CHAPTER IV

Growth and Instability of Area, Production and Yield
4.1 Introduction: Despite the shift in the composition of state income from the primary sector to other sector 'Andhra Pradesh' is an agricultural state. State wise sectoral GSDP growth rate in Andhra Pradesh was 2.21 per cent during 1980-81 to 1990-91 is increased to 2.47 per cent during 1993-94 to 2000-01 in agricultural sector. While the percentage of secondary or Industrial sector GSDP growth rate is 7.36 per cent to 6.20 per cent during 1980-81 to 1990-91, and 1993-94 to 2000-2001, and 7.69 per cent to 6.71 percent in the case of territory or service GSDP growth rate during the same period.

Cropping intensity was increased from 110 per cent in 1960-61 to 123 percent in 1999-2000. This is mainly due to the increase in area under irrigation. Andhra Pradesh is known as "River state of India". Irrigation has grown from 2.90 million hectares in 1960-61 to 4.29 million hectares in 1999-2000. Changes in cropping pattern gross cropped area is 121.8 hectares in 1958-59, 125.1 hectares in 1978-79 and 130.6 hectares in 1998-1999. Rice production was recorded 1, 03, 57,970 tones in 1999 followed by groundnut 17, 85,323 tones, sugarcane 15, 04,137 tones, maize 12, 18,909 tones. Andhra Pradesh is well known as a rice-bowl of South India. Andhra Pradesh accounts for 7.54 per cent of the country's food-grain production. A large proportion of labour force depends on agriculture in the state when compared with all-India level (56.2%). Similarly the share of agriculture in the state's gross state domestic product (28.6%) is higher than the corresponding figure at the all-India level (24.0%). In fact the state was known as the granary of the South India till recently.
Among the non-food crops, groundnut crop is one of the important crops with an area varying between 8 to 17 lakh hectares. In between 1960-61 and 2000-2001 the area was doubled, but in 1990-91 it was recorded more than 23 lakh hectares of area cultivated. Regarding the yield of groundnut, it is decreased to 865 kgs. to 739 kgs. in 1960-61 to 2000-2001. Sugarcane is another important commercial crop. The area under sugarcane crop was doubled, i.e., 96 lakh hectares to 237 lakh hectares between 1960-61 and 2000-01, but in case yield a little decrease was recorded, i.e., 8858 to 8095 kgs. Per hectares between 1960-61 to 2000-2001. The increase in cotton area is above 7 lakh hectares to 11 lakh hectares. The yield of cotton has a significant change which was 147 kgs. Per hectares to 1654 kgs. Per hectares in 1960-61 to 2000-01. The area under tobacco crop was increase from 1.4 and 2.3 lakh hectares. There is a significant change in the yield of tobacco.

The study of Growth and Instability of agriculture is important concept in estimating the future production, yield and area. With the help of these estimates it is possible to take policy decisions to meet the future demands of the country. The increasing population creates demand to agriculture commodities. To meet the future demand of agriculture production it is essential to study the growth and performance of major commercial crops, namely, Groundnut and Sugarcane. At present the growth and instability was estimated for area, production and yield of two commercial crops groundnut and sugarcane.
To fulfill our first objective it is proposed to estimate linear and compound growth rates of area, production and yield of two major commercial crops namely groundnut and sugarcane in three regions of Andhra Pradesh and the state as a whole. Also estimating the Instability in these crops with respect of area, production and yield.

4.2 Growth rates of Area: Pre-green revolution period (1960-1971).

Rayalaseema-Groundnut

The estimated linear regression equation of area under the groundnut crop in Rayalaseema region is:

\[ Y = 477026 + 33584t \]

L.G.R = 4.9494

Figures in the parentheses are standard error

* Significant at 5 per cent probability level.

From the above equation, the regression co-efficient, i.e. the value of ‘B’ is 33584. It is positive and significant at 5 per cent probability level. It reveals that there is an increasing trend in area under the groundnut crop in Rayalaseema region. In terms of numerical expression, on average 33584 hectares are increasing every year during the study period. The Linear growth rate is estimated and it is 4.95. This shows that the average annual growth in area under groundnut crop in Rayalaseema region is 4.95 per cent. The value of intercept term ‘A’ is 477026.

The estimated exponential equation is

\[ Y = (495406) (1.051)^t \]

C.G.R = 5.1162

C.V = 18.2893
The compound growth rate of area under groundnut crop is 5.12 per cent. It expresses that the average growth rate of area under the groundnut crop over the previous year is 5.12 per cent. The C.V. is 18.29. It shows that 18.3 per cent of variation in groundnut area was recorded during the pre-green revolution period, i.e., the instability in groundnut area during the period was recorded as 18.3 per cent.

**Rayalaseema-Sugarcane:**

The estimated linear regression equation is:

\[ Y = 14649 + 947 \times t \]  
\[ \text{L.G.R}=4.660 \]  
\[ (441) \]

The estimated equation reveals that the co-efficient of time is positive and significant. It expresses, there is a significant increase in area of the crop sugarcane during pre-green revolution period. Every year 947 hectares of area is increasing under this crop. It is observed that 4.66 per cent, growth in area of sugarcane during the period was recorded. The value of intercept term is 14649.

The estimated exponential equation is:

\[ Y = (14665)(1.050)^t \]  
\[ \text{C.G.R}= \ 5.015 \]  
\[ (0.022) \]

The Compound growth rate of area under sugarcane is 5.02. The co-efficient of ‘B’ is 1.050. It expresses that there is 1.05 hectares under sugarcane is increasing over the previous year. This change in area is significant. The estimated value of C.V reveals that there exists 26.53 per cent of variation in
sugarcane area during this period, i.e., the instability in cane area was 26.5 per cent.

**Coastal Andhra-Groundnut:**

The fitted linear regression equation is:

\[ Y = 130275 + 11816 \times t \]  
\[ \text{L.G.R}=5.874 \]  
\[ (885) \]

In the above fitted equation, the co-efficient of time is positive and Significant at 5 per cent Probability level. There is positive relationship between area and time. The positive relationship means every year the area under Groundnut will be increasing. It is found that the estimated co-efficient of ‘B’ is 11816. For every one year time period, 11816 hectares of area is increasing in this period. The linear growth rate is 5.87. The average annual growth in groundnut area during the study period is 5.87 per cent. The value of constant or intercept term is 130275.

The fitted exponential equation is:

\[ Y = (137774)(1.062)^t \]  
\[ \text{C.G.R}=6.183 \]  
\[ (0.0045) \]  
\[ \text{C.V}=19.967 \]

The compound growth rate of area under groundnut crop is 6.18. It expresses that the increase in the average annual growth rate of area over the previous year is 6.18 per cent. The C.V is 19.97. It means 19.97 per cent of variation in groundnut area was observed.
Coastal Andhra-sugarcane:

The computed linear regression is:

\[ Y = 50866 + 3585 \times t \quad \text{L.G.R}=4.953 \]

(1016)

From the above estimated equation the value of regression co-efficient i.e. ‘B’ is 3585. It is positive and significant. It means there is a significant increasing in area under Sugarcane crop in Coastal Andhra region. Every year 3585 hectares of area is increasing during this period. The linear growth rate is estimated and it is 4.95, it means the average annual growth in Sugarcane area during the period is 4.95 per cent. The value of constant ‘A’ is 50866.

