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GROWTH RATE OF AREA PRODUCTION AND PRODUCTIVITY OF LITCHI FRUIT IN JASHPUR DISTRICT OF CHHATTISGARH

Abstract

Present study was [done to](#) analyse the growth rate of litchi production in Jashpur district of Chhattisgarh. with specific objectives of determining trend in area, production and productivity of litchi. India is the second largest producer of litchi in the world after China. Presently in India, litchi is cultivated in an area about 99170 hectares with total production of 737200 metric tons and productivity of 7.43 metric tons / hectare. Chhattisgarh produces nearly cultivated in an area about 8474 hectares with a total production of 58907 metric tons and productivity of 1.94 metric tons / hectare. It is mainly cultivated in the old district of Surguja, Jashpur, Balrampur and Surajpur. The study revealed [s](#) that the growth rates in area, production and productivity [was](#) negative and found [to be](#) -0.02 [%per cent](#), -0.04 [%per cent](#) and [productivity](#) -0.02 [%per cent](#) respectively in India while, in Chhattisgarh it [was](#) recorded [of](#) -0.054539123%, -0.058485184%, and -0.003741976-[%per cent](#) [In Jaspur district,](#) and [negative rate](#) it was noted to be -0.0616%, -0.0463%, and 0.0144% respectively, [in Jashpur Districts.](#)

Keywords: Litchi, Area, Production, Productivity, Growth rate.

Introduction:

Litchi fruit is famous for its excellent quality, characteristics pleasant flavour and [for](#) attractive red colour. Martina (1655) called the litchi "the king of fruits ". Litchi fruit contains about 60 [%per cent](#) juice, 8 [%per cent](#) of rag, 19 [%per cent](#) seed and 13 [%per cent](#) rind which depends upon the varieties and the climate under which it is grown. The principle chemical constituents [in the fruit](#) are carbohydrate, organic acids, vitamins, pigments, proteins and fat. Litchi fruit is considerably rich in sugar and the sugar content in the fruit of Indian varieties varies from 6.74 to 18.0 [%per cent](#) with the average of 11.85 [%per cent](#). Litchi is also an excellent source of vitamins 'C' (ascorbic acid) ranging from 40.20 to 90 mg/100g. It [is](#) also contains proteins (0.8-0.9%), fat (0.3%), pectin (0.42%) and minerals specially calcium, phosphorus and iron (0.7%). Thus, litchi fruit adds to the country's total production of bulky food over and above its nutritive value. Litchi is a fruit containing healthy vitamins and antioxidants. China, India, and Vietnam are the major producers of litchi in the globe. According to the International Society for Horticultural Science (ISHS), China ranked first with a production volume of 2,000.0 thousand metric tons, followed by India and Vietnam with 677.0 thousand metric tons and 380.0 metric tons, respectively; in 2018. Vietnam has become the second-largest exporter of [litchi](#) despite its smaller output when compared to China and India. The United States, Canada, and Europe are the major importers of [lychee litchi](#) which accounted for 80% of China's litchi export market in 2018. Vietnam was the second-largest exporter of [lychee litchi](#) during 2018. The major reason for the increase in exports of litchi is the increasing demand for Vietnam's [lychee litchi](#) due to the better fruit

quality when compared to India and China, the largest litchi producers in Asia during the same period. Litchi occupies a prominent place in the fruit platter of Indian households. This increase in demand has led to an increase in litchi production in the country. According to AGRICOOP, the production of ~~litchi~~ was 568.0 thousand metric tons in 2016, which has increased by 20.8% and reached 686.0 thousand metric tons in 2017. ICAR-National Research Centre on Litchi (NRCL), has developed few litchi varieties that are suitable for agro-regions of South India such as Tamil Nadu and Andhra Pradesh. Bihar, Jharkhand, Chhattisgarh, and Assam are the major ~~litchi~~ producing states in the country. Bihar accounted for 62.1% of the total country's production, followed by Jharkhand, Chhattisgarh, and Assam, respectively; in 2017. Shahi litchi is one of the most cultivated varieties of litchi in the major litchi producing state in India. Farming of litchi fruit is being done in 7965 hectare of land area and 559060 M.T. production in Chhattisgarh state. Surguja district is the leading districts of area and production of litchi followed by Surajpur, Jashpur, balrampur and Korla. In Jashpur district, the area and production of litchi is 1700 hectare and 7650 M.T. respectively.

