

## Trend Analysis of Sorghum in Major Former Districts of Telangana State

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**ABSTRACT:** The study has been conducted with the objective of investigating the trends in sorghum area, production and productivity in major sorghum growing former districts of Telangana state. Secondary data related to sorghum area, production and productivity is collected for the recent two decades from 2001-02 to 2020-21. Compound annual growth rate is computed for Period I (2001-02 to 2010-11), Period II (2011-12 to 2020-21) and for overall period. During the study period it was observed that negative growth trend was observed in sorghum area and production whereas positive growth rate was observed in sorghum productivity in Telangana and its major former sorghum growing districts. From the study it was observed that decline in sorghum area was major concern so that appropriate measures should be taken by concerned authorities.

**Keywords:** CAGR, production, productivity, former districts, Telangana.

### INTRODUCTION

Sorghum (*Sorghum bicolor*) is a coarse cereal crop cultivated for grain and as a major food crop in much of South Asia, Africa and Central America. It is originated in Ethiopia and has spread to other parts of Africa, India, Southeast Asia, Australia and the United States. It is one of the main staple food crops for the world's poor and food insecure people in the semi-arid tropics of Africa and Asia. It is an important source of feed, fodder and bio-fuel apart from food. It is grown during both in rainy (*Khari*) and post-rainy (*Rabi*) seasons for multiple uses such as a food, feed, stover and fuel crop. Summer sorghum is also cultivated in parts of Maharashtra. Sorghum grown in the rainy season is mainly utilized as feed and other industrial uses as the grain is often caught in incessant rain due to which the quality is affected by grain moulds. However, post-rainy sorghum is primarily used as food owing to its good grain quality and also serves as a main source of stover, especially during dry seasons.

**World sorghum scenario.** In the year 2022 total global sorghum production was 60.13 million metric tonne. U.S.A is the largest producer of sorghum with 11.375 million tonnes of production in the world, followed by Nigeria (6.725 million tonnes). The other major sorghum producing countries in the world are Mexico (4.84 million tonnes), Ethiopia (4.45 million tonnes),

India (4.25 million tonnes), Sudan (3.53 million tonnes) and Argentina (3.4 million tonnes) (USDA).

**Sorghum scenario in India.** In India sorghum occupies an area of 4.37 million hectare with a production of 4.812 million tonnes. Maharashtra is the major sorghum growing state in India occupying area of 2.078 million hectare with a production of 1.746 million tonnes. The other major sorghum producing states are Karnataka (0.903 million tonnes), Rajasthan (0.589 million tonnes), Tamil Nadu (0.405 million tonnes), Andhra Pradesh (0.411 million tonnes), Uttar Pradesh (0.274 million tonnes) and Madhya Pradesh (217 million tonnes). Maharashtra occupies 47 per cent of the total sorghum area in India whereas Karnataka and Rajasthan occupies 17 per cent and 13 per cent of the total sorghum area respectively (Indiastat).

**Sorghum scenario in Telangana.** In Telangana sorghum occupies an area of 2,24,017 acre with a total production of 1,20,972 tonne in the year 2020-21 (Directorate of Economics and Statistics Telangana). In Telangana major sorghum growing districts are Adilabad, Rangareddy, Mahbubnagar and Sangareddy. Adilabad ranks first position in sorghum area and production followed by Rangareddy. Mahbubnagar ranks third in sorghum area followed by Sangareddy, Vikarabad, Nagarkurnool, Narayanpet and Kumeram Bheem.

**Sorghum contribution to the millet production in India.** In the year 2022, India produced 17.60 million metric tonne of millets that included 4.40 Million metric tonne of sorghum and 13.20 million metric tonne of other millets. The Indian contribution in world millet production has also been static with an average of 17 per cent between 2012 to 2022, rising to 19 per cent in 2022. In world sorghum contributes to 56 per cent of total millet area, 66 per cent of total millet production and 65 per cent of total millet consumption. The share of sorghum in millet production in India has been varying from 25 per cent to 32 per cent with an average of 29 per cent in the last 10 years (2012-22). In the year 2022, sorghum contributed 25 per cent (4.40 Million metric tonne) to the total millet production (17.60 Million metric tonne) (APEDA).

