CHAPTER: 13

STATISTICAL ANALYSIS

IN RESPECT OF

IRRIGATION
13.1 Statistical analysis in respect of irrigation:
Water management mainly deals with the irrigation practices. Irrigation determines the nature of agricultural land use, cropping pattern and agricultural productivity and it is determined by the configuration of terrain, soil factor and other aspects. Therefore in the present study an attempt has been made to observe the absolute and causal relationship between irrigation factor and other socio-economic indicators which determines irrigation or irrigation determines them.

13.2 Correlation analysis

In this correlation analysis the dependent variable is the % of net irrigated area, % of canal irrigated area and % of tank irrigated area and independent variables are the different aspects of configuration of terrain like, average height of the villages, absolute relief, relative relief, dissection index, average slope. Correlation and regression analysis have been done at the level of Sriniketan-Santiniketan Planning Area villages.

In this study the variables of 42 villages are noted and correlation co-efficient have been computed in all the villages of Sriniketan-Santiniketan Planning Area which are discussed below.

**Percentage of net irrigated area, percentage of canal irrigated area, percentage of tank irrigated area and depth of ground water table**

Here the correlation co-efficient have been computed between percentage of net irrigated area, percentage of canal irrigated area, percentage of tank irrigated area and depth of ground water table. It is observed that there is a positive correlation between percentage of net irrigated area and percentage of canal irrigated area and depth of ground water table; that means percentage of net irrigated area and percentage of canal irrigated area show the increase of depth of water table. On the other hand, there is a negative correlation co-efficient between the percentage of tank irrigated area and depth of water table. That means where there is high proportion of tank irrigated area there is very low depth of water table and vice-versa.
From the computed correlation co-efficient between net irrigated area and land use in different sectors, it is observed that there is a positive correlation between the percentage of net irrigated area and the total area, percentage of forest, percentage of net sown area, percentage of area not available for cultivation, percentage of net irrigated area, percentage of canal irrigated area and percentage of tank irrigated area. This indicates that when the net irrigated area increases the land use in all these sectors also increases too. On the other hand, the correlation co-efficient between waste lands, unirrigated area and percentage of tank irrigated area are negative. That means where the net irrigated area is larger in proportion the percentage of waste lands, unirrigated area and percentage of tank irrigated area are very smaller in proportion.
Scatter diagrams showing correlation between percentage of net irrigated area and percentage of Waste land

**Fig: 61**

**Percentage of canal irrigated area and land use**

The correlation between the percentage of canal irrigated area and the percentage of forest, percentage of net sown area, percentage of waste lands, percentage of area not available for cultivation, percentage of net irrigated area, percentage of unirrigated area and percentage of tank irrigated area, percentage of canal irrigated area have been computed. The correlation co-efficient between the percentage of canal irrigated area and total area, the percentage of forest, percentage of net sown area, percentage of area not available for cultivation, percentage of net irrigated area and percentage of canal irrigated area is positive. That means when percentage of canal irrigated area is enough in proportion there the land use in these sectors is also enough. Again the correlation co-efficient between the percentage of canal irrigated area percentage of waste lands, percentage of unirrigated area and percentage of tank irrigated area is negative. This indicates that increasing of canal irrigated area means decrease in the proportion of waste lands, percentage of unirrigated area and percentage of tank irrigated area.

**Scatter diagrams showing correlation between percentage of canal irrigated area and percentage of tank irrigated area**

**Fig. 62**
Percentage of tank irrigated area and land use

The correlation is computed between the percentage of tank irrigated area and total area, percentage of forest, percentage of net sown area, percentage of waste lands, percentage of area not available for cultivation, percentage of net irrigated area, percentage of unirrigated area. Here it is noticed that correlation co-efficient is positive between the percentage of tank irrigated area and percentage of waste lands, percentage of unirrigated area and percentage of tank irrigated area. This indicates that if the percentage of tank irrigated area larger in proportion then the percentage of waste lands, percentage of unirrigated area and percentage of tank irrigated area will also be larger in proportion. On the other hand, the correlation co-efficient is negative between the percentage of tank irrigated area and total area, percentage of forest, percentage of net sown area percentage of area not available for cultivation, percentage of net irrigated area and percentage of canal. That means where the tank irrigated area is larger in proportion there the percentage of area under these sectors will also be smaller in proportion.

Percentage of net irrigated area and crops

Here the correlation co-efficient is computed between percentage of net irrigated area and area under different crops. The correlation coefficient is positive between net irrigated area and percentage of area under aman, boro, wheat, potato, mustard seed, vegetables and pulses. That means increase in net irrigated area represents the increase in these above mentioned crops. On the other hand, the negative correlation co-efficient is found in between net irrigated area and percentage of area under aus paddy indicating that where net irrigate area is larger in proportion the area under aus paddy is very smaller in that place.

Percentage of canal irrigated area and crops

Now the researcher will compute the correlation co-efficient between the percentage of canal irrigated area and percentage of area under different crops. Here correlation co-efficient is positive between the percentage of canal irrigated area and percentage of area under Boro, wheat, potato, vegetables and pulses. That means where canal irrigation is largely found in that place boro, wheat, potato, vegetables and pulses are cultivated in lesser amount. The correlation co-efficient is negative in between canal irrigated area and area under aus, aman
and mustard seed crops. This indicates that where canal irrigation is larger in proportion the
cultivation of *aus*, *aman* and mustard seed crops is very smaller in that place.

**Percentage of tank irrigated area and crops**

The computed correlation co-efficient between the percentage of tank irrigated area and
percentage of area under different crops shows that positive correlation co-efficient is found
between tank irrigated area and *aus*, *aman*, wheat, vegetables and pulses crops. That means
where tank irrigated area are larger in proportion there these crops are cultivated in higher
order. The negative correlation co-efficient is found between tank irrigated area and *boro*,
potato and mustard seed crops indicating that where tank irrigation is adequately available
there these crops are not cultivated significantly.

**Percentage of net irrigated area and configuration of terrain**

Here the correlation co-efficient have been computed between the percentage of net irrigated
area and indicators of configuration of terrain like height and lowest contour in the village,
absolute relief, relative relief, dissection index, highest and lowest slope in the village and
average slope. It has been observed that the correlation coefficient between percentage of net
irrigated area and highest and lowest contour and absolute relief, highest and lowest slope
and average slope are positive. That indicates the villages where larger proportion of
percentage of net irrigated area is observed there all these indicators are also quite high,
whereas, the correlation co-efficient computed between the percentage of net irrigated area
and relative relief and dissection index are negative indicating that the villages with large
proportion of net irrigated area have small amount of relative relief and dissection index.

![Scatter diagrams showing correlation between percentage of net irrigated area and lowest contour](image)

**Fig: 63**
Scatter diagrams showing correlation between percentage of net irrigated area and percentage of canal irrigated area

Fig: 64

Percentage of canal irrigated area and configuration of terrain

Here the correlation co-efficient have been computed between the percentage of canal irrigated area and indictors of configuration of terrain like highest and lowest contour in the village, absolute relief, relative relief, dissection index, highest and lowest slope in the village and average slope. It has been observed that the correlation co-efficient between percentage of canal irrigated area and highest and lowest contour and absolute relief are positive. That indicates where large proportion of percentage of canal irrigated area is observed there all these indicators are also quite high, whereas, the correlation co-efficient computed between percentage of canal irrigated area and relative relief and dissection index, highest and lowest slope and average slope are negative indicating that the villages with large proportion of canal irrigated area have small amount of relative relief and dissection index, highest and lowest slope and average slope.

Scatter diagrams showing correlation between percentage of canal irrigated area and lowest contour

Fig. 65
Percentage of tank irrigated area and configuration of terrain

Here the correlation co-efficient have been computed between the percentage of tank irrigated area and indicators of configuration of terrain like highest and lowest contour in the village, absolute relief, relative relief, dissection index, highest and lowest slope in the village and average slope. It has been observed that the correlation co-efficient between percentage of tank irrigated area and all the indicators of configuration of terrain are positive. That indicates that villages where large proportion of tank irrigated area is observed there all the indicators are also very high.

Scatter diagrams showing correlation between percentage of tank irrigated area and dissection index

Fig. 66

Scatter diagrams showing correlation between percentage of tank irrigated area and high slope

Fig. 67

Scatter diagrams showing correlation between percentage of tank irrigated area and low slope

Fig. 68
Scatter diagrams showing correlation between percentage of tank irrigated area and average slope

Fig. 69

Scatter diagrams showing correlation between percentage of tank irrigated area and percentage of canal irrigated area

Fig. 70
Table: 86  Correlation between sources of irrigation and different parameters of physical factors, land use and cropping pattern

<table>
<thead>
<tr>
<th>Sources of irrigation</th>
<th>High contour</th>
<th>Lowest contour</th>
<th>Absolute relief</th>
<th>Relative relief</th>
<th>Dissection index</th>
<th>High slope</th>
<th>Low slope</th>
<th>Low slope</th>
<th>Water table depth</th>
<th>Moram soil</th>
<th>Loam soil</th>
<th>Clay soil</th>
<th>Sandy loam soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIA</td>
<td>.25</td>
<td>.32</td>
<td>.25</td>
<td>-.22</td>
<td>.26</td>
<td>.16</td>
<td>.04</td>
<td>.12</td>
<td>.28</td>
<td>-.03</td>
<td>.1</td>
<td>.14</td>
<td>.26</td>
</tr>
<tr>
<td>CANAL</td>
<td>.34</td>
<td>.39</td>
<td>.34</td>
<td>-.13</td>
<td>-.16</td>
<td>-.18</td>
<td>-.18</td>
<td>-.16</td>
<td>-.24</td>
<td>.57</td>
<td>.29</td>
<td>.13</td>
<td>.22</td>
</tr>
<tr>
<td>TANK</td>
<td>.09</td>
<td>.02</td>
<td>.09</td>
<td>.38</td>
<td>.44</td>
<td>.43</td>
<td>.57</td>
<td>.5</td>
<td>-.13</td>
<td>-.18</td>
<td>.23</td>
<td>.02</td>
<td>.14</td>
</tr>
</tbody>
</table>

Table continued below

<table>
<thead>
<tr>
<th>Sources of irrigation</th>
<th>Laterite soil</th>
<th>Red soil</th>
<th>Rajmahal soil</th>
<th>Gondwana soil</th>
<th>Sandy loam</th>
<th>Loam soil</th>
<th>Total area</th>
<th>% forest</th>
<th>% net sown area</th>
<th>% water table</th>
<th>ANAC</th>
<th>NIA</th>
<th>Unirrigated area</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIA</td>
<td>.11</td>
<td>.1</td>
<td>-.2</td>
<td>.03</td>
<td>-.07</td>
<td>.19</td>
<td>.04</td>
<td>.10</td>
<td>-.22</td>
<td>-.28</td>
<td>.12</td>
<td>1.00</td>
<td>-.24</td>
</tr>
<tr>
<td>CANAL</td>
<td>.23</td>
<td>-.22</td>
<td>.06</td>
<td>.02</td>
<td>-.13</td>
<td>.33</td>
<td>.25</td>
<td>.08</td>
<td>.04</td>
<td>-.15</td>
<td>.24</td>
<td>.36</td>
<td>-.02</td>
</tr>
<tr>
<td>TANK</td>
<td>-.24</td>
<td>.42</td>
<td>-.02</td>
<td>.21</td>
<td>-.22</td>
<td>-.112</td>
<td>-.13</td>
<td>-.12</td>
<td>.21</td>
<td>.17</td>
<td>-.26</td>
<td>.18</td>
<td></td>
</tr>
</tbody>
</table>

Table continued below

<table>
<thead>
<tr>
<th>Sources of irrigation</th>
<th>% canal</th>
<th>% tank</th>
<th>% aus paddy</th>
<th>% aman paddy</th>
<th>% boro paddy</th>
<th>% wheat</th>
<th>% potato</th>
<th>% mustard</th>
<th>Vegetable</th>
<th>Pulses</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIA</td>
<td>.36</td>
<td>-.26</td>
<td>-.12</td>
<td>.15</td>
<td>.25</td>
<td>.21</td>
<td>.01</td>
<td>.03</td>
<td>.007</td>
<td>.22</td>
</tr>
<tr>
<td>CANAL</td>
<td>1.00</td>
<td>-.82</td>
<td>-.11</td>
<td>-.08</td>
<td>.21</td>
<td>.07</td>
<td>.19</td>
<td>.31</td>
<td>.03</td>
<td>.02</td>
</tr>
<tr>
<td>TANK</td>
<td>-.82</td>
<td>1.00</td>
<td>.34</td>
<td>.28</td>
<td>-.16</td>
<td>.07</td>
<td>-.11</td>
<td>.18</td>
<td>.02</td>
<td>.08</td>
</tr>
</tbody>
</table>

Source: computed by the researcher
Percentage of net irrigated area and geological formation of soil

Now, the correlation co-efficient between net irrigated area and geological formation i.e. laterite, red, Rajmahal and Gondwana soil have been computed. Here we found that the correlation co-efficient between percentage of net irrigated area and laterite, red, and Gondwana soils are positive. This indicates that where net irrigated area is large in proportion there these factors are also larger. On the other hand, the correlation co-efficient between percentage of net irrigated area and Rajmahal soil are negative. That means the villages where the net irrigated area is larger in proportion the Rajmahal soil is very smaller in proportion in that village.

Percentage of canal irrigated area and geological formation of soil

Here the correlation co-efficient have been computed between the percentage of canal irrigated area and geological formation of the villages. In this case the correlation co-efficient between the canal irrigated area and laterite, Gondwana and Rajmahal soil covered villages are positive. This indicates that where canal irrigated area is of larger proportion there these aspects are also larger. On the other hand the correlation co-efficient between canal irrigated area and red soil is negative. That means where the canal irrigation is larger in proportion there red soil is very smaller in proportion.