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Materials and methodology:

~~Methodology will be used in the investigation to fulfill the various objectives of the study undertaken.~~ It includes the selection of district, block, villages ultimate unit of sample farmers (Litchi growers), market functionaries, consumers technique of collection of data and method of analysis.

- 1) Sampling framework
- 2) Collection of data
- 3) Analytical tools and techniques

1) Sampling framework

Sampling procedure:- Multistage sampling ~~was will be~~ followed, in which the districts (Jashpur) ~~was will be~~ considered as the first stage unit, the block as second stage.

Selection of District:- Out of 32 district, Jashpur district of Chhattisgarh ~~was will be~~ selected purposively for this study as it has the third highest area and production of litchi in the state.

Selection of block:- Among the 9 blocks of Jashpur district, two blocks (~~Kunkuri and Duldula~~) ~~were are~~ selected on the basis of area and production of litchi. ~~Two blocks i.e. Kunkuri and Duldula block will be selected.~~

Selection of villages:- Selection of villages ~~was done will be~~ according to litchi growing farmer available in the village. 2%-3% villages from each block ~~were will be~~ sampled.

Selection of Respondents: Suitable no. of litchi farmers ~~were will be~~ selected from the selected villages based on availability. About 100-150 litchi growers ~~were will be~~ sampled for the purpose of study.

2) Collection of data:- The primary data ~~was will be~~ collected from the respondents on various aspects ~~for the analysis of which will analyse the~~ different objectives of the study. The personal interview method ~~was will be~~ adopted for collection of primary data with the help of well designed questionnaires.

The secondary data ~~was will be~~ collected from published sources and from various government offices and official websites etc.

3) Analytical tools and techniques:- Collected data ~~was will be~~ tabulated and ~~3~~ analysed by using appropriate statistical tools and techniques. Descriptive statistics, Compound growth rate, Cost concepts, Returns, Marketing costs and margins in marketing of litchi, Resource-use efficiency and Garret ranking etc. may be employed.

1) Per cent over previous year (succeeding year- preceding year)/succeeding year*100

2) Compound growth rate:

• Exponential trend equation: $Y = abT^{ut}$

Where, Y = Area/production/productivity of litchi,

• T = Time element i.e. year which takes the value 1, 2n,

• Ut = Disturbance term

• b = Growth rate over a time period.

Results and Discussion

1) Growth rates in area, production, and productivity of litchi fruit in India :

In this section an attempt has been made to analyze the compound growth rate (CGR) and per cent change in area production and productivity of the litchi in India and the data pertaining to it was accessed from the secondary source for a period of ten years (2012-13 to 2021-22).

The area, production and productivity of litchi in India from 2012- 13 to 2021-22 has been presented in the table:1 The area under litchi cultivation in 2012-13 ~~was is~~ seen as 82740 hectares in 2013-14 ~~which they are~~ increased to 84170 hectares i.e. 1.69 ~~%per cent~~ over the previous year and it further increased to 84950 ha (0.92 ~~%per cent~~) in the subsequent year where-as, in 2015-16 they are increased to 90050 hectare (5.66 ~~%per cent~~) and again it further increased to 93310 hectares (3.49 ~~%per cent~~) in the year 2016-17. ~~In 2017-18, the area decrease by 92340 hectare (-1.05 %per cent) in the year 2017-18.~~ Further in 2018-19 the area ~~again~~ extended to 95510 hectares i.e. 3.32 ~~%per cent~~ over the previous year and again it increased to 96550 hectares (1.07 ~~%per cent~~) in 2019-20. The area increase by 97910 hectare (1.39 ~~%per cent~~) in the year 2020-21, finally in 2021-22, the area increased ~~to~~ 99170 hectares i.e. 1.27 ~~%per cent~~ over previous year. ~~The increased~~ in area of litchi cultivation from 2012-13 to 2021-22 was mainly due to ~~increase in~~ remunerative price of litchi.

