CHAPTER VII

Production Response of Groundnut and Sugarcane Crops
6.1 INTRODUCTION:

To study the production responses of two selected commercial crops, groundnut and Sugarcane in two periods, Pre-green revolution and Post-green revolution, the multiple log-linear regression models were adopted. The study was carried out for three regions namely, Rayalaseema, Coastal Andhra, Telangana and the state Andhra Pradesh as a whole. In the present study, the dependent variable is the Production under the crop in current year (Ot) and independent variables were Area in the current year (At), Rainfall (Wt), Lagged Rainfall (Wt -1 ), Irrigated area (It), Lagged farm harvest prices (Pt - 1). These above independent variables were used to estimate in both Pre and Post-green revolution periods. Two more independent variables were added to estimate for the Post-green revolution period estimations i.e. Fertilizer consumption (Ft) and Area under High Yielding Varieties (Ht). The data was fed to equations 5 and 6 i.e. Production response functions and the results were shown in the table 6.1 for both the periods. The estimated regression coefficients of the variables give different implications. These estimated regression coefficients were analyzed accordingly.
Table 6.1
Estimated Production Response functions of Groundnut and Sugarcane crops

<table>
<thead>
<tr>
<th>REGION/CROP</th>
<th>PERIOD</th>
<th>bo</th>
<th>At</th>
<th>wt</th>
<th>wt-1</th>
<th>It</th>
<th>Pt-1</th>
<th>Ft</th>
<th>Ht</th>
<th>(R^2)</th>
<th>(R^2)</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rayalaseema Groundnut</td>
<td>Pre-green</td>
<td>-17.2684* (3.8649)</td>
<td>1.8232* (0.2385)</td>
<td>0.2949 (0.2062)</td>
<td>0.5239* (0.2277)</td>
<td>0.3838* (0.1192)</td>
<td>-0.8014* (0.1842)</td>
<td>*****</td>
<td>*****</td>
<td>0.9575</td>
<td>0.9150</td>
<td>22.530*</td>
</tr>
<tr>
<td></td>
<td>Post-green</td>
<td>-4.6437 (11.0237)</td>
<td>1.4927 (0.8809)</td>
<td>0.7058 (0.5396)</td>
<td>-0.9708* (0.5327)</td>
<td>0.2436 (0.5765)</td>
<td>-0.2020 (0.4820)</td>
<td>-0.0812 (0.5061)</td>
<td>-0.4032 (0.6573)</td>
<td>0.5404</td>
<td>0.3942</td>
<td>3.6958*</td>
</tr>
<tr>
<td>Rayalaseema Sugarcane</td>
<td>Pre-green</td>
<td>3.1480 (2.1447)</td>
<td>0.9670* (0.1294)</td>
<td>-0.1438 (0.1533)</td>
<td>0.0719 (0.1651)</td>
<td>-0.0118 (0.0820)</td>
<td>-0.0382 (0.0539)</td>
<td>*****</td>
<td>*****</td>
<td>0.9711</td>
<td>0.9422</td>
<td>33.560*</td>
</tr>
<tr>
<td></td>
<td>Post-green</td>
<td>5.6756* (3.0422)</td>
<td>0.0294 (0.2450)</td>
<td>0.0114 (0.1713)</td>
<td>0.0073 (0.1713)</td>
<td>0.7117* (0.1991)</td>
<td>0.0477 (0.1279)</td>
<td>-0.2196 (0.1348)</td>
<td>0.1360</td>
<td>0.7185</td>
<td>0.6289</td>
<td>8.0211*</td>
</tr>
<tr>
<td>Coastal Andhra Groundnut</td>
<td>Pre-green</td>
<td>0.4732 (2.9617)</td>
<td>1.0775* (0.3360)</td>
<td>-0.1081 (0.0749)</td>
<td>-0.1346 (0.0914)</td>
<td>0.0899* (0.0313)</td>
<td>-0.1881 (0.2101)</td>
<td>*****</td>
<td>*****</td>
<td>0.9475</td>
<td>0.8951</td>
<td>18.064*</td>
</tr>
<tr>
<td></td>
<td>Post-green</td>
<td>-0.7484 (2.0428)</td>
<td>0.8719* (0.2048)</td>
<td>-0.0449 (0.1235)</td>
<td>-0.0509 (0.1189)</td>
<td>0.1676 (0.1574)</td>
<td>-0.0056 (0.0225)</td>
<td>0.0827 (0.0709)</td>
<td>0.0215 (0.1548)</td>
<td>0.9399</td>
<td>0.9208</td>
<td>49.1521*</td>
</tr>
<tr>
<td>Coastal Andhra Sugarcane</td>
<td>Pre-green</td>
<td>3.6449* (1.2217)</td>
<td>0.9030* (0.1248)</td>
<td>-0.0234 (0.0665)</td>
<td>0.0799 (0.0656)</td>
<td>-0.0766 (0.0762)</td>
<td>0.0005 (0.0397)</td>
<td>*****</td>
<td>*****</td>
<td>0.9609</td>
<td>0.9217</td>
<td>24.5556*</td>
</tr>
<tr>
<td></td>
<td>Post-green</td>
<td>7.6819* (2.0189)</td>
<td>0.0574 (0.2240)</td>
<td>-0.1295 (0.1524)</td>
<td>-0.0570 (0.1531)</td>
<td>0.6506* (0.2192)</td>
<td>-0.0498 (0.1059)</td>
<td>-0.1772 (0.1034)</td>
<td>0.1831</td>
<td>0.7657</td>
<td>0.6911</td>
<td>10.2724*</td>
</tr>
</tbody>
</table>

