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Agricultural development in Ratnagiri district

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Abstract
Agriculture plays vital role in the process of economic development of less developed countries like, India. Besides providing food for the nation, agriculture absorbs labor, provides saving, contributes to the market of industrial goods and earn overseas exchange. The present study attempted to estimate the growth in different sectors of agriculture and allied activities in Ratnagiri district. The information in this regard was obtained from different published records of State Government of Maharashtra for the period from 2006-07 to 2020-21. For knowing the growth in different sectors of agriculture and allied activities in Ratnagiri district use the linear growth rate and compound growth rate model. Study findings reveal that, growth in area under forest, barren and uncultivable land, culturable waste land, land under miscellaneous trees and grooves, current fallow and area sown more than once was significantly decreased, while the net sown area and other fallow area was increased significantly in Ratnagiri district. Growth rates of area under total cereals, total pulses, total spices, total vegetables and total oilseeds was significantly decreased, whereas area under Mango and other fruits (i.e. Cashew, Coconut, arecanut etc.) was significantly increased over the period in Ratnagiri district. In Ratnagiri district, the production of coconut, mango and cashew was significantly increased over the period, while the production of rice, other cereals and total food grains showed non-significant result. The productivity of rice, other cereals, total food grains, total oilseeds, Coconut, Mango and Cashew was significantly increased, while the productivity of total pulses showed non-significant result over the period in Ratnagiri district. Area irrigated by surface irrigation was significantly increased, while the area irrigated by well irrigation was significantly decreased over the period. Fertilizer consumption of Ratnagiri district over the period it was significantly decreased. In Ratnagiri district, daily wages paid to agricultural labour at current as well as at constant, it was significantly increased over the period.
In general, positive growth observed in net sown area, other fallows, land put to nonagricultural use and total cropped area, area under mango, cashew, coconut, production and productivity of important crops, area irrigated by surface irrigation, daily wages paid to male and female agricultural labour at current as well as at constant prices in the district. This indicated that the agricultural development is taking shape in the desired direction.

Keywords: Agricultural development, Ratnagiri district, significant, non-significant, LGR, CGR, increased, decreased, over the period

Introduction
Agriculture plays vital role in the process of economic development of less developed countries like, India. Besides providing food for the nation, agriculture absorbs labor, provides saving, contributes to the market of industrial goods and earn overseas exchange. In India, agriculture has the main source of national income and occupation since independence. During the first decade of independence, agriculture and allied activities contributed about 51.81 percent to India's national income and around 73 percent of the total working population were engaged in agriculture and allied sector. However, the share of agriculture to national income substantially has declined from 51.81 percent in 1951 to 18.20 percent in 2013-14. In spite of this, agriculture still has prominently playing vital role in the India's economic growth. Agriculture provides raw materials for industrial sector and creates employment opportunities in the ever-growing service sector. Since independence, Indian agriculture has been significantly progressing; it grew at the rate of one% per annum for sixty years during pre-independence era 1860-1920. Further, it springs up at the rate of about 2.6 percent per annum in the post- independence era 1951-56.
An increase in total cropped area was the main source of agriculture growth from fifties to eighties. During mid-eighties, a structural change in the production was observed. Area was moderately declined, while per hectare production was increased substantially due to technological transformation.

Apart from technological transformation, land reforms, an introduction of agricultural price commission with the objective to ensure remunerative prices to producers, new agricultural strategies, *viz*., introduction of hybrid seeds, chemical fertilizers, new cultivation & harvesting tools, improved irrigation facilities, agriculture credit & insurance, investment in research and extension services and improvement of rural infrastructure were taking place.

Agricultural development is the vital component of total economic development. At the time of independence, India's primary industry and source of income was agriculture. Nearly 50% of India's national income was generated by agriculture and related activities. 60% of the workforce in India was employed in the agricultural sector, which also accounts for around 17% of the country's GDP.