The production of litchi fruit in India in 2012-13 ~~was recorded is seen~~ as 580080 MT in 2013-14 it increased to 585300 MT (0.89 ~~%per cent~~). Where-as, in 2014-15, the production decreased to 528260 MT (-10.79 ~~%per cent~~) and inter covered to 558770 MT (5.46 ~~%per cent~~) in the subsequent year in 2015-16. The production increased to 568200 MT (1.66 ~~%per cent~~) in 2016-17, raised further to 686450 MT (17.22 ~~%per cent~~) in the year 2017-18. The production level of litchi in India again increased ~~i~~ in 2018-19 and 2019-20 to 721390 MT (4.84 ~~%per cent~~) and 726220 MT (0.66 ~~%per cent~~) over the previous year respectively. In 2020-21, it decreased to 720120 MT (-0.85 ~~%per cent~~). Finally in 2021-22, ~~the~~ production level increased comparatively ~~previous year~~ to 737200 MT i.e. 2.31 ~~%per cent~~ over previous year.

The productivity of litchi fruit in India in 2012-13 was recorded to be 7.01 MT/ha which decreased to 6.95 MT/ha (-0.86 %per cent) in 2013-14 and further decrease to 6.22 MT/ha (-11.73 %per cent) in the year 2014-15. The production level of litchi in India again decreased in 2015-16 and 2016-17 to 6.20 MT/ha (-0.32 %per cent) and 6.09 MT/ha (-1.80 %per cent) respectively, then recovered to 7.43 MT/ha (18.03 %per cent) in the year 2017-18. The productivity further increased to 7.55 MT/ha in 2018-19, then productivity decreased to 7.52 MT/ha (-0.39 %per cent) in the year 2019-20 and to 7.35 MT/ha (-2.31 %per cent) in the year 2020-21. Finally, in 2021-22 the productivity increased to 7.43 MT/ha (1.01 %per cent) over the previous year.

From the above observation, the compound growth rates for area, production and productivity of litchi fruit were -0.02 %per cent, -0.04 %per cent and productivity -0.02 %per cent, respectively. Among all the variables, the area and production growth rates are significant at 1% significance level, and productivity is significant at 5% level of significance.

Table 1 : Growth rate of area, production, productivity of litchi fruit in India

S.N.	Year	Area(ha)	Per cent over previous year	Production (MT)	Per cent over previous year	Productivity	Per cent over previous year
1	2012-13	82740	-	580080	-	7.01	-
2	2013-14	84170	1.69	585300	0.89	6.95	-0.86
3	2014-15	84950	0.92	528260	-10.79	6.22	-11.73
4	2015-16	90050	5.66	558770	5.46	6.20	-0.32
5	2016-17	93310	3.49	568200	1.66	6.09	-1.80
6	2017-18	92340	-1.05	686450	17.22	7.43	18.03
7	2018-19	95510	3.32	721390	4.84	7.55	1.59
8	2019-20	96550	1.07	726220	0.66	7.52	-0.39
9	2020-21	97910	1.39	720120	-0.85	7.35	-2.31
10	2021-22	99170	1.27	737200	2.31	7.43	1.01
1							
Cagr		0.020960669 ***		0.044553358 ***		0.023108336 **	

*** Significant @ 1% level of significance **Significant @ 5% level of significance

2) Growth rates in area, production and productivity of litchi fruit in Chhattisgarh

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In Chhattisgarh, the litchi cultivated area under litchi was in 2012-13 was 4990 hectares during 2012-13. During 2013-14, the area expanded by to 5363 hectares which was 6.95 %per cent more rise in than the previous year. The area extended to 5548 hectares in 2014-15 (3.33%) from the preceding year. It over again greater than before to 6614 ha (16.11%) in 2015-16. Further in the year 2016-17 increase area with 7017 hectare (5.74 %). Similarly in the year 2017-18 and 2018-19 further the area extends to 7409 hectares

(5.29 %) and 7708 hectares (3.88%) respectively from preceding year. In the year 2019-20 the area decreased with 7065 hectares with -9.10% from the preceding year. In the year 2020-21 further the area extends to 8087 hectare 12.63% from preceding year. Finally In the year 2021-22, area also increased with 8474 hectare with 4.56% from before year. Cultivated area under litchi cultivation increase from 2012-13 to 2021-22 was mainly due to remunerative price of Litchi.

The litchi production in the state in 2012-13 was 30887 MT. In 2013-14 it greater than before to 37631 MT (17.92%) and same as augmented to 39152 metric ton (3.88%) in succeeding year. the production increased to 45381 metric ton (13.72%) in 2015-16 from preceding year. The increase in production 49924 MT (9.09%) in 2016-17 year. In 2017-18 increased to 52501 MT (4.91%) from the prior year. The increase in production is 54298 MT in 2018-19 & (3.31per cent) The level of production in state again increased during 2019-20 and 2020-21 to 55907 MT and 56807 MT respectively. Finally in 2021-22 production level increased to 58907 MT i.e. 3.56% preceding year.

