Status of growth in area, production and productivity of major crops in Jammu province of J&K State

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ABSTRACT

In the present study, an attempt has been made to analyze the growth on the basis of secondary data in area, production and productivity of major crops in Jammu region for the period from 1984-85 to 2013-14. The comparison has been made over the time to examine the trends and it was observed that in Jammu region rice, maize and wheat crop dominated the area and these crops together occupied more than 84 per cent of gross cropped area during the last three decades. The entire period 1984-85 to 2013-14 found that rice, maize, wheat, millets, condiments and spices, fruits and vegetables, fodder crops had positive area growth while pulses, barley, jawar, bajra, sugarcane, oilseeds and fibers had negative area growth. The production was positive for rice, wheat and pulses and negative for maize whereas as yield was recorded positive for rice, wheat and pulses and negative for maize crop. The study concluded that most of the cultivated land is dominated by cereals groups, therefore, need for crop diversification which ultimately leads to protection of soil health, regular returns, employment opportunities as well as better and balanced diet for the local people in the region.

Key words: Area, Crop diversification, Growth, Production, Yield.

INTRODUCTION

The agriculture sector of India has occupied 43 per cent of India’s geographical area (Anonymous, 2012-13). Indian agriculture has registered impressive growth over last few decades. The food grain production has increased from 51 million tonnes in 1950-51 to 250 million tonnes during 2011-12 highest ever since independence (Arjun 2013). The growth rate in production of all principal crops is far behind population growth rate, the net per capita availability of food grains in the country has come down from 471 gram per capita per day during 1990s to 456 gram pet capita per day during 2000 (Anonymous, 2004). Agriculture is the mainstay of J&K and it is the main source of income and employment for the majority of population in the state. Nearly 70 per cent of the population in the state derives their livelihood directly or indirectly from agriculture sector. The average land holding in the state is 0.67 ha and majority of the farmers (78 per cent) in the state are marginal having less than 1ha land holding (Anonymous 2014-15). The production of three important food crops, namely, rice, maize and wheat, contributes a major portion of the food grain in the state and accounts for 84 per cent of the total cropped area; the balance 16 per cent is shared by other cereals and pulses (Dixit et al, 2014).

Jammu region also has rural economy where 82.70 per cent of the total population lives in rural area and is dependent on agriculture. The net cultivated area under field crops in Jammu region as reported by the Directorate of Economics and Statistics ranged between 382.51 thousand hectares and 400.954 thousand hectares during the period 2005-06 and 2012-13 and the gross cultivated area ranged between 674.14 thousand hectares and 728.967 thousand hectares respectively. The principal agricultural crops in Jammu region are paddy, jowar, bajra, maize, wheat, barley, pulses and millet. Jammu region dominates both in maize and wheat production, with 70 per cent of the area under maize and wheat with productivity of 18.53 q /ha for maize and 15.95 q/ ha for wheat. This region of the state has maximum cropping intensity of 182.85 per cent (Anonymous, 2012-13).The total production of food grain in the region has hovered between 860.90 thousand Mt to 1267.80 thousand Mt during the year 2005-06 to 2012-13. The production showed an increase from 1009.10 thousand Mt to 1267.80 thousand Mt during the period 2005-06 to 2008-09, but during the 2009-10 it plummeted to 860.90 thousand Mt due to adverse weather conditions (Anonymous, 2014-15). Keeping in view the above facts, this study has been undertaken with the objective of studying the status of growth as well as to work out the trend in area, production and productivity of major crops in Jammu division.

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MATERIALS AND METHODS
The present study was carried out on the basis of secondary data collected from published sources of various agencies of Jammu of J&K State, Government of India. The comparison has been made over the time to examine the trends in area, production and productivity of major crops grown in Jammu region for accounting four different period viz; period I (1984-1985 to 1993-1994), period II (1994-1995 to 2003-2004), period III (2004-2005 to 2013-2014) and overall period (1984-85 to 2013-14).