In the 1950s and 1960s, area expansion was the primary driver of growth. Subsequently the contribution of expanded land area used for agriculture has decreased over time and productivity growth has taken over as the primary driver of agricultural production growth. Success in reducing reliance on imported food grains is a crucial aspect of agricultural development. In India, half of the income generated in industrial sector is based on raw material obtained from agriculture. The trade both international and interstate in our country highly depends on agricultural products. The surplus from agricultural sector, because of increased productivity due to modernization of agriculture serve as the basis for starting several economic activities and finally contribute substantially to an overall economic growth of the country. This is the reason why agricultural development has been given priority in the economic planning during post-independence period in our country.

Objective

To estimate the growth in different sectors of agriculture and allied activities in Ratnagiri district.

Methodology

The present study on "Agricultural development in Ratnagiri District" attempts to estimate the growth in different sectors of agriculture and allied activities in Ratnagiri district. The present study was entirely depend on secondary data. Such data were collected from secondary sources i.e. different published records of the state government *viz*.

a. Socio-economic review and District Statistical Abstract of Ratnagiri district, Directorate of Economics and Statistics, Government of Maharashtra.
b. Statistical Abstract of Maharashtra State, Directorate of Economics and Statistics, Government of Maharashtra.

Hence, a time series data for the time period of 2006-07 to 2020-21 i.e. 16 year data was considered for studying the growth rates in the selected parameters of Ratnagiri district. Such parameters are: Land utilization pattern, Cropping pattern, Production and Productivity of principle crops, Daily wage rates of agricultural labour, Irrigation sources and Fertilizer consumption.

Calculating the growth rates of selected parameters of development with the help of linear growth rate and compound growth rate.

Linear growth rate

The linear trend equation was used for estimating linear growth rates. It is represented as;

$Y = a + bt$

Where
Y = Dependent variable
a = Intercept or constant
b = Regression or Trend coefficient
t = Period (in years)

Linear Growth Rate over the period of time in percentage was calculated using the following relationship.

L.G.R = b ^/ $Y1$ ^ x 100

Compound growth rate

Compound growth rates were estimated to study the percentage increase or decrease per annum in the selected parameters. The following exponential growth function was used;

$Y = ab^te$

Where
Y= Dependent variable
a = Intercept or constant
b = Regression or Trend coefficient
t = Period (in years)
e = Error term with zero mean and constant variance

The exponential growth function was converted into log linear form to facilitate easy calculations. Compound Growth Rate per annum in percentage was calculated using the following relationship.

C.G.R. (r) = [(Antilog of b) – 1] x 100

Result and Discussion

Growth rates of land utilization pattern

The growth rates of land utilization pattern in Ratnagiri district for the study period (2006-07 to 2020-21) were work out with the help of linear growth rate (over the period of time) and compound growth rate (per annum) and presented in Table 1.

Table 1: Growth rates of Land utilization pattern (2006-07 to 2020-21)

Particulars	Linear growth rate	Compound growth rate
Forest area	-0.68**	-0.70**
Land put non-agricultural use	0.28**	0.27**
Barren and uncultivable land	-0.33**	-0.35**
Culturable waste land	-0.34**	-0.35**
Permanent pasture and other grazing land	-0.05	-0.05
Land under Misc. trees and grooves	-0.35**	-0.37**

Current fallow	-0.19**	-0.20**
Other fallow	0.17**	0.18**
Net sown area	0.48**	0.47**
Area sown more than once	-2.60**	-3.28**
Total cropped area	0.32**	0.33**

** Significant at 5%

Growth rates for land put to non-agricultural use, net sown area, total cropped area and other fallow land

From the Table 1, it was seen that in Ratnagiri district, the area under land put to nonagricultural use was significantly increased over the period of time by 0.28% and per annum by 0.27% at 5% level. The net sown area of Ratnagiri district, it was significantly increased over the period of time by 0.48% and per annum by 0.47% at 5% level. The total cropped area of Ratnagiri, it was significantly increased over the period of time by 0.32% and per annum by 0.33% at 5% level. The area under the other fallow significantly increased over the period of time by 0.17% and per annum by 0.18%.

