Journal of Crop and Weed, 17(2): 261-266 (2021)
ISSN- O : 2349 9400 ; P : 0974 6315

http://cwssbckv.org
www.cropandweed.com

Study on behavior of market arrivals and prices of mustard in West Bengal

***S. SARKAR, A. JHA CHAKRABORTY AND B.K. BERA**

Department of Agricultural Economics,Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, W.B., Pin-741252, India

Received : 02.06.2021 ; Revised : 19.06.2021 ; Accepted : 25.06.2021

DOI: https://doi.org/10.22271/09746315.2021.v17.i2.1480

ABSTRACT

The seasonal nature of agricultural production system itself causes price fluctuations. Prices are the lowest when arrivals are at peak and vice-versa. Analyzing crop entry and prices over time is critical in formulating a sound agricultural price policy, as it affects investment in agriculture that contributes to the country's overall economy growth. Study reveals that for mustard, the average arrivals was found to be the highest in the month of March in three markets, namely, Bardhaman, Chakdah and Tufanganj and for remaining two markets, the same was noted in February. The highest average price was observed in the month of October-November when the arrivals were supposed to be the lowest with moderate to low variability. Price had not shown larger variation across the markets. Intra year price rise was also negligible for this crop.

Keywords **:** ASPV, CV, IPR, market arrival, moving average, seasonal index and seasonal variation

Price alteration and price projection on global good markets have got frontline attention of the public now-a-days. For all financial institutions engaged, extreme price volatility brings instability and financial risks.Short-term price variations resulting from mismatches in demand and supply for agricultural commodities are said to be caused by seasonality of agricultural products as well as changes in market arrivals. Market arrivals and market prices are prone to a considerable amount of uncertainty (Kainth and Mehra, 1988). Farm product tends to fluctuate relatively more than those of manufactured products. Some causes of these variations are of a temporary in nature while others lead to a long-lasting effect. As a result of the wide variety in crop output, there is also a significant difference in market arrivals resulting large fluctuation in farm pricing which has a negative impact on farmers' income as well as in farm investments.Again, this cost's unpredictability of farm commodity impacts the country's millions of non-farming citizens, particularly those worked in unorganized sectors whose wages are not index-linked (Bera, 2017). On the consumer end, market uncertainty in agricultural commodities has been a key influence determining farmers' income levels as well as the frequency with which agricultural products is produced (Patel *et al.*, 2013). Consumers are not able to rationally allocate their scarce income or resources. As a corollary, both producers, specifically small and marginal farmers in developing countries like India who have a low proclivity for saving and limited access to efficient saving tools, and consumers struggle to deal with excessive price movements. Ranges of parameters *viz*. yearly variance in output, low price flexibility of demand, and the periodicity of agricultural outcomes, are the reasons of price volatility of agricultural commodities (Kahlon and Tyagi, 1989). The most essential criteria in establishing the efficacy of a commodity on a local and international level to draw influence for future prices and develop a long-term trading plan is statistics about price performance in terms of price level, trend, and fluctuations (Chand, 2002). Under this backdrop, the present study has been undertaken with a view to examine the behavior of market arrivals and prices of mustard in some selected markets of West Bengal. Mustard is a prominent oilseed crop in West Bengal, accounting for 53 per cent of total oilseed yield (Dutta, 2014). During the period 2017-18, the state has produced 0.72 m tonnes of mustard seed from an area of 0.62m ha with an average productivity of 1175kg ha^{-1}. Late sowing due to late harvesting of *kharif* (aman) paddy, insufficient moisture at sowing time, particularly in rice-fallow lands, flood-affected areas resulting in delayed land preparation and heavier soils, and major biotic stress (mustard aphid, *Alternaria* blight, white rust, and club root) are the main production constraints here(Source-https://icar.org.in/files/state-specific/chapter/125.htm). So due to irregular production manner there is a chance of variation in comings and costs of mustard in the market. The high price variation is crucial to comprehend since it means that not only consumers pay different prices in various places for the identical items (unless subsidized by schemes like PDS) but also that producers receive varying prices based on their physical location (Chatterjee and Kapur, 2016). Under this context, these specific objectives, i.e. to analyze the seasonal behavior of market arrivals and prices of mustard and to examine the correlation between current as well as one year

Short Communication

Email: sourakantisarkar@gmail.com

lagged price with corresponding market arrivals are taken to know the seasonal price behavior with respect to arrivals in some selected markets of West Bengal.