The Litchi productivity in 2012-13 is seen as 1.82 MT/ha which increased to 1.94 MT/ha in 2013-14 and it increased marginally to 1.95 MT/ha (0.51%) in year of 2014-15. where as the productivity decreased to 1.92 MT/ha (-1.56 per cent) in 2015-16 and then increased 2.04% during 2016-17. Then the productivity decreased to 1.95 MT/ha (-0.51 per cent) in 2017-18. The productivity stable with 0.00, MT/hectare in year 2018-19, and it marginally increased to 2.07 MT/ha in 2019-20. Whereas in 2020-21, the productivity decreased to 1.95 MT/ha (-6.15%) from the preceding year & also decreased with 1.94 MT/ha (-0.51%) in the year 2021-22.

From the above observation the Area, production, and productivity have the compound growth rates of -0.054539123%, -0.058485184%, and -0.003741976%, respectively. Among all the variables, the area and production growth rates are significant at 1% significance level, and productivity is significant at 5% level of significance.

Table 2: Growth rate of area, production, productivity of litchi fruit in Chhattisgarh:

S.N.	Year	Area	Per cent over previous year	Production	Per cent over previous year	Productivity	Per cent over previous year
1	2012-13	4990	-	30887	-	1.82	-
2	2013-14	5363	6.95	37631	17.92	1.94	6.18
3	2014-15	5548	3.33	39152	3.88	1.95	0.51
4	2015-16	6614	16.11	45381	13.72	1.92	-1.56
5	2016-17	7017	5.74	49924	9.09	1.96	2.04
6	2017-18	7409	5.29	52501	4.91	1.95	-0.51
7	2018-19	7708	3.88	54298	3.31	1.95	00

8	2019-20	7065	-9.10	55907	2.88	2.07	5.79
9	2020-21	8087	12.63	56807	1.58	1.95	-6.15
10	2021-22	8474	4.56	58907	3.56	1.94	-0.51
1							
Cagr		-0.054539123 ***		-0.058485184 ***		-0.003741976	

*** Significant @ 1% level of significance **Significant @ 5% level of significance

3) Growth rates in area, production and productivity of litchi fruit in Jashpur district :

The litchi cultivated area in 2012-13 was 1079 hectares. During 2013-14, the area expanded by **0.55** per cent rise in the previous year to 1085 hectares. The area extended to 1090 hectares in 2014-15. (0.45 from the preceding year) It over again greater than before to 1102 ha (1.88%) in 2015-16. Further in the year 2016-17 increase area with 1220 hectare (9.67 per cent). Similarly in the year 2017-18 and 2018-19 further the area extends to 1320 hectares (7.57 %) and 1420 hectares (7.04%) respectively from preceding year. In the year 2019-20 the area also increased with 1520 hectares with **6.57%** from the preceding year. In the year 2020-21 the area stable with 1520 hectare 00.00% from preceding year. Finally In the year 2021-22, area also increased with 1700 hectare with 10.58% from before year. Cultivated area under litchi cultivation increase from 2012-13 to 2021-22 was mainly due to remunerative price of Litchi.

The litchi production in the state in 2012-13 was 5395 MT. In 2013-14 it greater than before to 5425 MT (**0.55%**) and same as augmented to 5450 metric ton (0.45%) in the year 2014-15. the production increased to 5500 metric ton (0.90%) in 2015-16 from preceding year. The increase in production 5600 MT (1.78%) in 2016-17 year. In 2017-18 increased to 5940 MT (**5.72%**) from the prior year. Further the production increased to 6999 MT (15.13 per cent) in the year 2018-19 The level of production in district decreased during 2019-20 to 6840 MT (-2.32%). In the year 2020-21 the area stable with 6840 hectare 00.00% from preceding year. Finally in 2021-22 production level increased to 7650 MT i.e. 10.58% preceding year.

