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Trend analysis of area, production and productivity of banana in Maharashtra

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Abstract

The present study has been undertaken to estimate the trends in area, production and productivity from Maharashtra, India and the World. The secondary data were taken from the various issues of horticultural database of National Horticulture Board, Department of Agriculture and Co-operation. In order to analyse the growth in area, production and productivity of the banana in the state, India and the World as a whole for the study period of 57 years as pre WTO- (1960-1994), post WTO- (1995-2017), overall period (1960-2017). The results of the study revealed that during the overall period (1960-2017) the compound annual growth rates of banana for area and production showed a significant growth of 1.97 and 2.73, 2.88 and 5.19, 2.3 and 4.67 per cent per annum, for the World, India and Maharashtra, respectively.

Keywords: trend analysis, compound annual growth rate

Introduction

Banana is one of the important fruit consumed by people in the World. Banana (*Musa sp.*) is the 2nd most important fruit crop in India next to mango. India is the largest producer of banana ranks first among top ten banana producing countries in the World. The major banana producing states in our country includes Andhra Pradesh, Gujarat, Maharashtra (Jalgaon, Nanded, Solapur, Nandurbar and Pune), Tamil Nadu, Uttar Pradesh, Karnataka, Madhya Pradesh, Bihar, Kerala and West Bengal and Other states which have substantial area under banana are Assam, Chhattisgarh and Orissa. The extent under banana in Maharashtra during 1960-61 was about 20.00 thousand ha which increased to 84.00 thousand ha in 2016-17. During this period, area increased at the annual average growth rate of 2.3 percent. Production increased from 473.00 thousand MT to 2928.00 thousand MT i.e. @ 4.67 percent per annum. Productivity increased from 24.00 MT/ha to 35.00 MT/ha and per annum growth rate was 2.32 percent. This indicated that production is combine effect of area and productivity, the growth of production is majorly contributed by area. Therefore, keeping the area as constant the productivity of banana can be further increased by taking appropriate use of production technologies. The area under banana in India expanded from 181.00 thousand ha in 1960-61 to 884.00 thousand ha in 2016-17 at the rate of 2.88 per cent per annum. The production of banana rose from 2425.00 thousand MT in 1960-61 to 30808.00 thousand MT in 2016-17 @ 5.19 per cent annually, while the productivity of banana has increased from 13.30 MT/ha to 36.37 MT/ha during this period at 2.26 per cent per annum. The coverage under banana in the World during 1960-61 was about 2043.10 thousand ha which increased to 5526.00 thousand ha in 2016-17. During this period, area increased at the annual average growth rate of 1.97 percent. Production increased from 21870.70 thousand MT to 114146.20 thousand ha i.e. @ 2.73 percent per annum. Yield rate increased from 10.70 MT per hectare to 20.63 MT per hectare and per annum growth rate was 0.75 percent. This indicated that production of banana increased mainly on account of increase in area and yield during the period. Fruits and vegetables are protective foods and each adult individual should have 209.7 and 393.76 grams of the same in his daily diet, recommended by the Indian Council of Medical Research (ICMR). The growers have shifted from conventional crops to banana production but the concern is that whether production growth is at par with productivity growth or it is just due to area growth, which might not be sustainable in the long run. So the present study is undertaken with a view to analyze trend to know growth of banana crop. The main objective of this study is to estimate the growth rates of area, production and productivity of banana in the state of Maharashtra, India and the World.

Objective: To estimate the trends in area, production and productivity of banana.

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Hypotheses: The growth trend in area, production and productivity fluctuating over the year.

Methodology

Trends in area, production and productivity of banana

In order to analyse the growth in area, production and productivity of the banana in the state as a whole for the study period of pre WTO- (1960-1994), post WTO- (1995-2017), overall period (1960-2017), compound annual growth rate was computed by using the following form of the relationship.

$$Y = ab^t$$

Where,

Y = Area/ Production/ Productivity

a = Constant

b = Regression coefficient

t = Time period in years

CAGR (%) = (Antilog b-1) x 100

The compound annual growth rate was estimated for pre and post WTO and overall time periods. The significance of the estimated compound growth rate was tested with the help of student "t" test.

Results and Discussion

The present study estimated growth rates of banana in Maharashtra, India and the World, examined changes occurred in banana acreage in absolute terms, production and productivity and its rate of change has been also evaluated during the different time periods selected for the study in the state, nation and the World. The periodwise annual compound

growth rates in area, production and productivity of banana in Maharashtra, India and the World were worked out for the pre WTO period (1960-1994), post WTO period (1995-2017) and overall period (1960-2017). The results of the growth rates analysis are presented in following Table 1.

At the overall period, the area under banana in Maharashtra raised from 20.00 thousand ha in the year 1960-61 to 84.00 thousand ha in the year 2016-17 at the rate of 2.3 per cent, during the same period production also increased from 473.00 thousand MT to 2928.00 thousand MT at the rate of 4.67 per cent annually. In India, the area under banana expanded from 181.00 thousand ha in the year 1960-61 to 884.00 thousand ha in the year 2016-17 at the rate of 2.88 per cent, during this period production surged from 2425.00 thousand MT to 30808.00 thousand MT at the rate of 5.19 per cent. While, in the case of the World, the area under banana increased from 2043.10 thousand ha in 1960-61 to 5526.00 thousand ha in the year 2016-17 at a compound growth rate of 1.97 per cent, and production increased from 21870.70 thousand MT to 114146.20 thousand MT at the rate of 2.73 per cent, annually. The Maharashtra's banana productivity growth rate was found increasing and highly significant during all the periods (1.23 and 2.32%) under study except post WTO period, it was negatively significant i.e. -1.41%, (Appendix I). While, the productivity of Indian banana showed increasing trend from 13.3 to 36.37 MT/ha during all the period under study at the rate of 1.53, 1.45 and 2.26 per cent per annum, respectively. In case of the world, the trend in productivity gradually increased from 1960-2017 were 10.7 to 20.63 MT/ha and the rate of gradual increase was 0.75 per cent annually. It was higher in post WTO period (1.39%) compared to pre WTO period (0.92%).

