ANNEXURE NO. 1

TEA CULTIVATION AND SUSTAINABLE DEVELOPMENT:
A CASE STUDY OF KANGRA VALLEY

CULTIVATOR’S SCHEDULE

IDENTIFICATION

Name of the Farmer/Planter……………………………………………………
Age …. Years Sex Male/Female
Educational Status ...............................................................................
Village …………………… Block……………. Tehsil……….. District……………

TEA CULTIVATION STATUS

1. Total owned land .................................................................
2. Land under tea plantation .....................................................
3. Started tea cultivation from (year) .................................
4. Did you start your tea plantation or was it ancestral? ........
5. Have you added any new land area to ancestral land for tea
cultivation? If yes please mention how much: ......................
6. Replacement of tea plants, if any. .................................
7. Presently total number of tea plants .................................
8. What was done with the tea produced earlier:
   a) Self consumed   b) Locally sold   c) Sold out of state
d) Sold to local processing units
9. In comparison to past, presently the quality of tea produced is
   a) Very good   b) Good   c) Poor   d) Same
10. Do you think Kangra tea was more popular in the past than today?
    Yes/No
11. Do you get quality-planting material?   Yes/No
12. If yes, from where ......................... Are you satisfied? ............
    a) If not, what in your opinion is the solution ......................

13. Presently, the steps taken by the Government for developing the tea
cultivation, in comparison to past are
    a) Poor   b) Positive   c) Very positive   d) Can’t say
14. What measures are taken by the local tea processing units for improving the quality of product? (Tick the option)
   a) Using the best available method and machinery
   b) Taking active help from Agricultural University and research centres
   c) Try to produce different products like green tea/ herbal tea etc.
   d) Think that present quality is already good.

15. In your view the present status of your tea garden is:
   a) Good b) Average C) Poor

16. In your view the future of tea cultivation in Kangra Valley is:
   a) Dark b) Bright c) Can’t say

17. What do you suggest for bright future of tea cultivation in Kangra Valley?
   a) Govt. should take positive steps
   b) Proper training should be provided to the cultivators
   c) Tea gardens should be protected by implementing strong laws
   d) All of the above

18. In your view, what measures should be taken by the govt. to increase tea productivity.
   a) Improving the delivery system of technological inputs
   b) Providing more marketing facilities
   c) By improving the infrastructure necessary for tea development
   d) Increasing investment for providing needed help to the tea cultivators.

19. Are you satisfied by engaging yourself in tea cultivation?
    Yes/No

20. Are you interested in selling tea garden land? Yes/No

ECONOMIC STATUS

1. Main occupation ..............................................
2. Subsidiary Occupation ........................................
3. Total annual income ...........................................
4. Total annual income from tea cultivation ..................
5. Variation in income since last five years
   a) Increasing b) decreasing c) no change.
6. Present cost of tea garden maintenance ...........................................
   i) **Labour**
      a) Planting work.......  b) Maintenance.......  c) harvesting.......  
   ii) **Irrigation** ..................  iii) **Fertilizers**..................  
   iv) **Other** ..................

7. Do you face any labour related problem?  Yes/No

8. If yes, of what type.................................................................

9. Operation wise labour use in tea production:

<table>
<thead>
<tr>
<th>Crop Operation</th>
<th>Family</th>
<th>Hired</th>
<th>Season</th>
<th>Days/month</th>
<th>Wages/days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field preparation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fertilizers application</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picking/ Grading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. To whom do you sell your produce?
    a) Village Traders       b) Forwarding Agent
    c) Local tea factory    d) Used for self consumption

11. Any problems related to price ................................................

12. Have you/villagers formed co-operatives to sell produce?  Yes/No

13. Impact of co-operative on:
   1. Price of tea ..........................................................
   2. Labour cost ..........................................................
   3. Marketing............................................................

14. In your view, the State Government should give some subsidy and protection for saving the Kangra Valley tea cultivation in context of General Agreement of Trade and Tariff (GATT)?
    a) Strongly agree       b) Agree       c) Strongly disagree d) Disagree
15. In your view, which factor is most responsible for low growth rate of tea cultivation?
   a) Financial constraints and poor overall management
   b) Small size of tea gardens
   c) Lack of grading, standardization and highly technical processing units
   d) All of the above.

