CHAPTER V

ADOPTION AND CHARACTERISTICS OF THE FARMERS

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1. Introduction :

In the previous chapter the trends of diffusion in general for the Kolhapur district, (tahsilwise) are analysed. It is noted that among all the tahsil, Karveer ranks first in accepting the innovation and diffusing it rapidly. Karveer tahsil alone comprises 31.57% of the district tractor, having the highest proportion per 1000 hect. of cultivated area (Fig.2-3). On this background this chapter proposes to take the case study of Karveer tahsil for detail analysis of trends and process of diffusion of tractor.

2. Methodology :

Here, the adoption of tractors is considered at the level of a individual farmer, in order to gain further knowledge of the diffusion process. About 100 farmers (responded) among 22 stratified randomly selected villages and 21 farmers (non responded) from 4 villages were selected for the personal interviews. The 37 points detailed questionnairy (Appendix I) was prepared to study the diffusion of tractors in relation to selected socio-economic characteristics of the farmers. It includes the biographical set like education, age, agricultural knowledge, size of family, formal social participation, and income. The resources set includes; farm size, irrigated area, and area under sugarcane, while the communications set includes cosmopoliteness, information seeking through agricultural

training, participation, observation, and mass media, etc.

Further, dependent and independent variables selected for this study are elaborated here. Adoption of the tractor is the dependent variable, while the socio-economic characteristics of the farmers are independent variables. The tractor owner farmers have given the adoption score, according to the following formula.

Adoption Score = 1983 - K

Where K is the year of actual adoption of a tractor. The farmers who have adopted a tractor in the year 1983 has given score as zero, and who have adopted a tractor in the year 1957 has given score as 26. The tractor owner farmers are categorized as follows, on the basis of their adoption scores. The maximum adoption scores are 24.

1) 0 to 3 adoption score (Low)
2) 4 to 12 " " (Medium)
3) 13 and above " " (High)

With the help of the scoring scheme the individual scores of all the respondents were worked out with respect to socioeconomic characteristics; so as to group them in various categories.

The relationship between adoption score of tractor of the farmers and their personal characteristics is studied here.

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Various subhypothesis indicating specific directions between adoption score and each of the other characteristic are tested here. Person's correlation coefficient (r), and chi-square $(X)^2$ were computed for this purpose. The significance of the correlation coefficient is tested by the use of student's 't' table.

3. Analysis of the characteristics of adopter farmers :

A. The Biographical set :

a) Education

Formal education is a key to print media, persons with no education or low education are deprived of reading and thus gaining knowledge through leaflets, newspapers, farm magazines, book etc. Due to modern technology and communication facilities, more information is communicated through these chanals. Farmers with higher education are likely to use more of these chanals and seek more information.

Higher education develops positive attitudes towards modern technology in the field of agriculture. They are not tradition bounded, not superstitious compared with the persons who are not educated at all. So education plays an important role in the field of agriculture. It could be argued that education influences the course of behaviour of both individual and society.

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For the purpose of this study formal education was measured in terms of school grades and college years completed by the farmers. Each school grade or college year completed was assigned a score of one. Thus the total education score of a farmer was calculated. For example, if a farmer has completed 3rd grade i.e. primary school, his education score would be three.

For testing the association between education and adoption score, the following categories of farmers were made on the basis of their education scores.

1) 0 to 2 (Low)
2) 3 to 4 (Medium)
3) 5 and above (High)

The distribution of the farmers by their education (Table 5.1) shows that percentage of the farmers with middle education is larger than that of no education or low education (only can read and write). There are only 11 farmers who were illiterate and only can read and write. The mean education score was 3.67 (i.e. upto middle school standard). The maximum education level reported was post graduate degree. Almost all the farmers nearly 96 attended school and know reading and writing. Only 4 of the respondents had no opportunity to attend school and get formal education.

Hence the hypothesis : Higher the adoption score of tractor lower the educational score of the farmer.

Table 5.1 Distribution of the tractor adopter and non-adopter farmers by their characteristics.

Characteristics	ADOPTER			NON ADOPTER		
	Number of Farmers n=100	Mean	Range	Number of Farmers n=21	Mean	Range
1	2	3	4	5	6	7
A) The Biographical set						
a) Education (scores)						
i) 0 to 2	11	3.67	0- 7	10	2.33	0- 5
ii) 3 to 4	56	-		8		
iii) 5 and above	33			3		
b) Age (years)						
i) 38 and above	38	45.62	21-75	2	50.42	32-79
ii) 39 to 50	31			8		
iii) 51 and above	31			11		
c) Agri.knowledge (scores)						
i) 0 to 12	20	15.01	8-20	16	11.66	6-18
ii) 13 and 16	59			1		
iii) 17 and above	21			4		

Cont..

1	2	3	4	5	6	7
d) Size of family members						
i) 1 to 4	38	6.54	2-25	8	5.38	2-9
ii) 5 to 7	30			9		
iii) 8 and above	32			4		
e) Formal social participation (score)						
i) 0 to 2	17	3.81	0-7	11	2.33	1-4
ii) 3 to 4	51			10		
iii) 5 and above	32			-		
f) Income (in Rs.)						
i) 15,000 and below	21	31,400	9,000 to 1,50,000	21	6,190	2,400-10,000
ii) 15,001 to 30,000	47			-		
iii) 30,001 and above	32			-		
B) The Resources set						
a) Farm size (in acres)						
i) below 6	30	11.08	1-55	16	5.57	½-15
ii) 6.1 to 9	35			2		
iii) 9.1 and above	35			3		

Cont..

1	2	3	4	5	6	7
b) Irrigated area (in acres)						
i) 4.5 and above	34	7.51	1-25	21	1.04	0-4
ii) 4.6 to 7	27			-		
iii) 7.1 and above	29			-		
c) Area under Sugarcane (in acres)						
i) upto 3	35	5.23	1-25	21	0.61	0-3
ii) 3.1 to 5	32			-		
iii) 5.1 and above	33			-		
C) The communication set						
a) Cosmopoliteness (Score)						
i) 0 to 4	38	5.29	0-9	16	3.85	2-9
ii) 5 to 6	31			2		
iii) 7 and above	31			3		
b) Information seeking through agri.training (score)						
i) 0 score	41	3.85	0-10	16	0.95	0-5
ii) 5 scores	41			4		
iii)10 scores	18			1		

Cont..

1	2	3	4	5	6	7
c) Information seeking through participation (score)						
i) 0 to 1	28	3.34	0-9	14	1.3	0-4
ii) 2 to 4	39			7		
iii) 5 and above	33			-		
d) Information seeking through observation (score)						
i) 0 scores	38	1.71	0-6	15	0.66	0-4
ii) 1 to 2	38			4		
iii) 3 and above	24			2		
e) Information seeking through mass media (score)						
i) 0 to 3	21	5.64	0-10	10	3.52	0-7
ii) 4 to 6	37			10		
iii) 7 and above	42			1		

The data about the farmer's education and adoption score are presented in the Table 5.2.

Table 5.2 Percentage distribution of the tractor owner farmers by education and adoption score of the tractor.

Adoption Score	Educational Score			
	0 to 2 n=11	3 to 4 n=56	5 and above n=33	total n=100
Low (o to 3)	27.27	28.57	39.40	32
Medium (4 to 12)	45.46	42.86	30.30	39
High (13 and above)	20.58	24.32	44.82	29
Total	100	100	100	100

Chi square = 7.14 d.f. = 4 not significant at 0.05 level.

By applying the $(X)^2$ test it was found that the calculated value of $(X)^2$ test is 7.14 and critical value of $(X)^2$ test at 4 degree of freedom for 5% level of significance are 9.49. As calculated value is lesser than the critical value so have accepted the null hypothesis i.e. there is no correlation between education and higher adoption score of the tractor.

The person's correlation coefficient r=0.037 has also brought out a negative correlation between these to variables.

The significance of the correlation coefficient has been tested by student's 't' table, by the formula :

$$t = r\sqrt{\left(\frac{n-2}{1-r^2}\right)}$$

The calculated value of 't' is 0.366. Hence, the table value of 't' at 98 degrees of freedom at 0.05 level is greater than the calculated value of 't' (t=0.366). Hence, the hypothesis regarding formal education and higher adoption score of tractor is accepted. It is also represented by Fig.5-1A. Eventhough it was noticed that the high adoption score is medium.