**Objective of the study.** The specific objective is to study the trend in area, production and productivity of sorghum in major former districts of Telangana state.

#### DATA BASE AND RESEARCH METHODOLOGY

The study was based on the secondary data collected from the Directorate of Economics and Statistics, Telangana. Time series data related to area, production and productivity of sorghum for the period from 2001-02 to 2020-21 were collected. Respective secondary data was collected for 4 former districts of Telangana state namely Adilabad, Mahbubnagar, Medak and Rangareddy. The whole period was divided into 2 decades i.e

Period 1 - 2001-02 to 2010-11

Period 2 - 2011-12 to 2020-21

The compound annual growth rate was estimated for the above mentioned 2 decades and for the whole period (2001-02 to 2020-21). Compound growth rate analysis was carried out in order to analyse the growth in area, production and productivity of sorghum. Compound growth rates are computed using following form of the relationship.

$$Y_t = \dots A e^{bt} \quad (1)$$

where  $Y_t$  = area, yield or production of crops in year  $t$

$t$  = year which takes values 1, 2,.....n

$$Y_t = Y_0(1+r)^t$$

log transformation of the above i.e

$$\text{Log } Y_t = \text{Log } Y_0 + t \log (1+r), \text{ assuming } \text{Log } Y_0 = \text{log } A,$$

$$\text{Log}(1+r) = b$$

$$\text{Log } Y_t = \text{log } A + bt$$

By differentiating

$$d(\text{log } Y_t)/dt = b$$

$$\text{Since } b = \log (1+r)$$

$$\text{Antilog } b = 1+r$$

$$r = (\text{Antilog } b) - 1$$

$$r = \text{CAGR}$$

$$\text{CAGR in per cent} = [(\text{Antilog } b) - 1] * 100$$

Same type of methodology was used by Divya *et al.* (2013), Goutham *et al.* (2018), Jain A. (2018), Jainuddin *et al.* (2021), Laitonjam *et al.* (2018), Rao *et al.* (2003), Sunandini *et al.* (2020), Unjia *et al.* (2021), Vennila *et al.* (2021) and Shende *et al.* (2018) in the trend analysis.

#### RESULTS AND DISCUSSION

Compound growth rates of area, production, and productivity were primarily calculated in this part in order to examine the performance of sorghum in former districts and the state as a whole. The growth rates were calculated for the entire period from 2001-02 to 2020-21 as well as for 2 periods, namely Period-I from 2001-02 to 2010-11 and Period-II from 2011-12 to 2020-21. From the Table 1, it was evident in Telangana that throughout Periods I and II, growth rate of both area and production was found to be negative while the productivity witnessed a positive growth. The study also found that the rate at which the productivity was peaking was faster in Period-II as against Period-I. This could be due to crop improvement programme. The result of the study also revealed that the rate of decline in both the area and production of sorghum were faster in Period-I as against Period-II. The rate of decline in both area and production of sorghum was 10.741 per cent and 8.637 per cent respectively from 2001-02 to 2020-21. On the contrary, productivity was found to rise at a rate of 2.363 per cent. Decline in sorghum area in Telangana due to diversification of farmers to huge demanding crops like cotton, paddy and maize (Kumar *et al.*, 2020). The results are in line with Kumar *et al.* (2020) who studied on the growth in area, production and productivity of sorghum in Telangana state from 2010-11 to 2017-18.

**Table 1: Growth performance of sorghum in Telangana state.**

Particulars	CAGR (in %)		
	Period-I (2001-02 to 2010-11)	Period-II (2011-12 to 2020-21)	Overall period (2001-02 to 2020-21)
Area(acre)	-12.03***	-5.31**	-10.74***
Production(tonnes)	-10.84**	-1.18	-8.63***
Productivity(kg/acre)	1.36	4.35**	2.36***

Note: \*\*\*, \*\*, \* are significant at 1%, 5% and 10% level respectively.