The present study was based on secondary data collected during 2013-14 to 2018-19 (a period of 60 months) from Agmarknet.gov.in published by Govt. of India on arrivals and price in five purposively selected markets belonging to five purposive districts of the state of West Bengal, namely, Tufanganj market of Coochbehar, Bardhaman market of Bardhaman, Chakdah market of Nadia, Bankura Sadar of Bankura and Kandi market of Murshidabad district of West Bengal.

For calculating the seasonal variation, the twelve-month centered moving average (TMMA) was employed which gave us the periodic changes without seasonality. The actual values are divided by calculated values of TMMA to get the seasonal variations.

$$\text{Seasonal Indices (SI)} = \frac{Y}{T \times C} = \frac{T \times S \times C \times I}{T \times C}$$

[The Time Series data on Arrivals/Prices is denoted by the letter Y, Trend Components are denoted by T, Seasonal Variations are denoted by S, Cyclical Movements are denoted by C, and Irregular Variations are denoted by I]

$$\text{MA (12)} = \frac{1}{12} \times \sum PI$$

[Here all data related to market arrivals and prices are converted to index form,*i.e.*, multiplied into 100]

$$\text{S.I} = \frac{\sum PI}{MA} \times 100$$

The effects of irregular components from monthly time series that are deflated by a correction factor to create seasonal monthly indices of market arrivals/prices is meant to be negated by averaging monthly values over years. The following two methodologies, coupled with the coefficient of variation, had been used to estimate the magnitude of intra-year price fluctuation. (Acharya and Agarwal, 1994).

$$\text{Intra- year price rise (IPR)} = \frac{\text{HSPI-LSPI}}{\text{LSPI}} \times 100$$

The Highest Seasonal Price Index is HSPI, whereas the Lowest Seasonal Price Index is LSPI.

Coefficient of Average price variation

$$= \frac{\text{HSPI-LSPI}}{\frac{\text{HSPI+LSPI}}{2}} \times 100$$

$$\text{Coefficient of variation} = \frac{\text{STANDARD DEVIATION}}{\text{MEAN}} \times 100$$

For establishing the relationship between market arrivals(x) and prices(y) estimation of correlation coefficient (r) is needed. The formula for estimating r is given below: -

$$r = \frac{COV(x, y)}{\sigma_x . \sigma_y}$$ [COV(x, y) – co-variances of x and y; σ_x - standard deviation of x and σ_y – standard deviation of y]

The average monthly arrivals and associated variability measured in terms of coefficient variation of mustard demonstrated in Table 1 discerns that in Bardhaman, chakdah and Tufanganj market, the highest amount of arrival has registered in March with the tune of 1089.20 t, 377.26 and 454.0 t respectively followed by April (955.80 t and 363.47 t) in first two markets and in May (335.2 t) in the last market. From March onwards, it has started deceleration across the months till reaches October, November and December to record the lowest average monthly arrival of 658.50 t, 96.88 t and 120.25 t in those markets at same order and again it was moved upward at a slow rate. In Bardhaman market, the market arrival in the month of April is associated with the lowest level of fluctuation measured in terms of coefficient of variation which was worked out to be 17.83 per cent. The highest variability in market arrival was noted in December with the value of 29.80 per cent. Fluctuation in market arrivals varied from75 to 98 per cent in Chakdah, the lowest being in the month of January accounting 75.56 per cent and the highest was in December with the value of 97.97 per cent. The fluctuation of monthly arrival varies between 72.93 per cent in the month of October to 86.46 per cent in the month of January in Tufanganj market. So, the variability in market arrivals was very high in Chakdah and Tufanganj markets compared to Bardhaman, but it was relatively stable across the months. In Bankura Sadar market, the maximum arrival of 326.90 t was recorded in the month of February and gradually declines to the lowest level of 105.30 t in the month of October with small up and down movement across the months. The market had experienced a variation in arrivals ranging from 42.53 to 73.09 per cent, where the largest and smallest fluctuations were associated with the month of January and November respectively. The highest amount of average market arrival of 114.64 t was scored in the month of February in Kandi market with a variability of 64.14 per cent. Then it exhibited a steady deceleration to reach the lowest level of 47.30 t in the month of December. After December, it increased significantly measuring 97.78 t in January with the lowest coefficient of variation (63.50 %). Highest coefficient of 66.86 perc ent was noted in September in this market. In short, the study revealed that the average monthly arrivals in the selected five markets showed a pattern where the maximum arrival was noted in the season of harvesting