The computed exponential form of area under Sugarcane is:

\[ Y = (52079) (1.053)^{t} \quad \text{C.G.R}=5.265 \]

(0.0138) \quad \text{C.V}=4.953

The compound growth rate of area of Sugarcane is 5.27 per cent. The co-efficient of variation in area of Sugarcane is 4.95 during the study period 4.95 percent variation in sugarcane area was recorded in Coastal Andhra region.

Telangana-Groundnut:

The calculated linear regression equation is:

\[ Y = 84372 + 27979 \times t \quad \text{L.G.R}=11.092 \]

(2341)

From the above equation the value of ‘B’ is 27979. It is positive and significant at 5 per cent probability level. On average, 27979 hectares of area is
increasing every year during pre-green revolution period. This increase in groundnut in Telangana is significant. The linear growth rate is estimated and it is 11.09. It means average annual growth in groundnut area is 11.09 percent. The value of intercept term 'A' is 84372.

The calculated exponential equation is:

\[ Y = (113184)(1.129)^t \]

\[ \text{C.G.R} = 12.885 \]
\[ (0.0116) \]
\[ \text{C.V} = 37.929 \]

This function reveals that the relationship between independent and dependent variable is positive and significant. The compound growth rate of area is 12.89. It means the average annual growth of area over the previous year is 12.89 per cent. In Telangana region 37.93 per cent of variation in groundnut area was observed during the pre-green revolution period.

**Telangana-sugarcane:**

The estimated linear regression equation of area under the sugarcane in Telangana region is:

\[ Y = 29136 + 253t \]

\[ \text{L.G.R} = 0.0826 \]
\[ (626) \]

The estimated equation reveals that the co-efficient of time is positive but not significant. It means the rate of increase in area under sugarcane crop in not significant. Every year, 253 hectares of area is increasing under the crop in pre-green revolution period. The linear growth rate is 0.08 shows that, average annual growth during the period is 0.08 per cent. The value of intercept term is 29136.
The estimated exponential form is:

\[ Y = (28354)(1.010)^t \]

C.G.R = 0.995
C.V = 20.513

The compound growth rate of sugarcane area is 0.995 per cent. It means on average 0.99 percent of area is increasing over the previous year. The estimated coefficient of variation expresses that there is 20.51 per cent of instability in sugarcane area during the study period.

**Andhra Pradesh-Groundnut:**

The fitted linear regression equation is:

\[ Y = 698945 + 73379t \]

L.G.R = 6.441
(6921)

In the above fitted equation the coefficient of time is 73379. It is positive and significant at 5 per cent probability level. It means every year 73379 hectares of groundnut area is increasing in Andhra Pradesh. This increase in groundnut area is a significant increase. The linear growth rate is calculated, it is 6.44. It shows that the average annual growth in area in groundnut during the pre-green revolution period is 6.44 per cent. The intercept term value is 698945.

The estimated non-linear equation is:

\[ Y = (747378)(1.069)^t \]

C.G.R = 6.862
C.V = 22.202
(0.0063)

The compound growth rate of groundnut is 6.86. This reveals that every year 6.86 per cent area in groundnut is increasing over the previous year in
entire Andhra pradesh state. Almost 22 per cent of instability in groundnut area was observed during the pre-green revolution period by the value of C.V.

**Andhra Pradesh-Sugarcane:**

The fitted linear regression equation is:

\[ Y = 87015 + 5604^t \]

L.G.R = 4.645

(2227)

The estimated regression co-efficient value is 5604. It is positive and significant. This positive relationship shows an increasing trend in area under sugarcane crop in Andhra Pradesh. On average, 56.04 hectares of sugarcane area is increasing every year. The linear growth rate is estimated and it is 4.64. It means, the average annual growth in sugarcane area during the pre-green revolution period is 4.64 percent. The intercept term is 87015.

The estimated exponential equation is:

\[ Y = (85998)^{(1.053)^t} \]

C.G.R = 5.257

(0.0217)  C.V = 23.972

The compound growth rate of area of sugarcane in Andhra Pradesh is 5.26. Nearly 5.3 percent of area is increasing annually over the previous year. The co-efficient of variation in sugarcane area is 23.97, it reveals that 24 percent of variation was recorded in sugarcane area in Andhra Pradesh state.

**4.3 Growth rates of Area: Post-green revolution period (1971-2001).**

**Rayalaseema-Groundnut:**

The estimated linear regression equation of area under the groundnut crop in Rayalaseema region is:
From the above equation, the regression co-efficient, i.e., the value of ‘B’ is 31632. It is positive and significant at 5 per cent probability level. The positive relation reveals an increasing trend in area under the groundnut crop in the region. On average 31632 hectares of groundnut area is increasing every year during the post-green revolution period. This average annual increase in area is significant. The linear growth rate is estimated and it is 2.77. This shows that the average annual growth in area under groundnut crop in Rayalaseema is 2.77 per cent. The value of constant term ‘A’ is 634788.

The fitted exponential function to groundnut area in the region is:

\[ Y = (696297) \times (1.0288)^t \times (0.0031) \times C.G.R = 2.8756 \times C.V = 25.2084 \]

The compound growth rate of area under groundnut crop is 2.88. It expresses that the increase in the average annual growth rate of area over the previous year is 2.88 per cent. More than 25 per cent of instability in groundnut area was observed during the post-green revolution period in Rayalaseema region.

**Rayalaseema-Sugarcane:**

The estimated linear regression function is:

\[ Y = 21333 + 522 \times t \times (118) \times L.G.R = 1.7581 \]

Figures in the parentheses are standard error.

* Significant at 5 per cent probability level
The estimated equation reveals that the co-efficient of time is positive and significant. It shows a positive relationship between the area and time. It expresses that each year, on average, 522 hectares of area is increasing under the crop sugarcane. The recorded growth rate in sugarcane area in Rayalaseema region is 1.76. This exhibits on average 1.76 percent of growth in sugarcane area during the period. The value of intercept term is 21333.

The estimated exponential equation is:

\[ Y = (22322) \times (1.0165)^t \]

C.G.R = 1.6480
C.V = 15.9850

The compound growth rate of sugarcane area in this region is 1.65. It means 1.65 per cent area is increasing over the previous year. Almost 16 per cent of variation in sugarcane area was observed in the region Rayalaseema during the post-green revolution period.

