



## **Forecasting of Prices of Sunflower and Groundnut in Andhra Pradesh-An Application of ARIMA Model**

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### **ABSTRACT**

ARIMA Model was used to forecast sunflower and groundnut prices in Kurnool market for the period from January 2010 to May 2010 from the modal prices of 13 years. Forecasts were found fairly accurate when compared with real time prices.

**Key words :** ARIMA, Forecasting, Real time prices

Market information and intelligence are crucial to enable farmers and traders to make informed decisions about what to grow, when to grow, to which markets produce should be sent, and whether to store it or not. The most important marketing intelligence need of the farmer is price intelligence. Agricultural price data are based on thousands or millions of transactions, many of them on small scale, that are taking place everyday all over the country. As farmers become more market-oriented, extension workers need to be in a position to advise them not only on how to grow crops but also on how to market them. In order to be successful in marketing, stakeholders need to understand consumer preferences, price and markets. They need to organize the supply chain from producers to consumer; and they need to make investment, production and marketing decisions based on reliable market intelligence. Most farmers today still lack a good understanding and capacity to use market intelligence in guiding their production and marketing decisions. Against this background, the pre-harvest price forecasting was made for sunflower and groundnut in Andhra Pradesh and forecasted prices were validated with real time prices.

### **MATERIAL AND METHODS**

The price data collected by the Agricultural Market Intelligence Centre, S V Agricultural College, Tirupati formed the source for the present study.

All the sunflower and groundnut markets in Andhra Pradesh were listed out and the arrivals of the three years preceding 2010 were recorded. Based on the average arrivals of the three years all

the markets were arranged in descending order of arrivals. Looking into the average arrivals in different markets, the top two markets where the quantity of arrivals was maximum were selected for the present study. Thus, two markets selected for the study were Kurnool and Yemignoor.

The monthly modal prices of sunflower and groundnut for 13 years from the selected markets were collected and econometric analysis was carried out to predict prices of sunflower for the months commencing from January 2010 to April 2010.

### **Box-Jenkins models**

The Box-Jenkins procedure is concerned with fitting a mixed Auto Regressive Integrated Moving Average (ARIMA) model to a given set of data. The main objective in fitting ARIMA model is to identify the stochastic process of time series and predict the future values accurately. These methods have also been useful in many types of situation which involve the building of models for discrete time series and dynamic systems. But, this method was not good for lead times or for seasonal series with a large random component.

Originally ARIMA models have been studied extensively by Box and Jenkins (1976) and their names have been frequently been used synonymously with general ARIMA process applied to time series analysis, forecasting and control. However, the optimal forecast of future values of a time-series are determined by the stochastic model for that series. A stochastic process is either stationary or non-stationary. The first thing to note is that most time series are non-stationary and the

**Table 1. Residual analysis of monthly prices of sunflower and groundnut**

Crops	Model	AIC	SBC
Sunflower	(1,1,1) (1,2,1)	2272.4216	2292.393210
Groundnut	(1,1,1) (1,0,2)	2526.2101	2567.6912

**Table 2. Forecasted prices and their validation**

Crops	Months	Forecasted Prices (Rs Qtl <sup>-1</sup> )	Real Time Prices (Rs Qtl <sup>-1</sup> )	Per cent deviation
Sunflower	January 2010	2317	2204	5.12
	February 2010	2280	2191	4.33
	March 2010	2256	2136	5.62
	April 2010	2256	2097	6.2
	May 2010	2200	2085	5.52
Groundnut	January 2010	2455	2422	1.36
	February 2010	2591	2399	8
	March 2010	2580	2716	5.23
	April 2010	2720	2677	1.61
	May 2010	2733	2742	0.33

ARIMA model refer only to a stationary time series. Therefore, it is necessary to have a distinction between the original non-stationary time series and its stationary counterpart.

### RESULTS AND DISCUSSION

#### Forecasting of prices of sunflower and groundnut in the selected markets

Box-Jenkins model is concerned with fitting of a mixed autoregressive integrated moving average (ARIMA) to a given set of time series data. The main objective of using ARIMA model is to identify the stochastic process of time series and predict the future values accurately.

The tentative models were first identified based on auto correlation function (ACF) and partial auto correlation function (PACF) for the different

series  $Y_t$  for the selected market. Residual analysis was carried out to check the adequacy of the model. The residual of ACF and PACF were obtained from the tentatively identified model. The adequacy of the model was judged based on the values of Box-pierce Q statistics Akike Information Coefficient (AIC) (Beenstock and Bansali 1981) and sum of squares of residuals. The results were tested with their AIC and SBC values to know the accuracy of model. (Table 1)

#### Prices of sunflower and groundnut in Kurnool market

Table 2 presents the results of ARIMA employed to price data. The overall significance was tested by using Box-Jenkins test statistics which showed that none of the errors had fallen in the

rejection region. Therefore it was concluded that error term was non-significant implying that it was only random and hence the ARIMA model (1,1,1)(1,2,1) for sunflower and (1,1,1)(1,0,2) for groundnut were the best fit in the market under study. The forecasted sunflower prices per quintal were found to decrease from Rs.2317 to Rs. 2200 during the period from January 2010 to May 2010. For groundnut the forecasted prices tended to increase from Rs. 2455 to Rs.2733 per quintal for the period during the same period.

The price forecasts when compared with real time prices indicated that the extent of deviation was found vary from 4.33 to 6.2 per cent for sunflower and the same for groundnut ranged from 0.33 to 8 per cent. These results showed that ARIMA model

presented fairly good forecast of sunflower and groundnut prices in the selected market.

The analysis of forecasting of sunflower and groundnut prices indicated that ARIMA model was found suitable for the purpose. The price forecasts estimated for the period from January 2010 to May 2010 were found to be fairly accurate when the same were validated.

#### LITERATURE CITED

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