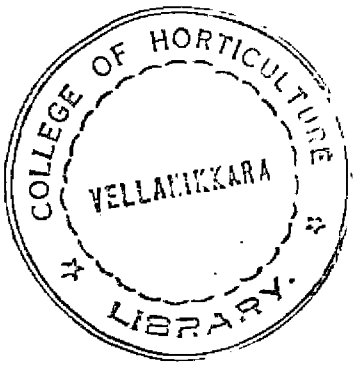
ADOPTION OF TECHNOLOGY FOR CULTIVATION OF BANANA VAR. NENDRAN IN TRICHUR DISTRICT



By

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THESIS

Submitted in partial fulfilment of the

requirement for the degree

Master of Science in Agriculture

(Agricultural Extension)

Faculty of Agriculture

Kerala Agricultural University

Department of Agricultural Extension

COLLEGE OF HORTICULTURE

Vellanikkara, Trichur

1989

DECLARATION

I hereby declare that this thesis entitled 'Adoption of technology for cultivation of Banana var. Nendran in Trichur District' is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title of any other University or Society.

Vellanikkara,

- -1989.

ANITHA VIJAYAN

CERTIFICATE

Certified that this thesis entitled 'Adoption of technology for cultivation of Banana var. Nendran in Trichur District', is a record of research work done independently by Mrs.Anitha Vijayan, under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to her.

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Introduction

CHAPTER-I
INTRODUCTION

After the stagnation of centuries, there is perceptible in our country, a change which appropriately is manifest most prominently in the field of agriculture. This is as it should be, because agriculture is the base, the real foundation of economy of our country.

We have now the scientific tool and competence to achieve a major technological change in our agriculture. But as Paul Leagans (1961) observed:

'It is not man's technology or physical resources alone but what he does with them is of transcendent importance to his progress.'

Science has given man immense powers. But all science whether physical or social will be useless and all human energy invested on scientific invention and discoveries will be a mere waste unless their useful and practical findings are communicated to the people in such a way that they accept and adopt them to attain a status of social and economical well-being.

India is undoubtedly an agricultural country where nearly 85 per cent of the people derive their livelihood in one or other-way from agriculture. But even after 41 years of political

freedom, we are still to achieve self sufficiency in the matter of food production. It is ironic to state that the productivity in majority of crops is possibly the lowest. The reason has to be attributed in the gap between the theoretical knowledge acquired by the scientists and the extent to which it has found practical application by the clientele. A major concern of rural sociological research has been to reduce the time lag between scientific discovery and actual use of new developments in farming.

It is commonly observed that most of the improved practices worked out by the scientists have been adopted only by a handful of progressive farmers in the country. It needs hardly to mention that majority of farmers who possess small acrage of land should not anyway be neglected since it is that portion of the population who could contribute much towards increased agricultural production.

There is a wide gap between the technology generated in Research Station and its actual use by farmers. In the process of agricultural development, the prime mover is considered to be the new farming technology. Higher the gap between recommended practices and its actual adoption, lesser will be the utilisation of research finding which will ultimately lower the agricultural production in the country. It is, therefore, necessary to

ascertain the extent of adoption of recommended cultivation practices by the clientele.

Importance of the study

Banana is one of the important commercial crops in Kerala state and play a key role in the state's economy. Among the different states in the country, Kerala occupies second position in respect of area under banana. As a field crop Nendran is more paying than any other cereals and field crops. It is reported to yield an edible matter of 17,500 to 20,000 kg per hectare, which is several fold higher than the average yield of rice or any other field crops. The state has 16,123 ha under banana cultivation (1984-85)*.

There is considerable scope to increase the productivity of banana to meet the increasing needs of the state in general and the country in particular. Many of the cultivators in Kerala are taking up its cultivation as a commercial proposition rather than as a substitute activity, inspite of the tiny holdings they possess. Hence, the present investigation is to study the technological gap between the recommendation and adoption of

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* Source: Office of the Deputy Director of Agriculture, Trichur.

improved practices by banana growers. This is carried out to know the technological gap of each recommended practices of banana Nendran and its relationship with personal, situational, psychological and communication characters of banana growers. The only Banana Research Station in Kerala State is located at Kannara, Trichur District. Hence, compared to other districts of the State the rate of flow of information dissemination and resultant adoption of package of practices of the crop is considered to be comparatively greater in the district.

In Kerala no systematic study has been conducted in this direction so far. Hopefully, the study would provide scientific information to administrators, planners and extension workers to reduce the technological gap and will finaly help to provide clues for increasing agricultural production in the country.

Objectives of the study

1. To identify the gap in adoption of technology in Banana var. Nendran cultivated in Trichur District.
2. To study the relationship between personal, situational, psychological and communication characteristics of Banana Nendran growers and their adoption.
3. To identify the constraints in adoption of recommended practices by Banana Nendran growers.

Limitations of the study

This study was restricted to Trichur District. So the study may have some limitations in making generalisation of the results to other areas. Moreover, a student researcher has the limitation of resources, time and finance. Inspite of the limitations hopefully it is expected that the finding of this study could certainly provide definite clues for increasing the banana Nendran production in the country and in formulating future extension programmes.

Presentation of the study

The thesis is divided into five chapters. The first chapter deals with introduction, objectives, importance and limitations of the study. The second chapter deals with the theoretical orientation pertaining to the study area. The third chapter deals the methodology comprising of the description of study area, selection of respondents, selection and empirical measurement of variables, tools for data collection and statistical techniques used. The fourth chapter deals with results and discussions of the study. The final chapter is summary and conclusion.

The references and appendices are given at the end.

Theoretical Orientation

CHAPTER-II

THEORETICAL ORIENTATION

A perusal of the available literature is of great importance in gaining insight into the directions of the research problem under study. In this chapter an attempt is made to review the related literature which will provide a basis for empirical investigation. The review is presented under the following heads.

I. Extent of adoption of technologies transferred

II. Relationship of independant variables with dependant variables

III. Constraints in the adoption of technologies

I. Extent of adoption of improved practices

Wilkening (1952) postulated adoption of innovation as a process composed of learning, deciding and acting over a period of time. The adoption or a decision to act has a series of actions and thought decisions.

Copp et al. (1958) defined adoption as an activity of farmers taking place over a period of time. They perceived adoption of farm practices as a bundle of related events flowing through time, not an instantaneous.

Emery and Oeser (1958) viewed adoption of farm practice as a consequence of communication.

According to Ramsey et al. (1959) adoption behaviour involved two components - behavioural, which involves the actual use of the practice and cognitive which includes obtained knowledge and critical evaluation of the practice in terms of individual situations.

Rogers (1962) defined adoption process as the mental process through which an individual passes from the first hearing about an innovation to its final adoption.

Chattopadhyaya (1963) viewed adoption as a stage in the adoption process where decision making is complete regarding the use of a practice and action with regard to such a decision commences.

Katz et al. (1963) defined diffusion adoption process as the acceptance over time of some specific items - an idea or practice by an individual, group or adopting unit limited to specific channels of communication to a social structure and to a given system of values or culture.

Rogers and Shoemaker (1971) defined adoption as a decision to continue the full use of an innovation as the best course of action.

Adoption research became part of the main stream of rural sociology in the early forties. Anthropologists like Suttle (1951) and Sharp (1951) attempted to emphasise the social consequences of innovations and their effects of adoption. Sociopsychological approach was the main criterion in Wilkening's (1952) researches. Sociometric analysis was utilised by Coleman (1955) in his study on adoption of soil conservation practices by farmers. He observed that the adoption of farm practices was influenced by social, psychological and economic factors of the individual respondents. Sawhney (1961) while examining the factors and forces contributing towards the wide difference in adoption and enhancing the process of acceptance, found that they can be explained better from social, psychological and economic point of view. Basaram (1966) conducted a study on motivational and resistance force related to acceptance of new ideas in Indian farming and concluded that sociological, psychological and economic variables of the farmers are important in explaining the attitude towards new ideas and techniques and final adoption of them.

II. Independent variables and their relationship with dependent variable

Age, Education, Social participation, Farm size, Socio economic status, Economic motivation, Market orientation, Risk preference, Innovation proneness, Extension contact, Information source

utilisation are the independant variables of the study. The relationship of these variables with the dependent variable, extent of adoption is studied.

Age

Manivannan (1980) reported that age was negatively and significantly correlated with extent of adoption of practices.

Balu (1980) and Sohiand Kherde (1980) reported no association between age and adoption. However, Balasubramanian (1980), Sanoria and Sharma (1983), Yadav and Jain (1984) and Balkishan Singh, Mahipal and Tyagi (1985) reported age and adoption was significantly correlated.

Kamarudeen (1981) and Vijayakumar (1983) reported a negative and non-significant relationship between age and adoption level.

Godhandapani (1985) and Wilson and Chaturvedi (1985) found negative and significant correlation of age with adoption behaviour of groundnut cultivators and tobacco cultivators respectively. Somasekharappa and Manimeghalan (1987) found no association between adoption and age of farmers.

Education

Nair (1969), Bhaskaran (1978) and Ravi (1979) observed that education had no significant relationship with adoption.

Sundaraswamy (1971) stated that education had significant influence on the adoption behaviour of hybrid jowar growers.

Many researchers have established positive relationship between education and adoption of improved agricultural practices by farmers (Hussain, 1971; Perumal and Duraiswamy, 1972 and Ramamoorthy, 1973). Similar results were also obtained by Raju (1978), Prasad (1978) and Sinha and Sinha (1980).

Viswanathan (1972) and Somasundaram (1976) in their studies observed that education was positively associated with adoption.

Supe and Salode (1975) reported that formal education had no significant relationship with adoption of demonstrated farm practices.

Tantray (1987) reported that education had little influence in the adoption of fertilizers.

Social participation

Social participation was reported by many researchers to have positive and significant association with the adoption of farm practices (Roy et al., 1968; Chandrakandan, 1973; Ramamoorthy, 1973; Anbalagan, 1974; Bhileganokar, 1976; Palaniswamy, 1978; Sadamate, 1978; Segar, 1979; Mishra and Sinha, 1980. Ravichandran, (1981) found that social participation showed a non-significant association with the degree of participation in Lab-to-Land Programme.

Singh (1981) reported that the level of adoption had no significant relationship with social participation except in the case of small farmers, where the above variable was positively and significantly correlated.

Researchers like Sundaraswamy (1977), Viswanathan (1972) and Sakthivel (1979) reported non-significant association between social participation and adoption.

Karim and Mahboob (1974) reported a positive and significant relationship between organisational participation and adoption of fertilizers among transplanted Aman rice growers in Bangladesh.

Somasekharappa and Manimegalan (1987) found no association between organisational participation and fertilizer use.

Farm size

Sharma and Nair (1974), Srinivasan (1974) and Raju (1978) found that size of holding was positively and significantly related to adoption.

Karim and Mahboob (1974) reported that effective farm size and adoption of fertilizers in paddy are positively correlated.

Supe and Salode (1975), Ravi (1979) and Sinha and Sinha (1980) did not find any association between farm size and adoption.

Viswanathan et al. (1975) stated that there was significant influence of farm size on the adoption of high yielding varieties of paddy by farmers.

Vijayaraghavan (1976) concluded that farm size was positively and significantly associated with adoption of high yielding varieties of paddy.

Sen (1981) observed that the adoption rates vary from one size group of farms to another.

Pillai (1983) also reported that farm size had influence over adoption of improved practices.

Krishnamoorthy (1984) reported that farm size and application of chemical fertilizers to dry land crop are positively correlated.

Tantray (1987) also observed that the rate of acceptance of fertilizers, weedicides and soil testing showed an increasing tendency as the land holding increased.

Socio-economic status

Somasundaram (1976) reported no association between socio-economic status and adoption of small farmers. Vijayaraghavan (1977) and Palaniswamy (1978) reported a positive and significant relationship between socio-economic status and adoption. Sinha and Sinha (1980) reported that adopters and higher socio-economic status than non-adopters.

Sushama et al. (1981) found that socio-economic status had significant correlation with adoption in more developed areas whereas in the less developed areas it showed a non-significant relationship. Singh (1983) found that socio-economic status was significantly associated with level of adoption of farm mechanisation.

Yadav and Jain (1984) reported that higher the socio-economic status of farmers greater was the tendency towards adoption.

Economic motivation

Hobbs (1964) reported that there was positive relationship between economic motivation of farmers and their adoption behaviour.

Beal and Sibley (1967) and Singh (1968) reported positive relationship between economic motivation and adoption of improved practices.

Nair (1969) revealed that economic motivation was positively and significantly related with adoption of high yielding variety paddy by farmers. Similar results were obtained by Singh and Singh (1970).

Rajendran (1978) reported that higher rate of adoption was demonstrated by farmers with high economic motivation.

Sohal and Tyagi (1978) and Haque and Ray (1983) also had reported that economic motivation was significantly related with adoption of improved practices.

Manivannan (1980) and Aristotle (1981) reported a positive and significant association between economic motivation and extent of adoption.

Tyagi and Sohal (1984) reported that economic motivation had a positive and significant relationship with adoption of dairy innovations.

Singh and Ray (1985) found that economic motivation had direct influence on the use of fertilizers by farmers.

Jayaramiah (1987) observed that economic motivation was significantly associated with levels of NPK use in groundnut, potato and jowar.

Market orientation

Since no relevant literature on market orientation was found, literature on management orientation, in which market orientation is one of the three dimensions, is considered for this study.

Samantha (1977) found that the cultivators with high management orientation were likely to repay the loan in time because they exhibited a high level of adoption.

Shanmukhappa (1978) pointed out the significant relationship between managerial ability of arecanut growers with their adoption of improved cultivation practices.

Bhaskaran (1979) reported a positive and significant correlation between management orientation and adoption.

Kamarudeen (1981) reported a positive and significant relationship between management orientation and extent of adoption of demonstrated cultivation practices.

Risk preference

Earnest (1973), Singh (1975), Somasundaram (1976), Balasubramanian (1977), Tripathy (1977) and Sethy (1978) reported a positive and significant association of risk orientation with adoption of farm practices.

Sachidananda (1972) found that there was a negative correlation between risk taking and adoption.

Majumdar (1976) reported that there was no correlation between risk preference and the extent of adoption of complex fertilizers.

Sinha (1978) in his study about association between characteristics of respondent and their level of adoption, reported that the correlation between risk orientation and level of adoption was positive but non-significant.

