

MARKET VALUE ANALYSIS: YIELD AND TIMELY DECISION OF SUNFLOWER MARKETS, SINDH PROVINCE OF PAKISTAN

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ABSTRACT: *Pakistan is a net importer of edible oils and spends huge foreign exchange on imports of edible oils. However, sunflower is a non-traditional oil seed crop of Sindh with potential to cope with the shortage of oil requirements of the country. The main objectives of the study were to identify factors affecting on yield and timely decisions of sunflower market and identify constraints in production and marketing. The average cash income of sunflower growers was Rs. 76500/ha with the average cost of production was estimated up to Rs35855/ha in the study area. Therefore, growers earned a net return of Rs. 40645/ha. Sunflower yield per hectare in the study area was 45 mds/ha in 2011-2012. The input-output and cost benefit ratios were reported as 1:1.67 and 1:0.67 respectively. Similarly, the parameters such as β_0 , β_1 , β_2 , β_3 shows the change in the dependent variable with per unit change in the independent variables. Therefore, the estimated coefficients of regression parameters such as Y-intercept, Nitrogen, Phosphorus, Planting Method and Planting Period were calculated as 0.283, 0.139, 2.032, and 1.589, respectively. Regression analysis indicated that nitrogenous fertilizer has a positive and significant effect on higher yields. Major problems in sunflower production and its marketing were the bird attack, indiscipline market prices and high taxes. Therefore, focus should be given to use hybrid seed to improve sunflower production to achieve self sufficiency in oil seed production in the country.*

Key words: Sunflower, Production, Decision, Market, Regression

INTRODUCTION

Agriculture Sector is a key sector of the economy and accounts for 21 percent of GDP. The supportive policies of the government resulted in a growth of 1.2 percent against 2.4 percent last year. Major Crops registered an accelerating growth of 3.2 percent compared to a negative growth of 0.2 percent last year. The major crops, including Cotton, Sugarcane and Rice witnessed growth in production of 18.6 percent, 4.9 percent and 27.7 percent respectively. However, preliminary estimates of wheat production showed a negative growth due to late receding of flood waters in lower Sindh, which hampered the timely cultivation of the wheat crop. Livestock has witnessed a marginally higher growth of 4.0 percent against the growth of 3.97 percent last year. Fisheries sector showed a growth of 1.8 percent. Forestry recorded a growth of 0.95 percent as compared to the contraction of 0.40 percent last year [1].

Oilseeds

The major oilseed crops grown in the country include sunflower, canola, cottonseed, rapeseed and mustard. Although the cotton crop is grown for its lint, cottonseed contributes 50 to 60 percent of local edible oil production. At present, the total requirement of edible oil in the country is 2.045 million tons. During the year 2010-11, the total availability of edible oil was 3.079 million tons; of which local production contributed 0.696 million tons (34 percent of the requirement); while imports of edible oil or oilseeds was 2.383 million ton. The import bill reached Rs. 224 billion (US\$ 2.611 billion) in 2010-11. It is estimated that 10 percent of the total availability of edible oil is consumed in industries like cosmetics, paints and other allied products. Around 200,000 tons of edible oil is exported, mainly to Afghanistan. This does not include smuggling through porous borders which is not accounted for. During the year

2012-13 (July-February) 1.467million tons of edible oil worth Rs. 145 billion (US\$ 1.654 billion) was imported. Local production during 2012-13 was 0.636 million tons [1]. One of the challenges harassing the economy of Pakistan is the edible oil deficit. Its indigenous production is below the consumption levels resulting in a very wide gap between production and consumption. This gap is bridged through import of edible oil worth more than Rs. 45.0 billion annually. Currently the oilseed production only meets about 27% of the requirements. Rapeseed-mustard is the second important crop which contributes more than 17% to domestic oil seed production, after cotton, which contributes more than 60% of the domestic production [2]. It is high time to adopt immediate and appropriate measures to overcome the existing edible oil deficit. As a result, Govt. of Pakistan has created Pakistan Oilseed Development Board (PODB) in the Ministry of Food, Agriculture and Livestock (MINFAL) to aid, promote, coordinate and monitor Oilseeds Research and Development activities in the country with the main objective to increase the domestic production on the one hand and reduce consumption on the other. The Production of domestic edible oil from all the sources has grown at the rate of 2.56% annually over the last three decades, which is unable to meet the consumption rate which is about 7.7% annually. Thus indigenous edible oil production could not match the growing demand of population. The graph of population and urbanization could not match the rising, outstretching the divergence between demand and domestic production. Because of the mounting import bill the fast and efficient expansion of domestic oilseed production has been the major concern for decision makers [3].