Table 1: CAGR of area, production and productivity of banana (%)

Sr. No.	Particulars	Pre WTO (1960-1994)			Post WTO (1995-2017)			Overall period (1960-2017)		
		A	P	Y	A	P	Y	A	P	Y
		1	Maharashtra	2.99 ***	4.27 ***	1.23 ***	1.68 ***	0.32 ^{NS}	-1.41 **	2.3 ***
2	India	2.41 ***	3.96 ***	1.53 ***	3.85 ***	5.36 ***	1.45 ***	2.88 ***	5.19 ***	2.26 ***
3	World	1.72 ***	2.65 ***	0.92 ***	1.71 ***	3.13 ***	1.39 **	1.97 ***	2.73 ***	0.75 ***

(Source: <http://www.fao.org.data> 2019, Horticulture Statistics at a Glance, 2018.)

(Note: ***, ** and * significant at 1, 5 and 10 per cent level of significance, respectively. NS= Non-significant, A-Area, P- Production, Y-Yield/productivity)

The area, production and productivity of banana were positively significant for Maharashtra, India and the World during the pre WTO, while in case of Maharashtra the production was positively non-significant and productivity was negatively significant during the post WTO.

The result revealed from the Table 1 that, the compound annual growth rate of area registered 1.68 per cent, production (0.32%) found non-significant and productivity is declined significantly by -1.41 per cent during post WTO as compared with pre WTO and overall period registered positive and significant growth for Maharashtra. The negative growth in productivity of banana in Maharashtra, implies available technologies could push up the yield of banana. Therefore, dissemination of use of technologies to push up the yield of banana was the matter of great challenge for researchers and extension agencies in Maharashtra. The result was in consonance with the findings of Kishor Kumar *et al.* (2013) [7].

Production is the combined effect of area and productivity. The growth of production is majorly contributed by areas, while in case of banana productivity effect is negative.

Therefore, keeping the area as constant the productivity of banana can be further increased by taking appropriate use of production technologies. The productivity was associated with adoption of technology and hence the decreasing trend in productivity could be attributed to poor adoption of technology such as high yielding varieties, irrigation methods, fertilizers and other management conditions. The reason for poor adoption of technology would be higher price of inputs and lower prices for the product. The Government intervention is required to make stable markets available for banana for marketing, which is being adopted by the growers and whose production has gained impetus, so that it's profitable to growers in long run. Similar results were reported by Agarwal *et al.* (2016) [1] and Kudagamage *et al.* (2002) [8].

In case of India, the area, production and productivity of banana registered positive and significant growth rates. The growth in production 3.96, 5.36 and 5.19 per cent was largely attributable to the corresponding growth in area 2.41, 3.85 and 2.88 per cent and was supplemented by productivity growth of 1.53, 1.45 and 2.26 per cent per annum for the pre WTO,

post WTO and overall period, respectively. It implied that, increased production of banana was mainly due to the increased area rather than increase in productivity in India. It shows that, the increased production of banana has been influenced largely by the increased area but in long term period this is not feasible as area can only be increased up to certain level. Measures needs to be taken to improve the productivity of banana so that their production can be increased without putting a pressure on the land resource. In case of the World, the area (1.97%) and production (2.73%) exhibits positive growth, while productivity (0.75%) of banana was found to be slow growing for overall period. This slow growth in productivity of banana may be contributed for poor management practices used by the growers of banana growing countries. These results are in conformity with the findings of Bondar (2015) [3] and Gowri (2015) [4].

These findings affirms the null hypothesis of the growth trend in area, production and productivity fluctuating over the year during pre WTO and post WTO and overall period of the study.

Summary and Conclusion

- In case of India and Maharashtra, the area, production and productivity of banana registered a positive and highly significant growth in all the periods under study except during post WTO period compound annual growth rate of banana production (0.32%) in Maharashtra found positively non-significant and productivity was declined significantly by -1.41 per cent. At the overall period (1960-2017), the World's area (1.97%) under banana and production (2.73%) exhibits positive and highly significant growth per annum at one per cent level of significance, while productivity (0.75%) of banana was found to be slow growing.
- The area, production and productivity of banana in India and Maharashtra registered a positive growth during the overall period (1960-2017) except non-significant production and declined productivity was found during post WTO period in Maharashtra. It implied that, increased production of banana was mainly due to the increase in its area rather than increase in productivity in India, but in long term period this is not feasible as area can only be increased up to certain level. Measures needs to be taken to improve the productivity of banana so that their production can be increased without putting a pressure on the land resource. The negative growth in productivity of banana in Maharashtra, showed available technologies were not adequate to push up the yield of banana. Therefore, dissemination of use of technologies to push up the yield of banana was the matter of great challenge for researchers and extension agencies in Maharashtra. The area and production of banana in the World exhibits positive growth, while productivity of banana was found to be slow growing for overall period. This slow growth in productivity of banana may be due to poor management practices used by the producers of banana growing countries.

Policy Implication

The growth rate analysis indicated that the increase in banana production was due to area, rather than productivity, which calls for intensive efforts to increase productivity of banana in India. The increased production of banana has been largely influenced by area expansion but in long term period this is not feasible as area can only be increased up to certain limit.

The measures like needs to be taken to improve the productivity of banana so that their production can be increased without putting a pressure on the land resource.

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