A STUDY ON ADOPTION BEHAVIOUR OF KHARIF PADDY GROWERS IN RELATION TO RECOMMENDED PLANT PROTECTION MEASURES IN PANCHMAHALS DISTRICT, GUJARAT STATE

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1995
ABSTRACT
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A STUDY ON ADOPTION BEHAVIOUR OF KHARIF PADDY GROWERS IN RELATION TO RECOMMENDED PLANT PROTECTION MEASURES IN PANCHMAHAL DISTRICT, GUJARART STATE

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In fact socio-economic development of the country basically depends on agriculture. More than 70 per cent of its' population directly or indirectly depends on agriculture. The role of agriculture in the economic development of India can not be under estimated, as the largest segment of her population is wedded to agriculture and it accounts for nearly half of the national income.

Since, independence, the country has observed revolutionary changes in agriculture and allied fields, particularly in cereals like rice and wheat. This has helped the country in becoming self sufficient in food grains. Rice is staple food of more than half of the world population.
With the introduction of high yielding dwarf varieties, use of chemical fertilizers and multiple cropping pattern have enhanced food production but at the same time have also aggravated the pest and disease problem in paddy. Even with the advancement of improved plant protection technology and introduction of effective pesticides and fungicides has not reached to the farmers field satisfactorily. Adoption of plant protection measures in paddy has not achieved the desired level. To assess this situation practically "A study on adoption behaviour of kharif paddy growers in relation to recommended plant protection measures in Panchmahals district, Gujarat State" was undertaken.

OBJECTIVES OF THE STUDY

1. To study the selected personal, social and economic characteristics of the kharif paddy growers.

2. To study the sources of information utilized by the kharif paddy growers.

3. To find out the level of knowledge of kharif paddy growers pertaining to recommended plant protection measures.

4. To study the extent of adoption of recommended plant protection measures by the kharif paddy growers.
5. To find out the relationship between personal, social and economic characteristics of the kharif paddy growers and their extent of adoption of recommended plant protection measures.

6. To ascertain the relationship between knowledge level and adoption of kharif paddy growers regarding recommended plant protection measures.

7. To study the constraints faced by the kharif paddy growers in adoption of recommended plant protection measures.

8. To study the suggestions of kharif paddy growers to overcome the constraints.

METHODOLOGY

The present study was conducted in Lunawada and Santrampur talukas of Panchmahals district of Gujarat State. Kharif paddy cultivators who adopt the plant protection measures were the respondents for the study. Among the villages growing paddy crop, 10 villages (5 villages from each taluka) were selected randomly. Proportionate random technique was employed to select 180 respondents from selected villages and the respondents were personally interviewed.
The tool of the study was interview schedule. Cultivators were personally interviewed by the investigator himself.

To know the socio-economic status of the respondents a scale developed by Pareek and Trivedi (1965) was used with some modifications. Measurement of knowledge of plant protection measures in kharif paddy was done by using a teacher made test based on the scale developed by Jha and Singh (1970). Measurement of adoption was done by using scale developed by Sengupta (1967). A simple ranking techniques was applied to measure the sources of information and constraints in adoption of plant protection measures in kharif paddy.

The statistical tools used to analyse the data were percentage, mean, standard deviation and correlation co-efficient.

MAJOR FINDINGS

1. Majority of the paddy growers belonged to middle age group and had below secondary level of education.

2. Majority of the respondents were from higher caste status and nearly half (41.11 per cent) of them had no membership in any organisation.
3. About 40.00 per cent of the paddy growers possessed their land holding up to 2.0 hectares and more than half (60.00 per cent) of them engaged in "farming and animal husbandary" as their main occupation. About 58.89 per cent of them had their annual income above Rs.20,000/.

4. Village level worker was found the most consulted source of information in adoption of plant protection measures followed by insecticide/pesticide sale depot and television.

5. Most of the paddy growers (78.89 per cent) possessed midium level of knowledge about plant protection measures.

6. Majority of the respondents had knowledge regarding seed treatment, appearance of insect pests and diseases in field, and controlling insect pests and diseases.

7. Majority of the respondents (80.00 per cent) were found in medium adoption category.

8. Majority of the respondents had adopted seed treatment, controlling insect pests and diseases and granular insecticides.
9. Among the different personal and socio-economic characteristics of paddy growers, education, land holding and annual income were found positively and significantly correlated with their extent of adoption of recommended plant protection measures.

10. There was positive and significant relationship between knowledge level of paddy growers and their extent of adoption of recommended plant protection measures.

11. Major constraints faced by the paddy growers in adoption of plant protection measures were: 'high cost of chemicals', 'spraying not effective due to standing water', 'lack of knowledge regarding dose' and 'non availability of resistant variety'.

12. Major suggestions pointed out the paddy growers to overcome constraints faced were: 'reasonable price of plant protection chemicals', 'technical guidance should be give before start of paddy season' and 'paddy price should be fixed on the basis of net profit'.

