DIFFUSION AND ADOPTION OF SELECTED NEW COTTON TECHNOLOGIES GENERATED FROM REGIONAL AGRICULTURAL RESEARCH STATION, NANDYAL AMONG FARMERS

Thesis submitted in part fulfilment of the requirements for the
Degree of ***MASTER OF SCIENCE (AGRICULTURE)***
in Agricultural Extension to the Tamil Nadu Agricultural University, Coimbatore

BY

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CERTIFICATE

This is to certify that the thesis entitled, **"DIFFUSION AND ADOPTION OF SELECTED NEW COTTON TECHNOLOGIES GENERATED FROM REGIONAL AGRICULTURAL RESEARCH STATION, NANDYAL AMONG FARMERS"** submitted in part fulfilment of the requirements for the award of the degree of **MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL EXTENSION** to the Tamil Nadu Agricultural University, Coimbatore, is a record of bonafide research work carried out by **Mr. K. JANARDHAN** under my supervision and guidance and that no part of this thesis has been submitted for the award of any other degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part or full in any scientific or popular journal or magazine.

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External Examiner

Date : 10-1-03

Dedicated to

the Lotus Feet of

my beloved Parents and

to my beloved Master

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(K. JANARDHAN)

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ABBREVIATIONS USED

I.C.A.R.	Indian Council of Agricultural Research
N.A.R.P.	National Agricultural Research Project
R.A.R.S.	Regional Agricultural Research Station
K.V.K.	Krishi Vigyan Kendra
D.A.A.T.T. Center	District Agricultural Advisory and Transfer of Technology Center
J.D.A.	Joint Director of Agriculture
D.D.A.	Deputy Director of Agriculture
A.D.A.	Assistant Director of Agriculture
A.O.	Agriculture Officer
A.E.O.	Agriculture Extension Officer
F.T.C.	Farmers' Training Centre
N.G.O.	Non-Government Organisation
Z.R.E.A.C	Zonal Research and Extension Advisory Council
S.A.U.	State Agricultural University
I.P.M.	Integrated Pest Management
I.N.M.	Integrated Nutrient Management
F.F.S.	Farmers Field School

Abstract

ABSTRACT

DIFFUSION AND ADOPTION OF SELECTED NEW COTTON TECHNOLOGIES GENERATED FROM REGIONAL AGRICULTURAL RESEARCH STATION, NANDYAL AMONG FARMERS

By

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The principal focus of the investigation was to identify the cotton technologies generated from Regional Agricultural Research Station, Nandyal from 1990-91 to 1999-2000 and to study the profile of cotton growers and their information source use behaviour, knowledge level and extent of adoption of selected new cotton technologies. Relationship between the characteristics of cotton growers with their knowledge and extent of adoption, constraints faced and suggestions offered by them were explored in this study.

The investigation was conducted with 100 respondents of Narasimha cotton growers i.e., 50 each from the adopted village of R.A.R.S., Nandyal and non-adopted village in Nandyal agricultural sub-division of Kurnool district of Andhra Pradesh. The data were collected with well structured, pre-tested interview schedules and analysed with appropriate statistical tools. The salient findings of the study are as given below.

The adopted village Narasimha cotton growers were middle aged and educated upto middle school. Most of them were big farmers with medium level of cropping intensity. Majority of them had medium level of farming experience, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, scientific orientation, innovativeness and progressiveness. Majority of them have perceived the Narasimha variety was useful, had medium level of marketing behaviour and giving feedback to A.E.O. followed by scientists of R.A.R.S.

In the case of non-adopted village, the Narasimha cotton growers were old aged and educated upto primary school. Majority of them were big farmers with medium level cropping intensity, farming experience, annual income and social participation. Most of them had low level of research contact, while majority of them had medium level of extension agency contact, mass media exposure, economic motivation, risk orientation, scientific orientation, innovativeness and progressiveness. Majority of them perceived that Narasimha cotton variety was useful, having medium level of marketing behaviour and giving feedback to only A.E.O. but not to scientists of R.A.R.S.

The Narasimha cotton growers of adopted village differed significantly from those of non-adopted village in their educational status, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, scientific orientation, marketing behaviour and feedback pattern.

But they were not differing significantly in their age, farm size, cropping intensity, farming experience, risk orientation, innovativeness, progressiveness and perception towards Narasimha cotton variety.

For gaining awareness of new cotton technologies, adopted village farmers were mainly using input dealers, contact / progressive farmers and friends in personal localite sources; input agency personnel, staff of State Department of Agriculture and R.A.R.S. scientists in personal cosmopolite sources; farm broadcast, farm telecast and agricultural exhibition in impersonal cosmopolite sources.

The non-adopted village farmers were mainly using input dealers, relatives and contact / progressive farmers in personal localite sources; staff of State Department of Agriculture, input agency personnel and office call in personal cosmopolite sources; farm broadcast, farm telecasat and printed material in impersonal cosmopolite sources for gaining awareness about new cotton technologies.

Majority of Narasimha cotton growers of both the villages had medium level of information source use behaviour. But the information source use behaviour of Narasimha cotton growers of adopted village was significantly different from those of non-adopted village.

Most of adopted and non-adopted village Narasimha cotton growers had knowledge on time of bollworm control. Less proportion of adopted village cotton growers had knowledge on basal dosage of nitrogen application and pesticide used to control whitefly, while the least proportion of non-adopted village cotton growers had knowledge on pesticide used to control whitefly.

Most of adopted village and majority of non-adopted village Narasimha cotton growers had medium to high level knowledge on Narasimha cotton cultivation practices. The knowledge level of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.

Of the recommended Narasimha cotton cultivation practices, most of the adopted and non-adopted village Narasimha cotton growers were fully adopting only ploughing. Most of the adopted village farmers were partially adopting basal dosage of nitrogen application, bollworm control, top dressing with nitrogen and basal dosage of phosphorus application, while in non-adopted village top dressing with nitrogen, bollworm control, time of second weeding and spacing were partially adopted. None was adopting grasshopper control in both the villages.

Majority of the adopted and non-adopted village Narasimha cotton growers had medium and low levels of adoption of recommended Narasimha cotton cultivation practices respectively. The extent of adoption of Narasimha cotton growers of adopted village was significantly different from those of non-adopted village.

The three independent variables *viz.*, age, farming experience and scientific orientation among adopted village farmers and age, farm size and scientific orientation among non-adopted village farmers had non-significant relationship. Farming experience alone was negatively and significantly correlated with the knowledge of non-adopted village farmers and the remaining 15 variables among adopted village and 14 variables among non-adopted village Narasimha cotton growers were positively and significantly correlated with their knowledge level on Narasimha cotton cultivation.

In the case of extent of adoption, age, farming experience and scientific orientation among adopted village farmers and age and scientific orientation among non-adopted village farmers had non-significant relationship, while farming experience alone was negatively and significantly correlated with extent of adoption in non-adopted farmers and the remaining 15 variables among adopted village and 16 variables among non-adopted village farmers were positively and significantly correlated with their extent of adoption of Narasimha cotton cultivation practices.

The independent variables *viz.*, educational status, scientific orientation and innovativeness of adopted village Narasimha cotton growers, farm size and marketing behaviour of non-adopted village Narasimha cotton growers contributed towards their knowledge level.

The contribution towards the extent of adoption in the case of adopted village farmers was due to farm size, annual income and feedback pattern, while in the non-adopted village farmers, it was due to research contact, marketing behaviour and feedback pattern.

The most important problems as perceived by the most of the Narasimha cotton growers were inadequate research on IPM in cotton, lack of suitable pest and disease control measures at low cost and low support price in that order.

The suggestions offered by majority of the Narasimha cotton growers were development of bollworm tolerant and drought tolerant varieties, followed by supply of plant protection chemicals at subsidised rate in that order.

Introduction

CHAPTER I

INTRODUCTION

Agriculture forms the backbone of the Indian economy. It provides employment to around 65 per cent of the total workforce in the country and contributes 25 per cent of GDP to the national income. Agriculture and its related goods contribute about 38 per cent in total exports of the country.

To promote this sector, the entire country was broadly divided into 15 agro-climatic zones, based on homogeneity in factors like soil type, rainfall, temperature, water resources etc., to realise the untapped potential resources and to reduce the regional imbalances in the country. These 15 agro-climatic zones were further divided into 127 sub zones by I.C.A.R. under National Agricultural Research Project (N.A.R.P) in 1979 for conducting the location specific agricultural research.

Under this project, Andhra Pradesh was divided into seven agro-climatic zones, of which, Scarce Rainfall Zone is one, which is predominantly characterized by dry land agriculture.

In this zone, the location specific agricultural research has been carried out at Regional Agricultural Research Station (R.A.R.S.), Nandyal of Kurnool District. This research station is mainly concentrating its research on the needs of black soil (Vertisols) farmers of Rayalaseema of A.P., particularly varietal improvement in cotton, sorghum and setaria.

Since its formation (1906), the research station has been concentrating its research mainly on cotton crop, as the zone is predominantly with black cotton soils. Cotton plays an important role in agricultural sector by providing employment to about 60 million people either directly or indirectly in various activities such as crop cultivation, trade and

textile industry in the country. Hence, cotton is considered as white gold and king fibre among the cultivated crops, on account of its importance in agricultural and industrial sectors.

Presently cotton is being cultivated in about 70 countries in the world in an area of 33.2 million hectares accounting for 18.9 million tones of cotton with a productivity of 590 kg per hectare during 1999-2000.

In India, it is being cultivated in 8.53 million hectares, which is about one-fourth of world's cotton area, with a production of 2.84 million bales and a productivity of 333 kg per hectare during 1999-2000.

In India, Andhra Pradesh is one of the major cotton producing states, which was ranked third in area, production and productivity. In the state, cotton is cultivated in an area of 0.91 million hectares with a production of 23 lakh bales and a productivity of 430 kg lint per hectare during 1999-2000.

In Andhra Pradesh, the Scarce Rainfall Zone is one of the major cotton producing areas, in which Kurnool district was ranked third in the state cotton area. Hence, the R.A.R.S, Nandyal has concentrated its research mainly on cotton.

Due to its vast research on cotton, R.A.R.S., Nandyal has released six varieties in desi/*arboreum* cottons, five varieties in american / *hirsutum* cottons and two hybrids during the last five decades (i.e., from 1950 to 2000). The varieties and hybrids developed at R.A.R.S., Nandyal is given in Appendix – I.

After generation of the technology by the research system, the diffusion of technology takes place in the clientele system. If the diffusion is a failure, the technology would not give desired outcome, and so the economic viability of the new technology will not be realised by the farmers.

A report of ICAR envisaged that only 45 per cent of the generated technologies by the research system have been diffused into the clientele system and only 30 per cent have been adopted by them.

In this context, it is very much essential to know the diffusion and adoption of the already released cotton varieties and technologies, constraints faced in adoption and suggestions offered by the farmers for development of new cotton technologies in near future.

Keeping this in view, this study was undertaken with the following specific objectives.

1. To identify the cotton technologies generated from R.A.R.S, Nandyal over a period of 10 years (from 1990-91 to 1999-2000).
2. To study the profile characteristics of cotton growers.
3. To identify the information sources used by the cotton growers in gaining awareness of selected new cotton technologies.
4. To analyse the knowledge and extent of adoption of the cotton growers on the selected new cotton technologies.
5. To find out the relationship of characteristics of cotton growers with knowledge and adoption of selected new cotton technologies.
6. To know the constraints faced by the cotton growers in the adoption of selected new cotton technologies and to know the suggestions offered by them.

Scope and importance of the study

This study would be of great help to the researchers and the extension personnel, who are the main agencies responsible for generating and transfer of technologies to the field level. The findings on the information sources used by the cotton growers in the diffusion of new technologies will bring out the order of importance of various sources of information, which in turn wou'd help the extension system to fix priorities in their

technology transfer process. The study will also indicate the knowledge and extent of adoption of new cotton technologies by the farmers. This will help the planners and administrators to formulate appropriate extension strategies for increasing the knowledge and extent of adoption of cotton growers.

Further the study reveals the constraints faced by the cotton growers in the adoption of new cotton technologies and also the suggestions offered by them. This will help the researchers, planners and administrators for refinement of already developed technologies and also further technology development in cotton.

Limitations of the study

This study takes no exception to the limitations of time, finance and conveyance facility that are normally faced by any student researcher. However, every effort was made by the researcher to keep this study as objective as possible by deliberately following all the norms of the scientific research. Hence the findings of this study can be made use of all such similar situations wherever exist.

Operationalization of concepts

The two major concepts involved in the study viz., technology and diffusion were operationalised as given below.

Technology

In this study, technology was defined as the new cotton variety / hybrid developed at R.A.R.S., Nandyal along with its package of practices for cultivation by the farmers.

Diffusion

In this study, diffusion was defined as the process by which the farmers are aware of the new cotton varieties / hybrids developed at R.A.R.S., Nandyal along with their package of practices for cultivation through various sources of information over a period of time.

Review of Literature

CHAPTER II

REVIEW OF LITERATURE

A comprehensive and critical review of previous research studies would provide a sound base for scientific investigation in formulating an appropriate conceptual framework for the study. It provides a link with the past approaches and also support for the interpretation of the findings. An acquaintance with earlier pertinent studies helps in orienting the researcher in the desired line of thinking, which is supposed to be a pre-requisite for the study.

With this idea in mind and based on the specific objectives of the present study, the literature directly / indirectly related to the study was reviewed and presented in this chapter under the following subheads.

2.1. Profile characteristics of cotton growers 2.1.1, 2.1.2.
2.2. Information source use behaviour of cotton growers
2.3. Knowledge and extent of adoption of recommended technologies by cotton growers
2.4. Relationship of characteristics with knowledge and adoption of cotton growers.
2.5. Constraints faced and suggestions offered by cotton growers

2.1. Profile characteristics of cotton growers

2.1.1. Age

Ponkathaperumal (1994) stated that 51.00 per cent of respondents were found to belong old age group.

Gurusamy (1996) expressed that there was no difference in the age of contact and other farmers.

Krishnakumar (1996) observed that almost an equal per cent of respondents belonged to old age group (50.00%) and middle age (48.00%). Only 2.00 per cent of the farmers were young.

Lawrance (2000) reported that there was no significant difference in the age of FFS and non-FFS farmers.

Kanimozhi (2001) reported that 24.17 per cent of the farmers belonged to young age category, followed by 28.33 per cent of middle aged and the rest 47.50 per cent were old.

2.1.2. Education

Palaniswamy (1978) observed that malli growers were significantly different from mullai growers with respect to their educational levels.

Chandramohan (1995) stated that there was no difference in the educational level of contact and other farmers.

Anasuya (1997) concluded that 59 per cent of the cotton growers studied upto middle and secondary school level of education, followed by 20 per cent upto primary school level, nine per cent illiterates, eight per cent functionally literates and four per cent with collegiate education.

Kanimozhi (2001) observed that 15.83 per cent of the farmers were illiterates, followed by secondary school level (19.18%) and primary school level (23.33%). Farmers having middle school level education got the higher percentage of 33.33. A very meagre proportion (8.33%) of the farmers had their education upto college level.

2.1.3. Farm Size

Palaniswamy (1978) revealed that there was no significant difference in farm size of malli and mullai growers.

Palani (1987) reported that majority (63.33%) of the respondents were big farmers, followed by 27.17 per cent of small farmers and 12.50 per cent of marginal farmers.

Rao (1988) observed that contact farmers were significantly different from non-contact farmers in their farm size.

Alagesan (1989) reported that there was no significant difference between the two groups of farmers with respect to their farm sizes.

Lawrance (2000) found that there was no significant difference in the farm size of Farmers Field School (FFS) and non-FFS farmers.

2.1.4. Cropping intensity

Rajapandi (1983) found that 66.67 per cent of farmers had medium level cropping intensity. About 28 per cent of the wetland farmers had low cropping intensity and only 5 per cent of farmers had higher cropping intensity.

Sakunthalai (1992) reported that, the cropping intensity of marginal, small and big farmers was significantly different from each other.

Sujatha (1996) concluded that more than fifty per cent of the respondents had medium level cropping intensity.

Kavitha (1998) reported that equal per cent (40.83% each) of the respondents belonged to medium and high level of cropping intensity and 18.34 per cent belonged to low level of cropping intensity.

Kavitha (2001) reported that 63.33 per cent of respondents had high level cropping intensity and 36.67 per cent had low level of cropping intensity.

2.1.5. Farming Experience

Sujatha (1996) revealed that majority of the respondents were found to have medium level of farming experience.

Lawrance (2000) reported that there was no significant difference in farming experience of FFS and non-FFS farmers.

Sriram (2000) stated that half (50.00%) of the cotton growers had medium level of farming experience and the rest had high (36.11%) and low (13.89%) levels of farming experience.

Kanimozhi (2001) inferred that majority (65.83%) of the farmers were found to be with medium level of farming experience, followed by high level (22.50%) of farming experience. Considerably a less percentage (11.67%) of farmers had low level of farming experience.

2.1.6. Annual Income

Krishnakumar (1996) opined that majority (63.00%) of the respondents belonged to low income group, nearly one-fourth (22.00%) belonged to high income group and only 15.00 per cent belonged to the medium income group.

Krishnan (1997) inferred that majority (60.87%) of cotton growers had medium level of annual income.

Venkattakumar (1997) stated that majority (87.61%) of the respondents possessed low to medium level of annual income and only a meagre proportion (12.39%) of them had high level of annual income.

2.1.7. Social participation

Alagesan (1989) stated that there was significant difference between two groups of farmers in their social participation levels.

Elangovan (1994) revealed that majority of the respondents had medium level of social participation.

Ponkathaperumal (1994) reported that majority (60.00%) of the respondents belonged to medium level of social participation, slightly more than one-fourth (28.00%) of the respondents were of low level of social participation, nearly one-eighth (12.00%) of the respondents belonged to high level of social participation.

Krishnakumar (1996) reported that majority (68.00%) of the respondents had medium level of participation in social organisations, while 18.00 and 14.00 per cent had low and high level of social participation respectively.

Venkatachalam (1999) indicated that majority (80.83%) of the respondents had medium level of social participation, followed by low (15.83%) and high levels (3.34%).

2.1.8. Research Contact

Sathiyanarayan (1999) reported that about one-third of paddy farmers had high (36.66%), low (33.33%) and medium (30.00%) levels of research contact, while most (96.66%) of dryland farmers had medium level of a meagre proportion (3.33%) had high research contact. In the case of cotton growers, most (86.66%) of them had medium level, followed by low (13.33%) level of research contact.

Jayalakshmi (2000) reported that nearly half (45.00%) of respondents were found to have low level of contact with research station and a little more than half (55.00%) of the respondents were found to have high level of contact with research station.

2.1.9. Extension Agency Contact

Rao (1988) revealed that the extension agency contact of the contact farmers was significantly different from non-contact farmers.

Alagesan (1989) reported that there was significant difference in the extension agency contact levels of two groups of farmers.

Ponkathaperumal (1994) reported that only a few (14.00%) respondents possessed high extension agency contact, while a major (59.00%) possessed medium and low level of contact (27.00%) with extension agency.

Sriram (1997) observed that majority of the cotton growers had medium and high levels of extension agency contact.

Venkatachalam (1999) reported that majority of the respondents had medium level of extension agency contact.

Lawrance (2000) observed that FFS farmers were significantly different from non-FFS farmers with respect to extension agency contact.

2.1.10. Mass Media Exposure

Rao (1988) reported that the contact farmers mass media exposure was significantly different from non-contact farmers.

Kumar (1994) pointed out that majority (78.33%) of the farmers were having medium degree of mass media exposure, whereas 14.17 per cent of the farmers had low degree of media exposure and 7.50 per cent had high degree of exposure.

Anasuya (1997) reported that majority (70.00%) of the respondents had medium level of mass media exposure, followed by low (15.83%) and high (14.17%) levels.

Krishnan (1997) observed that majority (60.00%) of the cotton growers had medium level of mass media exposure, followed by low (23.00%) and high (17.00%) levels.

Lawrance (2000) found that there was no significant difference in mass media exposure of FFS and non-FFS farmers.

2.1.11. Economic Motivation

Alagesan (1989) stated that there was no significant difference between two groups of farmers with respect to economic motivation.

Murugan (1993) stated that more than two-thirds (68.00%) of the beneficiaries (68.00%) had medium to high level of economic motivation followed by low level (32.00%).

Krishnakumar (1996) inferred that most (70.00%) of the farmers had medium level of economic motivation, followed by low and high level of economic motivation to the extent of 15.00 per cent each respectively.

Anasuya (1997) reported that majority of the cotton growers had medium level of economic motivation. She further concluded that the trained respondents had high level of economic motivation than untrained respondents.

Lawrance (2000) revealed that there was no significant difference in economic motivation of FFS and non-FFS farmers.

Kanimozhi (2001) emphasised that more than two-thirds (68.33%) of the respondents had medium level of economic motivation, 17.50 per cent of the respondents had low and 14.17 per cent of had high level of economic motivation.

2.1.12. Risk Orientation

Alagesan (1989) revealed that there was no significant difference in the risk orientation of two groups of farmers.

Rajkumar (1992) explicited that of local respondents (63.30%) possessed medium risk orientation, 24.20 per cent possessed high risk orientation and 12.50 per cent low risk orientation.

Lawrance (2000) observed that there was no significant difference in risk orientation of FFS and non-FFS farmers.

Kanimozhi (2001) reported that more than half (55.83%) of the respondents possessed medium level of risk orientation, one-fourth (25.00%) had low risk orientation and less proportion (19.17%) of the respondents had high risk orientation.

Rosaiah (2002) reported that majority (68.89%) of cotton growers had medium level of risk orientation, followed by high (30.00%) and low (1.11%) levels.

2.1.13. Scientific orientation

Rao (1988) reported that contact farmers' scientific orientation was significantly different from non-contact farmers.

Murugan (1993) found that majority (71.50%) of the beneficiaries possessed medium to high levels of scientific orientation, followed by low level (28.50%).

Krishnakumar (1996) concluded that a majority (68.00%) of the respondents had medium level of scientific orientation, followed by 17.00 per cent and 15.00 per cent had low and higher levels of scientific orientation.

Lawrance (2000) observed that scientific orientation of FFS farmers was significantly different from non-FFS farmers.

Kanimozhi (2001) inferred that majority (66.67%) of the respondents had medium level of scientific orientation, 20.83 per cent had low level and 12.50 per cent had high level of scientific orientation.

2.1.14. Innovativeness

Alagirisamy (1997) said that 40.00 per cent of the respondents had medium level of innovativeness, followed by 35.83 and 24.17 per cent with low and high levels of innovativeness respectively.

Krishnan (1997) revealed that 37.00 per cent of the RCH cotton growing farmers had high innovativeness, followed by medium (36.00%) and low (27.00%) levels.

Jayalakshmi (2000) reported that 47.50 per cent of respondents had high level of innovativeness and 43.33 per cent and 9.17 per cent had medium and low levels of innovativeness.

Lawrance (2000) concluded that innovativeness of FFS farmers was significantly different from non-FFS farmers.

2.1.15. Progressiveness

Jayaraman (1988) revealed that 60 per cent of the farmers had high level of progressiveness, while 15.84 per cent and 24.16 per cent possessed medium and low level of progressiveness respectively.

Sakunthalai (1992) reported that there was significant difference in the progressiveness of marginal, small and big farmers.

Kavitha (1998) found that 50.83 per cent of respondents had medium level of progressiveness and 29.17 and 20.00 per cent had high and low level of progressiveness respectively.

Lawrance (2000) reported that FFS farmers were significantly different from non-FFS farmers with respect to progressiveness.

2.1.16. Marketing behaviour

Palaniswamy (1978) stated that majority of malli and mullai farmers used gunny bags extensively as packing material and used bus and cycle as means of transport. Regarding place, person to whom sold and mode of sale, they sold their products locally to wholesale merchants on weight basis. They entered into contract with the merchants.

Majority of them expressed that the existing marketing facilities were sufficient for them. He further reported that there was no significant difference in marketing behaviour of malli and mullai growers.

Ravi (1979) reported that majority (69.17%) of tapioca farmers used palm leaves, 20.83 per cent used gunny bags and 10 per cent used coconut leaves as packing mateiral. 60 per cent of them practiced carrying by head load. One-fifth of them used bullock carts and cycle for transporting tapioca tubers. Majority (59.11%) of the farmers sold tubers in nearby town and 46.83 per cent sold products only. Private merchants played a major role in marketing. Only a meagre percentage (2.50 and 1.67%) of farmers sold their products to wholesale merchants and commission agents respectively. Cent per cent sold on weight basis. 98.83% sold in ready cash form. Credit sale to specified merchants was followed by 1.67% of farmers. Majority (63.33%) of the farmers felt that the existing marketing facilities were sufficient.

Sakthivel (1979) indicated that bullock cart and bus were used as extensive means of transport and in some cases, tractor attached with trailer. He found that majority of the farmers sold their produce locally and to the commission agent in the nearby towns on credit sale and cash payment.

Alagesan (1989) reported that there was significant difference in the marketing behaviour of two groups of farmers.

Suganthi (1991) reported that nearly two-thirds (64.29%) of users and more than half (52.5%) of non-users of regulated market had medium level of marketing perception, followed by high (20.00 and 17.50%) and low (15.71 and 30.00%) levels. She further reported that market perception of users of regulated market was significantly different from non-users.

Heddybai (1994) concluded that majority (86.60%) of the gardenland farmers transported their produce using bullock cart within the range of 10-20 km radius. No protective measure was followed. About 98.00 per cent of farmers sold their produce immediately after harvest. Commission mundies (57.33%) and village merchants (33.33%) dominated in the market. Nearly half (44.00%) of them sold for immediate cash and majority (86.60%) of the farmers received full money after the sale of their produce.

Alagirisamy (1997) observed that majority (71.66%) of vegetable growers used polythene bags as packing material. The mode of transport was mainly through bicycle (72.50%). He further inferred that most (95.84%) of them sold their produce in the nearby town and 53.33% of them sold their produce through commission agents followed by 26.67%, 10.00%, 6.67% and 3.33% through retailers, whole sale merchants, contractors and local merchants respectively.

Premavathi (1997) stated that 65.00 per cent of the respondents had medium level of marketing behaviour.

2.1.17. Perception of adopters on technologies

Sathiyanarayanan (1991)reported that about one – third of paddy farmers had high (36.67%), medium (33.33%) and low (30.00%) levels of perception on R.R.S., Paiyur technologies. Half (50.00%) of dry land farmers had medium level, followed by high (30.00%) and low (20.00%), while more than half (53.33%) of cotton growers and 45.66 per cent of them had medium and high levels of perception on RRS, Paiyur technologies.

2.1.18. Feedback Pattern

Kalaichelvan (1984) reported that half of the contact farmers discussed the usefulness and problems of the transferred technology to the VEWs.

Pushpa (1991) revealed that about two-fifths (41.11%) of the farmers felt that they used to give feedback to local leaders and a few (7.77%) of them directly to researchers.

Krishnan (1997) reported that 41 per cent of cotton growers had medium level information feedback, followed by 37 and 27 per cent had low and high feedback pattern.

2.2. Information source use behaviour of cotton growers

Jayaraman (1988) reported that use of radio was a common source in all villages under study. Newspapers, agricultural magazines and leaflets were being read by many farmers.

Helen *et al.* (1992) found that among the institutional sources, input agencies were the most utilized sources, followed by agricultural officers.

Sangha and Kalra (1993) stated that radio and T.V. were used to greater extent than other mass media sources.

Karippai *et al.* (1995) found that friends and relatives were rated to the maximum extent as the sources of farm information utilised by small farmers, followed by radio, newspaper, extension personnel and agricultural scientists in that order.

Nirmala *et al.* (1995) observed that among the institutional sources, the assistant agricultural officers, agricultural officers (information and training), agricultural officers (special schemes) were the frequently used sources by 65.00 per cent, 49.16 and 23.33 per cent respectively. Friends and relatives (cent per cent each) and progressive farmers and neighbours (99.16% each) were the frequently utilized non-institutional sources by the farmers. Posters and Charts (cent per cent), hoardings, wall paintings and radio (99.16% each) and T.V. (97.5%) were the media sources frequently used by the farmers.

Iqbal *et al.* (1996) revealed that one-third of the respondents utilized agricultural officers (Training and Visit) and training on integrated pest management as the main source of information under personal cosmopolite channel. The next source of information was found to be assistant agricultural officers as perceived by 22.50 per cent of the respondents. Regarding personal localite channels, two-thirds of the respondents received information from neighbours, followed by friends (40.83%) and fellow farmers (31.67%).

Karthikeyan (1997) concluded that medium level of information source exposure was observed among majority (62.03%) of the respondents, followed by low (25.00%) and high (12.97%) levels.

Kavitha (1998) reported that among all the personal localite sources of information, friends were believed to be the credible source for nearly 85 per cent of the farmers. More than 45 per cent of respondents believed other sources as credible source than input dealers and only 21.67 per cent believed input dealers as credible source of information. Among the personal cosmopolite channels, majority (55.83%) of respondents felt Assistant Agriculture Officer, 42.50 per cent believed Agricultural Officer and nearly one fourth of the respondents believed scientists as the credible source of information for neem technologies. Among the impersonal cosmopolite sources, radio occupied first position (72.50%), followed by television (45.83%) and newspapers / magazine (36.67%).

2.3. Knowledge level and Extent of Adoption of Recommended Technologies by Cotton Growers

2.3.1. Knowledge level of cotton growers

Rao (1988) revealed that the contact farmers were significantly different from non-contact farmers with respect to knowledge.

Alagesan (1989) reported that there was significant difference in the knowledge level of two groups of farmers.

Dharmalingam (1990) found that 56.00 per cent of farmers had medium level of knowledge.

Sekar (1991) reported that most of the hybrid cotton seed growers had medium level of knowledge about hybrid cotton seed production.

Sophia (1991) concluded that among the dry land farmers more than 60 per cent of them possessed good knowledge in the dry land practices viz., summer ploughing, seed rates, seed treatment, pre-monsoon sowing of cotton and cluster beans intercropping system, fertilizer application and chemical control of bollworms.

Ponkathaperumal (1994) revealed that more than half (54.00%) of respondents had medium level of knowledge.

Anasuya (1997) reported that majority of the cotton growers had medium level of knowledge about cotton IPM practices.

Venkatachalam (1999) interpreted that majority of the cotton growers had medium to high level of knowledge about the use of bio-control agents.

Subramanian (2000) found that nearly half (46.67%) of the respondents possessed medium level of knowledge, followed by low (28.00%) and high (25.33%) knowledge levels towards weed management practices in cotton.

Venketasan (2000) found that more than one-third (35.00%) of the respondents had medium level of knowledge, whereas another one-third (33.33%) of them had high level of knowledge and about the same proportion (31.67%) of them had low level of knowledge.

2.3.2. Extent of adoption of cotton growers

Rao (1988) reported that contact farmers were significantly different from non-contact farmers with respect to adoption.

Sathiyanarayanan (1991) indicated that nearly two-thirds (63.33%) of respondents were medium adopters of the azospirillum application, followed by low (20.00%) and high (16.67%) adopters respectively.

Mansingh (1992) stated that cent per cent (100%) of the grape growers were found to adopt the recommended practices in land preparation, planting and pruning operations as such without any modification. He also found that cent per cent of the sugarcane growers adopted the recommended practices in the preparation of nursery, micronutrient application, planting of setts, gap filling, earthing up, detrashing, propping, band placement of fertilizers application and pest and disease control measures.

Jeyaraj (1997) reported that majority (60.83%) of the respondents had low level of adoption, whereas more or less an equal percentage (20.00 and 19.17% respectively) had medium and high levels of adoption regarding pesticides practices.

Murugankani *et al.* (1999) reported that in small farmers, majority (63.34%) of them had low level of adoption, followed by medium (30.00%) and high (6.66%) levels. But the trend was reverse in the big farmers category i.e., the majority (60.00%) of the big growers had high level of adoption, followed by medium (36.66%) and low (3.34%) levels of adoption behaviour.

Venkatachlaam (1999) reported that 42.50 per cent of the cotton growers had low level of adoption, followed by medium (35.00%) and high (22.50%) levels of adoption towards bio-control agents.

Subramanian (2000) reported that two fifth (40.00%) of the cotton growers had medium level of adoption, whereas one-third (33.33%) of the respondents had low, followed by 26.67 per cent of respondents with high level of adoption of weed management practices.

Vekaria *et al.* (2000) reported that majority (69.05%) of the respondents fall under the category of medium adopters, while 15.71 and 15.24 per cent of the respondents were found under low and high adopter categories respectively.

Kanimozhi (2001) observed that majority (64.17%) of the respondents were medium adopters, nearly 20.00 per cent of them were low adopters, followed by 15.83 per cent of high adopters.

2.4. Relationship of characteristics with knowledge and adoption of cotton growers

2.4.1. Relationship of characteristics with knowledge

The relationship of profile characteristics of cotton growers with their knowledge level is presented in Table 1.

2.4.2. Relationship of characteristics with adoption

The relationship of profile characteristics of cotton growers with their extent of adoption is presented in Table 2.

2.5. Constraints faced and suggestions offered by cotton growers

2.5.1. Constraints faced by cotton growers

Chandrakandan (1984) revealed that out of the several bio-physical constraints identified, non-adequacy of irrigation water was the major constraint i.e., 86.70 per cent of the farmers, followed by pest and disease problem (80.00%) and the lack of drainage facilities (33.00%). Of the 18 socio-economic situational constraints limiting rice production level, economic and remunerative support price ranked first (100.00%), lack

of awareness and knowledge about new technologies (66.70%), high cost of inputs (53.30%), restriction for the movement of paddy to other places (36.70%), non-availability of credit (13.30%) and non availability of labour (13.30%) were some of the other constraints perceived.

Chenniappan (1987) reported that the following problems were encountered by the cotton growers, in the order of Uncontrollable whitefly attack (98.33%), lack of remunerative price for kapas (91.66%), increased cost of cultivation (79.16%), incidence of boll worms (62.50%), inadequate irrigation facilities (46.83%), increased cost of inputs (50.00%), scarcity of labour at peak operation (41.66%), inadequate market facilities (40.00%), inadequate facilities to pledge the produce (37.50%), inadequate credit facilities (37.50%), comparatively low price for cotton (33.33%), more labour to adopt the recommended practices (20.83%) and inadequate technical staff (8.33%).

According to Sriram (1997) the constraints faced by the cotton growers while following the eco-friendly agricultural practices were in the order of labour scarcity (92.50%), lack of assured irrigation (87.50%), lack of technical guidance (56.66%), non-availability of inputs (52.50%) and lack of knowledge to identify predators (40.00%).

2.5.2. Suggestions offered by cotton growers

Raju (1997) reported that farmers suggested the significant message flow from extensionists, timely information on technologies, timely availability of critical inputs, village adoption by research and extension organizations, establishing agricultural information centre in each village, complete information about any new technology and more field diagnostic team visits by the researchers to overcome their constraints.

Reddy (1997) revealed that farmers suggested the establishment of farm tele / radio clubs, organising more training programmes and more field visits by researchers and extensionists to overcome their constraints.

