

TREND OF MARKET PRICE AND SEASONALITY OF SOYBEAN IN GUJARAT

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ABSTRACT

The study was conducted to see the trend and relationship of market price and arrivals of soybean in Gujarat state. Total eight regulated markets were selected purposively on the basis of maximum arrival of soybean in the market. The secondary data on monthly prices and arrivals were collected from the website of www.agmarknet.gov.in of selected regulated markets for last ten years (2010 to 2019). The negative relationship was observed between arrivals and prices of soybean irrespective of the selected markets as expected and the pattern of arrival indices were found to be highest from March to May, whereas the peak of price indices was observed from the month of June to December. This may be due to the storage of soybean by the producers or farmers sale the produce to the local traders and they stored in post harvest season and released in the markets before commencement of new season to fetch better price. Therefore, it was suggested that farmers can sale their produce when prices are on peak in the market to get higher prices for their prosperity.

Keywords : soybean, inter and intra year price, seasonality, compound growth rate

INTRODUCTION

India is the fifth largest vegetable oil economy in the world, next to USA, China, Brazil and Argentina. India accounts for 12-15 per cent of oilseeds area, 7-8 per cent of oilseeds production, 6-7 per cent of vegetable oils production, 9-12 per cent of vegetable oils import and 9-10 per cent of the edible oils consumption (Girish, 2013). With its rich agro ecological diversity, India is ideally suited for growing all the major oilseed crops. Among the nine oilseed crops grown in the country, seven are of edible oils (Soybean, Groundnut, Rapeseed-Mustard, Sunflower, Sesame, Safflower and Niger) and two are of non-edible oils (castor and linseed). Similarly, the medicinal crops like holy basil and sweet basils also play an important role for oil production from green herbage under semi-arid conditions (Saran *et al.*, 2017 and 2019).

In terms of acreage, production and economic value, oilseeds are second only to food grains. India ranks first in the production of groundnut, third in rapeseed-mustard and fifth in soybean (Rai *et al.*, 2016). Soybean has proved to be highly promising oilseed as well as leguminous crop under different agro climatic regions of India because of its high yield potentiality, wide adaptability, short duration and can be grown under varying soil type due to tolerant habit to both drought and high soil moisture.

Soybean is gaining ground globally due to its multipurpose use as human food, livestock feed, industrial

purposes, and more recently, as a source of bio-energy (Myaka *et al.*, 2005). Crops and species considered as scare in its natural environment which warrants sustainable conservation, development and cultivation on top priority (Saran *et al.*, 2020). The horticultural plants and products widely used for the treatment of diseases by the traditional peoples in rural society like papaya (Saran *et al.*, 2015). Soybean and their value added products is also one of the main sources of vegetable oils and proteins for both human and animal consumption to maintain good health and well being of individuals. Therefore, looking to the importance of soybean the study was carried out with the following objectives.

OBJECTIVES

- (1) To estimate the growth and instability of price and arrivals of soybean
- (2) To study the inter & intra year price behaviour and seasonality of soybean

METHODOLOGY

This study has been carried out in Gujarat state and total eight regulated markets were selected based on maximum arrivals of soybean in the markets. Amreli, Modasa, Dahod, Vyara, Dhoraji, Junagadh, Himatnagar and Gondal markets were selected for analysis. The secondary data on monthly prices and arrivals were collected from the website of www.agmarknet.gov.in of selected regulated markets for last ten years (2010 to 2019).

The data collected from various APMCs is systematically arranged, organized and finally subject to tabular analysis for drawing inference in order to assessing growth, instability, trend, seasonality and market integration.

The CGR was calculated by fitting the exponential function given below:

$$Y = a b^t \dots\dots\dots (1)$$

Where, Y= annual price index number, a = constant, b= regression co-efficient and t= time variable

Thus, natural log on both the sides of eq (1) was taken to convert it in to linear form.

$$\text{Log } Y = \text{log } a + t \text{ log } b \dots\dots\dots (2) \text{ and}$$

CGR (%) was worked out using following formula:

$$\text{CGR } (\%) = (\text{antilog of } b - 1) \times 100$$

The simple co-efficient of variation (CV) often contains the trend component and thus over estimates the level of instability in time series data characterized by long-term trends. To overcome this problem, the Cuddy Della Valle Index was used to correct the CV. Similar methodology was also used by Changela & Devi, (2018).

$$\text{Instability Index (II)} = \text{CV} \times \sqrt{1 - R^2}$$

Where,

CV = co-efficient of variation and

R² = co-efficient of determination from a time trend regression adjusted by the number of degrees of freedom.

The significant CGRs was classified in two groups *i.e.* negative and positive CGR.

Inter-year price behavior

To examine the general behavior of market prices the year to year price behavior was ascertained by examining the price of soybean crop over the period. The general price behavior of price was studied through their price indices.

Annual price index was calculated by using the following formula:

$$I_t = P_t / P_0 \times 100$$

Where, I_t = price index for year t, P_t = price in period t, P₀ = price in the base year

To know the trend and rate of increase or decrease in annual prices the Compound Growth Rate (CGR) was calculated by using the exponential model as given in equation (1) and (2).