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CERTIFICATE

This is to certify that the thesis entitled "A STUDY ON ADOPTION BEHAVIOUR OF KHARIF PADDY GROWERS IN RELATION TO RECOMMENDED PLANT PROTECTION MEASURES IN PANCHMAHALS DISTRICT, GUJARAT STATE" submitted by Shri Bharatkumar Jethabhai Patel in partial fulfilment of the requirements for the award of the degree of Master of Science (Agriculture) in the subject of EXTENSION EDUCATION of the Gujarat Agricultural University is a record of the bonafide research work carried out by him under my guidance and supervision and the thesis has not previously formed the basis for the award of any degree, diploma or other similar title.

Place : Anand
Date : 26th May 1995

(P. P. PATEL)
Major Advisor
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ANAND
May, 26 1995

(B. J. Patel)
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INTRODUCTION
CHAPTER - I

INTRODUCTION

Agriculture is the most important occupation in India. More than 70 per cent of the people depend directly or indirectly upon agriculture. The role of agriculture in the economic development of India can not be underestimated, as the largest segment of her population is wedded to agriculture and it accounts for nearly half of the national income. However, it is a well known fact that the rate of production per unit area is low and the total foodgrains produced are not significant to feed the population which is growing enormously.

Rice is the staple food of more than half of the world population. Its production is mainly concentrated in south and south-east Asian countries namely India, Japan, China, Java and Korea. Which together accounts for 90 to 92 per cent of the total area under paddy cultivation in the world. India produce three-fifth to two-fifth paddy production of the world. India is second, next to China in production but at bottom in production per hectare. With regards to food value it occupies second position with a production of 74.50 million tonnes (Venkateshwarlu, 1992) next to wheat because it contains easily digestible high quality starch, protein and vitamin B group. It acts as a
valuable source for many products. The crude rice bran is used for producing solidified oils, steric and oleic acid, glycerine and soaps. Rice husk is used as fuel in brick, cement and activated charcoal industries.

Paddy, unfortunately affected by many pests and diseases resulting in decreased yield as well as inferior quality. Among the pests that regularly infest the paddy crop like rice stem borer, leaf and plant hopper, rice skipper, leaf folder, army worm, rice weevil are very important. Stem borer and leaf and plant hopper are the key pests of national importance.

Major diseases that infect the paddy crop are Bacterial leaf blight, Blast, Brown leaf spot, False smut and Foot rot. Bacterial leaf blight of rice thought to be confined to Japan was also reported in Bombay in 1951 and in short time spread throughout the country. With the introduction of Taichung Native-1, the disease appeared in epidemic form in mid 80's resulted into serious threat to rice cultivation. The yield loss due to rice insect pests was about 30 per cent in Asia. In India, the annual loss by insect pests alone was estimated to the tune of 20 per cent causing a loss of Rs. 12,000/ crores. In another estimate the damage due to insects alone, in the absence of proper plant protection measures was assessed as 40.18 per
cent in India (Anonymous, 1984-85). There was a loss of 16.2 per cent in rice production due to insect pests in Asia (Cramer, 1967).

The hot and humid climate necessary for rice crop is conducive to the multiplication and survival of insects such as rice stem borers, leaf and plant hoppers etc. Consequently, the threat by minor pest also cause serious menace to rice cultivation. The introduction of high yielding dwarf varieties, use of chemical fertilizers and multiple cropping pattern have also aggrevated the pest and disease problem in rice crop. Rice is grown under submerged conditions, hence high yielding dwarf varieties become much susceptible to pest and diseases (Heinrich et al., 1978).

Keeping in this view, plant protection measures are most effective input in agriculture. Poor plant protection is a major cause for low yield in paddy. It is essential that after using all the inputs such as hybrid seeds, irrigation, fertilizers, insecticides, pesticides, fungicides, etc. we protect our crop from ravages of pests. In order to get sustainable yield, the integrated pest management must be followed as per recommendation. Not only this, but to grow paddy successfully, one should keep the attack of pest and disease below economic threshold level.
Agrochemical play a key role in Indian agriculture, being one of the vital inputs for improving agricultural productivity. As our farming sector is becoming more technology intensive and production oriented, safe and judicious use of pesticides has a great economic and environmental significance. Therefore, judicious use of plant protection measures against control of insect-pests and diseases are very important.

1.1 STATEMENT OF THE PROBLEM

Paddy is one of the important crop next to maize in Panchmahals district. The crop is heavily infested with numerous insect-pests and diseases. The losses caused by insect-pests and diseases is very high.

Adoption of plant protection recommendation is one of the important aspect of controlling pests and diseases. In spite of this fact, farmers are not adopting the recommendations properly and hence, the importance of systemic use of plant protection measures to control pests and diseases cannot be neglected.

Of course, a critique can ask the justification for studies in adoption of plant protection measures as it become expensive, but these factors reinforce the need for the study rather than lower its relevance. Comprehensive knowledge of the input use is an important determinant of
its wise use by the consumers. For generating information on this direction, this study is a modest footnote in developing sound and systematic knowledge in this regards.

There have been several studies on adoption of agricultural innovations and many on technological gaps. The detail analysis of plant protection practices in kharif paddy is almost absent in Panchmahals district of Gujarat State. With this in view the present research on "A study on adoption behaviour of kharif paddy growers in relation to recommended plant protection measures in Panchmahals district, Gujarat State" was undertaken.