**Coastal Andhra-Groundnut:**

The constructed linear regression equation for the area of groundnut in Coastal Andhra region is:

\[ Y = 243538 + 799t \]

L.G.R = 0.3118
(1392)

From the above equation the value of ‘B’ is 799. The insignificant positive relationship was observed between time and area. The co-efficient of time variables shows that the average annual increase in area under groundnut in coastal region during post green revolution period. The average annual growth in the area of groundnut crop is 0.31 per cent. A negligible growth was recorded in this region. The value of intercept term ‘A’ is 243538.
The estimated exponential equation is:

\[ Y = (240799)(1.0019)^t \quad \text{C.G.R} = 0.1883 \]
\[ (0.0057) \quad \text{C.V} = 2.8352 \]

The compound growth rate of area is 0.19. It means average annual growth rate of area is increasing over the previous year is 0.19 per cent. The instability in groundnut area was 2.84 per cent during the post-green revolution period.

**Coastal Andhra-Sugarcane:**

The estimated linear regression equation of area under the sugarcane in Coastal Andhra region is:

\[ Y = 75712 + 1941t \quad \text{L.G.R} = 1.8177 \]
\[ (455) \]

In the above equation, the co-efficient of time is positive and significant at 5 percent probability level. It is noticed that the annual increase in the area of sugarcane crop is 1941 hectares. This increase in cane area is significant. The value of linear growth rate is 1.82. The recorded average annual growth during the Post-green revolution period is 1.82 per cent. The value of ‘A’ is 75712.

The fitted exponential form for sugarcane area is:

\[ Y = (78473)(1.0177)^t \quad \text{C.G.R} = 1.7668 \]
\[ (4.5760) \quad \text{C.V} = 16.5273 \]

The compound growth rate of Sugarcane is 1.7668. It means, 1.77 per cent of area is increasing over the previous year. The estimated co-efficient of variation is 16.53 during this period. The instability in cane area in Coastal Andhra region is 16.53 per cent.
Telangana-groundnut:

The calculated linear regression equation is:

\[ Y = 294825 + 2731t \quad \text{L.G.R} = 0.8067 \]

(2129)

In the above fitted equation the co-efficient of time is 2731. It is positive and insignificant. It means on average every year 2731 hectares of area is increasing during the study period. The value of linear growth rate is 0.81. It reveals that the average annual growth in groundnut area during the post-green revolution period is 0.81 percent. The value of ‘A’ is 294825.

The estimated exponential form is:

\[ Y = (203702)(1.0219)^t \quad \text{C.G.R} = 2.1880 \]

(0.0192) \quad \text{C.V} = 7.335

The compound growth rate of groundnut is 2.19 per cent. This means nearly 2.2 percent of area is increasing annually over the previous year. The estimated co-efficient of variation is 7.33, i.e. 7.3 per cent of instability was recorded in the groundnut area during the period in the Telangana region.

Telangana-Sugarcane:

The fitted linear regression equation is:

\[ Y = 45871 + 254t \quad \text{L.G.R} = 0.5087 \]

(2813)

From the above regression equation the value of ‘B’ is 254. It is positive and insignificant. A positive relationship between time and sugarcane area was observed. On average, each year 254 hectares of sugarcane area is increasing. The linear growth rate is estimated and it is 0.51. It expresses that the annual
growth during post-green revolution period is 0.51 per cent. The value of intercept term ‘A’ is 45871.

The estimated regression equation of exponential form is:

\[ Y = (43067) (1.0069)^{C.G.R} = 0.6857 \]
\[ \text{C.V} = 4.6253 \]

The compound growth rate of area under sugarcane is 0.69 per cent. On average, 0.69 percent of increase in sugarcane area was recorded over the previous during post-green revolution period. The co-efficient of variation in area of sugarcane is 4.62 per cent, i.e., 4.63 per cent of instability was recorded in cane area.

**Andhra Pradesh-Groundnut:**

The fitted linear regression equation is:

\[ Y = 1220744 + 33113 \times t \]
\[ \text{L.G.R} = 1.8916 \]
\[ \text{C.V} = 17.1982 \]

In the above equation the value of ‘B’ is an exhibit a positive and significant relationship between area and time period. The value of B is 33113, i.e. for every one year will increase 33113 hectares of groundnut area. This increase is significant. The value of linear growth rate is 1.89. The average annual growth during the post-green revolution period is nearly 1.9 per cent. The value of constant or intercept term is 1220744.

The fitted exponential equation is:

\[ Y = (1246848) (1.0196)^{t} \]
\[ \text{C.G.R} = 1.9624 \]
\[ \text{C.V} = 17.1982 \]
The compound growth rate of area under groundnut crop is 1.96. It expresses that the average annual growth of area over the previous year is 1.96 per cent. The value of co-efficient of variation is 17.1982, it indicates there is 17.2 per cent of instability in groundnut area.

**Andhra Pradesh-sugarcane:**

The calculated linear regression equation is:

\[ Y = 141647 + 2834 \times t \]  
\[ \text{L.G.R}=1.5157 \]

In the above regression equation the co-efficient of time is 2834. It is positive and significant. Therefore a significantly increasing trend in area of sugarcane was observed in the state. As the time period increases, 2834 hectares of area is increasing during post-green revolution period in Andhra Pradesh state. The linear growth rate is estimated and it is 1.52. This shows, average annual growth during entire period is 1.52 per cent. The value of constant A is 141647.

The estimated exponential form is:

\[ Y = (144053)(1.0151)^{t} \]  
\[ \text{C.G.R}=1.5062 \]
\[ \text{C.V}=13.7814 \]

The compound growth rate of sugarcane area is 1.51 per cent. The average annual growth in cane area over the previous year is 1.51 per cent. The co-efficient of variation in area of sugarcane is 13.78. Nearly 13.8 per cent of instability in sugarcane was noticed during the post-green revolution period in the Andhra Pradesh state.
4.4 Growth rates of Output: Pre-green revolution period (1960-1971). Rayalaseema-Groundnut:

The estimated linear regression equation of groundnut production in Rayalaseema region is:

\[ Y = 392429 + 25131 \times t \]

L.G.R = 4.626

(Figures in the parentheses are standard error
* Significant at 5 per cent probability level.

The performance of production is similar to that of groundnut area in the Rayalaseema. The value of ‘B’ in the fitted equation is 25131. Its is positive and significant. On average, 25131 quintals of groundnut production is increasing annually during the pre-green revolution period. The estimated linear growth rate is 4.63. It tells us that the average annual growth in groundnut production is 4.63 percent. The value of intercept term ‘A’ is 392429.

The fitted exponential form is:

\[ Y = (389164) (1.052)^t \]

C.G.R = 5.246

(C.V = 22.607

The compound growth rate of production under the groundnut crop is positive, i.e. 5.25 per cent. It expresses that the average annual growth in groundnut production over the previous year is 5.25 per cent. Almost 22.6 per cent of instability in groundnut production was observed during the pre-green revolution period in Rayalaseema region.
**Rayalaseema-Sugarcane:**

The fitted linear regression equation for sugarcane production in Rayalaseema region is:

\[ Y = 128174 + 5528t \]

\[ \text{L.G.R} = 3.4263 \]

(3372)

From the above equation, the estimated regression co-efficient of time is 5528. It is positive. It reveals that there is an increasing trend in production of sugarcane. Numerically on average 5528 tones of sugarcane production is increasing every year during the study period. But this increase in production is not significant. The calculated linear growth rate is 3.43 per cent. This shows that the annual growth in cane production is 3.43 percent. The value of ‘A’ is 128174.