Table1: Month-wise variability in market arrivals of mustard during 2013-14 to 2018-19 (Arrivals in tonne)

Months	Bardhaman		Chakdah		Bankura Sadar		Kandi		Tufanganj	
	Mean	CV (%)	Mean	CV (%)	Mean	CV (%)	Mean	CV (%)	Mean	CV (%)
January	758.00	20.17	165.26	75.56	308.20	73.09	97.78	63.50	162.87	86.46
February	753.80	20.03	319.88	75.74	326.90	65.47	114.64	64.14	275.68	85.15
March	1089.20	20.15	377.26	77.89	234.45	50.46	111.54	63.80	454.00	82.92
April	955.80	17.83	363.47	80.17	246.90	50.31	93.76	63.87	326.60	82.87
May	869.00	18.03	279.04	81.03	191.80	51.54	62.94	64.35	335.20	80.84
June	839.80	18.80	222.59	83.19	205.80	53.90	72.86	64.97	285.20	78.55
July	821.60	20.04	210.82	86.39	190.40	53.44	69.52	66.06	215.10	77.42
August	745.40	22.25	173.32	89.24	191.00	54.99	70.58	65.87	217.88	75.20
September	775.40	24.13	147.52	91.83	233.20	48.21	78.46	66.86	188.94	73.28
October	658.50	25.95	112.27	94.43	105.30	44.14	73.16	65.75	205.30	72.93
November	699.40	27.74	96.88	96.07	172.00	42.53	72.26	65.41	168.00	73.19
December	697.20	29.80	115.30	97.97	150.90	43.94	47.30	65.13	120.25	75.13

Table 2: Month-wise variability in price of mustard during 2013-14 to 2018-19 (Price in Rupees Q^{-1})

Months	Bardhaman		Chakdah		Bankura Sadar		Kandi		Tufanganj	
	Mean	CV (%)	Mean	CV (%)	Mean	CV (%)	Mean	CV (%)	Mean	CV (%)
January	4568.07	8.85	3896.86	9.08	4201.16	7.47	3966.19	11.64	3945	11.36
February	4454.54	8.83	3624.87	9.04	4001.29	7.48	3513.21	11.68	3756.77	11.35
March	4168.42	8.84	3677.15	8.68	3843.84	7.37	3546.08	11.70	3694.55	11.35
April	4199.34	8.63	3808.24	8.35	3781.27	7.30	3675.27	11.56	3784.62	11.37
May	4338.73	8.41	3910.20	8.30	3803.22	7.09	3888.73	11.66	3860.52	11.29
June	4437.69	8.39	3928.86	8.30	3924.96	6.83	3857.25	11.67	4032.10	11.06
July	4434.57	8.46	3973.17	8.25	4024.20	6.84	3895.03	11.65	4099.47	10.69
August	4537.68	8.45	4058.01	8.17	4089.16	6.83	3953.95	11.51	4117.24	10.00
September	4486.73	8.39	4072.00	8.10	4155.08	6.82	3676.73	11.42	4047.93	9.14
October	4599.70	8.34	4156.53	8.03	4231.21	6.73	4075.89	11.35	3945.17	8.61
November	4663.56	8.15	4186.15	7.74	4242.65	6.58	4222.08	11.20	4025.88	8.68
December	4625.87	7.77	4203.75	7.38	4294.09	6.42	4158.28	10.89	4030.87	8.76

Table3: Seasonal indices of prices and arrivals of mustard in selected markets of West Bengal