1.2 OBJECTIVES OF THE STUDY

The overall objective of this study was "To study the extent of adoption of recommended plant protection measures by the kharif paddy growers in Panchmahals district of Gujarat State". The specific objectives of the study were as under:

1. To study the selected personal, social and economic characteristics of the kharif paddy growers.

2. To study the sources of information utilized by the kharif paddy growers.

3. To find out the level of knowledge of kharif paddy growers pertaining to recommended plant protection measures.
4. To study the extent of adoption recommended plant protection measures by the kharif paddy growers.

5. To find out the relationship between personal, social and economic characteristics of the kharif paddy growers and their extent of adoption of recommended plant protection measures.

6. To ascertain the relationship between knowledge level and adoption level of kharif paddy growers regarding plant protection measures.

7. To study the constraints faced by the kharif paddy growers in adoption of recommended plant protection measures.

8. To study the suggestions of kharif paddy growers to overcome the constraints.

1.3 IMPORTANCE OF THE STUDY

The statement of the objectives mentioned earlier would indicate the practical utility of this research. It is expected that the findings of this study may prove beneficial to know the personal and socio-economic characteristics of the paddy growers as well as their extent of adoption too. The study would be useful to extension workers to concentrate their efforts and energy to enhance their knowledge and accordingly spread and increase
adoption of plant protection measures to augment income of farmers. It also would provide feedback to research workers to develop the appropriate plant protection practices needed and suitable to farmers.

This study would also be useful to the planners, administrators, teachers and those who are directly or indirectly related with the development of plant protection technology.

For the students and academicians it will serve as a guideline who want to work on the same direction.

1.4 HYPOTHESES

In light of the above referred objectives the following null hypotheses were formulated.

1. There is no relationship between personal, social and economic characteristics of kharif paddy growers and their extent of adoption of recommended plant protection measures.

2. There is no relationship between level of knowledge and level of adoption regarding recommended plant protection measures of kharif paddy growers.

1.5 OPERATIONALISATION OF THE CONCEPTS USED

1. Adoption: Adoption is a process to continue full use of an innovation. In the present context it means
acceptance of full use of plant protection measures in kharif paddy.

2. **Knowledge**: It is a body of understood information possessed by the farmers in respect of recommended plant protection measures of paddy crop.

3. **Pest**: Any organism detrimental to man or his properties. In the present context pest is an organism which harms the rice crop.

4. **Pest control**: Any method employed to reduce the pest population and to prevent damage caused by pests in paddy.

5. **Insect pest**: Any organism or pest causing economic damage to the paddy crop.

6. **Insecticides**: The chemicals which kill the insects by their chemical action are called insecticides.

7. **Pesticides**: Chemical substance useful for controlling the living pest organisms and to reduce their population are known as pesticides.

8. **Diseases**: Disease is an interaction among the host, parasite and environment. It is any departure from health, preventing marked symptoms malady, illness and disorder.
9. **Fungicide** : A fungicide is an agent that kills or inhibit the development of fungus spore or mycellium.

10. **Constraints** : This refers to the items of difficulties faced by the farmer in actual adoption of recommended agricultural technology.

1.6 **LIMITATIONS OF THE STUDY**

On account of limited time and resources available with the investigator, the study was undertaken with the following limitations.

1. The study was limited to only 180 paddy growers of ten villages of two talukas (i.e. Lunawada and Santrampur) of Panchmahals district of Gujarat State.

2. Only some selected personal and, socio-economic characteristics of the paddy growers were included in the study.

3. Findings drawn in this study were based on the verbally expressed opinions by the respondents and their honesty in providing requisite information of the study.
REVIEW
OF
LITERATURE
CHAPTER - II

REVIEW OF LITERATURE

The main purpose of this chapter is to organise and present the findings of the recent research studies which are related to the present investigation. The literature reviewed, so far, had revealed that very few systematic studies have been conducted on the investigation undertaken for this study, a brief account of related literature reviewed is presented in this chapter.

A brief account of these findings given by field workers, research workers and experts in different time is presented in this chapter under following heads:

2.1 Personal, social and economic characteristics of the respondents.

2.2 Sources of information utilized by the respondents regarding improved cultivation practices in different crops.

2.3 Knowledge level of the respondents regarding plant protection measures in different crops.

2.4 Extent of adoption of plant protection measures used by the growers in different crops.
2.5 Relationship between personal and socio-economic characteristics of the respondents and their extent of adoption of recommended cultivation practices in different crops.

2.6 Relationship between knowledge level of the respondents and their extent of adoption.

2.7 Constraints faced by the crop growers in adoption of plant protection measures in different crops.

2.8 Suggestions pointed out by the respondents to overcome the constraints.

2.1 Personal, social and economical characteristics of the respondents

2.1.1 Personal characteristics

2.1.1.1 Age

Age is one of the important factors which may influence the adoption of recommended plant protection measures in kharif paddy in remote area.

Ghose (1982) reported that majority of the farmers belonged to the age group of 31 to 45 years.

Bhatol (1987) observed that nearly two third of the respondents were in the age group of 31 to 50 years.
Puranik et al. (1992) observed that majority of the respondents were in the age group of 36 to 50 years.

