) are currently grown on 1.69 million hectares, and the nation produced 0.554 million tons of edible oil overall. To meet the country's needs for edible oil, an additional area of about 4.8 million hectares is needed. Total Area Needed in Pakistan for Self-Sufficiency in Edible Oil.

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6. Economic Impact

Oilseed crops, especially cottonseed, sunflower, canola, and rapeseed/mustard, hold a crucial position in Pakistan's agricultural framework. Their significance to the nation's GDP is directly tied to their pivotal role in domestic edible oil production (GOP, 2020). Additionally, they are of paramount importance for their potential in exports and in decreasing the expenditure on edible oil imports (FAO, 2017). Historically speaking, agriculture has consistently been responsible for approximately 20-25% of Pakistan's GDP (World Bank, 2022). Within this vast agricultural contribution, while oilseeds play a notable role, they do not match the dominance of staple crops such as wheat and rice (FAO, 2017).

The economic influence of the oilseed sector transcends mere production. It stands as a robust pillar for employment across its extensive value chain (GOP, 2020). This includes stages from cultivation, through harvesting and post-harvest operations, to the intricacies of processing, distribution, and marketing. For many farm workers, especially those residing in regions with prevalent oilseed cultivation, these crops are fundamental to their

livelihood (FAO, 2017). Moreover, the oil processing industry, encompassing oil extraction mills, is a considerable source of employment, providing jobs to a vast segment of the populace. Beyond these immediate operations, there's a burgeoning space for research and development within the sector (World Bank, 2022). Propelled by both governmental and private enterprises, this domain offers promising avenues for agronomists, dedicated researchers, and scientific minds. However, for a detailed insight into employment metrics or specific percentages tied to the oilseed industry, one would need to delve into specialized studies or authoritative reports. Renowned sources in this regard include publications by the Food and Agriculture Organization (FAO) or research outputs from indigenous agricultural research institutions (FAO, 2017).

Table 1: Local Oliseeds Cultivation and Froduction in the Country during 2017-2	Table 1: Local	Oilseeds Cultivation	n and Production in the	Country during 2019-20
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Table 1. Local Onseeds Caldvalon and Froduction in the County Gaming 2017 20					
Crop	Area (000 acres)	Seed Production (000 tons)	Oil Production (000 tons)		
Cotton	6,212	2,412	289		
Rapeseed-Mustard	970	545	180		
Canola	128	81	31		
Sunflower	274	157	55		
Sesame	318	62	-		
Total	7,902	3,257	555		

Source: Pakistan Oilseed Development Board (PODB)

Table 2: Local Edible Oil Production Vs Imported Edible Oil Production Vs	Edible Oil
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Year	Local Edible Oil production (Million Tons)	Imported Edible Oil (Million Tons)
2000-01	0.642	1.23
2001-02	0.497	1.197
2002-03	0.475	1.293
2003-04	0.494	1.382
2004-05	0.583	1.605
2005-06	0.793	1.696
2006-07	0.857	1.76
2007-08	0.833	1.871
2008-09	0.684	1.831
2009-10	0.662	1.681
2010-11	0.696	1.983
2011-12	0.636	2.097
2012-13	0.567	2.175
2013-14	0.573	2.326
2014-15	0.556	2.408
2015-16	0.462	2.791
2016-17	0.431	2.645
2017-18	0.508	2.931
2018-19	0.5	2.421
2019-20	0.554	3.765

Source: Economic Survey of Pakistan & Pakistan Bureau of Statistics

Table 4: Cost Analysis of Imported and Local Oilseeds during 2020

ltems	Value		
Total availability of edible oil during 2019-20	4.316 million tons		
Total share of imported edible oil available from all sources during 2019-20	3.765 million tons		
Total quantity of local seeds required for 3.765 million tons oil @ 33% oil recovery	I I.409 million tons		
Area required to produce 11.409 tons oilseeds @ 0.8 ton per acre	14.261 million acres		
Additional area required for oilseed crops in hectares	5.77 million ha		
Current Oilseeds Cultivation in the Country	1.69 million ha		
Total area required for oilseed crops for self sufficiency	7.46 million ha		
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Data source: I. Pakistan Bureau of Statistics, External Trade Section, Karachi, 2019-20: 2. Pakistan Economic Survey, 2019-20