There has been a fluctuation in the domestic production of edible oil for the last couple of decades. These fluctuations are result of original marketing low support price and high

Table 1. Area, production and yield per hectare of sunflower in Pakistan and Sindh, during 2001-02 to 2012-13

Year	Pakistan			Sindh		
	Area in (000) hectares	Production in (000) Tones	Yield kg/ha	Area in (000) hectares	Production in (000) Tones	Yield kg/ha
2001-02	65	76	1174	38	40	1060
2004-05	264	327	1241	106	158	1165
2009-10	872	1950	1189	468	635	1282
2010-11	1108	2440	1462	855	1025	1276
2011-12	877	2050	1250	452	585	1178
2012-13	968	2210	1200	440	570	1250

cost of production due to which these crops are unable to provide substantial profit to the farmers. Sunflower is the only oil crop which has shown some positive results area and production as compared to other oil crops [3].

Sunflower is not only a high value cash crop, but a source of high quality edible oil also [4]. In Pakistan, the sunflower cultivation in Sindh province is minimal (19%) as compared with other provinces. The area and production under Sunflower crop in Pakistan and Sindh is given in table 1. The Evidence shows that despite of all government efforts and favorable physical production environment, in the last couple of years, area under sunflower has increased considerably. Therefore, there are flaws and potential either in sunflower production technology or in the disposal of marketable surplus therefore situation demands special attention from policy makers and presents a challenge for researchers. Information on performance of sunflower production technologies and sunflower marketing system needs to be generated for identifying answers to those questions, immediate researchable issues and, also for formulating more sagacious policies. The area under sunflower crop has enhanced considerably, but the negligence from the Government is discouraging for the producer. So that the purpose of the study is try to minimize the import bill.

Source: Government of Pakistan, 2013

In light of above facts and figures, the present study was conducted in District Badin due to more area under sunflower and to their moderate temperature round the year, and it is designed to examine the sunflower production technologies, socio-economic factors determining general production environment, and output flow system and its constraints.

OBJECTIVES

In order to achieve the major objectives of the study, the leading activities of the project are as under:-

1. To identify the socio-economic factors of sunflower grower;
2. To examine the constraints in production practices of sunflower growers in the study area;
3. To regression analysis on factors affecting of yield of sunflower crop;
4. To study the critical marketing issues for timely decision;
5. To analyze the decision making process of growing sunflower;

METHODOLOGY

Both primary and secondary data were observed during the study and sample was 60 sunflower growers selected randomly and divided into different farm size categories. The selected sample was interviewed with the help of well-developed and designed questionnaire.

Firstly the primary data were ordered in coding scheme. By using the coding scheme, all the data were tabulated systematically, sum up and examined with the help of Computer Software SPSS (Statistical Package for Social Science) and used regression methods for the estimation of required aims of study objectives.

RESULTS

Characteristics of Sample Sunflower Growers

The knowledge of socio-economic characteristics of sample farmers provide better insights for understanding the general environments the farmers are working in some selected socio-economic characteristics of the sample farmers are depicted in table 5. Since the majority of the farmers are resource poor farmer, thereby only 9 percent of the samples growers have own tractors. In addition to their own land preparation, they rented out tractors to other farmers. Majority of the farmers (77 percent) used rented tractors. Education level of sample farmers was also obtained. Literacy ratio was very low in the study area as more than 50 percent of the respondents were illiterate. Farmers were also inquired about the sources of information regarding latest crop technology. More than 81 percent of the sample grower opined that they did not know about the extension activities of the Sindh Agricultural Extension Departments.

Cropping Patterns and Crop Rotation

Cropping patterns in study area is wheat, sugarcane and Sunflower were the major predominant crops with 22.0, 15.3 and 40.0 percent of the total cropped area, respectively. It was noticed that percent area under sunflower in study area was significantly higher than other Rabi crops. Also, vegetables, barseem, maize had sizable share in the Rabi cropping pattern of sample sunflower growers. During Kharif season, rice and sugarcane were the most important crops with 74.4 and 18.6 percent of the cropped area, respectively. Also, fodder had a sizable share in the Kharif cropping pattern of sample sunflower growers. The other crop rotations of sample sunflower growers during 2010-2011 are given in table 2.