The Litchi productivity in Jashpur districts from 2012-13 is seen as 1.60 MT/ha which is stable from 2013-14 to 2015-16. Where as the productivity decreased to 1.52 MT/ha (-5.26%) in year of 2016-17. And also decreased to 1.50 MT/ha (**-1.33** per cent) in 2016-17 and then increased 2.04% during 2016-17. Then the productivity decreased to 1.95 MT/ha (-0.51 per cent) in 2017-18. Further in 2018-19 the productivity extended to 1.59 MT/ hectares i.e. 5.66 per cent over the previous year and again it decreased to 1.50 hectares (-6.00 per cent) in 2019-20. The productivity stable with 0.00, MT/hectare in year 2018-19 and 2021-22.

From the above observation the Area, production, and productivity have the compound growth rates of -0.06164%, -0.0463%, and 0.014451508%, respectively. Among all the variables, the area and production growth rates are significant at 1% significance level, and productivity is significant at 5% level of significance.

Table3: Growth rate of area, production, productivity of litchi fruit in Jashpur district:

S.N	Year	Area(Ha)	Per cent over previous year	Production(MT)	Per cent over previous year	Productivity	Per cent over previous year
1	2012-13	1079	-	5395	-	1.60	-
2	2013-14	1085	0.55	5425	0.55	1.60	00
3	2014-15	1090	0.45	5450	0.45	1.60	00
4	2015-16	1102	1.88	5500	0.90	1.60	00
5	2016-17	1220	9.67	5600	1.78	1.52	-5.26
6	2017-18	1320	7.57	5940	5.72	1.50	-1.33
7	2018-19	1420	7.04	6999	15.13	1.59	5.66
8	2019-20	1520	6.57	6840	-2.32	1.50	-6.00
9	2020-21	1520	00	6840	00	1.50	00
10	2021-22	1700	10.58	7650	10.58	1.50	00
cagr		-0.06164 ***		-0.0463 ***		0.014451508 **	

*** Significant @ 1% level of significance **Significant @ 5% level of significance

Conclusion:

The study reveals that the growth rates in area, production and productivity in India is negative and found -0.02 per cent, -0.04 per cent and -0.02 per cent respectively while in Chhatisgarh state, it is recorded of -0.054539123%, -0.058485184%, and -0.003741976 per cent and negative rate -0.0616%, -0.0463%, and 0.0144% respectively in Jashpur Districts. From the above observation the Area, production, and productivity have the compound growth rates were negative rate. Among all the variables, the area and production growth rates are significant at 1% significance level, and productivity is significant at 5% level of significance.