Percentage of tank irrigated area and geological formation of soil

Here the correlation co-efficient have been computed between the percentage of tank irrigated area and geological formation of laterite, red soil, Rajmahal soil and Gondwana soils have been computed. Here the correlation co-efficient between tank irrigated area and red soil is positive indicating that where tank irrigated area increases red soil area also increases there. On the other hand, the correlation co-efficient between tank irrigated area and laterite, Gondwana soil and Rajmahal flat is negative. That means where tank irrigated area is of higher order there these variables are of lower order.
Percentage of net irrigated area and texture of soil

Here the correlation co-efficient have been computed between percentage of net irrigated area and texture of soil, that means Moram, loamy clay, sandy loam soils of the villages. The correlation co-efficient between percentage of net irrigated area and Moram, loamy clay, sandy loam soils are positive. That means where the net irrigated area is larger in proportion there these variables are also larger. On the other hand the correlation co-efficient between percentage of net irrigated area and Moram and clayey soil have negative correlation indicating that increase in the net irrigated area means the decrease in moram and sandy soil.

Percentage of canal irrigated area and texture of soil

Now, we compute the correlation co-efficient between canal irrigated area and Moram, loam, clayey and sandy loam soils of the villages. There is a positive correlation between canal irrigated area and all the above mentioned variables. It proves greater value of canal irrigated area means the greater value of all these variables. Only the canal irrigated area and sandy soils have negative correlation. That means the increase in one factor indicates the decreasing of another.

Scatter diagrams showing correlation between percentage of canal irrigated area and sandy loam soil

Fig. 71

Percentage of tank irrigated area and texture of soil

The correlation co-efficient between tank irrigated area and texture of soil shows that there is positive correlation between Moram and tank irrigated area. This indicates the increase of tank irrigated areas means the increase in Moram soil. Similarly, there is negative correlation between tank irrigated areas and loam, clayey, sandy loam and sandy soils. That means where tank irrigated area is larger in proportion there all these variables are smaller in proportion.
13.3 Regression analysis

Percentage of net irrigated area and canal irrigated area of the villages

The regression co-efficient \( b \) is computed between percentage of net irrigated area \((y)\) and percentage of canal irrigated area of the villages \((x)\). Here the second variable is regarded as independent variable because the canal irrigated area greatly determines the net irrigated area.

The co-efficient \( b \) is .43, where the equation is 
\[ y = 89.41 + .43x. \]
This depicts the fact that every unit increasing in the canal irrigated area will increase .43 unit in the percentage of net irrigated area. Intercept \( a \) shows the minimum average percentage of net irrigated area. In this case it is 89.41, which means percentage of net irrigated area per unit of canal irrigated area is 89.41 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of canal irrigated area have larger amount of percentage of net irrigated area.

The co-efficient of determination \( R^2 \) is 0.01 indicating that 1% of the total variation in \( y \) is being explained by \( x \).

Percentage of net irrigated area and tank irrigated area of the villages

The regression co-efficient \( b \) is computed between percentage of net irrigated area \((y)\) and percentage of tank irrigated area of the villages \((x)\). Here the second variable is regarded as independent variable because the tank irrigated area affects on the net irrigated area.

The co-efficient \( b \) is .31, where the equation is
\[ y = 54.43 + .31x. \]
This depicts the fact that every unit increasing in the tank irrigated area will increase .31 unit in the percentage of net irrigated area. Intercept \( a \) shows the minimum average percentage of net irrigated area. In this case it is 54.43, which means percentage of net irrigated area per unit of tank irrigated area is 54.43 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of tank irrigated area generate larger amount of net irrigated area.
The co-efficient of determination ($R^2$) is 0.07 indicating that 7% of the total variation in $y$ is being explained by $x$.

**Percentage of net irrigated area and aus paddy crops of the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($x$) and Aus paddy crops of the villages ($y$). Here the first variable is independent variable because the net irrigated area greatly influences the crop production.

The co-efficient ($b$) is .009, where the equation is

$$y = 3.65 + 0.009x.$$ This depicts the fact that every unit increasing in the net irrigated area will increase .009 unit in the Aus paddy crop. Intercept ($a$) shows the minimum average percentage of Aus paddy area. In this case it is 3.65, which means percentage of Aus paddy area per unit of net irrigated area is 3.65 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of net irrigated area increase the percentage of Aus paddy area.

The co-efficient of determination ($R^2$) is 0.04 indicating that 4% of the total variation in $y$ is being explained by $x$.

**Percentage of net irrigated area and highest contour in the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($y$) and highest contour height of the villages ($x$). Here the second variable is considered as independent variable, because the contour height affects on the irrigated area. Higher the contour height means higher the percentage of net irrigated area.

The co-efficient ($b$) is .09 where the equation is $y=34.33 + 0.09x$. This depicts the fact that per unit increase in contour height will increase .09 unit in the percentage of net irrigated area. Intercept ($a$) shows the minimum average percentage of net irrigated area. In this case it is 34.33, which means percentage of net irrigated area per unit of contour height is 34.33 and the regression co-efficient shows variation above this constant figure. It implies that the villages which have larger proportion of higher contour contain a larger amount of percentage of net irrigated area.
The co-efficient of determination ($R^2$) is 0.01 which means 1% of the total variation in $y$ is being explained by $x$.

**Percentage of net irrigated area and lowest contour in the villages**

This shows the regression co-efficient ($b$) is computed between percentage of net irrigated area ($y$) and lowest contour height of the villages ($x$). Here the second variable is considered as independent variable, because net irrigated area is determined by the contour height of the villages. The co-efficient ($b$) is 0.31, where the equation is $y = 5.60 + 0.31x$. This depicts the fact that per unit increase in contour height will increase 0.31 unit in the percentage of net irrigated area. Intercept ($a$) shows the minimum average percentage of net irrigated area. Here it is 5.60. That refers percentage of net irrigated area changes per unit of contour height of 5.60. The regression co-efficient shows the variability above this constant figure.

It means the villages having lower proportion of contour height generate a larger amount of percentage of net irrigated area.

The co-efficient of determination ($R^2$) becomes 0.05 which means 5% of the total variation in $y$ is being explained by $x$.

**Percentage of net irrigated area and relative relief of the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($y$) and relative relief of the villages ($x$). Here the second variable is considered as independent variable. Relative relief means the difference between highest and lowest contour of a unit area. So the net irrigated area of every village is determined by relative relief of the villages.

The co-efficient ($b$) is 1.31 where the equation is $y = 64.82 + 1.31x$. This depicts the fact that per unit increase in relative relief will increase 1.31 units in the percentage of net irrigated area. Intercept ($a$) shows the minimum average percentage of net irrigated area. Here it is 64.82; that means percentage of net irrigated area per unit of contour height is 64.82. The regression co-efficient shows the variation above this constant figure.

It means that the villages which have higher proportion of contour height generate a larger proportion of net irrigated area.

The co-efficient of determination ($R^2$) is 0.08 which means 8% of the total variation in $y$ is being explained by $x$. 
Percentage of net irrigated area and dissection index of the villages

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($y$) and dissection of the villages ($x$). Here the second variable is considered as independent variable because the dissection index (ratio between absolute relief and relative relief of a unit area) affects on the net irrigated area.

Here the co-efficient ($b$) is 280.92 and the equation is

$$y = 71.70 + 280.92x.$$ This depicts the fact that per unit increase in dissection index will increase 280.92 unit in the percentage of net irrigated area. Intercept ($a$) shows the minimum average percentage of net irrigated area. In this case it is 71.70 which means percentage of net irrigated area per unit of contour height is 71.70 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of higher contour generate a larger amount of percentage of net irrigated area.

The co-efficient of determination ($R^2$) is 0.12 which means 12% of the total variation in $y$ is being explained by $x$.

**Line of best fit between net irrigated area and dissection index of the villages**

![Graph showing the relationship between tank irrigated area and dissection index.](image)

Fig: 72

Percentage of net irrigated area and highest slope of the villages

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($y$) and highest slope of the villages ($x$). Here the second variable is considered as independent variable because the slope of an unit area affects on the net irrigated area.
The co-efficient \( b \) is 1.58 where the equation is 
\[ y = 42.41 + 1.58x. \]
This depicts the fact that per unit increase in the contour height will increase 1.58 units in the percentage of net irrigated area. Intercept \( a \) shows the minimum average percentage of net irrigated area. In this case it is 42.31 which means percentage of net irrigated area per unit of highest slope is 42.31 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of higher slope generate a larger amount of percentage of net irrigated area.

The co-efficient of determination \( R^2 \) is 0.01 which means 1% of the total variation in \( y \) is being explained by \( x \).

**Percentage of net irrigated area and lowest slope of the villages**

The regression co-efficient \( b \) is computed between percentage of net irrigated area \( (y) \) and lowest slope of the villages \( (x) \). Here the second variable is considered as independent variable because the lowest slope of influences on the net irrigated area.

The co-efficient \( b \) is 0.60 and the equation is 
\[ y = 47.00 + 0.6x. \]
This depicts the fact that per unit increase in the lowest slope will increase .60 unit in the percentage of net irrigated area. Intercept \( a \) shows the minimum average percentage of net irrigated area. In this case it is 47.00 which means percentage of net irrigated area per unit of lowest slope is 47.00 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of lowest slope generate a larger amount of percentage of net irrigated area.

The co-efficient of determination \( R^2 \) is 0.0004 which means .04% of the total variation in \( y \) is being explained by \( x \).
Percentage of net irrigated area and average slope of the villages

The regression co-efficient \( (b) \) is computed between percentage of net irrigated area \( (y) \) and average slope of the villages \( (x) \). Here the second variable is considered as independent variable because the average slope influences on the percentage net irrigated area.

The co-efficient \( (b) \) is 1.37 and the equation is

\[
y = 44.17 + 1.37x
\]

This depicts the fact that per unit increase in the average slope will increase 1.37 unit in the percentage of net irrigated area. Intercept \( (a) \) shows the minimum average percentage of net irrigated area. In this case it is 44.17 which means percentage of net irrigated area per unit of average slope is 44.17 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of average slope generate a larger amount of percentage of net irrigated area.

The co-efficient of determination \( (R^2) \) is 0.0036 which means .36% of the total variation in \( y \) is being explained by \( x \).

**Line of best fit between net irrigated area and average slope of the villages**

![Line of best fit plot](image)

**Fig: 7.3**

Percentage of net irrigated area and depth of water table of the villages

The regression co-efficient \( (b) \) is computed between percentage of net irrigated area \( (y) \) and depth of water table of the villages \( (x) \). Here the second variable is considered as independent variable because the percentage net irrigated area is very much influenced by the depth of water table of the villages.

The co-efficient \( (b) \) is 0.25 where the equation is
y = 45.88 + .25x. This depicts the fact that per unit increase in the depth of water table will increase .25 unit in the percentage of net irrigated area. Intercept (a) shows the minimum average percentage of net irrigated area. In this case it is 45.88 which means percentage of net irrigated area per unit of depth of water table is 45.88 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of depth of water table generate a larger amount of percentage of net irrigated area.

The co-efficient of determination (R^2) is 0.0001 which means .01% of the total variation in y is being explained by x.

**Line of best fit between net irrigated area and depth of water table of the villages**

![Graph showing the regression line](image)

**Percentage of net irrigated area and moram soil of the villages**

The regression co-efficient (b) is computed between percentage of net irrigated area (y) and moram soil of the villages (x). Here the second variable is considered as independent variable because the type of soil is a determinant factor of percentage net irrigated area.

The co-efficient (b) is 9.63 where the equation is

y = 52.68 + 9.63x. This depicts the fact that per unit increase in moram soil will increase 9.63 unit in the percentage of net irrigated area. Intercept (a) shows the minimum average percentage of net irrigated area. In this case it is 52.68, which means percentage of net irrigated area per unit of moram soil area is 52.68 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of moram soil area have a larger amount of percentage of net irrigated area.
The co-efficient of determination ($R^2$) is 0.02 which means 2% of the total variation in $y$ is being explained by $x$.

**Line of best fit between net irrigated area and moram soil of the villages**

![Graph showing the line of best fit between net irrigated area and moram soil of the villages.](image)

**Fig: 75**

**Percentage of net irrigated area and loam soil of the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($y$) and distribution of loam soil of the villages ($x$). Here the second variable is regarded as independent variable because the percentage net irrigated area is determined by the type of soils of the villages.

The co-efficient ($b$) is 5.56 where the equation is

$$y = 43.54 + 5.56x.$$  
This depicts the fact that per unit increase in loam soil area will increase 5.56 unit in the percentage of net irrigated area. Intercept ($a$) shows the minimum average percentage of net irrigated area. Here it is 43.54. This shows percentage of net irrigated area per unit of loam soil area is 43.54 and the regression co-efficient shows variation above this constant figure.

It means that the villages having higher proportion of loam soil generate a larger amount of percentage of net irrigated area.

The co-efficient of determination ($R^2$) is 0.003 which means .3% of the total variation in $y$ is being explained by $x$.

**Line of best fit between net irrigated area and loam soil of the villages**

![Graph showing the line of best fit between net irrigated area and loam soil of the villages.](image)

**Fig: 76**
Percentage of net irrigated area and distribution of clayey soil of the villages

The regression co-efficient \( b \) is computed between percentage of net irrigated area \( (y) \) and distribution of clayey soil of the villages \( (x) \). Here the second variable is considered as independent variable because the clayey soil covered area influence on percentage net irrigated area.

The co-efficient \( b \) is 36.03 where the equation is:

\[
y = 13.92 + 36.03x
\]

This represents the fact that per unit increase in clayey soil area will increase 36.03 units in the percentage of net irrigated area. Intercept \( a \) shows the minimum average percentage of net irrigated area. In this case it is 13.92 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of clayey soil generate a larger percentage of net irrigated area.

The co-efficient of determination \( (R^2) \) is 0.03 which means 3\% of the total variation in \( y \) is being explained by \( x \).

Percentage of net irrigated area and laterite soil covered of the villages

The regression co-efficient \( b \) is computed between percentage of net irrigated area \( (y) \) and laterite soil covered soil of the villages \( (x) \). Here the second variable is considered as independent variable because the distribution of laterite soil covered villages influence on percentage net irrigated area.

The co-efficient \( b \) is 10.82 where the equation is:

\[
y = 46.38 + 10.82x
\]

This depicts the fact that per unit increase in laterite soil will increase 10.83 units in the percentage of net irrigated area. Intercept \( a \) shows the minimum average percentage of net irrigated area. Here it is 46.38 which means percentage of net irrigated area per unit of laterite soil is 46.38 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of laterite soil area generate a larger amount of percentage of net irrigated area.