Patel (1993) concluded that majority of the contact and non contact farmers are from middle age group (31 to 50 years)

2.1.1.2 Education

Education is the process of bringing desired change in the adoption. So it is in generally believed to have the effect of widening the mental horizons of a person and thereby prepare him to be receptive to new ideas, that is why the education of the farmers is the most important factor.

Joshi (1979) revealed that the respondents were literate having primary and high school level education to the extent of 25.72 and 13.57 per cent respectively. Nearly one half of the respondents were illiterate.

Perumal and Menon (1986) concluded that majority of the contact farmers (58.00 per cent) were educated upto secondary level.

Patel (1990) revealed that nearly three-fourth (72.00 per cent) of the respondents were educated upto primary and secondary level.
Deswal (1993) observed that majority of the adopters (57.50 per cent) and nonadopters (65.00 per cent) were having secondary and primary level of education, respectively.

2.1.2 Social characteristics

2.1.2.1 Caste

Agarwal (1984) revealed that majority of respondents belonged to higher caste while studying plant protection measures in sugarcane.

Lavania (1989) concluded that most of trained farmers (76.00 per cent) and untrained farmers (62.67 per cent) belonged to higher caste group.

Suthar (1989) observed that a great majority of the respondents belonged to intermediate caste.

Deswal (1993) indicated that majority of adopters (90.00 per cent) and nonadopters (52.50 per cent) were from higher caste group.

2.1.2.2 Social participation

Social participation is most important social characteristics of the adopters. The membership in a village organisation is related with adoption process.
Vaghani (1982) said that majority of the adopters (55.00 per cent) were members in one village organisation followed by membership in more than one organisation (20.00 per cent).

Bhatol (1987) reported that majority of the respondents were members (64.67 per cent) in more than one organization, followed by member in one social organisation (19.33 per cent) and no-membership (6.67 per cent) whereas, only 9.33 per cent respondents were position holders.

Patel (1989) reported that majority of the trained (60.00 per cent) and untrained farmers (60.00 per cent) were members in one organisation.

Deswal (1993) stated that majority of the adopters (58.75 per cent) and non-adopters (60.00 per cent) were members in one organisation.

Patel (1993) revealed that majority of the contact (64.00 per cent) and non-contact (72.00 per cent) farmers were members in one organisation.

2.1.3 Economic characteristics

2.1.3.1 Size of land holding

The size of land holding cultivated by a farmer contributes much in adoption of improved agriculture...
practices. The size of land holding varies from area to area. From number of research studies it can be said that with the increase in size of land holding, there is also an increase in number of adopters.

Patel (1981) reported that nearly one third of the respondents (30.28 per cent) were found to have land holding upto 2.0 hectares, whereas 29.83 and 24.63 per cent respondents were having 2.1 to 4.0 hectares and 4.1 to 6.0 hectares of land, respectively.

Kalra (1983) revealed that more than one third of the contact farmers (53.75 per cent) had farm size more than 4.0 hectares followed by 16.07 per cent between 1.0 to 2.0 hectares and 15.18 per cent respondents were from marginal and medium farm size.

Vasoya et al. (1983) concluded that majority (82.00 per cent) of the contact farmers had large size of land holding, while only 18.00 per cent contact farmers had small size land holding.

Shukla (1985) concluded that majority (90.00 per cent) of the respondents were found to have land holding below 5 acres.

Bhatt (1990) indicated that more than half of the respondents (51.33 per cent) were having small size of land
holding followed by more than one-third respondents (38.00 per cent) belonged to middle size holding category, whereas only 10.67 per cent respondents had large size of land holding.

Deswal (1993) showed that half of the farmers had land holding more than four hectares while 40.00 per cent farmers had land holding between 1.1 to 2.0 hectares.

2.1.3.2 Occupation

Reddy and Reddy (1986) studied that agriculture was the main occupation of majority of farmers.

Sarkar and Reddy (1986) revealed that agriculture was the main occupation of contact as well as non contact farmers (83.33 per cent).

Bhatol (1987) found that majority of the respondents (80.67 per cent) were completely dependent on farming only, 8.66 per cent were dependent on farming and service, while 6.67 per cent on farming and labour work and 4.00 per cent on farming and business.

Patel (1993) observed that 58.00 per cent of respondents had their main occupation as farming only while, 36.00 per cent contact farmers had occupation farming and dairy.
2.1.3.3 Annual income

Transfer of technology requires more inputs in the form of money, labour etc. It is well known fact that economic condition of farmers play an important role in adopting new improved practices.

Vasoya et al. (1983) revealed that more than half (54.00 per cent) of the contact farmers had high annual income, 26.00 per cent contact farmers had medium annual income and 20.00 per cent had low annual income.

Thakrar (1986) stated that majority of the respondents (53.77 per cent) had gross annual income of above Rs. 10,000/- followed by 36.00 per cent who had gross annual income between Rs. 5,000/- to Rs. 10,000/- whereas only 6.67 per cent had gross annual income upto Rs. 5,000/- per annum.