Sakthivel (1979) reported that the perceived risk was not related with extent of adoption of farm practices but it was negatively related with the extent of adoption of the practices like seed treatment and plant protection measures.

Innovation proneness

Innovation proneness was found to be positively and significantly related with adoption (Moulik, 1965; Bhilegaonkar, 1976). Singh (1981) reported that the adoption level was positively and significantly correlated with innovation proneness of small, medium and pooled sample of farmers, but no significant relationship was found in the case of marginal farmers.

Innovation proneness was found to be highly associated with adoption of cattle feed mixture in the study by Sinha et al. 1974.

Balasubramanian (1977) also observed positive and highly significant association between innovativeness and adoption of improved practices in ragi.

Similar reports were given by Ravi (1979) among tapioca growing farmers and Sanoria and Sharma (1983) among beneficiaries of Farm Development Programme.

Philip (1984) reported non-significant association between innovation proneness and extent of adoption of recommended practices by the radio-listening farmers.

Extension contact

Sinha et al. (1974) reported that extension contact did not show any significant association with adoption.

Gangappa (1975) and Mahadevaswami (1978) found that farmers contact with extension agency and their participation in extension activities have got a positive influence on the adoption behaviour.

Kamarudeen (1981) found that there was positive and significant relationship between contact with extension agency and adoption of recommended practices.

Haraprasad (1982) reported a positive and significant relation between contact with extension agency and adoption behaviour of SFDA beneficiaries.

Sanoria and Sharma (1983) reported a significant association between adoption and contact with extension agencies in the beneficiaries of Lab-to-Land Programme.

Nanjayan (1985) also explained positive and significant correlation of extension agency contact with extent of adoption of small farmers.

Jayaramaiah (1987) observed a significant relationship between participation in extension activity and adoption of NPK in groundnut, potato and jowar.

However, Somasekharappa and Manimegalan (1987) found no association between extension contact and fertilizer use of farmers.

Information source utilisation

Perumal (1970) reported that mass media played a significant role in influencing farmers to adopt the practices of hybrid maize.

Chandrakandan (1973) concluded that higher the media participation better was the adoption of IR-8 paddy.

Tripathy (1977) observed negative and significant relationship between farmers use of mass media source of information and technological gap in new rice technology.

Manivannan (1980) found that mass media exposure was positively and significantly associated with the extent of adoption of the selected practices by sunflower growers.

Sohi and Kherde (1980) found that higher exposure to mass media was significantly correlated with the level of adoption of Dairy innovations by the respondents.

Singh (1981) reported that utilisation of mass media of small, margiinal and pooled samples of farmers was positively and significantly correlated with the level of fertilizer use.

Jayakrishnan (1984) reported that mass media participation was positively and significantly associated with extent of adoption of low-cost technology among paddy growers.

Balasubramanian (1985), Godhandapani (1985), Jayapalan (1985) and Wilson and Chaturvedi (1985) also observed positive and significant correlation of farmers extent of adoption with their mass media participation.

Utilisation of personal cosmopolite sources and personal localite resources on factors influencing adoption were studied by many researchers.

Choudhary (1970) reported positive and significant correlation of mass media and personal cosmopolite sources with adoption of nitrogenous and phosphatic fertilisers in a progressive village.

Menon (1970) found that neighbours and relatives, radio, exhibition and film shows served as excellent media for the adoption of improved practices by small farmers.

Tripathy (1977) reported that use of personal localite sources of information was negatively and significantly related to the technological gap of farmers in the adoption of new rice technology.

Singh (1981) found that level of fertilizer use was positively and significantly correlated with the utilisation of personal cosmopolite sources of information.

Ray and Singh (1985) reported that personal cosmopolite sources of information contributed positively and significantly to the level of fertiliser use of small farmers.

Constraints experienced by farmers in adoption

Sundaraswamy (1971) reported that lack of knowledge and lack of money were the main reasons for non-adoption of recommended farm practices.

Viswanathan (1972) concluded that high cost of cultivation expenses and lack of convictions were the reasons for non-adoption.

Anbalagan (1974) reported that the major limiting factors for adoption of practice were lack of knowledge, non-availability of inputs and high cost of cultivation.

Vijayaraghavan (1977) stated that non-adoption of all the recommended package of practices was due to inadequate irrigation facilities.

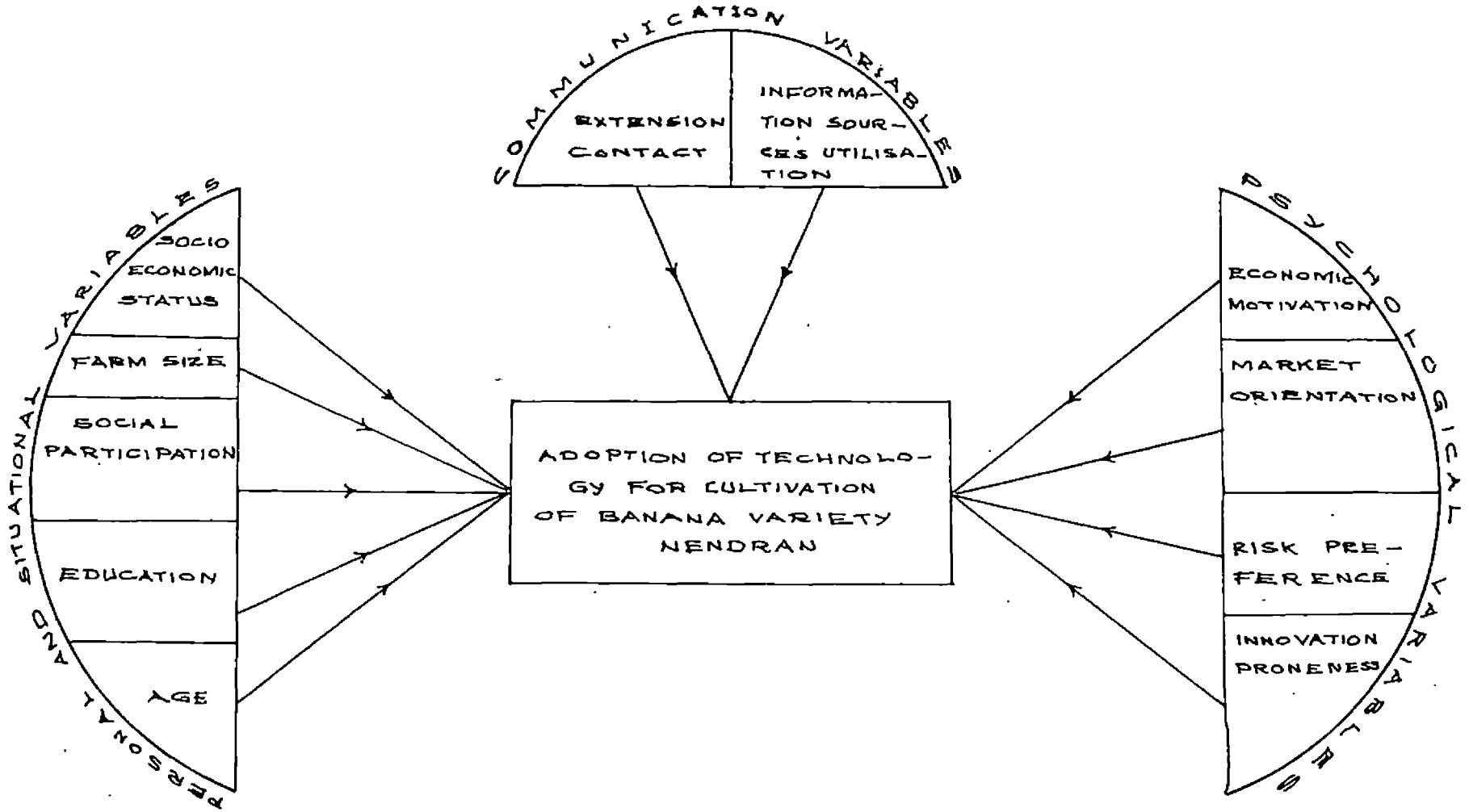
Waghmare and Pandit (1982) found that lack of knowledge, technical guidance and inputs and small size of holdings were the important constraints in adoption of wheat technology.

Bhoite and Nikalji (1983) found that factors responsible for non-adoption of dry land technology were inadequacy of capital, lack of knowledge, non-availability of technical guidance, non-availability of seeds, fertilizers, implements and uneconomic holding size.

Waghmare and Waghmare (1985) derived the constraints in transfer of wheat technology. They found that high cost of labour, high cost of inputs and non-availability of finance in time, as the main impediments for the speedy transfer of technology.

Jayaramiah (1987) reported the constraints perceived by farmers of Dharwad district in the adoption of recommended doses of NPK, in the order of priority were high prices of fertilizers (75%), inadequate supply of fertilizers, lack of desired type of fertilizers, non-availability of credit (25%), lack of soil testing facilities and adulteration in fertilizers.

FIG. 1. CONCEPTUAL FRAMEWORK SHOWING THE RELATIONSHIP BETWEEN INDEPENDENT VARIABLES AND ADOPTION



Methodology

CHAPTER-III

RESEARCH METHODOLOGY

This chapter enunciates the investigation methods and procedures adopted in the study. The methods and procedures followed are presented under the following sub-heads.

A. Location of study

B. Sampling procedures

C. Recommended practices selected for the study

D. Selection and empirical measurement of variables

(i) dependent variables

(ii) independent variables

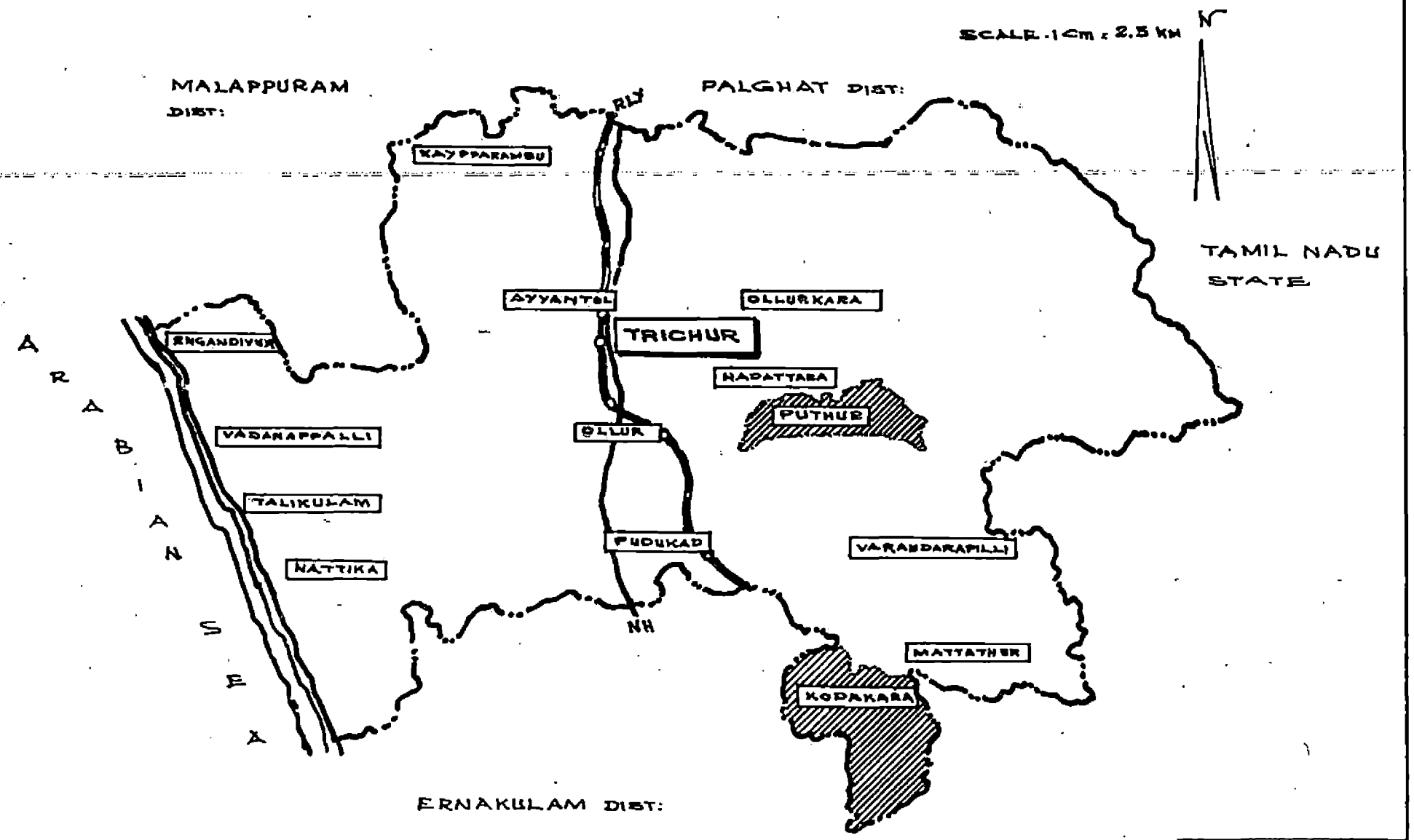
E. Procedure for data collection

F. Statistical techniques used

A. Location of study

The present study was taken up in Trichur District. Trichur District was selected considering the fact that the only Banana Research Station in Kerala State is located at Kannara, Trichur District. Hence it is assumed that the rate of flow of inflormation dissemination and resultant adoption of package of practices of the crop is comparatively greater in the District.

FIG. 2. MAP SHOWING THE LOCATION OF SELECTED PANCHAYATS IN TRICHUR SUB DIVISION



Darkened Area: Selected Panchayats

The location of the study area in Trichur District is given in Fig. 2.

B. Sampling procedures

The area under Banana Nendran in three subdivisions of Trichur District viz. Wadakanchery, Irinjalakkuda and Trichur was collected and are given in Table 1. Trichur subdivision has the maximum area under the crop and hence selected for the study.

Table 1. Subdivisional-wise area under Banana Nendran in Trichur District

Subdivision	Area
Trichur	3790.45 ha
Irinjalakkuda	2400 ha
Wadakanchery	432.34 acres

Source: Office of Deputy Director of Agriculture, Trichur, Irinjalakkuda, Wadakanchery.

Panchayat wise area under the crop in the subdivision was collected and is given Table 2. Two panchayats were selected with probability proportional to the area under the crop. Six wards were selected randomly from the two selected panchayats and 150 farmers were selected at random from these wards.

