AN EVALUATION OF COMPARATIVE ADVANTAGE OF DOMESTICALLY PRODUCED EDIBLE OIL CROPS: CHALLENGES & OPPORTUNITIES

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDIXES

EXECUTIVE SUMMARY

Pakistan's imports of edible oils (palm and soybean-related imports) stood at US$ 4 billion in 2020–21 with an average growth of 12.3 percent in the last 20 years. The present report aims to evaluate the economic viability of import substitution of edible oil in Pakistan by focusing on canola and sunflower oil as alternatives to wheat production. The study compared the economics of competing crops and assessed the potential for reducing oil imports by reallocating land from wheat to canola or sunflower cultivation. It further evaluated the import substitution by comparing the price of one kg of imported oil with domestically produced edible oil. Additionally, the research identified the challenges and inefficiencies at different nodes of the value chain of edible oils. The comparison of canola with wheat revealed that importing canola by exporting wheat was economically viable during the year 2021–22 but the situation reversed in 2022–23 when growing canola domestically became more feasible because the prices of canola oil increased more sharply than the prices of wheat. However, comparing wheat with sunflower demonstrated that it was economically more beneficial for the country to grow sunflower domestically during the years 2021–22 and 2022–23 because sunflower production was found to have a comparative advantage over wheat.

While exploring the import substitution of canola and sunflower with domestic production, our results revealed that import substitution of both canola and sunflower was not economically viable during 2021–22 and 2022–23 importing canola and sunflower oils was significantly cheaper than producing these oils domestically. However, comparing the prices of canola and sunflower oils with the price of palm oil widened the difference because the prices of palm oil are less than those of canola and sunflower oils in the international market. However, imposing high import taxes on palm oil, canola, and sunflower seeds, and taking initiatives to enhance the domestic yield of edible oil crops may help to boost import substitution. The feedback gathered from farmers and the oil industry through focused group discussions highlighted the multiple constraints like the low availability of high-quality seeds and the use of less efficient traditional

technology in the crushing and extraction of oil. Alongside, efforts have also been initiated by the government to cultivate palm oil domestically which may help to reduce edible oil imports in the future.

INTRODUCTION

Pakistan faced a huge trade deficit of USD 48.64 billion during 2021-22 and the challenge is getting more difficult to bridge this gap (GoP, 2021). Pakistan's imports of palm and soybean-related imports stood at USD 4 billion in 2020–21 with an average growth of 12.3 percent in the last 20 years (SBP, 2022). The value of the imports of edible oil is 43 percent of total food imports (USD 7.57 billion). It is equal to 60 percent of the three-year International Monetary Fund (IMF) loan program of USD 6 billion.

Edible oil is one of the important commodities of everyday use in Pakistan, but the country is chronically deficient in its production (Zaidi, 2014). About 86 percent of the domestic requirements are met through imports from different countries, especially Indonesia and Malaysia (SBP, 2022). Since the early 1970s, the import of edible oil has increased by 12.5 percent annually. This increasing trend of imports will not only continue but is expected to worsen with an increase in population and per capita income (Hameed & Azeem, 2017).

Pakistan was self-sufficient in edible oil at the time of independence, but in later years, the country began to import edible oil in small quantities to support domestic production. Since 1969-70, the consumption of edible oil has grown at exorbitant rates, while domestic production has failed to keep pace due to multiple reasons, which include, poor quality seed, poor crop management practices, lack of specific seed drills, harvesting machines, and moving production towards marginal lands. Per-capita use of vegetable oil has increased from 5.31 kg in 1973-74 to 20 kg in 2018 and is predicted to reach 22 kg by 2028, further worsening the demand-supply imbalance. Total consumption is projected to reach 6.5 million tons by 2028 (Rana, *et al.*, 2022).

Pakistan's current edible oil requirement is about over 4.7 million tons and is expected to be at 5.9 million tons in 2025–26. Pakistan produced only 8 percent of the total edible oil requirement and imported the rest 92 percent in 2020-21. Similarly, in 2021–22, the country produced only 11 percent of its total

requirement and imported the rest. The imports of soybean and rapeseed oil are 2.6 million and 0.8 million tons, respectively during 2021–22. Pakistan produced only 0.460 million metric tons of oilseeds (cotton, rapeseed, mustard, sunflower, and canola) in 2021–22. In the same year, Pakistan imported 0.573 million metric tons of oilseeds (soybean and canola) (PODB, 2023). This demonstrates that only 32 percent of the total seed consumption was locally produced, while the major share was imported. With global uncertainties and problems confronting the oilseed sector, such as sharp price volatility and market instability, as well as favourable import tariffs, the import cost is anticipated to rise, highlighting the importance of a well-thought-out strategy and planning.

In Pakistan, traditional and nontraditional seed crops are grown but among them, rapeseed, mustard, sunflower, and canola are most commonly grown. Several organizations, including the Pakistan Edible Oil Corporation (1977), the Ghee Corporation in Pakistan (1979), the National Oilseed Development Project (1990–95), and the Pakistan Oilseed Development Board (1995), were established over the years to improve the country's edible oil/oilseeds situation. However, little to no progress has been made in raising the cultivated area and production of oilseeds in the country and despite all these efforts, the production has remained low. The cultivated area decreased from 1.1 million hectares in 2003–04 to 0.58 million hectares in 2018–19, and the production of oilseeds also decreased over that time, from 0.93 million tons to 0.56 million tons (Rana, *et al.*, 2022).

In light of the above discussion, the objective of this study is to investigate the whole value chain of oil seed production and its processing to identify the causes of the decline in the area of edible oil crops in Pakistan. Considering the financial constraints, the report covers the value chain of only two major oil seed crops, namely, canola and sunflower.

The specific objectives of the proposed study are to:

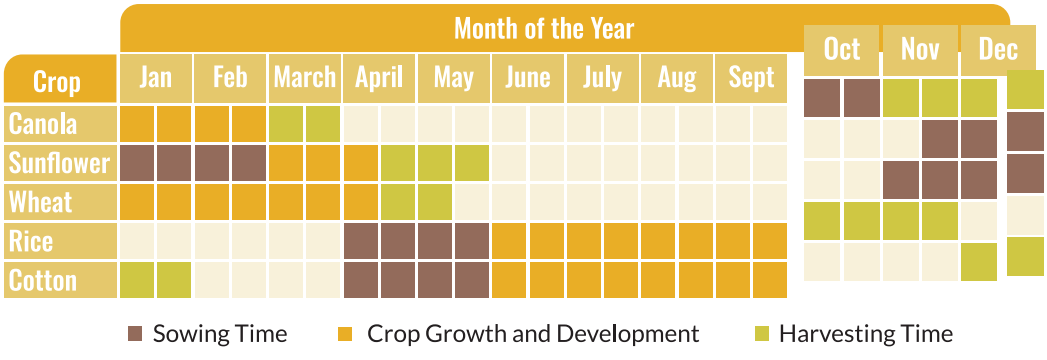
- compare the economics of competing crops, i.e., wheat, canola, and sunflower;

- assess the economic viability of import substitution of canola and sunflower oil; and
- identify the issues at different nodes of the value chain of edible oil.