Table Contd...
Table 6.1
Estimated Production Response functions of Groundnut and Sugarcane crops

<table>
<thead>
<tr>
<th>REGION/CROP</th>
<th>PERIOD</th>
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<th>Pt-1</th>
<th>Ft</th>
<th>Ht</th>
<th>R²</th>
<th>R²*</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telangana Groundnut</td>
<td>Pre-green</td>
<td>10.6584</td>
<td>-0.5624</td>
<td>-0.7141</td>
<td>0.7237</td>
<td>0.9846*</td>
<td>-0.3867</td>
<td>0.83331</td>
<td>0.6612</td>
<td>4.9901</td>
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</tr>
<tr>
<td></td>
<td>Post-green</td>
<td>4.6882*</td>
<td>0.0276</td>
<td>0.2574</td>
<td>-0.1140</td>
<td>0.8484*</td>
<td>0.1328</td>
<td>-0.3078</td>
<td>-0.0330</td>
<td>0.7689</td>
<td>0.6953</td>
<td>10.4554*</td>
</tr>
<tr>
<td>Telangana Sugarcane</td>
<td>Pre-green</td>
<td>0.9658</td>
<td>0.8973*</td>
<td>-0.3589</td>
<td>0.6684*</td>
<td>0.0075</td>
<td>-0.0038</td>
<td>0.9382</td>
<td>0.8763</td>
<td>15.1721*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Post-green</td>
<td>6.0739*</td>
<td>0.3739</td>
<td>0.3324</td>
<td>0.4782</td>
<td>0.0790</td>
<td>0.3516*</td>
<td>0.4396</td>
<td>0.2613</td>
<td>2.4710*</td>
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</tr>
<tr>
<td>Andhra Pradesh Groundnut</td>
<td>Pre-green</td>
<td>-14.2855</td>
<td>1.4747*</td>
<td>0.5595</td>
<td>0.3757</td>
<td>0.2481</td>
<td>-0.4276</td>
<td>0.7963</td>
<td>0.5926</td>
<td>3.9094</td>
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</tr>
<tr>
<td></td>
<td>Post-green</td>
<td>-5.3339</td>
<td>1.1240*</td>
<td>0.2964</td>
<td>0.1357</td>
<td>0.2638</td>
<td>-0.0612</td>
<td>0.8402</td>
<td>0.7893</td>
<td>16.5222*</td>
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<tr>
<td>Andhra Pradesh Sugarcane</td>
<td>Pre-green</td>
<td>8.8584</td>
<td>0.3868</td>
<td>-0.1551</td>
<td>0.1309</td>
<td>0.0367</td>
<td>0.0414</td>
<td>0.7217</td>
<td>0.4434</td>
<td>2.5935</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Post-green</td>
<td>7.6381*</td>
<td>0.1315</td>
<td>0.0226</td>
<td>0.0696</td>
<td>0.5634*</td>
<td>0.1193</td>
<td>-0.3551*</td>
<td>0.7751</td>
<td>0.7036</td>
<td>10.8328*</td>
<td></td>
</tr>
</tbody>
</table>

Note: * Significant at five Per cent Probability level.
Figures in Parentheses are Standard errors of the estimates.
6.2 RAYALASEEMA REGION:

GROUNDNUT:

From the table 6.1, it is noticed that the aggregate effect of all independent variables on dependent variable, i.e. production of groundnut during Pre-green revolution period is noticed 96 per cent, since the value of $R^2$ is 0.9575. From F-test statistic, the collective effect of variables is found to be significant. The value of adjusted multiple correlation ($\overline{R^2}$) is 0.9150. The coefficient of groundnut area (1.8232) is positive and significant at five per cent probability level. It shows a positive relation with the production of groundnut. Every one unit increase in groundnut area will increase the groundnut production by 1.82 units. This indicates that the groundnut production is area responsive. The coefficients of rainfall were positive and only lagged rainfall shows a significant effect on groundnut production. The coefficient of Irrigated area (0.3838) is positive and significant. A positive and significant relation was observed between groundnut production and groundnut irrigated area in Rayalaseema region during Pre-green revolution period. Here the coefficient of the variable of lagged price (-0.8014) shows its negative and significance effect on groundnut production. An increase in one unit of price will decrease the groundnut production by 0.80 units. The negative and significant value indicates that the grower's of groundnut in Rayalaseema region are not responded by farm harvest prices to allocate more area to groundnut. It may be concluded that the attractive prices of groundnut will motivate the farmers to enhance the production in Pre-green revolution period.
The value of constant term is negative and significant. It indicates that other variables which are not considered in the model are also influencing the production of groundnut in Rayalaseema region.