16. Do you want to continue with tea plantation? Yes/No

17. If no, than shift will be for:
   1 Horticulture activity .................................................... (specify)
   2 Floriculture activity....................................................
   3 Subsistence crops: Wheat, Maize, Rice etc.........................
   4 Any other reason......................................................

18. Do you want to shift for any value addition related to tea: Yes/No

19. If yes, of what type........................................................

20. Do you get any govt. subsidy for adopting new means? Yes/No

21. If yes, to what extent
   a) > 50%  b) 25-50%  c) <25%

22. Have you heard about organic tea farming? Yes/No

**ECOLOGICAL IMPACT**

1. Does the tea plantation affect soil quality? Yes/No
   If yes, in what manner? ....................................................
   ....................................................................................
   ....................................................................................

2. Have you noticed any change in the productivity in last 10 years?
   ....................................................................................
   ....................................................................................

3. Any ecological reason for low productivity?
   ....................................................................................

4. In your view, average temperature of the Kangra Valley in comparison to past is:
   a) Increasing  b) Decreasing  c) Keep on fluctuating  d) Can’t say
5. Do you think that change in temperature is having any impact on the tea production/cultivation? Yes/No

6. If yes, of what type…………………………………………………………………………………………

7. In your view average rainfall in the Kangra Valley, in comparison to past is:
   a) Increasing  b) Decreasing  c) Keep on fluctuating  d) Can’t say

8. Do you think rainfall fluctuation is having any impact on tea cultivation/Production? Yes/No

9. If yes, of what type?
   ……………………………………………………………………
   ……………………………………………………………………
   ……………………………………………………………………

10. Do you think that use of fertilizers in tea cultivation is having any negative impact on the local environment? Yes/No

11. In your view the State of Environment (Air Quality, Water quality, land productivity etc. is:
   a) Good b) Poor c) Declining fastly d) Remaining Static

12. Do you get environment related relevant information? Yes/No

13. If yes, what is the source………………………………………………………………………………………
   ……………………………………………………………………………………………………………………………

14. Training opportunities available in conservative practices:
   a) Once in 3 years  b) Once in 5 yrs  c) Not available

15. Measures being taken by you to manage the natural resources in a better way to increase tea production:
   a) Taking proper anti erosion steps: Yes/No
   b) Using natural drainage lines for draining out the garden: Yes/No
   c) Adding sufficient organic manures for replenishing the soil fertility Yes/No
   d) Using chemicals for plant protection only when economic injury is reached /crossed: Yes/No

16. Overall any other problem related to tea cultivation…………………………………………………………………
   ……………………………………………………………………………………………………………………………
MANAGEMENT

1. Are you aware of the changes in global scenario: Yes/No

2. Do you think that in the changed economic scenario your produce will be more prone to increase in competition in market: Yes/No

3. If yes, how will you respond to the situation? (Tick the relevant item/items)
   a) By becoming more competitive   b) By increasing the quality of produce
   c) By relying on Govt. help       d) Any other (Please specify)

4. Are you facing any sort of problem due to malpractices in buying and selling by middle men’s, Commission agents etc.? Yes/No

5. Production related problems:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Particulars</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sufficient credit facilities available</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Timely input supplies are available</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Adequate input supplies are available</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Proper technical know-how available</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>More demand of land for other activities causing problem to tea gardens</td>
<td></td>
</tr>
</tbody>
</table>

6. Marketing/Management related problems:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Particulars</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Small quantum of produce</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Proper grading facility easily available</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Middle man appropriating large and undue shares</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Adequate processing facilities available</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Markets being distant, poor bargaining</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Transportation facilities are poor.</td>
<td></td>
</tr>
</tbody>
</table>

7. Do you face any problem due to price fluctuation and price mechanism? Yes/No
8. If yes, what remedy would you suggest?.................................

9. In your view which method will help to solve the market problem of Kangra Tea?
   a) More advertisement and publicity
   b) High quality produce
   c) Increasing the quantity of produce
   d) All of the above

10. In your view what is the main cause of failure of co-operative tea management system in Kangra valley:
    a) Poor technology use
    b) Lack of co-ordination and management skills
    c) High processing costs
    Any other (Please specify) .................................................................
        ........................................................................................................