COMPARISON OF EDIBLE OIL CROPS WITH THE COMPETING CROP

To conduct a comprehensive economic analysis of the possibility of spreading edible crops in Pakistan, it is essential to consider the competing crops cultivated during both the Kharif and Rabi seasons. In the Rabi season, wheat, tobacco, and barley compete with edible crops but tobacco and barley are grown in different areas from edible oil crops. Hence, edible oil crops are not replacing tobacco and barely, but wheat is grown all over the country and could be competing with edible oil crops. Wheat crop occupies 70 percent of the Rabi area and 37 percent of the total cropped area in the country. Out of the net area sown (15.74 million hectares) of Pakistan in 2021-22, wheat dominates the landscape by covering approximately 57 percent of the area (8.976 million hectares), 0.25 percent of the area (0.039 million hectares) under barley, while only 0.35 percent area (0.055 million hectares) is occupied by tobacco cultivation (GOP, 2022a). The crop calendar presented in Table 1, demonstrates that there is real competition between edible oil crops and wheat in the Rabi season. It is important to highlight that the wheat sowing season is November-December and the harvesting season is April, while the sowing season of canola (R&M) is a bit earlier than wheat but its harvesting ends in mid-March.

Table 1: Oilseeds Crop Calendar in Pakistan



Source: PARC (2023).

The cultivation of cotton starts in early April and, thus, it is quite challenging for the canola growers to prepare land for cotton crops in such a short period. Hence, the cultivation of canola poses a risk to the farmers who are interested in planting cotton crops after canola. Similarly, the plantation of sunflowers starts in late November but its harvest starts in mid-April and ends in late May. On the other hand, the cotton and rice crop cultivation starts in the first week of April and May, respectively, implying that for sunflower growers it is almost impossible to plant cotton and rice which is a limiting factor for the expansion of the area under sunflower cultivation. This indicates that the cultivation period for edible crops coincides with Kharif crops, such as cotton and rice. This limits the expansion of area under edible oil crops because it is not economically viable for farmers to cultivate edible crops by sacrificing cotton or rice crops which are also cash crops and generate higher profits for farmers.

Farmer's Perspective

The present study considers only canola and sunflower as competing crops with wheat by ignoring other minor crops of edible oil crops because of small contribution, time, and financial constraints. We did not consider olive as an import substitute for canola, sunflower, and palm oil because olive oil is an expensive product and an average Pakistani cannot afford it. Moreover, olive is a

tree, not a crop and it can be grown in marginal areas implying that it is not competing with existing crops in Pakistan. Thus, it can be considered a good source of export earnings. Another reason for not considering minor crops as import substitution is their small contribution to total domestic edible oil production.

Farmers always decide about their cropping pattern based on expected returns (profitability). Hence, the study attempts to estimate and compare the profitability of all three competing crops (wheat, canola, and sunflower) of the Rabi season. The per-acre profitability of each crop is estimated and reported in Table 2 for the last five years from 2017–18 to 2021–22. The revenue per acre is calculated by multiplying yield per acre with the farm gate prices, whereas the cost of production[1] is obtained from the Crop Reporting Service, Agriculture Department, Punjab (AMIS, 2023). It is observed that the profitability of wheat has consistently remained higher than that of the edible oil crops, except in 2021–22, when prices of edible oil have drastically increased between 3 to 4 times in the domestic market derived by the devaluation of Pak Rupees and partially due to increase in prices in the international market.

Table 2: Per-acre profitability of Wheat, Canola, and Sunflower (PKR)

	Wheat			Canola			Sunflower		
Year	Revenue	Cost	Profit	Revenue	Cost	Profit	Revenue	Cost	Profit
2017–18	37,492	27,239	10,253	22,472	21,532	940	36,910	35,909	1,001
2018–19	36,985	32,250	4,735	26,931	21,677	5,254	38,509	36,508	2,001
2019–20	40,628	33,724	6,904	28,189	24,037	4,152	42,849	40,841	2,008
2020–21	54,558	38,880	15,678	34,884	28,747	6,137	53,868	44,025	9,843
2021–22	65,450	47,432	18,018	60,282	34,035	26,247	81,915	50,669	31,246

Source: Authors' calculation using data from AMIS (2023).

[1] The cost of production includes the cost of land preparation, seeds & sowing, water, fertilizers, dung, pesticides, weedicides, harvesting and transport costs, etc.

However, it is important to note that the profitability of canola and sunflower oil during the year 2021–22 did not surpass the profit of wheat due to an increase in yield, rather a devaluation of the Pakistani rupee, and thus inflationary effect pushed the farm gate price of canola more sharply upward than support prices of wheat. If the same scenario prevails in the future, it may continue to attract more area under canola which is expected to reduce the area under wheat cultivation. The wheat crop generates higher profitability than canola and sunflower mainly because of government intervention through minimum support price, which reduces the price risk for wheat growers and, consequently, leads to a preference bias towards wheat.

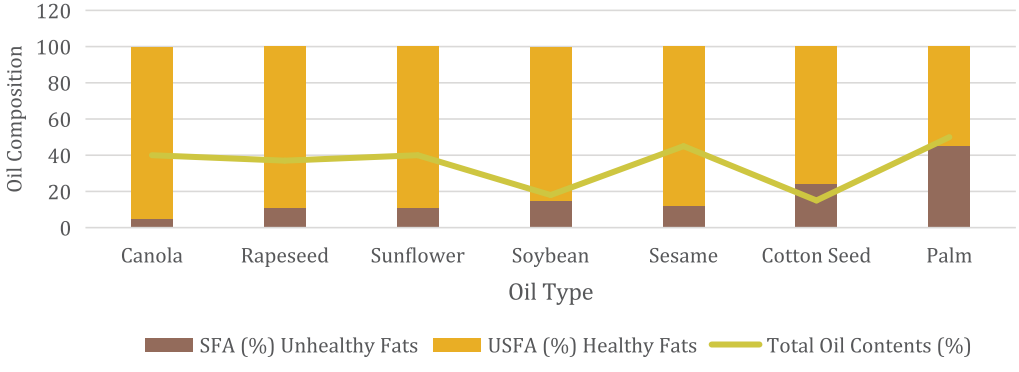
TRADE DEFICIT AND COMPARISON OF CANOLA AND SUNFLOWER OILS WITH PALM OIL?