During the Post-green revolution period, it is observed that the groundnut production is not responded positively and significantly by any one of the variables which are considered in the model. The two new variables, Fertilizers and HYV area, are not shown much effect on production. The value of multiple correlation coefficient is 0.5404, i.e. the combined effect of all independent variables on groundnut production is 54 per cent. From F-test statistic, the collective effect of all independent variables on the dependent variable is found to be significant. Only 54 per cent of variation in groundnut output was noticed by the all variables in the region. The value of adjusted multiple correlation (\( R^2 \)) is 0.3942. The coefficient of the variable area under the groundnut (1.4927) is positive but it is insignificant. It establishes a positive relation with groundnut production. One unit increase in groundnut area will increase the production by 1.49 units. The variable Rainfall's expressed a positive relation with groundnut output. It shows a positive and insignificant effect on exogenous variable groundnut production in Rayalaseema region. The coefficient of lagged rainfall is (-0.9708), negative and significant. An increase in one unit of lagged rainfall will decrease the groundnut production by 0.97 units, but this decrease is a significant. The coefficient of Irrigated area is positive, but it is insignificant. It reveals that groundnut production is not responsive. The coefficient of the variable lagged farm prices (-0.2020)
is negative and insignificant in Rayalaseema region during Post-green revolution period. It expresses, that the groundnut production is not price responsive in Rayalaseema region. The coefficient of Fertilizer consumption is 0.0812. It is noticed that there is a little positive effect on groundnut production. The coefficient of the variable HYV area is -0.4032. It established a negative and insignificant relation with the dependent variable Ot. The effect of two new variables was absent. The value of constant term (-4.64) is negative and insignificant.

Comparing the estimates of the variables in both the periods, it is observed that the variable At and It were influencing the groundnut output positively in Pre and Post green revolution periods. Hence, it is inferred that the groundnut production was responded by the area and water source, irrigated conditions are encouraging it’s grower to raise the groundnut production during the both the periods but it significant at Pre-green revolution period only. The price effect is insignificantly negative during Post-green revolution period. The groundnut production is not responded by the prices. The harvest prices are not encouraging its growers to raise the output. The coefficient of lagged rainfall is positive and significant during Pre-green revolution period but it is negative and significant in Post-green revolution period. It indicates the lack of rainfall or insufficient rainfall in Post-green revolution period. Area under groundnut crop is also influencing significantly to increase the groundnut production during Pre-green revolution period, but it is influencing positively but not significantly during Post-green revolution period. Finally, it is
concluded that the selected variables are influencing the groundnut production during the Pre-green revolution period but they are not so during the Post-green revolution period.

**SUGARCANE:**

During the Pre-green period, the coefficient of area is (0.9670). It is positive and significant at five per cent probability level. A positive and significant relationship was recorded between cane area and cane production in Rayalaseema region of Andhra Pradesh. For every one unit increase in current area under sugarcane crop will raise the production by 0.97 units and it is significant. The coefficient of lagged rainfall also established a positive and insignificant relationship with the sugarcane production, i.e. an increase in one unit in rainfall will increase the cane production by 0.072 units approximately. It is noticed that the cane production is positively responded by the area under the crop mainly and the impact of lagged rainfall is little. The coefficients of Rainfall in current year, Irrigated area and lagged farm harvest prices were (-0.1438, -0.0118 and -0.0382) negative and insignificant. Therefore sugarcane production in Rayalaseema region during Pre-green revolution period is negatively responded by these variables. A negative insignificance indicates an increase in above three endogenous variables will decrease the exogenous variable sugarcane production in the Rayalaseema region. Hence, cane production is not responded by water and price. The combined effect of all independent variables is 97 per cent, i.e. 97 per cent of variation in production was observed by these variables. This collective effect of independent variables
on sugarcane production is significant at five percent probability level. Proved by F-test statistic. The value of adjusted multiple correlation ($R^2$) is 0.9422. The constant term is 3.15. It is positive but not significant.

From the table 6.1 during Post-green revolution period, it is noticed that the collective effect of all independent variables on dependent variable production of sugarcane is 72 per cent. From F-test statistic, the collective effect of these independent variables is found to be significant. The value of adjusted multiple correlation ($R^2$) is 0.6289. The constant term is 5.68, it is positive and significant. This means some other variables were also influencing increase the production of sugarcane in this region. In this study, it is found that all most all endogenous variables except the variable $F_t$, are recorded positive effect on exogenous variable $O_t$ in Rayalaseema region. It is observed that the coefficient of Irrigated area (0.7117) is positive and significant effect. A positive significant relation was established a positive relation between $I_t$ and sugarcane production. This indicates that the irrigated area under sugarcane crop is encouraging the cane grower's to increase the sugarcane production. An increase in one unit of $I_t$, will increase the cane production by 0.71 units. The coefficients of area under sugarcane, Rainfall in current year, lagged Rainfall, lagged farm harvest price and Area under high yielding varieties were positive, but insignificant. It reveals a positive and insignificant relationship with sugarcane production in Rayalaseema region. Every one unit increase in these variables will raise the cane output by very little quantity. The coefficient of consumption of Fertilizer is (-0.2196)
negative and insignificant. This negative and insignificant coefficient reveals that the cane output was negatively responded by consumption of fertilizer during Post-green revolution period. As $F_t$ increases the production may be decreased.