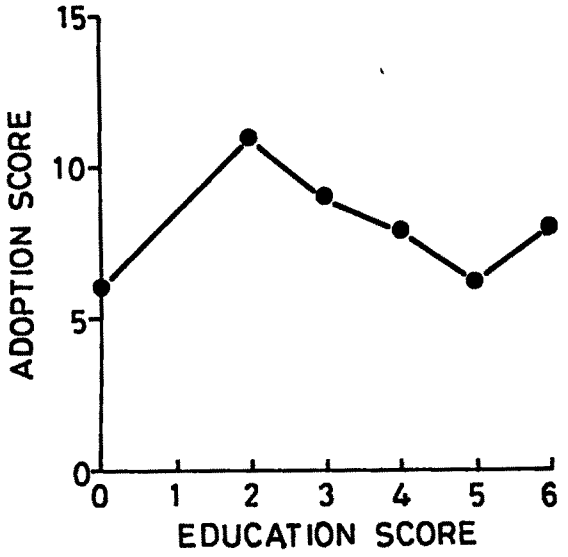
In case of non adopters the proportion of the farmers with low education score is larger (10) than that of medium or high education. The mean education score was 2.33 (i.e. upto primary school). The maximum education level reported was high school. Due to the low education score the farmers are tradition bounded. Hence, they could not develop positive attitudes towards modern technology in the field of agriculture.

b) Age

Age is one of the basic characteristics of an individual. His activities are restricted by his age. There is a traditional thinking that age brings wisdom. But under the process of modernization, age is now replaced for wisdom by the technical competence, social accessibility and cosmoploitencess. It is

Relationship of Education with adoption score of Tractor

(A)



Relationship of Age with adoption score of Tractor

(B)

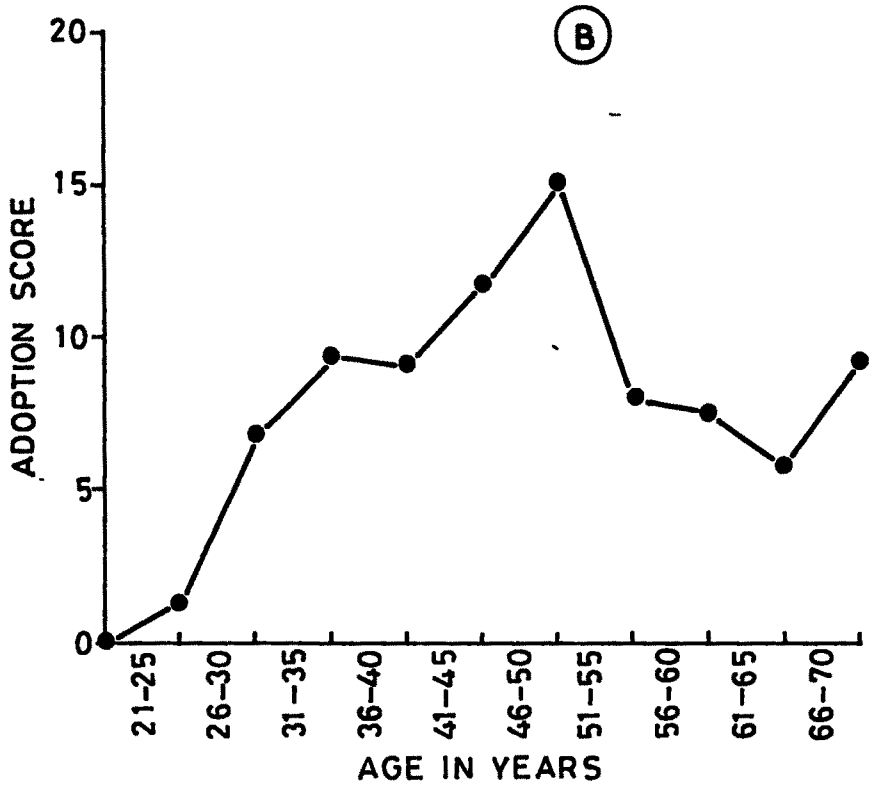


Fig. 5·1

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expected that young persons in a village are more active in the field of agriculture. They adopt the innovation as early as possible.

For the purpose of this study chronological age in completed years at the time of the interview was considered. Farmers were categorised into three groups on the basis of their age to ascertain its association with the adoption score of the tractor by computing chi squares. The categories made for the chi square test were.

1) up to 38 years (young)
2) 39 to 50 years (medium)
3) 51 and above years (old)

Table 5.1 reveals that the proportion of young farmers was larger than those of the middle age group and old age group. The mean age for all the respondents was 45-62 years. The range is 21 to 75 years.

Age limits an individual activities in a day to day life. Young persons often are more active and enthusiatic than others. They are likely to put in more efforts to seek correct and latest agricultural information than to the older persons. On these basis it is hypothesied that the highest adoption score of tractor is not related to the older age of the farmer.

The data pertaining to the tractor adopter farmer's age and tractor adoption score are presented in Table 5.3.

The critical value of the $(X)^2$ test is 9.49 and the calculated value of the $(X)^2$ test is 6.04. As calculated value is lower than the critical value, so accepted the null hypothesis, i.e. the highest adoption score of tractor is not related to the older age of the farmer.

Table 5.3 Percentage distribution of the tractor adopter farmer by their age and adoption score of tractor.

Adoption Score	Age in years			
	up to 38 n=31	39 to 50 n=38	51 & above n=31	Total n=100
Low (0 to 3)	38.70	23.68	35.48	32
Medium (4 to 12)	35.48	44.73	35.48	39
High (13 and above)	25.80	31.57	29.03	29
Total	100	100	100	100

Chi square = 6.04 d.f.=4 not significant at the 0.05 level.

The person's correlation coefficient (r) is 0.004. The result has been tested by student's 't' table. The value of 't' at 98 degrees of freedom at 0.05 level is greater than the calculated value of 't' (0.392). It can, therefore, be concluded that the highest adoption score of tractor is not related to the older age of the farmer. This relationship is depicted in Fig.5-1B.

Significant association is noticed between the tractor adopter farmer's age and tractor adoption score by them. The high adoption score is more among medium age group farmers (46-50 years), while it was the lowest among the farmers whose age group falls between 21 to 25 years and 61-65 years.

Among the non adopters the proportion of old farmers were large (11) than young farmers. The mean age for all the farmers was 50.42 years. The range is 32-79 years. As a result they are inactive in the field of agriculture.

c) Agricultural knowledge

Knowledge of an innovation is a pre-requisitive for its adoption. The extent to which a farmer possesses knowledge is likely to influence their adoption. English et al.,(1958) defines knowledge as a body of understood information possessed by an individual or by a culture. They further explained, "Knowledge is that part of a person's, information in accord with established fact".

Agricultural knowledge refers to the degree to which a farmer is aware of and has learnt about an agricultural enterprise. For the purpose of this study two criteria i.e. awareness and correct information about agricultural innovations were used to measure the agricultural knowledge of the farmer. A farmer was asked to whether he knew anything about the innovations selected for the study. If he answered 'yes' or indicated that he knew or heard about the inovation, he was credited with being aware of

the existence of that innovation. Awareness of an innovation was assigned a score of one, and non awareness a score of zero. After ascertaining the awareness, the farmers was asked to give details pertinent to the innovation by posing a question 'What is it?'. If he answered the question correctly, he was credited with a score of two. Thus a farmer is tested for ten agricultural innovations selected for this study. His total agricultural knowledge score was obtained by addiing all the scores of awareness and knowledge.

The relationship of agricultural knowledge with the adoption score was computed by using chi square test. The farmers were categorized on the basis of their agricultural knowledge scores as mentioned below.

1) 0 to 12 scores (Low)
2) 13 to 16 scores (Medium)
3) 17 and above scores (High)

It was observed from the distribution of these farmers on the basis of their agricultural knowledge scores that the 20 farmers had low score while 59 farmers possessed medium score. Whereas 21 farmers had high score. The mean agricultural knowledge score of the farmer is 14.51.

It is observed that a majority of the farmers (more than 75%) had correct knowledge of improved seeds, soil testing, improved implements, insecticides, uria, but the seed treatments

Table 5.4 Distribution of the farmers by their knowledge of each selected innovation.

Sr.No.	Innovations	Awareness	Correct knowledge
1.	Soil testing	93	78
2.	Green mannure	70	63
3.	Compost making	93	69
4.	Urea	89	73
5.	Mixed fertilizer	56	49
6.	Improved seed	98	80
7.	Seed treatment	34	29
8.	Insecticide	100	81
9.	Improved implement	100	97
10.	Cross breed cow	86	63

were not understood correctly by 70% of the farmers. The agricultural knowledge ranged from 8 scores to 20 scores. Hence the hypothesis : Highest adoption score of tractor is not related to the higher agricultural knowledge score of the farmer.

The critical value of the $(X)^2$ test at 4 degree of freedom (df) for 5% level of significance are 9.49, whereas calculated value of $(X)^2$ test is 54.43. As the calculated value is greater than critical value, hence have rejected null hypothesis; and

Table 5.5 Percentage distribution of tractor adopter farmers by their agricultural knowledge and adoption score of the tractor.

Adoption Score	Agricultural knowledge score			
	0 to 12 n=20	13 to 16 n=54	17 & above n=21	Total n=100
Low (0 to 3)	60	28.81	14.28	32
Medium (4 to 12)	30	39.49	47.63	39
High (13 and above)	10	32.20	38.09	29
Total	100	100	100	100