Bhatol (1987) revealed that 36.00 per cent of the respondents had annual income upto Rs. 5,000/- followed by 32.00 per cent each having annual income between Rs. 5,000/- to Rs. 10,000/- and above Rs. 10,000/-, respectively.

Bhatt (1990) reported that two third of the respondents (66.67 per cent) belonged to low income group i.e. upto Rs. 3,000/- per annum. Whereas, 24.34 per cent and 8.00 per cent had an annual income of Rs. 3,000/- to Rs. 5,000/- and above Rs. 5,000/-, respectively.
Deswal (1993) concluded that majority of the adopters (86.25 per cent) and non adopters (70.00 per cent) belonged to high income group (above Rs. 12,000/-).

2.2 SOURCES OF INFORMATION UTILISED BY THE RESPONDENTS REGARDING IMPROVED CULTIVATION PRACTICES IN DIFFERENT CROPS

The communication sources are important stimuli to the individual in the adoption process. It provides a link to transfer of technology between the diffusion of an innovation and its final adoption. Thus, adoption of innovation is a result of contact with the source of information. There are various sources of information from which the farmers can get information of new technology in agriculture.

Maladiya and Rajwadi (1976) found that most important sources of information were village level workers, relatives, neighbours and radio.

Kamble et al. (1987) found that VLW was the main source of information regarding use of bio-fertilizers.

Thakur et al. (1991) revealed that important sources of information of mango growers about horticultural development programme were radio, extension workers and television.
Girase et al. (1991-92) reported that among all the sources of information VLW (T & V system) was found most credible and referred by as many as 70.00 per cent of the tribal contact farmers.

2.3 KNOWLEDGE LEVEL OF THE RESPONDENTS REGARDING RECOMMENDED PLANT PROTECTION MEASURES IN DIFFERENT CROPS

Babu (1979) observed that knowledge level of rice growers regarding plant protection was medium.

Ray (1980) concluded that 49.17 per cent contact farmers were in high knowledge group, 49.17 per cent were in medium knowledge group and only 1.66 per cent were in low knowledge group.

Sharma et al. (1988) revealed that about 50.00 per cent of farmers had medium level of knowledge about pests, diseases, insecticides and pesticides.

Nasir (1989) reported that 27.67 per cent of contact farmers were in high knowledge group. Whereas, 60.00 per cent of them were in medium knowledge group and 13.33 per cent were in the low knowledge group.

Suryanarayana (1990) stated that 23.00 per cent of contact farmers had high knowledge level, 63.00 per cent had medium knowledge level and 14.00 per cent had low knowledge level.
Deswal (1993) showed that about 75.00 per cent of respondents (adopters) had medium knowledge level followed by 16.25 per cent who had high knowledge level.

2.4 EXTENT OF ADOPTION OF PLANT PROTECTION MEASURES USED BY THE GROWERS IN DIFFERENT CROPS

Patel (1981) studied that 65.49 per cent farmers were nonadopters of plant protection measures.

Singh (1984) observed that 75.00 per cent farmers were medium adopters.

Gupta (1987) studied that 61.00 per cent of the contact farmers were non-adopters regarding seed treatments while 83.25 per cent farmers did not adopt plant protection practices in main field.

Patil and Jadav (1987) reported that about 47.00 per cent of the onion growers adopted plant protection measures against the pests and diseases.

Sood (1987) revealed that 64.50 per cent farmers were in high gap category in regard to plant protection measures.

Deswal (1993) stated that majority of the adopters (78.75 per cent) were having medium extent of adoption of recommended plant protection measures in kharif rice followed by 11.25 per cent having low extent of adoption and 10.00 per cent were having high extent of adoption.
2.5 RELATIONSHIP BETWEEN SELECTED PERSONAL, SOCIAL AND ECONOMIC CHARACTERISTICS OF THE RESPONDENTS AND THEIR EXTENT OF ADOPTION OF RECOMMENDED CULTIVATION PRACTICES IN DIFFERENT CROPS

The characteristics differ from one respondent to another. The characteristics of the respondents are important factor influencing the extent of adoption of plant protection measures in rice cultivation.

2.5.1 Personal characteristics

2.5.1.1 Age and adoption

Wagh (1975) found that age showed significant association with adoption.

Ansari (1982) reported that age of the farmers was not associated with adoption.

Reddy and Reddy (1988) reported that age was negatively related with adoption of improved paddy cultivation practices.

Patil and Waghdhre (1989) revealed that age of banana growers was significantly associated with adoption of banana cultivation technology.

Sakharkar et al. (1992) reported that there was no relationship between farmers extent of adoption of improved practices and their age.
2.5.1.2 Education and adoption

Patel (1982) reported that formal education of the respondents had positive and highly significant association with their level of adoption.

Tripathi (1985) found that there was no relationship between education and extent of adoption.

Patel (1987) observed that there was significant relationship between farmers extent of adoption of Hybrid-6 cotton technology and their education.

Patil and Waghdhare (1989) studied that education of banana growers was found to be significantly associated with adoption of banana cultivation technology.

2.5.2 Social characteristics

2.5.2.1 Caste and adoption

Singh (1974) stated that adoption was higher in higher caste.

Joshi (1979) reported that there was no significant relationship between caste and extent of adoption.