Comparing the estimates of the function between the Pre-green revolution period and Post-green revolution period, it is observed that the cane output is positively responded by the variable Irrigated area during Post-green revolution period, but it is not so during Pre-green revolution period. Total area under the crop is influencing positively during Pre and Post-green revolution period, but it is significant during pre-green revolution period. The price effect is positive during Post-green revolution period, but it is negative during Pre-green revolution period. Hence, cane output is not price responsive in Rayalaseema. The consumption of Fertilizers’ effect during Post-green revolution period is negative and insignificant on sugarcane production. Observing the rainfall variables, almost both variables reveal shows a positive impact on cane production in both the periods of the region. Area under HYV’s impact on cane output is positive. The value of constant term is positive and significant during both the period.

6.3 COASTAL ANDHRA REGION:

GROUNDNUT:

The value of multiple correlation coefficient is 0.9475. From the table 6.1 it is noticed that the aggregate effect of all independent variable on the dependent variable, production of groundnut during Pre-green revolution
period is 95 per cent. Nearly 95 per cent of variation in cane output was observed by these variables. This collective effect of endogenous variable on groundnut production is significant at five per cent probability level. It is proved by F-test statistic. The value of adjusted multiple correlation ($R^2$) is 0.8951. Among the explanatory variables the coefficient of irrigated area is 0.0899. It is positive and significant. A increase in one unit of It variable will raise the production of groundnut in coastal Andhra region by 0.09 units. The coefficient of At (1.0775) is positive and significant at five per cent probability level. An increase in one unit of area will raise the production by more than one unit during Pre-green revolution period. The coefficients of Rainfall in current year, lagged rainfall and lagged farm harvest prices were negative and insignificant. An increase in these independent variables will decrease the groundnut production by 0.11, 0.14, and 0.19 units respectively in coastal Andhra region. This negative coefficients effect of above three variables reveals that groundnut production was not positively responded by these variables during Pre-green revolution period in coastal Andhra region of Andhra Pradesh. Hence, it is concluded that the groundnut output is responded by nearly two variables It and At. The constant or term is 0.47, it is positive but not significant. The variables, which are not taken in above model are not shown much impact on groundnut output.

During the Post-green revolution period, it is noticed that the coefficients of Area under the crop (0.8719) is positive and significant. A positive relation was exists between area and groundnut production. An
increase in one unit of area under groundnut will increase the groundnut production by 0.87 units in coastal Andhra region. The coefficient of Irrigated area is 0.1676. There is positive and insignificant relationship between production of groundnut and Irrigated area. The independent variables, consumption of fertilizer, Area under High Yielding Varieties’ coefficients 0.0827 and 0.0215 were positive and insignificant. A positive relation was exists between groundnut output with each of these variables. A unit increase in each of these variables will increase the groundnut production by 0.08 and 0.02 units respectively. The coefficients of Rainfall in current year, lagged rainfall, lagged farm harvest prices were (-0.1449, -0.0509 and -0.0056) negative and insignificant. Every one unit increase in these variables will decrease the production of groundnut in Coastal Andhra region. These negative insignificant sign indicates that these variables are not influencing to increase the production of groundnut during Post-green revolution period. The constant intercept term is -0.7484. It is negative and insignificant. It means other variables are influencing negatively on the production of groundnut in this region. The multiple correlation coefficient value (R²) is 0.9399. The combined effect of all independent variable on dependent variable is 94 per cent. Almost 94 per cent of variation in groundnut production was observed by these selected variables. From F-test statistic, the collective effect of endogenous variables was found to be significant. The value of adjusted multiple correlation (R²) is 0.9208.
Comparing the estimates in both the periods, it is noticed that the coefficients of Area under the crop (At) is showing a positive and significant effect on groundnut production in Coastal Andhra region. This indicates that Area under the crop is significantly influencing the groundnut growers to increase groundnut production in Coastal Andhra region. Therefore groundnut output is responded by area under groundnut. The coefficient of Irrigated area (It) is observed to be positive but significant during Pre-green revolution period, but it was only positive and not significant during Post-green revolution period. This means irrigated area under cultivation is encouraging farmer's to rise of groundnut production in Coastal Andhra region. The coefficients of Rainfall in current year (Wt), lagged rainfall (Wt-1), lagged farm harvest prices were express a negative and insignificant effect on groundnut production in both the periods. This indicates that these variables were not influencing positively to raise the production of groundnut in coastal Andhra region. Hence, groundnut output is not price responsive. The variable's coefficients, consumption of Fertilizer (Ft), Area under the High Yielding Varieties (Ht), were positive and insignificant. Hence, the groundnut production in Coastal Andhra region is also influenced positively by these two new factors. Finally, it may be concluded that the commercial crop groundnut output is area and irrigated area responsive but not price responsive in Coastal Andhra region.
SUGARCANE:

In case of sugarcane, during the Pre-green revolution period, in Coastal Andhra region, the coefficients of explanatory variables i.e. area under the crop (At), lagged rainfall (Wt-1) and lagged price (Pt-1) were 0.9030, 0.0799 and 0.0005 respectively. These variables expressed a positive correlation with the explained variable cane production. But this relation is significant between the variables At and sugarcane output. One unit increase in these variables each will raise the cane production by 0.9, 0.08 and 0.0005 units respectively. It is also noticed that the sugarcane output is significantly by area responsive. The lagged rainfall reveals only 8 per cent variation in sugarcane production. Hence, lagged price and lagged rainfall were reveals a negligible effect on cane production during Pre-green revolution in Coastal Andhra region. The coefficients of Rainfall in current year (Wt) and Area under Irrigated conditions (It) were expressed a negative and insignificant effect on sugarcane production. These variables are not influencing positively cane production in Coastal Andhra region. The multiple correlation coefficients is 0.9609. The combined effect of all independent variables is 96 per cent. Therefore, 96 per cent of variation in cane production was observed by these variables. The collective effect of these endogenous variables on sugarcane production is significant at five per cent probability level. It is proved from F-test statistic. The value of adjusted multiple correlation (\( R^2 \)) is 0.9217. The constant term is 3.65 it is positive and significant. Therefore, other variables were also influencing cane production significantly.
Observing the estimates of Post-green revolution period the multiple correlation coefficient is 0.7657. The value of $R^2$ is called as the aggregate effect of the explanatory variables on the explained variable. The collective effect of all these independent variables on dependent variable production of sugarcane is 77 per cent. It is known that 77 per cent of variation in cane production was recorded by these variables. The collective effect of independent variables on sugarcane production is significant at five per cent probability level. The value of adjusted multiple correlation ($\bar{R}^2$) is 0.6911. The constant intercept term is (7.6819) is positive and significant. The coefficient of independent variable Irrigated area (0.6506) is positive and significant at five per cent probability level. The (It) variable established a significant positive relation with the cane output. Every one unit increase in It will raise the output by 0.65 units. The coefficients of independent variables At and Ht were positive and insignificant. An insignificant positive relationship was observed by these variables with the sugarcane production in Coastal Andhra region. The coefficients of the variables rainfall (Wt), lagged rainfall (Wt-1), lagged price (Pt-1) and consumption of Fertilizer (Ft) are negative and insignificant. A unit increase in each of these variables will decrease the cane production by 0.13, 0.06, 0.05 and 0.18 units respectively in Coastal region during Post-green revolution period. It is noticed that the cane output is responded mainly by irrigated area only. This commercial crops sugarcane is not price responsive. It is responded by area under HYV. The coefficient of constant and intercept term is 7.68. It is positive and significant.
It reveals the external variables of the model were influencing positively and significantly the sugarcane production during Post-green revolution period.

Comparing the estimated coefficients during Pre-green revolution period and Post-green revolution period, the coefficients of Irrigated area is observed to be positive during Post-green revolution period and is observed to be negative and insignificance during Pre-green revolution period. Irrigated area is encouraging the sugarcane grower's in increasing cane output during Post-green revolution period. Hence, cane production is responded by It variable. The same positive trend was noticed in case of area under the crop in both the periods. The area under the crop during Pre-green revolution period is significant but it is insignificant during Post-green revolution period. The coefficient of both the Rainfall variables reveals all most negative impact on sugarcane output. Therefore, rainfall is adversely affecting the production in sugarcane in both the periods of Coastal Andhra region. In case of lagged price, there exists a opposite effects during both periods. But price effect is negligible effect on sugarcane output. The sugarcane output is not price responsive but it is area responsive. The variable consumption of Fertilizer is negative and insignificant. Therefore Fertilizer effect is negative on cane production. Hyv area's impact on cane output is positive during Post-green revolution period in Coastal Andhra region. The constant term is positive and significant in both the periods.
6.4 TELANGANA REGION:

GROUNDNUT:

The estimated regression coefficients of the equation 5 and 6 were given in the table 6.1 for the Telangana region. During Pre-green revolution period, it is observed that among the selected independent variables, the coefficient of irrigated area is (0.9846) positive and significant. A positive and significant relationship was noticed between the It and groundnut output in Telangana. An increase in one unit in It variable will increase the groundnut output by 0.99 units approximately. It reveals the production is responded by irrigated area. The coefficient of lagged rainfall (0.7237) is also positive but not significant, i.e. every one unit increase in Wt-1 will raise the output by 0.72 units. Hence, lagged rainfall is influencing the groundnut production during Pre-green revolution period. The coefficients of Area under the groundnut crop, Rainfall in current year, lagged farm harvest prices (-0.5624, -0.07141 and -0.3867) were negative and insignificant. These three variables established a negative relationship with groundnut production. The negative and insignificant coefficients indicate that, these variables are negatively influencing the production of groundnut in Telangana region. The multiple correlation coefficient value is 0.8331. The combined effect of all independent variables is 83 per cent. Over 83 per cent of production variation was observed. This collective effect of independent variables on groundnut production is not significant at five per cent probability level. It was proved by
F-test statistic. The value of adjusted multiple correlation coefficient is 0.6612. The constant term is 10.66. It is positive but not significant.

From table 6.1, during Post-green revolution period, the value of multiple correlation coefficient is 0.7689, i.e. the collective effect of all endogenous variables on exogenous variable, production of groundnut is noticed 77 per cent. Almost 77 per cent of variation in groundnut production was recorded by these explanatory variables. By F-test statistic, the collective effect of independent variables is found to be significant. The value of adjusted multiple correlation is 0.6953. With respect to the variables, the coefficient of Irrigated area (0.8484) is positive and significant. The irrigated area effect on production of groundnut was observed in Telangana region. The groundnut output is mainly responded by irrigated area variable only. The coefficients of Area under the crop (At), Rainfall in current year \( (W_t) \) and lagged farm harvest prices \( (P_{t-1}) \), \((0.0276, 0.2574, 0.1328)\) were positive but they show an insignificant effect on groundnut production. Therefore, the output is positively responded by these variables but it is insignificant. The coefficients of lagged Rainfall \((-0.1140)\) is negative and insignificant effect. The effect of rainfall on groundnut production during Post-green revolution period is negative. An increase in these variables will decrease the groundnut production. The coefficients of consumption of Fertilizer and area under High Yielding Varieties were \((-0.3078, -0.0330)\) negative and insignificant. They express negative effect on groundnut output during Post-green revolution.
period. The coefficient of intercept term is (4.6882) is positive and significant. Hence, the groundnut output was responded by mainly It, At variables.

Comparing the estimates of Pre -green and Post-green revolution periods, it is noticed that only one endogenous variable is shows a positive effect on exogenous variable groundnut production in both the periods. It is noticed that the variable Irrigated area (It) is influencing positively and significantly on groundnut production is in Telangana region. Hence, the groundnut output is Irrigated area responsive in Telangana. The coefficients of Rainfall, lagged rainfall, area under groundnut crop, lagged price where shown insignificant effect on groundnut output. Alternatively they expressed during both the periods, positive and negative impact on production. Therefore, it may be concluded that these variables effect is not significant on groundnut production. Finally, it may be concluded that the groundnut production is not price responsive, it is Irrigated area responsive. The groundnut prices were not encouraging its growers to raise the output. The two new variables Ft and Ht were not shown a positive effect on groundnut output. Hence, groundnut production is negatively affected by these two new variables. The constant term is positive and significant during Post-green revolution period, it means other factors are all influencing the production in Telangana region.

**SUGAR CANE:**

From the table 6.1, the multiple correlation coefficient is 0.9382. It is noticed that the collective effect of all endogenous variables on exogenous variable, production of sugar cane during Pre-green revolution period is noticed
as 94 per cent. Almost 94 per cent of variation in sugarcane output was observed by all independent variables. The collective effect of all independent variables on sugarcane production is significant at five per cent probability level. The value of adjusted multiple correlation is 0.8763. The coefficient of Area under the crop is (0.8973) positive and significant. A positive and significant relation was there between At and Ot. An increase in one unit of At will increase groundnut production by 0.9 units. Hence, area under the crop is influencing the growers to increase the production of sugarcane in Telangana region. Therefore cane output is responded by area under sugarcane. The coefficient of lagged rainfall is (0.6684), every one unit increase in this variable will increase the cane output by 0.67 units. Lagged Rainfall also influencing cane growers to increase the production in this region. The independent variable Irrigated area showing its positive and insignificant effect on dependent variable, production of sugarcane, during Pre-green revolution period. The value of constant term is 0.9658. The coefficients of Rainfall in current year (-0.3589) and lagged farm harvest price (-0.0038) were negative and insignificant. The effect of these two variables totally absent. This means these two independent variables were not influencing sugarcane output. Unfortunately, it is noticed that the commercial crop also not price responsive during Pre-green revolution period. It may be concluded that the prices were not attracting the growers to enhance cane output.