Months	Bardhaman		Chakdah		Bankura Sadar		Kandi		Tufanganj	
	Price	Arrival	Price	Arrival	Price	Arrival	Price	Arrival	Price	Arrival
January	102.29	89.28	97.53	97.75	103.65	88.96	103.61	85.02	102.53	75.61
February	99.43	88.64	92.23	152.42	99.84	96.42	90.77	147.34	96.00	121.41
March	94.46	120.39	93.29	149.85	95.07	118.26	91.50	137.16	94.03	181.26
April	95.51	113.85	95.21	133.24	94.31	126.37	93.70	129.49	94.60	129.32
May	97.95	106.51	96.51	114.53	94.88	105.98	97.29	96.98	95.87	130.94
June	99.03	103.64	96.01	91.05	95.88	92.66	96.55	85.38	100.09	107.49
July	99.10	104.60	117.41	95.72	99.88	110.16	117.35	79.96	104.40	75.40
August	101.86	98.44	101.41	81.52	100.22	91.55	100.99	92.94	104.84	87.54
September	100.33	101.93	101.35	88.32	102.13	131.85	90.61	99.27	102.84	60.36
October	102.77	85.31	102.77	63.77	104.11	57.33	104.66	91.23	100.07	95.96
November	104.03	93.35	103.18	60.73	104.06	95.25	107.78	90.78	102.15	73.53
December	103.23	94.07	103.11	71.12	105.99	85.22	105.17	64.44	102.58	61.19

or post harvesting (February-April) and arrival was lowest in the time of sowing and pre-sowing period *i.e*., September to December as mustard is cultivated here mainly as *rabi* crop. Market arrivals show wide variation across the markets, but more stable within the market across the months.

The average monthly mustard prices along with the associated volatility displayed in Table 2, reveales that the average mustard price was the highest in November and December just before next sowing season in all markets except Tufanganj which showed its highest value of Rs.4117.24 Q^{-1} in the month of August. It shifted down slightly in each successive month to record the lower value in the month of February-March-April, harvesting season. The lowest price varieed between Rs.3513.21Q^{-1}(Kandi market) to Rs.4168.42 Q^{-1} (Bardhaman) whereas the highest value ranged from Rs.4117.24Q^{-1}(Tufanganj) to Rs.4663.56Q^{-1}(Bardhaman)when all markets were taken together. The variability in prices is observed to be very low ranging from 6 to 12 per cent in all markets as well as across the months. Summarily, price behavior in all five markets is more or less same, from the highest point in the lean season of October-December, it gradually moved to the lowest level in the month of February, March or April *i.e*., harvesting period or just after the harvesting period and then rose upward again to witness the maximum with some minor variation across the markets. In all markets, price volatility was less than 12 per cent and the values were significantly low as compared to market arrivals, *i.e*., prices were more stable across the months as well as markets. The reason of this lower fluctuation rates across the months and markets can be attributed as the overall uniform demand of mustard oil throughout the year.To establish the long-term periodic inconsistency in market arrival and prices of mustard for selected five markets, 12-month centered moving average method was employed to construct the monthly seasonal index and represented in Table 3. It discerns that the highest index of price was found in the month of November (104.03%) in Bardhaman market, although the indices were recorded above 100 per cent from August to January (101.86 - 102.29 %). The values were found to be lower than 100 per cent for the rest of the months. The lowest value is registered in March (94.46%) and the peak index value in Chakdah market was noted in July (117.41%), followed by November (103.18%) and subsequently followed by December (103.11%) and October (102.77%).

There were six consecutive months starting from July to December, the price-index value was registered more than 100 per cent score and the remaining six months had recorded below 100 per cent, lowest being in February (92.23%). In the six consecutive months, starting from August (100.22%) to January (103.65%),

the Bankura Sadar market had shown more than 100 indices values and the remaining six months had recorded less than 100 indices. The highest was noted in December with a magnitude of 105.99 per cent and the bottom most was in April amounting of 94.31%. Kandi market have registered more than 100 per cent seasonal indices in consecutive six months from July to January expect September. Here July had shown highest seasonal index value with 117.35 per cent, whereas September has noted the lowest seasonal index (90.61%). In the Tufanganj market, from June to January, all months fall into the group of 100 or more indices, the highest was in the month of August with an index value of 104.84 per cent and deepest was accounted in March (94.03%).