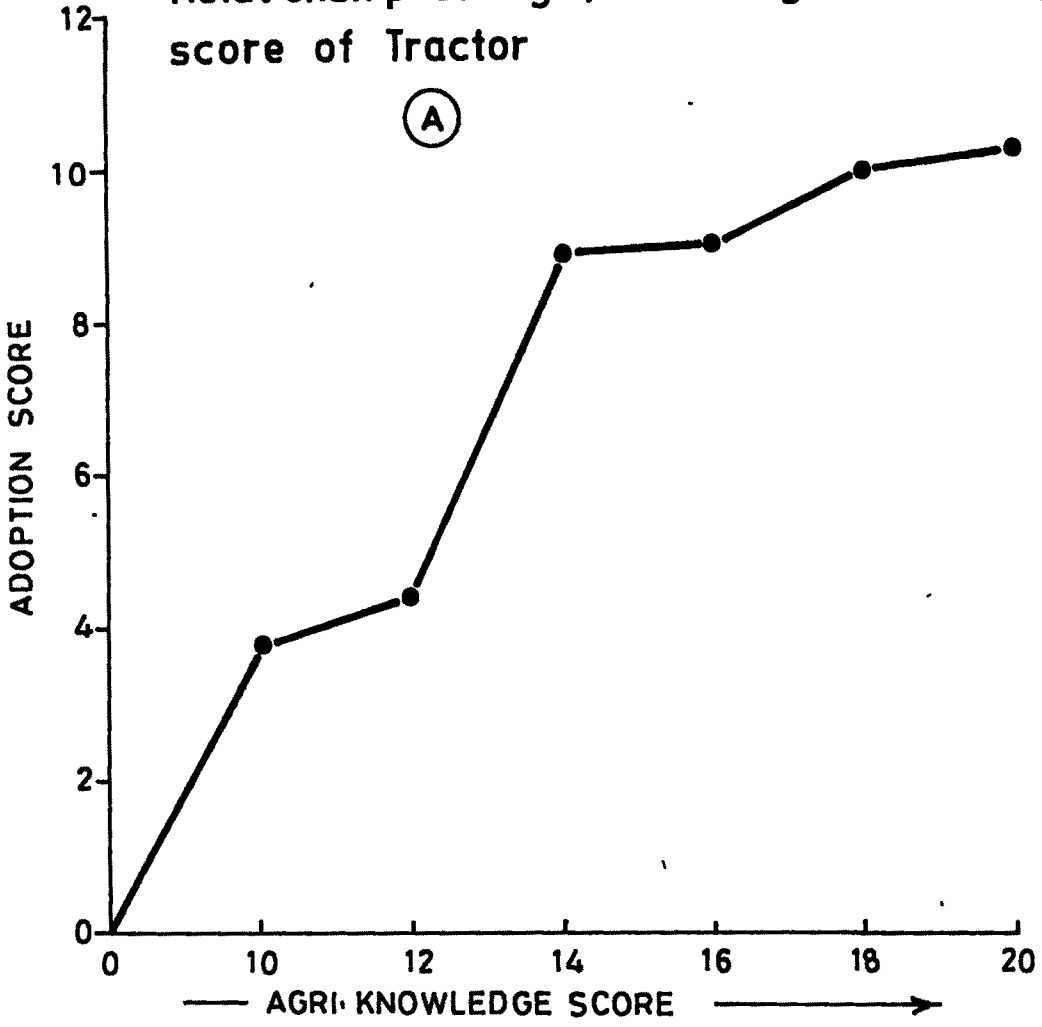
Chi square=54.43 d.f.=4 Significant at 0.05 level

accepted alternative hypothesis; i.e. there is significant association between higher adoption score of the tractor and high agricultural score of the farmer.

The person's correlation coefficient (r=0.33) also suggested that the respondent's level of agricultural knowledge is positively related to his adoption score of tractor. The result of r (r=0.33) has been tested by the student's 't' table. The calculated value of 't' at 98 degree of freedom at the 0.05 level is 3.463. So there is relationship between agriculture knowledge of the farmer and adoption score of the farmer (Fig.5-2A).

Relationship of Agri, knowledge with Adoption score of Tractor

(A)



Relationship of Size of Family with Adoption score of Tractor

(B)

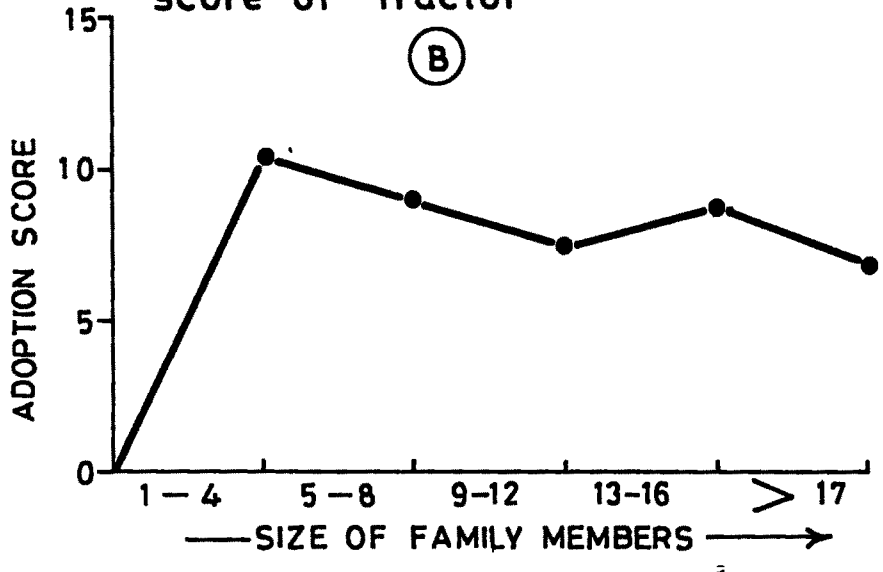


Fig. 5·2

Regarding the nom responded it was observed from the proportion of the farmers on the basis of their agricultural knowledge scores that the 16 farmers had low score (below 12). The mean agricultur knowledge score was only 11.66. The low agriculture knowledge is an obstaicle in adopting the new technology.

d) Size of family

Association of the size of the family members with adoption score of tractors was ascertained by computing the chi square.

The following categories were made to compute the chi square values.

1) 1 to 4 members (Small)
2) 5 to 7 members (Medium)
3) 8 and above members (Large)

Majority of farmers belonged to small size of the family (38), while the members having more than 8 are about 32 (Table 5.1) The mean of the size of the family members were 6.54 and the range was from 2 to 25 members. The farmers having family members more than 15 are very less, (only 2).

Tractor, is a labour saving inputs, used for several operations in agriculture, so it is hypothesized that : Highest adoption score of tractor is not related to the large size of family.

Table 5.6 Percentage distribution of tractor adopter farmers by their size of family members and adoption score of tractor.

Adoption Score	Size of family member			
	1 to 4 n=38	5 to 7 n=30	8 & above n=32	Total n=100
Low (0 to 3)	26.31	33.33	37.5	32
Medium (4 to 12)	42.19	36.67	37.5	39
High (13 and above)	32.50	30.00	25.0	29
Total	100.00	100.00	100.0	100

Chi square 3.17 d.f.=4 not significant at 0.05 level

By applying the chi square test it is found that critical value of $(X)^2$ test at 4 degrees of freedom at 5% level (9.49) is greater than critical value (3.17) of chi square test. So the null hypothesis is aceepted .

The person's correlation coefficient (r=0.15) and the result tested by applying the student's 't' table, reveals that there is no significant relationship, because the value of 't' is 1.5 lesser than the table value of 't' at 98 degrees of freedom at 0.05 level. As a result higher adoption score of tractor is related to small size of family. This relationship is also depicted in the Fig.5-2B.

In case of non adptors about 8 farmers belong to small size of the family (1 to 4 members), while the families having more than 8 members are only 4. The mean of the size of the family members were 5.38. These farmers use the maximum manual labour for agricultural purposes, so they do not adopt the tractorisation for agriculture.

e) Formal social participation

Formal social participation refers to association of an individual with formal organizations. Due to participation an individual's involvement in an organization is concerned. This influences behaviour of the participating individual.

In this study formal social participation in the form of membership, in each formal organization was considered and given a score of one, two, and three respectively. All formal registered organizations were covered in the study irrespective of whether these were voluntary or involuntary, statutory or nonstatutory. Farmer's formal social participation score was obtained by adding his participation scores in different organizations.

Association of formal social participation with the adoption score ascertained by computing the chi square test. The farmers were categorized on the basis of their formal social participation score as follows.

1) 0 to 2 scores (Low)
2) 3 to 4 scores (Medium)
3) 5 and above scores (High)

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The distribution of the farmers by their formal social participation scores indicates that, the proportion of low social participation farmers is lowest (17) whereas the proportion of moderate participation farmers is highest (51). This is followed by third category which has also high participation scores. The range was from 0 to 8.

Table 5.7 Distribution of the farmers by their formal social participations

Sr. No.	Name of the organization	Membership n=100
1.	Multipurpose co-operative society	100
2.	Dairy co-operative society	94
3.	Co-operative sugar factory	98
4.	Shetakari sangh	49
5.	Gram panchayat	33
6.	Panchayat samiti	4
7.	Zillha parishad	2
8.	Any other	1

The data reveals that all the farmers are members of multi purpose co-operative societies (100). It is followed by co-operative sugar factory (98) and co-operative dairy societies (94). The minimum number of the membership was panchayat samiti (4% and

Zillha parishad. These organizations provide inputs needed for farming.

A tractor adopter farmer's participation in informal organizations creates opportunities for him to go and meet other persons, express his feelings, interests and needs and also share experiences. Linkage of his organizations with other organizations out side the village also creates good opportunities for him to visit urban centres where he is exposed to many new ideas. On these back grounds it is hypothesised that : Highest adoption score of tractor is not related to the high score of formal social participation of the farmer.

Table 5.8 Percentage distribution of the tractor adopter farmers by formal social participation and adoption score of the tractor.

Adoption Score	Formal social participation score			
	0 to 2 n=17	3 to 4 n=51	5 & above n=32	Total n=100
Low (0 to 3)	32.29	31.38	31.25	32
Medium (4 to 12)	52.44	33.33	40.62	39
High (13 and above)	14.27	35.29	28.13	29
Total	100.00	100.00	100.00	100

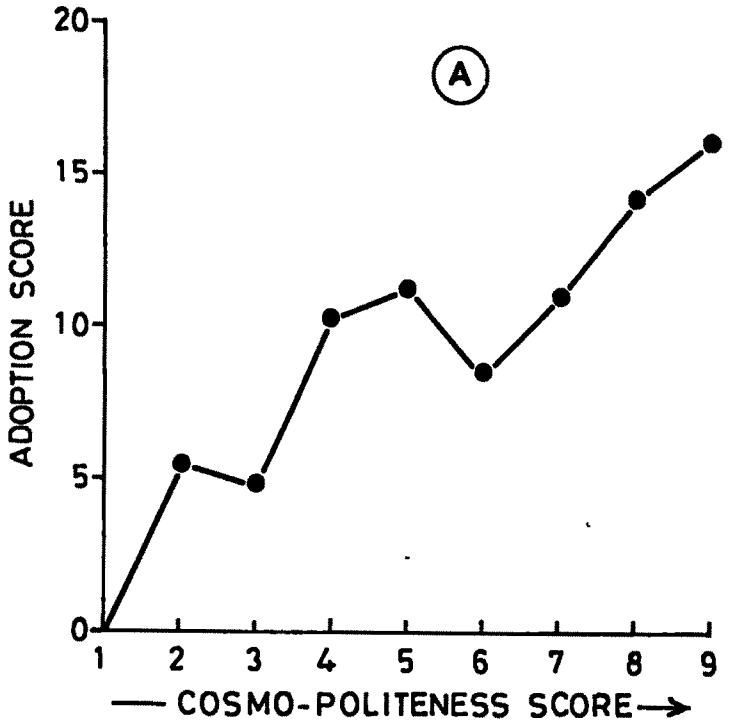
Chi square 18.02 d.f.=4 significant at 0.05 level.