Table 2. Panchayat-wise area under Banana - Nendran in Trichur Subdivision

Sl. No.	Panchayat	Area	Sl. No.	Panchayat	Area
1	Anthikad	5 ha	19	Madakathara	75 ha
2	Chazhur	15 ha	20	Nadathara	125 ha
3	Manalur	5 ha	21	Ollukkara	100 ha
4	Thanniyam	15 ha	22	Pananchery	124 ha
5	Avinissery	100 ha	23	Puthur	330 ha
6	Cherpu	62 ha	24	Vilvattom	30 ha
7	Koorkanchery	26 ha	25	Trichur (M)	12 ha
8	Ollur	95 ha	26	Adat	10 ha
9	Paralam	41 ha	27	Arimpur	95 ha
10	Vallachira	160 ha	28	Avannur	10 ha
11	Alagappa Nagar	86 ha	29	Ayyanthole	55 ha
12	Kodakara	213 ha	30	Kaiparambu	21 ha
13	Mattathur	136 ha	31	Killannur	25 ha
14	Nenmanikkara	55 ha	32	Tholur	20 ha
15	Pudukad	234 ha	33	Engandiyur	2 ha
16	Trikkur	160 ha	34	Nattika	4 ha
17	Varantherapilly	335 ha	35	Thalikulam	0.5 ha
18	Kolazhy	64 ha	36	Valappad	2 ha
			37	Vatanapilly	1.5 ha

Source: Office of Deputy Director of Agriculture, Trichur.

C. Recommended practices selected for the study

There are eleven improved cultivation practices in Banana - Nendran cultivation as recommended by Kerala Agricultural University. All these improved practices given in the 'Package of Practices' recommendations of KAU were considered for this study and they were as follows

1. Criteria for sucker selection

It is recommended to select 3-4 months old disease free sword suckers from healthy clumps.

2. Treatment of suckers

Cut back pseudostem at a length of 15-25 cm from corm and remove old roots. The rhizomes are to be smeared with cow-dung solution and then dried in sun for about 3-4 days and stored in shade upto 15 days before planting.

3. Spacing recommended for Nendran is 2 x 2 m

4. Pit size recommended is 50 cm^3

5. Manuring

Compost, cattle manure/green manure at the rate of 10 kg per plant at the time of planting is recommended.

6. Fertilizer application

For Banana var. Nendran apply fertilizers at the following dose:

	N	P_2O_5	K_2O	
Nendran	190	115	300	g/plant

Applying fertilizers in six split doses helps to increase finger size and bunch weight.

Time of fertilizer application	Quantity applied		
	N (g)	P_2O_5 (g)	K_2O (g)
Planting	40	65	60
One month after planting	30	50	60
Two months after planting	30	0	60
Four months after planting	30	0	60
Five months after planting	30	0	60
After complete emergence of bunch	30	0	0
Total	190	115	300

7. Irrigation

Banana var. Nendran needs 40 litres of water per plant. Irrigation once in two days during summer season is recommended to ensure higher bunch yield.

8. Propping is recommended soon after bunch emergence.

9. Intercultural operation

Includes weeding, mulching and desuckering.

(i) Weeding

Spraying with a combination of weedicide Diuron (2-3 kg/ha) and Paraquat at 0.30 kg ai/ha is effective and economical in controlling all types of weeds.

If hand weeding is resorted to give 4-5 surface diggings depending on weed growth. It is recommended to avoid deep digging.

(ii) Mulching

Mulching the basin with 3-5 kg paddy straw is recommended which ensures better bunch yield.

(iii) Desuckering

It is recommended to remove side suckers produced till the emergence of flowers. Retain 1-2 suckers produced after emergence of bunch.

10. Intercropping in Nendran variety

Cucumer and Amaranthus can be cultivated profitability in the interspaces of the main crop without affecting the bunch yield of banana.

11. Plant protection measures

Prophylatic measures taken against Bunchy top disease only was considered in the study. Since the control of other diseases and pests are need-based, they were not considered.

Bunchy top disease is a viral disease spread by the Banana aphid Pentalonia nigronervosa. This aphid can be controlled by following the recommendations suggested.

Control of aphids:

1. Apply 25 g of Phorate 10% G at the time of planting around the rhizomes in soil.
2. Apply 12.5 g of Photate 10% G per plant in the leaf axils or 25 g of 10% Phorate G per plant in soil on 75 DAP.

3. Apply 12.5 g of Phorate 10% G per plant in leaf axils or 25 g of 10% Phorate G in soil on 165 DAP.

It is also recommended to eradicate disease affected plants and use disease free suckers for planting.

D. Selection of variables and its empirical measurement

Based on specific objectives and review of past studies and in consultation with experts the following variables were selected for the study.

I. Dependent variables

Extent of adoption of improved practices in Banana var. Nendran cultivation.

II. Independent variable

A. Personal and situational characters

1. Age
2. Education
3. Social participation
4. Farm size
5. Socio-economic status

B. Phychological characteristics

1. Economic motivation

2. Market orientation
3. Risk preference
4. Innovation proneness

C. Communication variables

1. Extension contact
2. Information source utilisation

I. Extent of adoption of improved practices in Banana - Nendran cultivation

Many researchers have developed various methods to measure adoption behaviour.

Wilkening (1952) used an index for measuring the adoption of improved farm practices. The index of adoption used was the percentage of practices adopted to the total number of practices applicable for the adoption studied.

Fliegal (1956) constructed an index of adoption of farm practices using the correlation of several adoption variables, where non-adoption was given a score of '0' and adoption '1'.

Beal and Rogers (1960) developed an adoption scale for measuring the adoption of a practice. They studied in detail the adoption of two farm practices. This scale was computed which credited an individual with '1' score for adoption and '0' score for non-adoption of the practice.

Chattopadyaya (1963) used adoption quotient for measuring adoption behaviour. This is a ratio scale that measures a farmer's behaviour on dimension of applicability, potentiality, extent, time, consistency and differential nature of innovation.

Sundaraswamy and Duraiswamy (1975) developed 'Adoption Quotient' to measure the adoption behaviour. They took 13 practices and farmers were classified as low adopters (A.Q. 10-40%) medium adopters (A.Q. 40-80%) and high adopters (A.Q. 80-100%).

In the present study adoption index was calculated as given by Wilkening (1952).

For each of the recommended cultivation practices considered in this study, scoring adopted is as follows:

	Adoption	Non-adoption
1. Criteria for sucker selection	1	0
2. Treatment of suckers	1	0
3. Pit size	1	0
4. Spacing	1	0
5. Manuring	1	0
6. Fertilizer application:		
(a) Split application	Score	
Full adoption (in 6 splits)	3	
Upto 50% adoption	2	

	Score
Less than 50% adoption	1
No adoption	0

(b) Quantity of nutrient application

The fertilizer recommendation for Banana var. Nendran per plant is 190:115:300 gm/plant in terms of N P K, which will be approximately in the ratio of 2:1:3. As the quantity of fertilizer applied by respondents in terms of these 3 nutrients per plant will vary, it is thought that separate scoring will also be assigned to the usage of N P K by individual respondents as follows.

	Score
Full adoption for N	2
Full adoption for P	1
Full adoption for K	3

Hence the total score is calculated as follows.

Full adoption	18	ie (2:1:3) x 3
Upto 50% adoption	12	(2:1:3) x 2
Less than 50% adoption	6	(2:1:3) x 1

By the above method scores have been calculated and the scoring was subjected to further refinement by considering proportional values to the scores and final scoring were worked out.

	Adoption	Non-adoption
7. Propping	1	0
8. Intercultural operations		
1. Chemical weeding	1	0
2. Desuckering	1	0
3. Mulching	1	0
9. Intercropping	1	0

10. Plant protection measures

	Score
If in 3 splits	3
2 splits	2
1 application	1
Not applying	0

Adoption index was calculated using the formula

$$e = \frac{\text{Total number of scores obtained by the respondent}}{\text{Maximum number of scores that could be obtained by the respondent}} \times 100$$

Based on the adoption index, the respondents were grouped as high adopters, medium adopters and low adopters. Mean adoption score of the farmers was taken. Then $\bar{x}$ - 1 S.D, $\bar{x} \pm 1$ S.D and $\bar{x}$ + 1 S.D was calculated and they represent low, medium and high adopter categories of farmers. ($\bar{x}$: mean, S.D. : standard deviation). Technological gap in the study is defined as the gap between potential for adoption of the recommended cultivation

practices in Banana var. Nendran and his extent of adoption which is measured after adoption is found out. Technological gap and adoption are considered to be the two sides of the same coin.

Extent of adoption is the degree to which a farmer has actually adopted a practice.

$$\text{Technological gap} = \frac{\text{Recommended cultivation practices} - \text{Adopted cultivation practices}}{\text{Recommended cultivation practices}} \times 100$$

$$TG = \frac{RCP - ACP}{RCP} \times 100$$

Measurement of Independent Variables

1. Age

Age is operationalised for the study as the number of years the respondent has completed at the time of the study since his birth.

2. Education

Education was operationalised as the number of formal years of education an individual received. The scoring procedure developed by Trivedi (1963) was used here.

	Score
Illiterate	0
Can read only	1
Can read and write	2
Primary	3
Middle	4
High school and above	5

3. Social participation

Social participation refers to the degree of involvement of the respondent in formal organisations either as a member or as an office bearer. The scoring procedure developed by Trivedi (1965) was followed in this study.

		Score
i)	1. No membership in any of the organisation	0
	2. Membership in each organisation	1
	3. Office bearer in each organisation	2
ii)	Frequency of attending meetings	
	1. Not attending meetings	0
	2. Attending few meetings	1
	3. Attending all meetings	2

4. Farm size

The scale developed by Trivedi (1963) was used here.

	Score
Less than 50 cents	0
50-100 cents	1
1-2 acres	2
2 acres and above	3

4. Socio-economic status

Socio-economic status was operationalised as the position or status of an individual or a family in the society.

Chapin (1928) defined socio-economic status as the position an individual or a family occupies with reference to the prevailing average standards of cultural possessions, effective income, material possession and participation in the group activities of the community. Belcher (1951) found that the material possession items tended to be more staple indicators of socio-economic status than those dealing with social participation or cultural possession.

The socio-economic status scale developed by Trivedi (1963) and suitably modified by Sushama (1979) was used for the study which included respondents' occupation, education, social participation, land, house, farm power, material possession and family. The mean value was found out and above mean represented high socio-economic status group and below mean, low socio-economic status group.

In this study since only farmers are considered as respondents, occupation is not considered separately. Education, social participation, farm size are taken as independent variables in this study and they are also considered in the aspect of socio-economic status.

The scoring is as follows:

House	Score
a) Hut (one room)	1
Thatched	2
Tiled	3
Terraced	4
b) Plastered	1
Not plastered	0
c) Electrified	1
Not electrified	0

Agricultural and Household implements

Items considered under this were (1) Drought animal (2) Pumpset (3) Sprayer (4) Spade (5) Pickaxe (6) Reaper (7) Axe (8) Cycle (9) Radio (10) Watches (11) Chairs (12) Cots. For the above item the current market price was found out. For every Rs.1000 worth possession a score of 'one' was given.

	Score
Livestock	
Cow	3
Buffaloe	3
Goat	2
Poultry	1
Family type	
Nuclear	1
Joint	2

B) Psychological characters

1. Economic motivation

Nair (1969) defined economic motivation of farmers as their attitude towards farming, as a profit oriented enterprise. The definition given by Nair (1969) was followed in this study.

Moulik (1965) developed a scale for measuring this variable. The scale developed by Supe (1969) was used in this study. This scale consisted of six items against a five point range from 'strontly agree' to 'strongly disagree'. There were five positive items and one negative item. The scoring adopted was as follows.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Positive item score	7	5	4	3	1
Negative item score	1	3	4	5	7

The total scores of the respondents was taken as his score for economic motivation. Mean value was taken and above mean was treated as high economic motivation and below mean as low economic motivation group.

2. Market orientation

Market orientation was one of the 3 dimensions of the scale developed by Samantha (1977) for measuring management orientation, which has been operationally defined as the degree to which the farmer is oriented towards scientific farm management comprising of planning, production and marketing functions on his farm enterprise.

The dimension market orientation consisted of six statements; positive and negative statements were mixed retaining at the same time a more or less psychological order of the statement. In the case of positive statements a score 'one' was given for agreement and 'zero' for non-agreement. For negative statement the pattern was reverse. The total score

obtained by the respondent was taken as his score for market orientation. The mean value was taken and above mean represented high market orientation group and below mean low market orientation group.

3. Risk preference

Supe (1969) defined risk preference as the degree to which a farmer is oriented towards risk and uncertainity and the courage to face problems in farming. Risk preference scale developed by Supe (1969) consisted of 6 items given on a 5 point continuum. The points of continuum were 'strongly agree', 'agree', 'disagree', 'strongly disagree' and 'neutral' with scores 4, 3, 2, 1 and 0 respectively for positive items and scores 1, 2, 3, 4, 0 for negative items respectively.

4. Innovation proneness

It is referred to as the behaviour pattern of the farmers who have interest in and desire to seek changes in farming techniques and to introduce such changes into their operations when practical and feasible. Moulik's (1965) self rating, innovation proneness scale was used to measure the innovation proneness of the farmers. The scale consisted of 3 sets of statements each set containing three separate

statements with weights 3, 2 and 1 indicating high, medium and low degrees of innovation proneness. After obtaining the most-least choice for each of the three sets of statements, the scoring was done by summing up the ratios of the weight of the 'most like' statements to the weight of the 'least like' statement.

c) Communication variables

1. Extension contact

The dimension extension contact was taken from the extension orientation index developed by Bhaskaran (1979) which consisted of one more item, extension participation.

The extent of extension contact was computed giving scores to the items as given below.

Frequency of meeting Agricultural University Scientists/Extension Officers/Demonstrators

	Score
Two or more time a week	3
Once in a week	2
Once to thrice a month	1
Never	0

Score obtained by each respondent was calculated. The mean extension contact values was found and respondents were grouped as high extension contact group and low extension contact group.

2. Information source utilisation

The mass media sources of information considered for the present study were:

Radio, film, newspaper, farm publications, demonstrations, posters, field trips, text books and agricultural exhibitions.

Each respondent was asked to indicate as to how often he got innformation from each of the mass media sources. The responses were obtained on a 4 point continuum. The scoring procedure was 3, 2, 1 and 0 for the responses 'most often', 'often', 'sometimes' and 'never' respectively. The scores for an individual was obtained by adding the scores secured by him for the different sources of mass media.