Table 2. Crop rotations of sample sunflower growers, in the study area during 2012-13.

Crop Rotation	Percent Fields
Rice-SF-Rice	77.4
Rice-SF-Fallow	7.2
Sugar cane-SF-Sugarcane	6.7
Fallow-SF-Rice	2.2
Others	6.5
All	100

*SF= Sunflower

PRODUCTION PRACTICES

Land Preparation for Sunflower Crop

Generally Sunflower growers do apply ploughing and planking for land preparation. Farmers of study area ploughed the fields ranged from 2 to 6 with an average of 3, followed by planking which is considered sufficient for its cultivation. Almost one-fourth farmers used animals for land preparation, above seventy percent hired tractors, while other used with their own tractors.

Sunflower Planting Time and Methods

Planting time of sunflower in the study was end of November to mid of January and sunflower planting methods are given in Table 3. More than 80 percent farmers used drill compared 15 percent farmers used broadcast method. The difference was statistically significant.

Table 3. Planting methods of sample sunflower growers, in the study area during, 2012-13.

Farm Size	Drill	B/C*	All
Percent Farmers			
< 10 ha(Small)	50.00	50.00	100.00
10-20 ha(Medium)	60.40	39.60	100.00
> 20 ha(Large)	80.40	19.60	100.00
Total	84.80	15.20	100.00

*B/C: Broadcast

It was noticed that the proportion of drill and broadcast method users were 84.8 and 15.2 percent, respectively. Thus, it may be coincidence that most of the large farmers are using recommended methods of drill sowing for sunflower.

Seed Sources and Seed Rates

Majority of the sample sunflower growers 92.5 percent purchased sunflower seed from private seed companies and only a few 5.3 percent from GCP and research/extension staff 2.2 percent. Thus, private seed companies were the major source of sunflower seed in study area while research /extension agencies scatter for seed requirements. The average seed rate used sample growers was 4.6 kg/ha.

Irrigation Management Practices

Irrigation management practices of sunflower growers that 66 percent of the sample growers irrigate sunflower crop. First irrigation ranged from 2 to 60 days after DAP with an average of 35 days. In study area, sunflower is grown as Bosi crop in rice zone either without or with little irrigation. The results of this study indicate that more than one-third of the sample growers do not irrigate their crop and the remaining only an average three irrigation with an interval of 20 days.

Intercultural Practices

Information's on various inter-cultural practices carried out by the sample growers are given in Table 09. It was observed that majority of the farmers carried out thinning. This operation was undertaken 20 days after planting and the distance between plant to plant which was (1 ft). However, the row to row distance of line sowing was (2.0 ft).

It is observed that almost all the sample growers did not use any weedicide to control the weeds. Weeds cause considerable yield losses in sunflower crop. However, all the farmers 100 percent carried out manual weeding. Thus, it may be concluded that farmers realize lower sunflower yields due to absence of adoption of intercultural practices such as thinning and weeding. Sunflower can be intercropped with other crops due to its short duration and other agronomic requirements. [5] Sunflower productivity can be increased by intercropping and it can provide higher income benefits than the sole cropping. It was however, observed that limited farmers intercropped sunflower with sugarcane. Sunflower is a high potential crop with that can significantly contribute to meet the future oil requirements, particularly in the light of increasing population pressure and technological limitations [6].

Applications of Fertilizer for Sunflower

Almost all the farmers applied less chemical fertilizer used because sunflower is sown in the study area as "Bosi" crop. However, fertilizer use was estimated 62.87 kh/ha which was just 45.55 percent of the recommended dose for the area. As for as phosphoric fertilizer concerned, it was estimated 35 kg/ha. The phosphorus use rate was less by 31 percent than the recommended level of 50 kg/ha. Contrary to the phosphoric fertilizer, per hectare use of nitrogenous fertilizer was estimated 28 kg/ha. The nitrogenous uses rate only 31 percent of the recommended doses for the area. Hence, it was noticed that fertilizer use rate was significantly lower compared to the recommended levels.

Harvesting and Threshing

On an overall basis, a little more than 60 percent employed family labour; the rest either used hired labour or both hired and family labour for the purpose. It was observed that majority of the farmers used thresher as compared to manual threshing.