The critical value of chi square at 4 degree of freedom (df) for 5% level of significance is 9.49, whereas calculated value of chi square $(X)^2$ is 18.02. As the calculated value of chi square is greater than the critical value, so rejected null hypothesis. Hence, there is significant association between higher adoption score of tractor and high formal social participation score of the farmer.

Person's correlation coefficient (r=0.26) also brought out a positive relationship. The result of the correlation coefficient (r=0.26) has been tested by student's 't' table. The calculated value of 't' is 2.68. This value is greater than the table value of 't' at 98 degree of freedom (d.f.) at the 0.05 level. So have rejected null hypothesis. Relationship of formal social participation with adoption score of tractor shown in Fig.5-3B also reveals the definite relationship between them.

The distribution of the non adoptor farmers by their formal social participation score indicates that the proportion of low participation farmers and the moderate proportion of farmers was the same. There was no farmer who had high participation score. The average score was 2.33. The range was from 0 to 4. Most of them were the members of the Gram Panchayat, but they were not members of the co-operative sugar factory, Dairy co-operative society, Shetkari Sangh, which tends to influence the number and the type of the facilities available to the farmers.

Relationship of Cosmo-politeness with Adoption score of Tractor



Relationship of Formal social Participation with Adoption score of Tractor

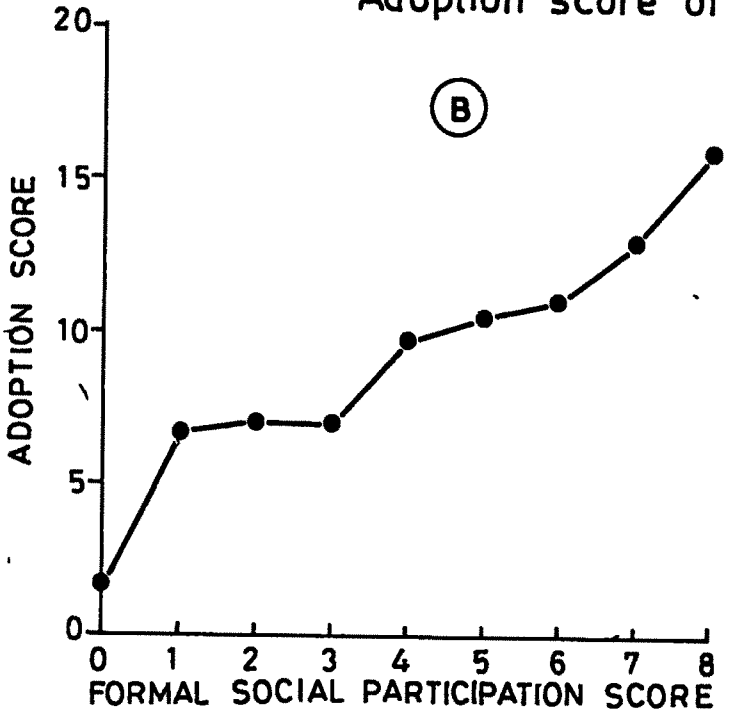


Fig. 5·3

f) Income

Adoption of innovations always involves additional expenditure for a farmer. Farmers with better economic conditions can afford to purchase news papers, subscribe to farm magazines, possess radio, visit$ to research stations, or research offices, that increases their technical competence. It is therefore, expected that better economic conditions influence the farmers adoption behaviour. Higher economic status helps them to influence other farmers in the adoption process. It has been observed that non availability of adequate agricultural inputs is one of the bottlenecks in bringing about technological change in agriculture (Ashakant, 1968). Very often inadequate and untimely supply of inputs results in colling down the enthusiasm of farmers in adopting an inovation.

For the purpose of this study income of the farmers family from all sources for the year 1982-83 was considered. Generally an individual hesitates to reveal his exact income. This information was sought at the end of the interview. The following categories were made to compute the chi square values.

1) Rs.15,000 and below (Low)
2) Rs.15,001 to 30,000 (Medium)
3) Rs.30,001 and above (High)

The main source of income of the farmers is through agricultural productions. The distribution of the respondents

(Table 5.1) by their income shows that the largest number of farmers (47) are belonging to middle income group, the number of the lowest income group farmers is comparatively less (21). Income ranges from nine thousand to one lakh fifty thousand rupees. The farmers average income is Rs.31,400/-. Hence the hypothesis : Higher adoption score is not related to higher income of the farmer.

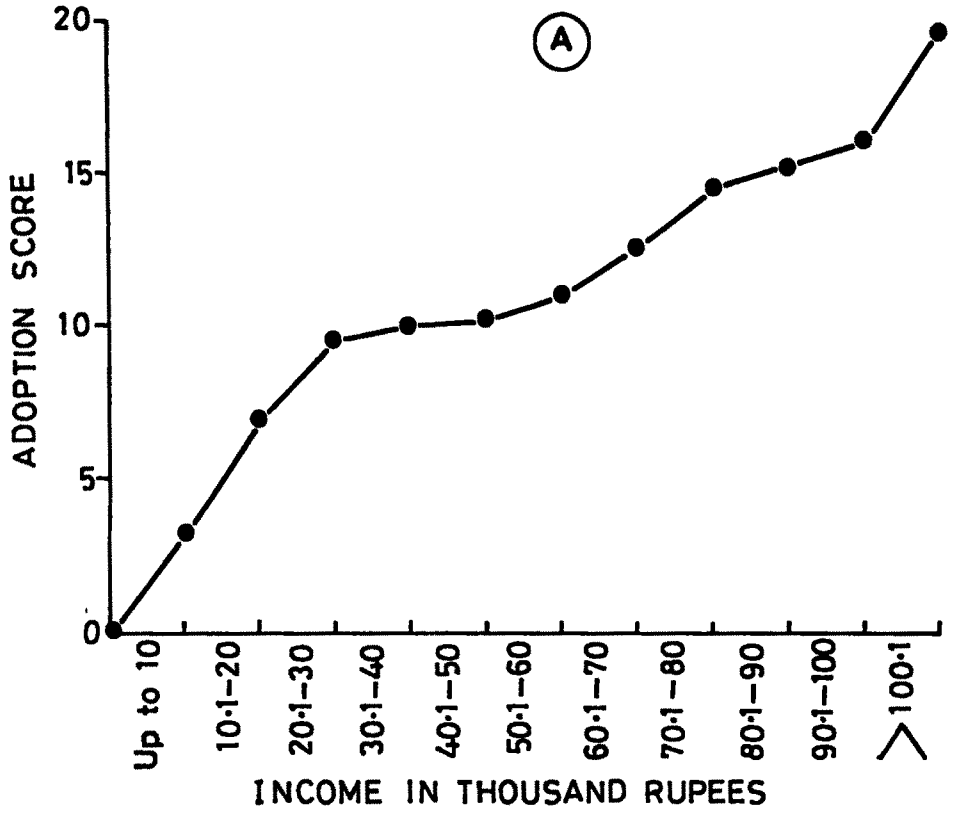
Table 5.9 Percentage distribution of the tractor adopter farmers by their income and tractor adoption score.

Adoption Score	Income in Rupees			
	up to 15,000	15,001 to 30,000	30,001 & above	Total
	n=21	n=47	n=32	n=100
Low (0 to 3)	42.85	34.06	21.67	32
Medium (4 to 12)	42.85	38.29	31.51	39
High (13 and above)	14.40	27.65	40.62	29
Total	100	100	100	100

Chi square = 21.4 d.f.=4 significant at 0.05 level.

The calculated value of chi square $(X)^2$ test is 21.4 which is higher than the (9.49) critical value of chi square. So rejected the null hypothesis, and accepted alternative hypothesis, i.e.