It is well documented that the import of edible oil is contributing significantly to the country's trade deficit. Among the edible oils, palm oil is the largest import item of Pakistan, which is ranked first in agro-imports and second overall after petroleum. The large-scale imports are a result of Pakistan's rising per capita consumption of edible oil and the inability to domestically produce enough edible oil competitively. The entire amount of edible oil consumed locally is 5 million metric tons, of which 14 percent is produced domestically and 86 percent of local consumption is fulfilled through imports (SBP, 2022).

The continuation of the comparative advantage of the wheat crop over the edible crops for several years has led to a decline in area under edible oil crop cultivation. Therefore, the increasing gap between demand and supply contributes to an increase in the dependency on imported oil. Moreover, imported palm oil is comparatively cheaper than locally produced canola and sunflower oils. However, the nutritional quality of palm oil is lower than canola and sunflower oils because of the presence of a high percentage of unhealthy fats. Palm oil is considered the unhealthiest oil as it contains 45 percent of

saturated fatty acids (SFA) (Figure 1) which is the highest compared to canola, sunflower, and others. Canola oil can be regarded as the healthiest oil because it has 95 percent of unsaturated fatty acids (USFA) and only 5 percent of SFA (Figure 1).

Figure 1: Edible Oil: Quality Perspective



Source: AARI (2021).

The study examines the possibility of import substitution of edible oils for the possible reduction of trade deficit from Pakistan's economic perspective and ultimately evaluates the opportunity for self-sufficiency. Palm oil is cheaper than canola oil not only in the domestic market but also in the international market mainly due to the presence of a high percentage of unhealthy contents as shown in Figure 1. Moreover, palm oil is not grown in Pakistan on a commercial basis yet. However, trials have been started but commercial production has not yet started.

In the absence of palm production in Pakistan, the presence of unhealthy contents in it, and low international prices of palm oil, in this report we compare the import substitution with canola and sunflower oil. We have also learned that canola and sunflower crops are competing with wheat crops. Hence, it is important to explore which crop has a comparative advantage to grow domestically. For this purpose, we explore how much canola/sunflower oil can be

imported by selling the amount of wheat from one acre. If that amount of canola/sunflower oil is higher than the domestic yield (yield=production/acre), it shows that wheat has a comparative advantage over canola/sunflower production and vice versa. To see the reduction in the import bill of edible oil, one acre of wheat land is relocated to canola or sunflower. The reduction in import will be equal to the domestic yield (production/acre) of canola/sunflower oil. It is important to make such a comparison to decide whether we should grow crops that have a comparative advantage or resort to import substitution by ignoring the comparative advantage. Hence, if the domestic yield of canola/sunflower oil per acre is less than the quantity of import that can be made by exporting wheat from one acre then this implies that import substitution is not economically viable.[2]

To develop empirical evidence and support the argument, Tables 3 and 4 present the estimated value of wheat from one acre in the international market. We simply multiplied the average yield from one acre with the international prices in Pakistani rupees by using the documented exchange rate and subtracted the cost of transportation from the local market to the port to come up with the FOB price. Similarly, the domestic and international value of canola and sunflower oils that can be extracted from the production of one acre is also reported in the respective tables. Domestic values of both commodities at the factory gate have been estimated by adding the transportation cost from the local market to the factory gate in the retail prices (PBS, 2023), whereas the international prices of wheat, canola, and sunflower were taken from various international data reporting websites[3]. These international prices of canola and sunflower oil were estimated by adding all import taxes, freight charges, and transportation costs from the port to the factory gate.

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[2] Canola and sunflower oil per acre were estimated by using the extraction rate of 43% and 45%, respectively. Additionally, based on the export revenue of wheat from one acre, the corresponding quantities of imported canola and sunflower seeds were calculated. These imported seeds were then converted into canola and sunflower oils using the above-mentioned extraction rates.

[3] The international price of wheat was taken from Macrotrends (2023).
The international price of canola was taken from Trading Economics (2023).
The international price of sunflower was taken from INSEE (2023).

Economic Evaluation of Import Substitution of Edible Oil with Canola Production and to Support the Import of Edible Oil by Exporting Wheat During 2021-22 and 2022-23

It has been discussed above that canola and sunflower are two major oil-producing crops that compete with wheat crops, implying that a significant increase of areas under these two crops will reduce the area under wheat production. It is important to note that Pakistan imports oil seeds (canola and sunflower) but we have made a comparison in terms of edible oils (by converting imported and domestically produced seeds into oil). The comparison of import substitution of edible oil with local production of edible oil crops (canola and sunflower) is meaningless without unveiling the trade-off between edible oil crops and wheat production. Hence, it is important to investigate, how wheat export from one acreage can support the import of canola oil because it might be possible that import substitution is economically less viable than growing wheat and selling it in the international market. For example, export earnings from one acre of wheat can help finance the import of more edible oil (canola/sunflower) than to produce it locally (via import substitution) by allocating the same acre to canola/sunflower crops. Therefore, we evaluated and compared the difference between allocating one acre in the Rabi season to edible oil crops (canola/sunflower) to produce more edible oil with importing edible oil by selling wheat from one acre in the international market. This comparative analysis will facilitate the well-informed decision-making process regarding adopting import substitution or growing wheat domestically instead of growing canola oil and exporting wheat to support the import of edible oil.

If one acre is allocated to canola seed production, it produces 286.7 kg of canola oil at an extraction rate of 43 percent (Zum Felde, et al., 2007). On the other hand, the per-acre yield of wheat in Pakistan was 1.19 tons during 2021-22 (AMIS, 2023) and the international value of 1.19 tons of wheat was PKR 90,569 during the same year. However, in the domestic market, its value was PKR 71,259. To sell the wheat in the international market Pakistan has to deliver wheat at the international port (Karachi or Gwadar port), which incurs additional costs of

loading and unloading, insurance, and freight from a domestic market to the delivery port. We considered these costs equal to 10 percent (GoP, 2022) of the domestic value (i.e., PRK 7,126). After deducting these costs from the international value of wheat, one acre could generate a revenue of PKR 83,443 in 2021–22 (Rs.83443 = 90,569-7126; see Table 3). This shows that wheat prices in the international market were higher than the domestic prices during 2021–22.