The estimated exponential equation of sugarcane production is:

\[ Y = (126042) (1.037)^t \]

\[ \text{C.G.R} = 3.7351 \]

\[ (0.0157) \]

\[ \text{C.V} = 23.6994 \]

The compound growth rate of production of sugarcane is 3.73. It expresses that the annual growth in sugarcane production over the previous year is 3.73 per cent. During the pre-green revolution period, it is observed that there is 23.7 per cent of variation in sugarcane production in the Rayalaseema region of Andhra Pradesh.

**Coastal Andhra-Groundnut:**

The calculated linear regression equation of groundnut production is:

\[ Y = 118743 + 9112t \]

\[ \text{L.G.R} = 5.2542 \]

(819)
From the above equation, the co-efficient of time is positive and significant at 5 percent probability level. A significant increase in groundnut production in Coastal Andhra region was observed. On average, every year 9112 quintals of groundnut production is increasing during the pre-green revolution period. The calculated linear growth rate is 5.25 per cent. The annual growth in groundnut production is 5.25 per cent. The value of intercept term is 118743.

The estimated exponential equation is:

\[ Y = (124296) (1.054)^t \]

The above log linear function reveals that the relationship between independent variable time and the dependent variable groundnut production is positive and significant. The compound growth rate of groundnut production is 5.44. It express that the average annual growth in production over the previous year is 5.44 per cent. More than 18 per cent of instability in groundnut production was observed during the pre-green revolution period in Coastal Andhra region.

**Coastal Andhra-Sugarcane:**

The computed linear regression function is:

\[ Y = 445279 + 23381t \]

The estimated equation reveals that the co-efficient of time is positive and significant. This positive and significant value tells us that there a
significant increase in sugarcane production in the region. The estimated regression co-efficient of time variable is 23381. Every year 23381 tones of sugarcane production is increasing in the region. The linear growth rate is 3.9934, express the average growth in production during the initial period is 3.99 per cent. The value of ‘A’ is 445279.

The calculated exponential production form is:

\[ Y=(445205) \times (1.044)^t \]  

\[ C.G.R=4.3772 \]  

\[ (0.0137) \]  

\[ C.V=18.7092 \]  

The compound growth rate of sugarcane production is 4.38 percent. This means nearly 4.38 per cent of production is increasing, on average, over the previous year. The co-efficient of variation in sugarcane production is 18.71 per cent during the study period.

Telangana-Groundnut:

The estimated linear regression equation is :

\[ Y=51201 + 18988 \times t \]  

\[ L.G.R=11.4993 \]  

\[ (3228) \]  

In the above fitted equation the value of ‘B’ is 18988. It is found that there exits a positive and significant relationship between production and time variable. It means, for every one-year time period, 18988 quintals of production will be increasing during the pre-green revolution period. The linear growth rate is 11.50. It indicates the average annual growth in groundnut production during the study period is 11.5 per cent. The constant or intercept term is found to be 51201.
The estimated exponential equation is

\[ Y = (71477) \times (1.1323)^t \quad \text{C.G.R} = 13.2472 \]
\[ (0.0216) \quad \text{C.V} = 42.8123 \]

The compound growth rate of production under groundnut crop is 13.25. It expresses that the average annual growth of groundnut production in Telangana region over the previous year is 13.25 percent. The C.V. is 42.81. It means 42.8 per cent of instability in groundnut production was observed.

**Telangana-Sugarcane:**

The computed linear regression equation is:

\[ Y = 263594 - 2229t \quad \text{L.G.R} = -0.8913 \]
\[ (5571) \]

The estimated value of ‘B’ is negative, (−2229) and insignificant. It indicates, there is an insignificant decreasing trend in sugarcane production was recorded in the region. On average, 2229 tones of sugarcane production was decreasing. The linear growth rate is estimated and it is (−0.89). This tells us that the average annual decrease in sugarcane production is 0.9 per cent. A negative and insignificant growth in cane production was observed. The value of intercept term ‘A’ is 263594.

The calculated exponential function is:

\[ Y = (260257) \times (0.990)^t \quad \text{C.G.R} = -1.002 \]
\[ (0.0210) \quad \text{C.V} = 22.3512 \]

The compound growth rate of cane production is negative, (−1.0020). The negative growth rate reveals that the sugarcane production is decreasing every year, more than 1 per cent, over the previous year. The coefficient of
variation in sugarcane production is 22.35. More than 22 per cent of instability was recorded during the pre-green revolution period in Telangana region.

**Andhra Pradesh-Groundnut:**

The fitted linear regression equation of groundnut is:

\[ Y = 509325 + 54665 \cdot t \]

\[ \text{L.G.R} = 6.5493 \quad (11450) \]

From the above function, the regression co-efficient of time is 54665. It is positive and significant. A significant increasing trend in groundnut production was observed in Andhra Pradesh. On average, annually 54665 quintals of groundnut production is increasing. The estimated linear growth rate is 6.55. It expresses that the average annual growth in groundnut production during pre-green revolution period is 6.55 per cent. The value of the intercept term is 509325.

The estimated exponential equation is

\[ Y = (551217) \cdot (1.0673)^t \]

\[ \text{C.G.R} = 6.6862 \quad (0.0141) \]

\[ \text{C.V} = 25.5731 \]

The calculated compound growth rate of groundnut production in Andhra Pradesh is 6.69. It reveals nearly 6.69 per cent increase in production over the previous year. The co-efficient of variation in production was 25.57. The instability in groundnut production was 25.57 per cent.

**Andhra Pradesh-Sugarcane:**

The estimated linear regression equation is:

\[ Y = 861248 + 24313 \cdot t \]

\[ \text{L.G.R} = 2.4143 \quad (13407) \]

The instability in sugarcane production is 22.35. More than 22 per cent of instability was recorded during the pre-green revolution period in Telangana region.
In the above fitted equation, the co-efficient of time is 24313. It is positive and significant at 5 per cent probability level. A significant increasing trend was observed in sugarcane production in the state. It means 24313 tones of sugarcane production is increasing every year. The value of linear growth rate is 2.41. It reveals that the average annual growth in sugarcane production during the study period is more than 2.4 per cent. The value of intercept term is 861248.

The estimated exponential form for sugarcane production is:

\[ Y = (854718)(1.0262)^t \]

C.G.R=2.5643
C.V=16.331

The compound growth rate in sugarcane production is 2.56 per cent. This reveals that 2.56 per cent of production is increasing over the previous year in entire state of Andhra Pradesh. The instability in sugarcane production in Andhra Pradesh is recorded 16.33 per cent.