Growth rates for area under forest, barren and uncultivable land, culturable waste land, land under miscellaneous trees crops and grooves, current fallow land and area sown more than once:

From the Table 1, it was seen that, the area under forest significantly decreased over the period of time by 0.68% and per annum by 0.70% at 5% level. The barren and uncultivable land significantly decreased over the period of time by 0.33 and per annum by 0.35%. The culturable waste land significantly decreased over the period of time by 0.34% and per annum by 0.35%. Land under miscellaneous trees crops and grooves significantly decreased over the period of time and per annum by 0.35 to 0.37%. Area sown more than once was significantly decreased over the period of time by 2.60% and per annum by 3.28%. Area under current fallow was significantly decreased over the period of time by 0.19% and per annum by 0.20%.

Growth rates for permanent pasture and other grazing land

From the Table 1, it was seen that, the area under permanent pasture and other grazing land showed non-significant result over the period of time and per annum in Ratnagiri during study period.

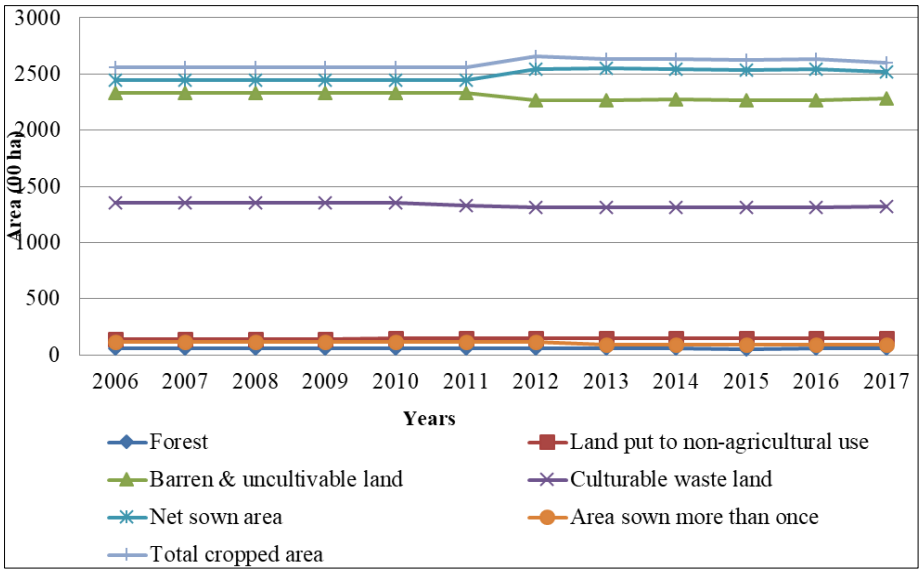

Fig 1: Growth in Land utilization pattern

Growth rates of area under different crops

The growth rates of area under different crops is worked out for study period (2006-07 to 2020-21) and presented in Table 2.

Table 2: Growth rates of area under different crops in Ratnagiri district (2006-07 to 2020-21)

Particulars	Linear growth rate	Compound growth rate
Total cereals	-2.33**	-7.10**
Total pulses	-5.12**	-5.02**
Total food grains	-2.57**	-2.63**
Total spices	-14.23**	-16.47**
Mango	6.46**	8.93**
Other fruits	8.71**	12.63**
Total vegetables	-2.59**	-16.53**
Total oilseeds	-18.72**	-25.88**
Total food crops	3.32**	3.77**
Total non-food crops	-26.51**	-41.30**

** significant at 5%)

Growth rates for area under mango, other fruits and total food crops

From the Table 2 it was seen that growth in area under mango in Ratnagiri was significantly increased over the period of time by 6.46% and per annum by 8.93% at 5% level. Growth in area under other fruits (i.e. cashew, coconut, arecanut etc.) was significantly increased over the period of time by 8.71% and per annum by 12.63%. Growth in area under total food crops was significantly increased over the period of time by 3.32% and per annum by 3.77% in Ratnagiri district at 5% level.

