

Price Dynamics of Tur in Major Markets of Karnataka.

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ABSTRACT

Agriculture occupies the central place in rural life. It is rightly said that agriculture is considered as the back bone of the Indian economy. Demand for pulses is increasing day to day as it is the rich source of proteins. Among pulses pigeon pea which is also called as tur is one of the major pulse. The time series data pertaining to prices and arrivals for the respective markets were collected for the period from January 2005 to October 2020. Auto regressive integrated moving average method is employed to forecast the prices of tur in the selected major markets. Seasonal Indices and forecasts revealed there is an increasing trend of prices

Key Words : Pulses, ARIMA, Forecasts, Policy, Awareness.

INTRODUCTION

The words of Mr. Jawaharlal Nehru, "Everything else can wait, but not agriculture" are true even today, as agriculture continues to be the most crucial sector of the Indian economy. Agriculture provides employment to major people as well as it is also key sector for the Indian economy. A variety of crops are grown in India. Pulses are rich in protein. Among pulses, redgram (Cajanuscajan) is one of the important pulse crop. Redgram is a perennial legume from the family Fabaceae. Redgram is commonly known as Tur or Arhar in India and is the second important pulse in the country after gram (chana). The ability of redgram to produce high economic yields under soil moisture deficit makes it an important crop in rainfed and dry land agriculture. India contributes for nearly 90% of world's total redgram production. The average yield of pulses in India is about 735 kg/hectare. In the rainy season, pulses like pigeon pea, green gram, black gram and cow pea are the most important and leading pulse crops of India. Major growing areas of pulses in India are Madhya Pradesh, Uttar Pradesh, Gujarat, Maharashtra, Karnataka and Rajasthan. Madhya Pradesh is the leading state in India in pulses, in terms of cultivated area and productivity (Ashwini et.al 2017). The paper attempts to study the

seasonal indices and price forecasts of tur in the major markets of North Karnataka.

METHODOLOGY

The study on price forecasts and seasonal indices was calculated for the major markets of Tur of North Karnataka which was selected by taking three years average of price. Of which Kalaburagi, Bidar and Raichur were the three major markets of Tur. The time series data pertaining to prices and arrivals for the respective markets were collected for the period from January 2005 to October 2020. Data used for the study was collected from Krishimarthavahini website.

Seasonal indices

To measure the seasonal variations in prices, seasonal indices were calculated employing twelve months ratio to moving average method. The seasonal indices were calculated by adopting the following steps: In the first step, 12 months moving total were generated. These totals were divided by 12 to compute 12 months moving average. Then a series of centered moving averages were worked out. In the next step, original values were expressed as a percentage of corresponding centered moving averages. Further, the irregular component in the series was removed. Afterwards, these percentages were arranged in terms of monthly averages. Then the average index for each month was computed. Finally these monthly average indices were adjusted in such a way that their sum becomes 1200.

This can be done by working out a correction factor

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and multiplying the average for each month by this correction factor. The correction factor (K) is worked out as follows.

$$K = 1200 / S$$

Where, K is correction factor and S is sum of averages of indices for 12 months, multiply K with the percentage of moving average for each month to obtain the seasonal indices.

ARIMA

ARIMA (p,d,q): ARIMA models are, in theory, the most general class of models for forecasting a time series which can be stationeries by transformations such as differencing and lagging. In fact, the easiest way to think of ARIMA models is as fine-tuned versions of random-walk and random-trend models: the fine-tuning consists of adding lags of the differenced series and/or lags of the forecast errors to the prediction equation, as needed to remove any last traces of autocorrelation from the forecast errors.

The acronym ARIMA stands for "Auto-Regressive Integrated Moving Average". Lags of the differenced series appearing in the forecasting equation are called "auto-regressive" terms, lags of the forecast errors are called "moving average" terms, and a time series which needs to be differenced to be made stationary is said to be an "integrated" version of a stationary series. Random-walk and random-trend models, autoregressive models and exponential smoothing models (i.e., exponential weighted moving averages) are all special cases of ARIMA models.

A non seasonal ARIMA model is classified as an "ARIMA(p, d, q)" model, where:

- p is the number of autoregressive terms,
- d is the number of non seasonal differences, and
- q is the number of lagged forecast errors in the prediction equation.

To identify the appropriate ARIMA model for a time series, one should begin by identifying the order(s) of differencing, needing to stationarise the series and remove the gross features of seasonality, perhaps in conjunction with a variance-stabilizing transformation such as lagging or deflating. If one stops at this point and predicts that the differenced series is constant, one has merely fitted a random walk or random trend model. However, the best random walk or random trend model may still have auto correlated errors, suggesting that additional factors of some kind are needed in the prediction equation. The similar method was used by Seyed J S ,2015.