Table 1. Relationship of characteristics of farmers with their knowledge level

	Author (year)	Age	Education	Farm size	Cropping intensity	Farming experience	Annual income	Social participation	Research contact	Extension agency contact	Mass media exposure	Economic motivation	Scientific orientation	Risk orientation	Innovativeness	Progressiveness	Perception of Adopters on technologies	Marketing behaviour
1.	Pushpa (1991)	NES	PS	PS	-	NES	NS	PS	-	PS	PS	-	PS	-	-	-	-	-
2.	Sathiyanarayanan (1991)	-	PS	PS	-	NS	PS	PS	PS	PS	PS	PS	PS	PS	-	-	PS	-
3.	Sophia (1991)	NES	PS	-	-	NS	-	PS	-	PS	NS	PS	NS	NS	-	-	-	-
4.	Venkatakrishnan (1991)	NS	PS	PS	-	NS	PS	PS	-	PS	PS	PS	PS	PS	-	-	-	-
5.	Kumar (1994)	NS	PS	NS	-	NES	NS	-	-	NS	PS	PS	PS	-	-	-	-	-
6.	Ponkathaperumal (1994)	PS	PS	NS	-	NS	-	PS	-	PS	PS	PS	PS	PS	-	-	-	-
7.	Krishnakumar (1996)	PS	PS	NS	-	PS	NS	PS	-	PS	PS	PS	PS	PS	-	-	-	-
8.	Alli (1997)	NES	PS	NS	-	-	-	NS	-	PS	-	NS	NS	NS	NS	-	-	-
9.	Jeyaraj (1997)	-	PS	PS	-	PS	-	PS	-	-	-	PS	PS	-	PS	-	-	-
10.	Venkatakumar (1997)	NS	PS	PS	-	NS	-	PS	-	-	PS	PS	NS	PS	-	-	-	-
11.	Kavitha (1998)	PS	PS	PS	NES	PS	-	PS	-	PS	PS	-	-	PS	PS	PS	-	-
12.	Venkatachalam (1999)	-	PS	PS	-	NS	-	PS	-	-	-	PS	PS	PS	PS	-	-	-
13.	Arulmurugan (2000)	NS	NS	NS	-	-	-	PS	-	-	NS	-	-	PS	PS	-	-	-
14.	Jayalakshmi (2000)	NS	NS	PS	-	NS	-	NS	PS	PS	NS	NS	NS	NS	NS	-	-	-
15.	Prabhakar (2000)	-	-	-	-	-	NS	-	-	-	-	-	-	-	-	-	-	NS
16.	Subramanian (2000)	NS	NS	NS	-	NS	-	PS	-	PS	PS	NS	NS	PS	PS	-	-	-
17.	Venkatesan (2000)	NS	NS	PS	-	NES	PS	PS	-	NS	-	-	PS	-	NS	-	-	-
18.	Kavitha (2001)	NS	NS	PS	PS	PS	-	PS	-	NS	PS	NS	PS	NS	NS	-	-	-

NES - Negatively significant NS - Non significant PS - Positively significant

Table 2. Relationship of characteristics of farmers with their adoption level of different practices

	Author (year)	Age	Education	Farm size	Cropping intensity	Farming experience	Annual income	Social participation	Research contact	Extension agency contact	Mass media exposure	Economic motivation	Scientific orientation	Risk orientation	Innovati-veness	Progressive-ness	Perception of Adopters on technologies	Marketing behaviour
1.	Pushpa (1991)	NES	PS	NS	-	NES	NS	NS	-	PS	PS	-	PS	-	-	-	-	-
2.	Sathiyanarayanan (1991)	-	NS	PS	-	NES	PS	PS	PS	PS	PS	PS	PS	PS	-	-	NS	-
3.	Sophia (1991)	NES	PS	-	-	NS	-	PS	-	NS	PS	PS	NS	NS	-	-	-	-
4.	Rajkumar (1992)	NES	PS	PS	-	NES	PS	-	-	-	-	NS	PS	NS	PS	-	-	-
5.	Sekar and Alagesan (1994)	NES	PS	PS	-	PS	PS	-	-	-	PS	PS	PS	-	-	-	-	-
6.	Krishnakumar (1996)	PS	PS	NS	-	PS	NS	PS	-	PS	PS	PS	PS	PS	-	-	-	-
7.	Sujatha (1996)	NS	PS	NS	-	NS	-	PS	-	-	-	PS	-	PS	PS	-	-	-
8.	Alli (1997)	NES	PS	NS	-	-	-	NS	-	PS	-	NS	NS	NS	NS	-	-	-
9.	Jeyaraj (1997)	-	PS	PS	-	PS	-	PS	-	-	-	PS	PS	-	PS	-	-	-
10.	Sriram (1997)	NES	PS	NS	-	PS	NS	NS	-	PS	PS	PS	-	PS	PS	-	-	-
11.	Kavitha (1998)	NES	PS	PS	NES	NES	-	PS	-	PS	PS	-	-	PS	PS	PS	-	-
12.	Venkatachalam (1999)	-	PS	PS	-	NS	-	PS	-	-	-	PS	PS	PS	PS	-	-	-
13.	Arulmurugan (2000)	NS	NS	NS	-	-	-	NS	-	-	NS	-	-	PS	PS	-	-	-
14.	Jayalakshmi (2000)	NS	NS	NS	-	NS	-	NS	NS	NS	PS	NS	PS	NS	NS	-	-	-
15.	Prabhakar (2000)	-	-	-	-	-	PS	-	-	-	-	-	-	-	-	-	-	NS
16.	Subramanian (2000)	NS	PS	NS	-	NS	-	NS	-	PS	PS	NS	NS	NS	NS	-	-	-
17.	Venkatesan (2000)	NS	NS	PS	-	NS	PS	PS	-	NS	-	-	PS	-	PS	-	-	-
18.	Kavitha (2001)	NS	NS	PS	PS	PS	-	PS	-	NS	PS	NS	PS	NS	PS	-	-	-

NES - Negatively significant NS - Non significant PS - Positively significant

Research Methodology

CHAPTER III
RESEARCH METHODOLOGY

This chapter sketches briefly the salient features of the study area and the rationale behind its choice, the methodology and sampling procedure followed and the statistical tools and techniques used in the analysis of data. The research methods followed in this study are presented under the following sub-heads.

3.1. Locale of research
3.2. Description of the study area
3.3. Selection, operationalisation and measurement of variables
3.4. Method of data collection
3.5. Statistical tools used

3.1. Locale of Research

3.1.1. Selection of zone

The Scarce Rainfall Zone of Andhra Pradesh was purposively selected. This is one of the seven agro-climatic zones of Andhra Pradesh. It comprises of entire Kurnool and Anantapur districts and parts of Cuddapah (22 mandals), Prakasam (12 mandals) and Mahbubnagar (four mandals) districts. For this agro-climatic zone, the location specific agricultural research is being carried out at Regional Agricultural Research Station (R.A.R.S.), Nandyal, which is the headquarters of the zone.

3.1.2. Selection of crop

R.A.R.S., Nandyal concentrates research on varietal improvement in cotton, sorghum and setaria crops. Of these crops, majority of the research is being done on the cotton crop. As a result, it has released six varieties in desi cottons, five varieties in the American cottons and two hybrids during the period of 1950 to 2000, and also the area under cotton is more among commercial crops of the zone. Hence, cotton crop was selected for the study. The varieties and hybrids of cotton so far developed at R.A.R.S., Nandyal are given in Appendix - I.

3.1.3. Selection of district

Kurnool district was selected for the study as it was having the maximum area under the cotton crop in the Scarce Rainfall Zone and also ranked third in the state cotton area. Further, the researcher's familiarity of the area, the language, time and other resources available facilitated the selection of the area for the study by the researcher. The Districtwise cotton area and production of Andhra Pradesh is given in Appendix - II.

3.1.4. Selection of agricultural sub-division

Nandyal agricultural sub-division was selected for the study among the 11 agricultural sub-divisions of the district where R.A.R.S., Nandyal is situated and influences the technology spread in this sub-division for adoption by the farmers.

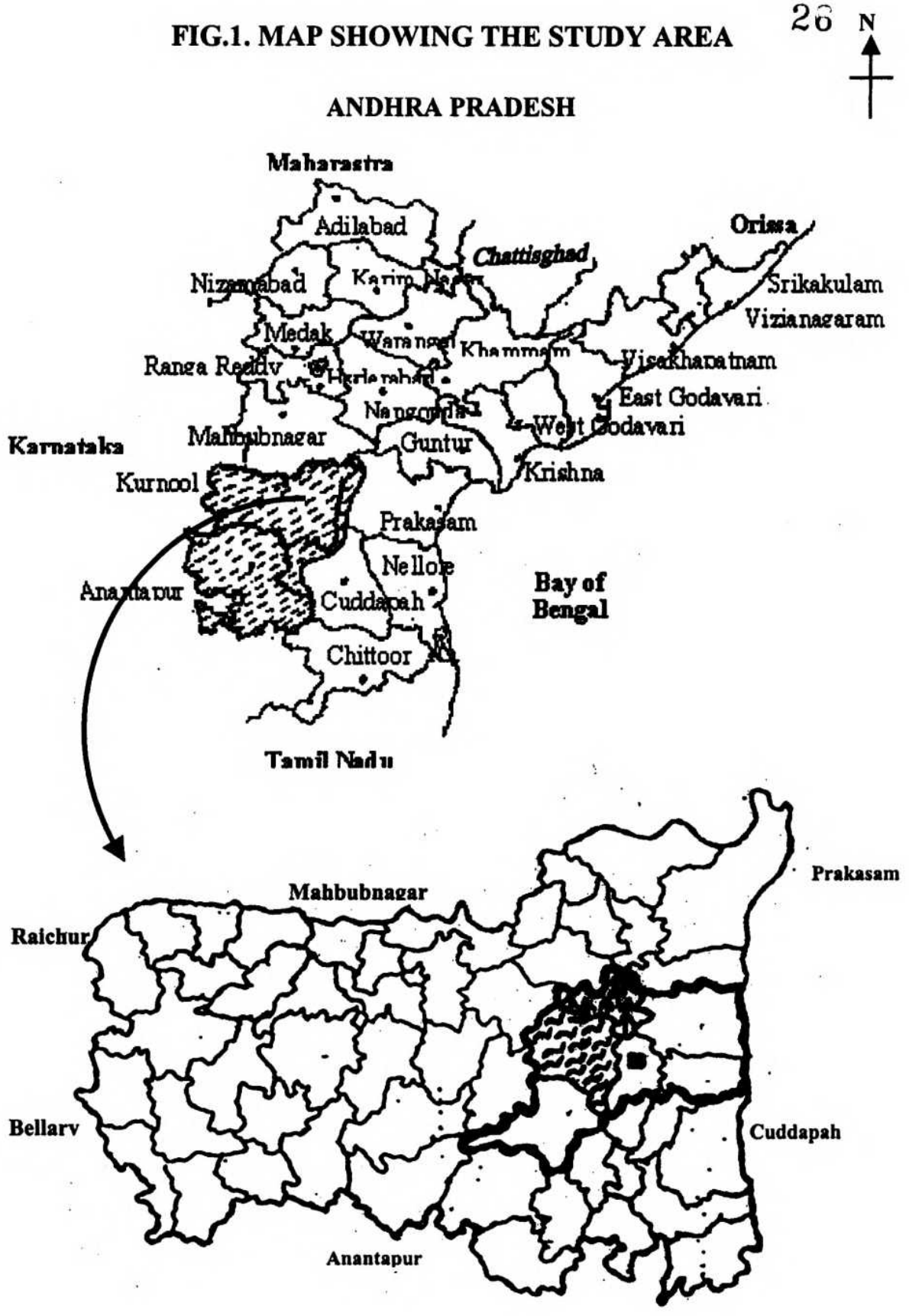
3.1.5. Selection of crop technologies

The latest cotton technologies developed at R.A.R.S., Nandyal over a period of 10 years (from 1990-91 to 1999-2000) were NHH 390 (*Intra hirsutum* hybrid) during 1990-91, Narasimha (American cotton variety) during 1994-95 and Aravinda (Desi cotton variety) during 1996-97. Of these, Narasimha cotton variety was selected for the study as it was having the maximum area under cultivation out of the three in the agricultural sub-division. Mandal-wise cotton area under varieties and hybrids and area of new cotton technologies of R.A.R.S., Nandyal in Nandyal agricultural sub-division is given in Appendix - III.

3.1.6. Selection of mandals

Nandyal agricultural sub-division consists of six mandals. Among them Panyam and Gadivemula mandals were selected, since maximum cotton area was under Narasimha cotton variety. Mandal-wise area of NHH - 390 cotton hybrid, Narasimha and Aravinda cotton varieties is given in Appendix - IV.

FIG.1. MAP SHOWING THE STUDY AREA



3.1.7. Selection of villages

The selection of villages was based on the maximum area under Narasimha cotton.

Panyam mandal consists of 18 villages. Among them, Narasimha cotton was cultivated in seven villages. Of the seven villages, Balapanur was selected as it was having the maximum cotton area under Narasimha cotton. Further, the Balapanur village is the adopted village of R.A.R.S., Nandyal from 1998 onwards, situated at a distance of 10 km from Nandyal.

Gadivemula mandal consists of 14 villages. Among them, Narasimha cotton was grown in two villages only. Of the two villages, K.Bollavaram village was selected for the study as it was having the maximum area under Narasimha cotton. It is not-adopted by R.A.R.S., Nandyal and situated in the hillock at a distance of 35 km from Nandyal. Village-wise Narasimha cotton area of Panyam and Gadivemula mandals is given in Appendix - V.

3.1.8. Selection of respondents

With reference to the facilities available to the student researcher, and time limit, a sample size of 100 farmers was fixed for this study. Of the 100 farmers, 50 farmers were selected from adopted village and the remaining 50 farmers were selected from non-adopted village by using simple random sampling.

Table 3. Village-wise distribution of sample respondents

S.No.	Name of the village	No. of Narasimha cotton growers	Respondents selected
1.	Balapanur	111	50
2.	K. Bollavaram	81	50
	Total	**192**	**100**

3.2. Description of the study area

A thorough understanding of agro-climatic conditions of the study area relating to rainfall, topography, soil type, temperature, cropping pattern is essential for any study pertaining to agricultural development. It provides background for analysis, interpretation and discussion of results and helps in drawing meaningful inferences and to relate the findings for similar situation elsewhere. Hence, the details of the selected area are given below.

3.2.1. Location and area

Kurnool district is located in Southern part of Andhara Pradesh. It lies between the northern latitudes of 14° 54' and 16° 11' and eastern longitudes of 76° 58' and 78° 25'. The altitude of the district ranges upto 1000 feet above mean sea level. The district is bounded on the North by Tungabhadra and Krishna rivers as well as Mahbubnagar district, on the South by Cuddappah and Ananthapur districts, on the East by Prakasam district and on the West by Bellary and Raichur districts of Karnataka State.

3.2.2. Climate and rainfall

The climate of the Kurnool district is generally warm. The hottest period of the year is generally during the months of March to May, the highest temperature goes to 45°C in May. The climate becomes cool in December and continues upto February, touching a minimum of 17°C in January. On an average, the district receives an annual rainfall of 750 mm, of which about 72 per cent is contributed by South-West monsoon, while the North-East monsoon accounts for about 10 per cent, the hot weather period gives about 12 per cent and the remaining rainfall of six per cent is received during cold weather period.

3.2.3. Soil type

Major part of the district is predominantly endowed with black cotton soils. The soils in the North Western are black cotton soils while the South Eastern parts are predominantly poor red soils.

3.2.4. Land utilisation pattern

A study on land use pattern is essential to know the extent of area used for crop cultivation. The details of land utilisation pattern are presented in Appendix - VI. Total geographical area is17,28,359 hectares, of which gross cropped area was 48.89 per cent, forest area was 18.41 per cent, current fallow area was 8.45 per cent and area under other fallows 7.60 per cent for the year 2000-01. The cropping intensity for the year 2000-01 was found to be 115 per cent.

3.2.5. Irrigation intensity

Intensive cultivation of land depends on the availability of water which is an important determinant of production and performance of agriculture. The gross cropped area of the district was 8.44 lakh hectares, of which 1.77 lakh hectares were irrigated through canals (46%), tube wells (18%), tanks (7%) and other sources (4%) for the year 2000-01.

3.2.6. Cropping pattern and crop rotation

3.2.6.1. Cropping pattern

Details on area under principal crops during the year 2000-01 is presented in Appendix -VII. Among the area of cereal crops, jowar occupied 22 per cent, while in oil seeds, groundnut occupied 25.4 per cent and cotton occupied 20 per cent area in the total area of commercial crops. Thus, major crops grown in the district are jowar, groundnut and cotton. Cotton area, production and productivity in Kurnool district for the period of 1990-91 to 2000-01 is given in Appendix - VIII.

3.2.6.2. Crop rotation

The crop rotations observed in the district are as follows:

(i)	Paddy (June-July)	⟶	Paddy (Sep-Oct)	⟶ Rice fallow pulses / groundnut (Jan-Feb)
(ii)	Cotton (Aug/Sep)	⟶	Pulses (Feb/Mar)	

3.3. Selection, operationalization and measurement of variables

3.3.1. Selection of variables

By reviewing the literature and discussing with the extension specialists, a list of 27 independent variables that could possibly influence the dependent variables *viz.*, knowledge and adoption was prepared and sent to 52 extension scientists both within and outside the Tamil Nadu Agricultural University. A three point continuum was given to the judges to indicate their response with regard to the level of relevancy. The scores of 3, 2 and 1 were assigned for "More relevant", "Relevant" and "Less relevant" responses respectively.

Based on the rating given by the judges, the mean was worked out for each independent variable. The individual variable which was having its mean score 2.5 and above was selected for this study. Thus, 18 independent variables were finally selected. The communication sent to judges and variables listed for their opinion are given in Appendix - IX. The independent and dependent variables of the study with their measurement procedure is given in the Table 4.

Table 4. Selected variables and their measurement procedure

Variable No.	Variables	Measurement
		Scoring procedure followed by
I.	**Independent variables**	
X_1	Age	Kanimozhi (2001)
X_2	Educational status	Vennila (1998)
X_3	Farm size	Reddy (1997)
X_4	Cropping intensity	Porchezian (1991)
X_5	Farming experience	Rosaiah (2002)
X_6	Annual income	Sathiyaseelan (1998)
X_7	Social participation	Sriram (2000)
X_8	Research contact	Parimalam (1990)
X_9	Extension agency contact	Jayalakshmi (2000)
X_{10}	Mass media exposure	Palani (1987) and Rosaiah (2002)

(Contd...)

Variable No.	Variables	Measurement
		Scoring procedure followed by
X_{11}	Economic motivation	Supe (1969)
X_{12}	Risk orientation	Supe (1969)
X_{13}	Scientific orientation	Supe (1969)
X_{14}	Innovativeness	Jayalakshmi (2000)
X_{15}	Progressiveness	Pareek and Rao (1974)
X_{16}	Perception of adopters on Narasimha cotton technologies	Sathianarayanan (1991)
X_{17}	Marketing behaviour	Alagesan (1989) with suitable modification
X_{18}	Feedback pattern	Krishnan (1997) with suitable modification
II.	**Information source use behaviour**	Alagesan (1989)
III.	**Dependent variables**	
Y_1	Knowledge	Test developed for the study
Y_2	Adoption	Schedule developed for the study

3.3.2. Operationalization of variables

The procedure followed for the measurement of each of the variable is presented in this section, separately for independent and dependent variables.

3.3.2.1. Independent variables

3.3.2.1.1. Age

It refers to the chronological age of the respondent at the time of interview. One score was given for every completed year. The scoring procedure adopted by Kanimozhi (2001) was followed for classifying the respondents into three categories as given below.

Category	Age (in years)
Young	upto 35 years
Middle	36-45 years
Old	Above 46 years

3.3.2.1.2. Educational Status

It is defined as the number of years of formal education received by the respondent at the time of interview. The scoring procedure adopted by Vennila (1998) and Rosaiah (2002) was followed for determining the educational status of the respondents and were classified into the following categories.

Category	Score
Illiterate	1
Primary School	2
Middle School	3
High School	4
Higher Secondary School	5
Collegiate	6

3.3.2.1.3. Farm Size

The farm size refers to the number of standard acres owned by the respondent. The size of land holding of farmers was arrived at by converting the dry and wet land owned by each individual into standard acres. Two and a half acres of dry land is equal to one standard acre as per the Section 8. Subsection (1)B of Andhra Pradesh Land Reforms (ceiling on Agricultural holding) Act No:1 of 1973. A weightage of one score was given to each standard acre to arrive at the land holding score of the respondent.

Based on the standard acres owned by the individual, all the respondents were categorised into the following categories as adopted by Reddy (1997) and Rosaiah (2002).

Category	Range (No. of standard acres)	Score
Marginal	< 2.50	1
Small	2.50 to 5.00	2
Big	> 5.00	3

3.3.2.1.4. Cropping Intensity

It is referred to as the ratio between gross and net cropped area in percentage. The formula suggested by Indian Society of Agronomy and followed by Porchezian (1991) and Kavitha (1998) was used to find out cropping intensity. This indicator becomes the index of effective utilization of land available for cultivation to the respondent.

$$\text{Cropping Intensity} = \frac{\text{Gross Cropped Area}}{\text{Net Cropped Area}} \times 100$$

Based on cropping intensity all the respondents were categorised into three groups *viz.*, low, medium and high by using cumulative frequency method.

3.3.2.1.5. Farming Experience

It refers to the number of completed years of experience, the respondent possessed in practicing agriculture. One score was given to every completed year of experience in farming. Farming experience of the respondents was classified into three categories *viz.*, low, medium and high by using the cumulative frequency method.

3.3.2.1.6. Annual income

It is defined as the total income of a respondent, derived from both agricultural and other non agricultural occupations in a year. A unit score was given for every thousand rupees of earning and the respondents were classified into low, medium and high by using the cumulative frequency method.

3.3.2.1.7. Social Participation

It refers to the involvement of farmers in various organisations existing in the study area. It is defined as the degree of involvement of the respondents in formal orgnaizations either as a member or office bearer at present and in the past. The sum of such scores depicted one's social participation. The method followed by Sriram (2000) and Rosaiah (2002) was adopted in this study.

Nature of Participation	Score	
	Past	Present
Member	1	3
Office bearer	2	4

Based on the overall scores, all the respondents were classified into three categories *viz.*, low, medium and high by using cumulative frequency method.

3.3.2.1.8. Research contact

It refers to the familiarity of the farmers with research station, frequency of visit and contact with researchers. It was measured by using the scale developed by Parimalam (1990) and followed by Sathiyanarayanan (1991). Awareness about the station, visit to the station and contact with researchers, each will have the score of two for 'yes' and the score of one for 'no' answer.

Based on the overall scores, all the respondents were classified into three categories *viz.*, low, medium and high by using cumulative frequency method.

3.3.2.1.9. Extension agency contact

It is operationalized as the respondent's awareness about change agency system, frequency of contact and purpose of contact. The scoring procedure adopted by Jayalakshmi (2000) and Rosaiah (2002) was followed.

Particulars of Extension Agency	Score
Awareness	
Not seen	0
Not heard	0
Seen and heard	1
Seen and discussed	2

(Contd ...)

Frequency of Contact	
Occasionally	1
Often	2
Regularly	3
Purpose of Contact	
Agriculture	2
Non-Agriculture	1

Based on overall scores, all the respondents were categorised into three groups *viz.*, low, medium and high by using the cumulative frequency method.

3.3.2.1.10. Mass Media Exposure

It is referred to the regularity with which an individual reads newspapers, magazines and listens to the radio for agricultural news, attends agricultural meetings and demonstrations, viewing agricultural films and television programmes.

For the first five items of the interview schedule, the scoring procedure used by Rosaiah (2002) was adopted.

Frequency	Score
Regularly	3
Occasionally	2
Never	1

For the last two items, the scale used by Palani (1987) and Krishnan (1997) was adopted.

Exhibitions visited last year

Frequency	Score
More than six	4
Four to six	3
One to three	2
None	1

Campaigns, demonstrations and other agricultural functions attended last year

Frequency	Score
More than six	4
Four to six	3
One to three	2
None	1

Considering the total score of mass media exposure the respondents were categorized into three groups *viz.*, low, medium and high by using cumulative frequency method.

3.3.2.1.11. Economic Motivation

It is operationalized in terms of profit maximization and the relative value placed by a farmer on economic ends. The scale developed by Supe (1969) was used in this study. The scale consisted of six statements, of which the first five were positive and the last one was a negative item.

Nature of statement	Scores for response				
	SA	A	UD	DA	SDA
Positive statement	7	5	4	3	1
Negative statement	1	3	4	5	7

SA - Strongly Agree; A - Agree ; UD - Undecided ; DA - Disagree; SDA - Strongly disagree

The sum total of scores exhibited one's economic motivation. Based on the total scores, the respondents were categorized into three groups *vi..*, low medium and high by using the cumulative frequency method.

3.3.2.1.12. Risk orientation

It refers to the degree to which an individual is preferred to take risk and uncertainty in adopting any new idea in farming. The scale developed by Supe (1969), which consisted six statements on a five point continuum was used in the present study. Out of the six statements, the first and fifth were negative ones. The scoring procedure adopted was given below.

Nature of statement	Scores for response				
	SA	A	UD	DA	SDA
Positive statement	7	5	4	3	1
Negative statement	1	3	4	5	7

SA - Strongly Agree; A - Agree ; UD - Undecided ; DA - Disagree; SDA - Strongly disagree

The sum total of the scores exhibited one's risk orientation. Based on the total scores, the respondents were categorized into three groups *viz.*, low, medium and high by using the cumulative frequency method.

3.3.2.1.13. Scientific orientation

It is the degree to which a farmer is oriented towards scientific methods of farming. It was measured with the help of a scale developed by Supe (1969). There were six statements in which the last statement was a negative one. The scoring procedure adopted was given below.

Nature of statement	Scores for response				
	SA	A	UD	DA	SDA
Positive statement	7	5	4	3	1
Negative statement	1	3	4	5	7

SA - Strongly Agree; A - Agree ; UD - Undecided ; DA - Disagree; SDA - Strongly disagree

The sum total of scores exhibited one's scientific orientation. Based on the total scores, the respondents were categorized into three groups *viz.*, low, medium and high by using the cumulative frequency method.

3.3.2.1.14. Innovativeness

Rogers and Shoemaker (1971) defined innovativeness as the degree to which an individual is relatively earlier in adopting new ideas than other members of his society. In this study, innovativeness is operationalized as the extent to which an individual wants to be early by adopting new ideas / innovations at first in the system.

Innovativeness of the respondents was assessed by asking the following question as followed by Jayalakshmi (2000) and Rosaiah (2002).

Question: When would you prefer to adopt an improved practice?

Response	Scores
As soon as it is brought to my knowledge	3
After I have seen it adopted by other members successfully	2
I prefer to wait and take my own time	1

Based on the response, all the respondents were categorized into three groups *viz.*, low, medium and high by using the cumulative frequency method.

3.3.2.1.15. Progressiveness

It is the degree to which farmers were receptive to modern values and practices. For measuring progressiveness of the respondent the scale published by Pareek and Rao (1974) and followed by Sakunthalai (1992) and Kavitha (1998) was adopted. The scale consists of seven statements for which the respondent had to answer 'yes' or 'no'. A positive response was assigned with 'one' score while a negative response received 'zero' score. The progressiveness score was obtained by summing up the responses of the items.

3.3.2.1.16. Perception of adopters on Narasimha cotton technologies

It refers to the views of the farmer adopters towards the technologies generated from R.A.R.S., Nandyal on their usefulness. It was measured on a five point continuum by the scale developed by Venugopalan (1989) and with slight modification as used by Sathiyanarayanan (1991) was used in this study. The scoring procedure used is as follows:

	HU	U	UD	NU	NAU
Technology from R.A.R.S., Nandyal	5	4	3	2	1

HU - Highly useful ; U - Useful ; UD - Undecided ; NU - Not useful; NAU - Not at all useful

3.3.2.1.17. Marketing behaviour

Alagesan (1989) studied the marketing behaviour of viticulturists on 10 aspects. This was modified to suit for cotton crop with nine items *viz.*, nature of marketing, packing materials used, means of transport, persons to whom sold, place of sale, terms and conditions, opinion on the existing market facility, market price and grading. Thus marketing behaviour of cotton growers was operationalized 'As the performance of the respondent in respect of marketing his produce *viz...*, Cotton, with respect to above nine items. The following scoring procedure was used in this study.

a) **Nature of marketing:** Based on involvement of labour, cost and ease in practice, the following scores were assigned.

Response	Score
After each picking is over	1
When all pickings are completed	2
When cash is needed after completing pickings	3
When attractive price prevails	4

b) **Packing Material:** Considering the reduction in damage caused to kapas by different packing materials as well as on their scope for reuse / durability, the following scoring procedure was adopted.

Response	Score
No packing	1
Jute gunny bag	2
Polythene gunny bag	3

c) **Means of Transport:** Considering the criteria of accessibility from the field to market centre, the quantum of produce transported at a time and the speed in mobility, the following scores were assigned.

Response	Score
Bullock cart	1
Tractor	2
Lorry	3

d) **Persons to whom sold**: Considering the criteria of quantity purchased and the price offered by the merchant, the following scores were assigned.

Purchaser	Score
Commission agent	1
Ginning factory	2
Regulated market	3

e) **Place of Sale:** Based on the distance, the place of sale was quantified as follows:

Response	Score
Locally	1
Near by town	2
Distant town	3

f) **Terms and Conditions:** This was based on the criteria of mode of payment as follows:

Response	Score
Credit sale	1
Partly cash + Partly credit	2
Cash payment	3
Partly advance payment	4
Full advance payment	5

g) **Existing market facility:** The scores were assigned based on the perceived satisfaction on the existing market facilities as given below:

Response	Score
Insufficient	1
Sufficient	2
Quite sufficient	3

h) **Market price:** This was measured on a five point continuum.

Response	Score
Very low	1
Low	2
Medium	3
High	4
Very high	5

i) **Grading:** This was studied in two dimensions *viz.*, aspects of grading for better price and opinion on the existing grading method.

Aspect of grading

Response	Score
By removing the reminance of bracts from kapas	1
By removing insect damaged kapas	2
Based on the staple length	3

Opinion on existing grading methods:

Response	Score
Insufficient	1
Sufficient	2
Quite sufficient	3

The scores obtained on all the above items were summed up to yield the score for the marketing behaviour of the respondent.

Based on the total scores, the respondents were classified into three categories *viz.*, low, medium and high by using the cumulative frequency method.

3.3.2.1.18. Feedback pattern

It denotes messages flowing from receiver back to the source about the technology. The scoring system followed by Krishnan (1997) was used with modification by adding three more items.

Response	Score
R.A.R.S. Scientists	8
K.V.K.	7
D.A.A.T.T. Centre	6
J.D.A.	5
D.D.A.	4
A.D.A.	3
A.O.	2
A.E.O.	1

The sum total of the scores of the checked items formed the respondents feedback pattern score. Based on the scores of the respondents, they were categorized into three groups *viz.*, low, medium and high using cumulative frequency method.

3.3.2.2. Information source use behaviour

It is referred to the channels (or) sources through which the respondents get the information on the technologies of R.A.R.S., Nandyal. These sources *viz.*, Personal Localite, Personal Cosmopolite and Impersonal Cosmopolite were analysed based on the performance on four aspects *viz.*, frequency of activity, adequacy of information, timeliness of information and credibility of information and indices were constructed for each source of information and the overall mean of the above three will give the respondent's information source use index. The method followed by Alagesan (1989) was adopted in this study.

Response	Score
a. Frequency of activity	
Occasionally	1
Often	2
Regularly	3
b. Adequacy of information	
Less adequate	1
Adequate	2
Most adequate	3
c. Timeliness of information	
After season	1
During season	2
Before season	3
d. Credibility of information	
Least credible	1
Credible	2
Most credible	3

Information Source Use Index: (ISI)

$$ISI_{PL} = \frac{\text{Sum total of scores obtained by the individual on personal localite sources}}{\text{Sum total of maximum scores on personal localite sources}} \times 100$$

$$ISI_{PC} = \frac{\text{Sum total of scores obtained by the individual on personal cosmopolite sources}}{\text{Sum total of maximum scores on personal cosmopolite sources}} \times 100$$

$$ISI_{IC} = \frac{\text{Sum total of scores obtained by the individual on impersonal cosmopolite sources}}{\text{Sum of total of maximum scores on impersonal cosmopolite sources}} \times 100$$

$$ISI = \frac{ISI_{PL} + ISI_{PC} + ISI_{IC}}{3}$$

ISI_{PL} = Information source use index for personal localite sources

ISI_{PC} = Information source use index for personal cosmopolite sources

ISI_{IC} = Information source use index for impersonal cosmopolite sources

Based on the information source use index, the respondents were categorized into three groups as followed below.

Information source use index	Category
0 – 33.3	Low
33.4 – 66.6	Medium
66.7 – 100	High

3.3.2.3. Dependent Variables

3.3.2.3.1. Knowledge

Bloom *et al.* (1995) defined knowledge as the behaviour and test situation with emphasis remembering either by recognition or recall of ideas, materials and phenomena.

In this study, knowledge denotes the understanding about various technologies / practices that were generated from R.A.R.S., Nandyal on Narasimha cotton, which were known to the respondents in the study area.

3.3.2.3.1.1. Item Analysis

To measure the knowledge level of the respondents, a teacher made test was constructed, with 33 knowledge items. Each item was provided with three answers, of which one is correct. The collected 33 items were administered to 20 cotton growers in the non-sample area. For correct answer 'one' score and for incorrect answer 'zero' score was given. The total score for each respondent was calculated. Afterwards, the

respondents were arranged in descending order of their scores. As suggested by Garret (1937), 27 per cent with high scores called high group and 27 per cent with lowest scores *viz.*, low group was considered for calculating item difficulty and item discrimination index.

3.3.2.3.1.2. Difficulty index

The difficulty index of an item ranged to the proportion of subjects giving correct answer to that particular item which revealed how difficult that item was. It was arrived at by using the formula adopted by Alagesan (1989) and Sekar (1994).

$$P_i = \frac{n_i \times 100}{N_i}$$

Where P_i = Difficulty index in percentage of i^{th} item

n_i = Number of subjects giving correct answer to i^{th} item

N_i = Total number of subjects to whom i^{th} item was administered.

3.3.2.3.1.3. Discrimination index

Discrimination index referred to the extent to which an item discriminates the well informed individual from the less informed ones. It was calculated by finding Phi-coefficient as formulated by Perry and Michael (1951) and adopted by Alagesan (1989) and Sekar (1994). In this study, the item discrimination index was arrived at by using the following formula.

$$E = \frac{S_1 - S_2}{N/3}$$

Where E = Discrimination Index

S_1 = Frequency of correct answer in high group

S_2 = Frequency of correct answer in low group

N = Total number of respondents in the item analysis sample.

3.3.2.3.1.4. Final selection of items

A total of 15 items were finally selected from the 33 items, based on the following criteria adopted by Alagesan (1989).

i) Item which had difficulty index ranging from above 21 and below 75.

ii) Discrimination index of 20 and above.

The difficulty index and the discrimination index of the selected items are given in Appendix - X.

The test was administered to the respondents. For correct answer 'one' score was given and for incorrect answer 'zero' score was given. The knowledge of the respondent was obtained by adding all the scores of all items.

Knowledge index for each respondent was calculated by using the formula as given by Pushpa (1991).

$$\text{Knowledge Index} = K/P \times 100$$

Where K = Knowledge score obtained by an individual respondent

P = Maximum possible scores for all items.

Based on the knowledge index, the cotton growers were categorised into three groups, for their extent of knowledge, as given below.

Knowledge Index	Category
0 - 33.3	Low
33.4-66.6	Medium
66.7-100	High

3.3.2.3.2. Extent of adoption

In this study adoption was operationalised as the use of newly developed R.A.R.S., Nandyal cotton technologies by the respondents either fully or partly. Full adoption of a practice was assigned with 'two' scores, while 'one' score for partial adoption and non-adoption was assigned with 'zero' score. The sum of the scores of the individual provide the adoption score of the individual.

The extent of adoption of recommended R.A.R.S., Nandyal practices concerning the cultivation of cotton was measured by means of an adoption index as given below.

$$\text{Adoption Index} = \frac{\text{Total score obtained by an individual}}{\text{Maximum possible score an individual can obtain}} \times 100$$

Based on the adoption index, the cotton growers were categorised into three groups for their extent of adoption, as given below.

Adoption Index	Category
0 - 33.3	Low
33.4-66.6	Medium
66.7-100	High

3.4. Method of data collection

The data collection was done with the use of a well structured interview schedule as given in Appendix - XV. The respondents selected for the study were contacted in person before data collection for rapport building and then subsequently interview was conducted, during May and June 2002 to collect data. Every effort was made to check and cross check the data collected from all the respondents.

3.5. Statistical tools used

The following statistical tools were used through computer based statistical package *viz.*, Statistical Package for Social Sciences (SPSS) for analysis and the interpretation of data was done.

The statistical tools used were given below.

1. Mean
2. Percentage analysis
3. Cumulative frequency
4. Independent 't' test
5. Zero-order correlation analysis
6. Multiple regression analysis with step down process

Thus by following the above methodology the data were collected, scored, tabulated, analysed, interpreted and presented in succeeding chapter.

Findings and Discussion

CHAPTER IV

FINDINGS AND DISCUSSION

The findings of the present study alongwith discussion are presented in this chapter under the following sub heads.

4.1. Profile characteristics of Narasimha cotton growers of adopted and non-adopted villages.

4.2. Item-wise and overall information source use behaviour of Narasimha cotton growers in adopted and non-adopted village.

4.3. Item-wise and overall knowledge of adopted and non-adopted village Narasimha cotton growers on Narsimha cotton production technology.

4.4. Recommended practice-wise and overall extent of adoption of Narasmiha cotton production technology by the Narasimha cotton growers of adopted and non-adopted villages.

4.5. Diffusion and adoption of Narasimha cotton in adopted and non-adopted villages.

4.6. Relationship of characteristics of adopted and non-adopted village farmers with their knowledge and adoption levels of Narasimha cotton variety.

4.7. Relative contribution of characteristics of adopted and non-adopted village farmers towards knowledge and extent of adoption of Narsimha cotton variety.

4.8. Constraints faced by the Narasimha cotton growers in adopting the recommended Narasimha cotton production technologies.