The co-efficient of determination \( (R^2) \) is 0.02 which means 2\% of the total variation in \( y \) is being explained by \( x \).
Line of best fit between net irrigated area and laterite soil of the villages

Fig: 77

Percentage of net irrigated area and red soil of the villages

The regression co-efficient \((b)\) is computed between percentage of net irrigated area \((y)\) and distribution of red soil of the villages \((x)\). Here the second variable is considered as independent variable because the distribution of red soil has a great impact on percentage net irrigated area.

The co-efficient \((b)\) is 7.16 and the equation is \(y = 44.61 + 7.16x\). This depicts the fact that per unit increase in red soil will increase 7.16 units in the percentage of net irrigated area. Intercept \((a)\) shows the minimum average percentage of net irrigated area. In this case it is 44.61, that means percentage of net irrigated area per unit of red soil is 44.61 and the regression co-efficient shows variation above this constant figure.

It implies that the villages where larger proportion of red soil covered area are found have a larger amount of percentage of net irrigated area.

The co-efficient of determination \((R^2)\) is 0.01 indicating that 1% of the total variation in \(y\) is being explained by \(x\).

Line of best fit between net irrigated area and red soil of the villages

Fig: 78

318
Percentage of net irrigated area and Rajmahal soil of the villages

The regression co-efficient \((b)\) is computed between percentage of net irrigated area \((y)\) and distribution of Rajmahal soil in the villages \((x)\). Here the second variable is considered as independent variable because the area covered by Rajmahal affects on the percentage net irrigated area.

The co-efficient \((b)\) is 33.27 where the equation is

\[ y = 51.00 + 33.27x. \]

This depicts the fact that per unit increase in Rajmahal soil covered villages will increase 33.27 units in the percentage of net irrigated area. Intercept \((a)\) shows the minimum average percentage of net irrigated area. In this case it is 51.00, which means percentage of net irrigated area per unit of Rajmahal soil covered villages is 51.00 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger amount of Rajmahal soil generate a larger amount of percentage of net irrigated area.

The co-efficient of determination \((R^2)\) is 0.07 indicating that 7% of the total variation in \(y\) is being explained by \(x\).

**Line of best fit between net irrigated area and Rajmahal soil of the villages**

![Graph showing line of best fit between net irrigated area and Rajmahal soil](image)

Fig. 79

Percentage of net irrigated area and Gondwana soil of the villages

The regression co-efficient \((b)\) is computed between percentage of net irrigated area \((y)\) and Gondwana soil in the villages \((x)\). Here the second variable is considered as independent variable because this type of soil greatly determines the percentage net irrigated area of the villages.

The co-efficient \((b)\) is 5.97 where the equation is
\[ y = 49.63 + 5.97x. \] This depicts the fact that per unit increase in Gondwana soil covered area will increase 5.97 units in the percentage of net irrigated area. Intercept \((a)\) shows the minimum average percentage of net irrigated area. In this case it is 49.63, which means percentage of net irrigated area per unit of Gondwana soil covered villages is 49.63 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of Gondwana soil covered area; generate a larger amount of net irrigated area.

The co-efficient of determination \((R^2)\) is 0.01 indicating that 1% of the total variation in \(y\) is being explained by \(x\).

**Percentage of net irrigated area and sandy loam soil covered villages**

The regression co-efficient \((b)\) is computed between percentage of net irrigated area \((y)\) and sandy loam covered area of the villages \((x)\). Here the second variable is considered as independent variable because this category of soil greatly affects on net irrigated area.

The co-efficient \((b)\) is 5.97 where the equation is

\[ y = 50.63 + 5.97x. \] This depicts the fact that per unit increase in sandy loam covered area will increase 5.97 units in the percentage of net irrigated area. Intercept \((a)\) shows the minimum average percentage of net irrigated area. In this case it is 50.63, which means percentage of net irrigated area per unit of sandy loam covered area is 50.63 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of area covered by sandy loam soil; creates a larger amount of net irrigated area.

The co-efficient of determination \((R^2)\) is 0.004 that means .4% of the total variation in \(y\) is being explained by \(x\).

**Percentage of net irrigated area and loam soil covered villages**

The regression co-efficient \((b)\) is computed between percentage of net irrigated area \((y)\) and loam covered area of the villages \((x)\). Here the second variable is considered as independent variable because the soil characteristics influence greatly on the percentage of net irrigated area.
The co-efficient \((b)\) is 8.26 where the equation is 
\[ y = 44.90 + 8.26x. \]
This depicts the fact that per unit increase in loam covered area will increase 8.26 units in the percentage of net irrigated area. Intercept \((a)\) shows the minimum average percentage of net irrigated area. In this case it is 44.90, which means percentage of net irrigated area per unit of loam soil covered area is 44.90 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of loam soil covered area; generate a larger amount of percentage of net irrigated area.

The co-efficient of determination \((R^2)\) is 0.01 that means 1\% of the total variation in \(y\) is being explained by \(x\).

**Percentage of net irrigated area and total area of the villages**

The regression co-efficient \((b)\) is computed between percentage of net irrigated area \((y)\) and total area of the villages \((x)\). Here the second variable is considered as independent variable because the total area affects on the percentage of net irrigated area.

The co-efficient \((b)\) is .02 and the equation is 
\[ y = 53.00 + .02x. \]
This depicts the fact that per unit increase in total area will increase .02 unit in the percentage of net irrigated area. Intercept \((a)\) shows the minimum average percentage of net irrigated area. In this case it is 53.00, which means percentage of net irrigated area per unit of total area is 53.00 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of total area; generate a larger amount of percentage of net irrigated area.

The co-efficient of determination \((R^2)\) is 0.02 that means 2\% of the total variation in \(y\) is being explained by \(x\).
Percentage of net irrigated area and percentage forest of the villages

The regression co-efficient \((b)\) is computed between percentage of net irrigated area \((y)\) and percentage forest of the villages \((x)\). Here the second variable is considered as independent variable because of forest covered villages influence on the percentage of net irrigated area.

The co-efficient \((b)\) is 1.10 and the equation is
\[ y = 46.09 + 1.10x. \]
This depicts the fact that per unit increase in forest covered area increases 1.10 units in the percentage of net irrigated area. Intercept \((a)\) shows the minimum average percentage of net irrigated area. In this case it is 46.09, which means percentage of net irrigated area per unit of forest covered area is 46.09 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of forest covered area; generate a larger amount of percentage of net irrigated area.

The co-efficient of determination \((R^2)\) is 0.05 that means 5% of the total variation in \(y\) is being explained by \(x\).

Percentage of net irrigated area and net sown area of the villages

The regression co-efficient \((b)\) is computed between percentage of net irrigated area \((y)\) and percentage of net sown area of the villages \((x)\). Here the first variable is regarded as independent variable because the net irrigated area influence greatly on the percentage of net sown area.

The co-efficient \((b)\) is 1.10 where the equation is
\[ y = 64.84 + .01x. \]
This depicts the fact that per unit increasing in the percentage of net irrigated area will increase .01 unit in the percentage of net sown area. Intercept \((a)\) shows the minimum average percentage of net sown area. In this case it is 64.84, which means percentage of net sown area per unit of net irrigated area is 64.84 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of net irrigated area generate larger amount of percentage of net sown area.
The coefficient of determination ($R^2$) is 0.0006 indicating that .06% of the total variation in $y$ is being explained by $x$.

**Percentage of net irrigated area and waste land of the villages**

The regression coefficient ($b$) is computed between percentage of net irrigated area ($y$) and percentage of waste land the villages ($x$). Here the second variable is regarded as independent variable because the increase in waste land indicates the increase in the net irrigated area.

The coefficient ($b$) is 9.95, where the equation is

$$y = 53.07 + 9.95x.$$  

This depicts the fact that per unit increasing in the percentage of waste land will increase 9.95 unit in the percentage of net irrigated area. Intercept ($a$) shows the minimum average percentage of net irrigated area. In this case it is 53.07, which means percentage of net irrigated area per unit of waste land is 53.07 and the regression coefficient shows variation above this constant figure.

It implies that the villages which have larger proportion of waste land generate larger amount of percentage of net irrigated area.

The coefficient of determination ($R^2$) is 0.08 indicating that 8% of the total variation in $y$ is being explained by $x$.

**Percentage of net irrigated area and area not available for cultivation of the villages**

The regression coefficient ($b$) is computed between percentage of net irrigated area ($y$) and percentage of area not available for cultivation of the villages ($x$). Here the second variable is regarded as independent variable because as the area not available for cultivation increases, the net irrigated area also increases.

The coefficient ($b$) is .25, where the equation is

$$y = 45.51 + .25x.$$  

This depicts the fact that per unit increasing in the percentage of area not available for cultivation will increase .25 unit in the percentage of net irrigated area. Intercept ($a$) shows the minimum average percentage of net irrigated area. In this case it is 45.51, which means percentage of net irrigated area per unit of area not available for cultivation is 45.51 and the regression coefficient shows variation above this constant figure.
It means that the villages which have larger proportion of area not available for cultivation generate larger amount of percentage of net irrigated area.

The co-efficient of determination ($R^2$) is 0.01 indicating that 1% of the total variation in $y$ is being explained by $x$.

**Percentage of net irrigated area and unirrigated area of the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($y$) and percentage of unirrigated area of the villages ($x$). Here the second variable is regarded as independent variable because the net irrigated area affects on the percentage of unirrigated area.

The co-efficient ($b$) is .46, where the equation is

$$y = 60.73 + .46x.$$  This depicts the fact that every unit increasing in the percentage of net irrigated area will increase .46 unit in the percentage of unirrigated area. Intercept ($a$) shows the minimum average percentage of unirrigated area. In this case it is 60.73, which means percentage of unirrigated area per unit of net irrigated area is 60.73 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of net irrigated area generate larger amount of percentage of unirrigated area.

The co-efficient of determination ($R^2$) is 0.23 indicating that 23% of the total variation in $y$ is being explained by $x$.

**Percentage of net irrigated area and aman paddy crops of the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($x$) and aman paddy crops of the villages ($y$). Here the first variable is independent variable because the net irrigated area determines the cultivation of aman paddy crop.

The co-efficient ($b$) is .01, where the equation is $y = 75.63 + .01x$. This depicts the fact that every unit increasing in the net irrigated area will increase .01 unit in the production of *aman* paddy crop. Intercept ($a$) shows the minimum average percentage of *aman* paddy cultivation. In this case it is 43.21, which means percentage of *aman* paddy area per unit of net irrigated area is 43.21 and the regression co-efficient shows variation above this constant figure.
It implies that the villages which have larger proportion of net irrigated area increase the amount of Aman paddy crop.

The co-efficient of determination ($R^2$) is 0.0009 indicating that .09% of the total variation in $y$ is being explained by $x$.

**Percentage of net irrigated area and Boro paddy crops of the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($x$) and Boro paddy crops of the villages ($y$). Here the first variable is independent variable because the net irrigated area affects on the cultivation of Boro paddy crop.

The co-efficient ($b$) is .09, where the equation is $y = 5.55 + .09x$. This depicts the fact that every unit increasing in the net irrigated area will increase .09 unit in the cultivation of Boro paddy area. Intercept ($a$) shows the minimum average percentage of Boro paddy area. In this case it is 5.55, which means percentage of Boro paddy area per unit of net irrigated area is 5.55 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of net irrigated area increase the area of Boro paddy.

The co-efficient of determination ($R^2$) is 0.08 indicating that 8% of the total variation in $y$ is being explained by $x$.

**Percentage of net irrigated area and wheat cultivation of the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($x$) and percentage of area under wheat crop of the villages ($y$). Here the first variable is independent variable because the net irrigated area affects on the cultivation of wheat crop of the villages.

The co-efficient ($b$) is .003, where the equation is $y = 3.75 + .003x$. This depicts the fact that every unit increasing in the net irrigated area will increase .003 unit in the cultivation of wheat crop area. Intercept ($a$) shows the minimum average percentage of wheat crop cultivated area. In this case it is 3.75, which means
percentage of wheat crop cultivated area per unit of net irrigated area is 3.75 and the
regression co-efficient shows variation above this constant figure.

It implies that the villages which have higher proportion of net irrigated area generate
larger amount of wheat cropped area.

The coefficient of determination ($R^2$) is 0.002 indicating that .2% of the total variation
in $y$ is being explained by $x$.

**Percentage of net irrigated area and potato cultivation of the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($x$) and
percentage of area under potato crop of the villages ($y$). Here the first variable is independent
variable because the net irrigated area influences on the cultivation of wheat crop of the
villages.

The co-efficient ($b$) is .04, where the equation is

$$y = 7.56 + .04x.$$ This depicts the fact that every unit increasing in the net irrigated area will
increase .04 unit in the area of cultivation of potato crop area. Intercept ($a$) shows the
minimum average percentage of potato crop cultivated area. In this case it is 7.56, which
means percentage of potato crop cultivated area per unit of percentage of net irrigated area is
7.56 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of net irrigated area have a
larger amount of potato crop area.

The co-efficient of determination ($R^2$) is 0.06 indicating that 6% of the total variation
in $y$ is being explained by $x$.

**Percentage of net irrigated area and mustard seed cultivation of the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($x$) and
percentage of area under mustard seed crop of the villages ($y$). Here the first variable is
independent variable because the mustard seed crop cultivation is largely determined by the
percentage of net irrigated area.

The co-efficient ($b$) is .06, where the equation is
\[ y = 10.39 + 0.06x \]. This depicts the fact that every unit increase in the net irrigated area will increase .06 unit in the area of cultivation under mustard seed crop. Intercept \((a)\) shows the minimum average percentage of mustard seed crop cultivated area. In this case it is 10.39, which means percentage of mustard seed crop cultivated area per unit of percentage of net irrigated area is 10.39 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of net irrigated area generate a larger amount of potato crop area.

The co-efficient of determination \(R^2\) is 0.05 indicating that 5\% of the total variation in \(y\) is being explained by \(x\).

**Percentage of net irrigated area and the vegetables cultivation of the villages**

The regression co-efficient \((b)\) is computed between percentage of net irrigated area \((x)\) and percentage of area under vegetable crop of the villages \((y)\). Here the first variable is independent variable because the percentage of net irrigated area influences the cultivation of vegetable crops.