	Table 5: Cost Anal	ysis of Imported	& Local Oilseeds	during 2020
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ltems	Imported oilseed (Rs./metric ton)			
	Canola	Sunflower	Soybean	
Average C&F price at Karachi during 2020	81,220	67,580	62,426	
Import duty with additional charges @ 5%/metric ton	4,061	3,379	3,121	
Federal Excise Duty (FED)/Sales tax	13.807 (17%)	11,489 (17%)	6,243 (10%)	
*Import expenses @ 10.5%	8,528	7,096	6,555	
pcountry transportation	5,000	5,000	5,000	
Total landed cost at factory gate	112,616	94,544	83,345	
Total landed cost at factory gate (Rs./kg)	113	95	83	
Market price of local produce (Rs./kg)	80	75	70	

* Import expenses = Insurance 1%, Shortage 1%, LC 0.4%, Bank charges 0.6%, Income Tax 5.5%, Stevedoring and Packing/bagging charges 2%. (I US\$ = 155.0 PKR: Source: I. USDA December 2020: 2. Pakistan Oilseeds Development Board, Islamabad.

Table 6: Cost Analysis of Imported & Local Edible Oil during 2020

ltems	Imported Edible Oils (Rs./metric ton)				
	Palm oil	Palm Olein	Sunflower	Soybean	Canola
Average C&F price at Karachi during 2020	119,970	124,000	133,610	132,630	151,125
Import duty fixed on oil	9,180	7,692	16,800	10,550	16,800
Federal Excise Duty (FED)/Sales tax @ 17%	20,395	21,080	22,714	22,547	25,691
PODB Cess on edible oil import	50	50	50	50	50
*Import expenses @ 10.5%	12,597	13,020	14,029	13,926	15,868
Upcountry transportation	5000	5000	5000	5,000	5000
Total landed cost at factory gate	167,192	170,842	192,203	184,703	214,534
Total landed cost at factory gate (Rs./kg)	167	171	192	185	215
Local cost after meal adjustment (Rs./kg)	-	-	175	150	185

* Import expenses = Insurance 1%, Shortage 1%, LC 0.4%, Bank charges 0.6%, Income Tax 5.5%, Stevedoring and Packing/bagging charges 2%. (I US\$ = 155.0 PKR: Source: I. USDA December 2020: 2. Pakistan Oilseeds Development Board, Islamabad

6.1. Cost Analysis of Local Vs Imported Oilseeds and Edible Oils

Typically, imported canola, soybean, and sunflower seeds are used to make meal and extract oil. The importers contend—falsely—that imported seeds are less expensive at the factory gate than locally produced canola and sunflower. (Chaudhry et al. 2021). A proper cost analysis of imported vs local oilseeds revealed that production of canola and sunflower seeds in the country is not only economical than the imported but also save precious foreign exchange. Similarly, production of canola and sunflower oil in the country is more economical than the imported canola and sunflower oils (USDA Foreign Agricultural Service, 2021). However, the Vanaspati ghee Industry always prefers to import palm oil due to its low price and ease for conversion into Vanaspati ghee (Tariq et al. 2018). Whereas the palm oil is the lowest quality oil having maximum saturated fatty acid portion which causes serious health hazards (Wiseman, 2019). The detailed cost analysis of oilseeds and edible oils (local vs Imported) during 2020 is given in Table 5 and Table 6.

Reviewing Table 5 and 6 makes it abundantly evident that the oil business may access locally produced Canola and Sunflower seed and oil at a more reasonable cost without having to go through several procedures to import these goods (USDA Foreign Agricultural Service, 2021). Saving money on foreign currencies and protecting local oilseed farmers are further benefits to the national economy. Both the oil industry and oilseed growers benefit from the circumstance. Therefore, the government and all other oil seed stakeholders should take action to increase domestic output by creating and implementing farmer-friendly policies that address production and procurement challenges for the nation's sustainable domestic oilseed production (Chaudhry et al. 2021).

7. Challenges of Oilseeds Production

Oilseed cultivation in Pakistan faces multiple challenges that need to be addressed to ensure sustainable production and meet domestic demand. Among these challenges, marketing constraints stand out prominently. The unstable and inefficient marketing of oilseed crops greatly undermines development and promotional endeavors. Farmers often face challenges in obtaining a reasonable price for their produce, leading to a decline in their enthusiasm to grow oilseed crops. One viable solution could be the establishment of facilitation centers in collaboration with stakeholders at grain markets. Announcing a reasonable procurement price in a timely manner can instill confidence in farmers and motivate them to cultivate oilseeds (Rana et al. 2022).