4.9. Suggestions offered by the Narasimha cotton growers.

4.1. Profile characteristics of Narasimha cotton growers of adopted and non-adopted villages

Eighteen characteristics of Narasimha cotton growers of adopted and non-adopted villages were studied. The difference between the means of farmers of adopted and non-adopted villages were also tested by 't' test. The findings have been presented and discussed in this section.

4.1.1. Age

The distribution of respondents according to their age is presented in Table 5.

Table 5. Distribution of respondents according to their age

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Young	6	12.00	6	12.00	-0.188^{NS}
2.	Middle	24	48.00	19	38.00	
3.	Old	20	40.00	25	50.00	
	Total	50	100.00	50	100.00	
	Mean score	46.18		46.48		

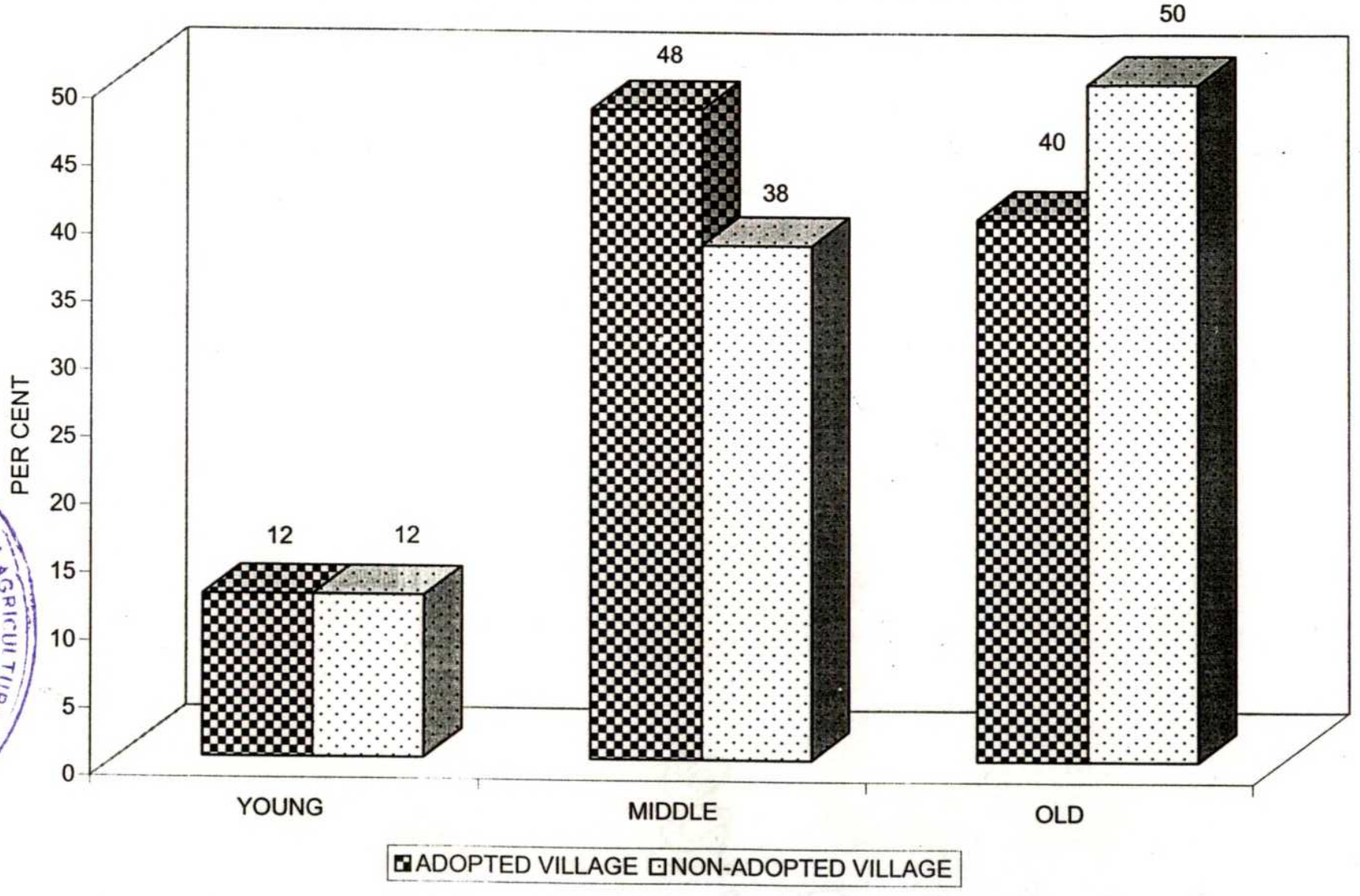
NS – Non-significant

The data reveal that nearly half (48.00%) of the respondents were middle aged in the case of adopted village, while it was 38.00 per cent in the case of non-adopted village. This was followed by old aged 40.00 per cent and 50.00 per cent respectively in the case of adopted and non-adopted villages. Equal percentage (12.00% each) of respondents were found under young aged category. This finding derives support from Ponkathaperumal (1994), Krishnakumar (1996) and Kanimozhi (2001).

The mean age of non-adopted village farmers was more than that of adopted village farmers. However the difference between the means was not significant as the 't' value revealed that there was no difference between adopted and non-adopted village farmers with respect to their age. This finding derives support from Gurusamy (1996) and Lawrance (2000).

From the results it can be inferred that the Narasimha cotton growing farmers of both the villages were similar in their age group.

FIG.2. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR AGE



4.1.2. Educational status

The distribution of respondents according to their educational status is presented in Table 6.

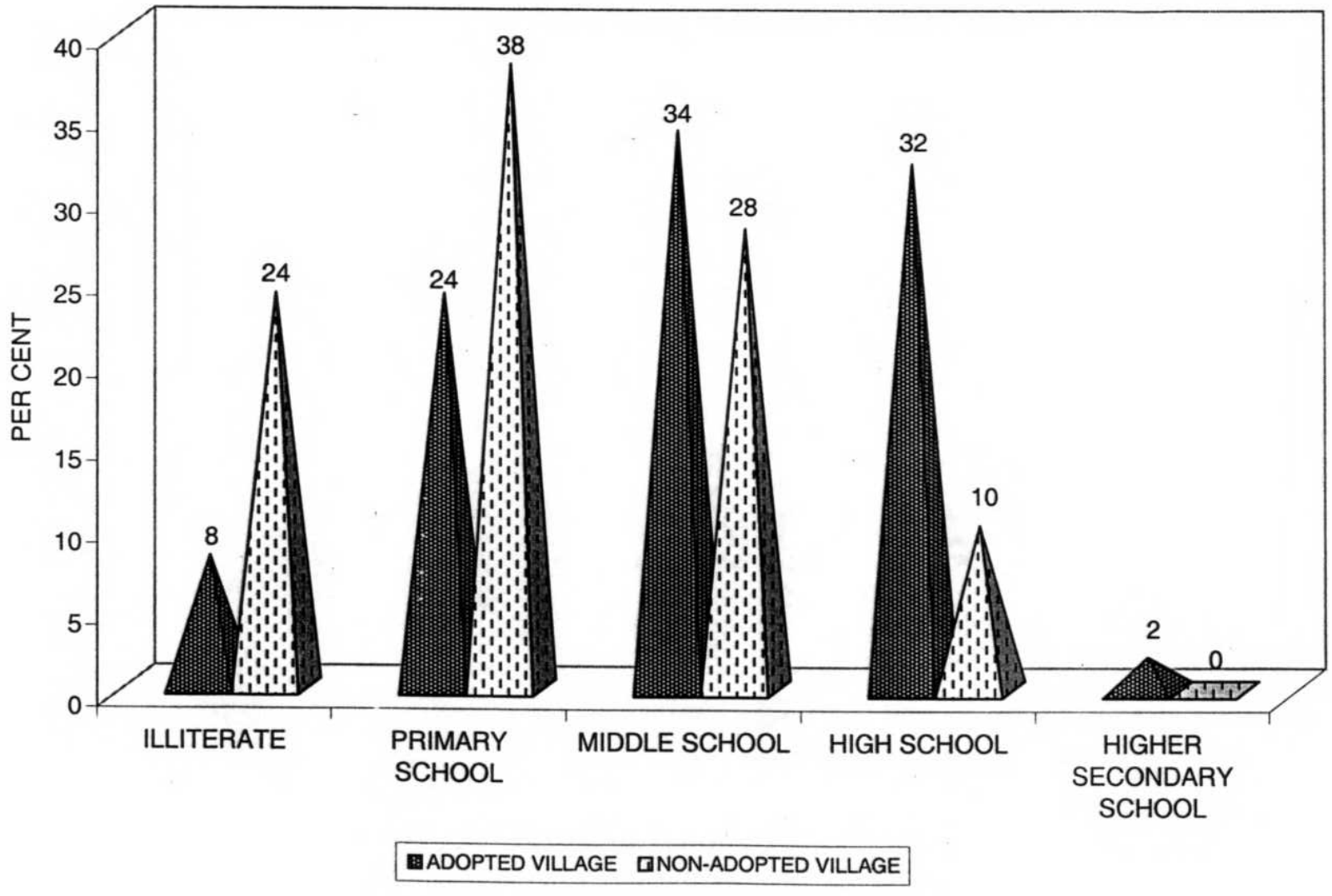
Table 6. Distribution of respondents according to their educational status

S. No	Category	Adopted village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Illiterate	4	8.0	12	24.00	3.735**
2.	Primary School	12	24.00	19	38.00	
3.	Middle School	17	34.00	14	28.00	
4.	High School	16	32.00	5	10.00	
5.	Higher Secondary School	1	2.00	-	-	
	Total	50	100.00	50	100.00	
	Mean score	2.96		2.24		

** Significant at 0.01 level of probability.

The data reveal that more than one-third (34.00%) of respondents had middle school education in the case of adopted village, while it was more than one fourth (28.00%) for non-adopted village. This was followed by high school education, 32.00 per cent and 10.00 per cent for adopted and non-adopted village farmers respectively. It is seen that nearly one fourth (24.00%) and more than one-third (38.00%) of respondents from adopted and non-adopted villages had primary school level of education. In the case of illiterate category, it was more in non-adopted village (24.00%) than the adopted village (8.00%). Further it could be observed that there was none in the case of higher secondary educational level in the non-adopted village, while it was few (2.00%) in the adopted village. This finding derives support from Anasuya (1997) and Kanimozhi (2001).

FIG.3.DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR EDUCATIONAL STATUS



The mean score of educational status was more for adopted village farmers (2.96) than the non-adopted village farmers (2.27). The difference between means was significant at 0.01 level of probability revealing that adopted village farmers were significantly higher in their educational status than that of non-adopted village farmers. This finding is in accordance with Palaniswamy (1978).

From this it could be inferred that higher educational status of the adopted village farmers with higher mean score could be because of the presence of the high school in the adopted village and also the proximity to the Nandyal town, which would have enabled them to prosecute better education than that of the non-adopted village farmers. This can also be supported from the figures seen among the adopted village farmers where two-thirds of them had concentrated from middle school category onwards, while the same proportion in the non-adopted village had concentrated under illiterate and primary school educational level.

4.1.3. Farm Size

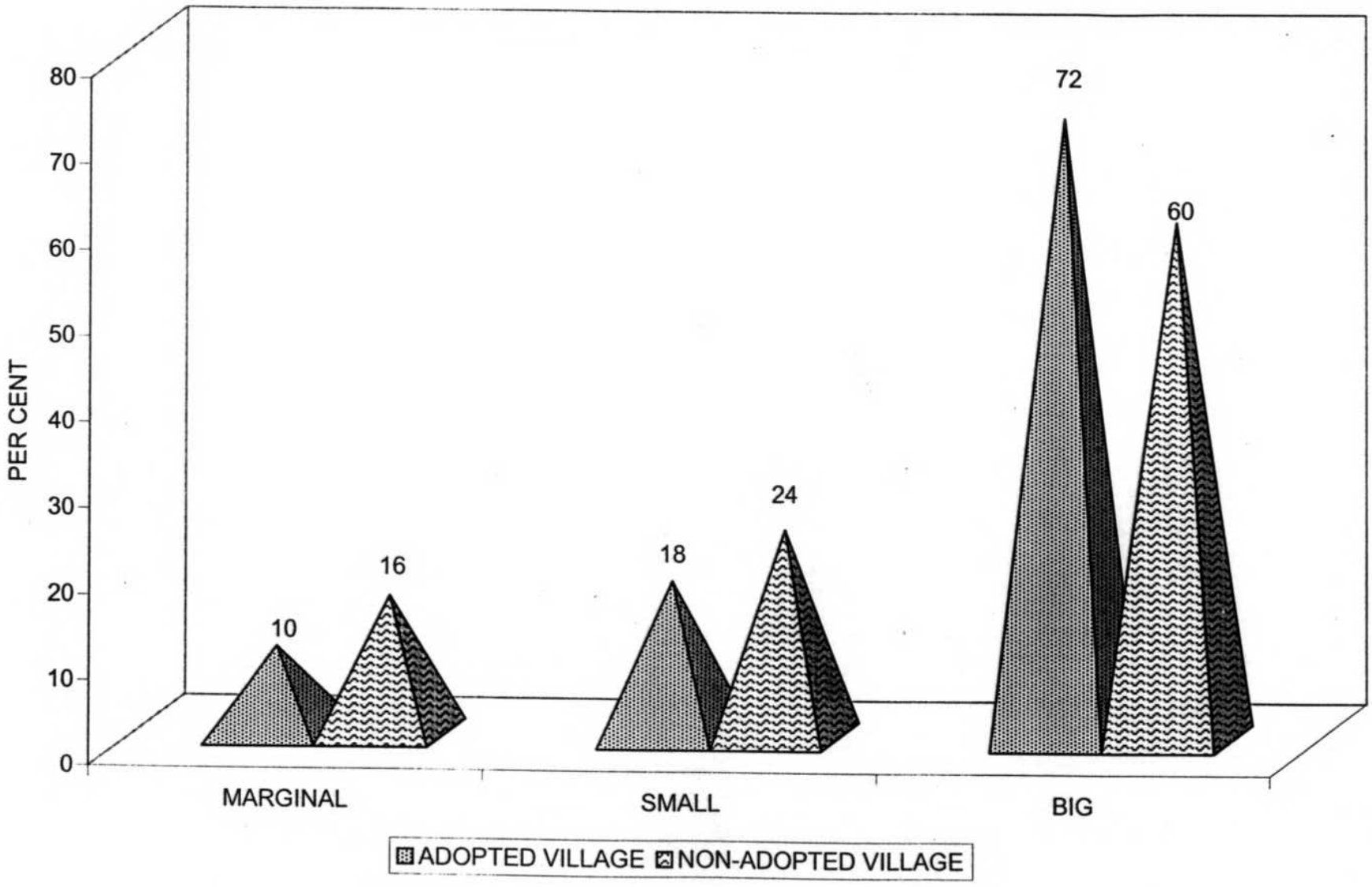
The distribution of respondents for their farm size was collected and categorised as marginal, small and big and is presented in Table 7.

Table 7. Distribution of respondents according to their farm size

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Marginal	5	10.00	8	16.00	1.259^{NS}
2.	Small	9	18.00	12	24.00	
3.	Big	36	72.00	30	60.00	
	Total	50	100.00	50	100.00	
	Mean score	2.62		2.44		

NS – Non-significant

FIG.4. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR FARM SIZE



The data reveal that majority (72.00 and 60.00% respectively) of adopted and non-adopted village farmers were big farmers. Nearly one-fifth (18.00%) and one-fourth (24.00%) of respondents were small farmers in adopted and non-adopted villages respectively. The least numbers of respondents (10.00 and 16.00%) were marginal farmers in adopted and non-adopted villages respectively. This finding is in line with Palani (1987).

The mean farm size of adopted village farmers was more than that of non-adopted village farmers. But the difference between the means was not significant as revealed in 't' value. From the results it could be inferred that both the villages farmers who grow cotton own similar farm size. This finding is in line with Palaniswamy (1978), Alagesan (1989) and Lawrance (2000).

4.1.4. Cropping Intensity

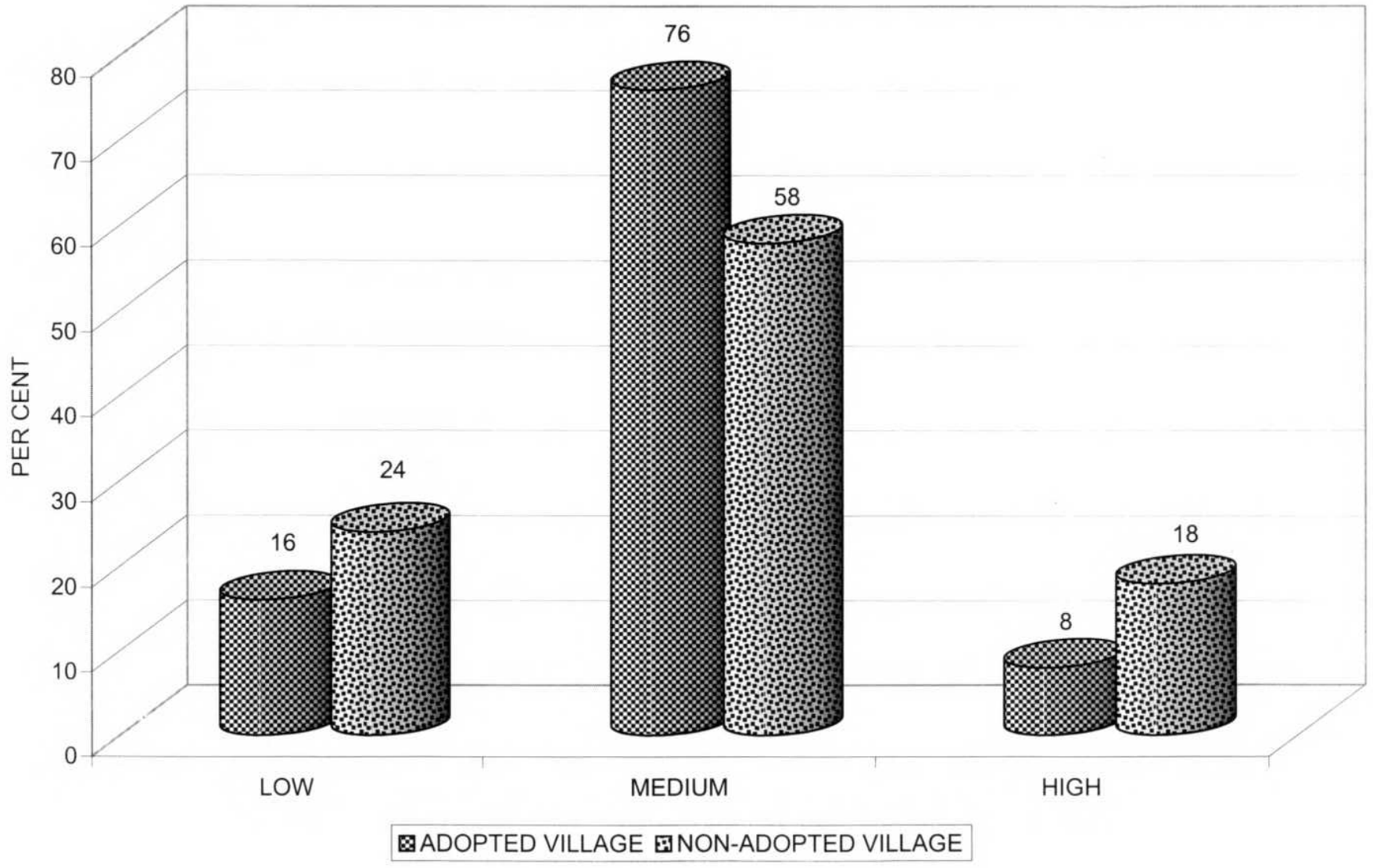
The distribution of respondents for their cropping intensity was worked out and given in Table 8.

Table 8. Distribution of respondents according to their cropping intensity

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	8	16.00	12	24.00	0.917^{NS}
2.	Medium	38	76.00	29	58.00	
3.	High	4	8.00	9	18.00	
	Total	50	100.00	50	100.00	
	Mean score	105.67		104.76		

NS – Non-significant

FIG.5. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR CROPPING INTENSITY



The data reveal that slightly more than three-fourths (76.00%) of the respondents had medium level of cropping intensity in the adopted village and in the non-adopted village it was 58.00 per cent. Nearly one-fifth (16.00%) of the respondents in the adopted village and one-fourth (24.00%) of the respondents in non-adopted village fall under low level of cropping intensity category. It is further observed that 8.00 per cent and 18.00 per cent of the respondents were under high level of cropping intensity respectively for adopted and non-adopted villages. This finding is on par with Rajapandi (1983) and Sujatha (1996).

Though the mean cropping intensity score vary between two village farmers, the difference was not significant as was seen in the 't' value. This shows that they were similar with respect to the cropping intensity. This finding is in contradiction with Sakunthalai (1992).

In drylands the possible single crop rotation is mostly followed in both adopted and non-adopted villages. This is how lack of variation in the cropping intensity could be explained in this study.

4.1.5. Farming Experience

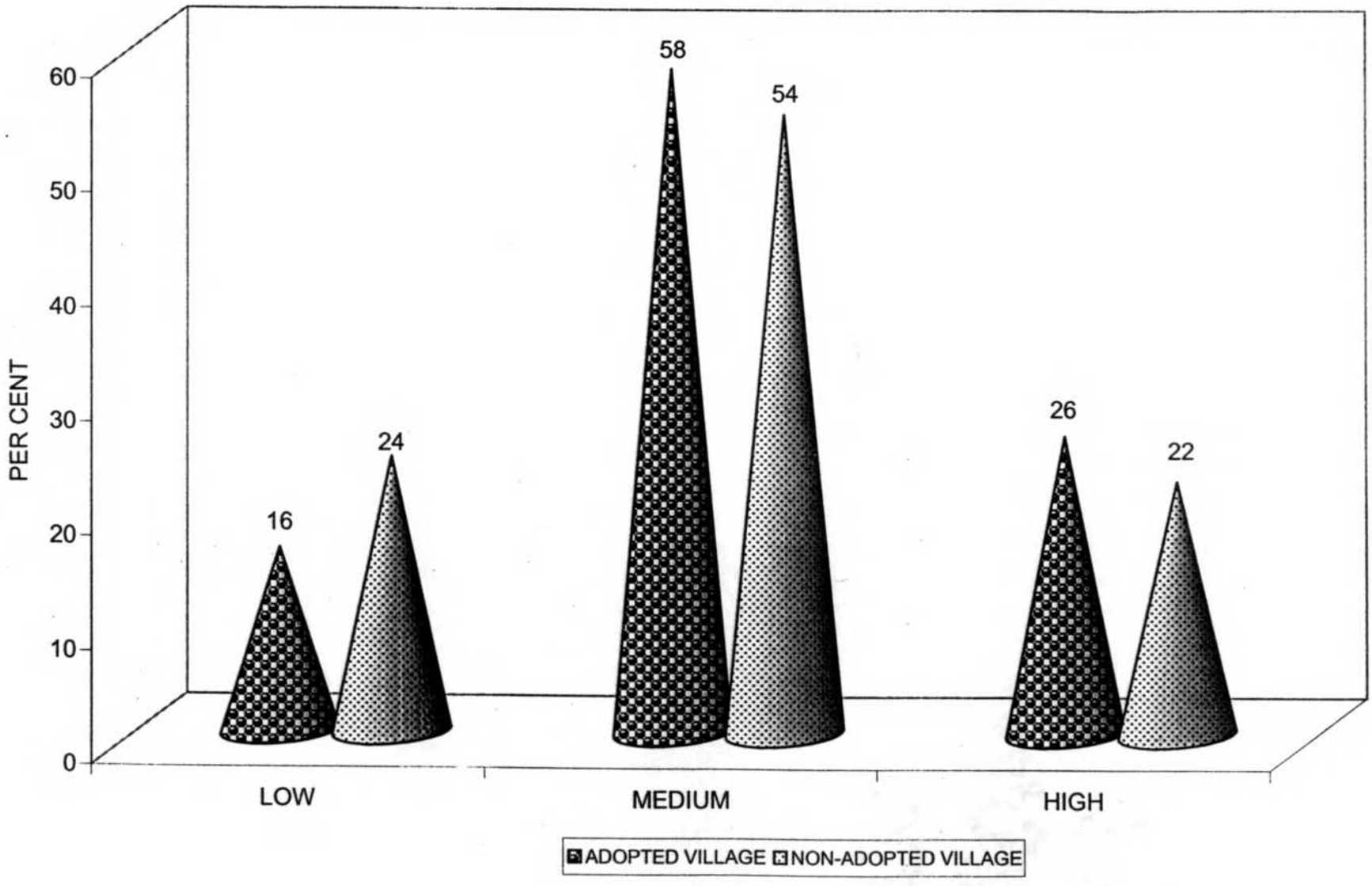
The distribution of respondents according to their farming experience was worked out, grouped into three categories and presented in Table 9.

Table 9. Distribution of respondents according to their farming experience

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	8	16.00	12	24.00	-1.707^{NS}
2.	Medium	29	58.00	27	54.00	
3.	High	13	26.00	11	22.00	
	Total	50	100.00	50	100.00	
	Mean score	25.98		28.92		

NS – Non-significant

FIG.6.DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR FARMING EXPERIENCE



The data reveal that majority (58.00 and 54.00% respectively) of the respondents had medium level of farming experience in adopted and non-adopted villages. More than one-fourth (26.00%) and more than one-fifth (22.00%) of the respondents had high level of farming experience in adopted and non-adopted villages respectively. It is further observed that 16.00 per cent and nearly one-fourth (24.00%) of the respondents had low level of farming experience in both the cases. This finding derives support from Sujatha (1996), Sriram (2000) and Kanimozhi (2001).

The mean scores of farming experience for adopted and non-adopted village farmers were found to be non-significant. It indicates that there was no difference in respect of farming experience between the two groups of farmers of adopted and non-adopted villages. This infers that Narasimha cotton growers of both the villages had the similar farming experience. This finding is on par with Lawrance (2000).

4.1.6. Annual Income

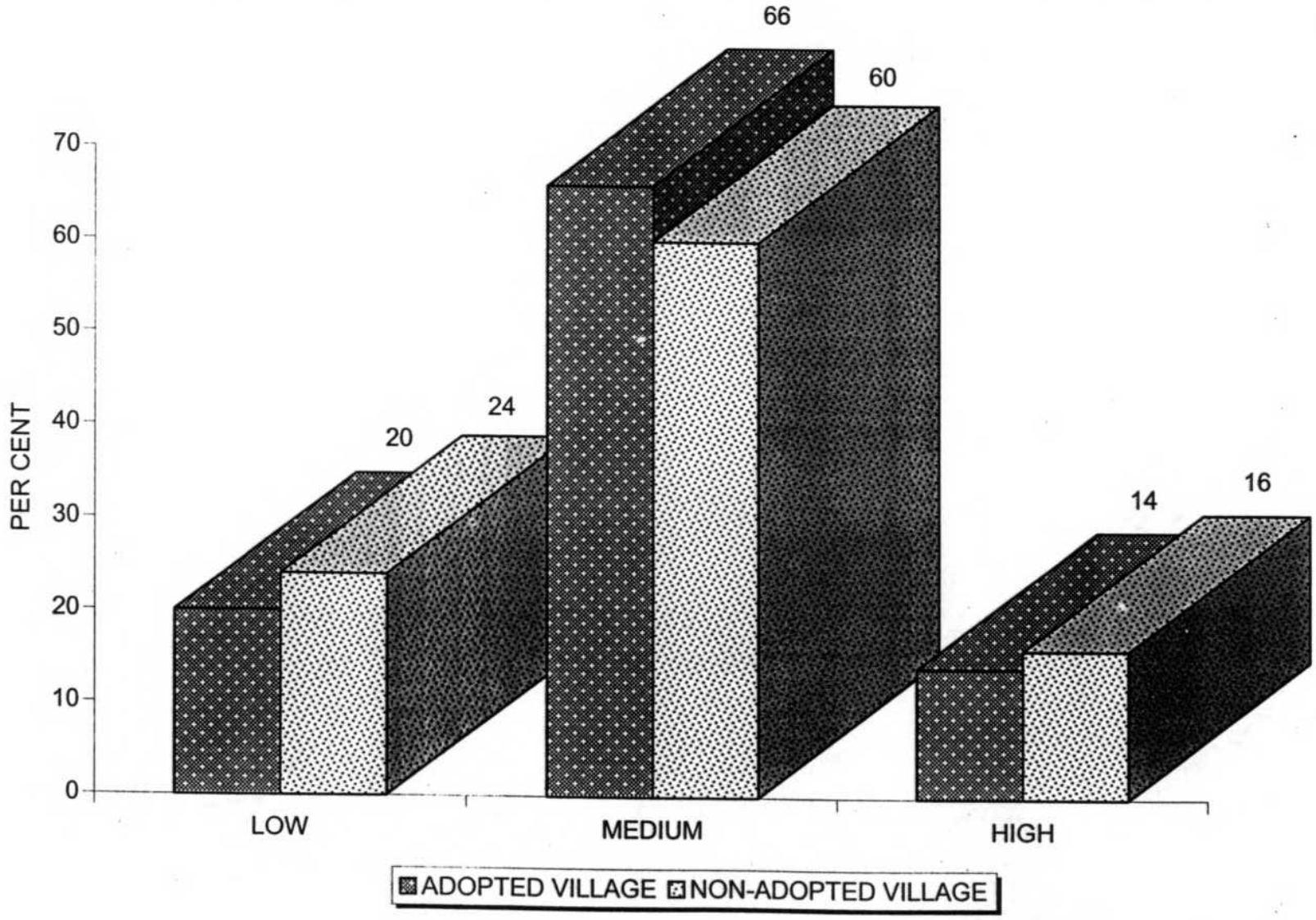
The distribution of respondents according to their annual income was worked out and presented in Table 10.

Table 10. Distribution of respondents according to their annual income

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	10	20.00	12	24.00	3.331**
2.	Medium	33	66.00	30	60.00	
3.	High	7	14.00	8	16.00	
	Total	50	100.00	50	100.00	
	Mean score	64.90		44.60		

** Significant at 0.01 level of probability

FIG.7. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR ANNUAL INCOME



The data reveal that nearly two-thirds (66.00%) of adopted village farmers and three-fifths (60.00%) of non-adopted village farmers had medium level of annual income. One-fifth (20.00%) of adopted village farmers and nearly one-fourth (24.00%) of non-adopted village farmers had low level of annual income. It is further observed that 14.00 per cent and 16.00 per cent of adopted and non-adopted village farmers respectively fall under high annual income level category. This finding is in accordance with Krishnan (1997) and Venkattakumar (1997).

The mean scores for adopted and non-adopted village farmers were 64.90 and 44.60 respectively. The 't' value was found to be highly significant at 0.01 level of probability, which indicates the existence of difference between adopted and non-adopted village farmers in respect of annual income.

From the above results it could be inferred that the adopted village farmers had comparatively more annual income than the non-adopted village farmers, with the higher mean score of 64.90. This might be because of the more research contact, extension agency contact and mass media exposure resulting in higher knowledge and adoption of technologies for earning more annual income.

4.1.7. Social Participation

The distribution of respondents according to their social participation were grouped into three categories and presented in Table 11.

Table 11 reveal that majority (66.00 and 70.00%) of respondents had medium level of social participation in adopted and non-adopted villages respectively. It is further observed that 16.00 per cent and 24.00 per cent of respondents belonged to low level of social participation category in adopted and non-adopted villages. Nearly one-fifth (18.00%) of adopted village farmers had high social participation and only negligible

percentage (6.00%) of non-adopted village farmers were found under this level of social participation. This finding derives support from Elangovan (1994), Ponkathaperumal (1994) and Krishnakumar (1996).

Table 11. Distribution of respondents according to their social participation

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	8	16.00	12	24.00	3.313**
2.	Medium	33	66.00	35	70.00	
3.	High	9	18.00	3	6.00	
	Total	50	100.00	50	100.00	
	Mean score	5.88		3.38		

** Significant at 0.01 level of probability

From the mean scores on social participation, it could be seen that adopted village farmers had high mean score than non-adopted village farmers. The difference between means was highly significant. Hence, it can be inferred that the adopted and non-adopted village farmers were distinctly different, showing that the adopted villagers had higher social participation. This finding is in line with Alagesan (1989).

Social participation of the adopted village farmers had more social participation than the non adopted village farmers as was reflected in the mean score. Annual income of the adopted village farmers as well as educational status might have prompted them to have more social participation. This might be the reason for their difference, when compared to the non-adopted village farmers.

4.1.8. Research Contact

The distribution of respondents according to their research contact is presented in Table 12.

FIG.8. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR SOCIAL PARTICIPATION

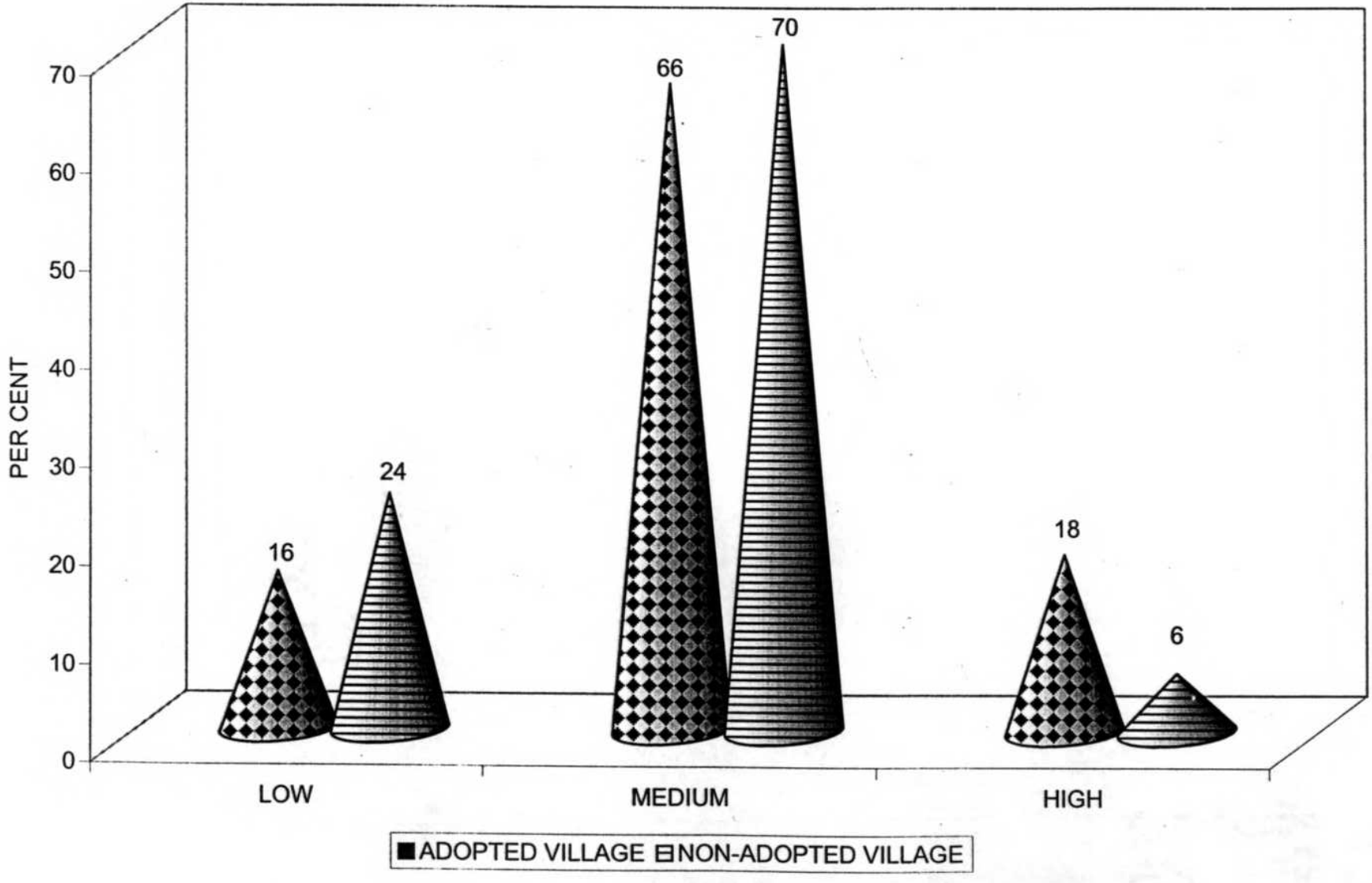


Table 12. Distribution of respondents according to their research contact

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	9	18.00	42	84.00	8.226**
2.	Medium	30	60.00	5	10.00	
3.	High	11	22.00	3	6.00	
	Total	50	100.00	50	100.00	
	Mean score	6.06		4.24		

** Significant at 0.01 level of probability

The data reveal that majority (60.00%) of adopted village farmers and one-tenth (10.00%) of non-adopted village farmers had medium level of research contact. It is further observed that more than one-fifth (22.00%) of adopted village farmers and less than one-tenth (6.00%) of non-adopted village farmers had high level of research contact, while nearly one fifth (18.00%) of the adopted village farmers and more than three-fourths (84.00%) of the non-adopted village farmers had low level of research contact. This finding is in contradiction with the reported finding of Jayalakshmi (2000).