Compound Growth Rates: The Compound Growth Rates were worked out by fitting exponential function of the following type to the data for four periods, as used by Kachroo (2004).

\[ y = y_{0}(1+g)^{t} \text{ or } a(1+g)^{t} \]

\[ Y = ab(\text{where } b=1+g) \]

Or \[ \log y = \log a + \log b \]

Then, compound growth rate

Where,

\[ Y = \text{Area in hectares, production in quintals and yield in quintals per hectare} \]
\[ a = \text{Intercept} \]
\[ b = \text{Regression coefficient} \]
\[ t = \text{Time period (in year)} \]

Finally the annual rate of compound growth in area, production and productivity of the crops was worked out by using the formula

\[ r = \frac{(\text{Antilog } b - 1) \times 100}{t} \]

The significance of the estimated compound growth rates was tested with the help of students’ t-test which is given below.

\[ t = \frac{r}{S.E.} \quad (r) \sim t \]

RESULTS AND DISCUSSION
Changes in the area under food grains crops in Jammu region: The perusal of the data of last 30 years on changes in cropping pattern of Jammu region (Table 1) indicated that rice, maize and wheat dominated the cropping pattern during all the years taken into consideration and ranged between 91.03 per cent to 91.06 per cent of area during period I to overall period. While the balance 8.93 per cent to 8.36 per cent of area was recorded by other food grain crops during the same period. It is noted that the area under total pulses and bajra had decreased from 25.57 thousand hectares to 21.10 thousand hectares, 15.39 thousand hectares to 12.67 thousand hectares respectively, during period I to overall period. However, the area in thousand hectares under barley, jawar, millets increased from 7.64 to 7.77, 0.10 to 0.28 and 5.58 to 10.82, respectively. Decadal Compound Growth Rate (DCGR) revealed that during overall period in terms of area under wheat crop had shown significantly positive highest growth trend of 0.70 per cent as compared to rice (0.39 per cent) and maize (0.44 per cent). Barley had shown positively significant growth trend of 4.20 per cent during period II and significantly negative growth trend of -12.98 per cent during period III. While during period I and overall period it had shown non-significantly negative growth trend of -1.04 per cent, -2.04 per cent, respectively. In case of jawar no growth rate was recorded during period I and period II. Whereas it had shown non-significantly negative growth trend of -5.14 per cent and significantly negative growth trend of -5.48 per cent during period III.

Table 1: Changes in area under food grain crops in Jammu region

<table>
<thead>
<tr>
<th>Crops</th>
<th>Period I (000 ha)</th>
<th>Period II (000 ha)</th>
<th>Period III (000 ha)</th>
<th>Overall period (000 ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>109.23</td>
<td>109.60</td>
<td>118.69</td>
<td>112.51</td>
</tr>
<tr>
<td>Maize</td>
<td>200.78</td>
<td>211.57</td>
<td>219.28</td>
<td>210.52</td>
</tr>
<tr>
<td>Wheat</td>
<td>239.68</td>
<td>245.11</td>
<td>247.23</td>
<td>253.01</td>
</tr>
<tr>
<td>Barley</td>
<td>7.46</td>
<td>8.76</td>
<td>7.09</td>
<td>7.77</td>
</tr>
<tr>
<td>Jawar</td>
<td>15.39</td>
<td>12.82</td>
<td>9.80</td>
<td>12.67</td>
</tr>
<tr>
<td>Millets</td>
<td>5.58</td>
<td>7.41</td>
<td>19.45</td>
<td>10.82</td>
</tr>
<tr>
<td>Total cereals</td>
<td>578.22</td>
<td>595.29</td>
<td>622.14</td>
<td>607.58</td>
</tr>
</tbody>
</table>

Note: Figures in the parentheses indicates percentage of gross cropped area.

Area in (000 ha) is the decadal mean area of respective period.

*significant at 1% los, **significant at 5% los and ***significant at 10% los.

Changes in the area under non-food grain crops in Jammu region: The Table 2 revealed that area under sugarcane, fibers and drugs, narcotics and plantation crops had decreased from 0.46 to 0.22, 0.91 to 0.45 and 0.27 thousand hectares to 0.10 thousand hectares, respectively, during the period under study. While the area under oilseeds, condiments and spices and fruits and vegetables had marginally increased from 17.09 to 17.31, 1.20 to 1.34 and 2.72 to 2.95 thousand hectares respectively, during the same period. The area under fodder crop had increased to 24.46 thousand hectares during period II from 21.77 thousand hectares during period I but again decreased to 22.42 thousand hectares during period III and marginally increased to 22.88 thousand hectares during overall period.

