

Original Article

Stability in Sorghum Prices in Maharashtra: An Empirical Analysis

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Abstract

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The paper examined the sorghum prices in Maharashtra state, using 12 years prices obtained from APMC Varanasi and AGMARKNET. The result revealed a very low coefficient of variation (C.V) which is an indication of stability in price of sorghum. In changing climate scenario, farmers are experiencing increased cost of production as well as risk of low output in many crops, which are more remunerative. Due to these high risks, farmers are either under debt or depression. Maharashtra Govt has also put a ban on cultivation of sugarcane due to water crisis in the state. Under these circumstances, sorghum may be an alternative option, being drought tolerance and having very low variability in prices. It is suggested that sorghum production should be encouraged in the Maharashtra and linkage between farmers and processing industry may be strengthened to produce highly nutritive products from sorghum.

Keywords: Sorghum; Sugarcane; Coefficient of Variation (C.V).

Introduction

With the recent ban on sugarcane farming as a result of Sugar cultivation and crushing require huge amounts of water from dams, rivers and bore wells and have to be banned in order to preserve the water level in the area, the over use of water by the sugarcane production lead to drought in some areas. Sorghum is

one of the most drought tolerant cereal crops currently under cultivation. It enables the farmers to reduce costs on irrigation and other on-farm expenses. The International Water Management Institute (IWMI) warns that by the year 2025, 25 percent of the world's population will experience severe water scarcity. However, water productivity in both irrigated and rain-fed areas can be increased through the use of more water-use efficient crops, like sorghum [8].

Comparison of Sugarcane and Sorghum

Characteristics	Sugarcane	Sweet sorghum
Crop Duration	About 12–13 months	About 3 ¹ / ₂ months
Growing Season	Only one season	All season - Kharif, Rabi, and summer
Soil Requirement	Grows well in loamy soil	All types of drained soil
Water Management	Requires water throughout the year	Less water requirement; can be grown as rain-fed crop
Crop Management	Requires good management.	Little fertilizer required; less pest and disease complex; easy management
Yield Per Acre	25–30 tons	10–20 tons
Ethanol production directly from juice	1700–2700 L/acre	1140–1640 L/acre
Harvesting	Difficult and laborious	Very simple; both manual and with simple small mechanical machine can be used

Table 1 compares sugar and sorghum based on some characteristics such as crop duration, growing season, soil requirement, water management, crop management, yield per acre, ethanol production directly from juice and harvesting. The table revealed that sorghum has more advantage based on the following characteristics.

Maharashtra state far excels all other states and produces more than 54 per cent of the total jowar production of India. As many as 22 districts of Maharashtra produces jowar, Osmanabad, Nanded, Yavatmal, Buldhana, Parbhani, Kolhapur, Amravati, and Ahmednagar are important producing districts [12]. Developing market infrastructure is the major concern to boost Indian agriculture. It is considered as one of the important factor for improving market efficiency and controlling food inflation. Greater price volatility, especially of perishable commodities and underdeveloped markets are key marketing constraints faced by producers [3] [4]. Volatility in the agricultural prices has catastrophic effect on all the stakeholders involved in the production, marketing and consumption of the food commodities.

$$\text{Seasonal Index (Price)} = \frac{\text{Actual average price for the month}}{\text{Moving average price for the month}} \times 100$$

$$\text{Seasonal Index (Arrival)} = \frac{\text{Actual average quantity for the month}}{\text{Moving average quantity for the month}} \times 100$$

Three types of infrastructure index were calculated i.e. trade, storage and support:

Trade Related Infrastructure

Common covered auction halls, Common open Auction Platforms, Common drying yards, Weighing equipments, Grading equipments, Rate display boards.

Infrastructure for Storage and Processing

Warehouses, Cold Storage, Processing units, Storage godowns.

Support Infrastructure

Farmers rest rooms, Canteen/tea shops, Common utility (washrooms etc), Water supply, Parking facilities, Banks, Post office, Police and security posts

Infrastructure development index was computed as a weighted average of various components of

This has increased the risk faced by farming community. Besides temporal volatility, which either might be inter annual or intra annual, there also exist wide spatial variability in the prices of agricultural commodities. So, there is fluctuation in prices from market to market within India during these months. Maharashtra ranks first in the production of Sorghum. Keeping in view the maximum production, high volatility in the prices low per capita income of the state, the present study was conducted to examine the pattern of price of sorghum in the major market and its price behaviour over a period of time. An attempt was also made to analyse the season index of major sorghum market in Maharashtra for the development of various logistics.