Relationship of income with adoption score of Tractor



Relationship of Farm size with adoption score of Tractor

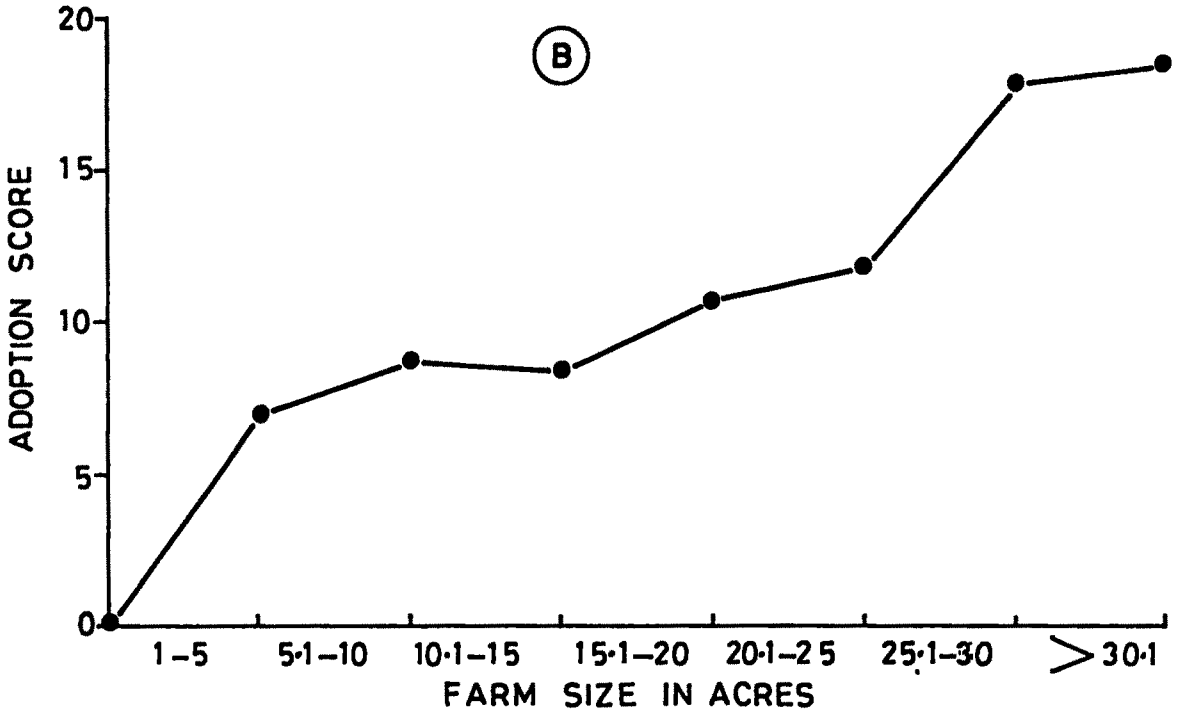


Fig. 5·4

there is significant association between higher adoption score of the tractor and adequate income of the farmer.

The person's correlation co-efficient (r=0.37) also indicates a significant and positive relationship between two variables. In order to evaluate the differences more clearly 't' table is carried out. The calculated value of the 't' is 3.94 much higher than the table value of 't' at 98 degree of freedom at the 0.05 level. Hence, the higher adoption score of tractor is related to adequate income of the farmer. The positive relationship between these two variables is also represented in Fig.5-4A.

The income of all the non responded farmers is below ten thousand. Income ranged from 2,400 to 10,000. The farmers average income was 6.19 thousands. Such farmers are not economically well off to adopt the tractors.

B. The Resources set :

a) Farm size

In an agricultural economy the value of land hardly needs any emphasis and in fact it is one of the most important indicators to measure ones socio-economic status. Several sociological and socio-anthropological studies have well established this fact (Roy,1968; Freeman,1961; Panse and Singh,1966).

An important consideration in the adoption of tractor is

the financial ability to innovate. Tractor involves an investment of about thirty five thousand rupees, which amounts to as much as 25% of the value of an average farm. Loans for investment in farms are generally difficult to obtain, however government loans for installation of tractors are available, but government loans involve restrictions on landuse. Tractor can be used economically only in contiguous and large strip of fields.

In this study, farm size was measured in terms of acres (both land owned and land taken on lease) cultivated by the farmer during the year 1982-83. Association of the farm size with adoption score was ascertained by computing the chi squares. The following categories were made to compute the chi square values.

1) 6 acres and below (Small)
2) 6.1 to 9 acres (Medium)
3) 9.1 and above acres (Large)

The farm size distribution indicates that (Table 5:1), the proportion of farmers who had medium size farms and large farms in the same (35). The proportion of farmers who had small farms is comparatively less than middle and large farms. The mean farm size was 11.08 acres. The farms ranged from 2 acres to 55 acres.

Hypothesis : Higher adoption score of tractor is not related to large size of holdings.

Table 5.10 Percentage distribution of the tractor adoptor farmers by farm size and adoption score of tractor.

Adoption Score	Land holding in acres			
	upto 6 n=30	6.1 to 9 n=35	9.1 & above n=35	Total n=100
Low (0 to 3)	42.33	22,85	31.42	32
Medium (4 to 12)	30.00	40.00	45.73	39
High (13 and above)	26.67	37.15	22.85	29
Total	100	100	100	100

Chi square 12.56 d.f.=4 significant at 0.05 level.

By applying the chi square $(X)^2$ test it was found that the calculated of $(X)^2$ test is 12.56 and critical value of $(X)^2$ is 9.49. As calculated value is higher than the critical value, so have rejected the null hypothesis, and accepted the alternative hypothesis, i.e. there is significant association between higher adoption score of the tractor and large size of holdings.

The person's correlation coefficient (r=0.32) also indicates a positive relationship between two variables. This result has been tested by student's 't' table. The calculated value of 't' is 3.35 which is greater than the table value of 't'. Hence, the

null hypothesis is rejected. This positive relationship is presented in Fig.5-4B.

In case of non responded farmers the farm size distribution indicates that the proportion of farmers who had small farm size (below 6 acres) was higher (16) than medium and large farms. The farms ranged from 0.5 acre to 15 acres. The average size of the farms is 5.57 acres. Because of dry farming and low holding of the farm they could not get loan from the banks, co-operative society, and sugar factory to purchase a tractor.

b) Irrigated area

Irrigation is needed for the life-breathe of agriculture. Its importance in the development of agriculture in general and monsoonal countries in particular hardly needs any emphasis. Very often it plays a decisive role in selection of crops to be sown; cropping pattern, intensity of cropping, crop combination extent of yield and time of sowing the crops.

Almost all the studies conducted to find out the impact of irrigation facilities on adoption of agricultural innovatàtion have concluded the positive correlationship between the two variables, viz. farmers with adequate and assured irrigation facilities adopt improved agricultural practices much earlier as compared to others (Mohammad,1976; Rangaswamy,1972; Bowden,1965).

The analysis of irrigated area per farmer depicted in Table 5.1 reveals that middle category comprises 37 farmers

followed by first category (34). Relatively high irrigated acrage is possessed by only 29 of the farmers. The mean of the irrigated area is 7.51 acres, and this area ranges from 1 acre to 25 acres. Association of the irrigated area with adoption score of tractor is ascertained by computing the chi square values.

1) Below 4.5 acres (Small)
2) 4.6 to 7 acres (Medium)
3) 7.1 acres and above (Large)

Hypothesis : Higher adoption score of tractor is not related to larger irrigated area hold by individual farmer.

Table 5.11 Percentage distribution of the tractor adopter farmers by their area under irrigation and tractor adoption score.

Adoption Score	Area under irrigation in acres			
	upto 4.5 acres n=34	4.6 to 7 n=37	7.1 & above n=29	Total n=100
Low (0 to 3)	41.30	35.14	17.32	32
Medium (4 to 12)	38.22	40.54	37.94	39
High (13 and above)	20.58	24.32	44.82	29
Total	100	100	100	100

Chi square=21.4 d.f.=4 Significant at 0.05 level.

By applying the chi square test it is found that critical value of $(X)^2$ is 9.49, whereas calculated value of chi square $(X)^2$ is 21.4. The calculated value of chi square test is greater than the critical value, so rejected the null hypothesis. Hence there is significant association between higher adoption score of tractor and larger irrigated area.

The person's correlation coefficient (r=0.39) also showed a positive relationship, between two variables. In order to evaluate the differences more clearly 't' table is carried out. The calculated value of the 't' is 4.21, much higher than the table value of 'T'. So, the higher adoption score of tractor is related to the farmers having larger irrigated area. The positive relationship between these two variables is also represente by Fig.5-5A.

All the 21 non responded farmers had the irrigated area below four acres. Out of 21 farmers, 8 farmers had no irrigated area. There were only two farmers having an irrigated area of 4 acres. The mean of the irrigated area was 1.04 acres. The main source of irrigation is well, which is not assured, so it affects on cropping pattern, intensity of cropping, extent of yield, and time of sowing the crops, so they can not adopt tractor on their farms.

c) Area under sugarcane

Mechanisation of agricultural is taking its roots, where cash crops are grown. In the study region sugarcane is the major