The personal cosmopolite sources of information considered for the study were: Research Scientists, Extension Officers, Demonstrators and others. In order to measure the degree of utilisation of personel cosmopolite sources, each respondent was asked to indicate on a 4 point continuum as to how often he got information about the cultivation practices of

Banana - Nendran from each of the above sources. The scoring procedure was 3, 2, 1 and 0 respectively. By adding the scores secured by him for the different sources the score of an individual respondent was obtained.

The personal localite sources of information considered for the present study were: neighbours, friends, family members and relatives.

Each respondent was asked to indicate in a 4 point continuum as to how often he got information about recommended cultivation practices in Banana - Nendran from each of these sources. The scoring procedure was 3, 2, 1 and 0 for the responses 'most often', 'often', 'sometimes' and 'never' reespectively. By adding the scores secured by him for the different sources, the score of an individual respondent was obtained.

Constraints in the adoption of technologies

A list of 18 constraints were included in the interview schedule based on the pilot study. The respondents were asked to identify each constraint as 'most important' and or 'least important'. The rank order of the constraint was determined.

E. Procedure for data collection

The data were collected using a well structured, pre-tested interview schedule by personal interview with the respondents. The schedule used in the study is shown in the Appendix . The data were collected during the months of June-July, 1989. The schedule was translated into Malayalam before administuring to the respondents.

F. Statistical techniques used

The data for advanced statistical procedures were processed at the computer centre, Kerala Agricultural University, Vellanikkara. For analysis of data the following statistical tests and procedures were applied.

Path Analysis

Haque and Ray (1983) conducted path analysis to get a clear picture of the direct and indirect effects of the selected independent variables on the adoption of recommended species of fish in composite fish culture.

Ramkumar (1987) used path analysis to get a clear picture of the direct and indirect effects of the selected independent variables on the practice adoption of improved dairy practices.

Efforts was put in this study to analyse the relative contribution of each independent variable in explaining the variations in the adoption of improved practices by the farmers. The direct and indirect effects of various independent variables were studied by path coefficient analysis. A table of direct and substantial indirect effects were constructed to help in further selection of the variables. The procedure suggested by Kempthorne (1957) was used for the purpose.

Step-wise Regression Analysis

This was done to know the relative effect of the independent variables in predicting the dependent variable and for elimination of unimportant variables. The best fitting regression equation of dependent variable on independent variables was estimated by step-wise regressiion as suggested by Draper and Smith (1966).

Kruskal Wallis one-way analysis of variance by ranks

This non-parametric test was used to know the significance of difference in the extent of adoption between the low, medium and high groups of respondents who were classified on the basis of their selected characteristics ie., the independent variables. The respondents were classified into three groups, namely 'low',

'medium' and 'high' groups in such away that each group contained approximately equal number of respondents.

The formula used for the purpose is given below:

$$H = \frac{12}{N(N+1)} \quad \frac{(Xi)^2}{ni} - 3(N+1)$$

N = Total number of observations

Xi = Sum of ranks in the i^{th} group

ni = Number of observations in i^{ih} group

The 'H' value calculated was compared with the table value to find out the significance of association.

Results and Discussion

CHAPTER-IV

RESULTS AND DISCUSSION

The findings of the present study and the discussions of their results are presented in this chapter under the following broad sub-heads.

I) The gap in the adoption of technology in Banana variety Nendran.

II) Relationship between personal, situational, psychological and communication characteristics of Banana variety Nendran growers and adoption.

III) Constraints experienced by the farmers in the adoption of recommended cultivation practices.

It was found that all of the recommended practices in the cultivation of Banana var. Nendran except four practices viz. adoption of fertilizers, desuckering, mulching and plant protection measures were adopted by almost all farmers. Only little variability was found in the scores of all other practices except these four ones. Hence these practices alone were ultimately selected as dependent variables for the study. Chemical weeding was found to be adopted by no one.

I) The gap in the adoption of technology of Banana var. Nendran

Distribution of farmers based on this is shown in Table 3.

Table 3. Distribution of farmers based on their technological gap

Category technological gap	Adoption score	F	Technological gap %
Low	Above 6.86	38	25.33
Medium	Between 3.08 & 6.86	77	51.33
High	Below 3.08	35	23.33

Based on the adoption index, the respondents were grouped as high adopters, medium adopters and low adopters (Table 4).

The mean ($\bar{x}$) adoption scores of the farmers was taken. Then $\bar{x}$ - 1 S.D., $\bar{x} \pm 1$ S.D. and $\bar{x} \pm 1$ S.D. was calculated and they represent low, medium and high adopter category of farmers.

From Table 4 it can be seen that 51.33 per cent of farmers were medium adopters, 25.33 per cent were high adopters and 23.33 per cent were low adopters.

The technological gap is presented in Table 3. It may be seen that 25.33 per cent of the respondents fall within the category of low, 51.33 per cent of the respondents fall within the category of medium and 23.33 per cent of the respondents fall within the category of high technological gap.

II) **Relationship between personal, situational psychological and communication characteristics of Banana var. Nendran growers and their adoption.**

Statistical techniques employed were Kruskal- Wallis test, step-wise regression analysis and path analysis.

Table 5 provides the results of the Kruskali-Wallis analysis of various tests for their significance or other wise of the various independent variables on the dependent variables.

Table 4. Distribution of farmers based on their adoption of recommended cultivation practices in Banana var. Nendran

Category	Adoption score	Number of respondents	%
Low (Below $\bar{X}$ - I.S.D)	Below 3.08	35	23.33
Medium (Between $\bar{X} \pm$ I.S.D)	Between 3.08 & 6.86	77	51.33
High (Between $\bar{X}$ + I.S.D)	Above 6.86	38	25.33
	Total	150	

$\bar{X}$ = 4.97 S.D. = 1.89

Table 5. Results of Kruskal-Wallis test

Independent variable	Dependent variable	Value of statistic	Significance
1	2	3	4
Age	Adoption of fertilizers	6.797	Non-significant
	Desuckering	1.620	,,
	Mulching	3.327	,,
	PP measures	4.995	,,
Education	Adoption of fertilizers	9.901	Significant
	Desuckering	3.877	Non ,,
	Mulching	7.595	Non ,,
	PP measures	10.247	Significant
Social participation	Adoption of fertilizers	5.849	Non-significant
	Desuckering	3.498	,,
	Mulching	3.692	,,
	PP measures	9.492	Significant
Farm size	Adoption of fertilizers	7.202	Non-significant
	Desuckering	1.706	,,
	Mulching	11.393	Significant
	PP measures	21.986	,,
Socio-economic status	Adoption of fertilizers	.829	Non-significant
	Desuckering	6.230	,,
	Mulching	5.232	,,
	PP measures	.310	,,

Contd.

Table 5. Continued

1	2	3	4
Economic motivation	Adoption of fertilizers	14.114	Significant
	Desuckering	9.315	,,
	Mulching	23.321	,,
	PP measures	38.388	,,
Market orientation	Adoption of fertilizers	10.822	Significant
	Desuckering	9.380	,,
	Mulching	19.693	,,
	PP measures	35.843	,,
Risk preference	Adoption of fertilizers	38.254	Significant
	Desuckering	7.083	Non-significant
	Mulching	29.371	Significant
	PP measures	47.455	,,
Innovation proneness	Adoption of fertilizers	53.999	Significant
	Desuckering	14.804	,,
	Mulching	27.060	,,
	PP measures	44.997	,,
Extension contact	Adoption of fertilizers	39.968	Significant
	Desuckering	3.406	Non-significant
	Mulching	15.432	Significant
	PP measures	41.829	,,
Information source utilisation	Adoption of fertilizers	70.431	Significant
	Desuckering	12.212	,,
	Mulching	42.712	,,
	PP measures	71.252	,,

Value at 5% = 7.81

1. a. Age and dependent variables

1. a. 1. Age and adoption of fertilizers

There was no significant relationship between age and adoption of fertilizers in Banana var. Nendran.

1. a. 2. Age and adoption of desuckering

No significant relationship was found between age and adoption of desuckering. Hence it was concluded that age difference of the farmers was unrelated to the adoption of desuckering.

1. a. 3. Age and adoption of mulching

Results indicated that the adoption of mulching was not at all influenced by the age of the farmers.

1. a. 4. Age and adoption of plant protection measures

Age did not have any significant relationship with the adoption of plant protection measures.

Adoption of cultivation practices in Banana var. Nendran could be considered to be independent of the difference in age. This may be because most of the farmers respondents fall within the medium age category.

Similar results were obtained by Balu (1980), Sohi and Kherde (1980), Somasekharappa and Manimeghalan (1987).

1. b. Education and dependent variables

1. b. 1. Education and adoption of fertilizers

It was found that education had significant relationship with adoption of fertilizers.

1. b. 2. Education and adoption of desuckering

Only non significant relationship could be found between education and adoption of desuckering.

1. b. 3. Education and adoption of mulching

Results indicated that adoption of mulching was not at all influenced by the farmers educational status.

1. b. 4. Education and adoption of plant protection measures

Significant relationship could be found between educational status of the farmers and adoption of plant protection measures.

Significant relationship was noticed between the independent variable, education and adoption of fertilizers and adoption of plant protection measures. The reason being that these technologies are slightly complex in nature when compared to the other two

and hence proper education in these technologies could show a better impact in the adoption process.

Many researchers have established positive relationship between education and adoption of improved agricultural practices by farmers. Ramamoorthy (1973), Prasad (1978) and Sinha and Sinha (1980).

But Nair (1969), Bhaskaran (1978) and Ravi (1979) observed that education had no significant relationship with adoption.

In the case of adoption of desuckering and mulching, due to the low variability in scores, no significant relationship was obtained.

1. c. Social participation and dependent variables

1. c. 1. Social participation and adoption of fertilizers

No significant relationship was found between social participation and adoption of fertilizers. Hence it was concluded that social participation was unrelated to adoption of fertilizers.

1. c. 2. Social participation and adoption of desuckering

Results indicated that adoption of desuckering in Banana variety Nendran was not at all influenced by the farmers social participation.

1. c. 3.. Social participation and adoption of mulching

Social participation did not have any significant relationship with adoption of mulching.

1. c. 4. Social participation and adoption of plant protection measures

Social participation have significant relationship with adoption of plant protection measures.

The reason might be that the respondent farmers are getting opportunity for free discussion in meetings which might have directly or indirectly influenced them in taking decisions about the various plant protection measures that are to be finally adopted in Banana cultivation.

Sundaraswamy (1977), Rao (1972) and Sakthivel (1979) reported non-significant association between social participation and adoption.

Positive and significant relationship between social participation and adoption were reported by Mishra and Sinha (1980) and Sohi and Kherde (1980).

1. d. Farm size and dependent variables

1. d. 1. Farm size and adoption of fertilizers

There was no significant relationship between farm size and adoption of fertilizers.

1. d. 2. Farm size and adoption of desuckering

Non-significant relationship exists between farm size and adoption of desuckering.

1. d. 3. Farm size and adoption of mulching

It was found that farm size had significant relationship with adoption of mulching.

1. d. 4. Farm size and adoption of plant protection measures

Results indicated that adoption of plant protection measures was significantly influenced by the farm size. It is generally observed that adoption of plant protection measures will be easier and more effective when the farm size is bigger and this might be the probable reason why the adoption of plant protection measures was significantly influenced by farm size.

Supe and Salode (1975), Sinha and Sinha (1980) did not find any association between farm size and adoption.

Pillai (1978), Sen (1981) and Krishnamoorthy (1984) reported that farm size influence adoption.

1. e. Socio-economic status and dependant variables

1. e. 1. Socio-economic status and adoption of fertilizers

There was no significant relationship between socio-economic status and adoption of fertilizers.

1. e. 2. Socio-economic status and adoption of desuckering

No significant relationship could be found between socio-economic status and adoption of desuckering.

1. e. 3. Socio-economic status and adoption of mulching

Socio-economic status did not have any significant relationship with adoption of mulching.

1. e. 4. Socio-economic status and adoption of plant protection measures

Only non-significant relationship could be found between socio-economic status and adoption of plant protection measures.

It was found from the results that difference in socio-economic status of the farmers do not influence their adoption.

Similar results were obtained by Somasundaram (1976).

1. f. Economic motivation and dependent variables

1. f. 1. Economic motivation and adoption of fertilizers

It was found that economic motivation had significant relationship with adoption of fertilizers.

1. f. 2. Economic motivation and adoption of desuckering

Results indicated that the adoption of desuckering was influenced by farmers economic motivation.

1. f. 3. Economic motivation and adoption of mulching

Significant relationship could be found between economic motivation and adoption of mulching.

1. f. 4. Economic motivation and adoption of plant protection measures

There was significant relationship between economic motivation and adoption of plant protection measures.

The adoption of cultivation practices in Banana var. Nendran was found to be significantly associated with the farmers economic motivation.

The economic motivation is the active force which influence the farmers to adopt scientific agricultural practices. Hence it is quite evident that in this case also Banana Nendran being

a crop mainly grown on a commercial scale the economic motivation was significantly related to adoption of improved practices.

Similar results were obtained by Tyagi and Sohal (1984), Singh and Roy (1985) Jayaramiah (1987).

1. g. Market orientation and dependent variables

1. g. 1. Market orientation and adoption of fertilizers

Significant relationship could be found between market orientation and adoption of fertilizers.

1. g. 2. Market orientation and adoption of desuckering

It was found that market orientation had significant relationship with adoption of desuckering.

1. g. 3. Market orientation and adoption of mulching

There was significant relationship between market orientation and adoption of mulching.

1. g. 4. Market orientation and adoption of plant protection measures

Results indicated adoption of plant protection measures was influenced by the farmers market orientation.

Banana Nendran is a crop which is grown essentially on a commercial basis and the produce is prepared for the market by the farmers. This might be the probable reason why there was significant relationship between market orientation and adoption of improved practices.

Similar results were obtained by Bhaskaran (1979) and Kamarudeen (1981).

1. h. Risk preference and dependent variables

1. h. 1. Risk preference and adoption of fertilizers

There was significant relationship between risk preference and adoption of fertilizers.

1. h. 2. Risk preference and adoption of desuckering

Non-significant relationship between these two variables.

1. h. 3. Risk preference and adoption of mulching

Results indicated significant relationship between risk preference and adoption of mulching.

1. h. 4. Risk preference and adoption of plant protection measures

Significant relationship could be found between risk preference and adoption of plant protection measures.