The next step is to investigate how much canola seed (for oil extraction) we import instead of growing it domestically by spending the export revenue from wheat from one acre. This involves some cumbersome process. We had to estimate the factory gate prices of the imported and domestically produced canola/sunflower oil. Imported canola/sunflower oil involves several costs that need to be documented and required to be added to the international prices to find the factory price. Initially, we added loading and unloading, insurance, and freight costs equal to 10 percent (PKR 14.3 per kg) of the international price of canola oil (GoP, 2022) to the international prices to get free on board (F.O.B.) price (d=b+c in Table 3). In addition, imported edible oil is subject to a regulatory duty of 5 percent (equivalent to PKR 7.2 per kg), an import duty of 2 percent (equivalent to PKR 2.9 per kg), and a federal export duty/sales tax of 17 percent (equivalent to PKR 24.3/kg) (Hanif, 2022). Multiple other import expenses[4] at the rate of 10.5 percent (equivalent to PKR15/kg) and domestic transportation costs of PKR 8/kg from the domestic port to the factory gate add to the international price (AARI, 2021). Finally, the factory gate price of imported canola oil was PKR 214.6/kg. If we simply divide the revenue generated by exporting wheat from one acre by the price of imported canola oil (i.e. k=a/j) at the factory gate, it allows us to import 388.8 kg of canola oil.

[4] Import expenses = insurance 1 percent, shortage 1 percent, LC 0.4 percent, bank charges 0.6 percent, income tax 5.5 percent, stevedoring and packing charges 2 percent.

Table 3. Comparison of Import Substitution of Canola with Wheat Export

Import Substitution of Canola with Wheat Export	2021-22	2022-23
a. Revenue from the export of wheat from one acre (PKR)	83,443	47,600
b. The international price of canola per kg (PKR)	143	148.5
c. Loading and unloading cost, freight cost @10%	14.3	14.9
d. FOB Price (d=b+c) at a domestic port	157.3	163.4
e. Regulatory duty @ 5%	7.2	7.4
f. Import duty @ 2%	2.9	3
g. Federal Excise Duty (FED)/sales tax @ 17%	24.3	25.3
h. Import Expenses @10.5%*	15	15.6
i. Upcountry transportation charges per kg (PKR)	8	8
j. Factory gate landed price of canola oil (PKR/kg) (j=d+e+f+g+h+i)	214.6	222.6
k. The amount of canola oil that can be imported by exporting the amount of wheat from one acre (k=a/j) (kg)	388.8	213.8
l. Canola oil production from one acre (kg)**	286.7	286.7
m. Evaluation of import substitution (with taxes) with wheat export (m=k/l)	1.4	0.75
n. The domestic price of canola (PKR/kg)	388	580.5
o. Factory gate prices of domestically produced canola oil (PKR/kg) (o=n+i)	396	588.5
p. Difference between prices of domestically produced and imported Canola oil at factory gate PKR/kg (p=o-j)	173.4	357.9

**Import expenses = Insurance 1%, shortage 1%, LC 0.4%, bank charges 0.6%, income tax 5.5%, stevedoring and packing charges 2%.*

*** Using the extraction rate of 43% (Zum Felde, et al., 2007)*

Source: Authors' Calculation.

If the same acre had been allocated to canola production, it would have produced only 286.7 kg of canola oil. Hence, our analysis reveals that growing wheat on one acre would have allowed us to import 1.4 times more canola oil during 2021–22 which is about 40 percent higher compared to if we had produced canola oil domestically by allocating the same acre to canola production (Table 3). It shows that it is economically more profitable to grow wheat and export it to the international market and spend export earnings from wheat to import canola oil.

However, the situation reversed in 2022–23 because domestic prices of wheat were fixed higher than the international price through minimum support price which eliminated the possibility of wheat export. In such a situation if wheat has to be exported, the difference between domestic and international prices plus the transportation cost from the domestic market to the port has to be compensated by the government. Put differently, these costs have to be deducted from revenue earned by selling wheat in the international market. The net revenue earned by exporting wheat that will be available to import edible oil will decrease significantly. Therefore, the government policy of fixing high minimum support prices to protect domestic wheat farmers has changed the comparative advantage of growing wheat towards edible oil cultivation. This is how government interference in the free market mechanism changes the comparative advantage in favour of one crop by creating a disadvantage for other competing crops that leads to inefficient resource allocation. Besides government inference in markets, a slight decrease in international wheat prices and an increase in canola oil prices also contributed to a change in the comparative advantage in favour of canola oil production domestically.

The analysis demonstrates that Pakistan had a comparative advantage in growing wheat and spending the revenue of wheat export to import canola oil in 2021–22 but the scenario changed in 2022–23 when import substitution of growing canola became economically more feasible. This implies that the direction and magnitude of government interference in the wheat market is an important factors in deciding whether the country should move towards import substitution or export wheat and import canola oil with the revenue earned

through wheat export. In a nutshell, if wheat prices in the international market are significantly higher than the domestic price, then based on comparative advantage, it is more beneficial for Pakistan to grow a surplus of wheat and export it to the international market, and spend that revenue to import canola oil.

Industry's Perspective on the Domestically Produced Canola Oil

It is evident from comparing the prices of domestically produced and imported canola oil at the factory gate that the prices of imported canola oil are significantly lower than the domestically produced canola oil. This creates an incentive for domestic industry to import canola oil rather than purchasing from domestic producers. For example, during 2021–22 and 2022–23, the price differential was PKR 181.4 and PKR 365.9/kg, respectively. Our analysis reveals that domestically produced canola oil was about 85 percent and 164 percent more expensive than the imported canola oil at the factory gate in 2021–22 and 2022–23, respectively.

Empirical evidence from price comparison favours importing canola oil instead of growing it domestically. In the presence of such a huge difference in prices, the oil industry has no incentive to purchase domestically produced-canola oil. This implies that there is no comparative advantage in growing canola oil domestically, which might be because of low productivity of canola seed, unavailability of certified canola seed in Pakistan, poorly managed value chain of canola at the processing stage, or low extraction rate from the existing varieties of seeds. Thus, it requires further detailed investigation of the complete value chain to identify the potential intervention at different nodes of the value chain.

Economic Evaluation of Import Substitution of Edible Oil with Sunflower Production and to Import Edible Oil by Exporting Wheat During 2021–22 and 2022–23

Sunflower is another edible oil crop that can help to reduce the import bill of edible oil in Pakistan. In this section, we explore the option of the import substitution of sunflower oil with domestic production of sunflower and

supporting the import of sunflower oil by exporting wheat. We attempt to identify the most viable option by comparing the economics of both options.