Growth rates for area under total cereals, total pulses, total food grains, total spices, total vegetables, total oilseeds and total non-food crops

From the Table 2, it was seen that growth in area under total cereals significantly decreased over the period of time and per annum by 2.33 to 7.10% respectively at 5% level. Growth in area under total pulses was significantly decreased over the period of time by 5.12% and per annum by 5.02%. Growth in area under total food grains was significantly decreased over the period of time by 2.57% and per annum by 2.63% at 5% level.

Growth in area under total spices was significantly decreased over the period of time by 14.23% and per annum by 16.47%. Growth in area under total vegetables was significantly decreased over the period of time by 2.59% and per annum 60 by 16.53%. Growth in area under total oilseeds was significantly decreased over the period of time by 18.72% and per annum by 25.88%. Growth in area under total non-food crops was significantly decreased over the period of time by 26.51% and per annum by 41.30% at 5% level in Ratnagiri district.

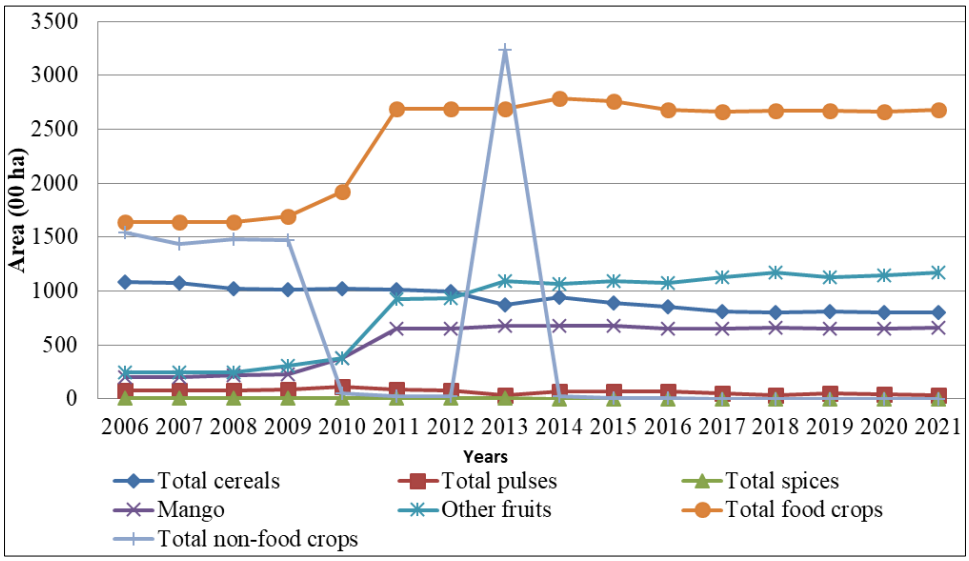

Fig 2: Growth in area under different crops

Growth rates for production of principle crops

The growth rates of production of principle crops for study period (2006-07 to 2020-21) in Ratnagiri district is worked out and presented in Table 3.

Table 3: Growth rates of production of principle crops in Ratnagiri (2006-07 to 2020-21)

Particulars	Linear growth rate	Compound growth rate
Rice	0.37**	0.33 **
Other cereals	0.06	0.03
Total pulses	4.48**	-6.18**
Total food grains	0.06	0.02
Total oilseeds	-13.80**	-16.21**
Coconut	7.56**	8.51**
Mango	12.30**	18.99**
Cashew	12.39**	18.81**

** significant at 5%)

Growth rates of production of Rice, total pulses, coconut, mango and cashew

From the Table 3, it was observed that growth in production of Rice was significantly increased over the period of time by 0.37% and per annum by 0.33% at 5% level. Growth in production of total pulses was significantly increased over the period of time by 4.48% and per annum production of total pulses was significantly decreased by 6.18% at 5% level. Growth in production of coconut was significantly increased over the period of time by 7.56% and per annum by 8.51% at 5% level. Growth in production of mango was significantly increased over the period of time by 12.30% and per annum by 18.99%. Growth in production of cashew was significantly increased over the period of time by 12.39% and per annum by 18.81% at 5% level.