Intra-year price behavior

The intra-year price behavior was studied by calculating the seasonal price indices of monthly prices of soybean crop in selected markets. To know the seasonal pattern of prices of soybean the following multiplicative model of time series analysis was used.

$$O = T \times C \times S \times I$$

Where, O = Monthly prices, T = Trend value, C= Cyclical variation S = Seasonal variations, and I = Irregular variations.

The seasonal index numbers was constructed by using the twelve months moving average method. To remove the effects of trend (T) and cyclical variations (C), twelve months moving average was calculated and centered. Further, ratios of original price indices to centered moving average were calculated to obtain the combine effect of S x I. In order to eliminate the effect of irregular component (I), these ratios were averaged and finally adjusted seasonal indices (S) were obtained.

RESULTS AND DISCUSSION

Table 1 showed the results of instability in annual arrivals of soybean. It is indicated that among the selected markets, the instability index in arrivals was highest in Amreli (180.74), followed by Himatnagar (74.76) and Vyara (73.16) market, whereas, it was found lowest in Junagadh (35.39) market. This may be due to the changing cropping pattern, area allocation under the crop and production scenario of soybean in the respective districts.

Moreover, the results of instability index in price of soybean indicated that the instability index in price was found highest in Vyara (15.29) and lowest in Himatnagar (10.89) market. From the findings it was concluded that the variability in arrivals observed more as compared to the prices of soybean. This may be the result of price support mechanism in soybean crop which leads lower price fluctuations.

Table 1: Estimates of compound growth rate and instability of arrivals and price indices of soybean in selected markets (2010-2019)

Sr. No.	Markets	Arrivals				Price			
		CV %	R ²	(CGR)%	II	CV %	R ²	(CGR) %	II
1	Dahod	59.99	0.46	-13.84*	46.73	18.60	4.52**	0.41	15.20
2	Modasa	60.44	0.42	14.96*	48.67	16.82	4.49**	0.53	12.21
3	Dhoraji	55.09	0.04	4.28*	57.11	18.49	4.42**	0.41	15.11
4	Gondal	72.61	0.58	23.46**	50.19	18.28	4.54**	0.42	14.72
5	Junagadh	79.36	0.82	33.33**	35.39	18.42	5.26**	0.58	12.65
6	Vyara	107.03	0.58	-18.78**	73.16	17.73	3.88*	0.34	15.29
7	Amreli	193.83	0.22	-18.09*	180.74	15.99	3.10*	0.29	14.24
8	Himatnagar	73.33	0.07	6.02*	74.76	19.09	5.79**	0.71	10.89

**Significant at 1 per cent and *Significant at 5 per cent level

Trend in arrivals and price indices (Inter-Year Variation)

Trend is that component of variation which reveals the general direction change over a long period of time. The variation in arrivals generally depends upon the changes in production technology, production incentives and marketable surplus *etc.* the variation in price is the result of factor such as change in demand and supply.

It can be observed from the Table 2 that there is no uniformity in the arrivals was found in last ten years almost

in all the selected markets. This may be due to fluctuated production of soybean which mainly depends on rain during monsoon and may be the farmers sale their produce in local markets also. In case of annual price indices only in Modasa market overall increasing trend was observed for soybean prices. Whereas, there is no uniformly increasing or decreasing trend was found in other selected markets, it may be due to the fundamental rules that with lowest production have highest price indices and highest production in a year has lower prices.

Table 2: Trend in annual arrivals and price indices (Inter-Year Variation)

Markets	Annual arrival indices									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Dahod	101.4	94.66	103.92	56.64	38.86	17.51	16.8	55.73	40.22	25.67
Modasa	56.18	171.53	72.28	235.3	79.95	106.91	97.47	341.38	250.11	296.31
Dhoraji	184.4	83.19	32.41	61.84	68.08	234.61	157.62	137.94	103.64	92.38
Gondal	126.84	80.13	93.05	399.84	293.76	487.41	445.21	711.65	197.28	883.68
Junagadh	78.54	102.21	119.27	73.26	101.74	457.49	477.47	492.01	685.25	720.34
Vyara	177.94	83.97	38.07	42.57	21.06	44.11	8.97	23.56	26.34	21.73
Amreli	62.12	231.63	6.27	3.55	6.56	7.85	9.51	20.87	9.69	6.84
Himatnagar	87.42	134.02	78.57	112.5	287.11	277.59	147.14	498.12	66.87	144.38
Annual price indices										
Dahod	79.87	89.62	130.51	139.19	145.7	133.54	135.83	111.4	134.57	145.45
Modasa	85.61	96.29	119.36	139.13	140.66	134.06	139.47	114.73	136.76	149.68
Dhoraji	83.68	88.31	128.01	137.24	150.15	133.31	138.98	110.96	135.15	145.16
Gondal	81.13	87.77	131.1	135.45	144.63	134.9	136.75	113.31	133.57	144
Junagadh	88.63	86.8	124.57	137.48	142.41	136.78	140.98	119.29	141.35	158.44
Vyara	79.99	93.08	126.93	140.3	145.1	135.94	130.9	108.41	133.98	136.34
Amreli	89.69	87.05	123.26	125.06	142.83	127.51	125.55	101.73	121.81	136.14
Himatnagar	89.19	103.33	107.49	118.56	154.12	147.68	151.8	126.24	150.19	158.31