RESULTS AND DISCUSSION

Table 1 depicts the actual and forecasted prices of tur in the Raichur market. In the month of January 2018 the price of tur was around Rs 4367 per quintal and it has reached Rs 4527 per quintal in December 2018. It was observed from the table that price of tur per quintal was observed to be Rs 6476 in the month of October, 2020. The forecasted values indicate there will be rise in price of tur in Raichur market from December 2020 crossing Rs 7000 around per quintal. The price of tur is having the increasing trend in till April 2021, and there after the model has indicated there will be decreasing trend. Table also depicts the validation of the forecasting model from January 2018 to October 2020. It can be observed that the validation is in between the range of 99.81 per cent to 73.89 per cent value. For the year of 2020 the validation of forecasted values were around in the range of above 90 per cent only. It can be observed that accuracy of forecasts were to the tune of 98.10 per cent for the value of June 2020 indicating the model of ARIMA 111 is best model for the forecasts. Similar observations were made by Changule,2012.

Table 2 shows the actual and forecasted prices of tur in the Kalaburagi market. It is observed from the table that the price of tur in the month of January, 2018 was Rs 4172 per quintal which has reached Rs 4761 per quintal in the month of December 2018. The price of tur was around Rs 7613 per quintal in the month of October, 2020. The forecasts value indicate the prices are expected to be increase from January 2021 crossing the value of Rs 8000 per quintal in the month of October 2021. Validation of the forecasts indicated that, accuracy of the forecasts were to the tune of 99.59 per cent which was observed for the month of January,2018. For the year 2020, validations of forecasts were in the range of 83 per cent to 99.10. Highest accuracy of forecasts were seen for the Month of August, 2020 with 99.10 per cent. Forecasts were found to be best in the ARIMA 101 which was higher accuracy of the forecasts.

Actual and forecasted prices of Tur in Bidar market can be observed in table no 3. Actual price of tur which was Rs 4249 per quintal in the month of Janaury 2018 has now reached Rs 4583 per quintal in December 2018. Per quintal of tur price was around Rs 7146 for the month of October, 2020. The forecasts value indicate that the prices of Tur is going to increase and is expected to reach Rs 7933 per quintal in the month of Sepetmber 2021. Validation of the forecasts indicate that the prices which were forecasted are accurate to the tune of 99.74 per cent. Range of validation was between 71.91 per cent to

99.74 per cent which was found to be best in ARIMA 101 model. For the year 2020 the validation of the prices for ten months was more than 90 per cent, highest accuracy was found for the month of January 2020, with the value of 99.54 per cent. The overall results obtained were on par with Kiran Kumar *et al.*

Table No.4 presents the seasonal indices of prices of tur in Raichur, Kalaburagi and Bidar market. It can be observed from the table that the seasonal indices for the prices of Kalaburagi was found to be more in the months of November (104.04), December (106.66), January (100.82), March (106.45), April (102.89), May (102.51) and June (101.35) indicating the prices of tur will be high in these months. Prices will be low in the months of July (95.85), August (97.55), September (91.26) and October with a seasonal index value of 92.34. Seasonal indices of prices in Kalaburagi market indicated that the prices of Tur will be more in the months of July (102.82), August (106.57), September (106.25), October (111.78), November (104.74) and December (100.13). Prices will be low in the months of January (91.44), February (91.72), March (92.87), April (96.27), May (97.51) and index of June was found to be 97.87. Results obtained were on par with Choudhary, 2010. It can be observed from the table that seasonal indices of prices of Tur in Kalaburagi and Bidar market are quite similar since price variation in one market has direct effect on the another market which is mainly due to the close proximity between the markets.

CONCLUSION

Market information dissemination may be geared up in order to create the awareness about the trends in

current and future prices in the regulated markets. Creation of awareness among the farmers to bring the produce in respective months of high price which will result in realizing better prices for their produce. Government may take the policy decisions for increasing the dissemination of information to the farmers in the larger extent since tur is one of the important and highly profitable produce.