During Post-green revolution period, in Telangana region, the coefficient of lagged farm harvest price (0.3516) is positive and significant. A
positive and significant relationship was established between Pt-1 and Ot. An increase in one unit of lagged price will increase the cane output by 0.35 units. The price effect is major influencing factor to increase the production of sugarcane in Telangana region. In the present study, majority of endogenous variables were showing positive effect on dependent variable production of sugarcane during Post-green revolution period. The coefficients of Area under the crop, Rainfall in current year, lagged Rainfall, Irrigated area were (0.3739, 0.3324, 0.4782 and 0.079) positive. It means all these variables were showing a Positive effect on cane production. Every one unit increase in each of these variables will increase 0.37, 0.33, 0.48, 0.08 units respectively. The constant term is 6.0739, it is positive and significant. It means other variables were also collectively affecting the sugarcane production. The coefficients of consumption of fertilizer and HYV area were (-0.4167, -0.0716) negative but the effect of Ft is significant. This negative and significance sign indicates that insufficient use of fertilizer in cane cultivation in Telangana region. It is inferred that there is some possibility to raise the cane output by raising Fertilizer consumption. According the estimated coefficient of Hyv area, it is noticed that, for every one unit increase in Hyv area will decrease the cane output. The multiple correlation coefficient $R^2$ is 0.4396. Nearly 44 percent of variation in cane output was recorded. It is observed that the collective effect of all endogenous variables on exogenous variable sugarcane production during Post-green revolution period is 44 per cent. From F-test statistic this collective
effect is found to be significant. The value of adjusted multiple correlation ($\bar{R}^2$) is 0.2613.

Observing the estimates of the variables during Pre-green revolution period and Post-green revolution periods in case of the production of sugarcane in Telangana region, it is found that the lagged farm harvest price is influencing cane output during Post-green revolution period, but it was not so in Pre-green revolution period. The same trend was observed in reverse order in case of Area under the crop (At) in the region. The area under the crop during Pre-green revolution period shows a positive and significant effect on cane output but it is negative in Post-green revolution period. Hence, cane output was influenced by At during Pre-green revolution period. The constant term was positive and significant during Post-green revolution period. It means some other variables, which are not considered were influencing sugarcane production, but the other variables effect, during Pre-green revolution period, on output is significant at five per cent. The effect of lagged Rainfall positive in both the periods but it is significant during Pre-green revolution period. The variable Irrigated area (It) is encouraging the growers in cane production in both the periods, but not significantly. The coefficients of Fertilizer consumption (Ft) is indicates insufficient use of fertilizer in Post-green revolution period. By raising Ft consumption, the cane output may be raised. Area under High Yielding Varieties is not influencing positively on production of sugarcane in Telangana region.
6.5 ANDHRA PRADESH:

GROUNDNUT:

From the table 6.1, it is noticed that the value of multiple correlation coefficient is 0.7963. The collective effect of all independent variables on dependent variable, production of groundnut crop during Pre-green revolution period for entire Andhra Pradesh state is 80 per cent approximately. Nearly 80 per cent of variation in groundnut output was observed by these independent variables in the entire state. From F-test statistic, it is noticed that this combined effect is not significant at five per cent probability level on groundnut production. The constant intercept term value is 14.2855. It means that the other variable effect on production was recorded negatively. The value of adjusted multiple correlation coefficient is 0.5926. Majority of selected endogenous variables were expressed a positive effect on groundnut production in Andhra Pradesh state. Here, there is only one independent variable’s effect i.e. Area under the crop (1.4747) is positive and significant. An increase in one unit of At variable, will increase the Ot by 1.50 units. It seems to be, area is a major influencing factor of groundnut production in Andhra Pradesh. Hence, it may infer that the grower’s in Andhra Pradesh were responded by area under groundnut crop. The coefficients of the variables Rainfall in current year, lagged rainfall and irrigated area were 0.5595, 0.3757 and 0.2481 respectively. All these variables established a positive relation with groundnut production in Andhra Pradesh, but these variables effect is insignificant. The coefficient of lagged farm harvest price (-0.4276) is a
negative and insignificant. An insignificant negative relation between the price and groundnut output was observed. This negative and insignificant effect of price indicates that as an increase in Pt will decrease the groundnut production in Andhra Pradesh state during Pre-green revolution period.

During the Post-green revolution period, it is noticed that almost all variables show a similar trend as in Pre-green revolution period. The coefficient of area under the crop is (1.1240) positive and significant. A positive relation between area and groundnut production was recorded. An increase one unit of area will raise the groundnut by 1.124 units. So, here also Area under the crop is a major factor to raise the groundnut production in the state. The coefficients of Rainfall in current year (Wt), Irrigated area (It) were 0.2964 and 0.2638 respectively. These variables reveal that there is a positive effect on production of groundnut in Andhra Pradesh. These variables effect is not significant on groundnut production during Post-green revolution period. The coefficients of lagged Rainfall and lagged farm harvest prices (-0.1357 and -0.0612) were negative and insignificant. It is recorded that these variable's effect on groundnut output is negative. This negative insignificant effect of the variables indicates that these two variables are not influencing the production of groundnut. Therefore groundnut output was not price responsive but it is area responsive only. The variables, consumption of Fertilizer is (-0.0662) negative and insignificant. An increase in the variable Ft will decrease the Ot. The coefficient of new variable Area under High Yielding Varieties is 0.0303. A Positive effect of this variable is noticed on groundnut
production in Andhra Pradesh, but this positive effect on production is not significant. The value of constant term is \(-5.3339\). It is negative and insignificant. The multiple correlation coefficient is 0.8402. The combined effect of all these independent variables was recorded as 84 per cent, i.e. 84 per cent of variation in groundnut output was recorded by these selected variables. This collective effect of endogenous variables on exogenous variable groundnut production was significant at five per cent probability level. It is noticed from F-test statistic. The value of adjusted multiple correlation is 0.7893.