The co-efficient \((b)\) is .03, where the equation is

\[ y = 3.59 + 0.03x \]. This depicts the fact that per unit increase in the net irrigated area causes .03 unit increase in the area of cultivation under vegetable crop. Intercept \((a)\) shows the minimum average percentage of area under vegetable crop. In this case it is 3.59, which means percentage of vegetable crop cultivated area per unit of percentage of net irrigated area is 3.59 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of net irrigated area have a larger area under vegetable crop.

The co-efficient of determination \(R^2\) is 0.3 indicating that 3\% of the total variation in \(y\) is being explained by \(x\).

**Percentage of net irrigated area and the pulses cultivation of the villages**

The regression co-efficient \((b)\) is computed between percentage of net irrigated area \((x)\) and percentage of area under pulses crop of the villages \((y)\). Here the first variable is independent
variable because the percentage of net irrigated area influences the cultivation of pulses crops.

The co-efficient ($b$) is .002, where the equation is

\[ y = 4.44 + .002x \]

This depicts the fact that per unit increase in the net irrigated area causes .002 unit increase in the area under cultivation pulses crop. Intercept ($a$) shows the minimum average percentage of area under pulses crop. In this case it is 4.44, which means percentage of pulses crop cultivated area per unit of percentage of net irrigated area is 4.44 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of net irrigated area have a larger area under pulses crop.

The co-efficient of determination ($R^2$) is 0.0006 indicating that .06% of the total variation in $y$ is being explained by $x$. 
Table: 87 Regression analysis between sources of irrigation and different parameters of physical factors

<table>
<thead>
<tr>
<th>Y VARIABLE</th>
<th>X VARIABLE</th>
<th>SLOPE (b)</th>
<th>INTERCEPT (a)</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of net irrigated area</td>
<td>High contour</td>
<td>.09</td>
<td>34.33</td>
<td>.01</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Low contour</td>
<td>.31</td>
<td>5.60</td>
<td>.05</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Relative relief</td>
<td>1.31</td>
<td>64.82</td>
<td>.08</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Dissection index</td>
<td>280.92</td>
<td>71.70</td>
<td>.12</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>High slope</td>
<td>.58</td>
<td>42.31</td>
<td>.01</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Low slope</td>
<td>.60</td>
<td>47.00</td>
<td>.0004</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Average slope</td>
<td>1.37</td>
<td>44.17</td>
<td>.0036</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Water table depth</td>
<td>.25</td>
<td>45.88</td>
<td>.0001</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Moram soil</td>
<td>.96</td>
<td>52.68</td>
<td>.02</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Loam soil</td>
<td>5.56</td>
<td>43.54</td>
<td>.003</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Clay soil</td>
<td>36.03</td>
<td>13.92</td>
<td>.03</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Laterite soil</td>
<td>10.82</td>
<td>46.38</td>
<td>.02</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Red soil</td>
<td>7.16</td>
<td>44.61</td>
<td>.01</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Rajmahal soil</td>
<td>33.27</td>
<td>51.00</td>
<td>.07</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Gondwana</td>
<td>5.97</td>
<td>49.63</td>
<td>.01</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Sandy loam soil</td>
<td>5.97</td>
<td>50.63</td>
<td>.004</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Loam soil</td>
<td>8.26</td>
<td>44.90</td>
<td>.01</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>Total area</td>
<td>.02</td>
<td>53.00</td>
<td>.02</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>% forest covered area</td>
<td>1.10</td>
<td>46.09</td>
<td>.05</td>
</tr>
</tbody>
</table>

Source: computed by the researcher

Table: 88 Regression analysis between sources of irrigation and different parameters land use and cropping pattern

<table>
<thead>
<tr>
<th>Y VARIABLE</th>
<th>X VARIABLE</th>
<th>SLOPE (b)</th>
<th>INTERCEPT (a)</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net sown area</td>
<td>net irrigated area</td>
<td>.01</td>
<td>64.84</td>
<td>.0006</td>
</tr>
<tr>
<td>net irrigated area</td>
<td>Waste land</td>
<td>9.95</td>
<td>53.07</td>
<td>.08</td>
</tr>
<tr>
<td>net irrigated area</td>
<td>Area not available for cultivation</td>
<td>.25</td>
<td>45.51</td>
<td>.01</td>
</tr>
<tr>
<td>net irrigated area</td>
<td>net irrigated area</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Unirrigated area</td>
<td>net irrigated area</td>
<td>.46</td>
<td>60.73</td>
<td>.23</td>
</tr>
<tr>
<td>net irrigated area</td>
<td>% of canal irrigated area</td>
<td>.43</td>
<td>89.41</td>
<td>.01</td>
</tr>
<tr>
<td>net irrigated area</td>
<td>% of tank irrigated area</td>
<td>.31</td>
<td>54.53</td>
<td>.07</td>
</tr>
<tr>
<td>Aus paddy</td>
<td>net irrigated area</td>
<td>.009</td>
<td>3.65</td>
<td>.04</td>
</tr>
<tr>
<td>Aman paddy</td>
<td>net irrigated area</td>
<td>.01</td>
<td>75.63</td>
<td>.0009</td>
</tr>
<tr>
<td>Boro paddy</td>
<td>net irrigated area</td>
<td>.09</td>
<td>5.55</td>
<td>.08</td>
</tr>
<tr>
<td>wheat</td>
<td>net irrigated area</td>
<td>.003</td>
<td>3.75</td>
<td>.002</td>
</tr>
<tr>
<td>potato</td>
<td>net irrigated area</td>
<td>.04</td>
<td>7.56</td>
<td>.06</td>
</tr>
<tr>
<td>mustard</td>
<td>net irrigated area</td>
<td>.06</td>
<td>10.39</td>
<td>.05</td>
</tr>
<tr>
<td>Vegetables</td>
<td>net irrigated area</td>
<td>.03</td>
<td>3.59</td>
<td>.3</td>
</tr>
<tr>
<td>pulses</td>
<td>net irrigated area</td>
<td>.002</td>
<td>4.44</td>
<td>.0006</td>
</tr>
</tbody>
</table>

Source: computed by the researcher
**Percentage of net irrigated area and percentage of canal irrigated area of the villages**

The regression co-efficient \( b \) is computed between percentage of net irrigated area \( (y) \) and percentage of canal irrigated area \( (x) \) of the villages. Here the second variable is considered as independent variable because canal irrigation is the controller of net irrigated area of the villages.

Here the co-efficient \( (b) \) is 0.43, where the equation is

\[
y = 89.41 + 0.43x
\]

This depicts the fact that per unit increase in the percentage of canal irrigated area will increase 0.43 unit in the percentage of net irrigated area. Intercept \( (a) \) shows the minimum average percentage of net irrigated area. In this case it is 89.41, which means percentage of net irrigated area per unit of percentage of canal irrigated area is 89.41 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of canal irrigation area generate a larger amount of net irrigated area.

The co-efficient of determination \( (R^2) \) is 0.14 indicating that 14\% of the total variation in \( y \) is being explained by \( x \).

**Percentage of non-irrigated area and percentage of canal irrigated area of the villages**

The regression co-efficient \( b \) is computed between percentage of non-irrigated area \( (y) \) and percentage of canal irrigated area \( (x) \) of the villages. Here the second variable is considered as independent variable because...

Here the co-efficient \( (b) \) is 0.46, where the equation is

\[
y = 79.22 + 0.46x
\]

This depicts the fact that per unit increase in the percentage of canal irrigated area will increase 0.46 unit in the percentage of non-irrigated area. Intercept \( (a) \) shows the minimum average percentage of non-irrigated area. In this case it is 79.22, which means percentage of non-irrigated area per unit of percentage of canal irrigated area is 79.22 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of canal irrigation area generate a larger amount of non-irrigated area.
The co-efficient of determination ($R^2$) is 0.02 indicating that 2% of the total variation in $y$ is being explained by $x$.

**Percentage of canal irrigated area and percentage of tank irrigated area of the villages**

The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($y$) and percentage of tank irrigated area of the villages ($x$). Here the second variable is considered as independent variable because percentage of tank irrigated area influences on the percentage of canal irrigated area.

Here the co-efficient ($b$) is 0.78, where the equation is

$$y = 97.26 + 0.78x.$$  

This depicts the fact that per unit increase in the percentage of tank irrigated area will increase 0.78 unit in the percentage of canal irrigated area. Intercept ($a$) shows the minimum average percentage of canal irrigated area. In this case it is 97.26, which means percentage of canal irrigated area per unit of percentage of tank irrigated area is 97.26 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of tank irrigation area generate a larger amount of canal irrigated area.

The co-efficient of determination ($R^2$) is 0.78 indicating that 78% of the total variation in $y$ is being explained by $x$.

**Percentage of canal irrigated area and highest contour of the villages**

The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($y$) and highest contour of the villages ($x$). Here the second variable is independent variable because the contour height is a great contributing factor of net irrigated area.

The co-efficient ($b$) is .07, where the equation is

$$y = 100.14 + 0.07x.$$  

This depicts the fact that per unit increase in the contour height will increase .07 unit increase in the percentage of canal irrigated area. Intercept ($a$) shows the minimum average percentage of canal irrigated area. In this case it is 100.14, which means percentage of canal irrigated area per unit of contour height is 100.14 and the regression co-efficient shows variation above this constant figure.
It implies that the villages which have larger proportion of contour height generate a larger percentage of canal irrigated area.

The co-efficient of determination ($R^2$) is 0.03 indicating that 3% of the total variation in $y$ is being explained by $x$.

**Percentage of canal irrigated area and lowest contour of the villages**

The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($y$) and lowest contour of the villages ($x$). Here the second variable is independent variable because the contour height determines the net irrigated area.

The co-efficient ($b$) is .11, where the equation is

$$y = 104.56 + .11x.$$  This depicts the fact that per unit increase in the contour height will increase .11 unit increase in the percentage of canal irrigated area. Intercept ($a$) shows the minimum average percentage of canal irrigated area. In this case it is 104.56, which means percentage of canal irrigated area per unit of contour height is 104.56 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of lower contour height generate a larger amount of canal irrigated area.

The co-efficient of determination ($R^2$) is 0.06 indicating that 6% of the total variation in $y$ is being explained by $x$.

**Percentage of canal irrigated area and relative relief of the villages**

The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($y$) and relative relief (difference between highest and lowest contour) of the villages ($x$). Here the second variable is considered as independent variable because the relative relief affects the net irrigated area.

The co-efficient ($b$) is .43, where the equation is

$$y = 95.11 + .43x.$$  This depicts the fact that per unit increase in the relative relief will increase .43 unit increase in the percentage of net irrigated area. Intercept ($a$) shows the minimum average percentage of canal irrigated area. In this case it is 95.11, which means percentage of canal irrigated area per unit of relative relief is 95.11 and the regression co-efficient shows variation above this constant figure.
It depicts that the villages which have larger proportion of relative relief generate a larger amount of canal irrigated area.

The co-efficient of determination ($R^2$) is 0.08 indicating that 8% of the total variation in $y$ is being explained by $x$.

**Percentage of canal irrigated area and dissection index of the villages**

The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($y$) and dissection index of the villages ($x$). Here the second variable is considered as independent variable because the dissection index influences the net irrigated area.

The co-efficient ($b$) is 53.78, where the equation is $y = 94.13 + 53.78x$. This depicts the fact that per unit increase in the dissection index will increase 53.78 unit increase in the percentage of canal irrigated area. Intercept ($a$) shows the minimum average percentage of canal irrigated area. In this case it is 94.13, which means percentage of canal irrigated area per unit of dissection index is 94.13 and the regression co-efficient shows variation above this constant figure.

It depicts that the villages which have larger proportion of dissection index generate a larger percentage of canal irrigated area.

The co-efficient of determination ($R^2$) is 0.04 indicating that 4% of the total variation in $y$ is being explained by $x$.

**Line of best fit between canal irrigated area and dissection index of the villages**

![Graph](image)

Fig. 80

**Percentage of canal irrigated area and high slope of the villages**

The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($y$) and high slope of the villages ($x$). Here the second variable is considered as independent variable because the slope determines the canal irrigation of the villages.

The co-efficient ($b$) is 2.86, where the equation is
\( y = 100.07 + 2.86x \). This depicts the fact that per unit increase in the high slope will increase 2.86 units in the percentage of canal irrigated area. Intercept \((a)\) shows the minimum average percentage of canal irrigated area. In this case it is 100.07, which means percentage of canal irrigated area per unit of high slope area is 100.07 and the regression co-efficient shows variation above this constant figure.

It depicts that the villages which have larger proportion of high slope generate a larger amount of percentage of canal irrigated area.

The co-efficient of determination \((R^2)\) is 0.25 indicating that 25\% of the total variation in \(y\) is being explained by \(x\).

**Percentage of canal irrigated area and lowest slope of the villages**

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((y)\) and lowest slope of the villages \((x)\). Here the second variable is considered as independent variable because the slope is a controlling factor of the canal irrigated area.

The co-efficient \((b)\) is 4.34, where the equation is
\[
 y = 104.56 + 4.34x .
\]
This depicts the fact that per unit increase in the low slope will increase 4.34 units in the percentage of canal irrigated area. Intercept \((a)\) shows the minimum average percentage of canal irrigated area. In this case it is 104.56, which means percentage of canal irrigated area per unit of lowest slope area is 104.56 and the regression co-efficient shows variation above this constant figure.

It depicts that the villages which have larger proportion of lowest slope generate a larger amount of percentage of canal irrigated area.

The co-efficient of determination \((R^2)\) is 0.16 indicating that 16\% of the total variation in \(y\) is being explained by \(x\).

**Percentage of canal irrigated area and average slope of the villages**

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((y)\) and average slope of the villages \((x)\). Here the second variable is considered as independent variable because the average slope is a controlling factor of the canal irrigated area.

The co-efficient \((b)\) is 3.97, where the equation is
\[
 y = 101.19 + 3.97x .
\]
This depicts the fact that per unit increase in the average slope will increase 3.97 units in the percentage of canal irrigated area. Intercept \((a)\) shows the minimum average percentage of canal irrigated area. In this case it is 101.19, which means percentage
of canal irrigated area per unit of average slope is 101.19 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of average slope generate a larger percentage of canal irrigated area.

The co-efficient of determination ($R^2$) is 0.25 indicating that 25% of the total variation in y is being explained by x.