Farmers will generally have to face certain amount of risks when at the time of adoption of innovations. Eventhough Banana cultivation does not involve much of a risk when compared to seasonal crops this variable had a significant relationship with three of the practices for the cultivation of Banana Nendran.

Balasubramanian (1977), Tripathy (1977) and Sethy (1978) reported positive and significant association between risk preference and adoption.

Sinha (1978) reported non-significant relationship between adoption and risk preference.

1. i. Innovation proneness and dependent variables

1. i. 1. Innovation proneness and adoption of fertilizers

Significant relationship was found between innovation proneness and adoption of fertilizers.

1. i. 2. Innovation proneness and adoption of desuckering

Significant relationship could be found between innovation proneness and adoption of desuckering.

1. i. 3. Innovation proneness and adoption of mulching

There exists significant relationship between innovation proneness and adoption of mulching.

1. i. 4. Innovation proneness and adoption of plant protection measures

Results indicated that there was significant association between adoption of plant protection measures and innovation proneness.

Results showed that there exists positive and highly significant association between innovation proneness and adoption of improved practices in Banana variety Nendran.

It is generally proved that those farmers who have a desire and tendency to seek changes in farming techniques will be the first ones to adopt innovation. This probably will be the obvious reason why there was significant relationship between innovation proneness and adoption.

Similar reports were given by Balasubramanian (1977) and Sanoria and Sharma (1983).

1. j. Extension contact and dependent variables

1. j. 1. Extension contact and adoption of fertilizers

There exists significant relationship between extension contact and adoption of fertilizers by the farmers.

1. j. 2. Extension contact and adoption of desuckering

Non-significant relationship was found between extension contact and adoption of desuckering.

i. j. 3. Extension contact and adoption of mulching

Significant relationship was found between extension contact and adoption of mulching.

1. j. 4. Extension contact and adoption of plant protection measures

Results indicated significant relationship between adoption of plant protection measures and extension contact by the farmers.

Positive relationship of extension contact with adoption of improved practices was observed in the three practices. Only in the case of adoption of desuckering non-significant relation was observed. This may be because of the simple nature of the practice and there was significant relationship in the other three in view of the complex nature of those practices for which frequent exposure to extension agences was required.

Jayaramiah (1987), Ramagowda and Siddaramiah (1987) reported positive and significant relationship between extension contact and adoption.

Somasekharappa and Manimeghalan (1987) found positive association between extension contact and adoption by farmers.

1. k. Information source utilisation and dependent variables

1. k. 1. Information source utilisation and adoption of fertilizers

Results indicated positive and highly significant relationship between information source utilisation by farmers and their adoption of fertilizers.

1. k. 2. Information source utilisation and adoption of desuckering

Significant relationship was found between information source utilisation by farmers and their adoption of desuckering.

1. k. 3. Information source utilisation and adoption of mulching

There exists significant relationship between information source utilisation and adoption of mulching by farmers.

1. k. 4. Information source utilisation and adoption of plant protection measures

Information source utilisation by farmers was found to be significantly related to their adoption of plant protection measures.

The more the farmers are exposed to information sources in a unit period of time better will be the adoption. The accessibility of the Banana Research Station, Kannara, Agricultural University and other mass media may be the reason for the positive relationship presently observed in the study.

Similar results were obtained by Sohi and Kherde (1980) and Jayakrishnan(1984).

II. (a) Relationship between adoption of fertilizer and independent variables

1. Step-wise regression analysis

The results of the step wise regression analysis of adoption of fertilizers on selected independent variables are presented in Table 6. It could be found that the variables information source utilisation (X_{11}) and innovation proneness (X_9) explained 46.13 per cent of the total variation which was found significant.

The results showed that a unit increase in the farmers information source utilisation resulted in an increase of 0.0895 units of their adoption of fertilizers other factors being kept constant. With a unit increase in innovation proneness, their adoption was increased by 0.2885 units.

2. Path analysis

It is revealed from Table 7, which presents the results of path analysis that the independent variables, information source utilisation, innovation proneness and extension contact exerted the maximum direct effect on adoption of fertilizers in the descending order (0.452, 0.245, 0,103 respectively). Marketing orientation, socio-economic status, education and risk preference also

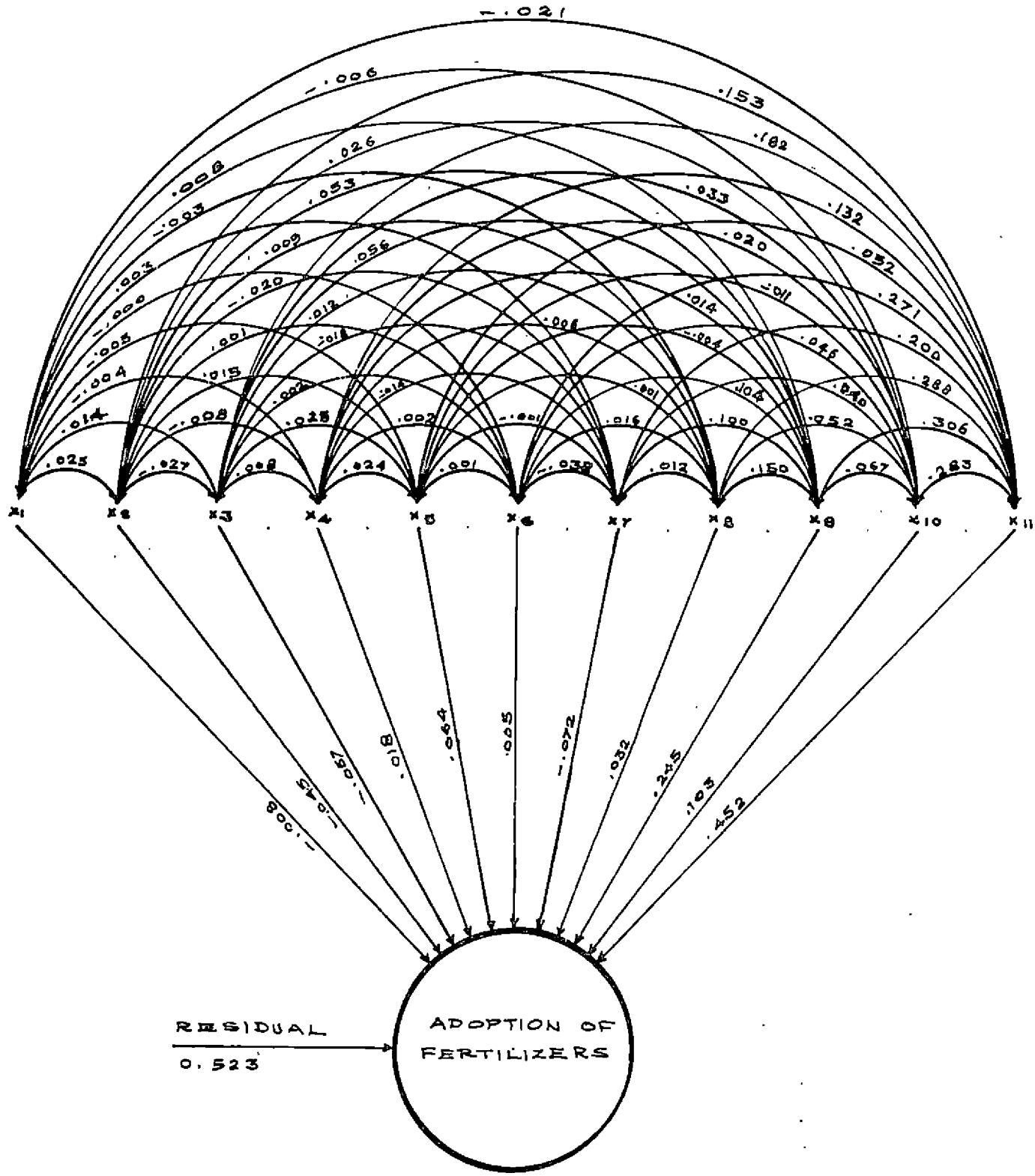
Table 6. Results of the step-wise regression analysis of adoption of fertilizers in Banana var. Nendran

Step No.	Variables entering regression	'b' coefficient	SE of 'b'	F value	Percentage variation explained
I	X_{11} Information source utilisation	0.1252	0.0121	107.519	42.08
II	X_{11} Information source utilisation	0.0895	0.0159	31.858	46.13
	X_9 Innovation proneness	0.2885	0.0868	11.058	

Table 7. Results of the path analysis showing the direct and indirect effects of the independent variables on adoption of fertilizers

Variable number	Name of variable	Direct effect	Variable through which substantial indirect effects were channelled			Path correlation
			I	II	III	
X_1	Age	-0.008	0.025(X_2)	-0.021(X_{11})	0.014(X_3)	0.004
X_2	Education	-0.045	0.153(X_{11})	0.053(X_9)	0.026(X_{10})	0.176
X_3	Social participation	-0.057	0.182(X_{11})	0.056(X_9)	0.033(X_{10})	0.223
X_4	Farm size	0.018	0.132(X_{11})	-0.027(X_3)	0.024(X_5)	0.156
X_5	Socio-economic status	0.064	0.052(X_{11})	-0.022(X_3)	0.011(X_{10})	0.097
X_6	Economic motivation	0.005	0.271(X_{11})	0.104(X_9)	0.046(X_{10})	0.389
X_7	Market orientation	-0.072	0.200(X_{11})	0.100(X_9)	0.040(X_{10})	0.260
X_8	Risk preference	0.032	0.288(X_{11})	-0.150(X_9)	0.052(X_{10})	0.469
X_9	Innovation proneness	0.245	0.306(X_{11})	0.067(X_{10})	-0.029(X_9)	0.587
X_{10}	Extension contact	0.103	0.283(X_{11})	0.159(X_9)	-0.028(X_7)	0.516
X_{11}	Information source utilisation	0.452	0.166(X_9)	0.064(X_{10})	-0.032(X_7)	0.649
	Residual effect	0.523				

FIG. 3. PATH DIAGRAM SHOWING THE DIRECT AND INDIRECT EFFECTS OF INDEPENDENT VARIABLES ON ADOPTION OF FERTILIZERS



had relatively higher values, while the remaining variables registered comparatively smaller effects on the extent of adoption. But they cannot be considered as unimportant because of their significant correlation coefficient due to which they have indirect effect on adoption of fertilizers through those variables which have direct effect on adoption of fertilizers.

Though the data were subjected to the above two types of analysis with specific purposes, the results of these analysis were uniform. Information source utilisation and innovation proneness emerged as the most important variables in these two analysis.

The direct and indirect effects of the independent variables on adoption of fertilizers is schematically represented in a path diagram which is given as Figure 3.

The variable wise discussion is presented below.

Information source utilisation

Mass media such as radio, television and newspaper, personal cosmopolite sources and personal localite sources may induce a tendency in a farmer to acquire more information with the motive of getting higher performance in farming.

Mass media sources now-a-days give due importance to agricultural programmes and bring to the farmers practical

knowledge on improved cultivation practices of various crops. The concept of "information threshold" given by Gaikwad seems to be applicable in the present case, wherein exposure to a large number of information sources may generate a force in an individual, to acquire more information, even without a deliberate/conscious effort. Balasubramanian (1985), Godhandapani (1985), Jayapalan (1985) and Wilson and Chaturvedi (1985) also observed positive and significant correlation of farmers extent of adoption with their mass media participation. Menon (1970) and Tripathy (1977) reported positive and significant relation between adoption and the utilisation of personal localite source of information. Roy and Singh (1985) and Singh (1981) found positive and significant correlation between utilisation of personal cosmopolite sources of information and extent of adoption.

Innovation proneness

Innovative farmers were found to be better adopters. Innovative farmers have better interest and desire to seek changes in farming techniques and to introduce such changes into their operation when practical and feasible. Balasubramanian (1977), Ravi (1979), Sanoria and Sharma(1983) also observed positive and highly significant association between innovativeness and adoption of improved practices.

Extension contact

The farmers who come in contact with different extension agencies are likely to receive message related to the package of practices to be followed for increased crop production. Sanoria and Sharma (1983), Nanjayan (1985), Jayaramiah (1987) also reported positive and significant correlation of extension agency contact with extent of adoption.

(b) Relationship between adoption of desuckering and independent variables

1. Step-wise regression analysis

The results of step-wise regression analysis of adoptioon of desuckering in Banana var. Nendran on the independent variables are presented in Table 8.

It was found that the variables, Information source utilisation (X_{11}), Economic motivation (X_6), Socio-economic status (X_5) and Marketing orientation (X_7) explained 11.377 per cent of the total variation which was found significant.