In case of arrivals, the seasonal monthly index was found to be the highest in March (120.39 %), while the index value was observed to be more than 100 in five months from March to July in a row and a lone month of September in Bardhaman market. The lowest index value was recorded in the month of October (85.31 %), from which the value showed an upward movement to attain the value of 100 per cent in March, with minor fluctuations across the months. Seasonal arrival index of mustard in Chakdah Market is the lowest in November (60.73 %) and it rises strikingly to reach the highest level in February (152.42 %). Months starting from February to May have reported more than 100 index values. The highest seasonal index for the Bankura Sadar market was observed in September (131.85 %) and the lowest in October (57.33%). In three successive months, from March to May and two separate months, July and September, the market had registered more than 100 indices value and less than 100 indices value had been registered for the remaining months. In the Kandi market, the lowest seasonal arrival index was seen in December (64.44%) and slowly rising upwards in successive months to attain the 100-percentage value in February and hold the same for the next two months, while the highest value was noted in February (147.34%). The seasonal index for the Tufanganj was the highest in March (181.26 %) and gradually moved downward to reach the lowest in September (60.36 %). Starting from February to June, the market was able to retain the arrival index value more than 100 per cent.

In short, all markets under study had reported more than 100 price indices values for at least five months or more; but the distribution of months with a price index value of more than 100 was different for different markets depending on the variation in sowing time and retention capacity of the farmers. The maximum values of price indices were noted in November-December and the lowest value was registered in the month of March (Dayabhai, 2010). In case of market arrival, it was found that generally for most of the market, four months starting from February to May were fallen into the group of 100 seasonal indices category and from June onwards, it to declined dramatically (Meena and Desai, 2011) *i.e.* there is an opposite relationship between indices of market-arrivals and prices of mustard. The indices of market arrivals of rapeseed-mustard were greater immediately after harvest, and the arrivals of rapeseed-mustard were higher in the months of peak season (March-May). Arrivals of rapeseed and mustard have certain seasonality to them. More than 50% of the total onsets arrived in the peak season when prices were low (Agarwal and Om,1990). In the Anakapalle controlled market of Andhra Pradesh, there was an adverse association between seasonal indices of arrivals and prices of selected commodities too (Ravi Kumar *et al*., 2001).

Table 4: Intra-year price rise, average seasonal price variation and co-efficient of variation

Markets	IPR	ASPV	CV (%)
Bardhaman	10.12	2.41	2.89
Chakdah	27.30	6.00	6.44
Bankura Sadar	12.39	2.92	3.95
Kandi	29.51	6.43	7.79
Tufanganj	11.49	2.72	3.72

Table 4 shows the intra-year price variation expressed as intra-year price increase (IPR), average seasonal price variation (ASPV), and co-efficient of variation (CV). It is discovered that Kandi market had the highest intra-year price increase (29.51 per cent), followed by Chakdah (27.30 per cent), and then Bankura Sadar (12.39%). In the Bardhaman market, the lowest intra-year price gain was anticipated to be 10.12%. The ASPV trend across markets was comparable to the intra-year price rise trend. Kandi and Bardhaman markets had the greatest and lowest ASPVs, at 6.43% and 2.41%, respectively.Similarly, the coefficient of variation of prices among these markets also shows the same sequences *i.e*., Kandi scored highest CV value of 7.79% and Bardhaman showed the lowest CV value of 2.89%. Here, it is to be noted that the cv in prices of all five market was less than 10% *i.e*., no significant variations in inter-year price behavior were seen across the markets during the study period (Patel, A. P., 1999).