**Line of best fit between canal irrigated area and average slope of the villages**

![Graph showing line of best fit between canal irrigated area and average slope.](image)

**Percentage of canal irrigated area and depth of water table of the villages**

The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($y$) and depth of water table of the villages ($x$). Here the second variable is considered as independent variable because the depth of water table determines the percentage of the canal irrigated area.

The co-efficient ($b$) is .54, where the equation is $y = 84.39 + .54x$. This depicts the fact that per unit increase in the depth of water table will increase .54 unit in the percentage of canal irrigated area. Intercept ($a$) shows the minimum average percentage of canal irrigated area. In this case it is 84.39, which means percentage of canal irrigated area per unit of depth of water table is 84.39 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger depth of water table at shallow depth generate a larger percentage of canal irrigated area.

The co-efficient of determination ($R^2$) is 0.005 indicating that .5% of the total variation in y is being explained by x.
The regression co-efficient \( (b) \) is computed between percentage of canal irrigated area \((y)\) and moram soil area of the villages \((x)\). Here the second variable is considered as independent variable because the distribution of soils influences the percentage of the canal irrigated area.

The co-efficient \((b)\) is 2.21, where the equation is \( y = 88.72 + 2.21x \). This depicts the fact that per unit increase in the moram soil area will increase 2.21 units in the percentage of canal irrigated area. Intercept \((a)\) shows the minimum average percentage of canal irrigated area. In this case it is 88.72, which means percentage of canal irrigated area per unit of moram soil area is 88.72 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger moram soil area generate a larger percentage of canal irrigated area.

The co-efficient of determination \((R^2)\) is 0.01 indicating that .1% of the total variation in \(y\) is being explained by \(x\).

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((y)\) and loam soil area of the villages \((x)\). Here the second variable is considered as independent variable because the distribution of soils affects on the percentage of the canal irrigated area.
The co-efficient \( (b) \) is 8.66, where the equation is
\[
y = 97.46 + 8.66x.
\]
This depicts the fact that per unit increase in the loam soil area will increase 8.66 units in the percentage of canal irrigated area. Intercept \((a)\) shows the minimum average percentage of canal irrigated area. In this case it is 97.46, which means percentage of canal irrigated area per unit of loam soil area is 97.46 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger loam soil area generate a larger percentage of canal irrigated area.

The co-efficient of determination \((R^2)\) is 0.06 indicating that .6% of the total variation in \(y\) is being explained by \(x\).

**Line of best fit between canal irrigated area and loam soil of the villages**

![Graph showing line of best fit](image)

**Fig. 84**

**Percentage of canal irrigated area and laterite soil of the villages**

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((y)\) and percentage of laterite soil area of the villages \((x)\). Here the second variable is considered as independent variable because the distribution of soils affects on the percentage of the canal irrigated area.

The co-efficient \((b)\) is 1.13, where the equation is
\[
y = 89.51 + 1.13x.
\]
This depicts the fact that per unit increase in the laterite soil area will increase 1.13 units in the percentage of canal irrigated area. Intercept \((a)\) shows the minimum
average percentage of canal irrigated area. In this case it is 89.51, which means percentage of canal irrigated area per unit of larelite soil area is 89.51 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger laterite soil area generate a larger percentage of canal irrigated area.

The co-efficient of determination ($R^2$) is 0.002 indicating that .2% of the total variation in $y$ is being explained by $x$.

**Line of best fit between canal irrigated area and laterite soil of the villages**

![Fig. 85](image)

**Percentage of canal irrigated area and red soil of the villages**

The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($y$) and percentage of red soil area of the villages ($x$). Here the second variable is considered as independent variable because the type of soils influences on the percentage of the canal irrigated area.

The co-efficient ($b$) is 1.29, where the equation is $y = 90.37 +1.29x$. This depicts the fact that per unit increase in the red soil area will increase 1.29 units in the percentage of canal irrigated area. Intercept ($a$) shows the minimum average percentage of canal irrigated area. In this case it is 90.37, which means percentage of canal irrigated area per unit of red soil area is 90.37 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger red soil area generate a larger percentage of canal irrigated area.

The co-efficient of determination ($R^2$) is 0.003 indicating that .3% of the total variation in $y$ is being explained by $x$. 
The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((y)\) and percentage of Rajmahal flat soil of the villages \((x)\). Here the second variable is considered as independent variable because the soil character influences on the canal irrigated area.

Here the co-efficient \((b)\) is 9.05, where the equation is \(y = 90.13 + 9.05x\). This depicts the fact that per unit increase in the Rajmahal flat soil will increase 9.05 units in the percentage of canal irrigated area. Intercept \((a)\) shows the minimum average percentage of canal irrigated area. In this case it is 90.51, which means percentage of canal irrigated area per unit of Rajmahal flat soil is 90.51 and the regression co-efficient shows variation above this constant figure.

It depicts that the villages which have larger proportion of Rajmahal flat soil area generate a larger percentage of canal irrigated area.

The co-efficient of determination \((R^2)\) is 0.05 indicating that 5% of the total variation in \(y\) is being explained by \(x\).

**Line of best fit between canal irrigated area and Rajmahal soil of the villages**

Fig. 86

**Percentage of canal irrigated area and Rajmahal flat soil of the villages**

![Graph showing the line of best fit between canal irrigated area and red soil of the villages.](image)

Fig. 87
**Percentage of canal irrigated area and Gondwana soil of the villages**

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((y)\) and percentage of Gondwana soil of the villages \((x)\). Here the second variable is considered as independent variable because the type of soil affects on the canal irrigated area.

Here the co-efficient \((b)\) is 4.73, where the equation is

\[ y = 88.71 + 4.73x. \]

This depicts the fact that per unit increase in the Gondwana soil will increase 4.73 units in the percentage of canal irrigated area. Intercept \((a)\) shows the minimum average percentage of canal irrigated area. In this case it is 88.71, which means percentage of canal irrigated area per unit of Gondwana soil is 88.71 and the regression co-efficient shows variation above this constant figure.

It depicts that the villages which have larger proportion of Gondwana soil area generate a larger percentage of canal irrigated area.

The co-efficient of determination \((R^2)\) is 0.03 indicating that 3% of the total variation in \(y\) is being explained by \(x\).

**Percentage of canal irrigated area and sandy loam soil of the villages**

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((y)\) and percentage of sandy loam soil area of the villages \((x)\). Here the second variable is considered as independent variable because the type of soil influence on the percentage of canal irrigated area.

Here the co-efficient \((b)\) is 6.71, where the equation is

\[ y = 93.30 + 6.71x. \]

This depicts the fact that per unit increase in the sandy loam soil will increase 6.71 units in the percentage of canal irrigated area. Intercept \((a)\) shows the minimum average percentage of canal irrigated area. In this case it is 93.30, which means percentage of canal irrigated area per unit of sandy loam soil is 93.30 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of sandy loam soil area generate a larger percentage of canal irrigated area.

The co-efficient of determination \((R^2)\) is 0.09 indicating that 9% of the total variation in \(y\) is being explained by \(x\).
**Percentage of canal irrigated area and loam soil of the villages**
The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($y$) and percentage of loam soil area of the villages ($x$). Here the second variable is considered as independent variable because the type of soil an indicator of canal irrigated area.

Here the co-efficient ($b$) is 7.06, where the equation is $y = 86.62 + 7.06x$. This depicts the fact that per unit increase in the loam soil will increase 7.06 units in the percentage of canal irrigated area. Intercept ($a$) shows the minimum average percentage of canal irrigated area. In this case it is 86.62, which means percentage of canal irrigated area per unit of loam soil is 86.62 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of sandy loam soil area generate a larger percentage of canal irrigated area.

The co-efficient of determination ($R^2$) is 0.1 indicating that 1% of the total variation in $y$ is being explained by $x$.

**Percentage of canal irrigated area and total area of the villages**
The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($y$) and percentage of total area of the villages ($x$). Here the second variable is considered as independent variable because...

Here the co-efficient ($b$) is .0006, where the equation is $y = 89.84 + .0006x$. This depicts the fact that per unit increase in the total area will increase .0006 units in the percentage of canal irrigated area. Intercept ($a$) shows the minimum average percentage of canal irrigated area. In this case it is 89.84, which means percentage of canal irrigated area per unit of total area is 89.84 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of total area generate a larger percentage of canal irrigated area.

The co-efficient of determination ($R^2$) is 0.0001 indicating that .01% of the total variation in $y$ is being explained by $x$.

**Percentage of canal irrigated area and percentage of forest area of the villages**
The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($y$) and percentage of forest area of the villages ($x$). Here the second variable is considered as independent variable because percentage of forest covered area affects on the percentage of net irrigated area.
Here the co-efficient \((b)\) is .35, where the equation is
\[ y = 90.82 + .0006x. \] This depicts the fact that per unit increase in the percentage of forest area will increase .0006 units in the percentage of canal irrigated area. Intercept \((a)\) shows the minimum average percentage of canal irrigated area. In this case it is 90.82, which means percentage of canal irrigated area per unit of percentage of forest area is 90.82 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have greater percentage of forest covered area generate a larger percentage of canal irrigated area.

The co-efficient of determination \((R^2)\) is 0.07 indicating that 7% of the total variation in \(y\) is being explained by \(x\).

**Percentage of canal irrigated area and percentage of net sown area of the villages**

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((x)\) and percentage of net sown area of the villages \((y)\). Here the first variable is considered as independent variable because percentage of canal irrigated area determines the percentage of net sown area of the villages.

Here the co-efficient \((b)\) is .38, where the equation is
\[ y = 29.94 + .38x. \] This depicts the fact that per unit increase in the percentage of canal irrigated area will increase .38 unit in the percentage of net sown area. Intercept \((a)\) shows the minimum average percentage of net sown area. In this case it is 29.94, which means percentage of net sown area per unit of percentage of canal irrigated area is 29.94 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have greater percentage of canal irrigated area generate a larger percentage of net sown area.

The co-efficient of determination \((R^2)\) is 0.05 indicating that 5% of the total variation in \(y\) is being explained by \(x\).

**Percentage of canal irrigated area and percentage of waste land of the villages**

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((x)\) and percentage of waste land of the villages \((y)\). Here the first variable is considered as independent variable because percentage of canal irrigated area influences on the percentage of waste land of the villages. Because increase in canal irrigation coverts waste lands to cultivable lands.

Here the co-efficient \((b)\) is -0.18, where the equation is
\[ y = 16.84 + (-0.18) \cdot x \] This depicts the fact that per unit increase in the percentage of canal irrigated area will decrease .18 unit in the percentage of waste land area. Intercept \((a)\) shows the minimum average percentage of waste land area. In this case it is 16.84, which means percentage of waste land area per unit of percentage of canal irrigated area is 16.84 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have greater percentage of canal irrigation area generate a smaller amount of waste land area.

The co-efficient of determination \((R^2)\) is 0.29 indicating that 29\% of the total variation in \(y\) is being explained by \(x\).

**Percentage of canal irrigated area and percentage of area not available for cultivation of the villages**

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((x)\) and percentage of area not available for cultivation of the villages \((y)\). Here the first variable is considered as independent variable because when percentage of canal irrigated area increases percentage of area not available for cultivation decreases.

Here the co-efficient \((b)\) is -0.41, where the equation is

\[ y = 50.62 + (-0.41) \cdot x \] This depicts the fact that per unit increase in the percentage of canal irrigated area results in .41 unit decrease in the percentage of area not available for cultivation. Intercept \((a)\) shows the minimum average percentage of area not available for cultivation. In this case it is 50.62, which means percentage of unavailable area per unit of percentage of canal irrigated area is 50.62 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have greater percentage of canal irrigation area generate a smaller amount of area not available for cultivation.

The co-efficient of determination \((R^2)\) is 0.07 indicating that 7\% of the total variation in \(y\) is being explained by \(x\).

**Percentage of canal irrigated area and percentage of aus paddy area of the villages**

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((x)\) and percentage of area aus paddy of the villages \((y)\). Here the first variable is considered as independent variable because percentage canal irrigated area influences on the cultivation of aus paddy of the villages.
Here the co-efficient \((b)\) is 0.05, where the equation is
\[ y = 3.65 + 0.05x. \]
This depicts the fact that per unit increase in the percentage of canal irrigated area will increase 0.05 unit in the percentage of \(aus\) cropped area. Intercept \((a)\) shows the minimum average percentage of \(aus\) cropped area. In this case it is 3.65, which means percentage of \(aus\) cropped area per unit of percentage of canal irrigated area is 3.65 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of canal irrigated area generate a larger amount of \(aus\) cropped area.

The co-efficient of determination \((R^2)\) is 0.08 which means that 8% of the total variation in \(y\) is being explained by \(x\).

**Percentage of canal irrigated area and percentage of aman paddy area of the villages**

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((x)\) and percentage of area aman paddy of the villages \((y)\). Here the first variable is considered as independent variable because percentage of canal irrigated area determines the cultivation of aman paddy of the villages.

Here the co-efficient \((b)\) is 0.09, where the equation is
\[ y = 68.03 + 0.09x. \]
This depicts the fact that per unit increase in the percentage of canal irrigated area will increase 0.09 unit in the percentage of aman paddy area. Intercept \((a)\) shows the minimum average percentage of aman paddy area. In this case it is 68.03, which means percentage of aman paddy area per unit of percentage of canal irrigated area is 68.03 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of canal irrigated area generate a larger amount of aman crop area.

The co-efficient of determination \((R^2)\) is 0.005 which means that .5% of the total variation in \(y\) is being explained by \(x\).

**Percentage of canal irrigated area and percentage of boro paddy crop area of the villages**

The regression co-efficient \((b)\) is computed between percentage of canal irrigated area \((x)\) and percentage of area boro paddy cultivated area of the villages \((y)\). Here the first variable is considered as independent variable because percentage of canal irrigated area influences largely on the boro paddy cultivation of the villages.

Here the co-efficient \((b)\) is 0.06, where the equation is
\( y = 5.36 + 0.06x \). This depicts the fact that per unit increase in the percentage of canal irrigated area will increase 0.06 unit in the percentage of boro paddy cultivated area. Intercept \( a \) shows the minimum average percentage of boro paddy area. In this case it is 5.36, which means percentage of boro paddy area per unit of percentage of canal irrigated area is 5.36 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of canal irrigated area generate a large amount of boro paddy crop area.