Comparing the estimates of the variables in both the periods, it is observed that the Area under the crop (At) is an influencing factor on groundnut production, in Andhra Pradesh state as a whole. Hence, groundnut output is responded by the current year area only. The variables, Rainfall in current year and Irrigated area reveals their positive effect on output in both the periods on production, but this effect on output is not significant. The variable, lagged price effect is negative in both the periods on output. Therefore, price effect is absent. Hence, the commercial crop groundnut output is not price responsive but area responsive in the Andhra Pradesh state. The coefficient of Area under High Yielding Varieties is positive and the variable consumption of Fertilizer is negative and insignificant effect. These two variables are not influencing the groundnut output. Finally it may say that the new variable's influence on production is absent in Andhra Pradesh state.
SUGARCANE:

During the Pre-green revolution period, all variables under consideration, except rainfall shows a positive relation with the sugarcane output. The sugarcane output is responded by four variables positively. The coefficient of Area under the sugarcane crop (0.3863) is positive. An increase in one unit of At will raise the cane output by 0.39 units approximately in the state. The coefficients of Irrigated area, lagged farm harvest price and lagged rainfall are 0.0367, 0.0414 and 0.1309 insignificant. This means, for every unit increase in these variables will raise the cane output in Andhra Pradesh state during Pre-green revolution period. The coefficient of rainfall is -0.1551. It is negative and insignificant. An increase in one unit of rainfall will decrease the sugarcane production by 0.16 units and this decrease is not significant at five per cent probability level. The value of intercept term is 8.8584. It is also positive and insignificant. The combined effect of all independent variables is 72 per cent. From F-test, it is known that the collective effect of all independent variables on sugarcane production is insignificant. It is noticed that more than 72 per cent of variation was recorded by these independent variables during Pre-green revolution period in Andhra Pradesh. The value of adjusted multiple correlation is 0.4434.

During the Post-green revolution period, it is observed, the value of multiple correlation coefficients is 0.775 per cent. The collective effect of all independent variables on dependent variable, production of sugarcane, is observed to be 77 per cent. About 77 per cent of variation in cane production
was recorded by these variables. From F-test statistic, the collective effect of endogenous variables is found to be significant. The value of adjusted multiple correlation is 0.7036. The coefficients of Irrigated area is (0.5634) positive and significant. A significant positive relation was recorded between cane production and It variable. An increase in one unit of irrigated area will increase the cane production by 0.56 units approximately. The Irrigated land is a major factor which is influencing sugarcane production in Andhra Pradesh state. Among the remaining variables, except Ft, all are established a positive relation with the sugarcane output. The coefficients of Area under the crop (0.1315), Rainfall in current year (0.0226) lagged Rainfall (0.0696) and lagged farm harvest prices (0.1193) were positive but their’s effect is insignificant on cane output in Andhra Pradesh state. An increase in each unit of these variables will increase the sugarcane production. Therefore sugarcane production is positively responded by these variables in Andhra Pradesh state during Post-green revolution period. The variable consumption of fertilizer (Ft) is (-0.3551) negative and significant. An increase in one unit of Ft will decrease the cane production by 0.3551 units. It also reveals that there is some scope to raise the cane output by raising the use of fertilizer in Andhra Pradesh state during the Post-green revolution period. Another variable, Area under High Yielding Varieties (0.1819) effect is positive and insignificant. An increase in one unit area under HYV will increase the cane output by 0.18 units but this increase in output due to HYV is not significant during Post-green revolution period. The constant term is 7.6381. It is positive and significant it
indicates the collective effect of other variables, which are not taken in the model, is positive and significant. It may be concluded that other variable’s influence on production is noticed.

Comparing the estimated values, during Pre-green revolution period and Post-green revolution period, sugarcane output was responded by Irrigated area positively during the both periods. A significant response of It on output was recorded during Post-green revolution period. The coefficients of Area under the crop, lagged farm harvest price, lagged rainfall were noticed a positive effect in both the periods. But their’s effect on output is not significant in the present study. The coefficient of Rainfall in current year was positive during Post-green revolution period, but it was negative during Pre-green revolution period. Hence, cane production is affected by rainfall in opposite direction in two periods. The positive coefficient of the variable under High Yielding varieties reveals that cane output was positively responded by this variable in Andhra Pradesh. The negative and significant coefficient of consumption of fertilizer in cane production to increase sugarcane production in Andhra Pradesh state, it may inferred that the consumption of fertilizer should not sufficient.