As discussed above, the wheat production from one acre generated revenue of PKR 83,443 and PKR 47,600 by selling it in the international market in 2021–22 and 2022–23, respectively. The factory gate prices of the imported sunflower oil were PKR 426.2/kg and PKR 421.3/kg in 2021–22 and 2022–23, respectively (Table 4). It is important to mention that the factory gate price of the imported sunflower oil was derived after including loading and unloading, insurance, and freight costs equal to 10 percent (Rs.28.9/kg). The addition of these costs gave the free-on-board (F.O.B.) price at the Karachi port. We further added import duties (2 percent), FED (17 percent), regulatory duties (5 percent), transportation costs, and other import expenses (10.5 percent) to the international prices of sunflower oil (GoP, 2022; Hanif, 2022; AARI, 2021) to derive the factory gate prices. The factory gate prices of the imported sunflower oil would have allowed the import of 195.8 kg and 183.2 kg of sunflower oil from the international market in 2021–22 and 2022–23, respectively. However, if we had allocated the same acre to the sunflower crop, it would have produced 374 kg of sunflower oil at an extraction rate of 45 percent (KMI, 2023), implying that import substitution is economically viable in the case of sunflower production. Revenue generated by exporting wheat from one acre would allow importing only half of the sunflower oil that could have been produced by allocating the same acre to the sunflower crop. This demonstrates that the import substitution of sunflower oil with domestically produced sunflower is economically viable. Moreover, it also produced evidence that sunflower crop had a comparative advantage over wheat production in 2021–22 and 2022–23, which is also reflected in the higher per-acre profitability acre of sunflower crop than the per-acre profitability of wheat crop in 2021–22 (Table 2).

Industry's Perspective on Domestically Produced Sunflower Oil

The comparative analysis of prices of domestically produced sunflower oil at the factory gate PKR 458/kg and PKR 658/kg with the factory gate price of imported sunflower oil PKR 426.2/kg and PKR 421.3/kg in 2021–22 and 2022–23,

respectively, indicate that prices of domestically produced sunflower oil were higher than the imported one. Hence, a comparison of factory gate prices of imported and domestically produced sunflower oil reveals that imported sunflower oil had a comparative advantage over domestically produced sunflower oil. Even after adding all kinds of import taxes and transportation costs to the international prices, still it was cheaper than the locally produced sunflower oil. Because of the cheaper availability of imported sunflower oil, the industry prefers to import rather than purchase domestically produced sunflower oil, simply due to the low prices of imported sunflower oil. This demonstrates that we are losing comparative advantage with world production. To compete with the world market, we need to investigate the domestic value chain of sunflower oil production to identify the existing inefficiencies at different nodes of the value chain. Besides inefficiency in production and processing, high inflation might have also increased the domestic prices could have changed the comparative advantage in favour of imported sunflower oil.

Table 4. Comparison of Import Substitution of Sunflower with Wheat Export

Import Substitution Of Sunflower With Wheat Export	2021-22	2022-23
a. Revenue from the export of wheat from one acre (PKR)	83,443	47,600
b. The international price of sunflower per kg (PKR)	289.4	286
c. Loading and unloading cost, freight cost @10%	28.9	28.6
d. C&F price (d=b+c)	318.3	314.6
e. Regulatory duty @ 5%	14.5	14.3
f. Import duty @ 2%	5.8	5.7
g. Federal Excise Duty (FED)/sales tax @ 17%	49.2	48.6
h. Import Expenses @10.5%*	30.4	30
i. Upcountry transportation charges per kg (PKR)	8	8
j. Factory gated landed price of imported sunflower oil (PKR/kg) (j=d+e+f+g+h+i)	426.2	421.3

k.	The amount of sunflower oil that can be imported by exporting the amount of wheat from one acre (k=a/j) (kg)	195.8	113
l.	Sunflower oil production from one acre (kg)**	374.0	374.0
m.	Evaluation of import substitution with wheat export (m=k/l)	0.5	0.5
n.	The domestic price of sunflower	450	650
o.	The domestic price of sunflower at the factory gate (PKR/kg) (o=n+i)	458	658
p.	Difference between the domestic and international price of sunflower at the factory gate (p=o-j)	31.9	235.7

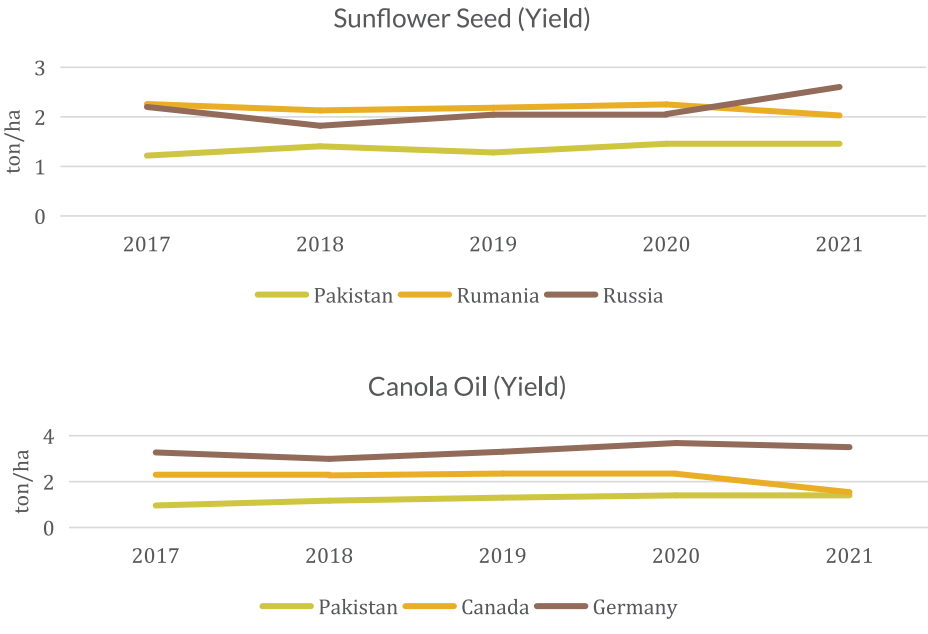
**Import expenses = insurance 1%, shortage 1%, LC 0.4%, bank charges 0.6%, income tax 5.5%, stevedoring and packing charges 2%*

*** Using the extraction rate of 45%*

Source: Authors' Calculation.