11. Do you think that profits can be increased more by processing raw tea in local cottage units? Yes/No

12. What changes have taken place in the factory management in your area?
    ........................................................................................................
    ........................................................................................................
    ........................................................................................................

13. What impact these changes have made on production? .................
    ........................................................................................................
    ........................................................................................................
    ........................................................................................................

14. Are the farmers in better/worse situations?
    ........................................................................................................
    ........................................................................................................
    ........................................................................................................

15. Do you think co-operative management is better instead of privatization of tea factories? .................................................................
16. For increasing the profits of the local tea related cottage industry, which measure will be more helpful?
   a) Improving tools and processing methods
   b) Improving crop varieties
   c) Improving roads and infrastructure
   d) All of above.

17. Are you interested to start processing tea by starting your own cottage unit? Yes / No

Thanks for your co-operation
TEA CULTIVATION AND SUSTAINABLE DEVELOPMENT: A CASE STUDY OF KANGRA VALLEY

TEA FACTORY OWNER’S SCHEDULE

IDENTIFICATION

Name of the unit …………………………………………………………………………………………………………………………………………………
Management type: Private/Govt./Co-operative
Name of the Manager/Owner………………………………………………
Age …….yrs Sex: Male/Female
Village …………………… Block……………… Tehsil……….. District………………

1. Total output of the processing unit…………………………………………
2. How much manpower is employed in the factory…………………………
3. Number of day’s the unit functions in a year……………………………
4. Overall production status (of last five years):
   2001………………… 2002………………… 2003…………………
   2004………………… 2005………………
5. Where do you sell your final product?
   a) Local Market b) Within the state
   c) Throughout country d) International market.
6. Are you facing any sort of market problem for selling the final product?
   Yes / No.
7. If yes, please specify…………………………………………………
   …………………………………………………………………………………
   …………………………………………………………………………………
8. What do you suggest to solve the market problem………………
   …………………………………………………………………………………
   …………………………………………………………………………………
9. Which method you are adopting presently for solving market problem:
   a) Improving quality of product.
   b) Investing more on marketing.
c) Investing more on research and technical know-how.

d) Relying on Government.

10. Are you getting any government support? Yes / No.

11. If yes, in what form…………………………………………………………………………………………………………………………………………………..

12. Do you keep unit in the category of sick unit? Yes/No

13. Presently what sort of other problems you are facing?

…………………………………………………………………………………………………………………………………………………………..

14. In your opinion quality of tea leaf produced in the region is:

   a) Very fine
   b) Good
   c) Average
   d) Poor.

15. Are you satisfied with the progress? Yes / No.

16. Which value added products do you produce? ………………..

17. What rating you would like to give to state Govt. efforts?

   a) Very good b) Good c) Poor d) Very poor.

18. Do you recommend giving special tax relief for the Kangra valley tea industry? Yes / No.

19. If yes, for how many years………………………………

20. What steps are you taking to face the increasing competition?

   ………………………………………………………………………………………………………………………………………………………………..

21. In your opinion co-operative factories functioning in the Kangra Valley should be: (Tick any one)

   a) Taken over by the Govt. for better functioning.
   b) Be closed and privatized.
   c) Given more financial assistance.
   d) None of the above.

**********

Thanks for your co-operation

**********
THE CHI SQUARE ($\chi^2$) TEST

The $\chi^2$ (Chi Square) test is one of the simplest method for comparing counted data, in which individual observations are assigned to categories and the number in each category counted. The $\chi^2$ test was first used by Karl Pearson in the year 1900.

Requirements for the use of the $\chi^2$ test are:

a) The data must be in the form of frequencies counted in each of a number of categories (percentages cannot be used).

b) The total numbers observed must exceed 20.

c) The observations must be independent (i.e. one observation must not influence another).

d) The sum of the observed and expected frequencies is always zero. Symbolically:

\[ \sum (O - E) = \sum O - \sum E = N - N = 0 \]

This provides an important check on the calculation in the computation of $\chi^2$.

e) Though $\chi^2$ distribution is essentially a continuous distribution than $\chi^2$ test can be applied to discrete random variables whose frequencies can be counted and tabulated with or without grouping.