Patel (1987) observed that there was nonsignificant relationship between caste and Hy-6 cotton cultivators and their extent of adoption.
Deswal (1993) revealed that there was significant relationship between caste and extent of adoption of recommended plant protection measures in kharif paddy.

2.5.2.2 Social participation and adoption

Singh (1984) found that there was relationship between social participation and adoption of improved crop practices of contact farmers.

Tripathi (1985) observed that there was no relationship between social participation and extent of adoption.

Bhatol (1987) generalised that there was significant relationship between social participation and adoption of recommended paddy cultivation practices.

Sakharkar et al. (1992) reported that there was highly significant relationship between social participation and adoption of recommended soybean cultivation practices.

2.5.3 Economic characteristics

2.5.3.1 Size of land holding and adoption

Sinha and Sinha (1980) observed that size of land holding was not associated with the adoption.

Popat (1984) revealed that extent of adoption of groundnut growers had no significant relationship with their size of land holding.
Reddy and Reddy (1988) found that farm size was highly significantly related with adoption.

Anonymous (1992) reported that the adoption of phosphatic fertilizers on paddy crop was found to be significantly associated with size of land holding.

2.5.3.2 Occupation and adoption

Patel (1981) stated that there was no significant relationship between occupation and the adoption.

Bhatol (1987) found that occupation was significantly associated with the adoption in kharif paddy technology.

Patel (1989) revealed that extent of adoption of castor had no association with the occupation of trained farmers.

Deswal (1993) concluded that occupation and extent of adoption of plant protection measures in kharif rice were not significantly related.

2.5.3.3 Annual income and adoption

Thakrar (1986) found that income of the respondents was statistically significant with their extent of adoption in summer groundnut technology.
Bhatol (1987) found that income level was directly associated with the extent of adoption in kharif paddy technology.

Patel (1989) reported that extent of adoption of castor had positively and highly significant correlation with annual income.

Deswal (1993) concluded that annual income of the adopters of plant protection measures in kharif paddy was not significantly related with their extent of adoption.

2.6 RELATIONSHIP BETWEEN KNOWLEDGE LEVEL OF THE RESPONDENTS AND THEIR EXTENT OF ADOPTION

Sethy et al. (1984) concluded that education was main factor influencing the knowledge of the farmers, thus knowledge of technology ultimately resulted in promoting the farmers’ adoption of recommended practices.

Jaiswal (1985) reported that there was a significant and positive correlation between level of knowledge and level of adoption of recommended technology.

Deswal (1993) observed that extent of adoption of plant protection measures had significant correlation with the knowledge level of kharif rice growers.
2.7 CONSTRAINTS FACED BY THE CROP GROWERS IN ADOPTION OF PLANT PROTECTION MEASURES IN DIFFERENT CROPS

Ray (1980) reported that high price of chemicals appeared to be (50.85 per cent in contact farmers and 39.17 per cent in fellow farmers) most serious problem in adoption of plant protection measures in paddy.

Patel (1981) concluded that majority of the respondents (61.27 per cent) expressed lack of knowledge as main constraint in adoption of plant protection measures in main field while 85.92 per cent of the respondents confessed that lack of knowledge in seed treatment was major constraint.

Anonymous (1990-91) studied that high cost of plant protection chemicals, economic weak condition of the farmers and lack of proper knowledge about plant protection measures were major constraints for nonadoption.

Deswal (1993) concluded that main constraints faced by both the adopters and nonadopters jointly in adoption of plant protection measures in kharif paddy were

(a) spraying not effective due to standing water,
(b) high cost of chemicals,
(c) lack of knowledge and
(d) complete immunity was not ensured.
2.8 SUGGESTIONS POINTED OUT BY THE RESPONDENTS TO OVERCOME THE CONSTRAINTS

Patel (1981) stated that regular visit of VLW, subsidy in inputs, reasonable price of inputs and paddy price should be fixed on net profit basis were the major suggestions which were stressed by the majority of the paddy growers.

Trivedi (1984) concluded that most of the respondents had suggested "arrangement for easy availability of inputs should be made", "training for new agricultural technology should be arranged", "Provision for sufficient finance for crop loan should be made" and "provision of long term loan for creating irrigation facilities should be made".

Patel (1993) showed that majority of contact and non-contact farmers suggested that there should be low price of chemicals followed by the quality of chemicals should be good, price of chillies should be increased and training should be given to farmers regarding plant protection measures.
METHODOLOGY
CHAPTER - III

METHODOLOGY

This chapter deals with the description of procedure followed for carrying out this investigation. It contains the research design, the tools and techniques including the interview schedule employed for the data collection for this study. The selection of universe and sampling techniques for investigation as well as devices used for analysis of data are also explained in this chapter under the following heads:

3.1 Plan of the study
3.2 Area of the study
3.3 Sampling technique
3.4 Tool of the study
3.5 Pre-testing of the interview schedule
3.6 Collection of the data
3.7 Statistical framework for analysis of data

3.1 PLAN OF THE STUDY

The present study was conducted to know the personal, social and economic characteristics of the paddy growers, their level of knowledge, level of adoption of recommended plant protection technology and constraints
faced by them. This study was conducted in Lunawada and Santrampur talukas of Panchmahals district of Gujarat state.