The results showed that a unit increase in the farmers information source utilisation resulted in an increase of 0.0321 units of their adoption of desuckering practices. With an unit

Table 8. Results of step-wise regression analysis of adoption of plant desuckering in Banana var. Nendran with the independent variables

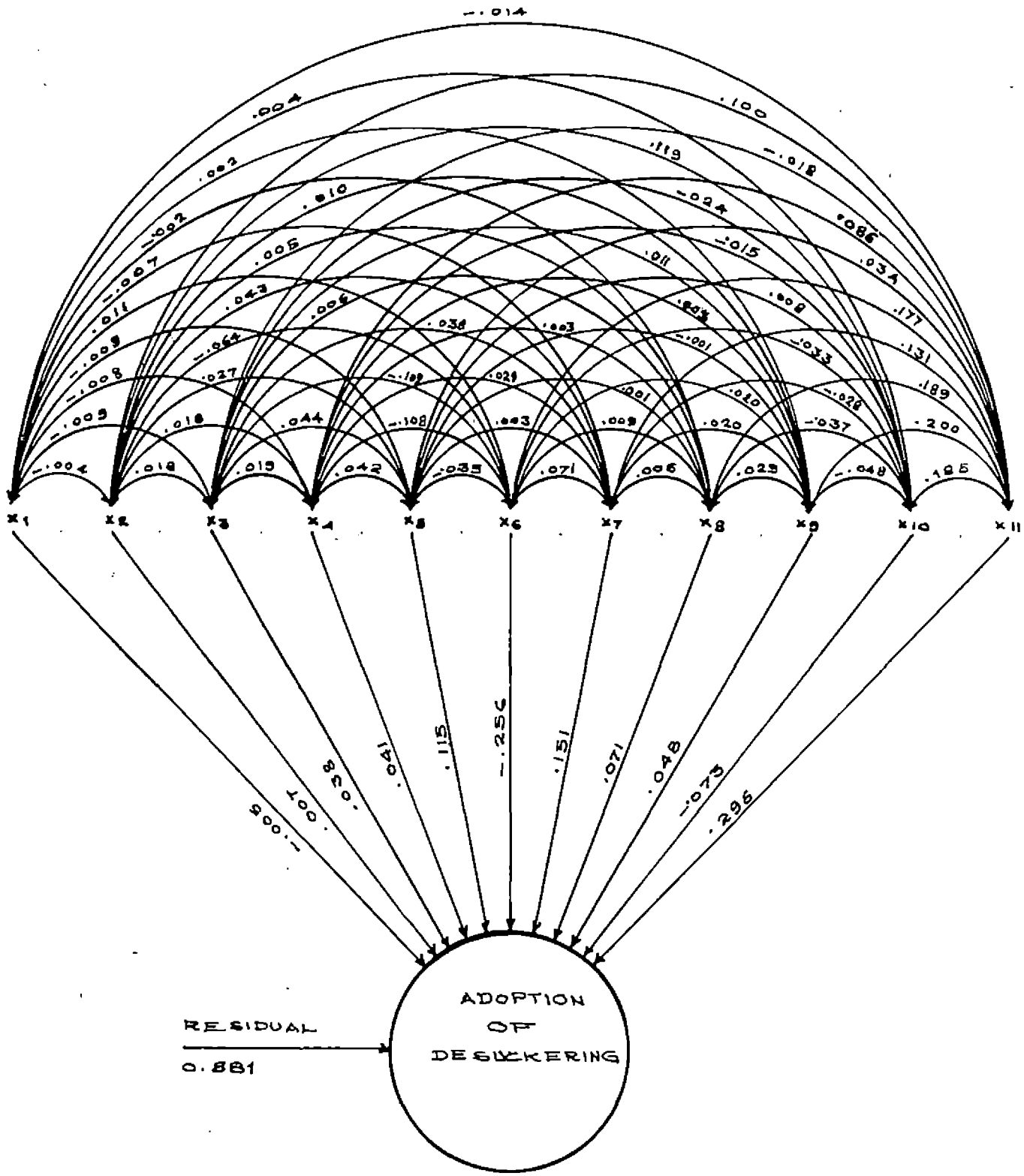
Step No.	Variables entering regression		'b' coefficient	SE of 'b'	F value	Percentage variation explained
I	X_{11}	Information source utilisation	0.261	0.0083	9.8038	6.213
II	X_{11}	Information source utilisation	0.369	0.0103	12.711	8.1015
	X_6	Economic motivation	-0.0216	0.0124	3.0215	
III	X_{11}	Information source utilisation	0.0362	0.0103	12.3427	9.6414
	X_6	Economic motivation	-0.0232	0.0124	3.5165	
	X_5	Socio-economic status	-0.0090	0.0057	2.4963	
IV	X_{11}	Information source utilisation	0.0321	0.0105	9.3442	11.377
	X_6	Economic motivation	-0.0295	0.0129	5.2649	
	X_5	Socio-economic status	0.0095	0.0056	2.8603	
	X_7	Market orientation	0.0708	0.0421	2.8316	

Table 9. Results of the path analysis showing the direct and indirect effects of the independent variables on adoption of desuckering practice

Variable number	Name of variable	Direct effect	Variables through which substantial indirect effects were channelled			Path correlation r
			I	II	III	
X_1	Age	0.005	$-0.014(X_{11})$	$-0.009(X_3)$	$-0.009(X_5)$	-0.032
X_2	Education	0.007	$0.100(X_{11})$	$-0.064(X_6)$	$0.043(X_7)$	0.143
X_3	Social participation	0.038	$0.119(X_{11})$	$-0.109(X_6)$	$0.044(X_5)$	0.146
X_4	Farm size	0.041	$0.086(X_{11})$	$-0.108(X_6)$	$0.042(X_5)$	0.102
X_5	Socio-economic status	0.115	$-0.035(X_6)$	$0.034(X_{11})$	$0.015(X_4)$	0.140
X_6	Economic motivation	-0.256	$0.177(X_{11})$	$0.071(X_7)$	$-0.033(X_{10})$	0.039
X_7	Market orientation	0.151	$0.131(X_{11})$	$-0.120(X_6)$	$-0.028(X_{10})$	0.181
X_8	Risk preference	0.017	$0.189(X_{11})$	$-0.131(X_6)$	$0.059(X_7)$	0.152
X_9	Innovation proneness	0.048	$0.200(X_{11})$	$-0.062(X_7)$	$-0.048(X_{10})$	0.175
X_{10}	Extension contact	-0.073	$0.185(X_{11})$	$-0.115(X_6)$	$0.058(X_7)$	0.129
X_{11}	Information source utilisation	0.296	$-0.153(X_6)$	$0.067(X_7)$	$-0.046(X_{10})$	0.249

Residual effect = 0.883

FIG. 4. PATH DIAGRAM SHOWING THE DIRECT AND INDIRECT EFFECTS OF INDEPENDENT VARIABLES ON ADOPTION OF DESUCKERING



increase in farmers economic motivation, their adoption was increased by -.0295 units. An unit increase in farmers socio-economic status would increase the adoption by 0.0095 units. An unit increase in the marketing orientation would increase the adoption by 0.0708.

2. Path analysis

The results of the path analysis of selected independent variables on the adoption of desuckering practice in Banana var. Nendran are furnished in Table 9. The direct and indirect effects of the independent variables on adoption of desuckering is schematically represented in a path diagram which is given as Figure 4.

It is revealed from Table 9 that the Information source utilisation (X_{11}), Economic motivation (X_6), Market orientation (X_7), Socio-Economic status (X_5) exerted maximum direct effects on the adoption in the descending order (0.296, -0.256, 0.151, 0.115 respectively). Innovation proneness, extension contact and farm size also had relatively higher values. But the remaining variables cannot be considered as unimportant because of their significant correlation coefficient due to which they have indirect effect on adoption of desuckering through those variables which have direct effect.

The data subjected to the above two types of analyses revealed that information source utilisation, economic motivation, marketing orientation and socio-economic status were the most important variables in determining adoption.

Economic motivation

Economic motivation has become highly applicable here as Banana Nendran is grown purely as a crop on commercial basis. The farmers might have thought of higher agricultural income from an unit area of Banana than other seasonal crops.

Economic motivation may be regarded as one indication of the degree of willingness of a farmer for investment of his available potential resources in adopting farm innovation. Singh and Roy (1985) and Jayaramiah (1987) has also reported significant relation between economic motivation and adoption.

Market orientation

Market orientation has a high direct effect on adoption (0.151). This finding draws support from the findings of Bhaskaran (1979) and Kamarudeen (1981).

The same reason given in the case of economic motivation is applicable here also.

Socio-economic status

Socio-economic status has a high direct effect on adoption viz. 0.115. This finding draws support from the findings of Singh (1983) and Yadav and Jain (1984).

The same argument putforth earlier for explaining the significant relationship of information source utilisation with adoption of fertilizers holds good in the case of desuckering also.

(c) Relationship between adoption of mulching and independent variables

1. Step-wise regression analysis

The results of step-wise regression analysis between adoption of mulching and selected independent variables are presented in Table 10.

It could be found that, the variables information source utilisation (X_{11}), market orientation (X_7), innovation proneness (X_4) together explained 27.41 per cent of the total variation in the dependent variable which was found significant.

Table 10. Results of step-wise regression analysis of adoption of mulching in Banana var. Nendran with the independent variables

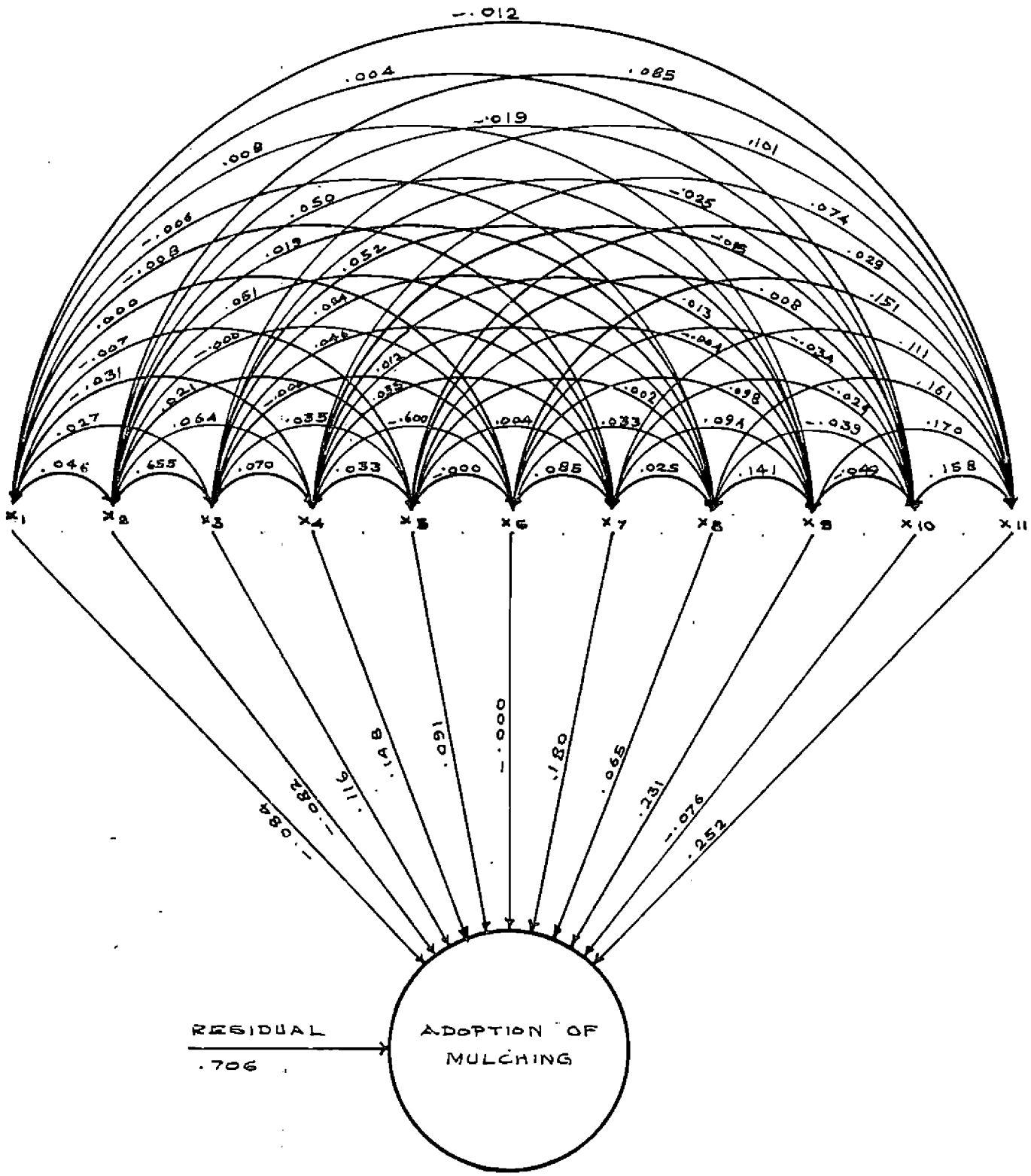
Step No.	Variables entering regression		'b' coefficient	SE of 'b'	F value	Percentage variation explained
I	X_{11}	Information source utilisation	0.0720	0.0113	40.7170	21.5757
II	X_{11}	Information source utilisation	0.0585	0.0124	22.4097	24.6914
	X_7	Market oriention	0.1344	0.0545	6.0817	
III	X_{11}	Information source utilisation	0.0424	0.0154	7.5514	
	X_7	Market orientation	0.1187	0.0549	4.6742	26.1941
	X_9	Extension contact	0.1431	0.0830	2.9727	
IV	X_{11}	Information source utilisation	0.0345	0.0162	4.5434	
	X_7	Market orientation	0.1092	0.0550	3.9467	27.414
	X_9	Extension contact	0.1715	0.0846	4.1136	
	X_4	Farm size	0.0816	0.0523	2.4368	

Table 11. Results of the path analysis showing the direct and indirect effects of the independent variables on adoption of mulching

Variable number	Name of variable	Direct effect	Variables through which substantial indirect effects were channelled			Path correlation r
			I	II	III	
X_1	Age	-0.084	0.046(X_2)	0.027(X_3)	-0.0121(X_{11})	-0.062
X_2	Education	-0.082	0.085(X_{11})	0.064(X_4)	-0.055(X_3)	0.181
X_3	Social participation	-0.116	0.101(X_{11})	0.070(X_4)	0.052(X_9)	0.169
X_4	Farm size	0.148	0.074(X_{11})	-0.055(X_3)	-0.035(X_2)	0.226
X_5	Socio-economic status	0.091	0.054(X_4)	-0.045(X_3)	0.029(X_{11})	0.111
X_6	Economic motivation	-0.000	0.151(X_{11})	0.098(X_9)	0.085(X_7)	0.341
X_7	Marketing orientation	0.180	0.111(X_{11})	0.094(X_9)	-0.029(X_{10})	0.363
X_8	Risk preference	0.065	0.161(X_{11})	0.141(X_9)	0.070(X_7)	0.367
X_9	Innovation proneness	0.231	0.170(X_{11})	0.074(X_7)	-0.049(X_{10})	0.425
X_{10}	Extension contact	0.076	0.158(X_{11})	0.150(X_9)	0.069(X_7)	0.319
X_{11}	Information source utilisation	0.252	0.156(X_9)	0.080(X_7)	0.080(X_7)	0.464

Residual effect = 0.706

FIG. 5. PATH DIAGRAM SHOWING THE DIRECT AND INDIRECT EFFECTS OF INDEPENDENT VARIABLES ON ADOPTION OF MULCHING



The results showed that a unit increase in the information source utilisation resulted in an increase of 0.0345 units of their adoption of mulching practice, other factors being kept constant. With unit increase in the market orientation by the farmers, their adoption was increased by 0.1092 units. An unit increase in farmers extension contact would increase the adoption by 0.1715 units. An unit increase in farm size resulted in an increase of 0.0816 units of adoption.

2. Path analysis

The results of the path analysis of independent variables on the adoption of mulching are furnished in Table 11. The direct and indirect effects of the independent variables on adoption of mulching is schematically represented in a path diagram which is given as Figure 5.