Growth rates of production of total oilseeds and total food grains

From the Table 3, it was seen that growth in production of total oilseeds was significantly decreased over the period of time by 13.80% and per annum by 16.21% in Ratnagiri district at 5% level. Growth in production of total food grains showed non-significant result over the period of time and per annum.

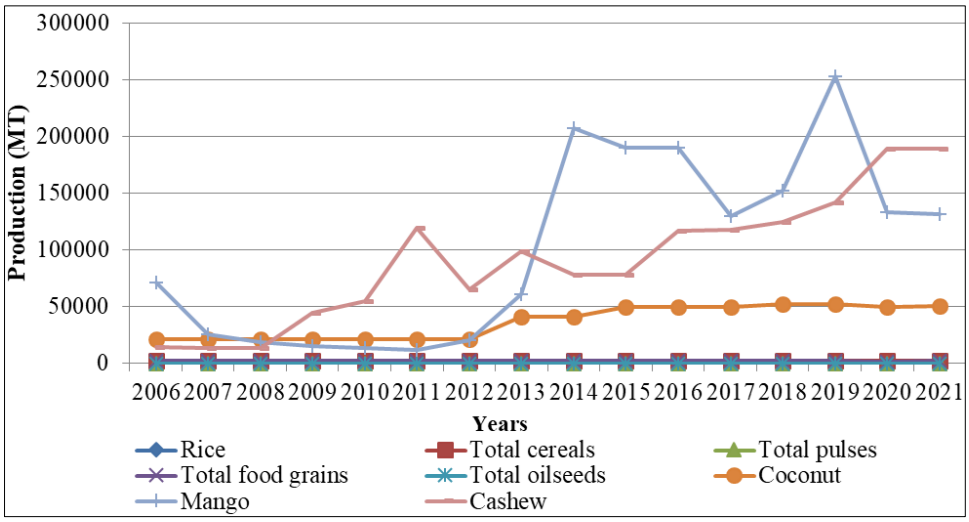

Fig 3: Growth in production of principle crops

Growth rates of productivity of principle crops

Growth rates of productivity of principle crops for study period (2006-07 to 2020-21) was calculated in Ratnagiri district and given in Table 4.

Table 4: Growth rates of productivity of principle crops in Ratnagiri (2006-07 to 2020-21)

Particulars	Linear growth rate	Compound growth rate
Rice	1.07**	1.08**
Other cereals	3.59 NS	3.27**
Total pulses	8.57NS	6.06 NS
Total food grains	3.85**	3.59**
Total oilseeds	10.11**	9.57**
Coconut	2.32**	2.37**
Mango	14.99**	35.31**
Cashew	9.23**	11.54**

** significant at 5%

Growth rates of productivity of Rice, other cereals, total food grains and total oilseeds

From the Table 4, observed that in Ratnagiri district, growth in productivity of rice was significantly increased over the period of time by 1.07% and per annum by 1.08% at 5% level. Growth in productivity of other cereals showed non-significant result over the period of time but per annum the productivity of other cereals was significantly increased by 3.27%. Growth in productivity of total food grains was significantly increased over the period of time by 3.85% and per annum by 3.59%. Productivity 62 of total oilseeds in Ratnagiri was significantly increased over the period of time by 10.11% and per annum by 9.57%.

Growth rates of productivity of Coconut, Mango and Cashew

According to table 4, growth in productivity of coconut was significantly increased over the period of time by 2.32% and per annum by 2.37%. The productivity of mango was significantly increased over the period of time by 14.99% and per annum by 35.31%. Growth in productivity of cashew was significantly increased over the period of time in Ratnagiri by 9.23% and per annum by 11.54% at 5% level.

Growth rates of productivity of total pulses

From the table 4 it was observed that, growth in productivity of total pulses showed non-significant result over the period of time and per annum in Ratnagiri district.