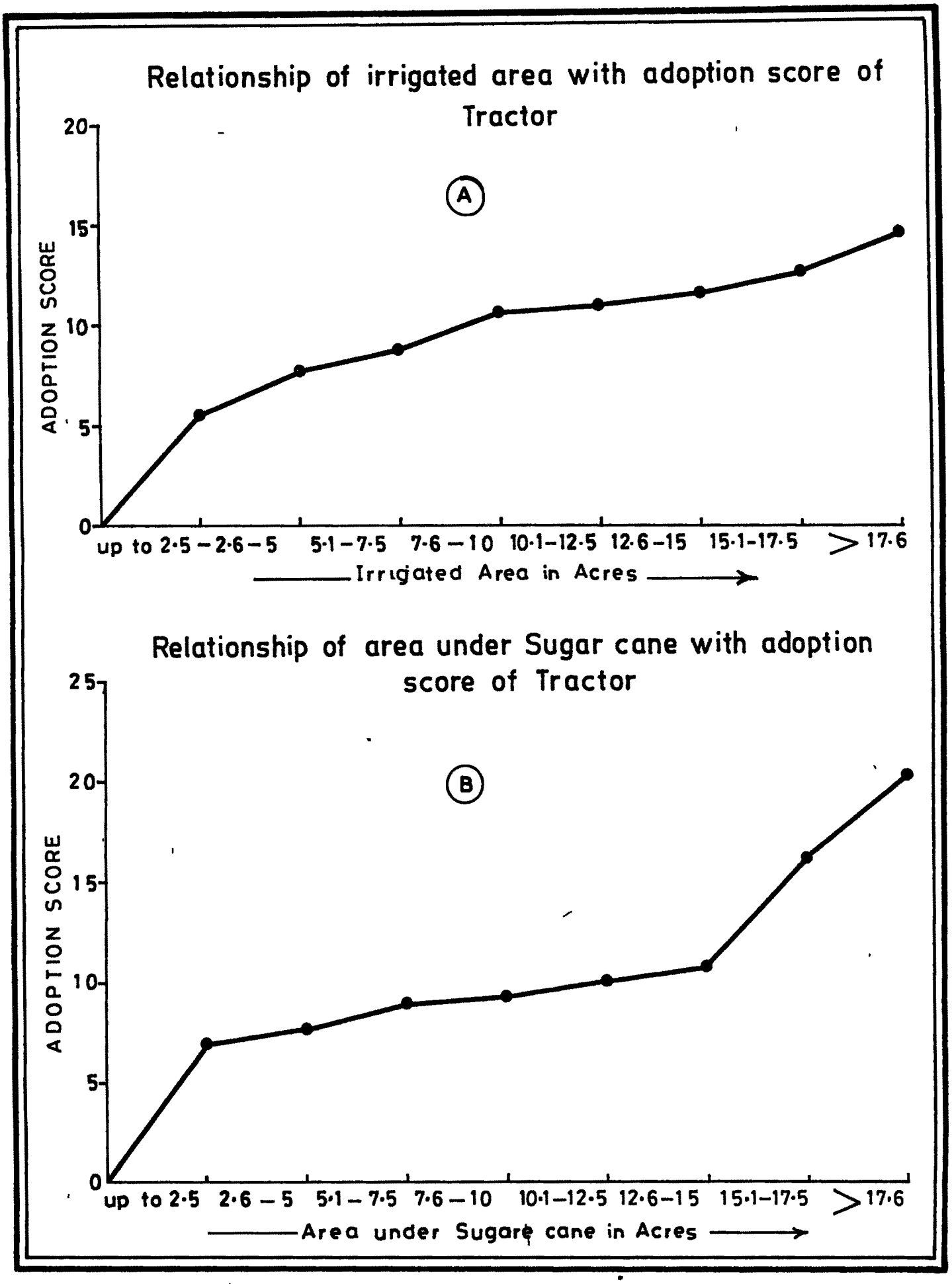

Relationship of irrigated area with adoption score of Tractor
A
ADOPTION SCORE
0
5
10
15
20
up to 2·5
2·6 – 5
5·1 – 7·5
7·6 – 10
10·1 – 12·5
12·6 – 15
15·1 – 17·5
> 17·6
Irrigated Area in Acres
Relationship of area under Sugar cane with adoption score of Tractor
B
ADOPTION SCORE
0
5
10
15
20
25
up to 2·5
2·6 – 5
5·1 – 7·5
7·6 – 10
10·1 – 12·5
12·6 – 15
15·1 – 17·5
> 17·6
Area under Sugare cane in Acres

Fig. 5·5

cash crop by which farmers are able to invest more in such improved implements. Tractor is a very important implement which has become popular in sugarcane growing areas due to its multiple uses, Karveer tahsil ranks first with 50 tractors per 1000 hect. of cultivated cane area. Tractor is used for deep ploughing which is essential for cane cultivation.

In this study, the area under sugarcane is measured in terms of acres cultivated by the farmer during the year 1982-83. Association of the area under sugarcane with adoption score was ascertained by computing the chi squares. The following categories were made to compute the chi square values.

1) 3 acres and below (Small)
2) 3.1 to 5 acres (Medium)
3) 5.1 and above (Large)

The distribution of the farmers by holding area under sugarcane in the year 1982-83 shows (Table 5.1) that nearly 35 farmers were upto 3 acres. The proportion of the farmers who had medium size farms and large size farms of sugarcane area were nearly the same. The mean area under sugarcane was 5.23 acres. This area ranged from 1 acres to 25 acres.

Hypothesis : Higher adoption score to tractor is not related to large size of sugarcane holdings.

The calculated value of chi square $(X)^2_p$ test is 15.96 which is higher than the critical value of chi square. Hence, the

Table 5.12 Percentage distribution of tractor adopter farmers by their area under sugarcane and adoption score of tractor.

Adoption Score	Area under sugarcane in acres			
	upto 3 n=35	3.1 to 5 n=32	5.1 & above m=33	Total n=100
Low (0 to 3)	45.72	28.12	21.12	32
Medium (4 to 12)	37.14	37.51	42.52	39
High (13 and above)	17.14	34.37	36.36	29
Total	100	100	100	100

Chi square=15.96 d.f.=4 Significant at 0.05 level

test proves to be significant. Person's correlation coefficient (r=0.38) also brought out a positive relationship. The result of correlation coefficiemt tested by student's 't' table is (3.94) is greater than the table value of 't' at 98 degree of freedom at the 0.05 level. So rejected the null hypothesis and accepted alternative hypothesis, i.e. the higher adoption score of tractor is related to large size of sugarcane area. The positive relationship between these two variables is observed among the farmers whose area under sugarcane is more (Fig.5-5B).

Among the non respondence 10 farmers have no area under sugarcane. There was only one farmer who had 3 acres of area under sugarcane; remaining farmers had one-half to one acre. The mean area under sugarcane was 0.61 acres. As result these farmers are unable to invest more in such improved implements.

C. The Communication set :

a) Cosmopoliteness

Cosmopoliteness is defined as the degree to which an individual's orientation is external to a particular social system (Roger, M 1962).

Two concepts are generally used to operationalise cosmopoliteness. The first is attitudial in which the respondent is asked to indicate the degree of agreement or disagreement with the statement. The second one contains behavioural indicators in which the respondent reflects contacts with the sources external to his social system. This is measured in terms of trips made to cities or urban centres. Roger measured cosmopoliteness, in a columbian study by the number of trips made by the respondent to urban centres.

In this study trips to the district and the state head quarters were considered. Trips to district places during the year were measured in the form of categories, such as 1) Daily 2) More than once a week 3) Once a week 4) Once a fortnight

5) Once a month 6) Sometimes in a year 7) Never. These categories were assigned scores of 6,5,4,3,2,1 and 0 respectively. Visits to the state head quarters once or more in the past was given a score of three. Thus farmers cosmopoliteness was obtained by adding all the two scores.

For ascertaining the association of cosmopoliteness with the adoption score the chi square test was used. The categorises of farmers on the basis of their cosmopoliteness were made as follow.

1) 4 and below (Low)
2) 5 to 6 (Medium)
3) 7 and above (High)

The distribution of the farmers by their cosmopoliteness scores reveals that 38 of the farmers have low cosmopoliteness score while the number of the moderate and high cosmopoliteness score is the same. The average cosmopoliteness score for all the 100 respondents was 5.29. The range was 1 to 9.

More than half a farmers have visited district place daily on an average the farmers have visited district place i.e. Kolhapur at least once a month. This indicates that farmers have high cosmopoliteness score. Organization of educational tours for these farmers would change their out look and would help to make them more cosmopolite in their behaviour.

Cosmopoliteness denotes the tendency of a farmer to mix with the out side world of his social system. The cosmopolite are

Table 5.13 Distribution of the farmers by their visits to district place.

Sr.No.	Frequency	Number reported
1.	Daily	54
2.	More than once a week	8
3.	Once a week	25
4.	Once a fortnight	1
5.	Once a month	12
6.	Sometimes in a year	-
7.	Never	-

not traditional minded. They generally accept change earlier than the localities. They may seek more information about innovations. Hence it was presumed that a farmer's cosmopoliteness would influence his adoption score behaviour favourably, to ascertain this it is hypothesised that, higher adoption score of tractor is not related to the higher cosmopoliteness score of the farmer.

The critical value of the $(X)^2$ test at 4 degree of freedom (d.f.) for 1% level of significance is 13.28, whereas calculated value of chi square $(X)^2$ is 15.07. As calculated value is greater than the critical value, hence rejected the null hypothesis. So there is significant association between higher adoption score of tractor and high cosmopoliteness score of the farmer.

Table 5.14 Percentage distribution of the tractor adopter farmers by cosmopoliteness and adoption score.

Adoption Score	Cosmopoliteness score			
	4 and below n=38	5 to 6 n=31	7 & above n=31	Total n=100
Low (0 to 3)	36.7	38.7	19.3	32
Medium (4 to 12)	42.2	35.7	38.8	39
High (13 and above)	21.3	25.6	41.9	29
Total	100	100	100	100

Chi square=15.07 d.f.=4 Significant at the 0.05 level

This observation was further supported by the person's correlation coefficient (r=32) which also showed a positive relationship between these two variables. The r (0.32) value has been tested by student's 't' table which is 3.35. So have rejected null hypothesis. Hence there is significant relationship between the high adoption score and higher cosmopoliteness score of the farmer. This relationship is depicted in the Fig.5-3A. It was noticed that the high adoption score is more among the farmers with high cosmopoliteness.

The distribution of the non responded farmers by their cosmopoliteness score reveals that 16 farmers had low cosmopoliteness score (0 to 4). The average cosmipoliteness score for all

21 farmers was 3.85. The range was 2 to 9. This indicates the farmers low cosmopoliteness score. Hence they can not change their out look in normal course.

b) Information seeking through agricultural training

Information seeking through training refers to all activities of a farmer related to seeking of agricultural information through training classes, conducted by Agriculture University, Zillha parishad, and Department of Agriculture during the last five years.

For the purpose of this study the duration of training attended by a farmer was considered for assigning scores. Each day of the training attended was given scores of five and a score of zero for non attendence. The scores given to various trainings attended by a farmer were added together to obtain the individuals score of information seeking through training. The farmers were cataegorized on the basis of these scores as follows for computing the chi squares.

1) 0 score (Low)
2) 5 score (Medium)
3) 10 score (High)

Table 5.1 indicates that 59 of the farmers attended training and the rest did not attend it. The average information seeking through training score was 3.85. Hypothesis : Higher agricultural training score of the farmer is not related to higher adoption score of tractor.

Table 5.15 Percentage distribution of tractor adopter farmers by their information seeking through agricultural training and adoption score of tractor.