It is revealed from Table 11 that the information source utilisation, innovation proneness, market orientation and farm size exerted the maximum direct effects on the adoption of mulching practice in the descending order (0.252, 0.231, 0.180, 0.148 respectively). Socio-economic status, education, innovation proneness and risk preference also had relatively higher values, while the remaining variables registered comparatively small effects on adoption of mulching, but cannot be considered

as important, because of their significant correlation coefficient due to which they have indirect effect on adoption of mulching through those variables which have direct, effect on adoption of mulching.

The results of step-wise regression analysis and path analysis presented above gave similar results. Information source utilisation, extension contact, market orientation and farm size were found significant in both type of analyses.

Farm size

Farmers with more area under Banana variety Nendran are likely to invest more in farm inputs with an eye on profit maximisation.

Krishnamoorthy (1984) and Tantray (1987) also reported positive and significant correlation between farmers adoption and their farm size.

The same argument putforth earlier for explaining the significant relationship of information source utilisation, extension contact and market orientation with adoption of fertilizers and adoption of desuckering holds good in the case of adoption of mulching also.

(d) Relationship between adoption of plant protection measures and independent variables

1. Step-wise regression analysis

The results of the step-wise regression analysis between adoption of plant protection measures (prophylatic) by the farmers and the independent variables are presented in Table 12.

It could be found that the variables information source utilisation (X_{11}), market orientation (X_7), extension contatct (X_{10}) together explained 52.67 per cent of the total variation caused by the independent variables in the dependent variable which was found significant.

The results showed an unit increase in the information source utilisation resulted in an increase of 0.179 units of their adoption of plant protection measures, other factors being kept constant. With an unit increase in market orientation, their adoption was increased by 0.2771 units. An unit increase in farmers extension contact would increase the adoption by 0.2290 units.

2. Path analysis

The results of the path analysis of independent variables on adoption of plant protection measures are furnished in

Table 12. Result of step-wise regression analysis of adoption of plant protection practices in Banana vr. Nendran with the independent variables

Step No.	Variables entering regression		'b' coefficient	SE of 'b'	F value	Percentage variation explained
I	X_{11}	Information source utilisation	0.2362	0.0201	137.7591	48.2081
II	X_{11}	Information source utilisation	0.2057	0.0218	89.2441	51.5362
	X_7	Market orientation	0.3051	0.0960	10.0948	
III	X_{11}	Information source utilisation	0.1791	0.0259	47.999	52.6685
	X_7	Market orientation	0.2771	0.0964	8.2652	
	X_{10}	Extension contact	0.2290	0.1225	3.4926	

Table 13. Results of the path analysis showing the direct and indirect effects of independent variables on adoption of plant protection measures

Variable Number	Name of variable	Direct effect	Variables through which substantial indirect effects were channelled			Path correlation r
			I	II	III	
X_1	Age	0.066	$0.026(X_2)$	$-0.022(X_{11})$	$-0.014(X_4)$	0.042
X_2	Education	-0.046	$0.158(X_{11})$	$0.048(X_7)$	$-0.037(X_1)$	0.198
X_3	Social participation	-0.009	$0.189(X_{11})$	$0.043(X_7)$	$0.039(X_{10})$	0.279
X_4	Farm size	0.066	$0.137(X_{11})$	$0.033(X_7)$	$0.024(X_{10})$	0.226
X_5	Socio-economical status	-0.059	$0.054(X_{11})$	$0.024(X_4)$	$0.012(X_{10})$	0.022
X_6	Economic motivation	0.028	$0.282(X_{11})$	$0.080(X_7)$	$0.054(X_{10})$	0.495
X_7	Market orientation	0.169	$0.207(X_{11})$	$0.046(X_{10})$	$0.027(X_8)$	0.470
X_8	Risk preference	0.069	$0.300(X_{11})$	$0.066(X_7)$	$0.061(X_{10})$	0.518
X_9	Innovation proneness	0.034	$0.318(X_{11})$	$0.078(X_{10})$	$0.069(X_3)$	0.549
X_{10}	Extension contact	0.121	$0.294(X_{11})$	$0.065(X_7)$	$0.035(X_8)$	0.538
X_{11}	Information source utilisation	0.470	$0.075(X_{10})$	$0.075(X_7)$	$0.044(X_8)$	0.694

Residual effect = 0.456

FIG. 6. PATH DIAGRAM SHOWING THE DIRECT AND INDIRECT EFFECTS OF INDEPENDENT VARIABLES ON ADOPTION OF PLANT PROTECTION MEASURES

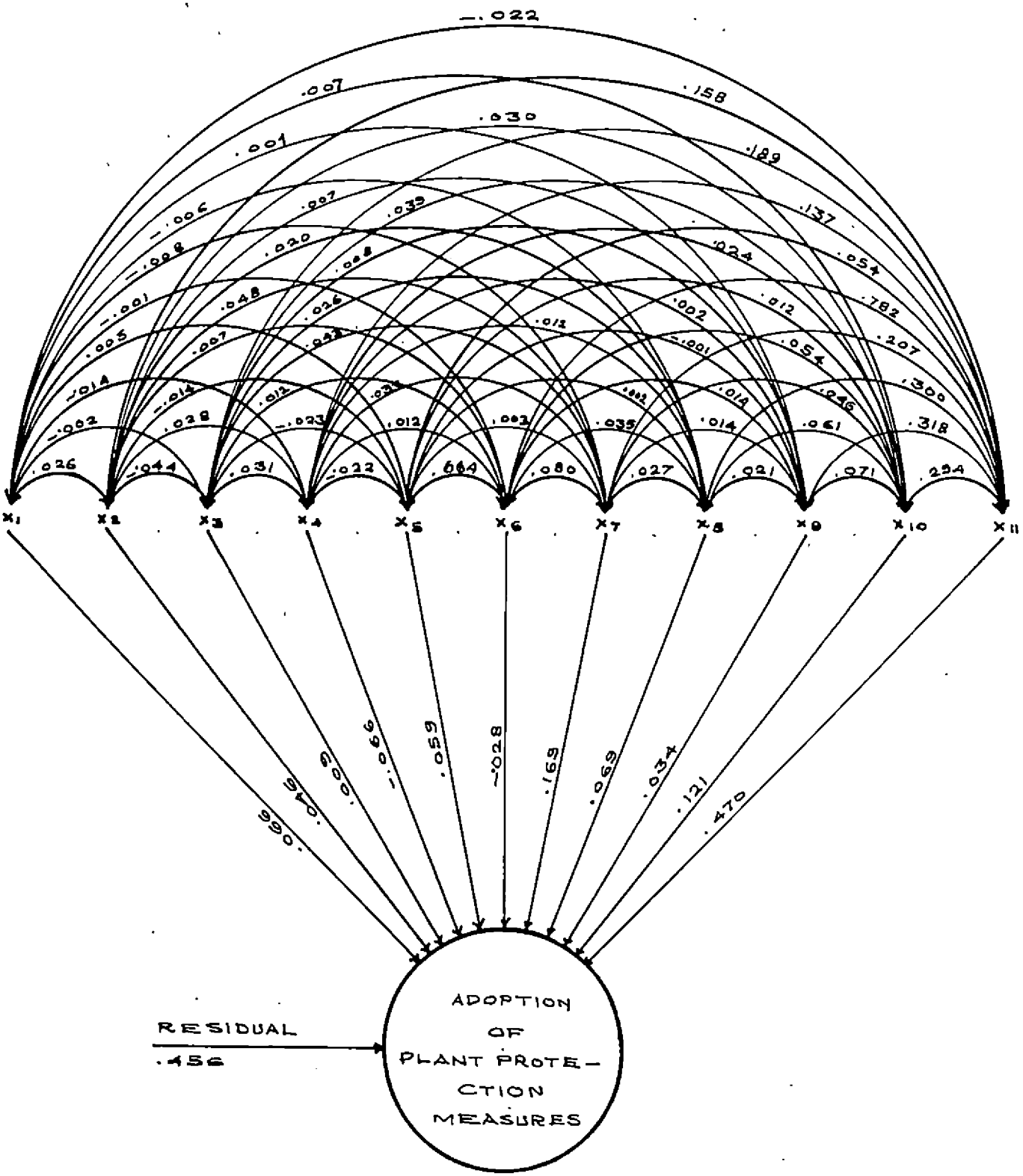


Table 13. The direct and indirect effects of the independent variables on adoption of plant protection measures is schematically represented which is given as Figure 6.

It is revealed from Table 13 that the information source utilisation, market orientation, extension contact and risk preference exerted the maximum direct effects on the adoption of plant protection measures in the descending order (0.470, 0.169, 0.121 and 0.069).

Farm size, age, socio-economic status and education also had relatively higher values, while the remaining variables registered comparatively smaller effects on the adoption of plant protection measures. But these variables cannot be considered as unimportant because of their significant correlation coefficients due to which they have indirect effect on adoption through those variables which have direct effect on adoption of plant protection measures.

The results of the analysis presented above were similar. In path analysis, risk preference emerged as significant.

Risk preference

Risk preference may be regarded as one indication of the degree to which a farmer is oriented towards risk and his courage to face problems in farming.

Tripathy (1977), Sathy (1978) also reported positive and significant association of risk orientation with adoption of farm practices.

The same argument putforth earlier for explaining the significant relationship with adoption of fertilizers and adoption of desuckering holds good here also.

III. Constraints as perceived important by the farmers in the adoption of recommended cultivation practices

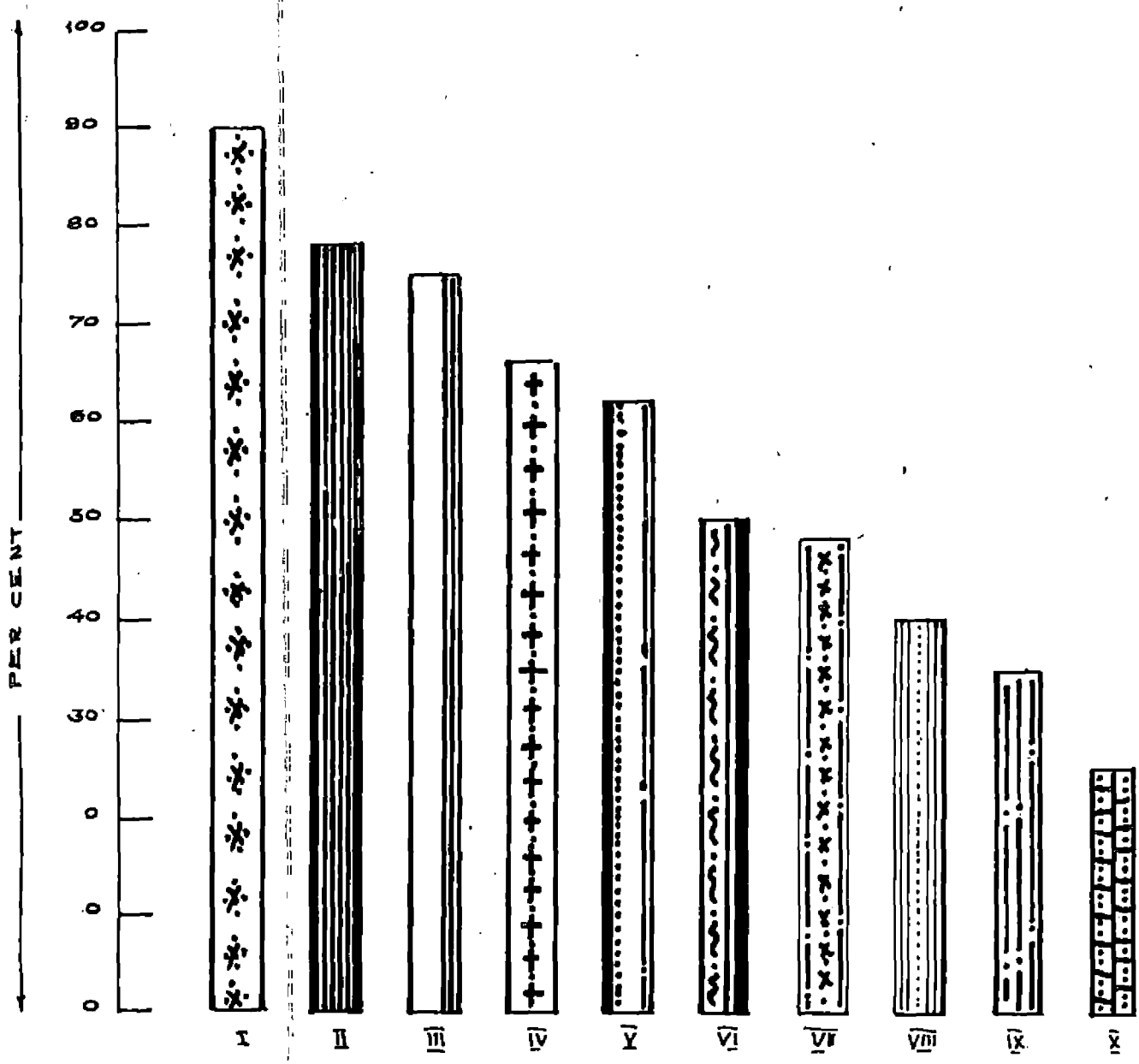
An attempt was made to find out the constraints as perceived important by the farmers in the adoption of recommended cultivation practices in Banana variety Nendran.

Table 14 revealed that the inadequacy of capital ranked first among the constraints as identified by the farmers. Ninety per cent of the farmers reported inadequacy of capital as the most important constraint. The other constraints were high labour charge (78.0 per cent) low price for out-put (75 per cent) high prop cost (66.0 per cent), high cost of plant protection chemicals and fertilizers (62 per cent), inadequate market facilities (50 per cent), nonavailability of equipments for plant protection (48 per cent), poor transport facilities (40.0 per cent) lack of knowledge about technology (35 per cent) and uneconomic holding size (25.0 per cent). The diagrammatic representation is given in Figure 7.

Table 14. Constraints regarding the adoption of recommended cultivation practices in Banana var. Nendran by the farmers

Order of constraints	Constraint	Percentage
I	Inadequacy of capital	90
II	High labour charge	78
III	Low price for output	75
IV	High prop cost	66
V	High cost of plant protection chemicals and fertilizers	62
VI	Inadequate market facilities	50
VII	Non-availability of equipments for plant protection	48
VIII	Poor transport facilities	40
IX	Lack of knowledge about technology	35
X	Uneconomic holding size	25

FIG. 7. DIAGRAM SHOWING THE RANK ORDER OF THE CONSTRAINTS AS PERCEIVED IMPORTANT BY THE FARMERS IN ADOPTING RECOMMENDED CULTIVATION PRACTICES OF BANANA - NENDRAN



RANK ORDER OF CONSTRAINTS

I INADEQUACY OF CAPITAL. III LOW PRICE FOR OUTPUT.