Table 5: Correlation coefficient between current prices and market arrivals as well as one year lagged prices of mustard

Markets	Correlation Coefficients	
	Current Prices	Lagged Prices
Bardhaman	0.14	-0.85
Chakdah	-0.49	-0.84
Bankura Sadar	-0.22	0.10
Kandi	0.13	-0.76
Tufanganj	-0.78	-0.71

Theoretically, market arrival is expected to be increasing function of prices and price is expected as a decreasing function of arrivals (Bera, 2017). The correlation coefficients of current prices as well as one year lagged prices of these markets are displayed in Table 5. In the present context, current price of mustard was adversely correlated with the market arrivals in the three markets, namely Chakdah, Bankura Sadar and Tufanganj. Negative relationship had also been recorded in similar study by Kumawat and Kumar (2006). The other two markets, *viz*. Kandi and Bardhaman were been able to hold positive correlation with market arrivals and one year lagged price was positively correlated only in Bankura Sadar market with the market arrivals. The negative correlation between market arrivals and current prices in markets may be attributed to the low retention capacity of the farmers which might not enable them to respond positively to price, lack of storage system and perishable nature of the crop.

From the above discussion, it can be concluded that the variation in arrival was found to be relatively lower in Bardhaman market compared to others. Price behavior in all five markets was more or less same, from the highest point in the lean season of October-December when arrival was lower, gradually approached to the lowest level in February- March - April *i.e*., harvesting or just after harvesting period and then rising up again to reach the maximum with a small variation across markets. The market arrivals of Bardhaman and Kandi markets exhibit positive correlation with the current prices for mustard where other three markets showed a negative correlation. According to the findings, the implementation of a scientific storage structure, the propagation of market information, proper utilization of a pledge loan to prevent distressed sales, continuous vigilance and good governance can all help to reduce the degree of capriciousness in market arrivals and prices, which is necessary to protect both producers' and consumers' interests.

REFERENCES

Acharya, S.S. and Agarwal, N.L. 1994. Agricultural prices-analysis and policy.*Agricultural prices-analysis and policy.*

Agarwal, N.L. and Om, H. 1990. Pattern of market arrivals and prices of rapeseed and mustard in Bharatpur district (Rajasthan).*Indian J. Agric. Market.*, **4**(2):140-146

Bera, B. 2017. A Study on the variability in market arrivals and prices of potato in some selected markets of West Bengal. *Int. J. Agric. Sci.*, pp. 0975-3710

Chand, R. 2002. *Trade Liberalisation WTO and Indian Agriculture: Experience and Prospects*. Mittal Publications.

Chatterjee, S. and Kapur, D. 2016. Understanding price variation in agricultural commodities in India: MSP, government procurement, and agriculture markets. *India Policy Forum*, pp. 12-13

Dayabhai, T. V. 2010. Price behaviour of major oilseed crops in Gujarat: an econometric analysis. Doctoral Thesis, Junagadh Agricultural University, Junagadh.

Directorate of Marketing & Inspection (DMI), Ministry of Agriculture and Farmer-Welfare, Government of India https://agmarknet.gov.in/

Dutta, A. 2014. Impact of improvised production technology for rapeseed-mustard in West Bengal. *J. Crop Weed*, **10**(2):272-276.

Kahlon, A.S. and Tyagi, D.S. 1989. *Agricultural price policy in India, 2nd edition*. Allied Pub., Mayapuri, New Delhi.

Kainth, G.S. and Mehra, P.L. 1988. *Indian J. Agric. Market.*, **2**(1): 13-120

Kumawat, R. C. & Kumar, P. 2006. An empirical analysis of market integration of rapeseed-mustard in the state of Rajasthan. *Indian J. Agric. Mktg*,**20**(3): 129-134

Meena, D.C. and Desai, N. 2011. Price behaviour and market integration of rapeseed-mustard in Rajasthan. *Karnataka J. Agric. Sci.*, **24**(3):408-409.

Patel, A. P. 1999. Price behaviour of rapeseed-mustard in Mehsana district of Gujarat state.Doctoral Thesis, AAU, Anand.

Patel, S.A. and Patel, J.M. 2013. A comparative study of arrivals and prices of agricultural commodities at APMC using Time Series Analysis.*Int. J. Adv. Innov. Res.*, **2**(4):778-782.

Ravi Kumar, K.N., Sreelakshmi, K. and Raju, V.T. 2001. Trends in arrivals and prices of selected commodities in Anakapalle regulated market. *J. Instit. Econ. Res.*, **23**: 41-48.