4.5Growth rates of Output: Post-green revolution period (1971-2001) Rayalaseema-Groundnut:

The fitted linear regression equation is:

\[ Y = 528733 + 25882t \]

L.G.R=2.7451

Figures in the parentheses are standard error
* Significant at 5 per cent probability level.

The estimated equation reveals that the co-efficient of time is positive and significant. It expresses that every year 25882 quintals of groundnut production, in Rayalaseema, is increasing during the post-green revolution
period. It is observed that 2.75 per cent growth in groundnut production by the value of linear growth rate. This shows that the average annual growth during the post-green revolution period is nearly 2.75 per cent. The value of intercept term is 528733.

The estimated exponential equation is:

\[ Y = (533046) (1.0277)^t \]

\[ \text{C.G.R}=2.7722 \]
\[ \text{C.V}=24.9592 \]

The compound growth rate of groundnut in the region is 2.77. It means more than 2.77 per cent growth in groundnut production was recorded over the previous year. Almost 25 per cent of instability in groundnut production was observed during post-green revolution period in Rayalaseema region.

**Rayalaseema-Sugarcane:**

The estimated linear regression equation of production of sugarcane crop in Rayalaseema is:

\[ Y = 161842 + 4640 \cdot t \]

\[ \text{L.G.R}=1.9655 \]

From the above equation, the regression co-efficient, i.e. the value of ‘B’ is 4640. It is positive and significant at 5 per cent probability level. It reveals that there is a significant increasing trend in production of sugarcane in the region. On average 4640 tones of sugarcane production is increasing every year during the study period. The linear growth rate is estimated and it is 1.97. This shows that the average annual growth in production of sugarcane in Rayalaseema is 1.97 per cent. The value of constant term A is 161842.
The estimated exponential form is:

\[ Y = (173724) \times (1.0173)^t \quad \text{C.G.R}=1.7282 \]
\[ (0.0045) \quad \text{C.V}=17.8706 \]

The compound growth rate of sugarcane production is 1.73 per cent. The average annual growth over the previous year in sugarcane production is 1.73 per cent in Rayalaseema region. By the value of C.V, 17.87 per cent of instability in sugarcane was noticed during the post-green revolution period.

**Coastal Andhra-Groundnut:**

The calculated linear regression equation is

\[ Y = 222810 + 3316 \times t \quad \text{L.G.R}=1.2021 \]
\[ (1602) \]

In the above fitted equation, the co-efficient of time is 3316. The time co-efficient is positive and significant. The groundnut production in coastal region is significantly increasing. It means every one year 3316 quintals of groundnut production was increased during the post-green revolution period. The average annual growth during this period is nearly 1.20 per cent. The constant or intercept term value is 222810.

The computed log-linear production equation is:

\[ Y = (215866) \times (1.0122)^t \quad \text{C.G.R}=1.2220 \]
\[ (0.0046) \quad \text{C.V}=10.9291 \]

The compound growth rate of production of groundnut crop is 1.22 per cent. It reveals that the increase in the average annual growth over the previous year is more than 1.22 per cent. The co-efficient of variation is 10.93 per cent.
It means almost 10.93 per cent of instability in groundnut production was observed.

**Coastal Andhra-Sugarcane:**

The fitted linear regression is:

\[ Y = 628139 + 8384t \quad \text{L.G.R}=1.0992 \]

(3066)

From the above equation, the regression co-efficient of time is 8384. It is positive and significant. It is noticed a significant increasing trend in production of sugarcane in this region. Every year 8384 tones of sugarcane production were increased during post-green revolution period. The linear growth rate is estimated and it is 1.10. This shows, the average annual growth in sugarcane output during the period is nearly 1.1 percent. The value of ‘A’ is 628139.

The estimated exponential function of sugarcane is:

\[ Y = (631997) (1.0104)^t \quad \text{C.G.R}=1.0433 \]

(0.0041) \quad \text{C.V}=10.00

The compound growth rate of sugarcane production expresses that the average annual growth in cane output over the previous year is 1.04 per cent. The co-efficient of variation in production is 10.00 per cent. The instability in sugarcane output during post-green revolution period is 10 per cent in coastal Andhra region.
**Telangana-Groundnut:**

The calculated linear regression equation is:

\[ Y = 210812 + 4419 \times t \quad \text{L.G.R}=1.5697 \]

(1623)

From the above equation the value of ‘B’ is 4419. The coefficient of time is positive and significant at 5 per cent probability level. In Telangana region, the groundnut production is increasing significantly. Every year, on average, 4419 quintals of output is increasing during the post-green revolution period. The estimated linear growth rate is 1.57 per cent. It indicates the average annual growth in production of groundnut crop 1.57 percent. The value of constant term A is 210812.

The estimated exponential equation is:

\[ Y = (207356) \times (1.0165)^t \quad \text{C.G.R}=1.6487 \]

(0.0057)

(0.0057) \quad \text{C.V}=14.2723

The compound growth rate of production is 1.65. It means the average growth in groundnut production is increasing 1.65 per cent over the previous year. From the value of C.V, more than 14.27 percent of variation in groundnut production was observed during the post-green revolution period in Telangana region.

**Telangana-Sugarcane:**

The constructed linear regression equation of sugarcane production in Telangana region is:

\[ Y = 359765 - 1273t \quad \text{L.G.R}= -0.3751 \]

(2341)
In the above estimated equation the co-efficient of time is negative and insignificant. An insignificant decreasing trend in sugarcane production is noticed in Telangana region of Andhra Pradesh. Every year 1273 tones of sugarcane production is decreasing. The linear growth rate is \(-0.38\). It expresses that average annual decrease in sugarcane output is 0.38 per cent during the post-green revolution period. The value of ‘A’ is 359765.

The estimated exponential function is:

\[
Y=(328599) \cdot (0.9988)^t \\
(0.0070) \\
\text{C.G.R}=-0.1244 \\
\text{C.V}=3.410
\]

The compound growth rate of sugarcane is \(-0.12\). More than 0.12 per cent negative growth was observed in sugarcane output over the previous year in this region. The calculated co-efficient of variation is 3.41 per cent. Hence it is noticed that the instability in sugarcane output is 3.41 per cent.

**Andhra Pradesh-Groundnut:**

The fitted linear regression equation of production is:

\[
Y=991457 + 33367 \cdot t \\
(9421) \\
\text{L.G.R}=2.1875
\]

In the above fitted equation, the co-efficient of time is 33367. It is positive and significant at 5 per cent probability level. The average annual groundnut production is increasing significantly in study period. On average every year 33367 quintals of groundnut production was increasing. The linear growth rate is 2.19 per cent. It reveals that the average annual growth during the post-green revolution period is 2.19 per cent. The value of ‘A’ is 991457.
The estimated log-linear model is:

\[ Y = (1012460)(1.0222)^t \]  
C.G.R = 2.2204  
C.V = 19.8893

The compound growth rate of sugarcane is 2.22 per cent. This means, on average, 2.22 per cent of groundnut production is increasing over the previous year. The estimated co-efficient of variation is 19.89 per cent during this period. The instability in groundnut production in the state Andhra Pradesh is recorded as 19.89 percent.