Comparing per-acre yields of edible oil crops with the yield of leading exporting countries (Canada, Germany, Romania, and Russia) demonstrates that Pakistan's yield is significantly lower (Figure 2). It contributes to increasing the cost of production and gives a comparative advantage to exporting countries over Pakistan. Hence, without increasing yield, it is hard to achieve import substitution. Rather, it requires a serious effort to enhance the domestic yield along with imposing import tax (as mentioned earlier). Fixing the minimum intervention price (MIP) as proposed by the Ministry of National Food Security and Research (MNFSR) for edible oil crops partially helps to achieve comparative advantage, but for sustainability, the country must enhance yield by introducing hybrid or GMO seeds.

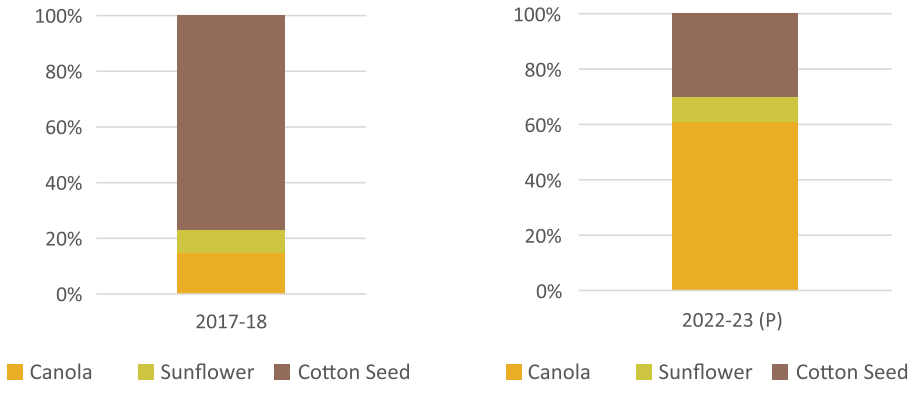
Figure 2: Yield Comparison of Canola Oil and Sunflower Seed



Sources: FAOS (2023) and Ritchie, et al., (2023).

As the yield of canola is increasing over time (Figure 2), it has attracted more area and, thus, the share of canola oil has also increased. In 2017–18, there was a 77 percent share of cotton seed oil which decreased to 30 percent in 2022–23, and contrary to that share of canola oil, increased from 15 percent in 2017–18 to 61 percent in 2022¬–23. This demonstrates that as the comparative advantage of canola oil has improved due to an increase in yield, its share in the total domestic editable oil supply has also increased (Figure 3) because of the increase in area under canola production.

Figure 3: Contribution of Different Sources of Edible in Domestic Production



Sources: GOP (2018 and 2023).

EVALUATING PALM OIL IMPORT SUBSTITUTION

Pakistan mainly imports palm oil which contains a high percentage of SFA. Palm oil is a natural and economical alternative for Pakistan due to its affordability, accessibility, and availability amid increased edible oil demand and stunted local production. Under the Preferential Trade Agreement, Pakistan buys 25 percent of its palm oil goods from Malaysia and 75 percent of its palm oil products from Indonesia. Due to increasing population pressure and increasing consumption of edible oils, Pakistan will have to import 4 million tons of palm oil by 2025, which would cost more than USD 3.5 billion (Aiman, 2021). Pakistan must regulate the import and usage of palm oil to prevent the anticipated increase. For that, there is a need to shift the import preferences towards canola and sunflower instead of palm oil. Moreover, since it is essential to mix palm oil with canola oil and others, its consumption cannot be eliminated. However, it can be reduced through import substitution. It is only possible if Pakistan can produce canola and sunflower oil domestically in an efficient manner, i.e., by offering lower factory gate prices of canola and sunflower oils than the imported ones.

Pakistan imports canola and sunflower seeds in small quantities, but the oils from these seeds are comparatively high quality and healthy. In contrast, the country imports palm oil in large quantities, which is comparatively low quality and unhealthy oil and causes health issues in all age groups. In 2021–22 and 2022–23, edible oil imports (majorly consisting of palm oil) amounted to USD 2.8 billion and USD 3.2 billion, respectively (GOP, 2023). More than 90 percent of edible oil imports consisted of palm oil and palm olein, whereas approximately 3 percent was soybean and the rest constituted olive, canola, and sunflower (AARI, 2021).

The analysis in previous sections revealed that factory gate prices of imported canola and sunflower oils are comparatively lower (after paying all the taxes) than the factory gate prices of locally produced canola and sunflower oils (Table 3 and Table 4). In the international market palm oil is cheaper (due to multiple reasons as explained earlier) than canola and sunflower oils. It implies that imported palm oil with domestically produced canola and sunflower will enhance the comparative advantage of industrialists by wide margins. Therefore, it can be safely concluded that the difference between factory gate prices of imported palm oil and domestically produced canola and sunflower oils will be larger than the difference between imported and domestically produced canola and sunflower oils.

As we have observed there is a large difference of PRK 181.4/kg and PKR 365.9/kg between domestically produced and imported canola oil prices in 2021–22 and 2022–23, respectively, and this difference emerged after the payment of all the import taxes, which are large in numbers. Similarly, the difference between domestically produced and imported sunflower oil prices was PKR 31.9/kg and PKR 236.7/kg in 2021–22 and 2022–23, respectively. In the presence of such a large difference between the prices of domestically produced and imported oils, there is little probability that import substitution will take place successfully because imported oils are significantly cheaper than domestically produced canola and sunflower oils. Palm oil is even cheaper than canola and sunflower oils. In the presence of such a large difference in the prices