Steps: To determine the value of $\chi^2$, the steps required are –

a) Calculate the expected frequencies. In general the expected frequency for any call can be calculated from the following equation:
\[ E = \frac{RT \times CT}{N} \]

E = Expected frequency

RT = The row total for the row containing the cell.

CT = The Column total for the column containing the cell.

N = The total number of observations.

b) Take the difference between observed (O) and expected (E) frequencies and obtain the squares of these differences, i.e., obtain the values of \((O - E)^2\).

c) Divide the values of \((O - E)^2\) obtained in step b) by the respective expected frequency and obtain the total \([((O - E)^2)/E]\). This gives the value of \(\chi^2\) which can range from zero to infinity. The greater the discrepancy between the observed and expected frequencies. The greater shall be value of \(\chi^2\).

The calculated value of \(\chi^2\) is compared with the table value of \(\chi^2\) for given degrees of freedom at a certain specified level of significance. If, the calculated value of \(\chi^2\) is less than the table value, the difference between theory and observation is not considered as significant, i.e., it is regarded as due to fluctuations of simple sampling and hence ignored.

Since \(\chi^2\) is derived from observations, it is a statistic and not a parameter (there is no parameter corresponding to it). The \(\chi^2\) test is therefore, termed non parametric. It is one of the great advantages of this test that it involves no assumption about the form of the original distribution from which the observations come.
CALCULATION OF $\chi^2$ FOR CONSTRAINTS FOR TEA DEVELOPMENT  
*(2006-07)*

On the basis of constraints faced by different tea farm owners i.e., small, medium and large, the data in the form of frequencies was recorded for fourteen constraints. The data is presented in table given below and constraints are shown with particular number as per table no 3.15.

<table>
<thead>
<tr>
<th>Constraints Particular’s S. No.</th>
<th>Small tea farm owners</th>
<th>Medium tea farm owners</th>
<th>Large tea farm owners</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>92 (82.7)</td>
<td>20 (80.0)</td>
<td>21 (84.0)</td>
</tr>
<tr>
<td>2.</td>
<td>86 (78.2)</td>
<td>20 (80.0)</td>
<td>24 (96.0)</td>
</tr>
<tr>
<td>3.</td>
<td>83 (75.5)</td>
<td>20 (80.0)</td>
<td>23 (92.0)</td>
</tr>
<tr>
<td>4.</td>
<td>90 (81.8)</td>
<td>16 (72.0)</td>
<td>17 (68.0)</td>
</tr>
<tr>
<td>5.</td>
<td>82 (71.5)</td>
<td>22 (88.0)</td>
<td>20 (80.0)</td>
</tr>
<tr>
<td>6.</td>
<td>73 (66.4)</td>
<td>16 (64.0)</td>
<td>14 (56.0)</td>
</tr>
<tr>
<td>7.</td>
<td>68 (62.7)</td>
<td>13 (52.0)</td>
<td>17 (68.0)</td>
</tr>
<tr>
<td>8.</td>
<td>61 (55.5)</td>
<td>16 (56.0)</td>
<td>17 (68.0)</td>
</tr>
<tr>
<td>9.</td>
<td>52 (47.7)</td>
<td>15 (60.0)</td>
<td>13 (52.0)</td>
</tr>
<tr>
<td>10.</td>
<td>28 (25.5)</td>
<td>04 (16.0)</td>
<td>02 (8.0)</td>
</tr>
<tr>
<td>11.</td>
<td>27 (24.5)</td>
<td>05 (20.0)</td>
<td>02 (8.0)</td>
</tr>
<tr>
<td>12.</td>
<td>24 (21.8)</td>
<td>01 (4.0)</td>
<td>01 (4.0)</td>
</tr>
<tr>
<td>13.</td>
<td>20 (17.3)</td>
<td>03 (24.0)</td>
<td>01 (4.0)</td>
</tr>
<tr>
<td>14.</td>
<td>19 (18.2)</td>
<td>06 (12.0)</td>
<td>01 (4.0)</td>
</tr>
</tbody>
</table>

*Note: Figures in parentheses represent percentages to total number of respondents.*
The expected frequencies corresponding to each group and constraint were obtained as follows:

For example, for frequency in first cell, first column and first row \(805 \times 133\)

\[
\frac{1155}{133} \quad \text{Expected frequency} = 92.7
\]