The co-efficient of determination \( (R^2) \) is 0.004 which means that .4% of the total variation in \( y \) is being explained by \( x \).

**Percentage of canal irrigated area and percentage of wheat crop area of the villages**

The regression co-efficient \( (b) \) is computed between percentage of canal irrigated area \( (x) \) and percentage of wheat crop area of the villages \( (y) \). Here the former variable is considered as independent variable because canal irrigation influences largely on the cultivation of wheat crop of the villages.

Here the co-efficient \( (b) \) is 0.01, where the equation is
\[ y = 2.67 + 0.01x. \] This depicts the fact that per unit increase in the canal irrigation will increase 0.01 unit in the percentage of wheat crop cultivated area. Intercept \( a \) shows the minimum average percentage of wheat crop cultivated area. In this case it is 2.67, which means percentage of wheat crop area per unit of percentage of canal irrigated area is 2.67 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of canal irrigated area generate a large more amount of wheat crop area.

The co-efficient of determination \( (R^2) \) is 0.004 which means that .4% of the total variation in \( y \) is being explained by \( x \).

**Percentage of canal irrigated area and percentage of potato crop area of the villages**

The regression co-efficient \( (b) \) is computed between percentage of canal irrigated area \( (x) \) and percentage of potato crop cultivated area of the villages \( (y) \). Here canal irrigated area is considered as independent variable because canal irrigation influences largely on the cultivation of potato crop cultivation of the villages.

Here the co-efficient \( (b) \) is 0.02, where the equation is
\[ y = 3.74 + 0.02x. \] This depicts the fact that per unit increase in the canal irrigation will increase 0.02 unit in the percentage of potato crop cultivated area. Intercept \( a \) shows the
minimum average percentage of potato crop cultivated area. In this case it is 3.74, which means percentage of potato crop area per unit of percentage of canal irrigated area is 3.74 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of canal irrigated area generate a large more amount of potato crop area.

The co-efficient of determination ($R^2$) is 0.0008 which means that .08% of the total variation in $y$ is being explained by $x$.

**Percentage of canal irrigated area and percentage of mustard seed crop area of the villages**

The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($x$) and percentage of mustard seed crop cultivated area of the villages ($y$). Here canal irrigated area is considered as independent variable because canal irrigation influences largely on the cultivation of mustard seed crop of the villages.

Here the co-efficient ($b$) is 0.02, where the equation is $y = -1.25 + 0.08x$. This depicts the fact that per unit increase in the canal irrigation will increase 0.08 unit in the percentage of mustard seed crop cultivated area. Intercept ($a$) shows the minimum average percentage of mustard seed crop cultivated area. In this case it is -1.25, which means percentage of mustard seed crop area per unit of percentage of canal irrigated area is 1.25 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of canal irrigated area generate a large more amount of mustard seed crop area.

The co-efficient of determination ($R^2$) is 0.04 which means that 4% of the total variation in $y$ is being explained by $x$.

**Percentage of canal irrigated area and percentage of vegetables crop area of the villages**

The regression co-efficient ($b$) is computed between percentage of canal irrigated area ($x$) and percentage of vegetable cultivated area of the villages ($y$). Here canal irrigated area is considered as independent variable because canal irrigation affects largely the vegetable cultivation of the villages.

Here the co-efficient ($b$) is 0.07, where the equation is $y = 8.09 + 0.07x$. This depicts the fact that per unit increase in the canal irrigation will increase 0.07 unit in the percentage of vegetable cultivated area. Intercept ($a$) shows the
minimum average percentage of vegetable cultivated area. In this case it is 8.09, which means percentage of vegetable crop cultivated area per unit of percentage of canal irrigated area is 8.09 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of canal irrigated area generate a large more amount of vegetable crop area.

The co-efficient of determination ($R^2$) is 0.19 which means that 19% of the total variation in $y$ is being explained by $x$.

**Percentage of canal irrigated area and the pulses cultivation of the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($x$) and percentage of pulses crop cultivated villages ($y$). Here the first variable is independent variable because canal irrigation affects the cultivation of pulses crops.

The co-efficient ($b$) is .08, where the equation is

$$y = -3.03 + .08x.$$  

This depicts the fact that per unit increase in the canal irrigation area will increase .08 unit in the pulses crop cultivated area. Intercept ($a$) shows the minimum average percentage of pulses crop cultivated area. In this case it is -3.03, which means percentage of pulses crop cultivated area per unit of percentage of canal irrigated area is -3.03 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of canal irrigated area generate a large amount of pulses crop area.

The coefficient of determination ($R^2$) is 0.12 indicating that 12% of the total variation in $y$ is being explained by $x$. 
Table: 89 Regression analysis between sources of irrigation and different parameters of physical factors, land use and cropping pattern

<table>
<thead>
<tr>
<th>y VARIABLE</th>
<th>x VARIABLE</th>
<th>SLOPE (b)</th>
<th>INTERCEPT (a)</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net irrigated area</td>
<td>Canal</td>
<td>.43</td>
<td>89.41</td>
<td>.14</td>
</tr>
<tr>
<td>Unirrigated area</td>
<td>Canal</td>
<td>.46</td>
<td>79.22</td>
<td>.02</td>
</tr>
<tr>
<td>Canal</td>
<td>Canal</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Canal</td>
<td>Tank</td>
<td>.78</td>
<td>97.26</td>
<td>.78</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>High contour</td>
<td>.07</td>
<td>100.14</td>
<td>.03</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Low contour</td>
<td>.11</td>
<td>104.56</td>
<td>.06</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Relative relief</td>
<td>.43</td>
<td>95.11</td>
<td>.08</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Dissection index</td>
<td>53.78</td>
<td>94.13</td>
<td>.04</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>High slope</td>
<td>2.86</td>
<td>100.07</td>
<td>.25</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Low slope</td>
<td>4.34</td>
<td>104.56</td>
<td>.16</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Average slope</td>
<td>3.97</td>
<td>101.19</td>
<td>.25</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Water table depth</td>
<td>.54</td>
<td>84.39</td>
<td>.005</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Moram</td>
<td>2.21</td>
<td>88.72</td>
<td>.01</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Loam</td>
<td>8.66</td>
<td>97.46</td>
<td>.06</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Clay</td>
<td>00</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Laterite</td>
<td>1.13</td>
<td>89.51</td>
<td>.002</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Red</td>
<td>1.29</td>
<td>90.37</td>
<td>.003</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Rajmahal</td>
<td>9.05</td>
<td>90.51</td>
<td>.05</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Gondwana</td>
<td>4.73</td>
<td>88.71</td>
<td>.03</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Sandy loam</td>
<td>6.71</td>
<td>93.30</td>
<td>.09</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Loam</td>
<td>7.06</td>
<td>86.62</td>
<td>.1</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>Total area</td>
<td>.0006</td>
<td>89.84</td>
<td>.0001</td>
</tr>
<tr>
<td>% of canal irrigated area</td>
<td>% forest</td>
<td>.35</td>
<td>90.82</td>
<td>.07</td>
</tr>
<tr>
<td>Net sown area</td>
<td>Canal</td>
<td>.38</td>
<td>29.94</td>
<td>.05</td>
</tr>
<tr>
<td>Waste land</td>
<td>Canal</td>
<td>-.18</td>
<td>16.84</td>
<td>.29</td>
</tr>
<tr>
<td>Area not available for cultivation</td>
<td>canal</td>
<td>-.41</td>
<td>50.62</td>
<td>.07</td>
</tr>
<tr>
<td>Aus</td>
<td>Canal</td>
<td>.05</td>
<td>3.65</td>
<td>.08</td>
</tr>
<tr>
<td>Aman</td>
<td>Canal</td>
<td>.09</td>
<td>68.03</td>
<td>.005</td>
</tr>
<tr>
<td>Boro</td>
<td>Canal</td>
<td>.06</td>
<td>5.36</td>
<td>.003</td>
</tr>
<tr>
<td>wheat</td>
<td>Canal</td>
<td>.01</td>
<td>2.67</td>
<td>.004</td>
</tr>
<tr>
<td>potato</td>
<td>Canal</td>
<td>.02</td>
<td>3.74</td>
<td>.0008</td>
</tr>
<tr>
<td>mustard</td>
<td>Canal</td>
<td>.08</td>
<td>-1.25</td>
<td>.04</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Canal</td>
<td>.07</td>
<td>8.09</td>
<td>.19</td>
</tr>
<tr>
<td>pulses</td>
<td>Canal</td>
<td>.08</td>
<td>-3.03</td>
<td>.12</td>
</tr>
</tbody>
</table>

Source: computed by the researcher

Percentage of tank irrigated area and canal irrigated area of the villages

The regression co-efficient \( b \) is computed between percentage of tank irrigated area \( y \) and percentage of canal irrigated area of the villages \( x \). Here the second variable is regarded as independent variable because the canal irrigation influences the tank irrigation.
The co-efficient ($b$) is .83, where the equation is $y = 83.35 + .83x$. This depicts the fact that every unit increasing in the canal irrigated area will increase .83 unit in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. In this case it is 83.35, which means percentage of tank irrigated area per unit of canal irrigated area is 83.35 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of canal irrigation have large amount of percentage of tank irrigated area.

The co-efficient of determination ($R^2$) is 0.78 indicating that 78% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and Percentage of net irrigated area of the villages**

The regression co-efficient ($b$) is computed between percentage of net irrigated area ($y$) and percentage of tank irrigated area of the villages ($x$). Here the second variable is regarded as independent variable because increase in tank irrigated area denotes the increasing in the net irrigated area.

The co-efficient ($b$) is .31, where the equation is $y = 54.43 + .31x$. This depicts the fact that every unit increasing in the tank irrigated area will increase .31 unit in the percentage of net irrigated area. Intercept ($a$) shows the minimum average percentage of net irrigated area. In this case it is 54.43, which means percentage of net irrigated area per unit of tank irrigated area is 54.43 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of tank irrigation facility generate large amount of percentage of net irrigated area.

The co-efficient of determination ($R^2$) is 0.07 indicating that 7% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and highest contour in the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and highest contour of the villages ($x$). Here the second variable is considered as independent
variable, because the contour height is a great contributing factor of the percentage of tank irrigated area.

The co-efficient ($b$) is .07 where the equation is $y = 35.45 + .07x$. This depicts the fact that per unit increase in contour height will increase .07 unit in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. In this case it is 35.45, which means percentage of tank irrigated area per unit of contour height is 35.45 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of contour height generate a larger percentage of tank irrigated area.

The co-efficient of determination ($R^2$) is 0.003 which means .3% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and lowest contour in the villages**

This shows the regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and lowest contour height of the villages ($x$). Here the second variable is considered as independent variable; because tank irrigated area contour height is a great contributing factor of the percentage of tank irrigated area.

Here the co-efficient ($b$) is 0.23, where the equation is

$$y = 57.24 + 0.23x.$$  
This depicts the fact that per unit increase in contour height will increase 0.23 unit in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. Here it is 57.24. That refers percentage of tank irrigated area changes per unit of contour height of 57.24. The regression co-efficient shows the variation above this constant figure.

It means the villages having lower proportion of contour height generate a larger amount of percentage of tank irrigated area.

The co-efficient of determination ($R^2$) becomes 0.03 which means 3% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and relative relief of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and relative relief of the villages ($x$). Here the second variable is considered as independent variable because relative relief is a determining factor of percentage of tank irrigated area.

The co-efficient ($b$) is 1.68 where the equation is

$$y = .73 + 1.68x.$$  
This depicts the fact that per unit increase in relative relief will increase 1.68 units in the percentage of net irrigated area. Intercept ($a$) shows the minimum average
percentage of tank irrigated area. In this case it is .73; that means percentage of tank irrigated area per unit of contour height is .73. The regression co-efficient shows the variation above this constant figure.

It implies that the villages which have larger proportion of relative relief generate a larger proportion of tank irrigated area.

The co-efficient of determination ($R^2$) is 0.15 which means 15% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and dissection index of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and dissection index of the villages ($x$). Here the second variable is considered as independent variable because the dissection index is a determining factor of the percentage of tank irrigated area.

Here the co-efficient ($b$) is 345.71 and the equation is $y = 7.60 + 345.71x$. This depicts the fact that per unit increase in dissection index will increase 345.71 unit in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. In this case it is 7.60, which means percentage of tank irrigated area per unit of dissection index is 7.60 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of dissection index generate a large amount of percentage of tank irrigated area.

The coefficient of determination ($R^2$) is 0.22 which means 22% of the total variation in $y$ is being explained by $x$.

**Line of best fit between tank irrigated area and dissection index of the villages**

![Fig. 88](image-url)
Percentage of tank irrigated area and highest slope of the villages

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and highest slope of the villages ($x$). Here the second variable is considered as independent variable because the slope is a controlling factor of the tank irrigated area.

The co-efficient ($b$) is 5.87 where the equation is $y = 0.96 + 5.87x$. This depicts the fact that per unit increase in the slope will increase 5.87 units in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. In this case it is .96 which means percentage of tank irrigated area per unit of highest slope is .96 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of highest slope generate a large amount of percentage of tank irrigated area.

The co-efficient of determination ($R^2$) is 0.12 which means 12% of the total variation in $y$ is being explained by $x$.

Percentage of tank irrigated area and lowest slope of the villages

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and lowest slope of the villages ($x$). Here the second variable is considered as independent variable because slope is a controlling factor of the tank irrigated area.

The co-efficient ($b$) is 14.50 and the equation is $y = 8.78 + 14.50x$. This depicts the fact that per unit increase in the lowest slope will increase 14.50 units in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. In this case it is 8.78 which means percentage of tank irrigated area per unit of lowest slope is 8.78 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of lowest slope generate a large amount of percentage of tank irrigated area.

The coefficient of determination ($R^2$) is 0.25 which means 25% of the total variation in $y$ is being explained by $x$.

Percentage of tank irrigated area and average slope of the villages

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and highest contour height of the villages ($x$). Here the second variable is considered as independent variable because the average slope determines the percentage tank irrigated area in the villages.
The co-efficient ($b$) is 9.88 and the equation is 

$$y = 6.97 + 9.88x.$$ 

This depicts the fact that per unit increase in the average slope will increase 9.88 units in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. In this case it is 6.97 which means percentage of tank irrigated area per unit of average slope is 6.97 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of average slope generate a large amount of percentage of tank irrigated area.