Seasonality (Intra-Year Variation)

It can be observed from the Table 3 and 4 that the negative relationship was observed between arrivals and prices of soybean irrespective of the selected markets as expected and the pattern of arrival indices were found to be highest from March to May, whereas the peak of price indices was observed from the month of June to December. This may be due to the storage of soybean by the producers or farmers sale the produce to the local traders and they

stored in post harvest season and released in the markets before commencement of new season to fetch better price. Therefore, it was suggested that farmers can sale their produce when prices are on peak in the market to get higher prices for their prosperity. Prices and arrivals generally have opposite relation as price goes down with high arrivals in the market and increase in prices indicate decreasing arrivals trend but it may not be true all the times. Similar types of results were also reported by Devi (2020), Jinjala *et al.* (2020), Devi *et al.* (2019^a), Devi *et al.* (2019^b) and Sharma & Burark (2015).

Table 3: Seasonal price indices of soybean in selected market of Gujarat

Sr. No.	Months	Price Indices							
		Dahod	Modasa	Dhoraji	Gondal	Junagadh	Vyara	Amreli	Himatnagar
1	January	103.02	103.19	105.96	102.16	98.79	107.72	103.70	101.88
2	February	102.86	98.47	99.67	96.83	97.73	101.37	100.52	97.78
3	March	97.14	95.97	91.31	93.27	92.96	92.63	96.55	96.99
4	April	92.57	93.00	91.09	94.33	93.83	93.61	92.45	96.16
5	May	94.60	95.93	96.14	98.97	100.73	95.74	95.89	98.26
6	June	96.00	99.88	97.88	100.12	101.15	97.22	98.80	101.86
7	July	100.19	102.81	111.45	102.18	106.28	100.40	100.84	102.02
8	August	100.18	102.79	101.05	101.59	100.89	100.53	104.67	103.85
9	September	101.01	102.30	97.78	100.35	101.74	100.94	100.84	99.42
10	October	105.59	101.21	102.79	104.73	102.80	103.59	101.82	100.71
11	November	105.01	103.15	100.89	103.95	103.86	102.97	103.98	98.82
12	December	101.83	101.28	103.99	101.52	99.24	103.28	99.94	102.25
Total		1200	1200	1200	1200	1200	1200	1200	1200

Table 4: Seasonal arrival indices of soybean in selected market of Gujarat

Sr. No.	Months	Arrival Indices							
		Dahod	Modasa	Dhoraji	Gondal	Junagadh	Vyara	Amreli	Himatnagar
1	January	46.74	3.49	35.20	24.4	10.13	6.39	127.72	3.17
2	February	33.28	3.67	60.16	29.41	8.85	27.74	53.54	8.32
3	March	47.31	2.29	66.04	29.68	11.16	16.45	34.41	23.34
4	April	242.23	242.18	419.21	272.87	308.63	289.43	120.29	242.23
5	May	338.17	496.40	280.39	338.46	342.86	388.68	191.17	336.33
6	June	176.60	304.70	90.31	165.31	306.08	206.57	134.02	279.67
7	July	93.24	92.60	57.64	104.38	95.5	124.53	115.40	133.93
8	August	80.70	33.39	52.31	73.06	53.62	39.76	85.27	136.33
9	September	51.61	5.65	45.54	34.34	22.75	41.72	79.83	15.74
10	October	32.98	7.65	28.39	44.92	20.68	21.14	94.95	4.26
11	November	21.67	2.89	29.89	48.41	10.3	10.02	59.77	10.81
12	December	35.47	5.09	34.92	34.76	9.44	27.57	103.63	5.87
Total		1200	1200	1200	1200	1200	1200	1200	1200

CONCLUSION

In nutshell the compound growth rate of market price of soybean recorded positive and significant growth in all the selected markets. There is no uniformity in the annual arrivals and prices were found in last ten years almost in all the selected markets. Further, negative relationship was observed between arrivals and prices of soybean irrespective of the selected markets as expected and the pattern of arrival indices were found to be highest from March to May, whereas the peak of price indices was observed from the month of June to December. This may be due to the storage of soybean by the producers or farmers sale the produce to the local traders and they stored in post harvest season and released in the markets before commencement of new season to fetch better price.

RECOMMENDATION/POLICY IMPLICATION

- (1) It was suggested that farmers can sale their produce when prices are on peak in the market to get higher prices for their prosperity.
- (2) There is a need to provide the storage facilities in rural area so, farmers can store the produce at the time of glut in the market.

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CONFLICT OF INTEREST

No conflict of interest among researchers.

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