Decadal Compound Growth Rate shows that except period II which was recorded positive growth trend for sugarcane with the value of 0.35 per cent but on the whole, it had shown non-significantly negative growth trend of -2.48 per cent, during period III and overall period respectively. Bajra shown significantly negative growth trend of -2.32 per cent, -5.48 per cent during period I and overall period. While there was recorded positive growth trend of 2.78 per cent, non-significantly negative growth trend of -18.94 per cent during period II and period III under study. There was observed positively significant growth trend of 4.28 per cent and non-significantly negative growth trend of -6.13 per cent for millets during period I and overall period. As far as pulses is concerned, it was indicated significantly negative growth trend of -2.56 per cent, -3.36 per cent, -1.73 per cent, -1.63 per cent for the period of I, II, III and overall period, respectively. The result of table further indicated that the efforts, therefore, need for crop diversification in the region which ultimately leads for protection of soil health, as well as better diet balanced for consumption of local people.

Table 2: Changes in area under non-food crops in Jammu region

<table>
<thead>
<tr>
<th>Crops</th>
<th>Period I</th>
<th>Period II</th>
<th>Period III</th>
<th>Overall period</th>
<th>Compound Growth Rate (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area (000 ha)</td>
<td>Decadal</td>
<td></td>
<td></td>
<td>Period I</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>0.46(0.99)</td>
<td>0.17(0.35)</td>
<td>0.03(0.06)</td>
<td>0.22(0.47)</td>
<td>-10.16*</td>
</tr>
<tr>
<td>Condiments &amp; Spices</td>
<td>1.20(2.59)</td>
<td>1.22(2.55)</td>
<td>1.61(3.75)</td>
<td>1.34(2.91)</td>
<td>3.64**</td>
</tr>
<tr>
<td>Fruits &amp; Vegetables</td>
<td>2.72(5.88)</td>
<td>2.86(5.99)</td>
<td>2.28(5.31)</td>
<td>2.95(6.42)</td>
<td>-0.29</td>
</tr>
<tr>
<td>Oilseeds</td>
<td>17.09(36.97)</td>
<td>18.55(38.90)</td>
<td>16.29(37.98)</td>
<td>17.31(37.68)</td>
<td>1.87**</td>
</tr>
<tr>
<td>Fibers</td>
<td>0.91(1.96)</td>
<td>0.39(0.81)</td>
<td>0.04(0.09)</td>
<td>0.45(0.97)</td>
<td>-8.55*</td>
</tr>
<tr>
<td>Dyes &amp; Tannings Materials</td>
<td>52(3.28)</td>
<td>0.03(0.06)</td>
<td>0.04(0.09)</td>
<td>0.53(1.15)</td>
<td>-22.17</td>
</tr>
<tr>
<td>Drugs, narcotics &amp; plantation crops</td>
<td>0.27(0.58)</td>
<td>0.03(0.06)</td>
<td>0.00(0.00)</td>
<td>0.10(0.21)</td>
<td>-28.75**</td>
</tr>
<tr>
<td>Fodder crops</td>
<td>21.77(47.10)</td>
<td>24.46(51.30)</td>
<td>22.42(52.27)</td>
<td>22.88(48.91)</td>
<td>1.36**</td>
</tr>
<tr>
<td>Other non-food crops</td>
<td>0.28(0.60)</td>
<td>0.00(0.00)</td>
<td>0.18(0.41)</td>
<td>0.15(0.32)</td>
<td>5.73</td>
</tr>
<tr>
<td>Gross cropped area</td>
<td>46.22(100)</td>
<td>47.68(100)</td>
<td>42.89(100)</td>
<td>45.93(100)</td>
<td>0.84**</td>
</tr>
</tbody>
</table>

Note: Figures in the parentheses indicates percentage of gross cropped area.
Area in (000 ha) is the decadal mean area of respective period.
*significant at 1% los, **significant at 5% los and ***significant at 10% los.
Source: Statistical Digest, Directorate of Economics and Statistics, Government of J&K
The result of the table revealed that the region has experienced an increase in the area under condiments and spices, which is a good indication for diversification of agriculture in the region. On the other hand, the area under fruits and vegetables had increased marginally during the entire period, which was observed to have a negative growth rate during period I and II, while it had a positive significant growth rate in period III and overall period. Therefore, there is need to be taken care so to increase commercialization of agriculture in the region. However, it needs to be strengthened by providing technical assistance like modern concepts of crop production and financial assistance like credit institutions like NABARD, PACCS for the small and marginal farmers of the region.