**Andhra Pradesh-Sugarcane:**

The computed linear regression equation is:

\[ Y = 1133412 + 12516t \]  
L.G.R = 0.9384  
(5514)

From the above equation the regression co-efficient ‘B’ is positive and significant. A significant increasing trend in sugarcane production was observed in the state. The average annual increase in sugarcane production is 12516 quintals. The linear growth rate is estimated and it is 0.94 per cent. It expresses that the average annual growth during study period in Andhra Pradesh is 0.94 per cent. The value of intercept term ‘A’ is 1133412.

The estimated exponential form is:

\[ Y = (1137398)(1.0087)^t \]  
C.G.R = 0.8692  
(0.0042)  
C.V = 8.5324

The compound growth rate of production is 0.87 per cent, shows the average annual growth in sugarcane production over the previous year is 0.87 per cent during the post-green revolution period in Andhra Pradesh state. The co-
efficient of variation in sugarcane production is 8.53 per cent. More than 8.53 per cent of production variation was observed in the entire Andhra Pradesh state.


Rayalaseema-Groundnut:

The estimated linear regression equation is:

\[ Y = 800 - 0.5091 t \quad \text{L.G.R} = -0.0643 \]

(10)

Figures in the parentheses are standard error

* Significant at 5 per cent probability level

The value of ‘B’ is negative (−0.5091) but not significant. The negative sign of B indicates that there is decreasing trend in groundnut yield during the pre-green revolution period. On average, nearly 0.51 kilograms of groundnut yield is decreasing every year during the study period, but this decrease is not significant. The linear growth rate is estimated and it is −0.0643. It reveals that the average annual decrease in groundnut yield was 0.06 per cent. The value of intercept term ‘A’ is 800.

The estimated exponential form is:

\[ Y = (786) (1.001)^t \quad \text{C.G.R} = 0.1242 \]

(0.0125) \quad \text{C.V} = 11.9273

The compound growth rate of groundnut is positive, i.e. 0.12. It expresses that the average annual growth rate of groundnut yield over the previous year is 0.12 percent. The co-efficient of variation in groundnut yield is 11.93 per cent during the pre-green revolution period in Rayalaseema region.
Approximately, 11.93 per cent instability in groundnut yield was recorded in the region.

**Rayalaseema-Sugarcane:**

The fitted linear regression form of Sugarcane yield is:

\[
Y = 8578 - 100^t \quad \text{L.G.R} = -1.2463
\]

The estimated equation, reveals that the co-efficient of time (-100) is negative and significant. The negative significant time co-efficient expresses a significant decreasing trend in sugarcane yield during the pre-green revolution period in Rayalaseema region of Andhra Pradesh. It means every year, 100 Kgs. of sugarcane yield is decreasing. This decrease in cane yield is also significant. The linear growth rate is -1.25 per cent. A decreasing or a negative growth was observed in the case of cane yield in the region, i.e., 1.25 per cent. The value of 'A' is 8587.

The calculated exponential form is:

\[
Y = (8609) (0.9872)^t \quad \text{C.G.R} = -1.2643
\]

\[
(0.0044) \quad \text{C.V} = 5.9553
\]

The compound growth rate of sugarcane is -1.26. This means 1.26 percent of yield is decreasing every year over the previous year. The estimated co-efficient of variation in sugarcane yield is 5.99 percent. The instability in sugarcane yield is almost 6 percent.
Coastal Andhra-Groundnut:

The estimated linear regression equation of groundnut yield is:

\[ Y = 906 - 6.409t \]

In the above fitted equation, the value of ‘B’ is \(-6.409\). It is negative and insignificant. It means more than 6 Kgs. of groundnut yield is decreasing annually, during the study period. But this decrease in groundnut yield is not significant. The linear growth rate is estimated and it is -0.74 per cent. It is observed that the average annual decrease in groundnut yield is 0.74 per cent, i.e., an insignificant negative growth rate was recorded. The value of intercept term ‘A’ is 906.

The estimated exponential equation is:

\[ Y = (902)(0.993)^t \]

The compound growth rate of yield of groundnut crop is negative, i.e. \(-0.70\). It expresses that the average annual decrease in the growth of groundnut yield over the previous year is 0.70 per cent. The C.V is 7.1234. More than 7 per cent of variation in groundnut yield was observed during the pre-green revolution period.

Coastal Andhra-Sugarcane:

The computed linear regression equation of sugarcane yield in Coastal Andhra region is:

\[ Y = 8496 - 50.6636t \]
From the above equation the regression co-efficient of time i.e., the value of ‘B’ is −50.6636. It is negative and insignificant. It reveals a decreasing trend in yield of sugarcane in the region. Numerically, on average, nearly 51 Kgs. of sugarcane yield is decreasing every year during the study period. The linear growth rate is estimated and it is −0.62 per cent. A decreasing growth in cane yield was recorded. The average annual decrease in cane yield is 0.62 per cent. The value of intercept term is 8496.

The estimated exponential equation of yield is:

\[ Y = (8506)^{(0.993)} \times C.G.R = -0.6512 \]
\[
\text{C.V}= 5.7293
\]

The compound growth rate of yield of Sugarcane is −0.65. It expresses that the decrease in growth of cane yield over the previous year is 0.65 per cent. Nearly 5.73 per cent of variation in Sugarcane yield was observed during pre-green revolution period in Coastal Andhra region. Almost 5.73 per cent of instability in cane yield was recorded.

**Telangana-Groundnut:**

The fitted linear regression equation is:

\[ Y = 631 + 1.2818t \]
\[
\text{L.G.R}= 0.2012
\]
\[
\text{(13)}
\]

From the above equation the value of B is 1.2818. It is positive but not significant. On average, 1.2818 Kgs. of groundnut yield is increasing every year during the study period. The estimated linear growth rate is 0.2012. i.e.,
the average annual growth in groundnut yield is 0.21 per cent. The value of intercept term ‘A’ is 631.

The estimated exponential equation is:

\[ Y = (613) \times (1.003)^t \]

\[ \text{C.G.R} = 0.3213 \]

\[ \text{C.V} = 20.9001 \]

The compound growth rate of yield is 0.32. It expresses that the average annual growth of groundnut yield is increasing, over the previous year by 0.32 percent. Almost 21 per cent of instability in groundnut yield was observed during the pre-green revolution period in Telangana region.

**Telangana-Sugarcane:**

The estimated linear regression equation of sugarcane yield is:

\[ Y = 9454 - 233t \]

\[ \text{L.G.R} = -2.8953 \]

The above equation reveals that the co-efficient of time is negative and insignificant. Every year 233 Kgs. of sugarcane yield was decreasing. This decrease is not significant. The linear growth rate is negative -2.90. This shows that the average annual growth during the pre-green revolution period is decreasing by 2.9 per cent. The value of ‘A’ is 9454.