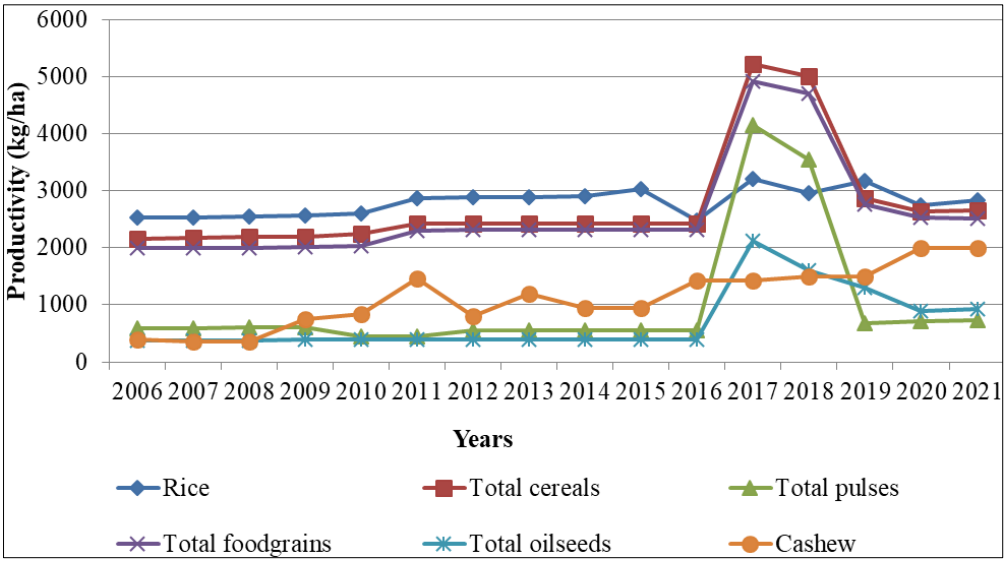

Fig 4: Growth in productivity of principle crops

Growth rates of source wise irrigation

The growth rates of area irrigated by different sources for study period (2006-07 to 2020-21) in Ratnagiri district is worked out and presented in Table 5.

Table 5: Growth rates of area irrigated by different sources in Ratnagiri (2006-07 to 2020-21)

Particulars	Linear growth rate	Compound growth rate
Surface irrigation	3.14**	3.59**
Well irrigation	-8.23**	-7.11**
Net irrigated area	-1.21**	-1.20**

** Significant at 5%

Growth rates of area under surface irrigation and well irrigation: From the Table 5, it was seen that in Ratnagiri district, the growth in area irrigated by surface irrigation was significantly increased over the period of time by 3.14% and per annum by 3.59% at 5% level, but area irrigated by well irrigation it was significantly decreased over the period of time by 8.23% and per annum by 7.11%.

Growth rates of net irrigated area

From the Table 5, it was observed that the net irrigated area of Ratnagiri district was significantly decreased over the period of time and per annum by 1.21 to 1.20%.

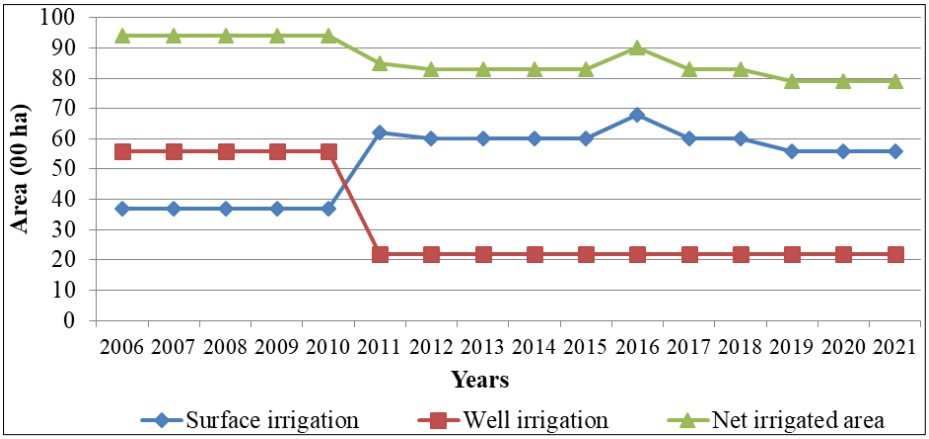

Fig 5: Growth in area irrigated by different sources

Growth rates of fertilizer consumption

The growth rates of fertilizer consumption for the period (2006-07 to 2020-21) in Ratnagiri district was worked out and given in Table 6.