Cultivation of paddy crop is not new to the farmers of these talukas eventhough the yield per hectare is very low due to either fully or partially non adoption of recommended plant protection technology to combat infestation of insect-pests and diseases.

The rice crop is being attacked by numerous insect pests and diseases and therefore, farmers are deprived of their due profit. The attack of insect pests and diseases is so frequent and severe that farmers have no option to adopt plant protection measures against them. The use of insecticides and fungicides are towards increasing trend. So far no such work was initiated scientifically in this area. Hence, the present investigation was conducted.

3.2 AREA OF THE STUDY

The present study was carried out in Panchmahals district of Gujarat state. The soil type of the district is mainly clay loam to sandy loam. Canals and wells are considered as main source of irrigation. Other important crops grown are maize, bajra, jowar and other cereal crops.

In view of fact that time available with the investigator was limited, only two talukas were selected for the study. Out of eleven talukas of Panchmahals district,
among them Lunawada and Santrampur talukas were purposively selected for the study in favour of following reasons.

(1) Highest area under kharif paddy in selected talukas.

(2) The investigator belongs to Lunawada taluka and aware of local people and situations, so good rapport could be developed.

(3) The district Panchmahals included in Anand zone of the Gujarat Agricultural University, where the researcher was studying.

The location of selected talukas and villages have been shown in Fig. 1.

3.3 SAMPLING TECHNIQUE

In present investigation, two stage simple random sampling was done. In the first stage of selection, a list of villages growing kharif paddy of the two talukas i.e. Lunawada and Santrampur were obtained from Zilla Panchayat Office, Agriculture Department, Panchmahals district, Godhra. From this list, five villages from each talukas were selected randomly consisting of total ten villages.

From the selected villages, out of 1415 farmer, 914 were identified as kharif paddy growers. Villagewise list of these farmers were prepared. From each village, 20 per cent of its population were interviewed randomly. The villagewise distribution of the respondents are given in Table 1.
FIG. 1 : MAP OF PANCHMAHALS DISTRICT SHOWING SELECTED TALUKAS AND SELECTED VILLAGES

1. Parampur
2. Malie
3. Vadi
4. Kantha
5. Madva
6. Barela
7. Mankodia
8. Kadibel
9. Gochr
10. Munpur

SELECTED TALUKA

SELECTED VILLAGE
### TABLE 1

VILLAGEWISE DISTRIBUTION OF THE RESPONDENTS

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of village</th>
<th>Name of Taluka</th>
<th>Total No. of farmers</th>
<th>Total No. of paddy growers</th>
<th>Respondents selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Parampur</td>
<td>Lunawada</td>
<td>65</td>
<td>52</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Malia</td>
<td>&quot;</td>
<td>52</td>
<td>37</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Vadi</td>
<td>&quot;</td>
<td>155</td>
<td>130</td>
<td>26</td>
</tr>
<tr>
<td>4</td>
<td>Kantha</td>
<td>&quot;</td>
<td>135</td>
<td>96</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>Madvas</td>
<td>&quot;</td>
<td>247</td>
<td>154</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>Barela</td>
<td>Santrampur</td>
<td>68</td>
<td>45</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>Mankodia</td>
<td>&quot;</td>
<td>78</td>
<td>57</td>
<td>11</td>
</tr>
<tr>
<td>8</td>
<td>Kadibel</td>
<td>&quot;</td>
<td>235</td>
<td>127</td>
<td>25</td>
</tr>
<tr>
<td>9</td>
<td>Godhr</td>
<td>&quot;</td>
<td>245</td>
<td>118</td>
<td>23</td>
</tr>
<tr>
<td>10</td>
<td>Manpur</td>
<td>&quot;</td>
<td>135</td>
<td>98</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>1415</strong></td>
<td><strong>914</strong></td>
<td><strong>180</strong></td>
</tr>
</tbody>
</table>

### 3.4 TOOL OF THE STUDY

The tool used for the study was well structured pre-tested Gujariti version interview schedule. Keeping in view the objectives of the study, the interview schedule was developed. In formulating questions and statements for schedule, the investigator secured technical guidance from the available literature, teaching staff of the Extension, Entomology and Pathology Department of B. A. College of
Agriculture, Anand and on the basis of their guidance and suggestions, the interview schedule was revised and then it was divided into the following six parts.

First part of the interview schedule was developed to study the personal, social and economic characteristics of the respondents.

Second part of the interview schedule was developed to study the various sources of information utilised by the respondents for getting information regarding plant protection measures in kharif rice crop.

Third part of the interview schedule was developed to determine the level of knowledge about recommended plant protection measures in kharif paddy.

Fourth part of the interview schedule was developed to ascertain the extent of adoption of recommended plant protection measures in kharif paddy by the respondents.

Fifth part of the interview schedule was developed to study various constraints experienced by the respondents in adoption of recommended plant protection measures in kharif paddy.

Sixth part of the interview schedule was developed to study the suggestions to overcome constraints
experienced by the respondents in adoption of recommended plant protection measures in kharif paddy.