Production and yield of major crops in Jammu region:

Table 3 and Fig 3 revealed that production of rice, maize, wheat and pulses was 1730.07, 4172.04, 3743.05 and 68.01 thousand quintals, respectively during period I, while it was 1751.01, 4133.05, 3773.02 and 76.05 thousand quintals, respectively during period II. During period III, production for rice, wheat and pulses increased significantly, whereas maize again recorded a decrease in production. As far as yield is concerned, it was found to be 19.23 q/ha, 16.31 q/ha, 15.02 q/ha and 3.68 q/ha, respectively for maize, rice, wheat and pulses. Likewise, the growth rates computed for production and yield of major crops in Jammu region (Table 3 and Fig 3) indicated that during period I, maize had shown a positive growth rate, while rice, wheat and pulses witnessed a negative growth rate. During period II, maize and pulses experienced a positive growth rate, whereas rice and wheat showed a negative growth rate, with the value of -0.34 per cent and -2.24 per cent, respectively. As far as the overall period is concerned, rice and pulses had shown significant positive growth rate, while wheat was recorded as positive growth. However, it needs to be taken care so to increase commercialization of agriculture in the region.
this strategy could be: (i) expansion of area under irrigation, (ii) increased and provision of key agricultural inputs like high yielding variety seeds, chemical fertilizers, pesticides and plant protection techniques, (iii) expansion and improvement of institutional support services such as research and extension, (iv) Farm mechanization and altered in agronomic practices and (v) provision of infrastructural items and offsetting the impact of climate change on major crops.

Direction of growth in area, production and yield of major crops in Jammu region: The direction of growth in area, production and yield presented in Table 4 revealed that area wise rice, maize, wheat, oilseed, fodder crops and condiments and spices were having positive growth and barley, bajra, sugarcane, jawar, millets, fruits and vegetables, fibers, pulses, dyes and tanning materials, and drugs, narcotics & plantation crops were having negative growth during period I. For same period production of maize was found to be positive while production of rice, wheat, and pulses were having negative growth. As far as in case of yield all four crops viz; rice, maize, wheat and pulses were recorded positive growth during the same period under study. During period II maize, wheat, barley, fibers, bajra, millets, sugarcane and condiments and spices were having positive growth of area while rice, fruits and vegetables, jawar, pulses, oilseeds, fodder crops, dyes and tanning materials and drugs, narcotics and plantation crops were having negative growth. In terms of production maize and pulses had positive growth while rice and wheat were having negative growth. Trend of positive growth were seen for rice, pulses and wheat in case of yield, whereas maize was experienced negative growth during the same period. The result further shows that for overall period rice, maize, wheat, millets, fodder crops, fruits and vegetables and condiments and spices had positive area growth, while barley, bajra, jawar, sugarcane, fibers, pulses, oilseeds, dyes and tanning materials, drugs, narcotics and plantation crops had negative area growth. As far as production is concerned, rice, wheat, pulses had positive growth and maize was having negative growth. On the other hand, during the same period, rice, wheat and pulses were having positive growth, while maize witnessed negative growth during overall period under study.

CONCLUSIONS

The pattern of a region is the reflection of the varied physical and socio economic factors. The cropping pattern of the region is typical of an under developed agricultural economy in which most of the cultivated area is dominated for food grain crops, particularly cereals and the region makes appreciable contribution to production of group of cereals. The perusal of the data of last 30 years on changes in cropping pattern of Jammu region indicated that rice, maize and wheat dominated the cropping pattern during all the years taken into consideration and ranged between 91.03 per cent to
91.06 per cent of area during period I to overall period. While the balance 8.93 per cent to 8.36 per cent of area was recorded by other food grain crops during the same period. Growth rates in terms of area were positive for rice, maize, wheat, millets, condiments and spices, fruits and vegetables, and fodder crops, while as negative for barley, jawar, bajra, pulses, sugarcane, oilseeds, fibers, dyes and tanning materials and drugs, narcotics and plantation crops. Production was recorded positive for rice, wheat and pulses, while negative for maize. Whereas yield was positive for rice, wheat and pulses and negative for maize during overall period under study.

REFERENCES