Table 6: Growth rates of fertilizer consumption in Ratnagiri district (2006-07 to 2020-21)

Particulars	Linear growth rate	Compound growth rate
Complex fertilizer	-3.24	-5.88
Other fertilizer	-3.58	-4.65
Total fertilizer	-3.34**	-3.39**

** Significant at 5%

From above the Table 6, it was observed that, in Ratnagiri district growth in total fertilizer consumption was significantly decreased over the period of time by 3.34% and per annum by 3.39%.

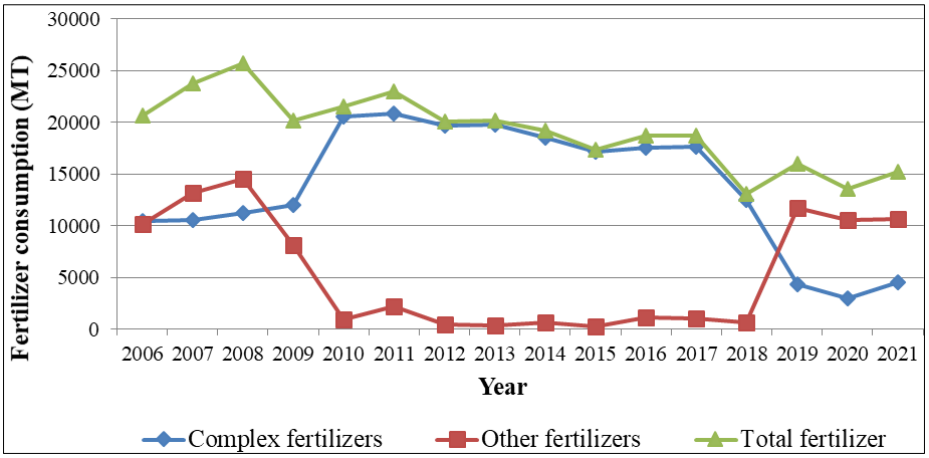

Fig 6: Growth in fertilizer consumption

Growth rates of daily wages paid to agricultural labour

The growth rates of daily wages paid to agricultural labour at current as well as at constant prices for the period (2006-07 to 2020-21) in Ratnagiri district is worked out and given in Table 7.

Table 7: Growth rates of daily wages paid to Agricultural labour in Ratnagiri district (2006-07 to 2020-21)

Particulars	Linear growth rate	Compound growth rate
Current prices		
Male agricultural labour	11.81**	13.24**
Female agricultural labour	9.05**	9.50**
Constant prices		
Male agricultural labour	12.15**	13.37**
Female agricultural labour	9.32**	9.67**

** significant at 5%

Growth rates of daily wages paid to male agricultural labour and female agricultural labour at current prices

From the Table 7, it was seen that in Ratnagiri district, growth in daily wages paid to male agricultural labour at current prices was significantly increased over the period of time by 11.81% and per annum by 13.24%.

Growth in daily wages paid to female agricultural labour at current prices was significantly increased over the period of time by 9.05% and per annum by 9.50%.

Growth rates of daily wages paid to male agricultural labour and female agricultural labour at constant prices

From the Table 7, it was seen that growth in daily wages paid to male agricultural labour at constant prices was significantly increased over the period of time by 12.15% and per annum by 13.37% at 5% level in Ratnagiri district.

Growth in daily wages paid to female agriculture labour at constant prices was significantly increased over the period of time by 9.32% and per annum by 9.67% at 5% level.