The computed exponential form is:

\[ Y = (8798) \times (0.9802)^t \]

\[ \text{C.G.R} = -2.0283 \]

\[ \text{C.V} = 25.3552 \]

The compound growth rate of sugarcane is -2.03 per cent. A negative growth rate was recorded. This means 2.03 per cent of sugarcane yield is decreasing annually over the previous year. By the estimated co-efficient of
variation 25.36 per cent. Therefore 25.36 per cent of instability in sugarcane yield was recorded in Telangana region.

**Andhra Pradesh-Groundnut:**

The fitted linear regression equation is:

\[
Y=747 - 1.6909 \, \text{t} \quad \text{L.G.R= - 0.2302} \\
\text{(10)}
\]

In the above fitted equation, the value of ‘B’ is −1.6909. It is negative and insignificant. It means a decreasing trend in groundnut yield was noticed. The average annual decrease in groundnut yield in Andhra Pradesh is 1.6909 Kgs. This decrease in groundnut yield leads to negative growth in Andhra Pradesh. The estimated linear growth rate is −0.23, i.e., the average annual growth in the study period is decreasing by 0.23 per cent. The value of intercept term ‘A’ is 747.

The estimated exponential equation is:

\[
Y=(737) (0.998)^t \quad \text{C.G.R= - 0.1632} \\
\text{(0.0143)} \quad \text{C.V=12.9564}
\]

The compound growth rate of groundnut yield is −0.16, reveals that more than 0.16 per cent decrease every year over the previous year during pre-green revolution period in Andhra Pradesh. The co-efficient of variation in groundnut yield is 12.96. Nearly, 12.96 per cent of instability in groundnut yield was recorded in Andhra Pradesh.

**Andhra Pradesh-Sugarcane:**

The calculated linear regression equation is:
In the above fitted equation the co-efficient of ‘B’ is negative (-122.464) and significant at 5 per cent probability level. It is noticed that on average, annually, 122.464 Kgs. of sugarcane yield was decreasing. This decrease is significant. A negative growth rate is recorded -1.49. It reveals that the average annual growth during the study period is decreasing by 1.5 per cent. The value of intercept term is 8956.

The estimated exponential yield equation is:

\[ Y = (8977) (0.9852)^t \]

The compound growth rate of sugarcane is -1.49 per cent. A negative growth rate was recorded. This means 1.49 per cent of sugarcane yield was decreasing annually over the previous year. By the estimated coefficient of variation 6.78 per cent of instability in sugarcane yield was observed during the period in Andhra Pradesh.


Rayalaseema-Groundnut:

The fitted regression equation is:

\[ Y = 856 - 1.2098t \]

From the above estimated equation the co-efficient of time is (-1.2098) negative and insignificant. This shows an insignificant negative trend in groundnut yield. The average annual decrease in groundnut yield is 1.2098 per
cent. This decreasing trend leads to a negative growth in groundnut yield. The computed linear growth rate is \(-0.15\), i.e., the average annual decrease in growth of yield is nearly 0.15 per cent in Rayalaseema region. The value of intercept term ‘A’ is 856.

The estimated exponential equation is:

\[
Y = (848) (0.9975)^t \\
\text{C.G.R= - 0.2542} \\
\text{(0.0053) C.V=1.3142}
\]

The compound growth rate of groundnut in the region is \(-0.25\). It means, over 0.25 per cent of groundnut yield is decreasing over the previous year. The C.V. is 1.31 per cent. Hence, 1.31 per cent of instability in groundnut yield was observed during post-green revolution period in Rayalaseema region.

**Rayalaseema-Sugarcane:**

The estimated linear regression equation of cane yield is:

\[
Y = 7770 + 14.7588t \\
\text{L.G.R=0.1843} \\
\text{(29.8797)}
\]

From the above equation, the regression co-efficient of time, i.e. the value of ‘B’ is 14.7588. It is positive but not significant. This positive value reveals that there is an increasing trend in yield of sugarcane. Numerically, on average 14.7588 Kgs. of cane yield was increasing every year during the study period. The linear growth rate is estimated and it is 0.18 per cent. This shows that the average annual growth in yield of sugarcane in Rayalaseema is 0.18 per cent. The value of intercept term is 7770.
The calculated log-linear regression equation is:

\[ Y = (7776) (1.0008)^t \]
\[ C.G.R = 0.0810 \]
\[ (0.0041) \]
\[ C.V = 1.6761 \]

It is observed that the compound growth rate of sugarcane yield is 0.08 per cent. By the value of C.V, 1.68 per cent of instability in sugarcane yield was observed during the post-green revolution period in Rayalaseema region.

**Coastal Andhra-Groundnut:**

The fitted linear regression equation is:

\[ Y = 894 + 10.687t \]
\[ L.G.R = 1.0039 \]
\[ (1.9877) \]

In the above fitted equation, the co-efficient time is 10.687, it is positive and significant. A significant increasing trend was recorded in the groundnut yield in Coastal Andhra region. It means for every one year time period 10.687 Kgs. of groundnut yield was increasing during the study period. The linear growth rate is 1.00. The average annual growth during the study period is almost 1.00 per cent. The value of intercept term is 894.

The estimated exponential equation is:

\[ Y = (897) (1.0103)^t \]
\[ C.G.R = 1.0313 \]
\[ (0.0019) \]
\[ C.V = 9.1273 \]

The compound growth rate of groundnut yield is 1.03. It expresses that the average annual growth of yield over the previous year is 1.03 per cent. The co-efficient of variation is 9.13. It means 9.13 per cent of instability in groundnut yield was recorded.
Coastal Andhra-Sugarcane:

The estimated linear regression equation is:

\[
Y = 8096 - 51.343t \quad \text{L.G.R} = -0.7057
\]

(22)

From the above regression equation the co-efficient of time is \(-51.343\) negative and significant. A significant negative trend in sugarcane yield was observed in the region. Every year, on average 51.343 Kgs. of sugarcane yield was decreasing during the study period. The estimated linear growth rate is \(-0.71\) per cent, i.e., the growth in cane yield is decreasing nearly 0.71 per cent in Coastal Andhra region. The value of constant ‘A’ is 8096.

The fitted exponential function is:

\[
Y = (8054) (0.9930)^t \quad \text{C.G.R} = -0.7108
\]

(0.0033) \quad \text{C.V=6.4175}

The compound growth rate of cane yield is negative -0.71. It is observed that 0.71 per cent decreasing growth was recorded per annum over the previous year. The co-efficient of variation in cane yield is 6.42 per cent during the post-green revolution period. It means the instability in sugarcane yield is 6.42 per cent.