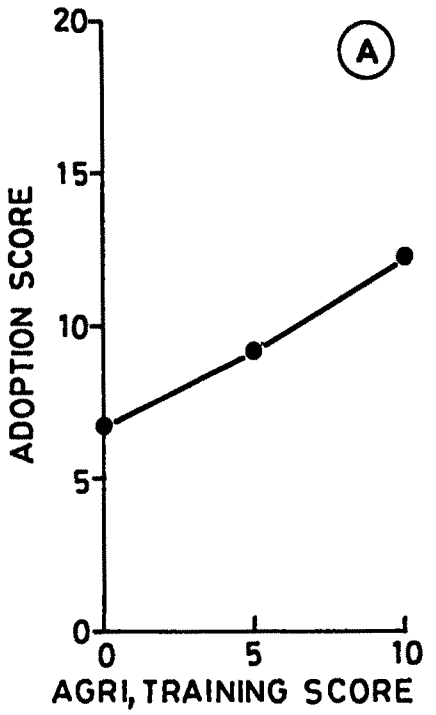
Adoption Score	Agricultural training score			
	0 n=41	5 n=41	10 & above n=18	Total n=100
Low (0 to 3)	41.46	31.70	11.12	32
Medium (4 to 12)	43.90	26.84	55.55	39
High (13 and above)	14.64	41.46	33.33	29
Total	100	100	100	100

Chi square=41.47 d.f.=4 Significant at 0.05 level.

By applying the chi square $(X)^2$ test it was found that the calculated value of $(X)^2$ test is 41.47 and critical value of $(X)^2$ test is 13.28. As calculated value is higher than the critical value, so rejected the null hypothesis. Hence, there is significant association between higher adoption score of tractor and higher agricultural training score of the farmer.

The person's correlation coefficient (r=0.26) also brought out a positive relationship. The significance of the correlation coefficient has been tested by 't' table. The value of 't' is 2.68. This value is greater than the table value of 't'. Hence, it seems

Relationship of Agricultural training with adoption score of Tractor



Relationship of Information seeking through Participation with adoption score

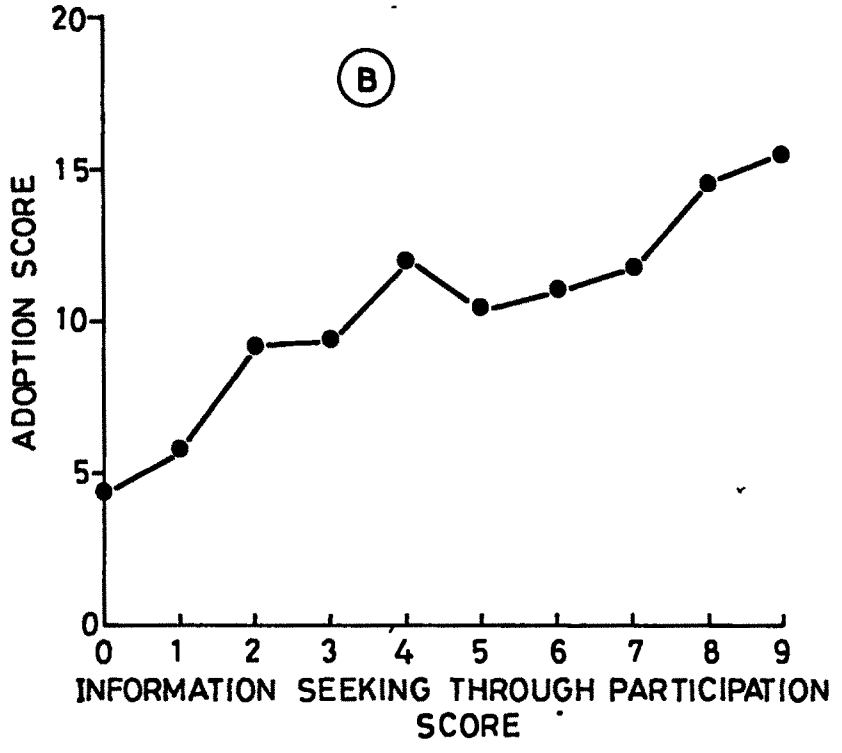


Fig. 5·6

that there is positive relationship between these two variables (Fig.5-A).

Regarding the non respondance the 16 farmers had not training while five farmers had attended only one day training conducted by Zillha parishad. The average information seeking through training score was only 0.95 .

c) Information seeking through participation

Information seeking through participation refers to all activities related to information seeking through individual participation. These activities include participation in result demonstration, farmers rallies, crop competitions, educational tours and the village meeting during the last five year. Here, the frequencies of participation of a farmer in these were assigned scores, participating once, twice, three times and so on, was given a score of 1,2,3, and so on respectively. A zero score indicated no participation. All scores were added to obtain a farmers score for information seeking through participation. On the basis of these scores, categories of farmers were made as under for computing the chi square values.

1) 0 to 1 score (Low)
2) 2 to 4 scores (Medium)
3) 5 and above scores (High)

The data about the frequency of participation by the farmers indicates that nearly 72 farmers participated more than

twice in crop competitions and farmers rallies, but the proportion of educational tours attended is very low. The combined scores indicate that (Table 5.1) 28 of the farmers score is below one and 39 of the farmers score is 2 to 4. Nearly all the farmers attended the village meetings once in a year. Village meetings of the farmers are very much important to exchange the ideas. Therefore, it is hypothesised that, information seeking through participation is not related to higher adoption score of the tractors.

Table 5.16 Percentage distribution of the tractor adopter farmers by their participation score and adoption score of tractor.

Adoption Score	Information seeking through participation			
	0 to 1 n=17	2 to 4 n=39	5 & above n=32	Total n=100
Low (0 to 3)	60.71	17.96	24.24	32
Medium (4 to 12)	17.85	15.28	42.43	39
High (13 and above)	21.44	30.76	33.33	29
Total	100	100	100	100

Chi square=49.84 d.f.=4 Significant at 0.05 level

The critical value of the $(X)^2$ is 9.49, whereas calculated

value of chi square $(X)^2$ is 49.84. As calculated value is greater than the critical value, so rejected the null hypothesis and accepted the alternative hypothesis i.e. there is significant association between higher adoption score of tractor and high participation score of the farmers.

The Person's correlation coefficient also shows a positive relationship, (r=0.32), between two variables. And tested value of 't' is 3.35 which is greater than the table value of 't'. Hence, the null hypothesis is rejected. This positive relationship is presented in Fig.5-6B.

14 non responded farmers participation score is below one, while 7 farmers participation score lies between 2 to 4. Most of the farmers had attended village meetings, but they had not participated in crop competitions and farmers rallies due to dry farming.

d) Information seeking through observation

Information seeking through observation refers to all activities, related to seeking of agricultural information through agriculture college, agricultural research station, agricultural exhibitions, and demonstrations. The farmers who are very active and progressive always try to achieve new things, which are recently developed.

In this study the frequencies of farmers visit to such centers during the year were considered and assigned scores;

visiting once, twice and thrice and so on times was given a score of 1,2,3 and so on respectively. A zero score indicated no visit. These scores were added to obtain a farmer's score for information seeking through observation. The farmers were categorised on the basis of the scores as under.

1) 0 score (Low)
2) 1 to 2 (Medium)
3) 3 and above (High)

The data collected in connection with farmers visit to these centre indicates that 38 of the farmers had not visited to these farms. Whereas the same proportion of the farmers had visited once and twice in a year 1982-83 and 24 of the farmers had visited more than twice (Table 5.1). The score of average visit to these farms were 1.71 and it ranges between 0 to 6.

Agriculture college and research stations are places of origin of innovations New innovations are first tried here, it is expected that farmers should pay visits to such farms at least twice in a year, preferably once in every season. Hypothesis : Higher adoption score of tractor is not related to the higher score of the observation of the farmers.

The critical value of the chi square $(X)^2$ test is 9.49, whereas calculated value of $(X)^2$ test is 49.73. As the calculated value is greater than critical value, hence have rejected null hypothesis and accepted alternative hypothesis i.e. there is

significant association between higher adoption score of the tractor and high observation score of the farmer.

Table 5.17 Percentage distribution of the tractor adopter farmers by observation score and adoption score of the tractor.

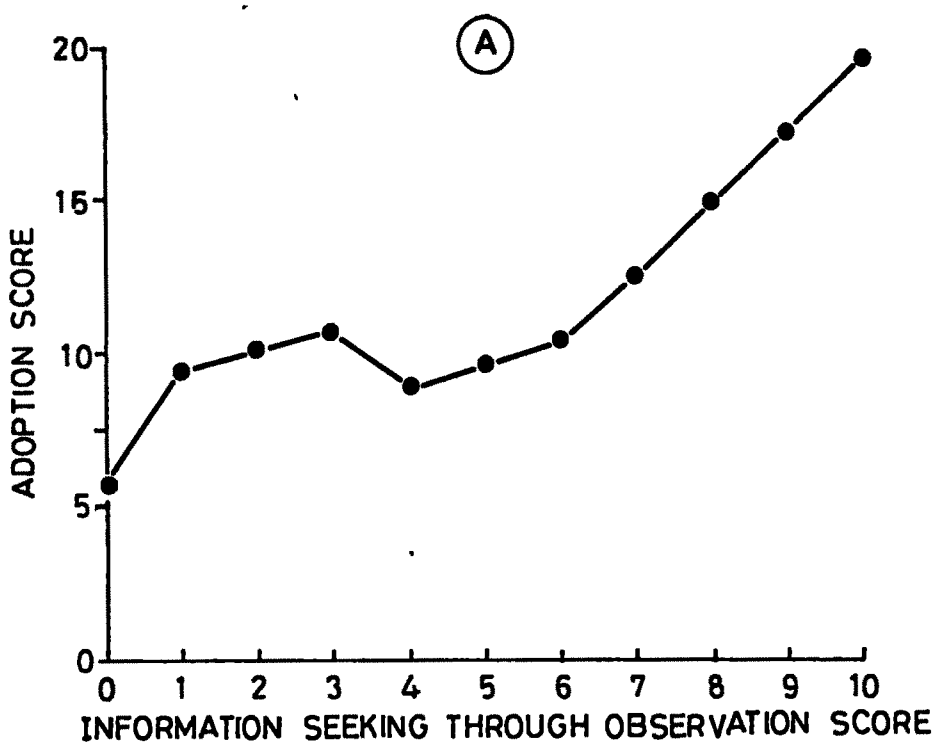
Adoption Score	Observation score			
	0	1 to 2	3 & above	Total
	n=38	n=38	n=24	n=100
Low (0 to 3)	50.00	15.78	29.16	32
Medium (4 to 12)	34.22	34.22	54.18	39
High (13 and above)	15.78	50.00	16,16	29
Total	100.00	100.00	100.00	100

Chi square=49.73 d.f.=4 Significant at 0.05 level

The Person's correlation coefficient also shows a positive relationship (r=0.24) between the two variables and tested by the student's 't' table. The calculated value of 't' is 2.42, which is greater than the table value of 't' at 98 degrees of freedom at the 5% level. Hence, it can be stated that higher adoption score of tractor is related to the farmers observation score. It is shown in Fig.5-7A.