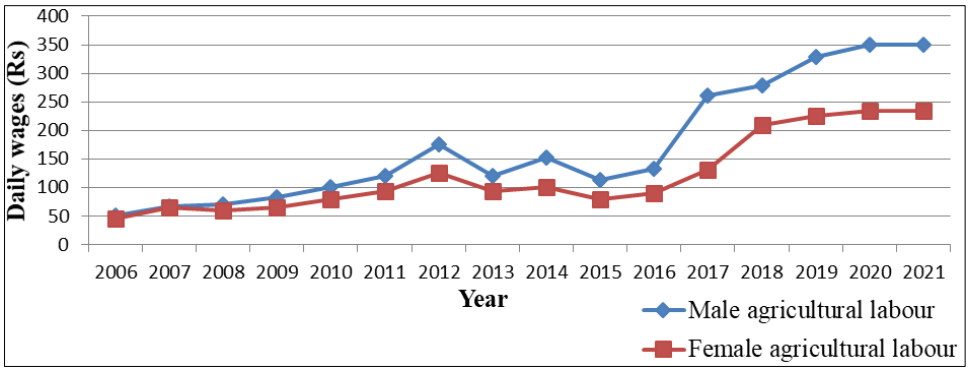

Fig 7: Growth in daily wages paid to agricultural labour at current prices

Conclusion and Implications

Conclusion

1. Growth in area under forest, barren and uncultivable land, culturable waste land, land under miscellaneous trees and grooves, current fallow and area sown more than once was significantly decreased, while the net sown area and other fallow area increased significantly in Ratnagiri district.
2. Growth rates of area under total cereals, total pulses, total spices, total vegetables and total oilseeds was significantly decreased, whereas area under Mango and other fruits (i.e. Cashew, Coconut, arecanut etc.) was significantly increased over the period in Ratnagiri district.
3. In Ratnagiri district, the production of coconut, mango and cashew was significantly increased over the period, while the production of rice, other cereals and total food grains showed non-significant result over the period.
4. In Ratnagiri, the productivity of rice, other cereals, total food grains, total oilseeds, Coconut, Mango and Cashew was significantly increased over the period, while the productivity of total pulses showed non-significant result over the period in Ratnagiri district.
5. Area irrigated by surface irrigation was significantly increased, while the area irrigated by well irrigation was significantly decreased over the period.
6. Fertilizer consumption of Ratnagiri district over the period it was significantly decreased.
7. In Ratnagiri district, daily wages paid to agricultural labour at current as well as constant it was significantly increased over the period.

Implications

1. In case of land use pattern of the Ratnagiri district, there is a need to bring about change in the technique of land utilization to increase land under plough and economic activities. Improved land use is the only answer and this includes provision for more and more irrigation facilities and application of whole range of practices as well as efficient management of forests and pastures.
2. The potential for commercial production of fruits and vegetables, for which many parts of the Ratnagiri are ideally suited, has not been fully exploited. Thus, government should look into various problems of marketing.
3. In Ratnagiri district, the area under the total cereals, total pulses, total oilseeds and total vegetables was declining. This was mainly due to increase in area under horticultural crops. However, it careful planning to maintain food security of the district. This challenge can be met by increasing production and productivity in agriculture through increased use of fertilizers, improved seeds, credit, improved agricultural implements, improved farm practices etc.
4. With the removal of subsidy on chemical fertilizers, its consumption has been decreased. Thus, the government should not subsidise chemical fertilizers and also other modern costly inputs till the initial breakthrough are achieved and purchasing power of the farmer is increased adequately.
5. Marketing of agricultural produce is as important as production. Marketing of agricultural produce is a great problem in Ratnagiri district due to the lack of transportation and communication network due to the

hilly and mountainous districts. The limitation of road and transport has also made the modern technology, modern inputs, credit and skilled manpower inaccessible and expensive in those regions. Thus government construct rural roads in all commercial production pockets and to link all headquarters by road network.

6. In Ratnagiri district, there is a irrigation facilities are insufficient. Hence, the government give some irrigation projects to improve the irrigation facilities at desired level and develop the agriculture sector.

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