Methodology

Sholapur being one of the major sorghum markets on the basis of frequent arrivals was selected purposively. Data was collected from APMC Varanasi and AGMARKNET for 12 years (2003-2015).

infrastructure services where the weights vary inversely to the variation of the components.

$$Y_{ij} = \frac{X_{ij} - \text{Min}_j X_{ij}}{\text{Max}_j X_{ij} - \text{Min}_j X_{ij}}$$

Where,

Y_{ij} is the standardized value of a marketing infrastructure indicator

X_{ij} represent the value of the i^{th} infrastructure development indicator in j^{th} mandi

Marketing Infrastructure development index can be calculated as

$$Y_j = W_1 Y_{1j} + W_2 Y_{2j} + \dots + W_m Y_{mj}$$

Where the weights W_i vary inversely as the variation in the respective indicator of the infrastructure services:

$$0 < W_i < 1 \text{ and } W_1 + W_2 + W_3 + \dots + W_m = 1$$

$$W_i = \frac{K}{\sqrt{\text{Variance } Y_i}}$$

$$K = \left[\sum \frac{1}{\sqrt{\text{Variance } Y_j}} \right]^{-1}$$

Result and Discussions

The price of sorghum shows fluctuating trend not only year to year but also month to month within the same year. During off season, the prices are generally high and it falls suddenly after the post harvest period during which the arrival of sorghum is more in the market. The seasonal indices of price and arrival of sorghum in Sholapur market is presented below in Table.

It is discernible from table 1 that seasonal indices

of price vary from 93.63 to 104.01 from the month of January to December. It was observed that prices in the month of August (starting season) were comparatively higher than other months. A decreasing trend of price indices can be observed up to the month of February and it was slightly increasing in the month of April. The peak season of the sorghum has been characterized by low seasonal indices [1][2][5] which can be observed during the month of February and March. The coefficient of variation was estimated to be 0.990056 which indicated variability among the seasonal indices of prices which is very low that is making the prices stable for the farmers.

The plot indicates seasonal pattern in time series data due to influence of seasonal factors which recurs on a regular basis. Figure 1 indicates the general trend of the prices of Sorghum in the market for the period from 2003 to 2015. After differencing the series was found stationary as shown in figure 2.

Table 1: Seasonal indices of prices in Sholapur market, 2003 to 2014-15

Sr. No.	Month	Price Seasonal Index
1	January	100.4239
2	February	93.62699
3	March	95.63883
4	April	102.7151
5	May	99.8857
6	June	100.215
7	July	96.8559
8	August	104.0076
9	September	99.98149
10	October	102.1749
11	November	102.2437
12	December	102.2308
13	Mean	99.96146
14	S.D.	0.989663
15	C.V.	0.99006