fig .1Area(ha)of litchi cultivation in India

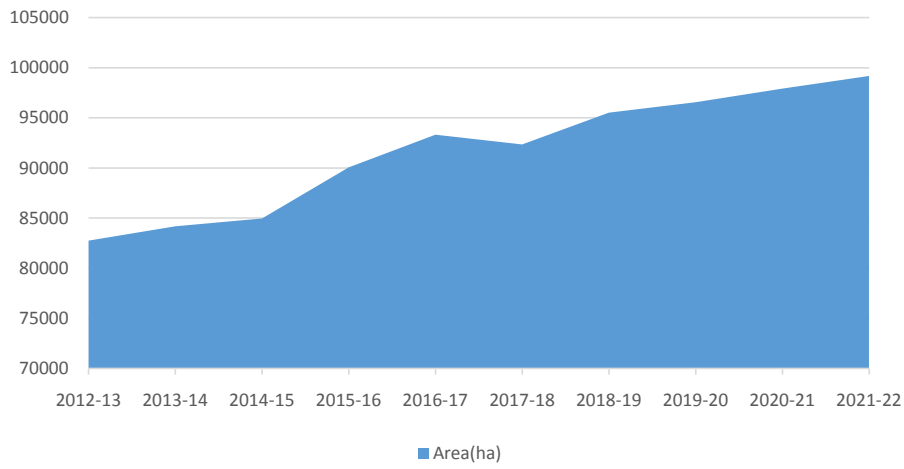
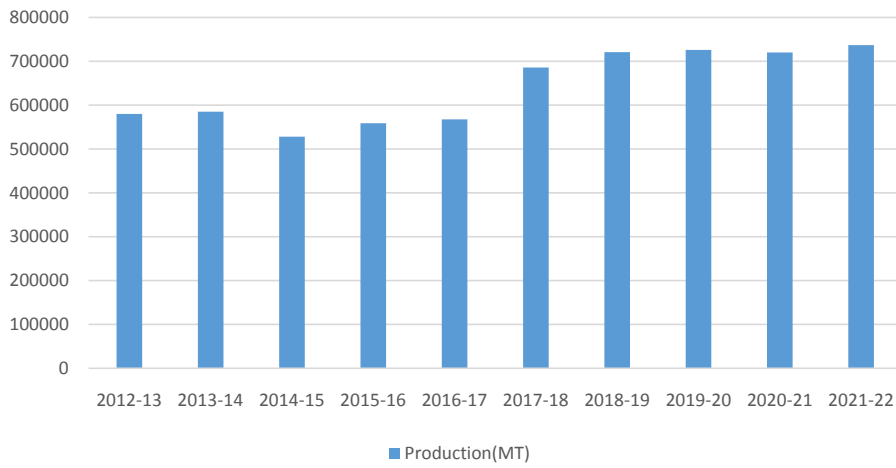
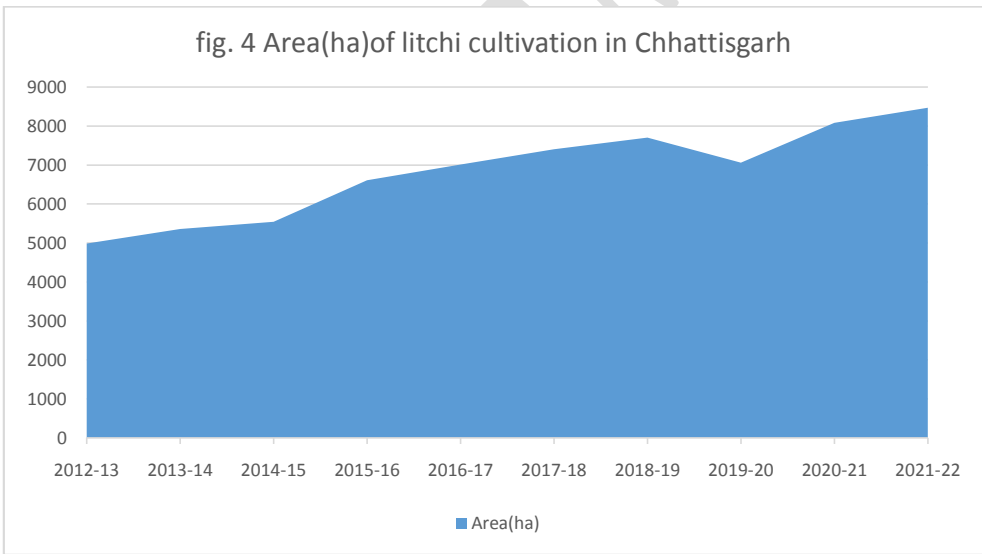