Policy constraints further exacerbate the situation. Historically, the government has regarded oilseed crops as minor, despite the significant import bill associated with them (FAO, OILCROPS, OILS AND MEALS, 2020). However, recent shifts in government focus have categorized oilseed crops as priority crops. Consistent and applied government policies will be essential to reinforce the confidence of oilseed growers and promote the sustainable cultivation of these crops. The past three decades have seen various government policies concerning the oilseed sector. A notable policy allowed the import of low-quality palm oil, ensuring a steady supply of edible oil at reduced prices. This inadvertently discouraged local production and led to a surge in domestic consumption, neglecting oil quality considerations. Additionally, this policy inadvertently promoted the illegal export of Vanaspati ghee to neighboring countries (Ali et al. 2021).

Quality seed availability is another hurdle. Although public research organizations have developed high-yield and quality oilseed varieties, the absence of an effective seed multiplication system hampers the widespread dissemination of these seeds to farmers. Imported hybrid seeds, especially for sunflower, canola, and mustard, often show reduced adaptability to the local climate and come at a high cost (Gremmen et al. 2019).

Machinery poses its set of challenges. Significant post-harvest losses occur primarily because appropriate machinery is either unavailable or financially out of reach for small farmers. It becomes imperative to design adequate planting, harvesting, and threshing machinery to mitigate these losses (Rana et al. 2022).

In terms of financial constraints, oilseed crops like sunflower involve a higher production cost compared to the selling price, discouraging farmers from adopting them. For consistent oilseed production, the government should consider setting an attractive support price for the produce and guarantee efficient local marketing systems. Moreover, the current government tax policy on oilseed and edible oil imports negatively impacts the demand and pricing of local produce. Creating favorable conditions for local oilseed production is essential (Kirby et al. 2017).

A significant challenge arises from the lack of coordination among oilseed stakeholders. Bodies like APSEA and the Vanaspati Ghee Mills Association often work at cross-purposes, creating a divide without considering the interests of oilseed growers. Aligning the interests of all stakeholders is crucial for the successful promotion of oilseeds in the country (Ahmed et al. 2017).

8. Future Perspectives

Pakistan holds a vast potential for the cultivation of non-traditional oilseed crops. In recent years, efforts have been made to promote the cultivation of oilseeds such as flaxseed, safflower, and sesame, which are not traditionally dominant in the country's agricultural landscape. These crops have shown adaptability to Pakistan's diverse agro-climatic conditions, especially in regions with water scarcity due to their drought-resistant properties (Haq et al. 2019). With increasing global demand for diverse edible oils and the nation's endeavor to reduce the hefty import bill of oils, tapping into this potential can bring lucrative economic benefits (Mahmood et al. 2021).

Simultaneously, research and development (R&D) initiatives in Pakistan are playing a pivotal role in boosting oilseed production. Institutions such as the National Agricultural Research Centre (NARC) and the Pakistan Agricultural Research Council (PARC) have embarked on projects to develop high-yielding, disease-resistant oilseed varieties. Their work in germplasm collection, hybrid seed development, and agronomic practices has shown promising results, especially in enhancing the yields of sunflower and canola. Such research not only assures better returns for farmers but also ensures sustainable production, keeping in view the increasing domestic demand for edible oils (Shah et al. 2014).

Moreover, the role of government policies and international partnerships cannot be understated in shaping the future of the oilseed sector in Pakistan. The government, recognizing the significance of the sector, has introduced initiatives like the 'National Oilseed Enhancement Program,' which aims to promote the cultivation of oilseeds and reduce dependency on imports ("National Oilseed Enhancement Program," 2023). Furthermore, international collaborations, especially with agricultural research institutions and universities, are facilitating the transfer of technology, capacity building, and knowledge exchange. For instance, the collaboration with the International Center for Agricultural Research in the Dry Areas (ICARDA) has enabled local researchers to access global best practices in oilseed cultivation, leading to the introduction of advanced cultivation techniques in the country (ICARDA, 2018).

10. Conclusion

It is concluded that a long-term, consistent oilseed policy is required in order to increase domestic oilseed production and reduce the cost of imports. Only by assuring the purchase of oilseed products at a fair price taking into account the cost of production would it be achievable. Additionally, canola, sunflower, and sesame crops have the potential to improve the nation's existing status with regard to edible oil. To achieve the goal of self-sufficiency, all parties involved in the oilseed industry will work together to motivate farmers, provide high-quality seed, disseminate useful production technology, offer machinery at reduced rates, and ensure that purchases are made at fair prices. In order to retain the confidence of the oilseed growers and keep oilseed farming in Pakistan on a sustainable basis, the entire oilseed picture in Pakistan has been critically examined.

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