Sunflower Yields

Sunflower yield was computed on the basis of farmers' perceptions. It ranged from 45 /ha to 50 mounds /ha with an average of mounds' 38 kg/ha. Regression analysis of the factors affecting sunflower yields is given in Table 11. It shows that in study area, though the signs for N and P application are positive, the use of nitrogen fertilizer had a significant effect on the yield. Similarly, the regression coefficient for planting methods was although positive, but statistically non-significant.

Coefficient for the planting period was negative as well as insignificant indicating negative relationship between planting period and sunflower yields. Adjusted R square value for the regression equation was 0.49, implying that factors included in the equation have explained at least 49 percent variation in yield given in table 6.

Table 4. Regression analysis of the factors affecting sunflower yields, 2012-13.

Variable	Reg.	S. E.	t-value
Coefficient			
N	0.282	0.090	3.73**
P	0.139	0.132	1.08 ^{ns}
Planting method	2.032	1.494	0.181 ^{ns}
Planting period	1.589	1.269	-0.543 ^{ns}
Constant	7.174	1.380	-
R-square	0.49	-	-
F-ratio	9.088**	-	-

** Highly significant * Significant^{ns} Non-significant

I) Recommended Planting Period (Jan 15 - Feb 15) =1 or 0 Otherwise

II) Planting Method (Drill) =1 or 0 otherwise

The above results indicated that the use of nitrogenous fertilizer for higher yields has a positive and significant effect.

Economics of Sunflower Production

Cost of production and net return for Sunflower cultivation for the study area is given in table 5. The major expenditures were incurred on seed, fertilizer, land preparation, Irrigation, harvesting, threshing and rest of amount spent on other practices. Net returns with and without land rent were Rs.40645.00 and Rs.53900.00 per hectare respectively. Sample farmers considered this income as additional income to buy inputs for next crop in Study areas.

Marketing of Sunflower

Overall in the study area farmers marketed more than 80 percent of the total produce to the private agencies, and the rest was sold to local market, local traders. Farmers generally sell Sunflower during first one month after harvesting. The market price of Sunflower grain in the study area was Rs. 1650/- per md to Rs. 1750/- per md and the average price was Rs. 1700/- per md kg. The procurement activity of PASSCO in study area seemed to be diminutive. All the sunflower growers disposed off their production the nearest town Mandi. Prices received by farmers varied among the procurement agencies. It was noticed that all the procurement agencies offered significantly lower prices than support price of last year (Rs. 700 per 40 kg). It is evident from the data collected from the field that most of the growers were compelled to sell their produce to the other marketing agencies at considerably lower prices compared to procurement prices announced by the Government. The price differential was about Rs: 100 per 40 Kg between the village and big city prices. Therefore, the average price received by the farmer was Rs: 1700 per 40Kg.

Farmers of the study area reported a number of constraints faced in the cultivation of Sunflower crop and marketing: Obviously, the biggest problem related with sunflower production in study area was the bird attack. It was reported by 58.2 percent and high prices of seed was ranked as the second most important problem followed by, unavailability of credit for inputs, poor quality of seed, threshing and post harvesting.

Table 5. Costs of production of sunflower by sample grower's area during 2012-13.

Particulars	Average	Minimum	Maximum	Stander Error
AVERAGE PER HECTARE LAND INPUTS				
Rent of Land	13250	11550	15500	158.23
Land Tax	540	460	630	15.47
Irrigation Charges	3250	2450	3600	37.56
Local Fund	340	300	450	13.12
Total	17380	14760	20180	224.38
AVERAGE PER HECTARE PHYSICAL PRODUCTIVITY				
Physical productivity	45	38	50	1.27
AVERAGE PER HECTARE REVENUE				
Revenue	76500	66500	87500	1351.36
Gross Income	76500	66500	87500	1351.36
AVERAGE PER HECTARE NET INCOME				
Total Cost of Production	35855	29708	41812	521.6
Net Income	40645	36792	45688	829.76

A section of farmers also complained about the unavailability of credit for the purchase of inputs (seed and fertilizer). Interestingly, harvesting did not seem to be one of the critical constraints as enough female labour was available at competitive wages for this operation.

Almost all the farmers described a variety of marketing constraints; about one-third respondents reported the monopoly of PASSCO with a minor role of private sector. Delay payments, unfair deductions from produce and underweighting problems were recorded by 40.7, 46.2 and 42.5 percent growers, respectively. Similarly, about 30 percent farmers were offered very low prices for their produce. The other two important marketing constraints identified were location of purchase center at a considerable longer distance from the farms and no marketing infrastructure/system. In a previous study [7] identified the problems of adjustment of sunflower with the existing cropping pattern, unavailability of proper markets, and lack of government procurement centers.