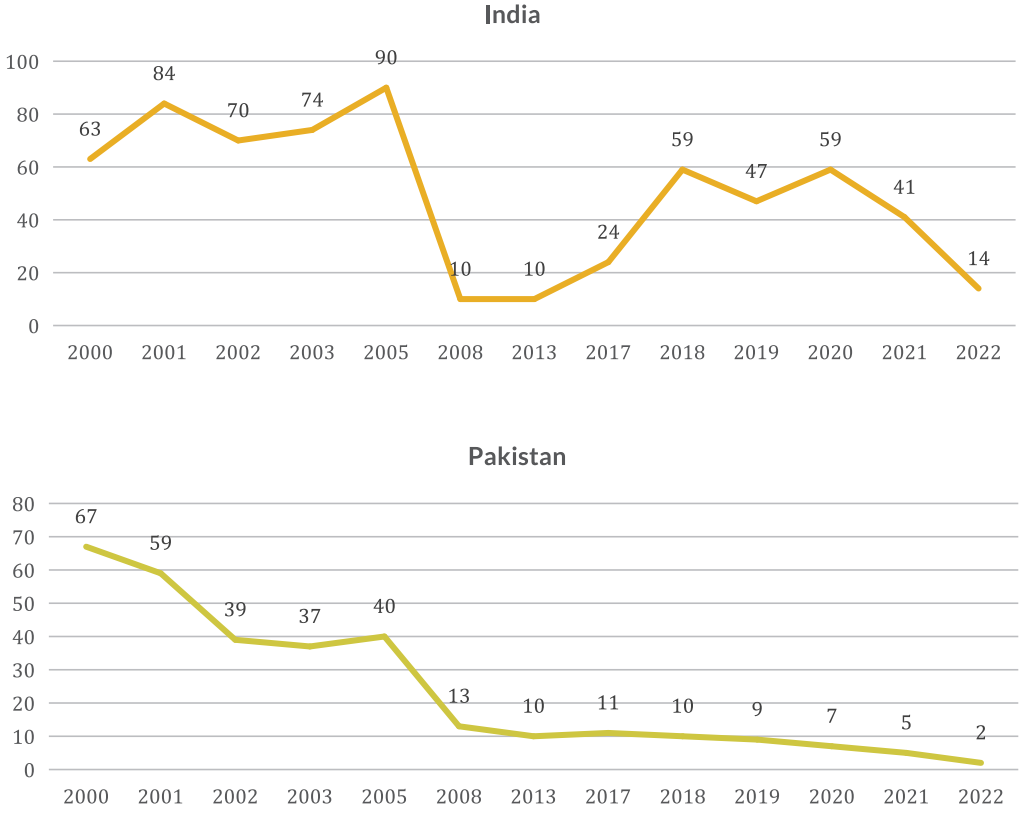
of imported oil even after paying all the import taxes and transportation costs, it is hard to imagine why will domestic oil industry will buy domestically produced canola and sunflower oil.

Import substitution takes place only if factory gate prices of domestically produced canola and sunflower oil are lower than the factory gate prices of imported oils, which is not true in our case because the oil industry prefers cheaper products over expensive ones. Hence, import substitution is not economically viable under the present situation unless we introduce drastic changes at different nodes of the value chain of edible oils. MNFSR has proposed that MIP for oil seeds should be fixed at PKR 7,000/40 kg through regulatory duty, which is equal to 20.3 percent for canola and 37.1 percent for palm oil. According to MNFSR, if MIP is ensured, the import substitution would be economically feasible. However, our analysis reveals that it will not be a viable and sustainable option unless an import tax is imposed. It may create an artificial comparative advantage on a sustainable basis in favour of domestic canola and sunflower production. A similar approach suggested by our study (imposition of import tax) has been successfully adopted by India to increase the domestic production of edible crops, which has ultimately created a comparative advantage for Indian farmers (Figure 4).

By keeping in view the import substitution of edible oil crops, the Government of Sindh successfully ran a pilot project near Thatta in 2016 in which they grew 1,100 palm trees on 50 acres of land. By 2020, it started to produce 2 tons of oil per day in the refinery near the project. The palm tree grown in Pakistan produces 2 percent oil as compared to the palms of Indonesia and Malaysia, which implies that the quantity and quality of palm oil are comparatively better. The Government of Sindh upscaled the project in 2022 intending to plant 60 thousand palm trees on 1,000 acres of land in Thatta (Rich Pakistan, 2023). Each tree would have the potential to produce 40 kg of oil per annum. Therefore, 60 thousand palm trees have the potential to produce 60 thousand maunds of oil per annum. Experts from Malaysia claim that Pakistan's coastal region is ideal for the cultivation of palm oil. Despite having a large water requirement, it is still 50

percent less than what banana trees need. In the future, such projects could have the potential to attract the private sector, and, with time, there is a probability that Pakistan may become self-sufficient in the domestic production of palm oil.

Figure 4. Comparison of Import Duties in India and Pakistan on Edible Oils



Sources: MOSPI (2022) and FBR (2023)

FOCUSED GROUP DISCUSSION WITH STAKEHOLDERS IN THE EDIBLE OIL VALUE CHAIN

In Punjab, the Oilseeds Promotion Initiative was started in 2017–18 to promote the cultivation of canola and sunflower through the provision of subsidies at PKR 5,000/acre and a purchase price of PKR 2,500 per 40 kg. When compared to 2016–17, the area planted with canola and mustard grew by 20 percent, while the average yield per acre increased by 30.6 percent. Similarly, the sunflower cultivation area expanded by 282.2 percent in 2017–18, while the average yield per acre increased by 16.5 percent (Rana et al., 2022). Hence, subsidies worth PKR 0.675 billion generated a net benefit of PKR 3.27 billion in terms of expansion in area and increased yield.

To understand the kind of changes required to address the challenges faced by different stakeholders in the supply value chain of edible oils, especially canola, and sunflower, we conducted focused group discussions with various farmers from Punjab and people belonging to the oil industry. Focus group discussions are widely employed as a qualitative strategy based on an individual's experience in the field to comprehend empirical findings.

Analysis of Focused Group Discussion with Farmers

The focused group discussions were been conducted in March and April 2023 with various farmers belonging to different districts of Punjab,[5] namely, Bahawalpur, Layyah, Muzaffargarh, and Faisalabad. Since the sampling was purposive, we selected those farmers who grow canola or sunflower and also have experience growing wheat either in the same season or in previous years. These discussions with farmers continued until a saturation of responses was reached, ensuring a comprehensive understanding of the topic. To facilitate the discussions, a semi-structured question guide was developed as summarized in Appendix A. This guide aims to identify the reasons behind farmers' preferences for edible oil crops and explore the prospects of these crops. After explaining the

[5] Due to time and financial constraint FGD from other provinces is not done.

objectives of the study and asking a few introductory questions, the farmers were requested to provide the relevant information based on the question guide (Appendix A). The viewpoints and recommendations were collected from farmers to enhance the productivity of edible oil crops which are summarized below.

- The profitability of canola and sunflower production is increasing over time, especially in 2021-22 the oil crops were very profitable because of the high market price. The major attraction for the potential growers in the coming years is the high expected prices of canola and sunflower as compared to wheat.

- As far as inputs are concerned, the seeds of both wheat and oil crops are available, but high-quality seeds are rarely available. For canola seeds, the Government of Punjab is giving a subsidy amounting to PKR 5,000 per two kg bag to the registered farmers.

- As far as the market is concerned, wheat is sold at the government centres at the government-announced price, but canola is sold in the open market. So farmers have to explore the market to find competitive prices but selling in the open market is easier than selling in the specified government centres as in the case of wheat.

- The water consumption depends on the type of the soil. For example, in tehsil Yazman of district Bahawalnagar, both canola and wheat consume equal water, whereas in Faisalabad canola consumes approximately 60-70 percent less water than wheat.