The coefficient of determination ($R^2$) is 0.21 which means 21% of the total variation in $y$ is being explained by $x$.

**Line of best fit between tank irrigated area and average slope of the villages**

![Graph showing line of best fit between tank irrigated area and average slope of the villages](image)

Fig. 89

**Percentage of tank irrigated area and depth of water table of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and depth of water table of the villages ($x$). Here the second variable is considered as independent variable because the percentage tank irrigated area is a controlling factor of the tank irrigation of the villages.

The co-efficient ($b$) is 8.31 where the equation is

$$y = 104.46 + 8.31x.$$ 

This depicts the fact that per unit increase in the depth of water table results in 8.31 units increase in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. In this case it is 104.46 which means percentage of tank irrigated area per unit of depth of water table is 104.46 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of depth of water table generate a large amount of percentage of tank irrigated area.

The co-efficient of determination ($R^2$) is 0.12 which means 12% of the total variation in $y$ is being explained by $x$. 
Line of best fit between canal irrigated area and depth of water table of the villages

![Graph showing the line of best fit between canal irrigated area and depth of water table of the villages. The equation is y = 104.46 + 8.31x.](image)

**Fig. 90**

**Percentage of tank irrigated area and moram soil of the villages**

The regression co-efficient \( b \) is computed between percentage of tank irrigated area \( (y) \) and moram soil covered area of the villages \( (x) \). Here the second variable is considered as independent variable because the type of soil determines tank irrigation of the villages.

The co-efficient \( b \) is 13.21 where the equation is \( y = 30.21 + 13.21x \). This depicts the fact that per unit increase in moram soil covered area will increase 13.21 units in the percentage of tank irrigated area. Intercept \( a \) shows the minimum average percentage of tank irrigated area. In this case it is 30.21, which means percentage of tank irrigated area per unit of moram soil area is 30.21 and the regression coefficient shows variation above this constant figure.

It implies that the villages which have large proportion of moram soil area have a large amount of percentage of tank irrigated area.

The coefficient of determination \( (R^2) \) is 0.04 which means 4% of the total variation in \( y \) is being explained by \( x \).

**Line of best fit between tank irrigated area and moram soil of the villages**

![Graph showing the line of best fit between tank irrigated area and moram soil of the villages. The equation is \( y = 88.72 + 2.21x \).](image)

**Fig. 91**
Percentage of tank irrigated area and loam soil of the villages

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and distribution of loam soil covered area of the villages ($x$). Here the second variable is regarded as independent variable because the soil type determines the percentage of tank irrigation of the villages.

The co-efficient ($b$) is 49.99 where the equation is $y = 70.06 + 49.99x$. This depicts the fact that per unit increase in loam soil area will increase 49.99 units in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. Here it is 70.06. This shows percentage of tank irrigated area per unit of loam soil area is 70.06 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have larger proportion of loam soil generate a larger amount of percentage of tank irrigated area.

The co-efficient of determination ($R^2$) is 0.19 which means 19% of the total variation in $y$ is being explained by $x$.

Line of best fit between tank irrigated area and loam soil of the villages

![Graph showing the line of best fit between tank irrigated area and loam soil area.](image)

Fig. 92

Percentage of tank irrigated area and distribution of clayey soil of the villages

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and distribution of clayey soil covered area of the villages ($x$). Here the second variable is considered as independent variable because the soil type is a controlling factor of the tank irrigation of the villages.

The co-efficient ($b$) is 77.56 where the equation is $y = 100.00 + 77.56x$. This represents the fact that per unit increase in clayey soil area will increase 77.56 units in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. In this case it is 100.00 which means percentage of...
tank irrigated area per unit of clayey soil is 100.00 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of clayey soil generate a large percentage of tank irrigated area.

The coefficient of determination ($R^2$) is 0.16 which means 16% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and laterite soil covered of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and laterite soil covered soil of the villages ($x$). Here the second variable is considered as independent variable because the soil type is an influencing agent of the tank irrigation of the villages.

The co-efficient ($b$) is 23.54 where the equation is $y = 28.89 + 23.54x$. This depicts the fact that per unit increase in laterite soil will increase 23.54 units in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. Here it is 28.89 which means percentage of tank irrigated area per unit of laterite soil is 28.89 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of laterite soil area generate a large amount of percentage of tank irrigated area.

The coefficient of determination ($R^2$) is 0.07 which means 7% of the total variation in $y$ is being explained by $x$.

**Line of best fit between tank irrigated area and laterite soil of the villages**

![Graph showing the line of best fit]

**Fig. 93**

**Percentage of tank irrigated area and red soil of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and distribution of red soil covered area of the villages ($x$). Here the second variable is considered
as independent variable because the soil type is a determining factor of the percentage of tank irrigation of the villages.

The co-efficient \( b \) is 32.02 and the equation is \( y = 8.12 + 32.02x \). This depicts the fact that per unit increase in red soil will increase 32.02 units in the percentage of tank irrigated area. Intercept \( a \) shows the minimum average percentage of tank irrigated area. In this case it is 8.12, that means percentage of tank irrigated area per unit of red soil is 8.12 and the regression co-efficient shows variation above this constant figure.

It implies that the villages where large proportion of red soil covered area generate a large amount of percentage of tank irrigated area.

The coefficient of determination \( (R^2) \) is 0.23 indicating that 23% of the total variation in \( y \) is being explained by \( x \).

\[ y = 8.12 + 32.02x \]

**Line of best fit between tank irrigated area and red soil of the villages**

**Fig. 94**

**Percentage of tank irrigated area and Rajmahal soil of the villages**

The regression co-efficient \( b \) is computed between percentage of tank irrigated area \( (y) \) and distribution of Rajmahal soil in the villages \( (x) \). Here the second variable is considered as independent variable because the soil coverage of the area influences on the percentage tank irrigation.

The co-efficient \( b \) is -10.37, where the equation is \( y = 25.55 + (-10.37) x \). This depicts the fact that per unit increase in Rajmahal soil covered villages will decrease 10.37 units in the percentage of tank irrigated area. Intercept \( a \) shows the minimum average percentage of tank irrigated area. In this case it is 25.55, which means percentage of net
irrigated area per unit of Rajmahal soil covered villages is 25.55 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large amount of Rajmahal soil generate a large amount of percentage of tank irrigated area.

The coefficient of determination ($R^2$) is 0.008 indicating that .8% of the total variation in $y$ is being explained by $x$.

**Line of best fit between tank irrigated area and Rajmahal soil of the villages**

![Graph showing the line of best fit between tank irrigated area and Rajmahal soil of the villages.](image)

**Fig. 95**

**Percentage of tank irrigated area and Gondwana soil of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and Gondwana soil in the villages ($x$). Here the second variable is considered as independent variable because this type of soil type is a controlling factor of tank irrigation.

The co-efficient ($b$) is -21.77 where the equation is $y = 29.23 + (-21.77)x$. This depicts the fact that per unit increase in Gondwana soil covered area will decrease 21.77 units in the percentage of tank irrigated area. Intercept ($a$) shows the minimum average percentage of tank irrigated area. In this case it is 29.23 , which means percentage of tank irrigated area per unit of Gondwana soil covered villages is 29.23 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of Gondwana soil covered area; generate a large amount of tank irrigated area.

The coefficient of determination ($R^2$) is 0.07 indicating that 7% of the total variation in $y$ is being explained by $x$. 

---

358
Percentage of tank irrigated area and sandy loam soil covered villages

The regression co-efficient \((b)\) is computed between percentage of tank irrigated area \((y)\) and sandy loam covered area of the villages \((x)\). Here the second variable is considered as independent variable because the character of soil governs the tank irrigation of the villages.

The co-efficient \((b)\) is 32.47 where the equation is \(y = 6.90 + 32.47x\). This depicts the fact that per unit increase in sandy loam covered area will increase 32.47 units in the percentage of tank irrigated area. Intercept \((a)\) shows the minimum average percentage of tank irrigated area. In this case it is 6.90, which means percentage of tank irrigated area per unit of sandy loam covered area is 6.90 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of area covered by sandy loam soil; creates a large amount of tank irrigated area.

The coefficient of determination \((R^2)\) is 0.24 that means 24\% of the total variation in \(y\) is being explained by \(x\).

Percentage of tank irrigated area and loam soil covered villages

The regression co-efficient \((b)\) is computed between percentage of tank irrigated area \((y)\) and loam covered area of the villages \((x)\). Here the second variable is considered as independent variable because character of the soil is a controlling factor of tank irrigation.

The co-efficient \((b)\) is -17.84 where the equation is \(y = 32.18 + (-17.84)x\). This depicts the fact that per unit increase in loam covered area will decrease 17.84 units in the percentage of tank irrigated area. Intercept \((a)\) shows the minimum average percentage of tank irrigated area. In this case it is 32.18, which means percentage of tank irrigated area per unit of loam soil covered area is 32.18 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of loam soil covered area; generate a large amount of percentage of tank irrigated area.

The coefficient of determination \((R^2)\) is 0.07 that means 7\% of the total variation in \(y\) is being explained by \(x\).

Percentage of tank irrigated area and total area of the villages

The regression co-efficient \((b)\) is computed between percentage of tank irrigated area \((y)\) and total area of the villages \((x)\). Here the second variable is considered as independent variable because the total area determines the percentage of tank irrigated area.
The co-efficient \( b \) is .02 and the equation is \( y = 31.66 + .02x \). This depicts the fact that per unit increase in total area will increase .02 unit in the percentage of net irrigated area. Intercept \( a \) shows the minimum average percentage of tank irrigated area. In this case it is 31.66, which means percentage of tank irrigated area per unit of total area is 31.66 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of total area; generate a large amount of percentage of tank irrigated area.

The coefficient of determination \( (R^2) \) is 0.02 that means 2% of the total variation in \( y \) is being explained by \( x \).

**Percentage of tank irrigated area and percentage forest of the villages**

The regression co-efficient \( b \) is computed between percentage of tank irrigated area \( (y) \) and percentage forest of the villages \( (x) \). Here the second variable is considered as independent variable because forest covered area determines the percentage of tank irrigated area.

The co-efficient \( b \) is .70 and the equation is \( y = 26.87 + .70x \). This depicts the fact that per unit increase in forest covered area increases .70 units in the percentage of tank irrigated area. Intercept \( a \) shows the minimum average percentage of tank irrigated area. In this case it is 26.87, which means percentage of tank irrigated area per unit of forest covered area is 26.87 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of forest covered area; generate a large amount of percentage of tank irrigated area.

The coefficient of determination \( (R^2) \) is 0.03 that means 3% of the total variation in \( y \) is being explained by \( x \).

**Percentage of tank irrigated area and net sown area of the villages**

The regression co-efficient \( b \) is computed between percentage of tank irrigated area \( (y) \) and percentage of net sown area of the villages \( (x) \). Here the second variable is regarded as independent variable because when the tank irrigation facility increases the percentage of net sown area also increases.

The co-efficient \( b \) is .13 where the equation is \( y = 64.76 + .13x \). This depicts the fact that per unit increasing in the percentage of net irrigated area will increase .13 unit in the percentage of net sown area. Intercept \( a \) shows the minimum average percentage of net sown area. In this case it is 64.76, which means percentage of net sown area per unit of net
irrigated area is 64.76 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of tank irrigated area generate large amount of percentage of net sown area.

The co-efficient of determination ($R^2$) is 0.06 indicating that .6% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and waste land of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and percentage of waste land the villages ($x$). Here the second variable is regarded as independent variable because in the area where the tank irrigation is largely found there other irrigation facility is not in considerable extent and waste land also predominates there.

The co-efficient ($b$) is .03, where the equation is $y = .73 + .03 x$. This depicts the fact that per unit increasing in the percentage of waste land will increase .03 unit in the percentage of waste land area. Intercept ($a$) shows the minimum average percentage of waste land area. In this case it is .73, which means percentage of tank irrigated area per unit of waste land is .73 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion tank irrigated area generate large amount of percentage of waste land area.

The coefficient of determination ($R^2$) is 0.05 indicating that 5% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and percentage of area not available for cultivation of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($x$) and percentage of area not available for cultivation of the villages ($y$). Here the first variable is regarded as independent variable because increasing of tank irrigation facilitates the not cultivable area to come under cultivation.

The co-efficient ($b$) is -.05, where the equation is $y = 11.04 + (-.05) x$. This depicts the fact that per unit increasing in the tank irrigation will decrease .05 unit in the percentage of area not available for cultivation. Intercept ($a$) shows the minimum average percentage of area not available for cultivation. In this case it is 11.04, which means percentage of area not available for cultivation per unit of tank irrigated area is 11.04 and the regression co-efficient shows variation above this constant figure.
It means that the villages which have large proportion of tank irrigation facility generate small amount of percentage of area not available for cultivation.

The coefficient of determination ($R^2$) is 0.01 indicating that 1% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and unirrigated area of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($y$) and percentage of unirrigated area of the villages ($x$). Here the later variable is regarded as independent variable because where the tank irrigation facility is largely available there other irrigation facility is minimum. Ultimately unirrigated area increases.

The co-efficient ($b$) is .2, where the equation is $y = 34.31 + .2x$. This depicts the fact that every unit increasing in the percentage of tank irrigated area will increase .2 unit in the percentage of unirrigated area. Intercept ($a$) shows the minimum average percentage of unirrigated area. In this case it is 34.31, which means percentage of unirrigated area per unit of tank irrigated area is 34.31 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of tank irrigated area generate large amount of percentage of unirrigated area.

The coefficient of determination ($R^2$) is 0.03 indicating that 3% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and aus paddy crops of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($x$) and aus paddy crops of the villages ($y$). Here the first variable is considered as independent variable because the tank irrigation determines the aus paddy crop production.

The co-efficient ($b$) is .02, where the equation is $y = 2.87 + .02x$. This depicts the fact that every unit increasing in the tank irrigation will increase .02 unit in the percentage of aus paddy crop area. Intercept ($a$) shows the minimum average percentage of aus paddy area. In this case it is 2.87, which means percentage of aus paddy area per unit of tank irrigated area is 2.87 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of tank irrigation generate larger proportion of percentage of aus paddy area.
The co-efficient of determination ($R^2$) is 0.09 indicating that 9% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and aman paddy crops of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($x$) and aman paddy crops of the villages ($y$). Here the first variable is independent variable because the tank irrigation determines the cultivation of aman paddy crop.