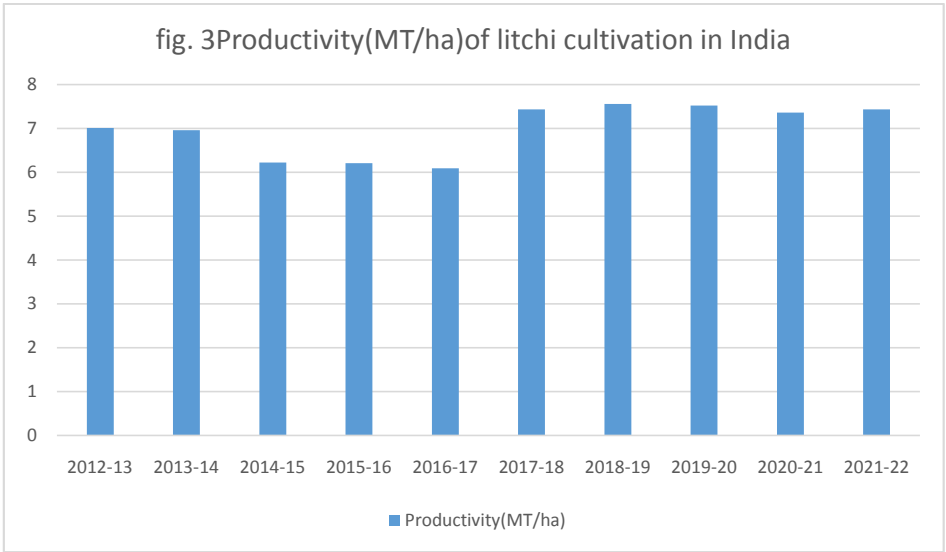
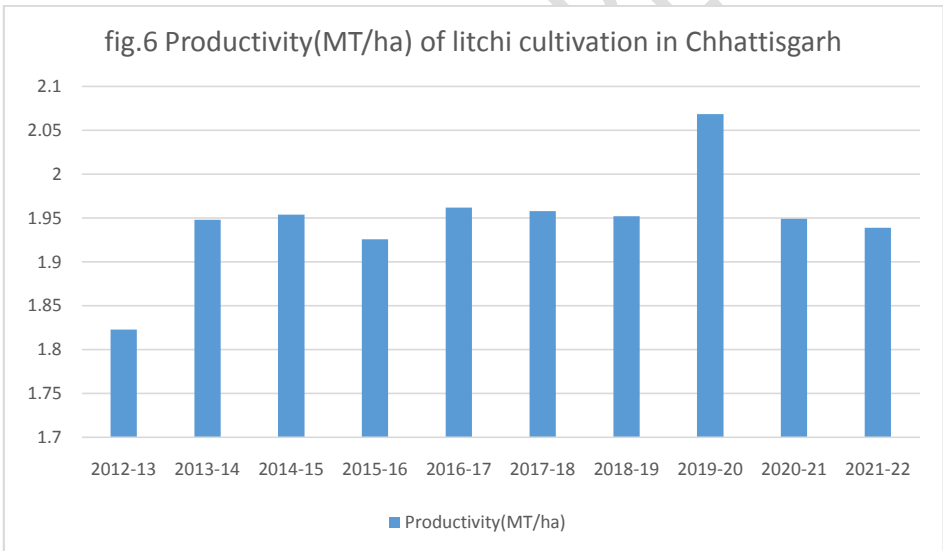
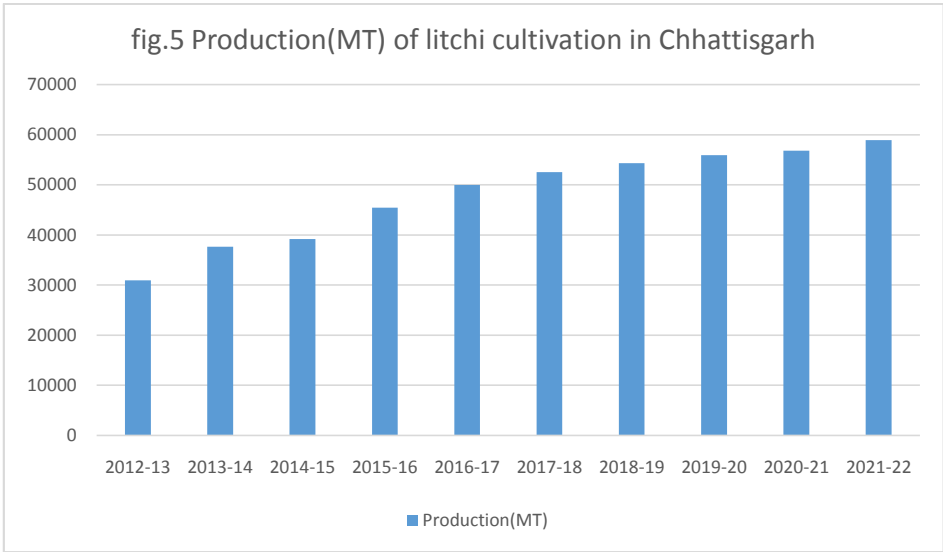
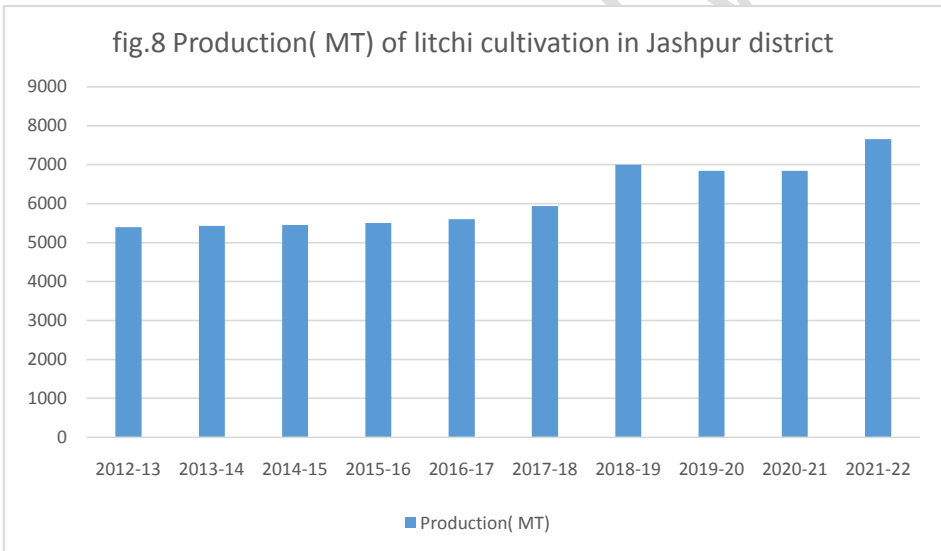
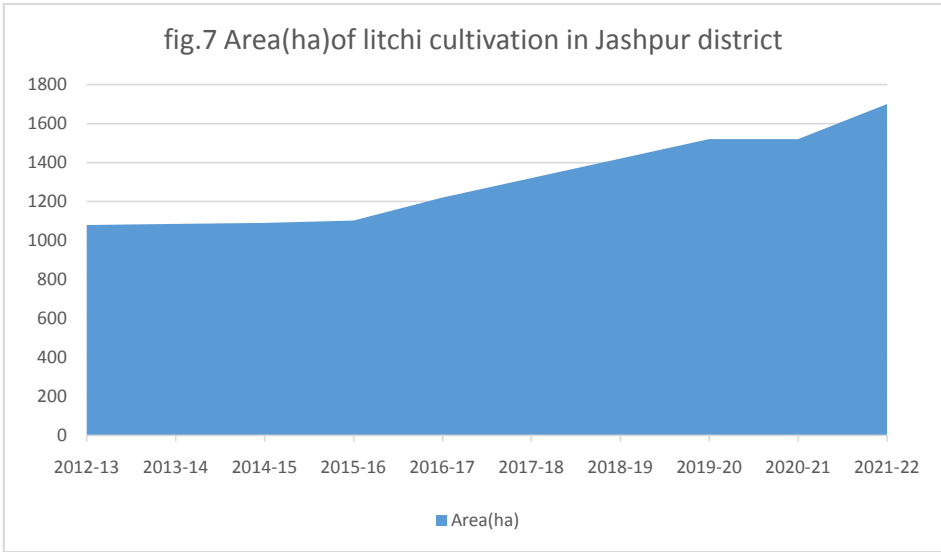