Similarly expected frequencies of other cells have been calculated and are given in following table:

<table>
<thead>
<tr>
<th>GROUP</th>
<th>1</th>
<th>2</th>
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<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>Small</td>
<td>92.7</td>
<td>90.7</td>
<td>87.8</td>
<td>85.7</td>
<td>86.4</td>
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<td>Total</td>
<td>133</td>
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<td>126</td>
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<table>
<thead>
<tr>
<th>GROUP</th>
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<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td>Small</td>
<td>71.8</td>
<td>68.3</td>
<td>65.5</td>
<td>55.8</td>
<td>23.7</td>
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<tr>
<td>Medium</td>
<td>15.8</td>
<td>15.0</td>
<td>14.4</td>
<td>12.3</td>
<td>5.2</td>
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<tr>
<td>Large</td>
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<td>14.7</td>
<td>14.1</td>
<td>11.9</td>
<td>5.1</td>
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<tr>
<td>Total</td>
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<td>94</td>
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<table>
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<td>18.1</td>
<td>18.1</td>
<td>16.7</td>
<td>805</td>
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<tr>
<td>Medium</td>
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<td>4.0</td>
<td>3.7</td>
<td>177</td>
</tr>
<tr>
<td>Large</td>
<td>5.1</td>
<td>3.9</td>
<td>3.9</td>
<td>3.6</td>
<td>173</td>
</tr>
<tr>
<td>Total</td>
<td>34</td>
<td>26</td>
<td>26</td>
<td>24</td>
<td>1155</td>
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Applying $\chi^2$ test

<table>
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<tr>
<th>O</th>
<th>E</th>
<th>$(O - E)^2$</th>
<th>$(O - E)^2 / E$</th>
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</thead>
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<tr>
<td>92</td>
<td>92.7</td>
<td>0.49</td>
<td>0.005</td>
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<tr>
<td>20</td>
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<td>86</td>
<td>90.7</td>
<td>22.09</td>
<td>0.243</td>
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<td>19.9</td>
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<td>0.000</td>
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<td>$\cdot [(O - E)^2 / E]$ = 24.423</td>
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\[ \chi^2 = \cdot \left[ \frac{(0 - E)^2}{E} \right] = 24.423 \]

\[ V = (r - 1) (c - 1) = (3 - 1) (14 - 1) = 26 \]

For \[ V = 26, \ \chi^2 0.05 = 38.885 \]

The calculated value of \( \chi^2 \) is less than the table value. This indicates that the responses given by the respondents do not differ significantly among themselves for the constraints in the development of tea in Kangra valley.

References:


Application of Student’s ‘t’ - test for variable other expenditure and tea Planters’ group Small and Medium

\[ t' = \frac{\bar{X}_1 - \bar{X}_2}{s} \times \sqrt{\frac{n_1 n_2}{n_1 + n_2}} \]

Where \( \bar{X}_1 \) = Mean of the first sample.

\( \bar{X}_2 \) = Mean of the second sample.

\( n_1 \) = Number of observations in the first sample.

\( n_2 \) = Number of observations in the second sample.

\( \bar{X}_1 = 1100.0, \quad n_1 = 07, \quad S_1 = 886.0, \quad \bar{X}_2 = 3062.5, \quad n_2 = 08, \quad S_2 = 1860.0 \)

\[ S = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}} \]

\[ = \sqrt{\frac{06(886)^2 + 07(1860)^2}{07 + 08 - 2}} \]

\[ = \sqrt{\frac{4499736 + 24217200}{13}} \]

\[ = \sqrt{\frac{23716936}{13}} = \sqrt{2208995} = 1486.26 \]

\[ t' = \frac{1100 - 3062.5}{1486.26} \times \sqrt{\frac{7 \times 8}{7 + 8}} \]

\[ = \frac{1962.5}{1486.26} \times 1.93 = 2.55 \]
\[ v = n_1 + n_2 - 2, \text{ the number of the degrees of freedom.} \]

\[ = 07 + 08 - 2; \text{ for } v = 13, \text{ the table value of 't' at 5 percent level is 2.16.} \]

The calculated value of ‘t’ is more than the table value and it shows that both the tea farmers group i.e. Small and Medium differ significantly in other expenditure case.