The mean scores for adopted and non-adopted village farmers were 6.06 and 4.24 respectively. The 't' value was found to be highly significant which indicates the existence of difference between adopted and non-adopted village farmers in respect of research contact. This could be inferred that adopted village farmers had more research contact than the non-adopted village farmers, since the scientists of RARS, Nandyal were regularly visiting the adopted village.

4.1.9. Extension agency contact

The distribution of respondents according to their extension agency contact is presented in Table 13.

FIG.9. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR RESEARCH CONTACT

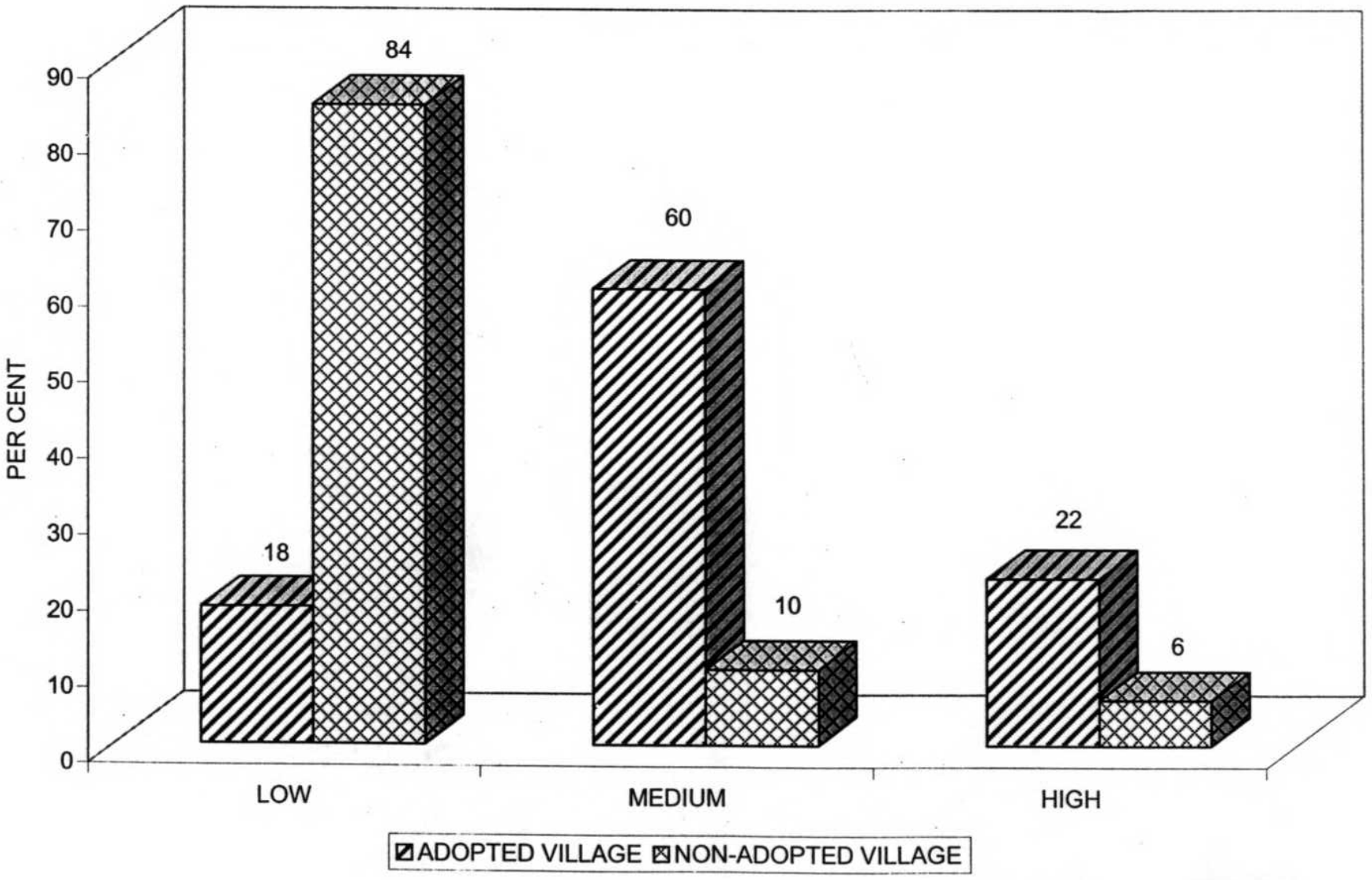


Table 13. Distribution of respondents according to their extension agency contact

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	11	22.00	11	22.00	3.831**
2.	Medium	31	62.00	33	66.00	
3.	High	8	16.00	6	12.00	
	Total	50	100.00	50	100.00	
	Mean score	21.46		14.20		

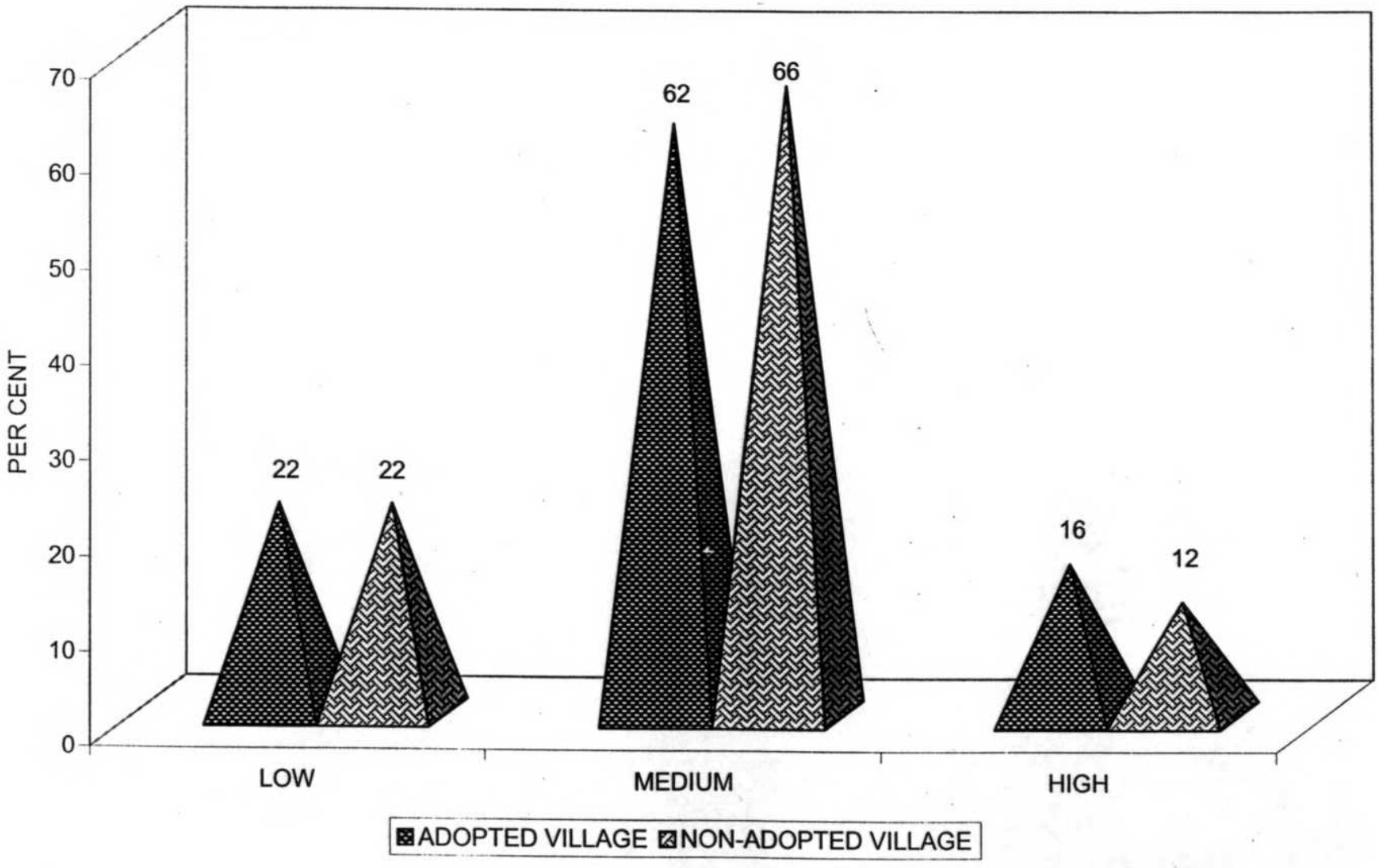
** Significant at 0.01 level of probability

The data reveal that more or less similar distribution of respondents both in adopted and non-adopted villages was observed in medium level of extension agency contact. It is further observed that equal proportion (22.00% each) of respondents were found in low level of extension agency contact in both the groups, while 16.00 per cent of adopted village farmers and 12.00 per cent of non-adopted village farmers were observed in high level of extension agency contact. This finding derives support from Ponkathaperumal (1994), Sriram (1997) and Venkatachalam (1999).

The respective mean scores for adopted village farmers and non-adopted village farmers were 21.46 and 14.20. The 't' value was highly significant indicating that these two groups were distinct in their extension agency contact, placing the adopted village farmers on a higher level. This finding is on par with Rao (1988), Alagesan (1989) and Lawrance (2000).

It could be interpreted that higher extension agency contact among the adopted village farmers may be because, they were more educated, more scientifically oriented, with higher economic motivation and marketing behaviour, which might have tempted

FIG.10. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR EXTENSION AGENCY CONTACT



them to have frequent extension agency contact for gaining more knowledge and adoption of cotton technology. This might have resulted in more extension agency contact among adopted village farmers.

4.1.10. Mass Media Exposure

The distribution of respondents according to their mass media exposure is presented in Table 14.

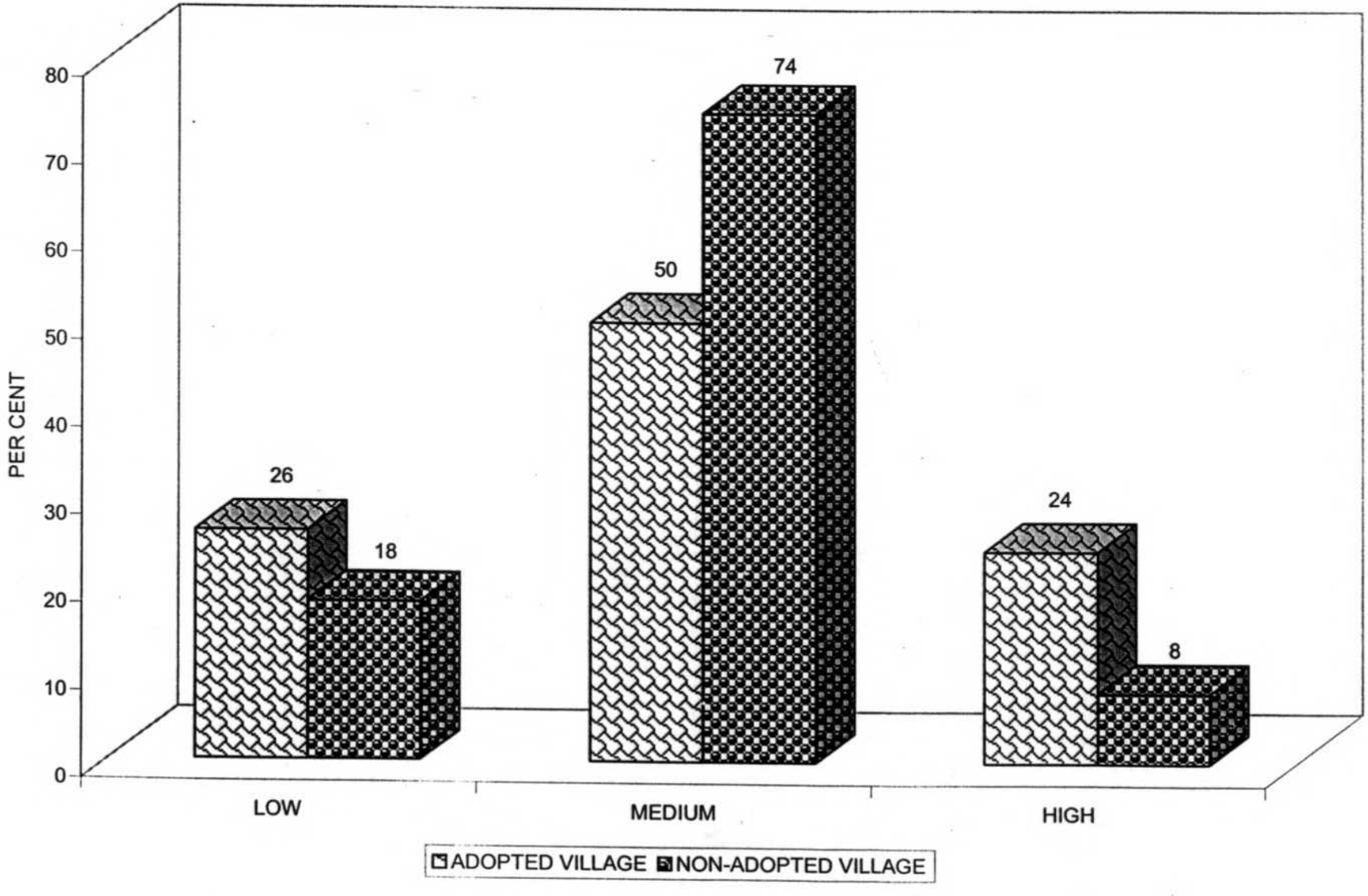
Table 14. Distribution of respondents according to their mass media exposure

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	13	26.00	9	18.00	3.775**
2.	Medium	25	50.00	37	74.00	
3.	High	12	24.00	4	8.00	
	Total	50	100.00	50	100.00	
	Mean score	13.10		10.10		

** Significant at 0.01 level of probability

Table 14 reveals that half (50.00%) of the adopted village farmers and nearly three-fourths (74.00%) of non-adopted village farmers had medium level of mass media exposure. More than one-fourth (26.00%) of the adopted village farmers and nearly one-fifth (18.00%) of the non-adopted village farmers accounted for low level of mass media exposure, while nearly one-fourth (24.00%) of the adopted village farmers and nearly one-tenth (8.00 percent) of non-adopted village farmers had high level of mass media exposure. This finding is in line with Kumar (1994), Anasuya (1997) and Krishnan (1997).

FIG.11. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR MASS MEDIA EXPOSURE



The respective mean scores for adopted and non-adopted village farmers were 13.10 and 10.10. The 't' value was highly significant indicating that these two groups were distinctly different in their exposure to mass media, with the adopted village farmers group on a higher level. This finding is on par with Rao (1988).

Majority of the respondents in adopted village were educated and they had studied upto middle and high school levels. Education had positive and significant relationship with mass media exposure as discussed elsewere. Perhaps this might have resulted in the corresponding increase in the level of mass media exposure.

4.1.11. Economic Motivation

The distribution of respondents according to their economic motivation is presented in Table 15.

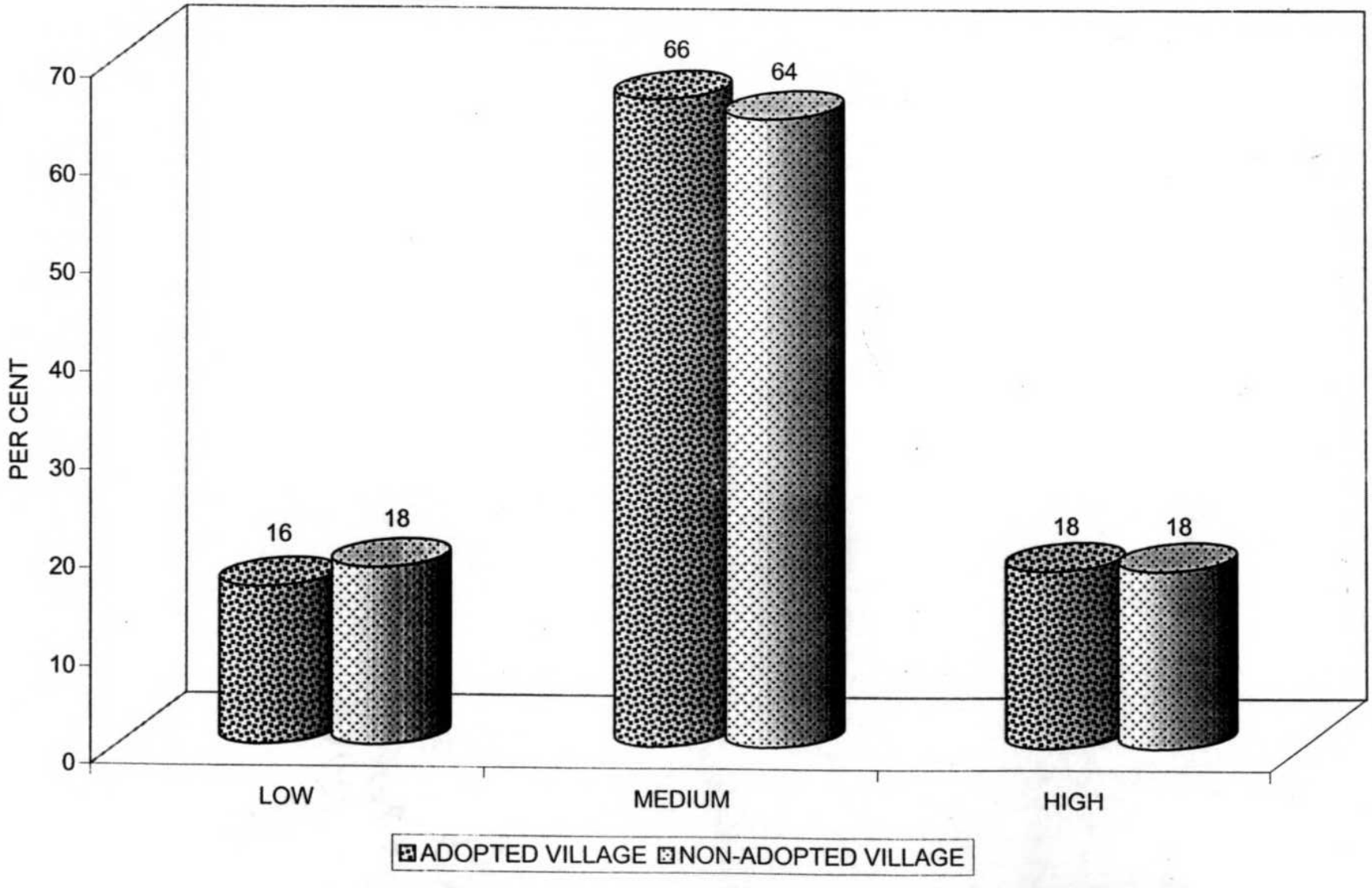
Table 15. Distribution of respondents according to their economic motivation

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	8	16.00	9	18.00	2.801**
2.	Medium	33	66.00	32	64.00	
3.	High	9	18.00	9	18.00	
	Total	50	100.00	50	100.00	
	Mean score	31.32		28.36		

** Significant at 0.01 level of probability

Table 15 reveals that more or less equal proportion (66.00 and 64.00%) of adopted and non-adopted village farmers respectively had medium level of economic motivation. It is further observed that 16.00 per cent of adopted village farmers and less

FIG.12.DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR ECONOMIC MOTIVATION



than one-fifth (18.00%) of the non-adopted village farmers had low level of economic motivation, while equal proportion (18.00% each) of adopted and non-adopted village farmers had high level of economic motivation. This finding is in accordance with Murugan (1993), Krishnakumar (1996), Anasuya (1997) and Kanimozhi (2001).

The mean scores were found to be 31.32 and 28.36 for adopted and non-adopted village farmers respectively. Highly significant 't' value indicates that the two groups were distinctly different in their economic motivation. This infers that adopted village farmers had high economic motivation. This finding is in contradiction with Alagesan (1989) and Lawrance (2000).

Adopted village farmers were having high social participation, educational status and marketing behaviour. This might have made them to have high economic motivation which might have reflected in the higher mean value than that of the non-adopted village farmers.

4.1.12. Risk Orientation

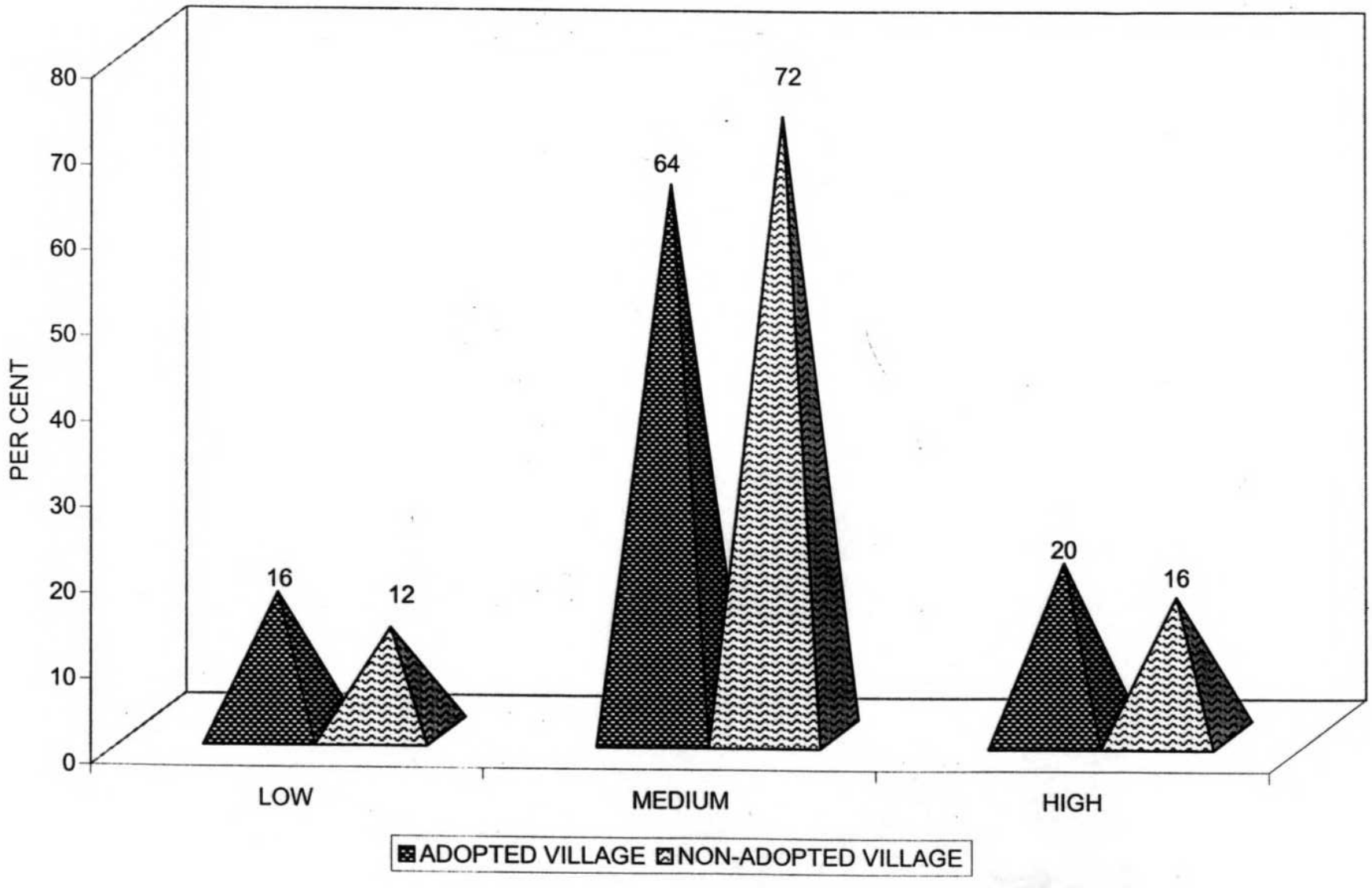
The distribution of respondents according to their risk orientation in adopted and non adopted village is presented in Table 16.

Table 16. Distribution of respondents according to their risk orientation

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	8	16.00	6	12.00	1.338^{NS}
2.	Medium	32	64.00	36	72.00	
3.	High	10	20.00	8	16.00	
	Total	50	100.00	50	100.00	
	Mean score	27.44		25.98		

NS – Non-significant

FIG.13.DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR RISK ORIENTATION



As seen from the table, nearly two-thirds (64.00%) of the adopted village farmers and nearly three-fourths (72.00%) of the non-adopted village farmers had medium level of risk orientation. One-fifth (20.00%) of the respondents from adopted village and nearly one-fifth (16.00%) of respondents from non-adopted village had high level of risk orientation, while it was nearly one-fifth (16.00%) in adopted village and more than one-tenth (12.00%) in non-adopted village had low level of economic motivation. This finding is on par with Rajkumar (1992) and Rosaiah (2002).

The mean scores were 27.44 and 25.98 for adopted and non-adopted village farmers respectively. It is inferred from the non-significant 't' value that the adopted and non-adopted village farmers did not differ in risk orientation. This finding derives support from the findings of Alagesan (1989) and Lawrance (2000).

From this it can be inferred that generally cotton cultivation involves lot of risk. In this study, whether the farmer is from adopted or non-adopted village, there was no variation in their risk orientation.

4.1.13. Scientific Orientation

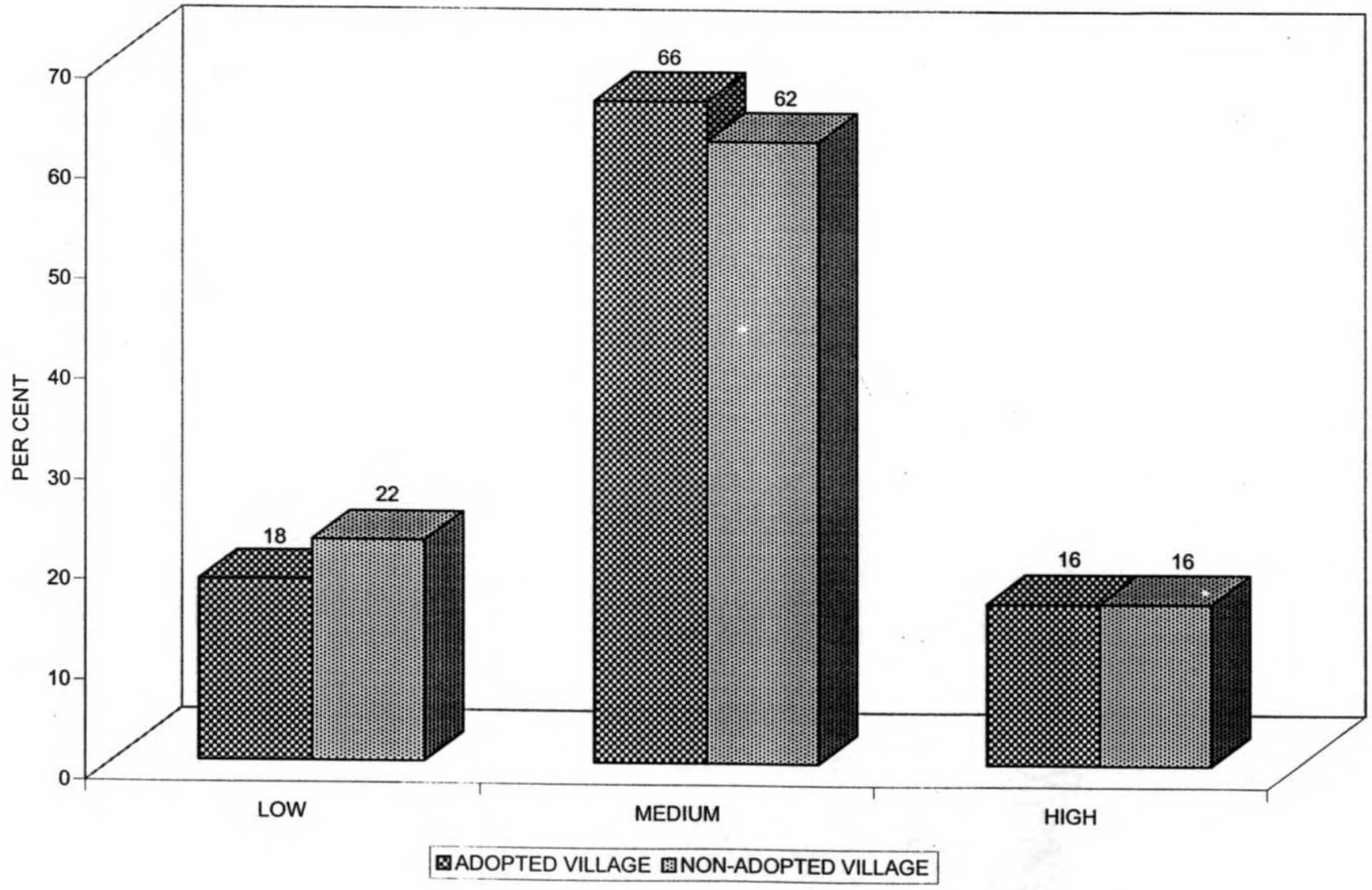
The distribution of respondents according to their scientific orientation in adopted and non-adopted village is presented in Table 17.

Table 17. Distribution of respondents according to their scientific orientation

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	9	18.00	11	22.00	4.559**
2.	Medium	33	66.00	31	62.00	
3.	High	8	16.00	8	16.00	
	Total	50	100.00	50	100.00	
	Mean score	28.22		25.28		

** Significant at 0.01 level of probability

FIG.14. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR SCIENTIFIC ORIENTATION



The data reveal that majority (66.00 and 62.00%) of adopted and non-adopted village farmers respectively had medium level of scientific orientation. Nearly one-fifth (18.00%) of adopted village and more than one-fifth (22.00%) of non-adopted village farmers had low level of scientific orientation, while equal proportion (16.00% each) of respondents had high level of scientific orientation in both the villages. This finding is on par with Krishnakumar (1996) and Kanimozhi (2001).

The mean scores were 28.22 and 25.28 for adopted and non-adopted village farmers respectively. The significant 't' value at 0.01 level of probability reveals that the two groups were different in their scientific orientation. This finding is in accordance with Rao (1988) and Lawrance (2000).

Adopted village farmers having more research contact, extension agency contact and mass media exposure might have resulted in more scientific orientation with the higher mean score than that of non-adopted village farmers.

4.1.14. Innovativeness

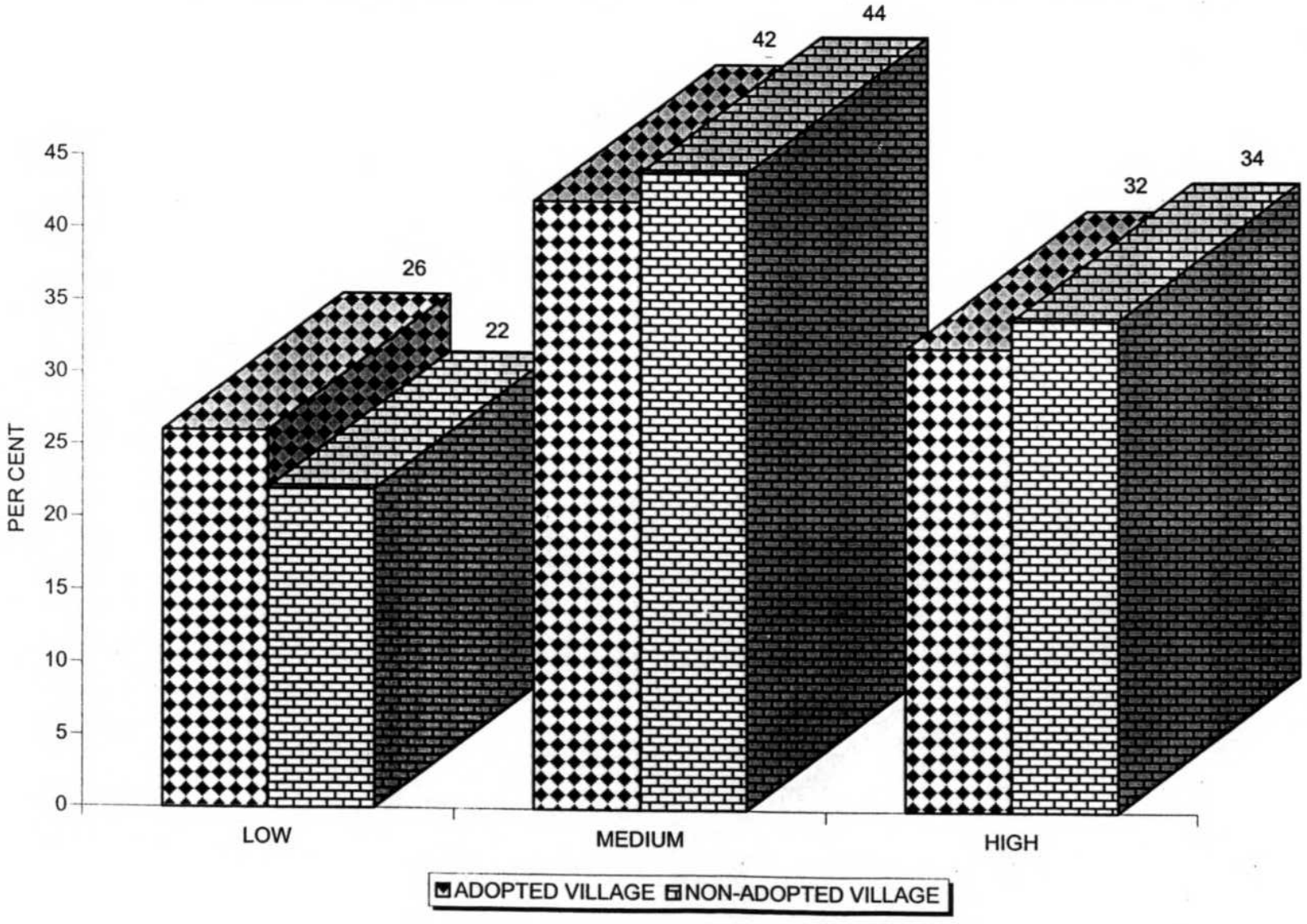
The distribution of respondents according to their innovativeness is presented in Table 18.

Table 18. Distribution of respondents according to their innovativeness

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	13	26.00	11	22.00	0.397^{NS}
2.	Medium	21	42.00	22	44.00	
3.	High	16	32.00	17	34.00	
	Total	50	100.00	50	100.00	
	Mean score	1.94		1.88		

NS – Non-significant

FIG.15. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR INNOVATIVENESS



It is interesting to see that more or less similar distribution (42.00 and 44.00%) of respondents were observed in medium and high (32.00% and 34.00%) levels of innovativeness in adopted and non adopted village farmers respectively, while slightly more than one-fourth (26.00%) of the adopted village farmers and little more than one-fifth (22.00%) of non-adopted village farmers had low level of innovativeness in both the cases. This finding is on par with Alagirisamy (1997) and Jayalakshmi (2000).

The mean scores were found to be 1.94 and 1.88 for adopted and non-adopted village farmers respectively. The 't' value was found to be non significant. This indicates that there was no difference in respect of innovativeness of the two groups of farmers. This finding is in contradiction with Lawrance (2000).

From this it can be inferred that both the groups of farmers might have strived hard to follow the cotton technology evenly for higher returns which might have reflected in no difference among them.