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Table 1. Actual and Price forecasts of Tur in Raichur Market

Year	Months	Actual Price	Forecasted Price	Validation
2018	January	4367	4408	99.06
	February	4365	4270	97.78
	March	4012	4761	84.28
	April	4086	4002	97.91
	May	4142	3982	95.98
	June	4030	4038	99.81
	July	3932	3767	95.63
	August	3689	3896	94.68
	September	3371	3587	93.99
	October	3384	3243	95.66
	November	3217	3444	93.42
	December	4527	4173	91.51
2019	January	5478	4344	73.89
	February	5710	5260	91.45
	March	5267	6019	87.51
	April	5244	5257	99.76
	May	5264	5139	97.56
	June	5117	5149	99.37
	July	4969	4893	98.44
	August	4746	4997	94.97
	September	4069	4584	88.77
	October	4106	3979	96.82
	November	4495	4159	91.92
	December	5247	5398	97.21
2020	January	5037	5150	97.80
	February	5056	4958	98.02
	March	4788	5322	89.97
	April	5368	4777	87.63
	May	5033	5227	96.29
	June	5045	4951	98.10
	July	5274	4827	90.74
	August	5361	5240	97.69
	September	5846	5146	86.39
	October	6476	5662	85.62
	November		6450	
	December		7422	
2021	January		7416	
	February		7361	
	March		7568	
	April		7518	
	May		7446	
	June		7346	
	July		7149	
	August		7140	
	September		6899	
	October		6806	
	November		6894	
	December		6849	

Table 2. Actual and Price forecasts of Tur in Kalaburagi Market

Year	Months	Actual Price	Forecasted Price	Validation
2018	January	4172	4155	99.59
	February	4110	4166	98.65
	March	3842	4093	93.88
	April	3773	4030	93.62
	May	3965	3845	96.89
	June	3751	3921	95.66
	July	3780	3906	96.78
	August	3793	4023	94.29
	September	3659	3883	94.22
	October	3573	3978	89.82
	November	4406	2900	48.07
	December	4761	4350	90.54
2019	January	4970	4587	91.64
	February	5127	4873	94.79
	March	4889	5036	97.08
	April	5106	5043	98.75
	May	5765	5151	88.07
	June	5641	5592	99.13
	July	5701	5770	98.80
	August	5693	5849	97.33
	September	5432	5777	94.03
	October	5303	5787	91.64
	November	5524	4843	85.94
	December	5239	5679	92.26
2020	January	4725	5303	89.11
	February	4813	4873	98.76
	March	4843	4762	98.29
	April	5159	4972	96.24
	May	5099	5274	96.68
	June	5296	5119	96.54
	July	5732	5372	93.31
	August	5823	5771	99.10
	September	6415	5831	89.99
	October	7613	6515	83.15
	November		6813	
	December		7062	
2021	January		6898	
	February		6923	
	March		6903	
	April		7076	
	May		7154	
	June		7176	
	July		7361	
	August		7488	
	September		7626	
	October		8064	
	November		7403	
	December		7676	

Table 3. Actual and Price forecasts of Tur in Bidar Market

Year	Months	Actual Price	Forecasted Price	Validation
2018	January	4249	4768	89.11
	February	4188	4231	98.99
	March	3914	4195	93.30
	April	3818	4071	93.78
	May	3954	3781	95.42
	June	3707	4035	91.88
	July	3733	3864	96.62
	August	3693	3606	97.58
	September	3583	3808	94.09
	October	3521	3630	96.99
	November	4331	3381	71.91
	December	4582	4086	87.87
2019	January	5006	4703	93.57
	February	5104	5036	98.65
	March	4922	5215	94.37
	April	5173	5150	99.54
	May	5712	5170	89.52
	June	5524	5828	94.78
	July	5419	5742	94.38
	August	5502	5488	99.74
	September	5178	5590	92.63
	October	4883	5201	93.88
	November	4954	4676	94.05
	December	4916	4825	98.11
2020	January	4834	4857	99.54
	February	4905	4783	97.46
	March	4816	4938	97.53
	April	5199	4954	95.06
	May	5081	5144	98.77
	June	5247	5125	97.61
	July	5536	5455	98.52
	August	5731	5595	97.57
	September	6044	5850	96.68
	October	7146	6140	83.61
	November		7205	
	December		7221	
2021	January		7321	
	February		7347	
	March		7407	
	April		7585	
	May		7671	
	June		7690	
	July		7853	
	August		7912	
	September		7933	
	October		7831	
	November		7828	
	December		7780	

Table 4. Seasonal Indices of arrivals of Tur in major markets of Karnataka

Months	Raichur	Kalaburagi	Bidar
January	100.82	91.44	93.43
February	98.31	91.72	92.94
March	106.45	92.87	94.39
April	102.89	96.27	97.14
May	102.51	97.51	98.04
June	101.35	97.87	99.35
July	95.85	102.85	103.38
August	97.55	106.57	106.79
September	91.26	106.25	103.25
October	92.34	111.78	106.65
November	104.04	104.74	105.66
December	106.66	100.13	98.99