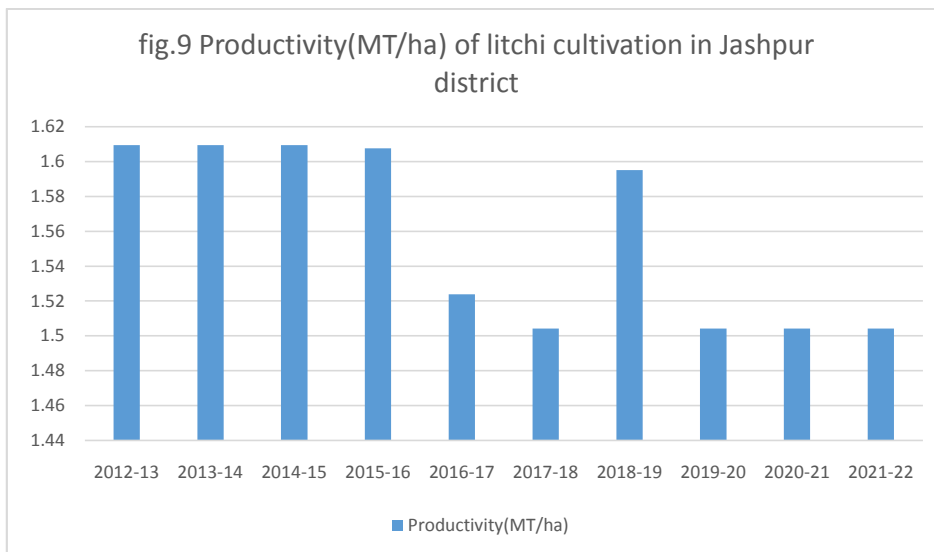
fig .2Production(MT) of litchi in India











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