4.1.15. Progressiveness

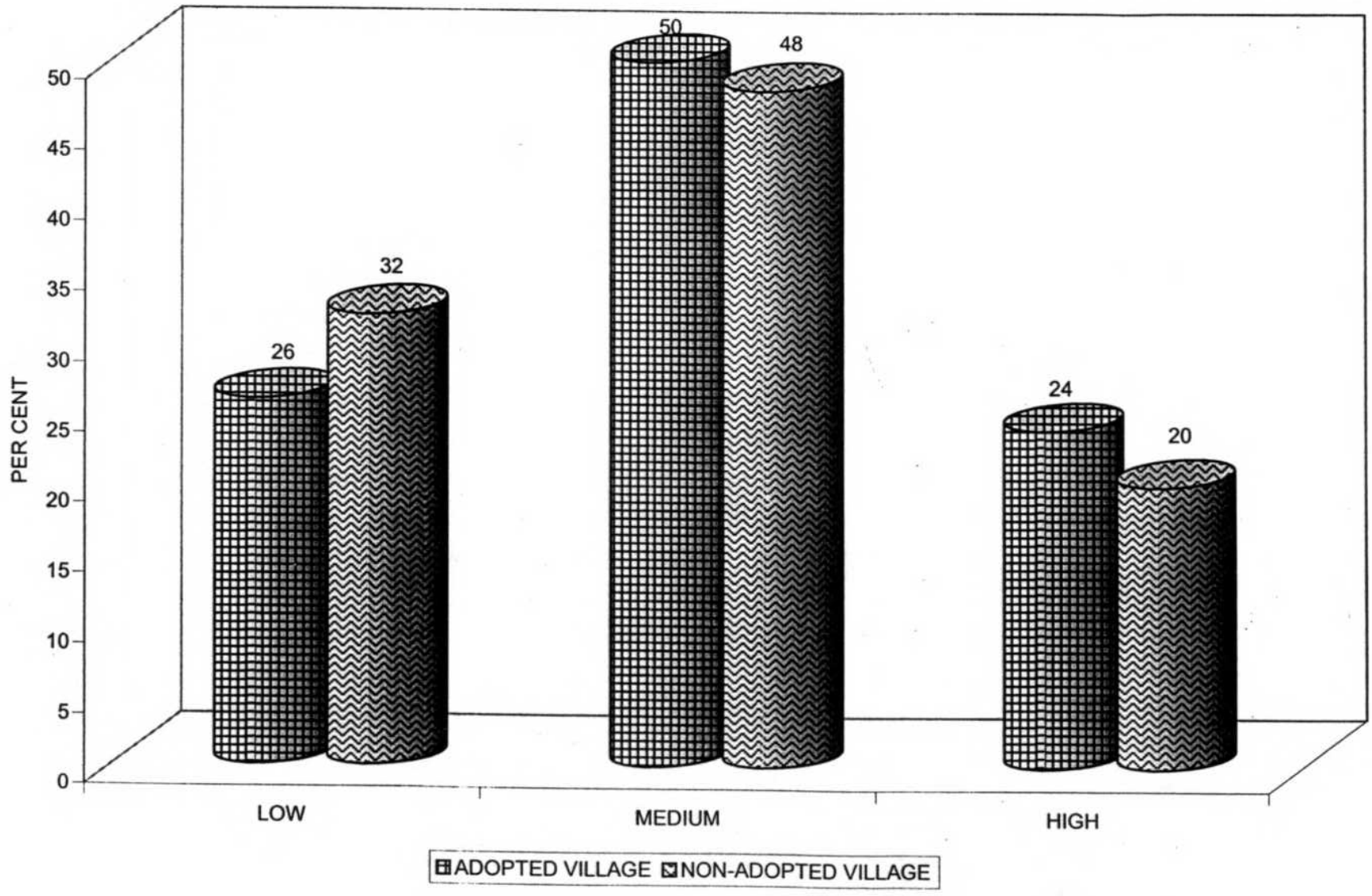
The distribution of respondents according to their progressiveness is presented in Table 19.

Table 19. Distribution of respondents according to their progressiveness

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	13	26.00	16	32.00	0.884^{NS}
2.	Medium	25	50.00	24	48.00	
3.	High	12	24.00	10	20.00	
	Total	50	100.00	50	100.00	
	Mean score	5.21		4.87		

NS – Non-significant

FIG.16. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR PROGRESSIVENESS



On perusal of the Table 19, it could be observed that half (50.00%) of the adopted village farmers and nearly half (48.00%) of non-adopted village farmers had medium level of progressiveness. It is further observed that slightly more than one-fourth (26.00%) of the adopted village farmers and nearly one-third (32.00%) of the non-adopted village farmers had low level of progressiveness, while nearly one-fourth (24.00%) of the adopted village farmers and one-fifth (20.00%) of the non-adopted village farmers had high level of progressiveness. This finding derives support from Kavitha (1998).

The mean progressiveness scores for adopted and non-adopted village farmers were found to be non-significant. This shows that there was no difference between adopted and non-adopted village farmers with respect to their progressiveness. This finding is in contradiction with Lawrance (2000).

From this it can be inferred that every one evenly compete to progress for their prosperity, which might be the reason for non-significant 't' value among the groups with respect to progressiveness.

4.1.16. Perception of adopters on Narasimha cotton technologies

The distribution of adopters according to their perception on Narasimha cotton is presented in Table 20.

Table 20 reveals that more than half (52.00%) of the adopted village farmers and nearly half (48.00%) of non-adopted village farmers have perceived that Narasimha cotton variety was useful, while equal proportion (36.00% each) of respondents from both the villages perceived Narasimha cotton variety was highly useful. It is further observed that an equal proportion (10.00% each) of respondents in both the villages were found under undecided category. Very few of the respondents (2.00 and 6.00% respectively) from adopted and non-adopted village perceived that Narasimha cotton was not a useful variety.

Table 20. Distribution of respondents according to their perception on Narasimha cotton

S. No	Category	Adopted village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Highly useful	18	36.00	18	36.00	0.517^{NS}
2.	Useful	26	52.00	24	48.00	
3.	Undecided	5	10.00	5	10.00	
4.	Not useful	1	2.00	3	6.00	
5.	Not at all useful	-	-	-	-	
	Total	50	100.00	50	100.00	
	Mean score	4.22		4.14		

NS – Non-significant

The mean perception scores on Narasimha cotton for adopted and non-adopted village farmers were found to be non-significant. This shows that there was no difference in respect of perception of adopters on Narasimha cotton variety between the two groups of farmers of adopted and non adopted villages.

Narasimha cotton being a high yielding variety, both the categories of farmers of the villages perceived that it can replace the existing varieties of cotton for higher yields and returns, which might have reflected in non-significant difference among the adopters of this cotton, in case of both the villages.

4.1.17. Marketing Behaviour

The distribution of respondents according to their marketing behaviour was computed and presented in Table 21.

FIG.17.DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR PERCEPTION OF ADOPTORS ON NARASIMHA COTTON TECHNOLOGIES

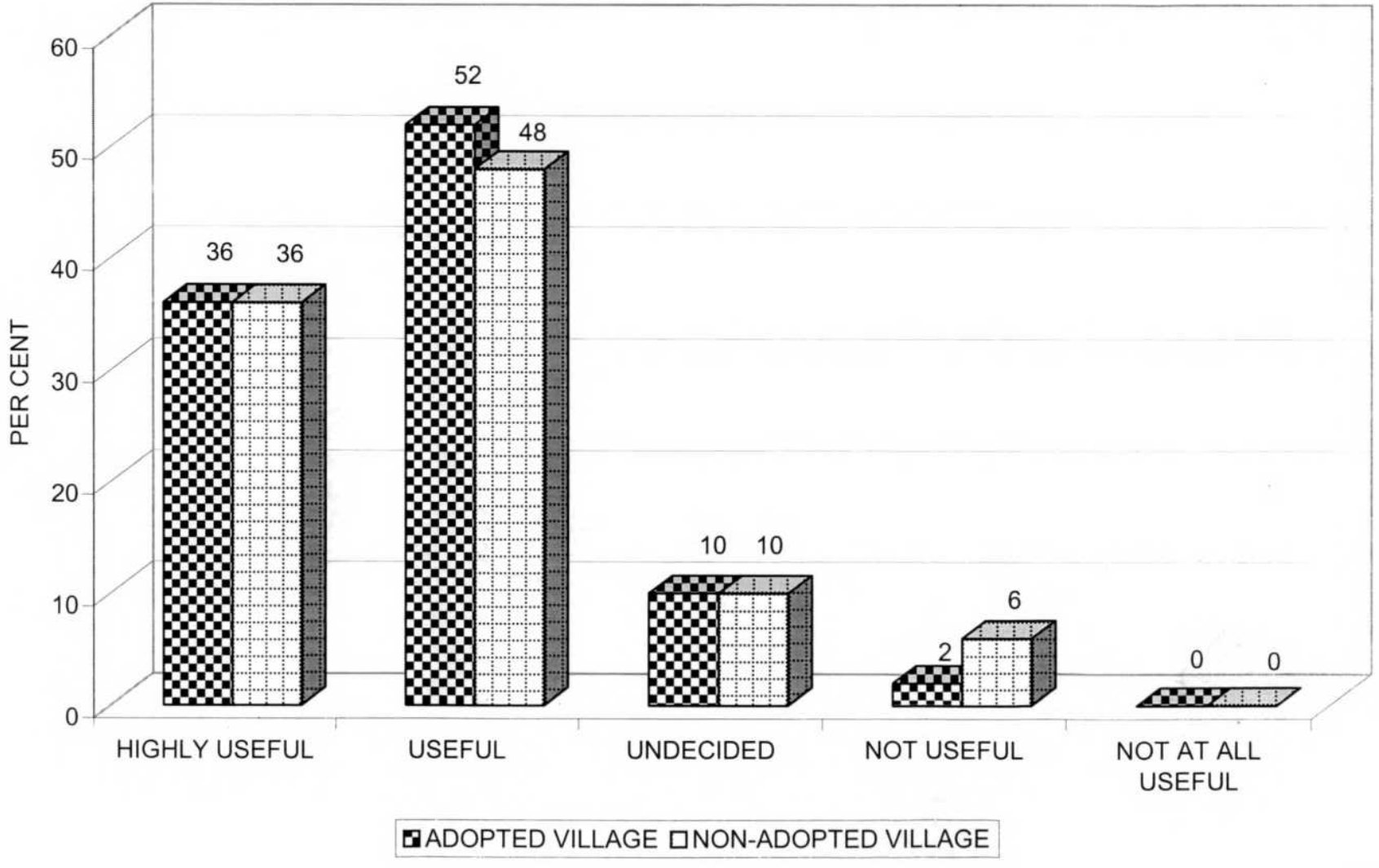


Table 21. Distribution of respondents according to their marketing behaviour

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	12	24.00	11	22.00	2.305*
2.	Medium	26	52.00	33	66.00	
3.	High	12	24.00	6	12.00	
	Total	50	100.00	50	100.00	
	Mean score	17.94		15.90		

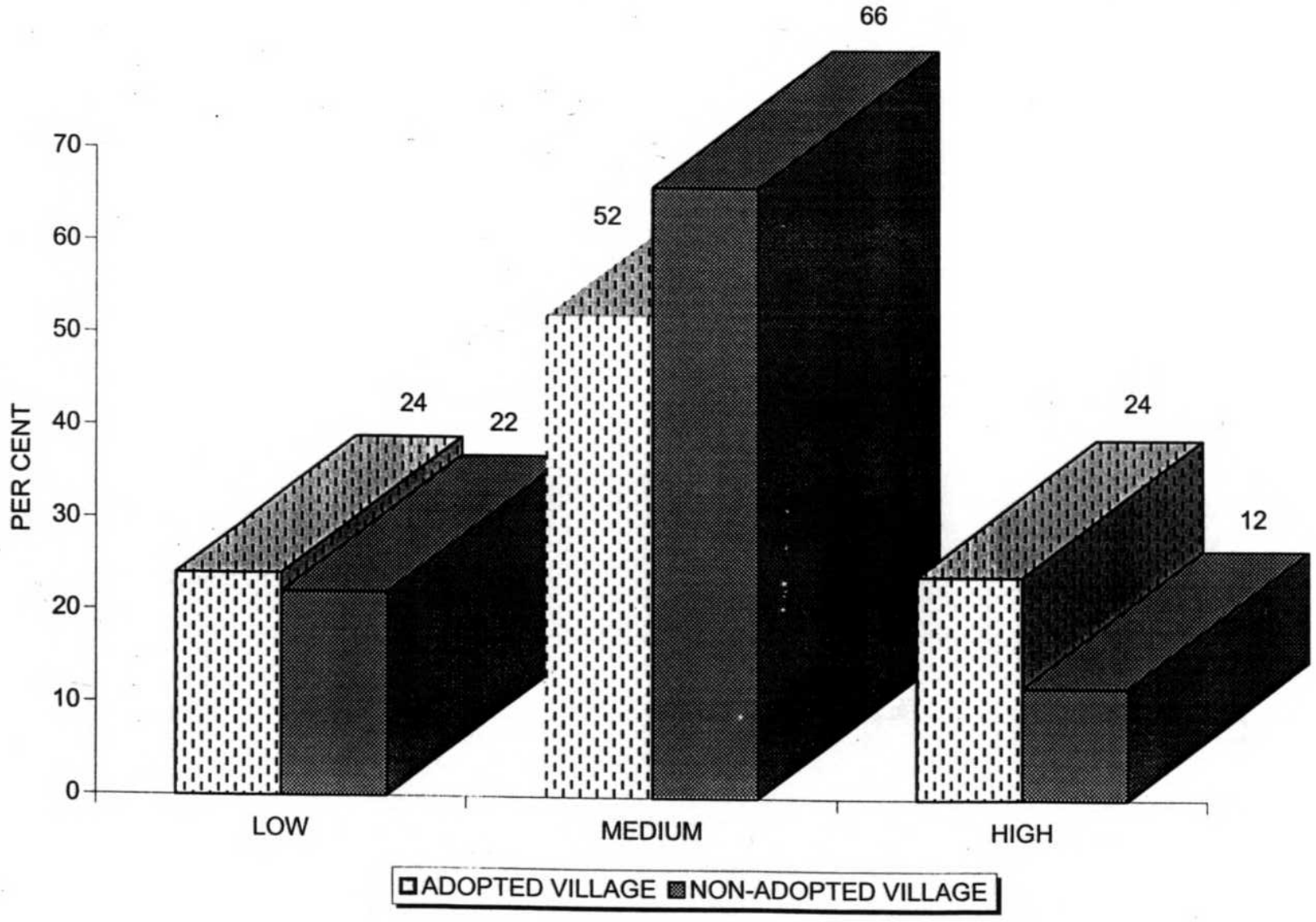
* Significant at 0.05 level of probability.

The data reveal that more than half (52.00%) of the respondents and two-thirds (66.00%) of respondents had medium level of marketing behaviour in adopted and non-adopted villages respectively. Nearly one-fourth (24.00%) of the adopted village farmers and more than one-fifth (22.00%) of the non-adopted village farmers had low level of marketing behaviour, while nearly one-fourth (24.00%) of the adopted village farmers and more than one-tenth (12.00%) of the non-adopted village farmers had high level of marketing behaviour. This finding derives support from Suganthi (1991) and Premavathi (1997).

The mean marketing behaviour scores for adopted and non-adopted village groups were 17.94 and 15.90 respectively. It can be inferred from the significant 't' value that the adopted and non-adopted village farmers have differed in respect of marketing behaviour. This finding is on par with Alagesan (1989) and Suganthi (1991).

Adopted village farmers had more research contact, contact with extension agency, mass media exposure and economic motivation, which might have made them to have better marketing behaviour which might have resulted in higher mean score. From this it can be stated that adopted village farmers had more marketing behaviour than the non-adopted village farmers.

FIG.18.DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR MARKETING BEHAVIOUR



The marketing behaviour of the cotton growers of adopted and non-adopted villages were studied with respect to nine items as given in Table 22.

The behaviour of cotton growers in both the cases revealed that they preferred to market their produce only when attractive price prevails.

It is also seen that all the respondents in both the villages did not use any packing material to take produce to the market. This finding is in accordance with Heddybai, (1994).

It is interesting to note that among the non-adopted village farmers about three-fourths (72.00%) of them used lorry to transport the produce, while it was one-fifth (20.00%) among adopted village farmers. But majority (82.00%) of the adopted village farmers use either tractor or lorry to transport the produce to market.

It is also noticed that all the farmers in the non-adopted village had sold the produce to the commission agent, while it was 88.00 per cent in the case of adopted village farmers. It is also interesting to note that more than one-tenth (12.00%) from the adopted village had marketed through regulated market and to the ginning factory directly. This is one of the welcoming features in the process of marketing among the adopted village farmers. This finding is on par with Sakthivel (1979), Heddybai (1994) and Alagirisamy (1997).

In respect of the place of sale of produce, about three-fourths (72.00%) of the non-adopted village farmers preferred locally, while in the adopted village about one-third (36.00%) of respondents preferred to sell the produce either in near by town or in distant town for fetching better price. This finding derives support from Palaniswamy (1978) and Sakthivel (1979).

Table 22. Item-wise marketing behaviour of Narasimha cotton growers

S. No	Item	Category	Adopted village farmers (n=50)		Non-adopted village farmers (n = 50)	
			Number	Per cent	Number	Per cent
1.	**Nature of Marketing**	After each picking is over	11	22.00	7	14.00
		When all pickings are completed	9	18.00	10	20.00
		When cash is needed after completing pickings	9	18.00	8	16.00
		When attractive price prevails	21	42.00	25	50.00
2.	**Packing Material**	No packing	50	100.00	50	100.00
		Jute gunny bag	-	-	-	-
		Polythene gunny bag	-	-	-	-
3.	**Means of Transport**	Bullock cart	9	18.00	14	28.00
		Tractor	31	62.00	-	-
		Lorry	10	20.00	36	72.00
4.	**Person to whom sold**	Commission agents	44	88.00	50	100.00
		Ginning factory	4	8.00	-	-
		Regulated market	2	4.00	-	-
5.	**Place of Sale**	Locally	32	64.00	36	72.00
		Nearby town	10	20.00	14	28.00
		Distant towns	8	16.00	-	-
6.	**Terms and Conditions**	Credit Sale	13	26.00	9	18.00
		Partly cash and partly credit	9	18.00	8	16.00
		Cash and carry	14	28.00	29	58.00
		Partly advance payment	6	12.00	4	8.00
		Full advance payment	8	16.00	-	-

S. No	Item	Category	Adopted village farmers (n=50)		Non-adopted village farmers (n = 50)	
			Number	Per cent	Number	Per cent
7.	Opinion about the existing market facility	Insufficient	16	32.00	48	96.00
		Sufficient	33	66.00	2	4.00
		Quite sufficient	1	2.00	-	-
8.	Opinion about prevailing market price	Very low	33	66.00	49	98.00
		Low	17	34.00	1	2.00
		Medium	-	-	-	-
		High	-	-	-	-
		Very high	-	-	-	-
9a.	Method of grading	By removing reminance of bracts from kapas	10	20.00	24	48.00
		By removing insect damaged kapas	23	46.00	18	36.00
		Based on staple length	17	34.00	8	16.00
9b	Opinion about present method of grading	Insufficient	18	36.00	50	100.00
		Sufficient	28	56.00	-	-
		Quite sufficient	4	8.00	-	-

Under terms and conditions of selling the produce, more than half (58.00%) of the non-adopted village farmers preferred cash and carry basis, while it was only 28.00 per cent among adopted village farmers. There are cases among the adopted village farmers, who sold the produce on receipt of full advance payment which was not seen among non-adopted village farmers.

Two thirds (66.00%) farmers from the adopted village had opined that the prevailing market facility was sufficient while most of the non-adopted village farmers expressed that marketing facility available at present was insufficient. Both the groups of farmers opined that the prevailing market price was very low.

With respect to the method of grading of the produce, about half (46.00 percent) of the adopted village farmers followed removing the insect damaged kapas, while it was 36.00 per cent among the non-adopted village farmers. About half (48.00%) of the non-adopted village farmers followed removing the reminance of bracts from the kapas.

All the non-adopted village farmers and one-thirds (36.00%) from adopted village farmers perceived that the present system of grading was insufficient. It is also interesting to note that more than half (56.00%) of the adopted village farmers expressed that the present system of grading was sufficient.

The marketing behaviour of Narasimha cotton growers of adopted village revealed that, marketing the produce at the time of attractive price, by transporting through tractor, selling it through commission agents locally, on cash and carry basis was more promising. In the opinion of the farmers, the existing marketing facility was sufficient (66.00%) but the market price offered to them was very low (66.00%). They felt that present method of grading was sufficient (56.00%).

Among the non-adopted village farmers, the marketing nature was similar to that of adopted village farmers (50.00 percent). But they used lorry for transport of the kapas (72.00 per cent) which is higher than that of adopted village farmers. This was because of the pooling of the produce by the farmers and transporting it through lorry due to terrain situation and far away from Nandyal town as observed by the researcher. The sale of produce was mainly to the local commission agents (72.00%) and on cash and carry basis (58.00%). The non-adopted village farmers were also of the opinion that the market facility which existed at present was insufficient with very low prevailing market price (98.00%) and insufficient grading facility (100.00%).

This leads to conclude that the adopted village farmers were favoured with the marketing behaviour of selling the produce in the regulated market and ginning factory directly either in nearby towns or distant town, transporting through either tractor or lorry without packing the kapas when attractive price prevailed on cash and carry basis. In the non-adopted village, their marketing behaviour is comparatively less as was seen in the less mean score in Table 21.

4.1.18. Feedback Pattern

The distribution of respondents according to their feedback pattern is presented in Table 23.

Table 23 reveals that nearly half (46.00%) of the adopted village farmers and nearly two-thirds (64.00%) of the non-adopted village farmers were giving feedback to A.E.O., while nearly one-fourth (24.00%) of adopted village farmers and more than one-third (36.00%) of non-adopted village farmers were giving feedback to A.O. It is further observed that more than one-fourth (28.00%) of adopted village farmers were giving feedback to R.A.R.S. scientists and the least proportion (2.00%) of respondents were giving feedback to A.D.A and none of the non-adopted village farmers were giving feedback to R.A.R.S scientists and A.D.A. This finding derives support from Kalaichelvan (1984).

Table 23. Distribution of respondents according to their feedback pattern

S. No	Category	Adopted village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	R.A.R.S. Scientists	14	28.00	-	-	
2.	A.D.A.	1	2.00	-	-	
3.	A.O.	12	24.00	18	36.00	4.326**
4.	A.E.O.	23	46.00	32	64.00	
	Total	50	100.00	50	100.00	
	Mean score	3.24		1.36		

** Significant at 0.01 level of Probability

The mean scores for feedback pattern were 3.24 and 1.36 for adopted and non-adopted village farmers respectively. Highly significant 't' value indicates that the two groups were different in respect of feedback pattern.

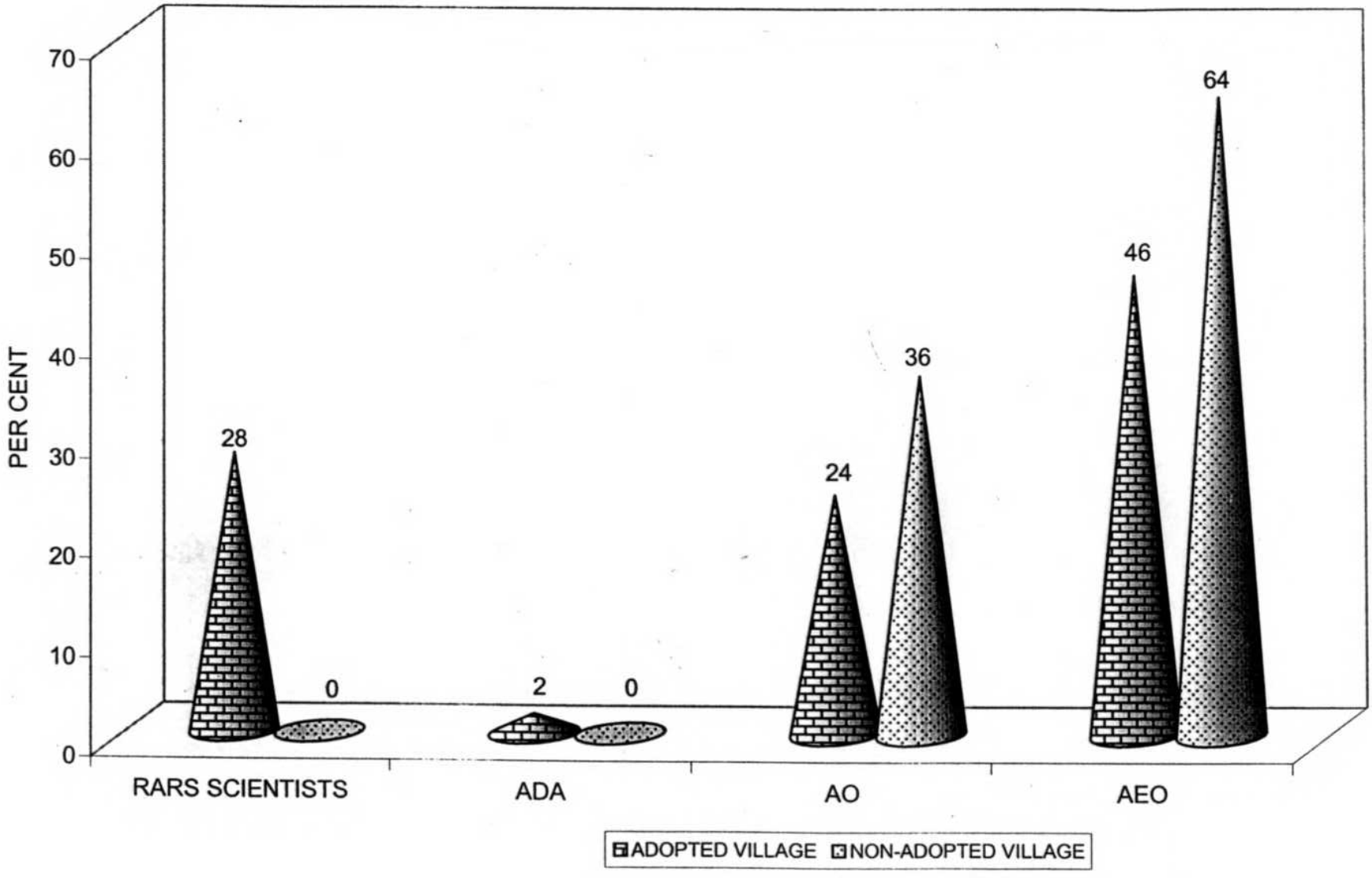
With respect to feedback pattern, adopted village farmers were different from non-adopted village farmers since they were more educated with more contacts with research scientists and extension agency personnel which might have reflected in better feedback pattern among the adopted village farmers.

4.2. Item-wise and overall information source use behaviour of Narasimha cotton growers in adopted and non-adopted village

4.2.1. Item-wise information source use behaviour of Narasimha cotton growers

In gaining awareness of the Narasimha cotton production technology, farmers have used different sources of information *viz*.., personal localite, personal cosmopolite and impersonal cosmopolite sources. Under these sources the respondents were studied

FIG.19.DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR FEEDBACK PATTERN



for the frequency, adequacy, timeliness and credibility of information received under each sub item. The scores thus obtained were pooled and the mean score for each sub item under each source was worked out, ranked and presented for both adopted and non-adopted villages separately in Table 24.

Table 24. Item-wise information source use behaviour of Narasimha cotton growers

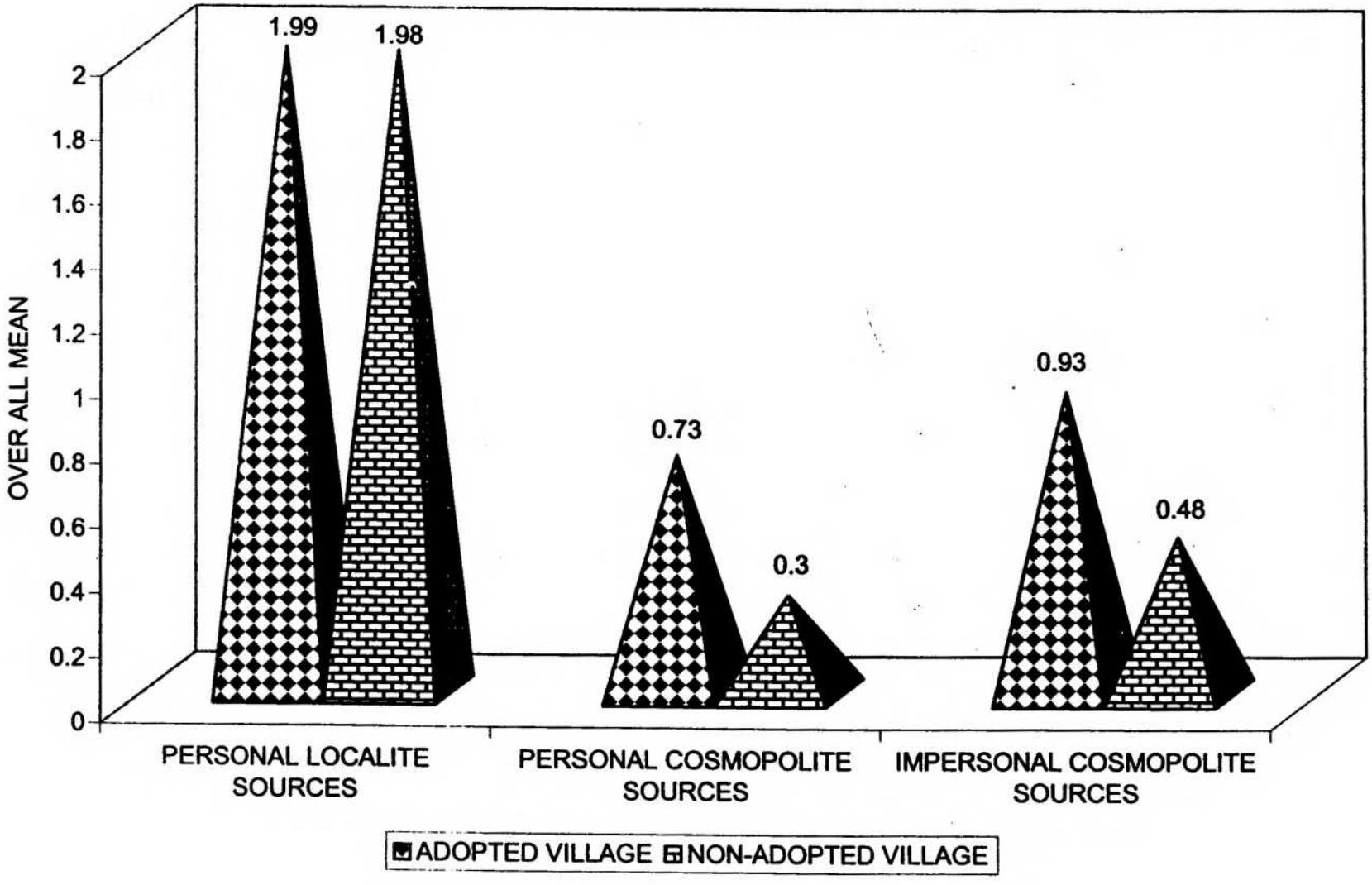
S. No	Information Sources / Channels	Mean scores of			
		Adopted village farmers (n = 50)	Rank	Non-adopted village farmers (n = 50)	Rank
I	**Personal Localite**				
1.	Family members	2.31	IV	2.12	V
2.	Friends	2.32	III	2.19	IV
3.	Neighbours	2.23	V	2.10	VI
4.	Relatives	1.75	VII	2.46	II
5.	Contact farmers / Progressive farmers	2.43	II	2.38	III
6.	Input dealers	2.62	I	2.62	I
7.	Village local leaders	1.96	VI	1.55	VII
8.	Recorded personal experience	0.30	VIII	0.44	VIII
	Over all mean score	1.99		1.98	
II	**Personal Cosmopolite**				
1.	R.A.R.S. Scientists	1.90	III	-	-
2.	K.V.K. Scientists	0.48	IX	-	-
3.	D.A.A.T.T. Centre scientists	0.11	XI	-	-
4.	F.T.C. personnel	0.24	X	-	-
5.	Staff of State Department of Agriculture	1.94	II	1.80	I
6.	A.Os of Nationalized Bank	0.04	XIV	-	-
7.	Input agency personnel	2.16	I	1.19	II
8.	Extension personnel of other development departments	0.02	XV	-	-

(Contd...)

S. No	Information Sources / Channels	Mean scores of			
		Adopted village farmers (n = 50)	Rank	Non-adopted village farmers (n = 50)	Rank
9.	NGOs	0.02	XV	-	-
10.	Office Call	0.50	VIII	0.92	III
11.	Demonstration	1.09	V	0.40	V
12.	Study tour / field trip	0.61	VII	-	-
13.	Group meeting / discussion	1.01	VI	0.43	IV
14.	Campaigns	0.07	XII	-	-
15.	Personal letter	0.06	XIII		
16.	Training	1.49	IV	0.10	VI
Overall mean score		0.73		0.30	
III	**Impersonal Cosmopolite**				
1.	Farm broadcast	2.35	I	1.83	I
2.	Farm telecast	2.07	II	1.17	II
3.	Leaflets and folders	0.85	V	0.35	IV
4.	Agricultural magazines / bulletins	0.73	VI	0.14	V
5.	Agricultural films	0.53	VII	0.10	VI
6.	Posters / charts	1.05	IV	0.86	III
7.	Circular letters	0.05	IX	-	-
8.	Field boards	0.12	VIII	-	-
9.	Agricultural exhibition	1.51	III	0.35	IV
10.	Recorded Cassette	0.04	X	-	-
Overall mean score		0.93		0.48	

From Table 24 it can be seen that under eight personal localite sources among adopted village farmers, input dealers was ranked as first followed by contact farmers / progressive farmers with second rank. Friends, family members and neighbours were in the order of third, fourth and fifth. In the case of non-adopted village farmers, the order of ranking for information source used were input dealers, relatives, contact farmers / progressive farmers, friends and family members. In both the groups of farmers, recorded personal experience was in the order of last rank. This finding is in contradiction with that of Kavitha (1998).

FIG.20. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR OVER ALL MEAN SCORE OF INFORMATION SOURCE USE BEHAVIOUR



Among 16 personal cosmopolite sources, adopted village farmers used input agency personnel as the first ranked source followed by staff of State Department of Agriculture, R.A.R.S. scientists, training and demonstration in that order. But the non-adopted village farmers used staff of State Department of Agriculture as the first ranked source followed by input agency personnel, office call, group meeting / discussion and demonstration in that order. It is also interesting to note that of the 16 sources, the non-adopted village farmers had used only six sources as seen from the table, with training as the last ranked one. This finding is in line with Helen (1992).

Among 10 impersonal cosmopolite sources, all the 10 were used by adopted village farmers, while it was only seven among non-adopted village farmers, excluding circular letters, field boards and recorded cassette. Among those sources utilised by adopted village farmers, farm broadcast ranked first followed by farm telecast, agricultural exhibition, posters / charts and leaflets and folders in that order. But in the case of non-adopted village farmers the first two rankings were similar to that of adopted village farmers, while posters / charts, leaflets and folders and agricultural exhibition were in the order of third, fourth and fifth rankings. This finding derives support from Jayaraman (1988), Singh and Kalra (1993) and Kavitha (1998).

In both adopted and non-adopted villages, input dealers were the main source among personal localite sources since farmers generally used to meet them for purchasing of inputs during which time they get information also. This might be the reason for the first ranking. Progressive farmers / contact farmers in the adopted village play a major role, since their access to the information may be easy. It was also observed by the researcher that few farmers in the adopted village served as Z.R.E.A.C. members of the R.A.R.S., Nandyal through whom the cotton technology might have diffused into the system. Some of the progressive farmers had also acted as seed growers as was observed

by the researcher. Hence, this might have acquired second ranking among personal localite sources. Similarly among non-adopted village farmers, relatives ranked second since most of the non-adopted village farmers had their relatives in the adopted village, through whom the information might have diffused into the non-adopted village, gaining second rank as was observed by the researcher.

Among personal cosmopolite sources, input agency personnel were ranked as first by adopted village farmers, may be because of the proximity of village to the Nandyal town, which might have had more access for frequent contacts and to exchange information. In the case of non-adopted village, only the state department extension personnel had played a major role in providing timely, adequate and credible information due to their regular visits through office call, group discussion and demonstration. This is how the state department staff would have gained the first rank in providing the information to the non-adopted village farmers. But in the adopted village it gained second rank, may be because of the reason that they had the influence of the other institutions like R.A.R.S., Nandyal through training and demonstrations.

Among 10 impersonal cosmopolite sources, the mass media *viz..*, farm broadcast and farm telecast were the main sources of information for both the adopted and non-adopted village farmers as was seen from the Table 24. This was because of the agricultural programmes given daily by the State Agricultural University and the State Department of Agriculture through AIR *viz..*, *Rythulaku Vyavasaya Soochanalu* and *Polam Kaburlu* respectively. Similarly in farm telecast through Doordarshan and EENADU Television (ETV), daily agricultural programmes like *Grama Darshini* and *Annadata* respectively. In the adopted village, agricultural exhibition, posters and charts and printed material had also played a major role to the cotton growers. Similar trend was also seen in the non-adopted village.

4.2.2. Overall information source use behaviour of Narasimha cotton growers

The distribution of respondents according to information source use index involving personal localite, personal cosmopolite and impersonal cosmopolite were worked out and the overall information source use index for adopted and non-adopted village was worked out and presented in Table 25.