Telangana-Groundnut:

The fitted linear regression equation of groundnut yield is:

\[
Y = 691 + 7.4725t \quad \text{L.G.R}=0.9225
\]

(2.6967)

From the above equation the co-efficient of time is 7.4725 positive and significant. A significant positive trend was observed in groundnut yield during
the post-green revolution period in Telangana region. On average, 7.4725 Kgs. of yield was increasing during the study period. It is a significant increase. The linear growth rate is estimated and it is 0.92. The average annual growth of groundnut yield is more than 0.92 per cent. The value of intercept term A is 691.

The calculated exponential equation is:

\[ Y = (613)(1.003)^t \quad C.G.R = 0.3214 \]
\[ (0.0225) \quad C.V = 20.9002 \]

The compound growth rate of groundnut yield is 0.32. It means the average growth in yield is increasing over the previous year by 0.32 per cent. Almost 20.9 per cent of variation in groundnut yield was observed during the post-green revolution period, i.e. 20.9 per cent instability in groundnut yield was noticed.

**Telangana-Sugarcane:**

The estimated linear regression equation of sugarcane yield is:

\[ Y = 8060 - 62.4747t \quad L.G.R = -0.8849 \]
\[ (44) \]

In the above equation, the co-efficient of time is negative (-62.4747) and insignificant. The negative co-efficient expresses that every year more than 62 Kgs. Of sugarcane yield is decreasing. The calculated linear growth rate is -0.88. It shows a decreasing growth in cane yield during the study period, i.e. 0.88 per cent. The value of ‘A’ is 8060.
The computed exponential form is:

\[ Y = (7627)(0.9920)^t \quad \text{C.G.R} = -0.8003 \]
\[ (0.0071) \quad \text{C.V} = 8.0457 \]

The observed growth rate of sugarcane yield is \(-0.80\). It means 0.8 per cent of yield is decreasing annually, over the previous year. The value of coefficient of variation is 8.05 during this period. The instability in cane yield in Telangana region is 0.81 per cent during the post-green revolution period.

**Andhra Pradesh-Groundnut:**

The calculated linear regression equation is:

\[ Y = 810 + 3.1507t \quad \text{L.G.R} = 0.3071 \]

(38)

In the above fitted equation, the coefficient of time is 3.1507. This shows, every year 3.1507 Kgs. of groundnut yield is increasing during the study period. The estimated linear growth rate is 0.31 per cent. The average annual growth in groundnut yield in Andhra Pradesh during the study period is nearly 0.31 per cent. The value of A is 810.

The estimated exponential equation is:

\[ Y = (805)(1.0026)^t \quad \text{C.G.R} = 0.2606 \]
\[ (0.0038) \quad \text{C.V} = 2.7923 \]

The compound growth rate of groundnut is 0.26 per cent. This means 2.6 percent of growth is recorded over the previous year. The estimated coefficient of variation is 2.79 per cent during this period, i.e. the instability in groundnut yield is almost 2.8 per cent.
Andhra Pradesh-sugarcane:

The estimated linear regression form is:

\[ Y = 7942 - 41.7386t \quad \text{L.G.R} = -0.5738 \]

(27)

From the above form, the regression co-efficient of time is \(-41.7386\). It is negative and insignificant. An insignificant negative trend was observed in case of sugarcane yield in Andhra Pradesh. On average, annually, nearly 42 Kgs. of sugarcane yield was decreasing during the study period. The estimated linear growth rate is \(-0.57\). It expresses that the average negative growth, during study period is more than 0.57 per cent. The value of intercept term ‘A’ is 7942.

The estimated log-linear regression equation is:

\[ Y = (7859)(0.9941)^t \quad \text{C.G.R} = -0.5863 \]

\[ (0.0040) \quad \text{C.V}=5.2176 \]

The compound growth rate of sugarcane yield \(-0.59\) reveals that nearly 0.59 per cent is decreasing annually over the previous year. The co-efficient of variation in cane yield is 5.22 per cent. The recorded instability in cane yield during post-green revolution period is 5.22 per cent in Andhra Pradesh.
### Table 4.1
The Linear Growth rates of Area, Production and Yield of Groundnut and Sugarcane crops

<table>
<thead>
<tr>
<th>Period</th>
<th>Linear Growth Rate</th>
<th></th>
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<td>Rayalaseema</td>
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<td>SUGARCANE</td>
<td>GROUNDNUT</td>
<td>SUGARCANE</td>
<td>GROUNDNUT</td>
<td>SUGARCANE</td>
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<td>YIELD</td>
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Source: estimated values from secondary data.

### Table 4.2
The Compound Growth rates of Area, Production and Yield of Groundnut and Sugarcane crops

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Source: estimated values from secondary data.
The compound growth rates of two commercial crops Groundnut and Sugarcane in three regions of Andhra Pradesh state was depicted in table 4.2, for the two periods namely pre-green revolution period (1960-71) and Post-green revolution period (1971-2001).

The compound growth rate of area under groundnut crop is more in Pre-green revolution period than the Post-green revolution period, in all the three regions of Andhra Pradesh and also the state as a whole. The same trend was observed in the case of sugarcane crop. The highest compound growth rate of groundnut area was recorded in Telangana region (12.88) followed by Coastal Andhra and Rayalaseema regions. Similarly the highest compound growth rate of Sugarcane area was recorded in Coastal Andhra region (5.26) followed by Rayalaseema and Telangana regions. In the case of state as a whole, the compound growth rate is more in Pre-green revolution period than the Post-green revolution period with respect to two commercial crops groundnut and sugarcane.

The compound growth rate of groundnut production is more in Pre-green revolution period than the Post-green revolution period in the all three regions of Andhra Pradesh and entire state also. The same trend was observed in the case of sugarcane crop except in Telangana region. Both Pre and Post green revolution periods recorded as negative compound growth rates. The highest compound growth rate of groundnut production was recorded in Telangana region (13.25) followed by Coastal Andhra and Rayalaseema regions. But in the case of sugarcane production compound growth rate of
Telangana region was negative i.e.-0.124 in Post-green revolution period but it is better than Pre-green revolution period's production compound growth rate (-1.00). The highest production growth rate was recorded in Coastal Andhra region (4.38) followed by Rayalaseema region in sugarcane production compound growth rates. In case of Andhra Pradesh state as a whole the compound growth rate of production is more in Pre-green revolution period than the Post-green revolution period with respect to two commercial crops groundnut and sugarcane.

There is no similarity in case of Yield's compound growth rates with that of area and production compound growth rates with respect to two commercial crops groundnut and sugarcane. Regarding the compound growth rates of groundnut yield, only Telangana region recorded positive growth rate in both periods. In case of groundnut a negative compound growth rate in Post-green revolution was recorded in Rayalaseema region and negative compound growth rate in Pre-green revolution period in coastal Andhra region. But in case of sugarcane yield compound growth rates recorded negative growth rates in both Pre and Post green revolution periods except, Rayalaseema region Post green revolution period. In the case of state as a whole, the compound growth rates of yields are positive during Post-green revolution period and the negative compound growth rates in Pre-green revolution period with respect to two commercial crops groundnut and sugarcane.