II HIGH LABOUR CHARGE. IV HIGH PROP COST.

V HIGH COST OF FERTILIZERS AND PLANT PROTECTION CHEMICALS.

VI INADEQUATE MARKET FACILITIES.

VII NON-AVAILABILITY OF EQUIPMENT FOR PLANT PROTECTION.

VIII POOR TRANSPORT FACILITIES. X UNECONOMIC HOLDING SIZE.

IX LACK OF KNOWLEDGE ABOUT TECHNOLOGY.

Although significant progress has been achieved in the fields of agriculture and allied sciences the extent of adoption of such technology by the clientele is far below expectations. This clearly warrants a restructuring of the extension system in the country so that the technological gap could however be reduced to a considerable extent for increased productivity and thus enabling increased agricultural production in the country.

Summary

CHAPTER-V

SUMMARY AND CONCLUSION

Science has given man immense powers. But all science whether physical or social will be useless and all human energy invested on scientific inventions and discoveries will be mere waste unless their useful and practical findings are communicated to the people in such a way that they accept them and adopt them to attain a status of social and economic well being. In India the productivity in majority of crop is possibly the lowest. The reason has to be found in the gap between theoretical knowledge acquired by the scientists and the extent to which it has found practical application by the clientele.

In the process of agricultural development, the prime mover is considered to be the new farming technology. Higher the gap between recommended practices and the actual adoption, lesser will be the utilisation of the research findings which will ultimately lower the agricultural production in the country. It is therefore necessary to ascertain the extent of adoption of recommended cultivation practices by the clientele. In this context, the present study was undertaken with the following specific objectives.

Objectives of the study

1. To identify the gap in the adoption of technology in Banana var. Nendran cultivated in Trichur District.
2. To study the relationship between personal, situational, psychological and communication characteristics of Banana Nendran growers and the extent of adoption.
3. To identify the constraints for non-adoption of recommended practices if any, by Banana var. Nendran growers.

The only Banana Research Station in Kerala is located at Kannara, Trichur District. Hence compared to other districts of the State the rate of flow of information dissemination and resultant adoption of package of practices of the crop is considered to be comparatively greater in the district. So the investigation was carried out in Trichur District.

The area under Banana var. Nendran in three sub-divisions of Trichur District viz. Wadakanchery, Irinjalakuda and Trichur was collected and the sub-divisions having the maximum area under the crop was selected by purposive sampling method. Panchayat wise area in the sub-division was collected and two Panchayats were selected by pps sampling method. Out of the two Panchayats 6 wards were again selected randomly and 150 farmers were selected at random from these wards.

Independent variables selected for the study based on review of literature were:

1. Personal and situational characters

Age, Education, Social participation, Farm size, Socio-economic status.

2. Psychological characters

Economic motivation, Market orientation, Risk preference and Innovation proneness.

3. Communication variables

Extension contact and Information source utilisation.

The extent of adoption of improved practices in the cultivation of Banana Nendran variety was taken as the dependent variable. But, on a preliminary analysis it was observed that only four practices viz. adoption of fertilizers, adoption of desuckering, adoption of mulching and adoption of plant protection operation were to be selected for the study as there was only very little variability in the scores of the other practices.

The data were collected by personal interviews with the respondents using a structured and pretested interview schedule developed for the purpose. The collected data were analysed using Kruskal Wallis test, step wise regression analysis and path analysis.

The salient findings of the study are summarised and presented below:

1. It was revealed from the study that majority of the farmers were in the medium adoption group.

2. Regarding the technological gap, most of the farmers belong to the medium gap category.

3. It was revealed from Kruskal Wallis test that

   (i) Education, economic motivation, market orientation, risk preference, innovation proneness, extension contact and information source utilisation had significant relationship with adoption of fertilizers.

   (ii) In the case of adoption of desuckering economic motivation, market orientation, innovation proneness and information source utilisation had significant relationship.

   (iii) In the case of adoption of mulching farm size, economic motivation, market orientation, risk preference, innovation proneness, extension contact and information source utilisation had significant relationship.

   (iv) All the independent variables except age and socio-economic status had significant relationship with adoption of plant protection measures.

4) From step-wise regression analysis it was revealed that

(i) Information source utilisation and innovation proneness were significant in predicting the adoption of fertilizers by farmers.

(ii) Information source utilisation, economic motivation, socio-economic status and market orientation were found significant in predicting the adoption of desuckering practice.

(iii) Information source utilisation, extension contact, market orientation and farm size were significant in predicting the adoption of mulching.

(iv) Information source utilisation, market orientation and extension contact were found significant in predicting the adoption of plant prtoection.

5) From path analysis it was revealed that

(i) Information source utilisation, innovation proneness and extension contact contribute significantly to the adoption of fertilizers.

(ii) Information source utilisation, economic motivation, market orientation and socio-economic status were found to contribute significantly to the adoption of desuckering practices in Banana var. Nendran.

(iii) Information source utilisation innovation proneness, market orientation and farm size contribute significantly to the adoption of mulching.

(iv) Independent variables which contribute significantly to the adoption of plant protection measures were information source utilisation, market orientation, extension contact and risk preference.

6. The important constraints perceived by farmers were inadequacy of capital, high labour charge, low price for output, high prop cost, high cost of plant protection chemicals and fertilizers, inadequate market facilities, non-availability of equipments for plant protection, poor transport facilities, lack of knowledge about technology and uneconomic holding size.

Implications and recommendations

The following implications and recommendations emerge out of the findings of the present study.

1. The study has established relationships between the selected independent and dependent variables in most cases. This could positively give important clues to the extension system for favourably manipulating the innovation decision of the clientele.

2. Eventhough various cultivation practices have been evolved to enhance the productivity, some of these practices are not seen adopted by the farmers. So more systematic and organised extension efforts are needed in this field.

3. The price of fertilizers and plant protection chemicals are increasing every year which makes the farmers difficult to buy these inputs. The Government may take appropriate measures to make available the required type and quantity of fertilizers and plant protection chemicals keeping the price at the level accessible to small and marginal farmers.

4. The Government should fix remunerative prices for the farm products as this will improve the purchasing capacity of the farmers and enable them to invest more on agricultural input. Moreover, this will also enhance the repaying capacity of the farmers for the crop loans availed by them.

Suggestions for future research

The present study was confined to only two selected panchayats in Trichur District. A comprehensive study of the adoption of recommended cultivation practices in Banana var. Nendran covering all the districts in the State with larger sample size could be undertaken.

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*Originals not seen

Appendices

APPENDIX-I

INTERVIEW SCHEDULE

Respondent No.

Name and address of the farmer

Panchayat

Block

District

1. Age

2. Education

Level

College and above

High School

Middle school

Primary

Can read and write

Can read only

3. Social participation

Do you participate in the activities of any organisation Yes/No

If yes,

Orgn./Institution

Not member Member Office bearer

How often do you attend meetings of the orgn.

Regularly Occasionally Never

i) Village panchayat

ii) Service co-operative

iii) Youth clubs

iv) Mahila mandals

v) Others (specify)

4. Farm size

/ 50 cents

50-100 cents

1-2 acre

2 and above

5. Socio-economic status

House

(a) Hut (one room)

Thatched

Tiled

Terraced

(b) Plastered

Not plastered

(c) Electrified

Agricultural and House hold implements

Draught animal

Pumpset

Sprayer

Spade

Pickaxe

Reaper

Axe

Cycle

Radio

Watches

Chairs

Cots

Family type

Nuclear

Joint

Psychological variables

6. Economic motivation

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1. A farmer should work towards higher yeild and economic profits					
2. The most successful farmer is one who makes the maximum profits					
3. A farmer should try any new farming ideas which may earn him more money					
4. A farmer should grow cash crops to increase monetary profits in comparison to growing of food crops for home consumption					
5. It is difficult for the farmers children to make good start unless he provides them with economic assistance					
6. A farmer must earn his living but the most important thing in life cannot be defined in economic terms					

7. Marketing orientation

1. Market is not useful to a fermer

2. A farmer can get good price by grading his produce

3. One should sell his produce to the nearest market irrespective of price

4. One should purchase his inputs from shops where his relatives purchase

5. One should grow those crops which have more market demand

8. Risk preference

a. A farmer should grow larger no: of crops to avoid greater risks involved in growing one or two crops

b. A farmer should take more of a chance in making a big profit than to be content with a smaller but less risky profit

c. A farmer who is willing to take greater risk than the average farmer usually does better financially

d. It is good for a farmer not to take risk when he knows his chance of success is fairly large

e. It is better for a farmer not to try new farming methods unless most others in the locality have used it with success

f. Trying entirely a new method in farming by a farmer involves risk but is worth it

9. Innovation proneness

Sl.No.	Statements	Most like	Least like
A.(a)	I try to keep myself up to date with information on new farm practices but that does not mean that I try out all the new methods on any farm		
(b)	I feel restless till I try out a new farm practice I have heard about		
(c)	They talk of new farm practices these days but who knows if they are better than old ones		
B.(a)	From time to time I have heard of several new farm practices and I have tried out most of them in the last few years		
(b)	I usually want to see what results my neighbours obtain before I try out the new farm practices		
(c)	Some how I believe that the traditional ways of farming are the best		
C.(a)	I am cautious about trying a new farm practice		
(b)	Afterall our forefathers were wise in their farming practices and I do not see any reasons for changing these old methods		

(c) Often new practices are not successful, however, if they are promising I would surely like to adopt them

Communication variables

10. Extension contact

Frequency of meeting Officials	Twice a week	Once a week	Once to thrice a month
a) Research scientists			
b) Extension officers			
c) Field level workers			
d) Input agencies			
e) Others			

11. Information source utilisation

Sl.No.	Source	Most often	Often	Sometimes	Never
(a)	Mass media sources				
1.	Radio				
2.	Film				
3,	Newspaper				
4.	Farm publications				
5.	Demonstrations				
6.	Poster				
7.	Field trips				
8.	Agrl. Journals				

9. Agrl exhibitions

10. Others (specify)

(b) Personal cosmopolite sources

Research Scientists

Extension Officers

Demonstrators

Others

(c) Personal localite sources

Neighbours

Friends

Family members

Relatives

12. Adoption of recommended practices for Nendran cultivation

Do you adopt the following recommended practices in Nendran cultivation?

1. At what age do you select & plant suckers — 2-3 months 3-4 months

2. Treatment of suckers
   Do you treat your suckers before planting : Yes/No

   If yes, How? ( ) — Smearing with cowdung solution; B H C treatment; ASs treatment

3. What is the spacing? : 2 m x 2 m 3 m x 3 m

4. Field preparation : Yes/No

   Specify the pit size adopted : 50 cm^3 55 cm^3 60 cm^3

5. Do you apply organic manure? : Yes/No

   If yes, Type of O.M. Quantity Time of application

6. Do you apply inorganic fertilizers : Yes/No

If yes, Name of fertilizer used | Quantity | Time & type of application

7. Do you irrigate your crop? : Yes/No

If yes, Time of irrigation | Quantity used | Irrigation interval

8. Do you take to timely intercultural operation? : Yes/No

If yes, specify the operations | Weeding (time) | Mulching (time) | Desuckering (time)

9. Do you intercrop your plot? : Yes/No

If yes, specify the crops | 1 | 2 | 3

10. Do you adopt timely plant protection measures? : Yes/No

If yes,

(a) Do you adopt preventive measures against bunchy top disease? : Yes/No

If yes, specify

(b) Diseases | Disease noticed | Fungicides used | Quantity

(c) Pests | Pests noticed | Insecticides used | Quantity

13. Constraints in adoption of recommended practices

Which among the following constraints would you identify as the most important and least important in adoption of recommendedpractices?

	Most Important	Least Important
1. Poor transport facilities		
2. Lack of communication facility		

3. Non-availability of supply & services
4. Lack of knowledge about technology
5. Uneconomic holding size
6. Inadequacy of capital
7. Inadequate supervision & guidance
8. Non-availability of labour
9. Inadequate market facilities
10. Water scarcity
11. Poor socio-economic status
12. Low price for output
13. Non-availability of equipments for plant protection
14. Non-availability of credit
15. Others (specify)
16. High labour charge
17. High prop cost
18. High cost of PP chemicals & fertilizers

ADOPTION OF TECHNOLOGY FOR CULTIVATION OF BANANA VAR. NENDRAN IN TRICHUR DISTRICT

By

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ABSTRACT OF THE THESIS

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ABSTRACT

It is commonly observed that there is wide gap between the technology generated in Research Station and its actual use by the clientele. It is with this view in mind that the present study was undertaken to identify the gap in the adoption of technology in Banana Nendran cultivated in Trichur District. The relationship between personal, situational, psychological and communication characteristics of Banana Nendran growers and their adoption was also studied. The constraints in the adoption process were also finally analysed.

The study was conducted in Trichur District. The sample was 150 farmers selected randomly from the six wards of the two Panchayats selected for the study. Data was collected using an interview schedule and suitable statistical techniques were employed in the analysis of the data.

It was revealed from the study that the technological gap with respect to 25.33 per cent of the respondents was low, 51.33 per cent of respondents was medium and 23.33 per cent of the respondents high.

The study revealed that information source utilisation, innovation proneness and extension contact contribute significantly to the adoption of fertilizers in Banana var. Nendran. In the case of adoption of desuckering practice it was found that information

source utilisation, economic motivation and market orientation were significant in predicting the adoption of desuckering. Information source utilisation, extension contact, market orientation and farm size were found to contribute significantly to the adoption of mulching in Banana var. Nendran. It was revealed from the study that independent variables contributing significantly to the adoption of plant protection measures were information source utilisation, extension contact and market orientation.

The important constraints perceived by the farmers were inadequacy of capital, high labour charge, low price for output, high prop cost, high cost of plant protection chemicals and fertlizers, inadequate market facilities, non-availability of equipment for plant protection, poor transport facilities, lack of knowledge about technology and uneconomic holding size.

The results point out vividly to the prime need for strengthening the extension education efforts of the field functionaries to reduce the technological gap with respect to the cultivation of Banana Nendran variety in the District.