The respondent farmers presented various suggestions for the improvement of existing marketing system. Almost two-third of them demanded the establishment of an efficient sunflower marketing system with competition.

- Establishment of nearest purchase centers and nearest establishment sale center was proposed by 65.9 and 70.5 percent growers, respectively.
- About one-third of them complained about the mishandling by unfair deductions and underweighting whereas more than 30 percent farmers emphasized on the proper publicity of procurement arrangements by the public as well as private sector.
- The above results show that sunflower growers are still looking forward to an efficient and fair marketing system for sunflower which could ensure them prompt and fair return of their produce. The other related constraints of

sunflower production and its marketing which was observed by the researcher are as under:

- The concerned organizations could not develop local sunflower hybrids and a dependable system of their seed production and distribution. There are instances when seeds of unsuitable hybrids both in quality and performances were supplied to farmers.
- The expansion of area of sunflower is restricted because of the high cost of imported seed and uncertainty about its quality.
- Knowledge of production technology involving harvesting and threshing for sunflower is lacking in local language.
- There are serious marketing problems. Officials cheated the poor growers by falsely promising to buy back their produce at higher than support prices. No procurement arrangements have been made by officials for purchase of sunflower production.
- Lack of extension services resulted in the unawareness of recommended agronomic practices. In the survey area farmers need credit, but only a few of them were in a position to obtain credit. One reason given for the no use of credit was the low value of land. Another problem was the lengthy bank procedure to obtain credit. This lack of credit obviously affects the use of inputs needed for crop. These are the main factors of low yields of sunflower production.
- It is believed that non-traditional oilseed crops lack comparative advantage at national level against the traditional crop of wheat.

CONCLUSION

Sunflower is a main non-traditional oil seed crop of Sindh and occupies only 19 percent of the total area under sunflower crop of Pakistan. Cost of production and net return for Sunflower cultivation in the study area were observed and the major expenditures were incurred on seed, fertilizer, land preparation, Irrigation, harvesting, threshing and rest of amount spent on other practices. The selected sunflower growers on an average realized cash income of Rs. 76500 as per hectare the average per hectare cost of production was estimated to the tune of Rs35855 per hectare in the study area. It was investigated that such selected sunflower growers in study area after meeting all expenses, earned an average net return of Rs. 40645 per hectare during the year of study.

It can be concluded from this study that almost all the farmers use their own same traditional seed from many years. There is a need to evolve new improved hybrids of Sunflower. Also through extension services, farmer may be informing regarding the recommended production practices of Sunflower. The results suggested that the efficiency of land, water and fertilizer use has to be enhanced through application of balanced doses of fertilizer at the right time in combination with organic matter. Availability and adoption of quality seed of desired varieties along with timely supply

of fertilizers may be ensured. It is possible to increase sunflower production by increasing the support price programmed should be continued with the objective of attaining self-sufficiency in sunflower crop. All attention should be given to the local production of seed of hybrids and other varieties this would also lower the cost of production.

RECOMMENDATION

The results suggested that the efficiency of land, water and fertilizer use has to be enhanced through application of balanced doses of fertilizer at the right time in combination with organic matter.

- Availability and adoption of quality seed of desired varieties along with timely supply of fertilizers may be ensured.
- It is possible to increase sunflower production by increasing the support price programmed should be continued with the objective of attaining self-sufficiency in sunflower crop. Support prices should be announced well before sowing time and implemented effectively.
- All attention should be given to the local production of seed of hybrids and other varieties. This would also lower the cost of production.
- The agricultural extension people of the provincial governments posted in the rural areas provide on the spot guidance in the correct methods of production practices and marketing.
- To reduce losses during harvesting, bagging, marketing, transport have been provided the facilities between main producing and consuming centers.
- The proper diffusion of technical knowledge and recommended agronomic practices should be introduced through on farm research trials.
- Pure and certified varieties of Sunflower should be made available to all farmers through Sindh Seed Corporation.
- A more comprehensive survey with a big sample size in the Sunflower growing areas is recommend to determine the high production and to meet the country's requirement.
- Comparative advantage of producing oilseed crops can be established through increasing their yield substantially. Thus, the provincial research departments should concentrate to evolve / introduce such varieties/hybrids which are suitable to grow in different ecological zones and capable of enhancing the yield more than the present level.

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