**Trends in area, production and productivity of sorghum in major former districts of Telangana state.** In the major former districts of Telangana, negative growth was seen during the Period-I(2001-02 to 2010-11). Sorghum acreage and production showed a negative growth trend in each of the four districts namely Adilabad, Mahbubnagar, Medak and Anusha *et al.*,

Rangareddy. In Period-I, highest rate of deceleration in the area was noticed in Rangareddy(-13.41%) followed by Mahbubnagar (-13.38%), Adilabad (-10.28%), and Medak (-9.78%). Rangareddy (-14.1%) witnessed the highest rate of decline in sorghum production, followed by Mahbubnagar (-12.2%), Adilabad (-8.39%) and Medak (-8.19%). Except for the Rangareddy district,

where it saw a negative growth rate of -0.78 per cent, sorghum productivity increased in other districts. It was highest in Adilabad district (2.11%).

During Period-II (2011–2012 to 2020–21), area and production declined at a slower rate than during Period-I. Except for Rangareddy, where there was positive increase in both sorghum area (0.69%) and production (3.39%) all the other districts registered negative growth rates in both area and production. In Period-II highest rate of decline in the area of sorghum was noticed in Medak (-11.38%) followed by Adilabad (-6.73 %) and Mahbubnagar (-4.36 %). Highest rate of decline in the production of sorghum was observed in Medak (-10.27%) followed by Mahbubnagar (-2.94%) and Adilabad (-2.01%). In Period-II, sorghum productivity increased positively across all districts, with Adilabad recording the highest rate (5.06%), followed by Rangareddy (2.69%), Mahbubnagar (2.40%), and Medak (1.26%).

From the Table 2, it was obvious that area and production under sorghum experienced negative growth rates throughout the entire period (2001-01 to 2020-21), but productivity of sorghum experienced positive growth rates across all districts with the exception of Rangareddy district. In the whole period highest rate of decline in the area under sorghum was observed in Medak (-12.09%) followed by Adilabad (-11.32%), Mahbubnagar (-9.80 %) and Rangareddy (-9.24 %). Higher rate of decline in production of sorghum was observed in Medak (-10.93 %) followed by Adilabad (-9.36 %), Rangareddy (-9.25%) and Mahbubnagar (-7.56 %). Mahbubnagar (2.77%) had the highest rate of sorghum productivity growth, followed by Adilabad (2.20%) and Medak (1.33%). Similar type of results obtained by Gaware *et al.* (2017) and Walke *et al.* (2018).

**Table 2: Growth performance of sorghum in major sorghum growing former districts of Telangana state.**

Districts	Particulars	CAGR (in %)		
		Period-I (2001-02 to 2010-11)	Period-II (2011-12 to 2020-21)	Overall period (2001-02 to 2020-21)
Adilabad	Area (acre)	-10.28**	-6.73**	-11.33***
	Production (tonnes)	-8.39***	-2.02	-9.37***
	Productivity (kg/acre)	2.11	5.06	2.20**
Mahbubnagar	Area (acre)	-13.39***	-4.36*	-9.81***
	Production (tonnes)	-12.20***	-2.95	-7.57***
	Productivity (kg/acre)	1.39	2.41	2.78***
Medak	Area (acre)	-9.78***	-11.39***	-12.10***
	Production (tonnes)	-8.19***	-10.27**	-10.93***
	Productivity (kg/acre)	1.76	1.27	1.33**
Rangareddy	Area (acre)	-13.41	0.70	-9.24***
	Production (tonnes)	-14.10***	3.39**	-9.26***
	Productivity (kg/acre)	-0.78	2.69	-0.01

**Note:** \*\*\*, \*\*, \* are significant at 1%, 5% and 10% level respectively

## CONCLUSIONS

It is concluded from the study that over the past two decades sorghum area and production are in decreasing trend while sorghum productivity is in positive trend in study area. UN declared the year 2023 as International Year of Millets which was proposed by the Indian government to promote millets for food security and nutritional security both at national and global level in the future. However, the millet area decline is a major concern, sorghum being a major millet grown in the study area also recorded drastic decline in the area. Hence, the availability of high yielding varieties and hybrids to farmers through extension services will help in increase area, yields and production. Incentivisation of sorghum production by way of seed subsidies in the study area will encourage the farmers to shift towards sorghum cultivation. Mixed cropping, intercropping, crop rotation models should also be promoted to increase sorghum area in the state through FPOs and community approach.

## FUTURE SCOPE

The results found in this study help the concerned authorities to take appropriate measures to increase the sorghum crop area and production.

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**Conflict of Interest.** None.

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