Table 25. Distribution of respondents according to their overall information source use behaviour

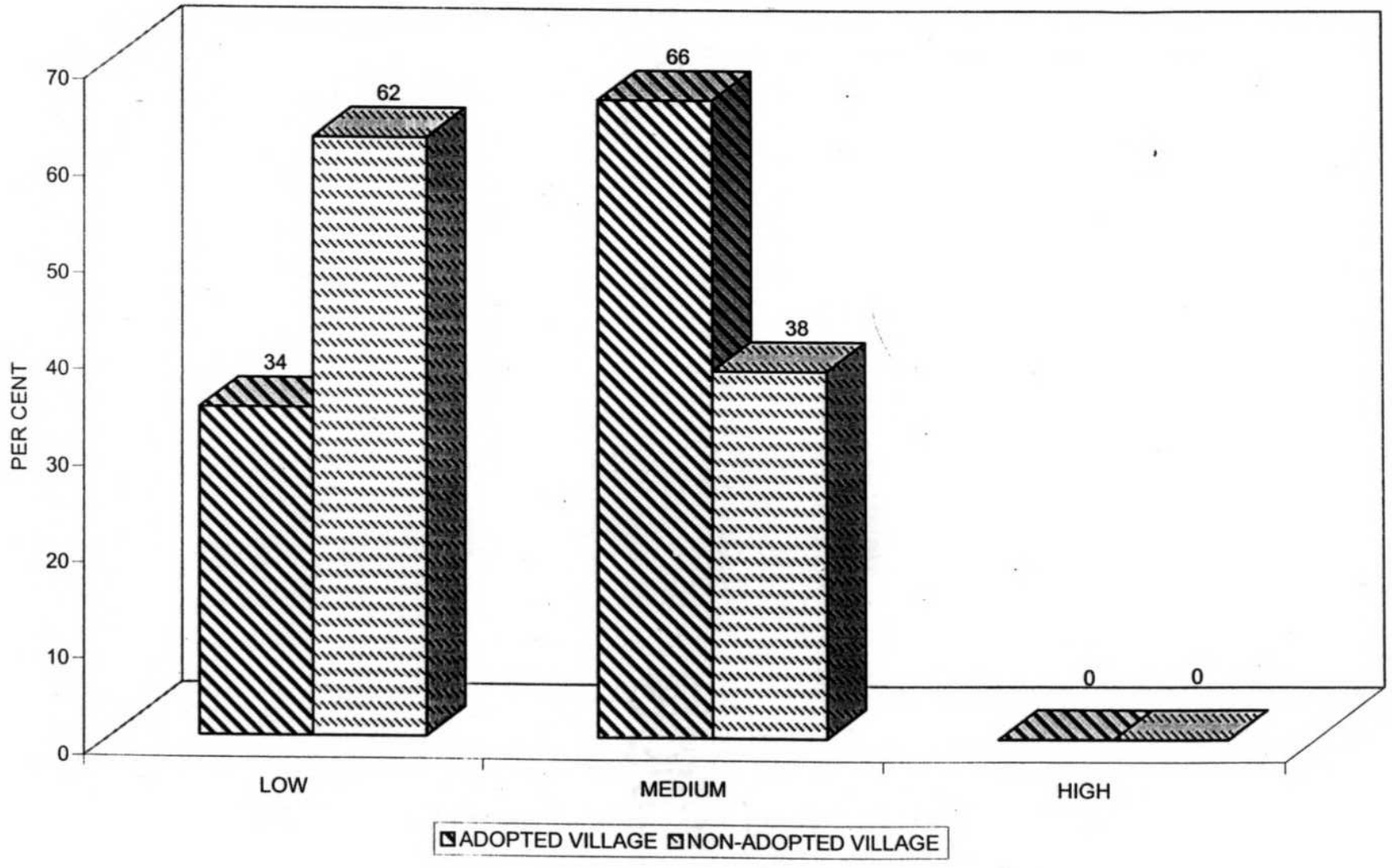
S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	17	34.00	31	62.00	3.373**
2.	Medium	33	66.00	19	38.00	
3.	High	-	-	-	-	
	Total	50	100.00	50	100.00	
	Mean score	39.49		30.74		

** Significant at 0.01 level of probability

Table 25 reveals that two-thirds (66.00%) of adopted village farmers and more than one-third (38.00%) of non-adopted village farmers had medium level of information source use behaviour, while little more than one-third (34.00%) of adopted village farmers and nearly two-thirds (62.00%) of non-adopted village farmers had low level of information source use behaviour. None of the respondents were observed in high category in both the groups. This finding is in line with Karthikeyan (1997).

The mean scores for information source use behaviour were 34.49 and 30.74 for adopted and non-adopted village farmers respectively. Highly significant 't' value indicates that the two groups were different in respect of information source use behaviour indicating that adopted village farmers had more information source contact than that of non-adopt village farmers.

FIG.21. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR OVER ALL INFORMATION SOURCE USE BEHAVIOUR



This could be interpreted that adopted village farmers having high educational status, more research and extension agency contact, mass media exposure, high scientific orientation and marketing behaviour might have made them to have more information source contact than that of non-adopted village farmers.

4.3. Item-wise and overall knowledge of adopted and non-adopted village Narasimha cotton growers on Narasimha cotton technology

4.3.1. Item-wise knowledge among adopted and non-adopted village farmers on Narasimha cotton technology

To study the knowledge level of Narasimha cotton production technology among adopted and non-adopted village farmers, 15 knowledge items were administered and their knowledge levels were studied and presented item-wise as given below in Table 26.

From the Table 26, it could be seen that among the adopted village farmers about three-fourths of them had knowledge on Narasimha cotton which fall under the category of American cotton (72.00%), quantity of fungicide for seed treatment (74.00%), research station which developed the variety (76.00%) and time of bollworm control (80.00%). About half of them had knowledge on quantity of nitrogen for top dressing (42.00%), important disease in cotton (44.00%), pesticide dosage to control whitefly (46.00%), fungicide used for seed treatment (46.00%), basal dosage of phosphorus application (46.00%), pesticide dosage to control sucking pests (48.00%), number of pesticide sprayings to control sucking pests (52.00%), quantity of pesticide spray fluid required for bollworm control (52.00%) and time of sucking pests control (60.00%) in that order. Above one-third of them had knowledge on basal dose of nitrogen application and pesticide used to control whitefly (38.00% each).

Among the non-adopted village farmers about three-fourths of them had knowledge on dosage of fungicide for seed treatment (70.00%) and time of boll worm control (80.00%).

Table 26. Item-wise knowledge level of Narasimha Cotton growers

S. No	Item	Adopted village farmers (n = 50)		Non-adopted village farmers (n = 50)	
		Number	Per cent	Number	Per cent
1.	Category of Narasimha cotton	36	72.00	23	46.00
2.	Research station which developed the Narasimha cotton	38	76.00	31	62.00
3.	Seed treatment with fungicide	23	46.00	13	26.00
4.	Dosage of seed treatment fungicide	37	74.00	35	70.00
5.	Basal dosage of nitrogen application	19	38.00	15	30.00
6.	Basal dosage of phosphorus application	23	46.00	23	46.00
7.	Quantity of nitrogen for top dressing	21	42.00	10	20.00
8.	Time of sucking pests control	30	60.00	24	48.00
9.	Dosage of pesticide for sucking pest control	24	48.00	8	16.00
10.	Number of pesticide sprayings to control sucking pests	26	52.00	24	48.00
11.	Pesticide used to control whitefly	19	38.00	7	14.00
12.	Dosage of pesticide for whitefly control	23	46.00	21	42.00
13.	Time of Bollworm control	40	80.00	40	80.00
14.	Quantity of pesticide spray fluid required for boll worm control	26	52.00	32	64.00
15.	Important disease in cotton	22	44.00	24	48.00

About two-thirds of them had knowledge on research station which developed the variety (62.00%) and quantity of pesticide spray fluid required for boll worm control (64.00%) in that order. About half of them had knowledge on dosage of pesticide for whitefly control (42.00%), Narasimha cotton which fall under the category of American cotton and basal dosage of phosphorus application (46.00% each), time of control of

sucking pests, number of pesticide sprayings to control sucking pests and important disease in cotton (48.00% each) in that order. Less than one-third of them had knowledge on pesticide used to control whitefly (14.00%), pesticide dosage to control sucking pests (16.00%), quantity of nitrogen for top dressing (20.00%), fungicide used for seed treatment (26.00%) and basal dosage of nitrogen application (30.00%) in that order.

From the Table 26, it can be inferred that both adopted and non-adopted village farmers had same level of knowledge with respect to time of bollworm management which is a major pest in cotton production. But surprisingly it was noticed that among non-adopted village farmers the knowledge on the quantity of pesticide spray fluid required for boll worm management was more than the adopted village farmers which might be due to the fact that they did not want to use more chemical as that of adopted village farmers, involving more money. In the absence of knowledge in this aspect they could not take a good crop, might be the reason for their knowledge in this aspect among both the groups of the farmers.

Similarly, seed treatment with fungicide with correct dose, to curtail seed borne diseases at a cheaper cost in the initial stage itself, might be the reason in which about three-fourths of the respondents had knowledge in both the groups.

To get higher yield in any crop, farmers must know the variety and the source, which is a pre-requisite to procure the material and to raise a crop for more returns. This is how two-thirds of the farmers in both the villages might have had knowledge about Narasimha cotton and RARS, Nandyal research station, which developed the variety.

With respect to specific fungicide used for seed treatment, the adopted village farmers had comparatively more knowledge (46.00%) than non-adopted village farmers (26.00%) which could be attributed for the influence of the research station since it has been adopted.

In the case of fertilizer application items, with respect to nitrogen in both basal and top dressing, more number of adopted village farmers had knowledge than that of the non-adopted village farmers.

It is imperative that in cotton, sucking pests management is the prime factor for better growth of the crop. The knowledge on time of sucking pests occurrence and their control with specific pesticide, among farmers of adopted village were more than the non-adopted village farmers. Similar trend was noticed in pesticide use to control whitefly also.

With respect to knowledge on important cotton disease (blackarm) the non-adopted village farmers (48.00%) had more knowledge than adopted village farmers (44.00%). This is because of more prevalence of disease in non-adopted village than the adopted village.

4.3.2. Overall knowledge level of respondents on Narasimha cotton cultivation

Knowledge is the pre-requisite for acceptance and adoption of any innovation. Hence, the knowledge level of the farmers on the Narasimha cotton cultivation practices was assessed for the adopted and non-adopted village farmers and they were categorised and presented below.

Table 27 reveals that more than one-third (38.00%) of adopted village farmers and more than half (52.00%) of the non-adopted village farmers had medium level of knowledge. It is further observed that nearly one-third (32.00%) of adopted village farmers and the least proportion (6.00%) of non-adopted village farmers had high level of knowledge, while 30.00 per cent of adopted village farmers and 42.00 per cent of non-adopted village farmers had low level of knowledge. This finding derives support from Dharmalingam (1990), Ponkathaperumal (1994) and Venkatesan (2000).

Table 27. Distribution of respondents according to their overall knowledge level

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	15	30.00	21	42.00	1.973*
2.	Medium	19	38.00	26	52.00	
3.	High	16	32.00	3	6.00	
	Total	50	100.00	50	100.00	
	Mean score	53.60		43.87		

* Significant at 0.05 level of probability.

The mean scores of knowledge for adopted and non-adopted village farmers were 53.60 and 43.87 respectively. The significant 't' value indicates that the adopted village farmers were having more knowledge on Narasimha cotton cultivation practices than the non-adopted village farmers. This finding is on par with Rao (1988) and Alagesan (1989).

The high level of knowledge in the case of adopted village farmers is quite easily understandable because of their more disposition to research contact, extension agency contact, exposure to mass media and scientific orientation. This is how the higher mean score of the adopted village farmers for their knowledge over the non-adopted village farmers can be explained.

4.4. Recommended practice-wise and overall extent of adoption of Narasimha cotton production technology by Narasimha cotton growers of adopted and non-adopted villages

4.4.1. Recommended practice-wise adoption of Narasimha cotton production technology by the Narasimha cotton growers of adopted and non-adopted villages

To study the 21 recommend practices in Narasimha cotton production by both the adopted and non-adopted village farmers, the adoption behaviour was studied on three levels *viz*., full adoption, partial adoption and non-adoption and were presented in Table 28.

FIG.22. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR OVER ALL KNOWLEDGE LEVEL

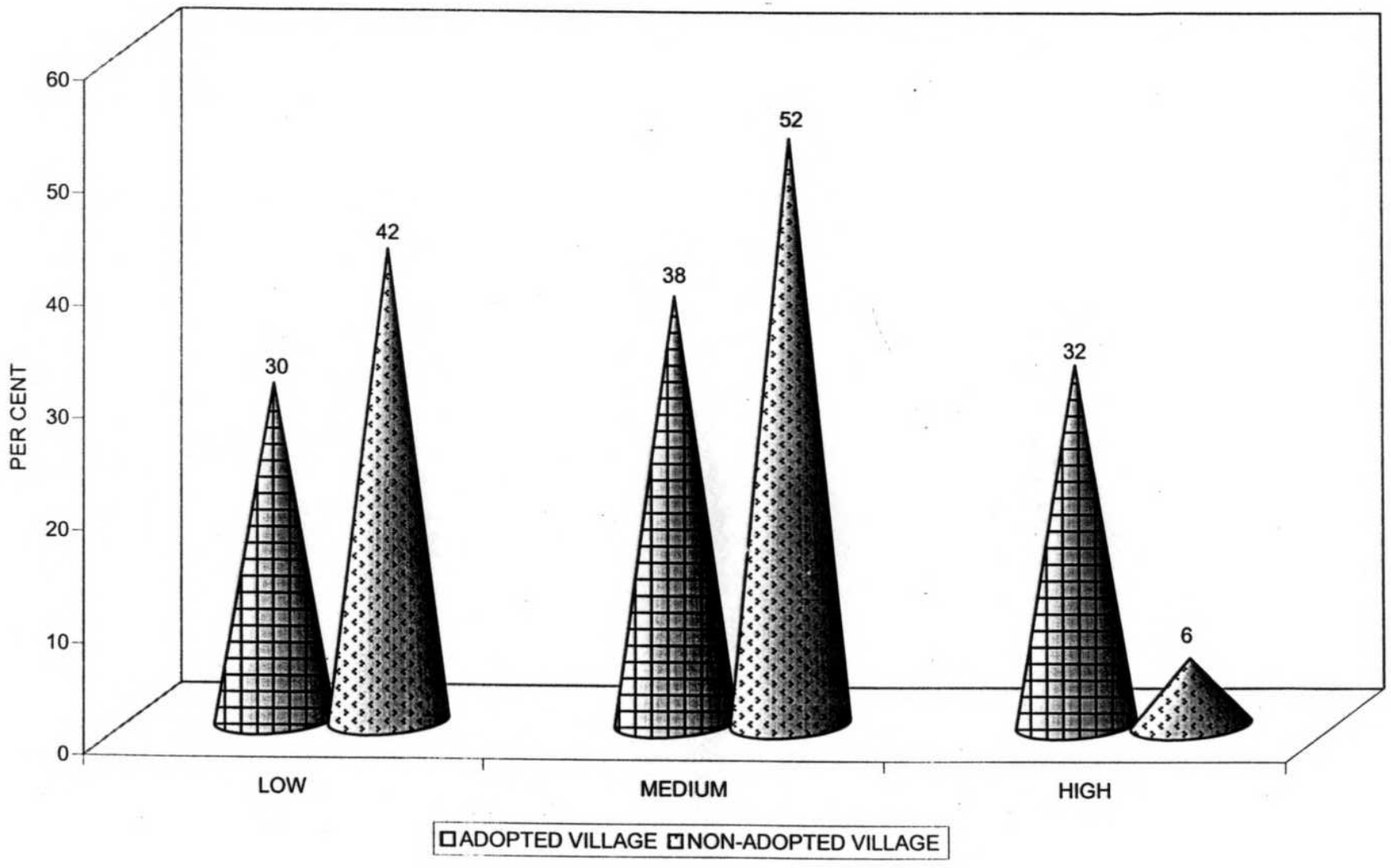


Table 28. Recommended Practice-wise Adoption level of Narasimha cotton growers

S. No	Recommended Practice	Adopted village farmers (n = 50)						Non-adopted village farmers (n = 50)					
		Full adoption		Partial adoption		Non-adoption		Full adoption		Partial adoption		Non-adoption	
		No.	%	No	%	No.	%	No	%	No.	%	No	%
1.	Ploughing	50	100.00	0	0.00	0	0.00	42	84.00	8	16.00	0	0.00
2.	Application of FYM	12	24.00	26	52.00	12	24.00	12	24.00	24	48.00	14	28.00
3.	Seed rate	26	52.00	24	48.00	0	0.00	11	22.00	39	78.00	0	0.00
4.	Seed sowing time	12	24.00	38	76.00	0	0.00	6	12.00	44	88.00	0	0.00
5.	Acid delinting	0	0.00	4	8.00	46	92.00	0	0.00	0	0.00	50	100.00
6.	Seed treatment	0	0.00	28	56.00	22	44.00	5	10.00	19	38.00	26	52.00
7.	Spacing	20	40.00	30	60.00	0	0.00	1	2.00	48	96.00	1	2.00
8.	Time of thinning	14	28.00	36	72.00	0	0.00	5	10.00	44	88.00	1	2.00
9.	Time of first weeding	12	24.00	38	76.00	0	0.00	5	10.00	44	88.00	1	2.00
10.	Time of second weeding	6	12.00	43	86.00	1	2.00	0	0.00	48	96.00	2	4.00
11.	Basal application of nitrogen	1	2.00	49	98.00	0	0.00	0	0.00	15	30.00	35	70.00
12.	Basal application of phosphorus	1	2.00	44	88.00	5	10.00	0	0.00	7	14.00	43	86.00
13.	Top dressing of nitrogen	1	2.00	46	92.00	3	6.00	0	0.00	50	100.00	0	0.00
14.	Application of Harmones	0	0.00	4	8.00	46	92.00	0	0.00	4	8.00	46	92.00
15.	Grasshopper control	0	0.00	0	0.00	50	100.00	0	0.00	0	0.00	50	100.00
16.	Sucking pests control	1	2.00	42	84.00	7	14.00	0	0.00	33	66.00	17	34.00
17.	Whitefly control	2	4.00	14	28.00	34	68.00	0	0.00	3	6.00	47	94.00
18.	Redspider mite control	0	0.00	2	4.00	48	96.00	0	0.00	0	0.00	50	100.00
19.	Stemborer control	1	2.00	30	60.00	19	38.00	0	0.00	8	16.00	42	84.00
20.	Bollworm control	1	2.00	47	94.00	2	4.00	0	0.00	50	100.00	0	0.00
21.	Blackarm control	0	0.00	15	30.00	35	70.00	0	0.00	5	10.00	45	90.00

It is seen from the Table 28 that, ploughing was adopted by all the farmers at full adoption level in the adopted village, whereas it was 84.00 per cent among non-adopted village farmers. This could be attributed that the adopted village could have used the tractor for preparation of field as was observed by the researcher, while in the non-adopted village ploughing was done by using country plough due to its hillock in nature.

More than half (52.00%) of the farmers had full adoption in the adopted village for the seed rate at the rate of 3 kg/acre, while 48.00 per cent had partial adoption. But in the non-adopted village, 22.00 per cent of farmers had full adoption, while more than three-fourths (78.00%) could be attributed for use of less seed rate owing to the high fertility status of the hill soils of non-adopted village resulting in provision of more spacing might be the reason for not using the recommended seed rate.

Seed treatment using fungicide was mainly concentrated under partial adoption category (56.00%) among adopted village farmers, while it was 38.00 per cent among non-adopted village farmers. Most of the farmers from both the villages did not adopt seed treatment as was seen in the table. There was none under the full adoption category in the adopted village, while it was 10.00 per cent in the non-adopted village. This could be because that the adopted village farmers were using other than the recommended chemical *viz.*, Imidachloprid and Thiamithaxam in the place of Carbendazim and Mancozeb as was observed by the researcher. But in the non-adopted village, they were using only the recommended chemicals. This could be the reason for the presence of 10.00 per cent of respondents under full adopter category from the non-adopted village.

For Narasimha cotton, a spacing of 60x45cm was recommended. This was followed by 40.00 per cent of the adopted village farmers and 60.00 per cent of them had partial adoption but in the non-adopted village, almost all of them (96.00%) had partial adoption which could be explained for higher spacing due to fertility status of soil as discussed under seed rate.

It is observed from the table that, the adoption of recommended technology under thinning and weeding had partial adoption among more than three-fourths of the respondents from both the villages. This might be because of the reason that the crop being cultivated under rainfed condition and the recommendation could not be adhered to the time factor since the operations are undertaken only on receipt of rains.

Among the recommended practices of nutrient application, almost all the farmers from the adopted village had partial adoption as seen from the table, while it was cent per cent for top dressing of nitrogen among non-adopted village farmers. Basal application of nitrogen and phosphorus were not at all adopted by 70.00 and 86.00 per cent respectively by non-adopted village farmers. The non-adoption could reflect because of the rainfed nature of the crop which does not ensure the anticipated receipt from the crop, which might be the reason for partial and non-adoption of the recommended practices.

Among the plant protection technologies, none from both the villages had adopted grass hopper management, which might be because of the reason that the pest would not have occurred.

Among the sucking pests control measures, in whitefly management and red spider mite control the partial adoption category had dominated in the adopted village ranging from 4.00-84.00 per cent, while it ranged 34.00 to cent per cent among non-adopted village farmers for the non-adoption. The variation for such expression could be attributed for non-occurrence of such pests in general in dryland conditions accompanied with their financial condition.

Bollworm being a prominent pest in cotton, its control is inevitable for a good crop. The control measure recommended was adopted partially by both adopted and non-adopted village farmers with 94.00 and cent per cents respectively. This could have resulted because of more number of chemicals available in the market to the choice of the farmers and the quantity they used which would have resulted for such partial adoption.

Among the diseases, blackarm is one of the major diseases in cotton. The farmers of adopted village did not have clear knowledge about different diseases in cotton even though they used some fungicide to control the diseases whenever they noticed in the crop. This might be the reason for 30.00 per cent of respondents had partial adoption in the adopted village against blackarm control. The non-adoption category was more in both the villages ranging from 70.00 to 90.00 per cent for the blackarm control management. Since the farmers might not have felt the importance of this disease.

4.4.2. Overall extent of adoption of Narasimha cotton cultivation practices

The overall extent of adoption of the 21 recommended practices of Narasimha cotton cultivation was studied among adopted and non-adopted village farmers and were categorised into three and presented in the Table 29.

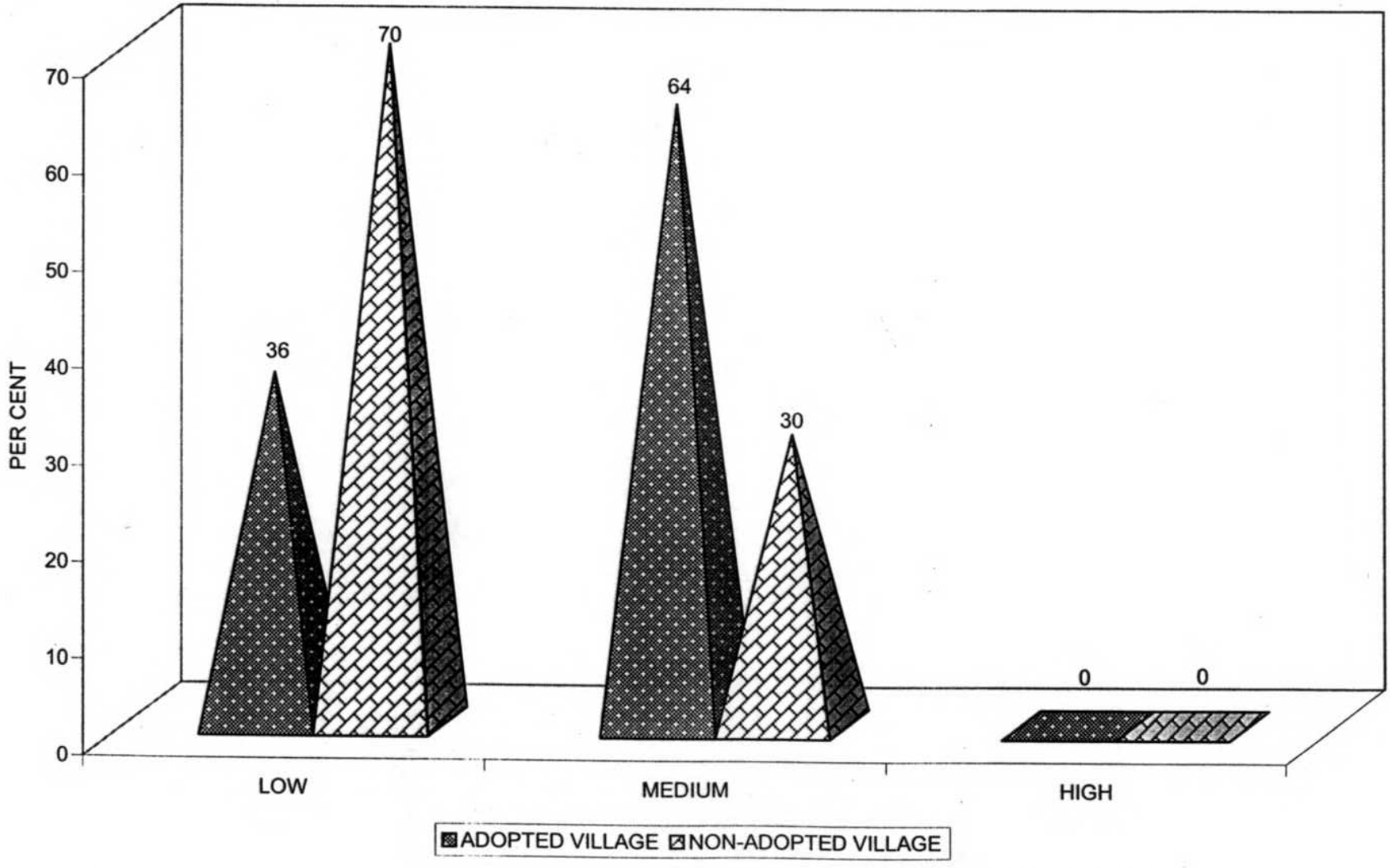
Table 29. Distribution of respondents according to their overall extent of adoption of Narasimha cotton cultivation practices

S. No.	Category	Adopted Village farmers (n = 50)		Non-adopted village farmers (n = 50)		't' value
		Number	Per cent	Number	Per cent	
1.	Low	18	36.00	35	70.00	4.248**
2.	Medium	32	64.00	15	30.00	
3.	High	-	-	-	-	
	Total	50	100.00	50	100.00	
	Mean score	41.39		32.34		

** Significant at 0.01 level of probability

The Table 29 reveals that nearly two-thirds (64.00%) of adopted village farmers and nearly one-third (30.00%) of non-adopted village farmers had medium level of adoption, while more than one-third (36.00%) of adopted village farmers and majority (70.00%) of non-adopted village farmers had low level of adoption. There was none under high adopter category. This finding is in line with Murugankani *et al.* (1999).

FIG.23. DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR OVER ALL EXTENT OF ADOPTION



The mean scores for extent of adoption for adopted and non-adopted village farmers were 41.39 and 32.34 respectively. The highly significant 't' value denotes that the two groups were different in respect of extent of adoption on Narasimha cotton cultivation practices, which means that the adopted village farmers were better adopters than the non-adopted village farmers. This finding is on par with Rao (1988).

The high level of adoption in the case of adopted village farmers might be because of their more information source use behaviour, marketing behaviour, scientific orientation and knowledge as was discussed in this study elsewhere.

4.5. Diffusion and Adoption of Narasimha cotton in adopted and non-adopted villages

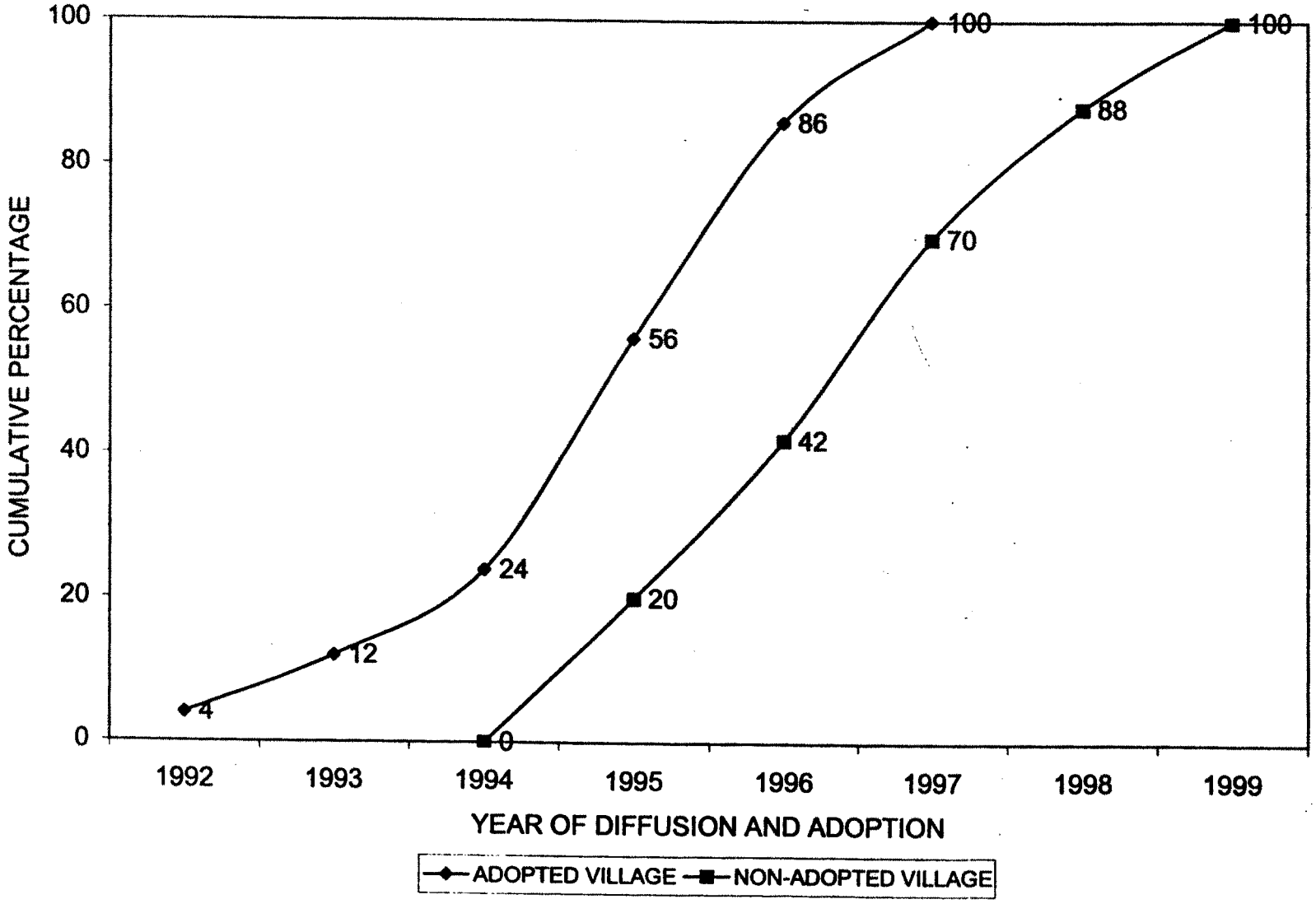
The Narasimha cotton variety though released during 1994 from R.A.R.S., Nandyal, it has diffused at different periods and adopted at different proportions among adopted and non-adopted villages. The information was collected and presented in the Table 30.

Table 30. Diffusion and adoption of Narasimha cotton in adopted and non-adopted villages

Year of diffusion and adoption	Adopted village farmers (n = 50)			Non-Adopted village farmers (n = 50)		
	Number of farmers	Per cent	Cumulative percentage	Number of farmers	Per cent	Cumulative percentage
1992	2	4.00	4.00	-	-	-
1993	4	8.00	12.00	-	-	-
1994	6	12.00	24.00	-	-	-
1995	16	32.00	56.00	10	20.00	20.00
1996	15	30.00	86.00	11	22.00	42.00
1997	7	14.00	100.00	14	28.00	70.00
1998	-	-	-	9	18.00	88.00
1999	-	-	-	6	12.00	100.00

The Narasimha cotton (American cotton) variety was released from R.A.R.S., Nandyal in the year 1994. The Balapanur village, which is 10km away from R.A.R.S., Nandyal, was adopted by the research station. This cotton variety though released in the

FIG.24. DIFFUSION AND ADOPTION OF NARASIMHA COTTON AMONG ADOPTED AND NON-ADOPTED VILLAGES



year 1994, it was adopted by 12.00 per cent of the adopted village farmers even before its release. But after release in the second year itself i.e., 1995 about one-third of respondents (32.00%) had adopted. By the end of fourth year of the release of the variety (1997) all the farmers had adopted it. This shows that because of the proximity and the access of the farmers to the research station would have enable them to adopt the variety even before its release and the diffusion of the variety among cent per cent of the respondents for its adoption within four years of release.

The non-adopted village, K.Bollavaram, is located 35k.m. far away from RARS, Nandyal and situated in the hillock. The farmers of this village took two years from date of its release to adoption among 42.00 per cent of the respondents and it took six years for cent per cent of the farmers to adopt the technology. The technology diffused into the system mainly through personal localite sources *viz.*, input dealers and relatives, as was observed by the researcher. Further it can also be said that the spatial distribution of the villages from the R.A.R.S., Nandyal might have had the effect of early adoption of technology by the adopted village and the later adoption by the non-adopted village.

4.6. Relationship of characteristics of adopted and non-adopted village farmers with knowledge and adoption levels

The results on the zero order correlation of profile characteristics of adopted and non-adopted village farmers with their respective knowledge and adoption levels for Narasimha cotton cultivation are presented separately in Table 31 and 32 respectively.

4.6.1. Relationship of profile characteristics of adopted and non-adopted village farmers with the knowledge level

The results of zero order correlation of 18 independent variables with the knowledge of both the groups of adopted and non-adopted village farmers are furnished in Table 31.

Table 31. Relationship of profile characteristics of adopted and non-adopted village farmers with their knowledge level

Variable Number	Characteristic variables	'r' value for	
		Adopted village farmers (n = 50)	Non-adopted village farmers (n = 50)
X_1	Age	-0.014^{NS}	-0.178^{NS}
X_2	Educational status	0.687^{**}	0.592^{**}
X_3	Farm size	0.684^{**}	0.203^{NS}
X_4	Cropping Intensity	0.486^{**}	0.530^{**}
X_5	Farming Experience	-0.091^{NS}	-0.298^{*}
X_6	Annual Income	0.802^{**}	0.384^{**}
X_7	Social Participation	0.670^{**}	0.446^{**}
X_8	Research Contact	0.808^{**}	0.500^{**}
X_9	Extension Agency Contact	0.820^{**}	0.604^{**}
X_{10}	Mass Media Exposure	0.757^{**}	0.479^{**}
X_{11}	Economic Motivation	0.794^{**}	0.575^{**}
X_{12}	Risk Orientation	0.780^{**}	0.522^{**}
X_{13}	Scientific Orientation	0.031^{NS}	0.269^{NS}
X_{14}	Innovativeness	0.898^{**}	0.618^{**}
X_{15}	Progressiveness	0.873^{**}	0.640^{**}
X_{16}	Perception of Adopters on Narasimha cotton technologies	0.789^{**}	0.382^{**}
X_{17}	Marketing Behaviour	0.853^{**}	0.685^{**}
X_{18}	Feedback Pattern	0.764^{**}	0.552^{**}

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

NS – Non-significant

It is seen from the Table 31 that the correlation values of 15 characteristic variables *viz.*., education, farm size, cropping intensity, annual income, social participation, research contact, extension agency contact, mass media exposure,

economic motivation, risk orientation, innovativeness, progressiveness, perception of adopters, marketing behaviour and feedback pattern of adopted village farmers were positively significant relationship at 0.01 level of probability with their knowledge.

In the case of non-adopted village farmers also 15 characteristic variables *viz*.., education, cropping intensity, farming experience, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, innovativeness, progressiveness, perception of adopters, marketing behaviour and feedback pattern were significant relationship with their knowledge. Of these correlation values, farming experience was alone negatively and significantly correlated with their knowledge at 0.05 level of probability, while the remaining 14 variables were positively and significantly correlated with their knowledge at 0.01 level of probability. It derives support from Pushpa (1991), Kumar (1994) and Venkatesan (2000) who reported that farming experience had negative and significant relationship with knowledge.