- There are very low or no risk factors as far as pest attacks or climate conditions are concerned for both canola and wheat. Nevertheless, Canola is a bit more vulnerable to extremely cold weather conditions.

- Some farmers face difficulty in growing canola especially if they have to grow cotton in the Kharif season because the cotton harvesting period

overlaps the canola sowing season. Whereas some farmers are of the view that it will not make much difference if they delay the plantation of canola a week or two, others consider that delaying in plantation affects productivity.

- In our sample, more than 70 percent of the farmers were motivated to cultivate canola and sunflower again in the coming season due to rising profitability, whereas the rest of them found it hard to continue because they suffered losses in canola production.
- Farmers from Faisalabad and Muzaffargarh who have taken subsidies on canola seed were of the view that no matter whether the subsidy was given on seed or not, the cultivation of canola was still feasible for them because of rising profitability.
- To expand the cultivation of edible oil crops, farmers need additional resources which could be provided through formal credit at a low interest rate.

Analysis of the Focused Group Discussion with the Oil Industry

The discussion with stakeholders from the oil industry based on the interview guide (Appendix B) revealed that extracting oil domestically requires advanced infrastructure which is costly. For example, canola oil needs to be hardened before use which requires expensive infrastructure. They find it cheaper to import crude oil from other countries and process it according to need. Hence, financial constraints faced by processing units cannot be ignored if the country wants to promote the domestic edible oil industry.

Moreover, Pakistan needs to introduce hybrid or GMO seeds to improve productivity. Also, the extraction of oil from seeds with traditional technology (Kolhu), i.e., wood-pressed oil, creates inefficiency and increases the cost of production, which translates to high prices of domestically produced edible oils. It demands a shift to modern technology which will help to increase the

extraction rate and reduce the factory gate prices. A more detailed investigation of the value chain of edible oil may help to identify the required changes at different nodes of the value chain.

CONCLUSION

The study aimed to address three main objectives. Firstly, it compared the economics of competing crops (wheat with canola and sunflower crops). Secondly, it evaluated the economic feasibility of import substitution of canola and sunflower oil. Thirdly, it identified the challenges and inefficiencies at the various nodes of the value chain of edible oil. It is important to mention that due to time and financial constraints, the study compared only two edible oil crops that are mainly grown in Pakistan, i.e., canola and sunflower.

The comparative analysis presented in this report compared the trade-off between wheat production and the competing edible oil crops such as canola and sunflower. The findings demonstrate that during 2021–22, it was economically more profitable for Pakistan to grow wheat and export it to the international market. Because revenue earned from the export of wheat allowed the importation of more canola oil than would have been produced locally by allocating the same acre to canola production. However, the situation changed in 2022–23 when domestic wheat prices exceeded international prices, making wheat exports less viable. In this scenario, import substitution by growing canola domestically became economically more feasible. The government's interference in the wheat market, such as setting high minimum support prices, played a significant role in altering the comparative advantage between wheat and canola oil production.

Additionally, the analysis revealed that the domestic industry is inclined to import canola oil due to significant price differentials compared to domestically produced oil, highlighting potential issues in the domestic canola value chain. Further investigation and interventions are required to address the challenges in

canola seed productivity which include the availability of certified seeds, improved management practices, and the use of modern technology during the crushing and extraction of edible oil. The comparative analysis of sunflower with wheat production indicated that in 2021–22 and 2022–23, it was economically viable to opt for import substitution with sunflower production. The revenue earned by exporting wheat from one acre allows the importing of only half of the amount of sunflower oil that could have been produced by allocating the same acre to the sunflower crop. This demonstrates the comparative advantage of domestically growing sunflower oil over domestic wheat production.

The price comparison of imported and domestically produced canola and sunflower oil reveals that import substitution under a given market structure is not economically viable because imported oils are cheaper than locally produced. The difference widened when domestically produced canola and sunflower were compared with imported palm oil because palm oil is cheaper than canola and sunflower oil in the international market. However, there are uncertainties about the sustainable supply of oilseeds and the price stability of edible oil worldwide which may lead to creating serious food security issues in Pakistan.

Any change in domestic and international prices of edible oils may change the comparative advantage in favour of import substitution, i.e., domestic production but the current situation does not favour the import substitution. Among the possible options in the short run is to impose import duty to create a comparative advantage for local producers. As a long-run strategy, priority should be given to addressing the issues of seed quality, inefficiency at the crushing and extraction stages, and improving the farmer's management practices to upgrade the value chain of canola and sunflower oils. Furthermore, to increase oilseed production in Pakistan, a consistent national seed policy, holistic farming approach, development of high-yielding varieties, exploitation of spate irrigated areas, adoption of advanced oil extraction techniques, and better access to formal credit at low-interest rates may help to boost the production of edible oil crops in Pakistan. Farmers need to be trained to bring the additional area under oilseed cultivation through intercropping, while sequential cropping may be an

additional strategy. Achieving self-sufficiency in edible oils may not be feasible in the short term but the prospects for attaining this goal in the long run appear promising, particularly with the implementation of supportive policies and the provision of appropriate incentives. This necessitates significant expenditures for research and development together with long-term planning and implementation.

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Appendix A: Focus Group Question Guide for Farmers

1. Which crop is more profitable? Edible oil or any other crop you grow in the same season?
2. What are the reasons for the low or high profitability of edible oil crops?
3. Which crop is less expensive as far as inputs are concerned?
4. Which crop is less labour-intensive?
5. Which crop is easy to sell?
6. Which crop requires more finance and a need for credit?
7. Land preparation is easy for which crop?
8. Seed availability is easy for which crop?
9. Which crop is water intensive?
10. Where do you sell your produce? At the farm, at the mandi, or the oil extraction plant?
11. Which crop is more vulnerable to insects?
12. Which crop is more vulnerable to weather?
13. How much is the subsidy provided for edible crops? and what are the criteria for the provision of subsidy?
14. Does subsidy provision make the production of edible crops feasible?

Appendix B: Focus Group Question Guide for Industry

1. Does the oil industry prefer importing crude oil from other countries instead of extracting oil from domestic production? In either case why it is so?
2. What kind of measures do you expect the government to take to upgrade the value chain of edible oil crops or in processing?
3. Do financial constraints faced by processing units impact the promotion of the domestic edible oil industry?
4. Do you believe there is any role of hybrid or GMO seeds in improving the comparative advantage of local edible oil crops in Pakistan?
5. Does the use of traditional technology (Koholoo) in the oil extraction process create inefficiencies and increase production costs?

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