In case of non adoptors about 15 had not visited agricultural research stations and demonstration plots, because they

Relationship of Information seeking through Observation with adoption score of Tractor



Relationship of Information seeking through Mass media with adoption score of Tractor

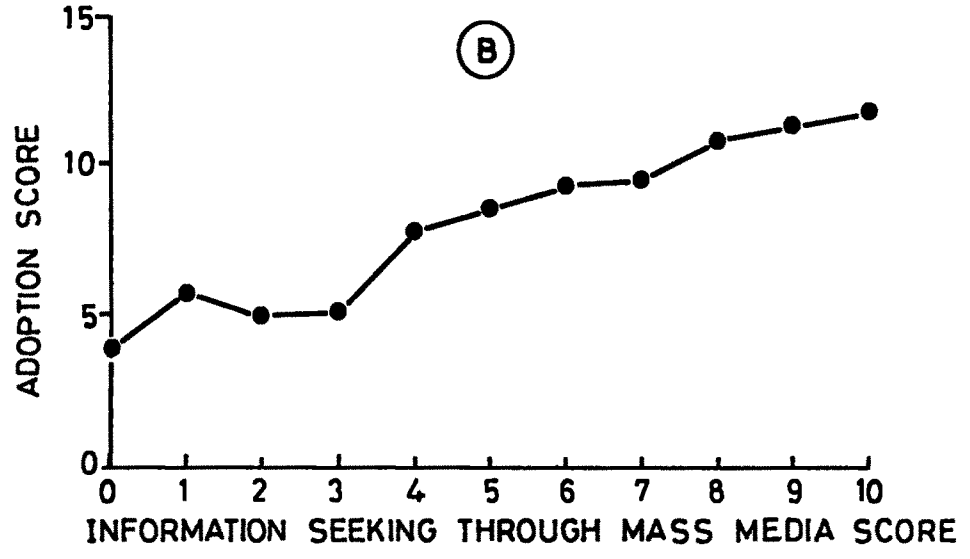


Fig. 5·7

were not using high yielding varieties, which are developed through research. They cultivate the lands according to their own premitive methods.

e) Information seeking through mass media

Mode of seeking information through mass media is composed of four components viz. radio, news papers, farm magazines, films etc.

(1) Radio

Now adays radio has become a powerful medium of communication. Data were collected to understand upto what extent do the farmers use to listen radio broadcasts and sought agricultural information through radio during the last year.

Table 5.18 Distribution of the farmers by the frequency of seeking information through radio and news papers.

Sr. No.	Frequency of seeking information	Radio Number of farmers n=100	News Paper n=100
1.	Daily	7	0
2.	Sometimes in a week	20	9
3.	Once a week	29	17
4.	Once a fortnight	17	31
5.	Once a month	23	31
6.	Never	4	32

It is interesting to note that nearly all the farmers (96) sought agricultural information through radio. Only 4 farmers are reported as non user of this channel. A majority of the farmers receive agricultural information once a week. People listen to radio for entertainment also. The All India Radio broadcasts agricultural programmes daily for farmers. Private firms concerned with agricultural inputs make advertisement on Vividh Bharati.

(2) New papers

Of the print mass media, news papers reach larger audience than Magazines (Rogers, et al.,1962). Almost all the farmers (88) use to read the news papers daily.

It is interesting to note that nine out of ten farmer read news papers, but nine of them receive agricultural information daily through newspapers. In general they receive it once a fortnight, once a month or less. It seems that it is possible to contact these farmers through newspapers and feed them with agricultural information every day, writing of personal columns in district and state level news papers under catchy headings like 'Farming', 'Farm News', 'Hints for Farmers', Farm and Home' will act as a two way channel for supplying information to farmers and for receiving their comments and querries.

(3) Farm magazines

The large number of farmers (79) use farm magazines for

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seeking agricultural information. The 'Shetakari' magazine seemed to be the most popular among these farmers. Very few use the magazine namely 'Shet and Shetakari', 'Baliraja' etc. These magazines should keep at public places like Gram-panchayat, village libraries and co-operative societies; to increase the farmer readers.

(4) Film

Film is a medium which entertains and educates people. Films pertaining to agriculture and allied subjects are generally screened in villages by development agencies, private firms, and also by commercial enterprises through news before the main film is screened. Nearly 57 farmers, received an agricultural information through films but the frequency is very low, generally once in six months or once in a year.

The Panchayat Samiti, the Zila Parishad, the department of Agriculture, the Agricultural University, the Publicity department, the Health department, and Commercial firms have 16 mm film projectors for screening films for rural people. Efforts are needed to coordinate all these resources and make full use of these agencies for information through the channel of movie films.

Frequencies of using these by a farmer were considered for assigning scores. The data regarding the use of radio and news papers were obtained in terms of whether a farmer had used these materials, daily, more than once a week, once a week, once a fortnight, once a month and never. These categories of use were

assigned scores of 5,4,3,2,1 and 0 respectively.

In the case of farm magazines farmer was asked to state whether he received agricultural information, a) always. b) some time's c) occasionally or d) never. These categories were given scores of 3,2,1 or 0 respectively.

About agricultural films, a farmer was asked to state whether he received agricultural information.
a) sometimes in a month b) once a month c) sometimes in six months d) once in six months e) once in a year or never. These categories were scored 5,4,3,2,1 or 0 respectively.

All the scores were added to obtain a farmers score for information seeking through mass media. On the basis of the scores the farmers included in the study are categorized as follows.

1) 0 to 3 scores (Low)
2) 4 to 6 scores (Medium)
3) 7 and above score (High)

The chi squares were computed by using these categories.
Hypothesis : Higher adoption score of the tractor is not related to the higher score of the mass media of the farmers.

Table value of chi square is 13.28, whereas calculated value of chi square $(X)^2$ test is 45.16. As calculated value of the $(X)^2$ test is greater than the critical value, so rejected the null hypothesis and accepted the alternative hypothesis i.e.

higher adoption score of tractor is related to the higher score of mass media of the farmer. Person's correlation coefficient (r=0.35) also brought a positive relationship. The significance of the correlation coefficient is tested by the use of the 't' table. The calculated value of 't' is 3.714. This value is greater than the table value of 't' at 98 degrees of freedom at the 0.05 level. So there is a relationship between mass media score of the farmer and adoption score of the tractor. It is also evident from Fig.5-7B.

Table 5.19 Percentage distribution of the tractor adopter farmers by their mass media score and adoption score of the tractor.

Adoption Score	Mass media score			
	0 to 3 n=21	4 to 6 n=37	7 & above n=42	Total
Low (0 to 3)	57.15	29.35	21.42	32
Medium (4 to 12)	38.09	40.30	38.09	39
High (13 and above)	4.76	29.30	40.49	29
Total	100.00	100.00	100.00	100

Chi square 45.16 d.f.=4 Significant at 0.05 level.

Regarding the non adopter farmers about 13 sought agricultural information through radio; 15 read news papers once in a week and 16 received agricultural information through films but the frequency was very low; generally once in six months; or once in a year; and only 6 farmers used farm magazines. It is observed that 10 farmers had low mass media score (0 to 3). There was only one farmer who had this score more than 7. The average score is 3.52.

4. Summary

The data computed and analysed reveals that in the process of agricultural innovation and its diffusion, different socio-economic parameters play very important role.

The biographical set contained six variables. Among them the middle age farmers adopt the innovation earlier than younger and elder group of farmers. It was noticed that the high adoption score of tractor was more among the farmers, whose education score is medium. Similarly the medium size of family (4 to 12 persons) is more respondant to this innovation. The agricultural knowledge, formal social participation, and income have proved the positive co-relation i.e. higher the degree of these variables higher is the score of adoption of innovation. The resource set includes three variables viz. farm size, irrigated area, and area under sugarcane have also exhibited the positive trend in diffusing the agricultural innovation like tractor. The communications set which

includes cosmopoliteness, information seeking through agricultural training, through participation, observation and through mass media gave high response to the adoption of innovation.

The analysis of non responded farmers reveals the fact that they are non adopter because of i) The lack of education ii) Most of them are old in age iii) Lack of agricultural knowledge iv) Maximum use of manual labour for agriculture v) Economically backward (Low income) vi) Small farm size vii) Less irrigated area (below 1 acre) viii) Lack of cultivation of cash crops ix) Inadequate financial facilities available and x) Lack of agricultural training, and low cosmopoliteness.

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