The correlation values of the three characteristic variables in both the groups were non-significant *viz*.., age, farming experience and scientific orientation in the adopted village farmers, while it was age, farm size and scientific orientation in the case of non-adopted village farmers. This derives support from Subramanian (2000) who reported that age, farm size, farming experience and scientific orientation had non-significant relationship with knowledge.

It could be inferred that the knowledge on Narasimha cotton production technology of adopted village farmers was the function of education, farm size, cropping intensity, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, innovativeness, progressiveness, perception of adopters, marketing behaviour and feedback pattern, while in

the non-adopted village farmers knowledge was the function of education, cropping intensity, farming experience, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, innovativeness, progressiveness, perception of adopters, marketing behaviour and feedback pattern.

It could be explained from the non-significant correlation values in both adopted and non-adopted villages, because of the old age nature of farmers as was seen in the mean age of both groups from Table 5. Normally old aged people will not have inclination towards risk orientation, scientific orientation and may not have innovativeness, which lead to not acquiring of more knowledge. This might be the reason for non-significant correlation value of –0.014 and –0.178 respectively for adopted and non-adopted village farmers.

With respect to non-adopted village farmers the mean farm size was less than that of adopted village farmers as was explained elsewhere, might not have taken initiative to enrich their knowledge for further adoption. This might be the reason for non-significant correlation value of 0.203 among non-adopted village farmers.

The farming experience among the non-adopted village farmers was more as was seen in the mean score (28.92) when compared to the adopted village farmers (25.98). Due to more farming experience, the non-adopted village farmers might have felt that the already gained knowledge would be sufficient in cotton cultivation rather than gaining more knowledge through different activities. This might be the reason for the negatively significant correlation value of –0.298 at 0.05 probability level.

Scientific orientation in crop production demands acquiring of more knowledge continuously but both the adopted and non-adopted village farmers would not have taken much initiative to know the latest technologies in Narasimha cotton production which might have reflected in the non-significant correlation values for the knowledge as seen from the table.

4.6.2. Relationship of Profile Characteristics with the extent of adoption of Narasimha Cotton Technology

The results of zero order correlation of 18 independent variables with the adoption of both the groups of respondents are furnished in Table 32.

Table 32. Relationship of Profile Characteristics with the extent of adoption of Narasimha Cotton Technology

Variable Number	Characteristic Variables	'r' value for	
		Adopted village farmers (n = 50)	Non-adopted village farmers (n = 50)
X_1	Age	0.176^{NS}	-0.139^{NS}
X_2	Educational status	0.537^{**}	0.618^{**}
X_3	Farm size	0.567^{**}	0.450^{**}
X_4	Cropping Intensity	0.347^{*}	0.627^{**}
X_5	Farming Experience	0.091^{NS}	-0.297^{*}
X_6	Annual Income	0.859^{**}	0.636^{**}
X_7	Social Participation	0.724^{**}	0.428^{**}
X_8	Research Contact	0.692^{**}	0.602^{**}
X_9	Extension Agency Contact	0.827^{**}	0.756^{**}
X_{10}	Mass Media Exposure	0.824^{**}	0.439^{**}
X_{11}	Economic Motivation	0.794^{**}	0.682^{**}
X_{12}	Risk Orientation	0.745^{**}	0.662^{**}
X_{13}	Scientific Orientation	0.083^{NS}	0.418^{NS}
X_{14}	Innovativeness	0.830^{**}	0.715^{**}
X_{15}	Progressiveness	0.783^{**}	0.769^{**}
X_{16}	Perception of Adopters on Narasimha cotton technologies	0.753^{**}	0.462^{**}
X_{17}	Marketing Behaviour	0.769^{**}	0.766^{**}
X_{18}	Feedback Pattern	0.802^{**}	0.768^{**}

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

NS – Non-significant

It is seen from the Table 32 that the correlation values of 15 characteristic variables *viz*.., education, farm size, cropping intensity, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, innovativeness, progressiveness, perception of adopters, marketing behaviour and feedback pattern had significant relationship with their extent of adoption of Narasimha cotton among adopted village farmers. Of these correlation values, cropping intensity alone was positively and significantly correlated with their level of adoption at 0.05 probability level, while the remaining 14 variables were positively and significantly correlated with their adoption level at 0.01 probability level.

In the case of non-adopted village farmers, 16 variables were significant. Of these correlation values, farming experience alone was negatively and significantly correlated with their adoption level at 0.05 probability level, while the remaining 15 characteristic variables *viz*.., education, farm size, cropping intensity, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, innovativeness, progressiveness, perception of adopters, marketing behaviour and feedback pattern were positively and significantly correlated with their adoption at 0.01 level of probability. This finding derives support from Sathiyanarayanan (1991), Rajkumar (1992) and Kavitha (1998) who reported that farming experience had negative and significant relationship with adoption.

The correlation values of the remaining three characteristic variables in the case of adopted village farmers *viz*.., age, farming experience and scientific orientation, while in the case of non-adopted village farmers, two characteristic variables *viz*.., age and scientific orientation were non-significant. This derives support from Subramanian (2000) who reported that age, farming experience and scientific orientation had non-significant relationship with adoption.

It could be inferred from the table that the adoption of Narasimha cotton cultivation practices of adopted village farmers was the function of education, farm size, cropping intensity, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, innovativeness, progressivenss, perception of adopters, marketing behaviour and feedback pattern, while in the non-adopted village farmers, adoption was the function of education, farm size, cropping intensity, farming experience, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, innovativeness, progressiveness, perception of adopters, marketing behaviour and feedback pattern.

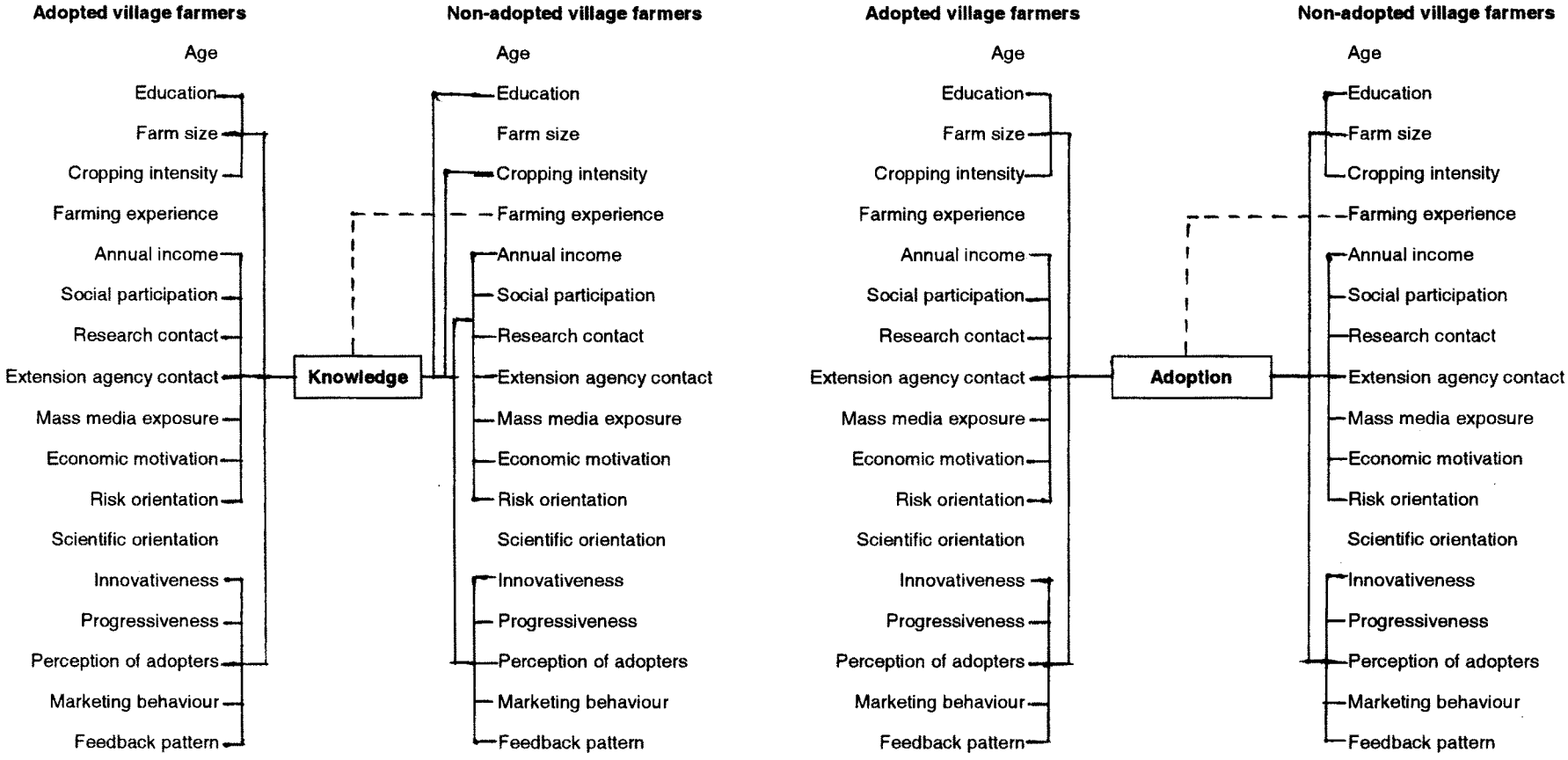
It could be explained that knowledge is the pre-requisite for the adoption of any technology. In this study the variables age and scientific orientation had non-significant relation with knowledge among both village farmers which might have reflected in the adoption also in the same way which is self-explanatory.

Farming experience can be explained as a factor for accumulated knowledge over time may result in adoption. But in this study the results show a non-significant relation with respect to adopted village farmers, while it was negatively significant in the non-adopted village farmers for their adoption of Narasimha cotton technology, which was reflected in the significantly lesser mean score (32.34) than the adopted village farmers (41.39).

4.7. Relative Contribution of characteristics of adopted and non-adopted village farmers towards knowledge and extent of adoption

More in depth analysis of the data was done by employing the step down multiple regression technique which ranks the variables in order of casual priority. It provides for the manipulation of variables at a way to reveal the amount of total variation in the

Fig. 25. Empirical model showing the relationship of profile characteristics of Narasimha cotton growers with their knowledge and adoption



____ Positively significant
------ Negatively significant

independent variables explained by the contribution of selected independent variables at any step of the analysis. This helps to improve the knowledge of the relationship between the selected variables.

The results of multiple regression analysis with 18 independent variables for both the adopted and non-adopted village farmers for knowledge and extent of adoption are given in Appendices XI, XII, XIII and XIV. The results of the final prediction equation for adopted and non-adopted village respondents for their knowledge and adoption are given in Tables 33, 34, 35 and 36 respectively.

4.7.1. Relative contribution of characteristics of adopted and non-adopted village farmers towards knowledge

The extent of contribution of characteristic variables towards knowledge level was assessed by computing step down multiple regression analysis to get rid off the most irrelevant variables and the final equation was arrived and is presented in Tables 33 and 34.

Table 33. Relative contribution of characteristics of adopted village farmers towards knowledge (Y_1)

Variable Number	Independent Variable	Partial Regression Coefficient 'b'	SE(b)	't' value
X_2	Educational status	5.717	1.690	3.383**
X_{13}	Scientific Orientation	1.000	0.450	2.220*
X_{14}	Innovativeness	17.404	3.802	4.577**

$R^2 = 0.909$ $F = 113.014$** $a = 56.175$

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

From the table, it could be seen that in the case of adopted village farmers R^2 value was 0.909 with highly significant F value of 113.014 at 0.01 level of probability. This shows that 90.9 per cent of variation in the knowledge was contributed by three variables included in the step down regression. Of the three characteristic variables taken for analysis, educational status (X_2), scientific orientation (X_{13}) and innovativeness (X_{14}) contributed positively and significantly towards knowledge level. The contribution of scientific orientation was significant at 0.05 level of probability, while educational status and innovativeness were significant at 0.01 level of probability.

The fitted equation is as follows :

$$\hat{Y}_1 = 56.175 + 5.717^{**}X_2 + 1.000^{*}X_{13} + 17.404^{**}X_{14}$$

This indicates that an unit increase in the educational status (X_2), *Ceteris paribus,* resulted in an increase of 5.717 units in the knowledge, keeping the other variables at constant. Similarly, unit increase in scientific orientation (X_{13}) and innovativeness (X_{14}) would result in an increase of 1.000 and 17.404 units respectively in the knowledge.

Thus it could be inferred that the knowledge of adopted village farmers with respect to Narasimha cotton could be positively influenced by increasing their education, scientific orientation and innovativeness.

Table 34. Relative contribution of characteristics of non-adopted village farmers towards knowledge (Y_1)

Variable Number	Independent Variable	Partial Regression Coefficient 'b'	SE(b)	't' value
X_3	Farm size	10.465	2.768	3.781**
X_{17}	Marketing Behaviour	2.823	0.794	3.555**

$R^2 = 0.673$ F = 31.605** a = 5.417

** Significant at 0.01 level of probability

From the Table 34, it could be seen that in the case of non-adopted village farmers R^2 value was 0.673 with highly significant F value of 31.605 at 0.01 level of probability. This shows that 67.3 per cent of variation in knowledge was contributed by two variables included in the step down. Of the two characteristics taken for analysis, farm size (X_3) and marketing behaviour (X_{17}) contributed positively and significantly at 0.01 level of probability.

The fitted equation is as follows

$$\hat{Y}_1 = 5.417 + 10.465^{**}X_3 + 2.823^{**}X_{17}$$

This indicates that an unit increase in farm size (X_3), *Ceteris paribus,* resulted in an increase of 10.465 units in the knowledge keeping the other variables at constant. Similarly unit increase in marketing behaviour (X_{17}) would result in increase of 2.823 units in their knowledge.

Thus it could be inferred that the knowledge of non-adopted village farmers could be positively influenced by increasing their farm size and marketing behaivour.

4.7.2. Relative contribution of characteristics of adopted and non-adopted village farmers towards extent of adoption of Narasimha cotton production technology

The contribution of characteristic variables towards the extent of adoption of Narasimha cotton production technology was assessed by computing step down multiple regression analysis and the final equation arrived at is presented in Tables 35 and 36.

Table 35. Relative contribution of characteristics of adopted village farmers towards extent of adoption of Narasimha cotton production technology

Variable Number	Independent Variable	Partial Regression Coefficient 'b'	SE(b)	't' value
X_3	Farm Size	4.560	1.473	3.095**
X_6	Annual Income	0.208	0.039	5.285**
X_{18}	Feedback Pattern	1.035	0.313	3.307**

$R^2 = 0.885$ F = 86.441** a = 25.591

** Significant at 0.01 level of probability

From the table, it could be seen that in the case of adopted village farmers R^2 value was 0.885 with highly significant F value of 86.441 at 0.01 level of probability. This shows that 88.5 per cent of variation in the extent of adoption was contributed by three variables included in the step down. Of the three characteristic variables taken for analysis, farm size (X_3), annual income (X_6) and feedback pattern (X_{18}) contributed positively and significantly at 0.01 level of probability.

The fitted equation is as follows :

$$\hat{Y}_2 = 25.591 + 4.560^{**}X_3 + 0.208^{**}X_6 + 1.035^{**}X_{18}$$

This indicates that an unit increase in farm size (X_3), *Ceteris paribus,* resulted in an increase of 4.560 units in the extent of adoption keeping the other variables at constant. Similarly unit change in annual income (X_6) and feedback pattern (X_{18}) would result in increase of 0.208 and 1.035 units respectively in their extent of adoption.

Thus it could be inferred that the extent of adoption of adopted village farmers could be positively influenced by increasing their farm size, annual income and feedback pattern.

Table 36. Relative contribution of characteristics of non-adopted village farmers towards extent of adoption of Narasimha cotton production technology

Variable Number	Independent Variable	Partial Regression Coefficient 'b'	SE(b)	't' value
X_8	Research Contact	4.690	1.234	3.800**
X_{17}	Marketing behaviour	1.270	0.260	4.876**
X_{18}	Feedback pattern	7.319	1.952	3.750**

$R^2 = 0.775$ F = 55.60** a = 17.690

** Significant at 0.01 level of Probability

From the Table 36, it could be seen that in the case of non-adopted village farmers R^2 value was 0.775 with highly significant F value of 55.60 at 0.01 level of probability. This shows that 78.4 per cent of variation in the extent of adoption was contributed by three variables included in the stepdown. Of the three characteristic variables taken for analysis, all the three characteristics *viz*.., research contact (X_8), marketing behaviour (X_{17}) and feedback pattern (X_{18}) contributed positively and significantly at 0.01 level of probability.

The fitted equation is as follows :

$$\hat{Y}_2 = 17.690 + 4.690^{**}X_8 + 1.270^{**}X_{17} + 7.319^{**}X_{18}$$

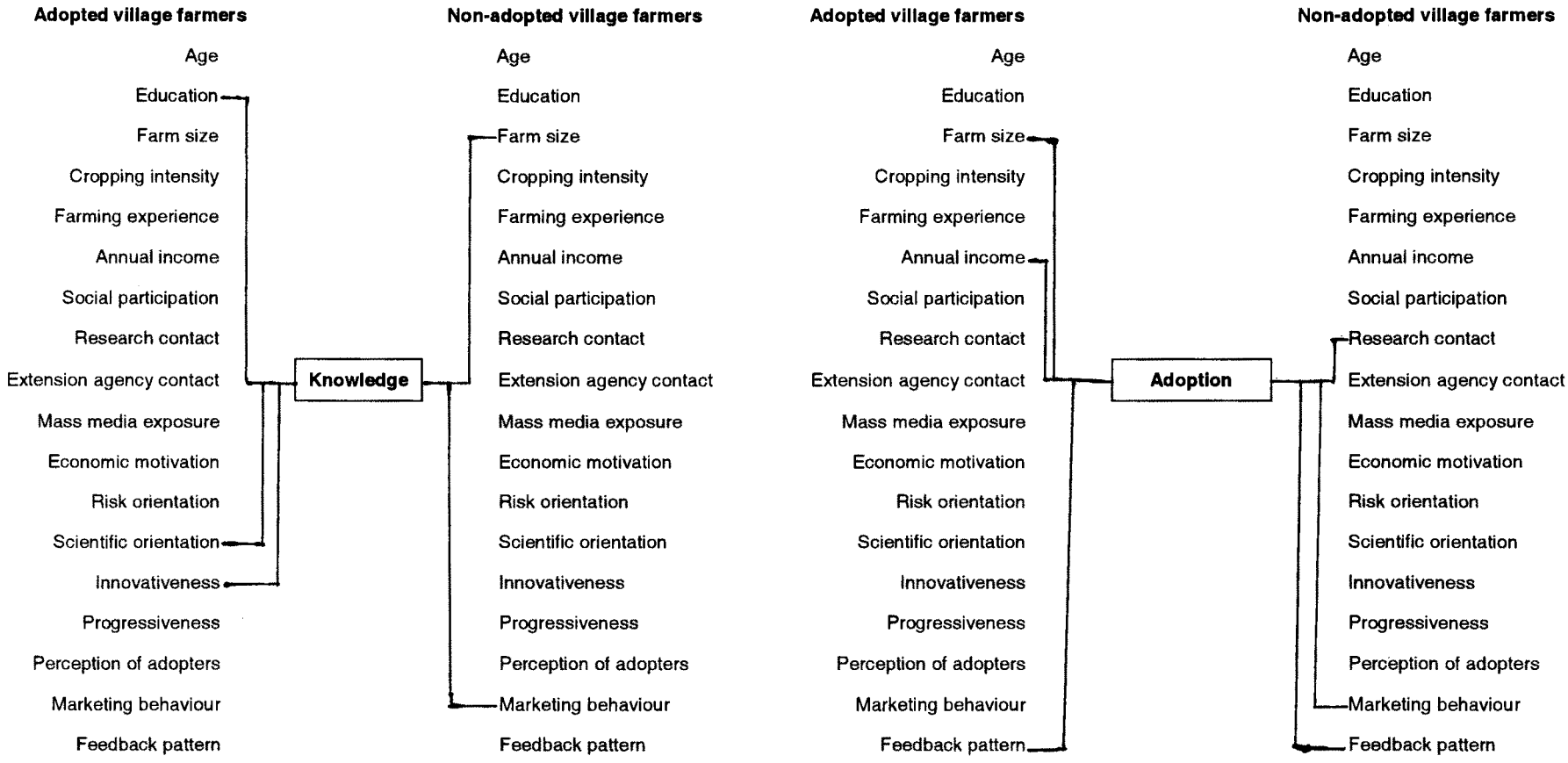
This indicates that an unit increase in research contact (X_8) *Ceteris paribus* resulted in an increase of 4.690 units in the extent of adoption keeping the other variables at constant. Similarly unit increase in marketing behaviour (X_{17}) and feedback pattern (X_{18}) would result in an increase of 1.270 units and 7.319 units in their extent of adoption respectively.

Thus it can be inferred that the extent of adoption of non-adopted village farmers could be positively influenced by increasing their research contact, marketing behaviour and feedback pattern.

4.8. Constraints faced by the farmers in adopting the recommended Narasimha cotton technologies

In accordance with the objectives, the constraints as perceived by Narasimha cotton growers were presented in general by incorporating both the groups of adopted and non-adopted village farmers so as to have a clear perception. The results are presented in Table 37.

Fig. 26. Empirical model showing the contribution of profile characteristics of Narasimha cotton growers towards their knowledge and adoption



____ Positively significant

Table 37. Constraints faced by the Narasimha cotton growers in adopting the recommended technologies

(n = 100)

S. No	Constraint	Per cent	Rank
1.	Inadequate research on IPM in cotton	100.00	I
2.	Lack of suitable pest and disease control measures at low cost	99.00	II
3.	Low support price	98.00	III
4.	Lack of irrigation facilities	86.00	IV
5.	High cost of labour	84.00	V
6.	Inadequacy of required labour	77.00	VI
7.	Inadequate research on cotton intercropping systems	54.00	VII
8.	Inadequate research on INM in cotton	50.00	VIII
9.	Lack of proper transport facilities	48.00	IX
10.	Lack of proper credit facilities	45.00	X
11.	Non-availability of labour in time	42.00	XI
12.	Lack of good extension services	30.00	XII
13.	Soil related problems	29.00	XIII
14.	Inadequate storage facilities	28.00	XIV
15.	Lack of proper marketing channel	27.00	XV
16.	High cost of seed	25.00	XVI

It is seen from the Table 37, that altogether 16 problems were perceived by Narasimha cotton growers. They varied in their magnitude with wide range (25.00 – 100.00%). The table further shows that the most important problem in cotton cultivation was the inadequate research on IPM. The next important problem as perceived by majority of the respondents was lack of suitable pest and disease control measures at low cost. Low support price, lack of irrigation facilities and high cost of labour were the third, fourth and fifth ranked constraints. The last ranked constraint was high cost of seed.

Cotton is attacked by various types of pests *viz*.., sucking pests, defoliators and bollworms. Of these, the major problem faced by the farmers is bollworm. This may be the reason for reporting the inadequate research on IPM.

The pest and disease control measures are too costly in cotton because of its susceptibility to a wide range of pests and diseases and its long duration. This may be the reason for reporting lack of pest and disease control measures at low cost.

For cotton, support price is in practice only for few varieties *viz*.., H-4, F-414 and H-777, while for Narasimha cotton the price offered in the market may be less which has emerged as third rank constraint among cotton growers.

4.9. Suggestions of Narasimha cotton growers to alleviate their problems

The suggestions as perceived by farmers, to solve their problems are given in Table 38.

Table 38. Suggestions of Narasimha cotton growers

(n = 100)

S. No	Suggestions	Respondents	
		Number	Per cent
1.	Development of bollworm tolerant variety	72	72.00
2.	Development of drought tolerant variety	48	48.00
3.	Plant protection chemicals should be supplied at subsidised rate	36	36.00
4.	Liberal financial assistance should be made available	34	34.00
5.	Need good extension services	32	32.00
6.	Training on cotton diseases identification and control measures	25	25.00
7.	Training on IPM practices	20	20.00
8.	Market intelligence should be provided	15	15.00
9.	Mobile plant protection unit should be introduced for timely control of pests and diseases	1	1.00

(Total will not tally with 100 due to multiple responses)

It could be seen from the table that altogether nine suggestions were offered by varied proportion of respondents. Of which about three-fourths (72.00%) suggested for development of bollworm tolerant variety. Nearly half (48.00%) of the respondents suggested development of drought tolerant variety, more than one-third (36.00%) of the respondents suggested that plant protection chemicals should be supplied at subsidised rate, while more or less one-third (34.00 and 32.00% respectively) of the respondents suggested liberal financial assistance should be made available and good extension services provided, one-fourth (25.00%) of the respondents suggested training on cotton diseases identification and control measures and one-fifth (20.00%) of the respondents suggested the training on IPM practices.

From this it may be stated that the crop protection was the major concern of the cotton growers suggesting tolerant variety to bollworm and drought and supply of plant protection chemicals at subsidised rate.

Cotton is attacked by different types of insect pests from germination to picking of bolls. Among the cotton pests, bollworm is the major insect pest causes more damage to the crop and difficult to control. That is why the respondents would have suggested the development of bollworm tolerant variety.

The annual rainfall of scarce rainfall zone is very little. Hence the respondents gave second priority to the development of drought tolerant variety.

The suggestion on supply of plant protection chemicals at subsidised rate could be because of more pest attack on the crop and high cost of insecticides and lack of liberal financial assistance to the farmers in their vicinity.

The suggestion on good extension services, training on cotton plant protection, provision of market intelligence and mobile plant protection unit might be because of the absence of systematic extension support for cotton growers.

Summary and Conclusion

CHAPTER V

SUMMARY AND CONCLUSION

The Regional Agricultural Research Station (R.A.R.S), Nandyal was started in 1906 as Agricultural Research Station and was redesignated in 1954 as Cotton Research Station to cater the needs of black soil (vertisol) farmers of Rayalaseema of A.P., particularly varietal improvement ir cotton, sorghum and setaria. This station has been strengthened under National Agricultural Research Project (N.A.R.P.) and upgraded as Regional Agricultural Research Station (R.A.R.S) in 1980 with a team of interdisciplinary scientists to serve as zonal headquarters of the Scarce Rainfall Zone of Andhra Pradesh.

Since its formation, it has been concentrating its research mainly on cotton, due to which it has released six varieties in desi/arboreum cottons, five varieties in American/hirsutum cottons and two hybrids during the period of 1950 to 2000. Further development of new cotton technologies, it is very much needed to know the diffusion and adoption of the already released varieties among the farmers and also the constraints faced by them in adopting the released technologies and the suggestions offered by them.

Keeping this in view, the study was undertaken with the following specific objectives.

1. To identify the cotton technologies generated from R.A.R.S, Nandyal over a period of 10 years (from 1990-91 to 1999-2000).
2. To study the profile characteristics of cotton growers.
3. To identify the information sources used by the cotton growers in gaining awareness of selected new cotton technologies.
4. To analyse the knowledge and extent of adoption of the cotton growers on the selected new cotton technologies.

5. To find out the relationship of characteristics of cotton growers with knowledge and adoption of selected new cotton technologies.
6. To know the constraints faced by the cotton growers in the adoption of selected new cotton technologies and to know the suggestions offered by them.

The study was conducted in Balapanur (adopted village of R.A.R.S., Nandyal) and K. Bollavaram (non-adopted village) villages of Panyam and Gadivemula mandals respectively of Nandyal agricultural sub-division in Kurnool district of Andhra Pradesh with 50 Narasimha cotton growers in each village by using the simple random sampling without replacement technique.

The data were systematically collected with the use of well structured and pre-tested interview schedules and analysed by using appropriate statistical tools such as mean, percentage analysis, cumulative frequency, independent 't' test, zero order correlation analysis and multiple regression analysis with stepdown process.

The salient findings of the study are presented below.

5.1. Profile characteristics of Narasimha cotton growers of adopted and non-adopted villages

1. Nearly half (48.00%) of adopted village Narasimha cotton growers were middle aged, while half (50.00%) of non-adopted village Narasimha cotton growers were old aged. There was no significant difference in the age of both the groups of Narasimha cotton growers.
2. Slightly more than one-third (34.00%) of adopted village Narasimha cotton growers had middle school level education, while in non-adopted village, more than one-third (38.00%) were educated upto primary school level. The educational status of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.

3. Nearly three-fourths (72.00%) and three – fifths (60.00%) of adopted and non-adopted village Narasimha cotton growers respectively were big farmers. There was no significant difference in farm size of both the groups of Narasimha cotton growers.
4. Slightly more than three-fourths (76.00%) and nearly three-fifths (58.00%) of adopted and non-adopted village Narasimha cotton growers respectively had medium level of cropping intensity. There was no significant difference in the cropping intensity of both the groups of Narasimha cotton growers.
5. More than half (58.00 and 54.00% respectively) of adopted and non-adopted village Narasimha cotton growers had medium level of farming experience. There was no significant difference in farming experience of both the groups of Narasimha cotton growers.
6. About two-thirds (66.00 and 60.00% respectively) of adopted and non-adopted village Narasimha cotton growers had medium level of annual income. The annual income of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.
7. About two-thirds (66.00 and 70.00% respectively) of adopted and non-adopted village Narasimha cotton growers had medium level of social participation. The social participation of Narasimha cotton growers of adopted village was significantly different from those of non-adopted village.
8. Nearly two-thirds (60.00%) of adopted village Narasimha cotton growers had medium level research contact, while most (84.00%) of non-adopted village Narasimha cotton growers had low level of research contact. The research contact of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.
9. About two-thirds (62.00 and 66.00% respectively) of adopted and non-adopted village Narasimha cotton growers had medium level of extension agency contact. The extension agency contact of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.

10. Half (50.00%) and nearly three-fourths (74.00%) of adopted and non-adopted village farmers respectively had medium level of mass media exposure. The mass media exposure of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.
11. About two-thirds (66.00 and 64.00% respectively) of adopted and non-adopted village Narasimha cotton growers had medium level of economic motivation. The economic motivation of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.
12. Nearly two-thirds (64.00%) and nearly three-fourths (72.00%) of adopted and non-adopted village Narasimha cotton growers respectively had medium level of risk orientation. There was no significant difference in the risk orientation of both the groups of Narasimha cotton growers.
13. About two-thirds (66.00 and 62.00% respectively) of adopted and non-adopted village Narasimha cotton growers had medium level of scientific orientation. The scientific orientation of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.
14. More or less similar distribution (42.00 and 44.00% respectively) of adopted and non-adopted village Narasimha cotton growers had medium level of innovativeness. There was no significant difference in the innovativeness of both the groups of Narasimha cotton growers.
15. Half (50.00%) and nearly half (48.00%) of adopted and non-adopted village Narasimha cotton growers respectively had medium level of progressiveness. There was no significant difference in the progressiveness of both the groups of Narasimha cotton growers.
16. More than half (52.00%) and nearly half (48.00%) of adopted and non-adopted village Narasimha cotton growers respectively perceived Narasimha cotton variety was useful. There was no significant difference between the two groups towards the perception of Narasimha cotton.

17. More than half (52.00%) and two-thirds (66.00%) of adopted and non-adopted village Narasimha cotton growers respectively had medium level of marketing behaviour. The marketing behaviour of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.
18. Nearly half (46.00%) and nearly two-thirds (64.00%) of adopted and non-adopted village Narasimha cotton growers respectively were giving feedback to A.E.O. The feedback pattern of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.

5.2. Information source use behaviour of Narasimha cotton growers

1. Both adopted and non-adopted village Narasimha cotton growers were using all the eight personal localite sources for gaining awareness of selected new cotton technologies. Among adopted village farmers, input dealers were ranked first, followed by contact farmers/progressive farmers, friends, family members and neighbours in that order, while among non-adopted village farmers, input dealers, relatives, contact farmers/progressive farmers, friends and family members were ranked in that order.
2. Among 16 personal cosmopolite sources, adopted village Narasimha cotton growers were using all sources, while non-adopted village Narasimha cotton growers were using only six sources for gaining awareness of selected new cotton technologies. Adopted village farmers used input agency personnel as the first ranked source, followed by staff of state department of agriculture, R.A.R.S scientists, training and demonstration in that order, while non-adopted village farmers used staff of state department of agriculture as the first ranked source, followed by input agency personnel, office call, group meeting/discussion and demonstration in that order.
3. Among 10 impersonal cosmopolite sources, all the 10 sources were used by adopted village Narasimha cotton growers, while non-adopted village farmers used only seven sources in gaining awareness of selected new cotton technologies. Among

those sources utilized by adopted and non-adopted village Narasimha cotton growers, farm broadcast ranked first, followed by farm telecast. Agricultural exhibition, posters/charts, leaflets and folders were ranked in that order by adopted village farmers, while posters/charts, leaflets and folders and agricultural exhibition were ranked in that order by non-adopted village Narasimha cotton growers.

4. About two-thirds (66.00 and 62.00% respectively) of adopted and non-adopted village Narasimha cotton growers had medium and low levels of information source use behaviour indices respectively. The information source use behaviour of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.

5.3. Knowledge and extent of adoption of Narasimha cotton production technology of adopted and non-adopted village farmers

5.3.1. Knowledge of Narasimha cotton growers of adopted and non-adopted villages

1. Most (80.00% each) of the adopted village and non-adopted village Narasimha cotton growers had knowledge on time of bollworm control. Less proportion (38.00% each) of adopted village farmers had knowledge on basal dosage of nitrogen application and pesticide used to control whitefly, while in the case of non-adopted village Narasimha cotton growers, very less proportion had knowledge on pesticide used to control whitefly (14.00%), dosage of pesticide to control sucking pests (16.00%), quantity of nitrogen for top dressing (20.00%) and seed treatment with fungicide (26.00%).
2. Most (70.00%) of the adopted village and majority (58.00%) of non-adopted village Narasimha cotton growers had medium to high level of knowledge on Narasimha cotton cultivation practices. The knowledge level of adopted village Narasimha cotton growers was significantly different from those of non-adopted village.

5.3.2. Extent of adoption of Narasimha cotton production technology by the adopted and non-adopted village farmers

1. Among 21 recommended practices, ploughing alone was fully adopted by most (100.00 and 84.00% respectively) of the adopted village and non-adopted village Narasimha cotton growers. Almost all the adopted village farmers were partially adopting basal nitrogen application (98.00%), bollworm control (94.00%) and top dressing of nitrogen (92.00%), while all (100.00% each) the non-adopted village farmers were partially adopting top dressing of nitrogen and bollworm control and almost all (96.00% each) were partially adopting spacing and time of second weeding. All (100.00% each) of adopted and non-adopted village Narasimha cotton growers were not adopting grasshopper control measures.
2. Nearly two-thirds (64.00%) of adopted village Narasimha cotton growers had medium level of adoption, while more than two-thirds (70.00%) of non-adopted village Narasimha cotton growers had low level of adoption of Narasimha cotton production technologies. The adopted village Narasimha cotton growers differed significantly from those of non-adopted village with respect to extent of adoption of Narasimha cotton production technologies.

5.4. Relationship of profile characteristics with knowledge and extent of adoption of Narasimha cotton growers

5.4.1. Relationship of profile characteristics with the knowledge level of Narasimha cotton growers of adopted and non-adopted villages

Among the 18 independent variables, 15 variables *viz.*, educational status, farm size, cropping intensity, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, innovativeness, progressiveness, perception of adopters, marketing behaviour and feedback pattern of adopted village farmers had positively significant relationship with their knowledge.

In the case of non-adopted village farmers also 15 variables *viz.*, educational status, cropping intensity, farming experience, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, innovativeness, progressiveness, perception of adopters, marketing behaviour and feedback pattern had significant relationship with their knowledge. Of these, farming experience alone was negatively and significantly correlated with their knowledge, while the remaining 14 variables were positively and significantly correlated with their knowledge.

The variables *viz.*, age, farming experience and scientific orientation had non-significant relationship with knowledge among the adopted village farmers, while it was age, farm size and scientific orientation in the case of non-adopted village farmers.

5.4.2. Relationship of profile characteristics with extent of adoption of Narasimha cotton growers of adopted and non-adopted villages

Among the 18 independent variables, 15 variables *viz.*, educational status, farm size, cropping intensity, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, innovativeness, progressiveness, perception of adopters, marketing bahaviour and feedback pattern had positively significant relationship with their extent of adoption of Narasimha cotton production technologies among adopted village farmers.

In the case of non-adopted village farmers, 16 variables were significant. Of these, farming experience alone was negatively and significantly correlated, while the remaining 15 variables *viz.*, educational status, farm size, cropping intensity, annual income, social participation, research contact, extension agency contact, mass media exposure, economic motivation, risk orientation, innovativeness, progressiveness, perception of adopters, marketing behaviour and feedback pattern had positive and significant relationship with their adoption of Narasimha cotton technology.