The co-efficient ($b$) is .12, where the equation is $y = 72.59 + .12x$. This depicts the fact that every unit increasing in the tank irrigation will increase .12 unit in the percentage of aman paddy crop area. Intercept ($a$) shows the minimum average percentage of aman paddy crop area. In this case it is 72.59, which means percentage of aman paddy area per unit of tank irrigated area is 72.59 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of tank irrigation generate a large amount of aman paddy crop area.

The co-efficient of determination ($R^2$) is 0.09 indicating that .9% of the total variation in $y$ is being explained by $x$.

**Percentage of tank irrigated area and boro paddy crops of the villages**

The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($x$) and boro paddy crops of the villages ($y$). Here the former variable is independent variable because the tank irrigation is the controlling agent of the cultivation of boro paddy crop.

The co-efficient ($b$) is .28, where the equation is $y = 5.62 + .28x$. This depicts the fact that every unit increasing in the tank irrigated area will increase .28 unit in the percentage of boro paddy area. Intercept ($a$) shows the minimum average percentage of boro paddy area. In this case it is 5.62, which means percentage of boro paddy area per unit of tank irrigated area is 5.62 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of tank irrigation generate large amount of boro paddy area.

The co-efficient of determination ($R^2$) is 0.05 indicating that 5% of the total variation in $y$ is being explained by $x$. 


Percentage of tank irrigated area and wheat cultivation of the villages
The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($x$) and percentage of area under wheat crop of the villages ($y$). Here the first variable is independent variable because the tank irrigation affects on the cultivation of wheat crop of the villages.

The co-efficient ($b$) is .02, where the equation is $y = 3.78 + .02x$. This depicts the fact that every unit increase in the tank irrigation will increase .02 unit in the percentage of wheat crop area. Intercept ($a$) shows the minimum average percentage of wheat crop cultivated area. In this case it is 3.78, which means percentage of wheat crop cultivated area per unit of tank irrigated area is 3.78 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have larger proportion of tank irrigation generate large amount of wheat crop area.

The co-efficient of determination ($R^2$) is 0.07 indicating that 7% of the total variation in $y$ is being explained by $x$.

Percentage of tank irrigated area and potato cultivation of the villages
The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($x$) and percentage of area under potato crop of the villages ($y$). Here the first variable is independent variable because potato is rabi crop and it is mainly dependent on tank irrigation.

The co-efficient ($b$) is .02, where the equation is $y = 5.53 + .02x$. This depicts the fact that every unit increasing in the tank irrigation will increase .02 unit in the percentage of potato crop area. Intercept ($a$) shows the minimum average percentage of potato crop area. In this case it is 5.53, which means percentage of potato crop cultivated area per unit of percentage of tank irrigated area is 5.53 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of tank irrigated area have a large amount of potato crop area.

The co-efficient of determination ($R^2$) is 0.01 indicating that 1% of the total variation in $y$ is being explained by $x$.

Percentage of tank irrigated area and mustard seed cultivation of the villages
The regression co-efficient ($b$) is computed between percentage of tank irrigated area ($x$) and percentage of area under mustard seed crop of the villages ($y$). Here the first variable is independent variable because rabi crop and is largely dependent on tank irrigation.

The co-efficient ($b$) is .12, where the equation is
\[ y = 5.50 + .12x \]. This depicts the fact that every unit increase in the tank irrigation will increase .12 unit in the area of cultivation under mustard seed crop. Intercept \((a)\) shows the minimum average percentage of mustard seed crop cultivated area. In this case it is 5.50, which means percentage of mustard seed crop cultivated area per unit of percentage of net irrigated area is 5.50 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of tank irrigated area generate a large amount of mustard seed crop area.

The co-efficient of determination \((R^2)\) is 0.16 indicating that 16% of the total variation in \(y\) is being explained by \(x\).

**Percentage of tank irrigated area and the vegetables cultivation of the villages**

The regression co-efficient \((b)\) is computed between percentage of tank irrigated area \((x)\) and percentage of area under vegetable crop of the villages \((y)\). Here the former variable is independent variable because tank irrigation is a contributing factor for irrigation of vegetable crop production.

The co-efficient \((b)\) is .01, where the equation is
\[ y = 2.02 + .01x \]. This depicts the fact that per unit increase in the tank irrigation will increase .01 unit in the percentage of vegetable crop area. Intercept \((a)\) shows the minimum average percentage of area under vegetable crop. In this case it is 2.02, which means percentage of vegetable crop cultivated area per unit of percentage of tank irrigated area is 2.02 and the regression co-efficient shows variation above this constant figure.

It means that the villages which have large proportion of tank irrigated area generate a large amount of vegetable crop area.

The co-efficient of determination \((R^2)\) is 0.5 indicating that 5% of the total variation in \(y\) is being explained by \(x\).

**Percentage of tank irrigated area and the pulses cultivation of the villages**

The regression co-efficient \((b)\) is computed between percentage of tank irrigated area \((x)\) and percentage of area under pulses crop of the villages \((y)\). Here the first variable is independent variable because pulses are rabi crop and its cultivation is largely influenced by tank irrigation.

The co-efficient \((b)\) is .001, where the equation is
\[ y = 3.71 + .001x \]. This depicts the fact that per unit increase in the tank irrigation causes .001 unit increase pulses crop area. Intercept \((a)\) shows the minimum average percentage of area
under pulses crop. In this case it is 3.71, which means percentage of pulses crop cultivated area per unit of percentage of tank irrigated area is 3.71 and the regression co-efficient shows variation above this constant figure.

It implies that the villages which have large proportion of tank irrigation generate larger amount of pulses crop area.

The co-efficient of determination ($R^2$) is 0.001 indicating that .1% of the total variation in $y$ is being explained by $x$. 
Table: 90 Regression analysis between sources of irrigation and different parameters of physical factors, land use and cropping pattern

<table>
<thead>
<tr>
<th>y VARIABLE</th>
<th>x VARIABLE</th>
<th>SLOPE (b)</th>
<th>INTERCEPT (a)</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>net irrigated area</td>
<td>Tank</td>
<td>.31</td>
<td>54.43</td>
<td>.07</td>
</tr>
<tr>
<td>Unirrigated area</td>
<td>Tank</td>
<td>.20</td>
<td>34.31</td>
<td>.03</td>
</tr>
<tr>
<td>Tank</td>
<td>Canal</td>
<td>.83</td>
<td>83.35</td>
<td>.78</td>
</tr>
<tr>
<td>Tank</td>
<td>Tank</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>High contour</td>
<td>.07</td>
<td>35.45</td>
<td>.003</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Low contour</td>
<td>.23</td>
<td>57.24</td>
<td>.03</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Relative relief</td>
<td>1.68</td>
<td>7.3</td>
<td>.15</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Dissection index</td>
<td>345.71</td>
<td>7.60</td>
<td>.22</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>High slope</td>
<td>5.87</td>
<td>96</td>
<td>.12</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Low slope</td>
<td>14.50</td>
<td>8.78</td>
<td>.25</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Average slope</td>
<td>9.88</td>
<td>6.97</td>
<td>.21</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Water table depth</td>
<td>8.31</td>
<td>104.46</td>
<td>.12</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Moram</td>
<td>13.21</td>
<td>30.21</td>
<td>.04</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Loam</td>
<td>49.99</td>
<td>70.06</td>
<td>.19</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Clay</td>
<td>77.56</td>
<td>100</td>
<td>.16</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Laterite</td>
<td>23.54</td>
<td>28.89</td>
<td>.07</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Red</td>
<td>32.02</td>
<td>8.12</td>
<td>.23</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Rajmahal</td>
<td>-10.37</td>
<td>25.55</td>
<td>.008</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Gondwana</td>
<td>-21.77</td>
<td>29.23</td>
<td>.07</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Sandy loam</td>
<td>32.47</td>
<td>6.90</td>
<td>.24</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Loam</td>
<td>-17.84</td>
<td>32.18</td>
<td>.07</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>Total area</td>
<td>.02</td>
<td>31.66</td>
<td>.02</td>
</tr>
<tr>
<td>% of tank irrigated area</td>
<td>% forest</td>
<td>.70</td>
<td>26.87</td>
<td>.03</td>
</tr>
<tr>
<td>Net sown area</td>
<td>Tank</td>
<td>.13</td>
<td>64.76</td>
<td>.06</td>
</tr>
<tr>
<td>Waste land</td>
<td>Tank</td>
<td>.03</td>
<td>.73</td>
<td>.05</td>
</tr>
<tr>
<td>Area not available for cultivation</td>
<td>Tank</td>
<td>-.05</td>
<td>11.04</td>
<td>.01</td>
</tr>
<tr>
<td>Aus</td>
<td>Tank</td>
<td>.02</td>
<td>2.87</td>
<td>.1</td>
</tr>
<tr>
<td>Aman</td>
<td>Tank</td>
<td>.12</td>
<td>72.59</td>
<td>.09</td>
</tr>
<tr>
<td>Boro</td>
<td>Tank</td>
<td>.28</td>
<td>5.62</td>
<td>.05</td>
</tr>
<tr>
<td>wheat</td>
<td>Tank</td>
<td>.02</td>
<td>3.78</td>
<td>.07</td>
</tr>
<tr>
<td>potato</td>
<td>Tank</td>
<td>.02</td>
<td>5.53</td>
<td>.01</td>
</tr>
<tr>
<td>mustard</td>
<td>Tank</td>
<td>.12</td>
<td>5.50</td>
<td>.16</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Tank</td>
<td>.01</td>
<td>2.02</td>
<td>.05</td>
</tr>
<tr>
<td>pulses</td>
<td>Tank</td>
<td>.001</td>
<td>3.71</td>
<td>.001</td>
</tr>
</tbody>
</table>

Source: Computed by the researcher
13.4 Chi square analysis
Chi square tests have been attempted between percentage of net irrigated area as the row variable and pH value of soil, pH value of tank, pH value of tank water, pH value of shallow tube well water, soil moisture during wet season, soil moisture during moderately wet season and soil moisture during dry season as the column variables. These chi square tests have been done with the help of data of all the 42 villages in this region. It has been observed that in between percentage of net irrigated area and pH value of soil, pH value of tank, pH value of tank water, pH value of shallow tube well water and soil moisture during wet season the association is insignificant. That means the null hypothesis which states that there is no statistical association between the above mentioned variables is accepted. On the other hand, the chi square tests computed between percentage of net irrigated area and soil moisture during moderately wet season and soil moisture during dry season is significant which indicates that the above mentioned null hypothesis is rejected so that the alternative hypothesis is accepted that means there is statistical association between above mentioned variables which can be observed in details from the following table.

Table: 91 Chi square tests

<table>
<thead>
<tr>
<th>Row Variable</th>
<th>Column Variable</th>
<th>Computed $X^2$</th>
<th>Tabulated $X^2$ 5%</th>
<th>Tabulated $X^2$ 1%</th>
<th>Significant / Insignificant</th>
<th>Null Hypothesis Accepted/ Rejected</th>
<th>Association</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of net irrigated area</td>
<td>Soil pH</td>
<td>7.63</td>
<td>12.59</td>
<td>16.81</td>
<td>Insignificant</td>
<td>Accepted</td>
<td>No</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>pH value of tank water</td>
<td>12.07</td>
<td>12.59</td>
<td>16.81</td>
<td>Insignificant</td>
<td>Accepted</td>
<td>No</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>pH value of shallow tube well water</td>
<td>6.22</td>
<td>12.59</td>
<td>16.81</td>
<td>Insignificant</td>
<td>Accepted</td>
<td>No</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>soil moisture (wet)</td>
<td>5.99</td>
<td>12.59</td>
<td>16.81</td>
<td>Insignificant</td>
<td>Accepted</td>
<td>No</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>soil moisture (moderate)</td>
<td>14.49</td>
<td>12.59</td>
<td>16.81</td>
<td>Significant</td>
<td>Rejected</td>
<td>Yes</td>
</tr>
<tr>
<td>% of net irrigated area</td>
<td>soil moisture (dry)</td>
<td>18.79</td>
<td>12.59</td>
<td>16.81</td>
<td>Significant</td>
<td>Rejected</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Computed by the researcher
13.5 Analysis of variance

Analysis of variance has been computed with the distribution of net irrigated area of all the 50 farms of the 5 sample study villages. The objective is to find out whether the distribution pattern of net irrigated area of all the 5 villages for all the 50 farms is either same or common pattern or possesses different patterns. The study indicates that the computed F ratio is larger than the tabulated F ratio both at the 1% and 5% levels of significance. Thus, the variance is significant. So that the null hypothesis is rejected and the alternative hypothesis is accepted. The null is that the sample that is net irrigated area is taken from a common or normally distributed population or from identical population which reveals the same common pattern. On the other hand, the alternative hypothesis is that the samples come from population either different distribution that means the distribution of net irrigated area of 50 farms of 5 sample villages are of different nature and do not possess the same or common pattern. In the present study as the null hypothesis is rejected and the alternative hypothesis is accepted so that the distribution of net irrigated area of all the 50 farmers of 5 sample villages are of different nature and do not posses same, identical and common distributional pattern. Following table further illustrate this.

Table: 92 Analysis of variance

<table>
<thead>
<tr>
<th>Between Samples Variance Estimate</th>
<th>Within Samples Variance Estimate</th>
<th>Computed F Ratio</th>
<th>Degree Of Freedom For Between Samples Variance Estimate</th>
<th>Degree Of Freedom For Within Samples Variance Estimate</th>
<th>Tabulated F Ratio At The Significance Points Of Variance</th>
<th>Significant/ Insignificant</th>
<th>Null Hypothesis Accepted/ Rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>683.21</td>
<td>113.25</td>
<td>6.03</td>
<td>4.00</td>
<td>253</td>
<td>2.37 3.32</td>
<td>Significant</td>
<td>Null Hypothesis Rejected And Alternative Hypothesis Accepted</td>
</tr>
</tbody>
</table>

Source: Computed by the researcher