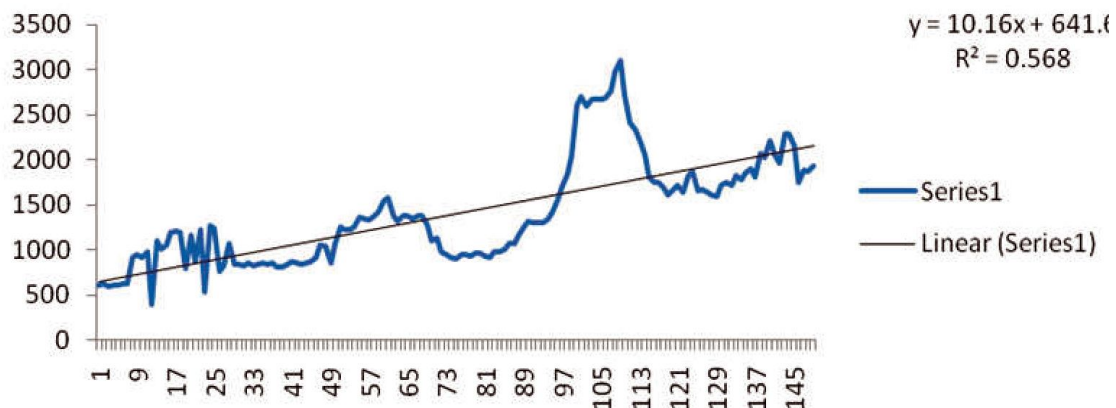


Fig. 1: Seasonal plot of price of Sorghum obtained from the market

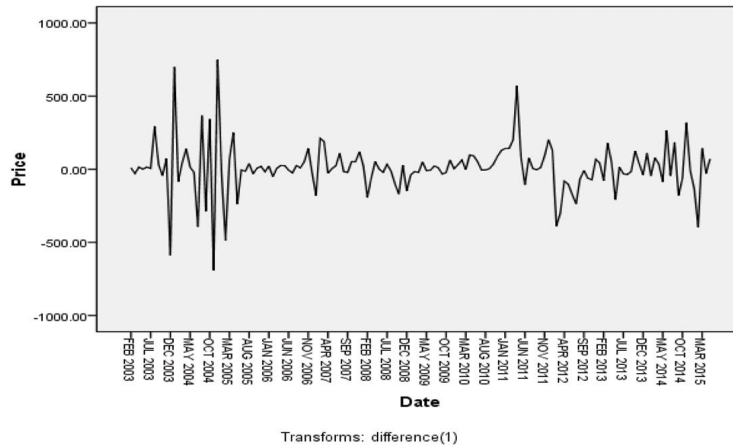


Fig. 2: Seasonal plot of price of Sorghum obtained from the market after differencing

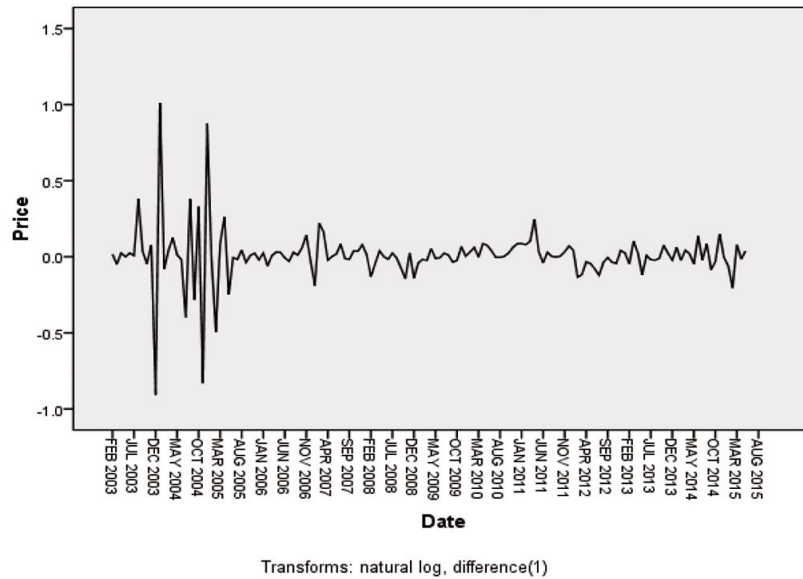
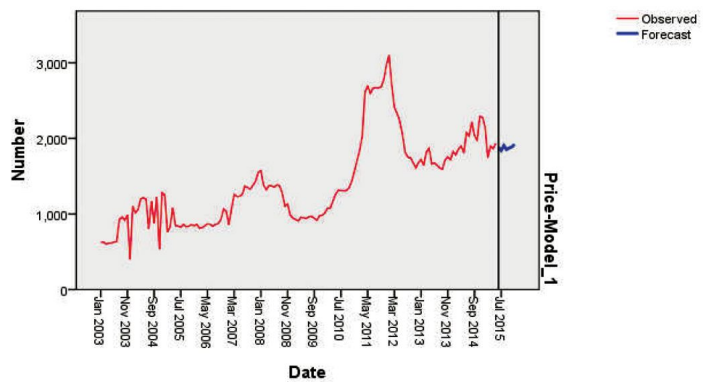


Fig. 3: Seasonal plot of price of Sorghum obtained from the market after differencing and natural log

Model Description			
Model ID	Price	Model_1	Model Type
			Simple Seasonal



Model		Jun 2015	Jul 2015	Aug 2015	Sep 2015	Oct 2015	Nov 2015	Dec 2015
Price -Model_1	Forecast	1881.52	1839.41	1905.19	1852.14	1874.23	1886.29	1922.70
	UCL	2207.55	2256.70	2397.08	2408.72	2488.73	2553.70	2639.12
	LCL	1555.48	1422.13	1413.30	1295.56	1259.73	1218.88	1206.28

For each model, forecasts start after the last non-missing in the range of the requested estimation period, and end at the last period for which non-missing values of all the predictors are available or at the end date of the requested forecast period, whichever is earlier. From the above table we can notice that with even the forecast of prices the prices of sorghum tend to be stable with little or no fluctuation

Conclusion

In changing climate scenario, farmers are experiencing increased cost of production as well as risk of low output in many crops, which are more remunerative. Due to these high risks, farmers are either under debt or depression. Maharashtra Govt has also put a ban on cultivation of sugarcane due to water crisis in the state. Under these circumstances, sorghum may be an alternative option, being drought tolerance and having very low variability in prices. It is suggested that sorghum production should be encouraged in the Maharashtra and linkage between farmers and processing industry may be strengthened to produce highly nutritive products from sorghum.

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