Age, farming experience and scientific orientation of adopted village farmers and age and scientific orientation in the case of non-adopted village farmers did not have any relationship with regard to adoption of Narasimha cotton production technology.

5.5.1. Relative contribution of characteristics of adopted and non-adopted village Narasimha cotton growers towards knowledge

Among the 18 independent variables, only three variables *viz.*, educational status, scientific orientation and innovativeness jointly explained 90.9 per cent variation in the knowledge level of the Narasimha cotton growers of adopted village, while in the non-adopted village Narasimha cotton growers, only two variables *viz.*, farm size and marketing behaviour jointly explained 67.3 per cent variation in their knowledge level.

5.5. Relative contribution of characteristics towards knowledge and extent of adoption of Narasimha cotton growers

5.5.2. Relative contribution of characteristics of adopted and non-adopted village Narasimha cotton growers towards extent of adoption

Among 18 independent variables, only three variables *viz.*, farm size, annual income and feedback pattern jointly explained 88.5 per cent variation in the extent of adoption of Narasimha cotton production technologies by the Narasimha cotton growers of adopted village, while in the non-adopted village Narasimha cotton growers, only three variables *viz.*, research contact, marketing hebaviour and feedback pattern jointly explained 77.5 per cent variation in their extent of adoption of Narasimha cotton production technologies.

5.6. Constraints faced and suggestions offered by Narasimha cotton growers

5.6.1. Constraints faced by the Narasimha cotton growers in adopting the recommended practices

Altogether 16 problems were perceived by the Narasimha cotton growers with wide range (25.00 – 100.00%) in adopting the recommended practices. The most important problem as perceived by them was inadequate research on IPM. Lack of

suitable pest and disease control measures at low cost, low support price, lack of irrigation facilities and high cost of labour were the next four problems in that order. The last ranked constraint was high cost of seed.

5.6.2. Suggestions of Narasimha cotton growers to alleviate their problems

Altogether nine suggestions were offered by Narasimha cotton growers with varied proportion (1.00 – 72.00%). Most (72.00%) of them suggested for development of bollworm tolerant variety. Nearly half (48.00%) of them suggested for development of drought tolerant variety. Supplying of plant protection chemicals at subsidized rate was suggested by more than one-third (36.00%) of them.

5.7. Implications of the study

- Profile characteristics of Narasimha cotton growers revealed that majority of them fall under middle and old age group with primary school level of education in non-adopted village and middle school level in adopted village. Therefore educational activities need to be centred around with demonstrations, exhibitions, use of audio visuals and in the easily understandable form of leaflets and folders. Field days and farmers fairs will also help to transfer the cotton production technology to these categories of farmers.
- Personal localite sources like input dealers, contact farmers/progressive farmers, friends and relatives played a major role in transferring Narasimha cotton production technology to both adopted and non-adopted village farmers. Therefore irrespective of the spatial distribution, these sources need to be strengthened by the transfer of technology agencies through different educational programmes for crop production technologies in addition to cotton.
- In the personal cosmopolite sources, staff of state department of agriculture, input agency personnel and R.A.R.S. scientists played a major role in transferring the latest cotton production technology to the farmers. These sources need to be given

concentration whenever any crop production technology is planned to transfer to ultimate user through field visits, office call, laying out Front Line Demonstration etc. in collaboration with development departments.

- In the impersonal cosmopolite sources, farm broadcast, farm telecast, posters and charts and agricultural exhibition played a major role in both adopted and non-adopted villages. Therefore the farm telecast and farm broadcast need to be utilized by presenting the technologies in different modes preferred by the farmers. Even method demonstrations can also be considered, while giving farm technologies through farm telecast. Agricultural exhibitions may be given importantance during farmer's fairs, strengthening the existing permanent agricultural exhibitions both in state department and SAUs.
- The characteristics *viz.*, education, scientific orientation and innovativeness in the adopted village; farm size and marketing behaviour in the non-adopted village contributed significantly on acquiring knowledge about cotton technology by the farmers. Therefore, the farmers with such type of characteristics need to be considered for inclusion in the educational programmes like training, demonstration etc. So that the lateral spread of technology in the system can be achieved quickly.
- The characteristics *viz.*, farm size, annual income and feedback among the adopted village farmers and research contact, marketing behaviour and feedback among non-adopted village farmers contributed substantially for adoption of the Narasimha cotton technology. Therefore the farmers need to be strengthened with frequent research contact through office calls, personal letters, field visits, diagnostic team visits, so that the confidence of the farmers can be increased on the research system, which subsequently may help to reduce the adoption gap of any new technology generated from research station. This will also promote the feedback pattern, which may help to retune/modify/to generate new technology as per the perceived needs of the client system by research. Marketing being the crucial factor for better returns from agriculture, while planning any agricultural programme need to be supported with agricultural marketing information.

- Farmers perception in cotton production revealed that lack of adequate research in IPM, low cost pest and disease management techniques, inadequate labour supply resulting in high cost and low support price were the major constraints. Therefore the research need to be strengthened in generating appropriate IPM technologies giving more concentration on low/no cost. Government need to consider providing favourable price policy for the agricultural produce including cotton. Infrastructural development for marketing of the agricultural produce need to be promoted on priority sector.
- Cotton growers needed bollworm tolerant and drought tolerant varieties of cotton supported with credit facilities, trainings, market intelligence etc. Therefore research organizations need to plan on projects to meet the above demands of farmers in a strategic way. The financial and the marketing institutions can co-ordinate with cotton growers through buy back policy for better investment and returns, which will promote cotton production to meet the domestic needs.

5.8. Suggestions for future areas of research

- Scarce Rainfall Zone of A.P. need to be endowed with drought tolerant and bollworm tolerant cotton varieties for which biological scientists may give due importance to plan for future programmes accordingly.
- Cotton being a commercial and high cost investment crop, the social scientists may consider, studying the training needs of the cotton growers giving specific importance to IPM.
- The SAUs may give thrust on conducting social science studies to know the diffusion of technologies generated from their respective Zonal Research Centres to help to revamp the research programmes to meet the location specific problems/needs of the farmers of the respective zones.

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* Original not seen.

Appendices

APPENDIX – I

Cotton varieties and hybrids developed at R.A.R.S., Nandyal

S.No.	Variety / Hybrid	Year of release	Duration (days)	Yield (q/ha)	Special features and coverage
I	**Varieties**				
a.	**Arboreum or Desi cotton varieties**				
1.	N-14	1950	175	2.5	Hingari - rainfed
2.	Nandicum	1962	175	3.5	Hingari – rainfed
3.	Mahanandi	1978	170	4.0	Hingari – rainfed
4.	Srisailam	1978	170	5.0	Mungari – rainfed / Irrigable dry
5.	Raghavendra	1986	180	6.0	Hingari – rainfed
6.	Aravinda	1996	160	6.5	Mungari – rainfed / Irrigable dry
b.	**Hirsutum or American cotton varieties**				
1.	Mahalakshmi	1972	170	5.0	Vertisols
2.	Fedraj	1976	165	10.0	Rabi (Irrigable dry)
3.	Vijayalakshmi	1982	160	6.0	Vertisols
4.	Priya	1988	160	6.0	Vertisols
5.	Narashima	1994	155	8.0	Vertisols and high yielder with wide adaptability
II.	**Hybrids**				
1.	Bhagyalakshmi	1982	180	12.0	Interspecific – Irrigable dry conditions
2.	NHH – 390 (NHH-39)	1991	160	14.0	Rainfed / irrigable dry conditions

Source : Regional Agricultural Research Station, Nandyal – 518 503.

APPENDIX II

District-wise cotton area and production of Andhra Pradesh, 2000-01.

(Area in hectares, production in tonnes of bales of 170kg each)

S. No	District	Area	Production
1.	Srikakulam	2038	1606
2.	Vijayanagaram	13179	10389
3.	Visakhapatnam	1343	1059
4.	East Godavari	7947	6264
5.	West Godavari	3101	2444
6.	Krishna	41298	32553
7.	Guntur	193583	120705
8.	Prakasam	62810	82392
9.	Nellore	7055	5561
10.	Chittoor	25	23
11.	Cuddapah	24778	22883
12.	Anantapur	13990	12920
13.	**Kurnool**	**153708**	**141954**
14.	Mahbubnagar	93598	77081
15.	Ranga Reddy	26447	25358
16.	Hyderabad	-	-
17.	Medak	22616	32328
18.	Nizamabad	19956	28525
19.	Adilabad	162070	154443
20.	Karimnagar	84270	195804
21.	Warangal	146323	296089
22.	Khammam	88140	143098
23.	Nalgonda	112666	128572
	State	**1280941**	**1522051**

Source : Directorate of Economics and Statistics, Government of Andhra Pradesh, Hyderabad.

APPENDIX – III

Mandal wise cotton area under varieties and hybrids in Nandyal agricultural sub-division in 2001-2002

S.No.	Mandal	Cotton area (ha)	
		Varieties	Hybrids
1.	Nandyal	310	150
2.	Panyam	2442	644
3.	Gadivemula	160	933
4.	Banaganapalli	805	1110
5.	Bandiatmakur	80	50
6.	Mahanandi	40	238
	Total	**3837**	**3125**

Area of new cotton technologies of R.A.R.S., Nandyal in Nandyal Agricultural Sub-division

Area under **Narasimha cotton** in total area of cotton varieties = 450 ha

Area under **Aravinda cotton** in total area of cotton varieties = 250 ha

Area under **NHH-390** in total area of cotton hybrids = 135 ha

Source : Office of the Assistant Director of Agriculture, Nandyal.

APPENDIX IV

Mandal-wise area of NHH-390, Narasimha and Aravinda cotton varieties in Nandyal agricultural sub-division in 2001-02

S. No	Mandal	Narasimha cotton area (ha)	Aravinda cotton area (ha)	NHH-390 cotton area (ha)
1.	Nandyal	20	50	10
2.	Panyam	300	100	50
3.	Gadivemula	130	-	75
4.	Banaganapalle	-	100	-
5.	Bandiatmakur	-	-	-
6.	Mahanandi	-	-	-
	Total	**450**	**250**	**135**

Source : Office of the Assistant Director of Agriculture, Nandyal.

APPENDIX V

Village-wise Narasimha cotton area of Panyam and Gadivemula mandals in 2001-02

S. No	Village	Narasimha cotton area (ha)
I	**Panyam Mandal**	
1.	Balapanur	200
2.	Neravada	50
3.	Kouluru	10
4.	Poluru	10
5.	Udumalpuram	10
6.	Anupur	10
7.	Bhupanapadu	10
	Total	**300**
II	**Gadivemula Mandal**	
1.	K. Bollavaram	125
2.	Chindukur	5
	Total	**130**

Source : Office of the Assistant Director of Agriculture, Nandyal.

APPENDIX VI

Land utilisation pattern in Kurnool District in 2000-01

S. No	Particulars	Area (ha)	Percentage to total geographical area
1.	Total geographical area	1728359	100
2.	Forest	318250	18.41
3.	Barren and uncultivable land	99374	5.74
4.	Land put to non-agricultural use	100808	5.83
5.	Cultivable waste	81502	4.72
6.	Permanent pasture and other grazing land	4075	0.24
7.	Land under miscellaneous tree crops grown, not included in net area sown	2030	0.12
8.	Current fallows	146003	8.45
9.	Other fallow lands	131395	7.60
10.	Net area sown	734167	-
11.	Area sown more than once	110755	-
12.	Total cropped area	844922	48.89
13.	Cropping intensity	115	-

Source : Office of the Chief Planning Officer (CPO), Kurnool, A.P.

APPENDIX VII

Area under principal crops in Kurnool district 2000-01

S. No	Crop	Area (ha)	Percentage to total geographical area
1.	Paddy	105055	11.77
2.	Maize	1503	0.16
3.	Jowar	199977	21.99
4.	Bajra	4128	2.63
5.	Wheat	2234	0.46
6.	Ragi	991	0.14
	Total Cereals	**313888**	**37.15**
7.	Bengal gram	48519	5.28
8.	Redgram	39882	4.34
9.	Blackgram	3104	0.66
10.	Greengram	2781	0.63
11.	Horsegram	1683	0.33
	Total pulses	**94969**	**11.24**
12.	Groundnut	214723	25.43
13.	Sesamum	1408	0.15
	Total oilseeds	**216131**	**25.58**
14.	**Cotton**	**153708**	**20.03**
15.	Tobacco	32347	2.43
16	Chillies	15952	1.52
17	Sugarcane	1112	0.06
	Total commercial crops	**203119**	**24.04**
18.	Fruits & vegetables	119134	1.41
19	Other crops	4900	0.58
	Total cropped area	**844922**	**100.00**

Source : Office of the Chief Planning Officer (CPO), Kurnool, A.P.

APPENDIX VIII

Area, Production and Productivity of Cotton in Kurnool District

Area : '000. hectares
Production : '000 bales of 170 kg each
Productivity : kg lint/ha

S. No	Year	Area	Production	Productivity
1.	1990-91	57	50	146
2.	1991-92	67	82	209
3.	1992-93	77	77	170
4.	1993-94	82	113	234
5.	1994-95	83	125	244
6.	1995-96	86	131	258
7.	1996-97	87	138	269
8.	1998-99	131	217	282
9.	1999-2000	133	200	254
10.	2000-01	153	141	220

Source : Office of the Chief Planning Officer (CPO), Kurnool, A.P.

APPENDIX – IX

TAMIL NADU AGRICULTURAL UNIVERSITY

COIMBATORE – 641 003

From:

Dr. V. ALAGESAN, Ph.D,
Professor & Head,
Krishi Vigyan Kendra,
TNAU campus,
Coimbatore - 641 003.

Dear sir/ madam,

It is in connection with the research study of one of my students, **Mr. K. Janardhan,** on **"Diffusion and Adoption of Selected New Cotton Technologies Generated from Regional Agricultural Research Station, Nandyal Among Farmers"** for his M.Sc. (Ag) Programme.

The following variables were considered relevant for the study. We are interested to identify the relevancy of these variables in relation to Farmers knowledge level and extent of adoption.

You are chosen as a judge on your experience and expertise in the field of Extension Education.

I request you kindly judge these variables by putting **Tick (✓) mark** in a three point continuum for its relevancy.

If you feel any variable is relevant, you may feel free to include such variable and judge them also.

After incorporating your valuable judgement, the schedule may kindly be returned at the earliest.

Yours faithfully,

Place : Coimbatore

Date :

(V. ALAGESAN)

To :

Diffusion and Adoption of Selected New Cotton Technologies Generated From Regional Agricultural Research Station, Nandyal among Farmers

Dependent Variables

1. Knowledge level of farmers
2. Adoption level of farmers

List of independent variables

S. No	Name of the variable	More relevant	Relevant	Less relevant	Mean
1.	Age				2.55*
2.	Educational status				2.80*
3.	Caste				1.38
4.	Family type				1.83
5.	Occupation				2.10
6.	Farm size				2.73*
7.	Farming experience				2.88*
8.	Farm power status				2.28
9.	Livestock possession				2.15
10.	Material possession				2.10
11.	Social participation				2.80*
12.	Annual income				2.75*
13.	Information feedback pattern				2.93*
14.	Research contact				2.69*
15.	Extension agency contact				2.80*
16.	Mass media exposure				2.80*
17.	Risk orientation				2.78*
18.	Economic motivation				2.88*
19.	Scientific orientation				2.83*
20.	Urban contact				1.88
21.	Innovativeness				2.90*
22.	Progressiveness				2.74*
23.	Farm diversification				2.15
24.	Marketing behaviour				2.59*
25.	Perception of adopters on technologies				2.77*
26.	Credit behaviour				2.43
27.	Cropping intensity				2.53*

* Selected variables for the study

APPENDIX X

Selection of statements for Knowledge test based on Difficulty index and Discrimination index

Item No.	Statement No.	Difficulty index	Discrimination index
1.	2	55	57.14
2	3	45	71.43
3	6	72	57.14
4	7	60	28.57
5.	12	70	28.57
6.	13	40	71.43
7	20	60	28.57
8	21	70	28.57
9	22	70	42.86
10	23	55	28.57
11	24	70	57.14
12	25	60	28.57
13	27	65	28.57
14	28	70	28.57
15	29	60	28.57

APPENDIX XI

Relative contribution of characteristics of adopted village farmers towards knowledge

Variable Number	Independent Variable	Partial Regression Coefficient 'b'	SE (b)	't' value
X_1	Age	0.445	0.513	0.867^{NS}
X_2	Educational status	8.181	3.406	2.402^{*}
X_3	Farm size	1.037	5.549	0.187^{NS}
X_4	Cropping Intensity	0.053	0.109	0.506^{NS}
X_5	Farming Experience	0.019	0.592	0.032^{NS}
X_6	Annual Income	-0.337	0.167	-2.015^{NS}
X_7	Social Participation	-0.315	0.600	-0.525^{NS}
X_8	Research Contact	2.513	1.818	1.383^{NS}
X_9	Extension Agency Contact	0.003	0.332	0.11^{NS}
X_{10}	Mass Media Exposure	0.112	0.803	0.139^{NS}
X_{11}	Economic Motivation	0.894	0.686	1.304^{NS}
X_{12}	Risk Orientation	0.041	0.584	0.071^{NS}
X_{13}	Scientific Orientation	0.935	0.754	1.241^{NS}
X_{14}	Innovativeness	17.034	4.747	3.588^{**}
X_{15}	Progressiveness	0.421	3.209	0.131^{NS}
X_{16}	Perception of Adopters on Narasimha cotton technologies	0.003	3.715	0.003^{NS}
X_{17}	Marketing Behaviour	0.308	0.690	0.446^{NS}
X_{18}	Feedback Pattern	0.106	1.093	0.097^{NS}

$R^2 = 0.935$

$F = 22.884^{**}$

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

NS – Non-significant

APPENDIX XII

Relative contribution of characteristics of non-adopted village farmers towards knowledge

Variable Number	Independent Variable	Partial Regression Coefficient 'b'	SE (b)	't' value
X_1	Age	-0.492	0.886	-0.555^{NS}
X_2	Educational Status	0.707	3.908	0.181^{NS}
X_3	Farm size	8.369	3.352	2.497^{*}
X_4	Cropping Intensity	0.352	0.158	2.228^{*}
X_5	Farming Experience	0.318	0.842	0.377^{NS}
X_6	Annual Income	-0.204	0.124	-1.640^{NS}
X_7	Social Participation	-0.409	1.074	-0.380^{NS}
X_8	Research Contact	5.260	4.259	1.235^{NS}
X_9	Extension Agency Contact	-0.429	0.786	-0.546^{NS}
X_{10}	Mass Media Exposure	0.658	0.682	0.965^{NS}
X_{11}	Economic Motivation	1.444	0.672	2.147^{*}
X_{12}	Risk Orientation	-0.982	0.626	-1.569^{NS}
X_{13}	Scientific Orientation	-1.036	0.751	-1.380^{NS}
X_{14}	Innovativeness	-1.105	5.117	-0.216^{NS}
X_{15}	Progressiveness	-3.333	2.427	-1.374^{NS}
X_{16}	Perception of Adopters on Narasimha cotton technologies	0.506	3.098	0.163^{NS}
X_{17}	Marketing Behaviour	4.712	1.542	3.057^{**}
X_{18}	Feedback Pattern	-5.745	6.317	-0.909^{NS}

$R^2 = 0.718$

$F = 7.111^{**}$

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

NS – Non Significant

APPENDIX - XIII

Relative contribution of characteristics of adopted village farmers towards extent of adoption

Variable Number	Independent Variable	Partial Regression Coefficient 'b'	SE (b)	't' value
X_1	Age	0.083	0.224	0.372^{NS}
X_2	Educational Status	-1.889	1.490	-1.268^{NS}
X_3	Farm size	5.733	2.427	2.362^{*}
X_4	Cropping Intensity	-0.065	0.048	-1.377^{NS}
X_5	Farming Experience	-0.272	0.259	-1.050^{NS}
X_6	Annual Income	0.231	0.073	3.154^{**}
X_7	Social Participation	-0.142	0.263	-0.542^{NS}
X_8	Research Contact	-1.332	0.795	-1.676^{NS}
X_9	Extension Agency Contact	0.204	0.145	1.406^{NS}
X_{10}	Mass Media Exposure	-0.220	0.351	-0.625^{NS}
X_{11}	Economic Motivation	0.264	0.300	0.881^{NS}
X_{12}	Risk Orientation	-0.438	0.255	-1.716^{NS}
X_{13}	Scientific Orientation	0.042	0.330	0.129^{NS}
X_{14}	Innovativeness	1.934	2.076	0.932^{NS}
X_{15}	Progressiveness	0.776	1.403	0.553^{NS}
X_{16}	Perception of Adopters on Narasimha cotton technologies	2.960	1.625	1.822^{NS}
X_{17}	Marketing Behaviour	-0.259	0.302	-0.859^{NS}
X_{18}	Feedback Pattern	1.099	0.478	2.301^{*}

$R^2 = 0.919$

$F = 17.874^{**}$

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

NS – Non Significant

APPENDIX XIV

Relative contribution of characteristics of non-adopted village farmers towards extent of adoption

Variable Number	Independent Variable	Partial Regression Coefficient 'b'	SE (b)	't' value
X_1	Age	-0.104	0.394	-0.264^{NS}
X_2	Educational Status	-2.880	1.736	-1.659^{NS}
X_3	Farm size	-0.139	1.490	-0.093^{NS}
X_4	Cropping Intensity	0.089	0.070	1.282^{NS}
X_5	Farming Experience	-0.194	0.374	-0.519^{NS}
X_6	Annual Income	0.056	0.055	1.027^{NS}
X_7	Social Participation	-0.804	0.477	-1.684^{NS}
X_8	Research Contact	4.272	1.892	2.258^{*}
X_9	Extension Agency Contact	-0.228	0.349	-0.652^{NS}
X_{10}	Mass Media Exposure	-0.094	0.303	-0.313^{NS}
X_{11}	Economic Motivation	-0.039	0.299	-0.133^{NS}
X_{12}	Risk Orientation	0.056	0.278	0.203^{NS}
X_{13}	Scientific Orientation	-0.089	0.334	-0.208^{NS}
X_{14}	Innovativeness	1.711	2.274	0.753^{NS}
X_{15}	Progressiveness	0.803	1.078	0.745^{NS}
X_{16}	Perception of Adopters on Narasimha cotton technologies	1.155	1.377	0.839^{NS}
X_{17}	Marketing Behaviour	0.525	0.685	0.767^{NS}
X_{18}	Feedback Pattern	5.890	2.807	2.099^{*}

$R^2 = 0.784$

$F = 9.894^{**}$

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

NS – Non Significant

APPENDIX XV

Diffusion and Adoption of Selected New Cotton Technologies Generated from Regional Agricultural Research Station, Nandyal Among Farmers

INTERVIEW SCHEUDLE

PART – I

Respondent Name :- Respondent Number :

Village :

Mandal :

1. **Age** (in completed years) :
2. **Education :** - Illiterate / Primary School / Middle School / High School / Higher Secondary / Collegiate
3. **Farm Size :**

Particulars	Type of land (acres)		
	Wet / irrigated	Dry	Total
1. Area owned			
2. Area leased in			
3. Area leased out			
4. Total			

4. **Crops grown during current year :**

S. No.	Season	Wet / irrigated		Dry	
		Crop	Area (acres)	Crop	Area (acres)

5. **a) Farming Experience** (in years)

   b) From which year onwards you are cultivating Narasimha cotton.

6. **Annual Income :-**

   a. From farming (Rs) :-

   b. From others (Rs) :-

   c. Total (Rs) :-

7. **Social Participation :-**

S. No	Organization	Past		Present	
		Member	**Officer bearer**	**Member**	**Office bearer**
1.	Village Panchayat				
2.	Mandal Parishad				
3.	Zilla Parishad				
4.	Village Co-operative society				
5.	Land Development Bank				
6.	Farmers Culb/Rythu Club				
7.	Water Users Association				
8.	Milk Society				
9.	Youth Club				
10.	Others (Specify)				

8. **Research Contact**

   a) Have you heard of the RARS, Nandyal - Yes / No

   b) Have you seen the RARS, Nandyal - Yes / No

   c) Have you visited the RARS, Nandyal - Yes / No

   d) Have you had discussion with research scientists of RARS, Nandyal - Yes / No

9. Extension Agency Contact

S. No	Particulars	Awareness about extension agency				Frequency of contact			Purpose of contact	
		Not seen	Not heard	Seen and heard	Seen and discussed	Regularly	Often	Occasionally	Agri	Non-agri
1.	AEO									
2.	AO									
3.	ADA									
4.	DDA									
5.	JDA									
6.	Extn. Personnel of banks									
7.	Extn. Personnel of input dealers									
8.	Extn. Personnel of other development departments									
9.	KVK									
10.	DAATT Centre									
11.	FTC									
12.	NGOs									
13.	Others									

10. Mass Media Exposure :-

S. No.	Particulars	Regularly	Occasionally	Never
1.	Listening to farm broadcast			
2.	Reading Newspaper			
3.	Reading agril. Bulletins / magazines			
4.	Viewing farm telecast			
5.	Viewing agricultural films & other related documentary films			

6. How many exhibitions did you visit last year?
Above 6 / 4 to 6 / 1 to 3 / None

7. How many demonstrations or other agril. functions did you attend last year?
Above 6 / 4 to 6 / 1 to 3 / None

11. **Economic Motivation** :- Please give your agreement / disagreement (or) undecidedness about each of the following statements.

S. No.	Statement	SA	A	UD	DA	SDA
1.	Farmers should work towards larger yields and economic profit					
2.	The most successful farmer is one who makes the most profits					
3.	A farmer should try any new farming idea that 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 farmer's children to make a good start unless he provided them with economic assistance					
6.	A farmer must earn his living but most important thing in life cannot be defined in economic terms.					

SA- Strongly agree, A – Agree, UD – Undecided, DA-Disagree, SDA-Strongly Disagree

12. **Risk Orientation** :- Please give your agreement / dis-agreement (or) undecidedness about each of the following statements

S. No.	Statement	SA	A	UD	DA	SDA
1.	A farmer should grow large number of crops to avoid greater risks involved in growing one or two crops					
2	A farmer should take more of a chance in making a big profit than to be content with smaller but less risk profit					
3	A farmer who is willing to take greater risks than the average farmer actually does better financially					
4	It is good for a farmer to take risk when he knows his chance of success is fairly high.					
5	It is better for a farmer not to try new farming methods unless most others in the locality have used it with success.					
6	Trying entirely a new method in farming by a farmer involves risk but it worth of it.					

SA- Strongly agree, A – Agree, UD – Undecided, DA-Disagree, SDA-Strongly Disagree

13. Scientific orientation : Please give your agreement/dis-agreement (or) undecidedness about each of the following statements

S.No.	Statement	SA	A	UD	DA	SDA
1.	New methods of farming give better results to a farmer than old methods					
2.	The way farmer's fore fathers farmed is, still the best way to farm today					
3.	Even a farmer with lot of experience should use new method of farming					
4.	Though it takes time for a farmer to learn new method it is worth the efforts taken					
5.	A good farmer experiments with new ideas in farming					
6.	Traditional methods of farming have to be changed in order to raise the living of farmers					

SA- Strongly agree, A – Agree, UD – Undecided, DA-Disagree, SDA-Strongly Disagree

14. Innovativeness

When would you prefer to adopt an improved agricultural technology?

a. As soon as it is brought to my knowledge.

b. After seeing other farmers have done it successfully

c. I prefer to wait and take my own time.

15. Progressiveness : Please give your answers to the following questions

S. No.	Questions	Response	
		Yes	No.
1.	A progressive farmer has to know about recently developed scientific practices Do you know about such practices?		
2.	A progressive farmer has to accept the improved practices which give more income		
3.	When new varieties are recommended, a progressive farmer has to help other farmers to adopt them. (a) Do you tell the other farmers about the benefits of new varieties? (b) Do you help other farmers to follow the improved practices?		

(Contd...)

S. No.	Questions	Response	
		Yes	No.
4.	A progressive farmer is one who adopts the improved practices immediately or follow ahead of others.		
	(a) In your village, are you the first person to adopt the improved practices?		
	(b) If no, have you adopted the practices recommended in the last two years?		
	(c) If yes, specify them		
5.	The progressive farmer should have contact with extension agency.		
	(a) Have you approached the extension workers to get their advice?		
6.	The progressive farmer should cultivate superior varieties or high yielding varieties.		
	(a) Did you cultivate such varieties in the last year?		
7.	The progressive farmer should fully follow the plant protection measures.		
	(a) Do you follow the seed treatment?		
	(b) Do you follow plant protection practices?		

16. Perception of adopters about technologies of RARS, Nandyal

Please give your perception about Narasimha cotton variety generated from RARS, Nandyal.

S. No.	Technology	HU	U	UD	NU	NAU
1.	Narasimha cotton variety					

HU – Highly useful, U – Useful, UD-Undecided, NU- Not useful, NAU – Not at all Useful

17. Marketing behaviour :

(a) Nature of marketing: When do you market your produce?

(a) After each picking is over (b) When all pickings are completed

(c) When cash is needed after completing pickings (d) When attractive price is prevailed

(b) Packing material : How do you pack your kapas for transport to market?

No Packing / Jute gunny bag / Polythene gunny bag

(c) **Means of transport:** How do you transport kapas to the market?

Bullock cart / Tractor / Lorry / Any other

(d) **Persons to whom you sold :** To whom do you sell kapas?

Commission agents / Regulated market / Ginning factory

(e) **Place of sale :** Where do you sell your kapas?

Locally / Near by town / Distant towns

(f) **Terms and conditions**

Under what terms and conditions you sell kapas?

Full advance payment / partly advance payment / cash and carry / partly cash and partly credit / credit sale / any other

(g) **What is your opinion about the existing market facility?**

Quite sufficient / sufficient / insufficient

(h) **What is your opinion about the prevailing market price?**

Very high / High / Medium / Low / Very Low

(i) **Grading**

(a) How do you grade your kapas?

By removing reminance of bracts from kapas / By removing insect damaged kapas / Based on the staple length

(b) Give your opinion about the present method of grading?

Quite sufficient / sufficient / insufficient

18. Feedback pattern

From the technology received, you might have come across some problems in its adoption. To whom you contact / communicate about this problem?

(a) RARS scientists
(b) KVK
(c) DAATT centre
(d) JDA
(e) DDA
(f) ADA
(g) AO
(h) AEO

PART II

Information Source Use Behaviour

S.No.	Information Source / Channel	Whether performed		Frequency of activity			Adequacy of information			Timelines of information			Credibility of the information		
		Yes	No	Occasionally	Often	Regularly	Less adequate	Adequate	Most adequate	After sowing	During sowing	Before sowing	Least credible	Credible	Most credible
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
A.	**Personal localite**														
	1. Family members														
	2. Friends														
	3. Neighbours														
	4. Relatives														
	5. Contact farmers/Progressive farmer														
	6. Input dealers														
	7. Village local leaders														
	8. Recorded personal experience														
B.	**Personal cosmopolite**														
	1. Scientists of RARS														
	2. KVK scientists														
	3. DAATT centre scientists														

(Contd...)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
	4. FTC personnel														
	5. State Department of Agriculture staff														
	6. A.Os of Nationalized bank														
	7. Input agency personnel														
	8. Other development departments of extension personnel														
	9. NGOs														
	10. Office call														
	11. Demonstration														
	12. Study tour/field trip														
	13. Group meeting/discussion														
	14. Campaigns														
	15. Personal letter														
	16. Training														
C.	**Impersonal Cosmopolite**														
	1. Farm broadcast														
	2. Farm telecast														
	3. Leaflets and folders														
	4. Agricultural magazines/bulletines														
	5. Agricultural films														
	6. Posters / charts														
	7. Circular letters														
	8. Field boards														
	9. Agricultural exhibition														
	10. Recorded casette														

PART III

A. Knowledge of farmers in Narasimha cotton cultivation

1. Specify the category of Narasimha cotton.
   (a) Mungari cotton variety (b) American cotton variety (c) Hybrid cotton

2. Specify the research station from which Narasimha cotton variety was developed (or) Generated
   (a) RARS, Nandyal (b) RARS, Lam (c) RARS, Tirupati

3. Specify the fungicide used for seed treatment
   (a) Carbendazym (b) Mancozeb (c) Any one of the two

4. Specify the dosage of fungicide for seed treatment
   (a) 2 gr/kg (b) 3 gr/kg (c) 4 gr/kg

5. Specify the quantity of Nitrogen to be applied at the time of sowing
   (a) 10 kg/ac (b) 15 kg/ac (c) 20 kg/ac

6. Specify the quantity of Phosphorus to be applied at the time of sowing
   (a) 10 kg/ac (b) 12 kg/ac (c) 15 kg/ac

7. Specify the quanity of Nitrogen recommended for top dressing
   (a) 10 kg/ac (b) 15 kg/ac (c) 20 kg/ac

8. Specify the time of pesticide application to control sucking pests
   (a) 15-20 DAS (b) 25-30 DAS (c) 35-40 DAS

9. Specify the concentration of chemical to control sucking pests
   (a) 1 ml/lit (b) 1.5 ml/lit (c) 2 ml/lit

10. Specify the number of pesticide applications to control sucking pests
    (a) 2 (b) 3 (c) 4
11. Specify the recommended pesticide for the control of white fly
    (a) Quinolphos (b) Monocrotophos (c) Triazophos

12. Specify the concentration of chemical to control whitefly
    (a) 1.5 ml/lit (b) 2.5 ml/lit (c) 3.5 ml/lit

13. Specify the time of pesticide application to control Bollworms
    (a) 30 DAS (b) 40 DAS (c) 50 DAS

14. Specify the quantity of pesticide spray fluid required to control bollworms
    (a) 150 lit/ac (b) 200 lit/ac (c) 250 lit/ac

15. Specify the important disease in cotton
    (a) Blackarm (b) Wilt (c) Leaf spots

B. Adoption of Narasimha Cotton Cultivation Practices

S. No.	Recommended Technology	Extent of adoption		
		Full adoption	Partial adoption	Non-adoption
1.	Plough the soil for 3 times			
2.	Application of 4t FYM/acre during the last ploughing			
3.	Seed rate @ 3 kg/acre			
4.	Optimum time of sowing is July month			
5.	Treating the seed with conc. H_2SO_4 @ 100 ml/kg			
6.	Seed treatment with carbendazym @ 2 g/lit/kg (or) Mancozeb @ 3g/lit/kg			
7.	Spacing – 60 x 45 cm			
8.	Thinning at 20 DAS			
9.	First Weeding at 20 DAS			
10.	Second Weeding at 30 DAS			
11.	Application of 10 kg N/acre as basal			
12.	Application of 12 kg P_2O_5/acre as basal			
13.	Top dressing with 10 kg N/acre at 30 DAS			
14.	Spraying of NAA @ 1 ml/4.5 lit (or) Tricontinol @ 0.5 ml/lit at 40 DAS and 60 DAS			
15.	Dusting of BHC 10% D at 10 DAS to control grasshoppers			
16.	Spraying of Metacystax / Rogor / Democran @ 1 ml/lit at 25-30 DAS to control sucking pests.			
17.	Spraying of Triazophos @ 2.5 ml/lit to control whitefly			
18.	Spraying of Ethion @ 1 ml/lit (or) Dicofol @ 3 ml/lit to control Redspider mite damage			
19.	Spraying of Endosulphon / Quinolphos/ Monocrolophos@ 2 ml/lit to control Stem borer damage			
20.	Spraying any one of pesticides to control Bollworms			
	Propenphos @ 2 ml/lit			
	Monocrotophos @ 1.6 ml/lit			
	Quinolphos @ 3 ml/lit			
	Endosulphon @ 2 ml/lit			
	Carbaryl @ 3 ml/lit			
	Chlorypyriphos @ 2.5 ml/lit			
	Acyphate @ 1.5 gr/lit			
	Thiodicarb @ 1.5 gr/lit			
	Indoxicarb @ 1.0 ml/lit			
	Cypermethrin/Fenvelrate @ 10 ml/13 lit for 1 time at 90 DAS			
21.	Spraying of Blitax @ 3.0 gr/lit + Poshamycin @ 0.1gr/lit to control Blackarm disease			

PART IV

A. Constraints faced by the farmer in adopting the recommended technologies

S. No.	Constraints	Yes/No
1.	Lack of irrigation facilities	
2.	Lack of suitable pest and disease control measures at low cost	
3.	Soil related problems	
4.	Non-availability of labour in time	
5.	High cost of labour	
6.	Inadequacy of required labour	
7.	Inadequate research on cotton intercropping system	
8.	Inadequate research on INM.	
9.	Inadequate research on IPM.	
10.	Inadequate storage facilities	
11.	Lack of proper marketing channel	
12.	Low support price.	

Others (Specify)

1.

2.

3.

B. Perceived Technology Needs of the Cotton growers

1.

2.

3.