3.5 PRE-TESTING OF INTERVIEW SCHEDULE

Pre-testing of interview schedule was done to find out whether the questions were clear to the respondents or not. Before finalizing the interview schedule, it was pre-tested with 30 paddy cultivators of nearby village Kalva which was not included in the study. The respondents were explained about the purpose of the study before conducting interview. On the basis of the experience gained, wording of the questions and statements were corrected in the final format of the interview schedule.

3.6 COLLECTION OF THE DATA

The data were collected by personal interview schedule from 180 respondents in 10 villages of Lunawada and Santrampur talukas during the month January and February, 1995. Before taking the interview, the investigator introduced himself to the respondents. The objectives of the study were explained to them with a view to facilitate in giving correct responses. The questions from the schedule were asked one by one and their responses were recorded. Every possible care was taken to maintain congenial atmosphere to get unbiased operations of the respondents. Help of local leaders like Sarpanch, Chairman of Co-
operative Society were sought by the investigator for personal approach. The respondents were contacted at their home or at community place and on some cases on their farm.

3.7 STATISTICAL FRAME WORK FOR ANALYSIS OF DATA

All the responses recorded in the interview schedule were transferred to master sheet to describe personal, social and economic characteristics and sources of information utilized by them. Their level of knowledge about recommended plant protection practices in kharif paddy, extent of adoption of recommended plant protection practices in kharif paddy, constraints experienced by them in adoption of recommended plant protection practices in kharif paddy and suggestions to overcome constraints experienced by the respondents in adoption of recommended plant protection practices in kharif paddy.

The following statistical tools were used for interpretation of data.

1. Percentage : The simple comparisons were made on the basis of percentage.

2. Mean Score : This was obtained by total score divided by the number of respondents.

3. Standard deviations : This was obtained by the square root of the average of the squared deviation from mean.
4. Co-efficient correlation 'r': It is the measurement of association between two variables.

3.7.1 Measurement of personal and socio-economic variables

To describe respondents according to their personal and socio-economic characteristics, the respondents were grouped into various categories on the basis of available data as under.

3.7.1.1 Age

It refers to chronological age of the respondents at the time of investigation which was recorded by asking them. The data regarding age of the respondents were collected and divided into three groups.

(a) Young age group (upto 30 years)

(b) Middle age group (31 to 50 years)

(b) Old age group (above 50 years)

Four qualitative characters like education, caste, social participation and occupation were converted into quantitative as per scale developed by Pareek and Trivedi (1965) with due modification.
3.7.1.2 Education

It refers to formal education obtained by the respondents in terms of their level of education. The respondents were classified into four groups according to their educational level and measured with score assigned as per SES scale developed by Pareek and Trivedi (1965).

<table>
<thead>
<tr>
<th>Education level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Illiterate</td>
<td>0</td>
</tr>
<tr>
<td>(b) Primary (1 to 7th standard)</td>
<td>1</td>
</tr>
<tr>
<td>(c) Secondary (8 to 10th standard)</td>
<td>2</td>
</tr>
<tr>
<td>(d) Higher Secondary (11th and 12th standard)</td>
<td>3</td>
</tr>
<tr>
<td>(e) College level and above</td>
<td>4</td>
</tr>
</tbody>
</table>

3.7.1.3 Caste

Caste is one of the important characteristics of the farmer, as the social status of the individual farmer indirectly effects his thoughts, beliefs, innovativeness etc. Caste of the respondents was divided into three categories and measured with score assigned as per SES scale developed by Pareek and Trivedi (1965).
Caste Score

(a) Higher caste (Bania, Patel, Brahmin Rajput) 3
(b) Middle caste (Thakor, Kolipatel, Bharwad, Luhar and Kadia) 2
(c) Lower caste (Schedule caste and Schedule tribe) 1

3.7.1.4 Social participation

Information regarding membership in the formal organization was collected and categorized into four groups and measured with score assigned as per SES scale developed by Pareek and Trivedi (1965).

Social participation Score

(a) No membership 0
(b) Membership in one organization 1
(c) Membership in more than one organization 2
(d) Position holding in any organization 3

3.7.1.5 Size of land holding

Land holding is an important factor which determines the economic status and potentiality of the farmer to adopt high cost cropping system and allied enterprises. It was measured by number of hectares of land
owned and cultivated by the respondents. Size of land holding of respondents grouped as under:

(a) Upto 2.0 hectares  
(b) 2.01 to 4.0 hectares  
(c) Above 4.0 hectares

3.7.1.6 Annual income

This refers to the total income earned by the respondents from all sources per annum. Annual income of the respondents was categorized as under:

<table>
<thead>
<tr>
<th>Annual income</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Upto Rs. 10,000/-</td>
<td>1</td>
</tr>
<tr>
<td>(b) Rs. 10,001/ to 20,000/-</td>
<td>2</td>
</tr>
<tr>
<td>(c) Above Rs. 20,000/-</td>
<td>3</td>
</tr>
</tbody>
</table>

3.7.1.7 Occupation

Occupation of the respondents refers to their engagement in different activities through which they earn their livelihood. It also helps in indicating their annual income and outside interactions. The data collected from the respondents about their occupation were categorized into four groups and measured with score assigned as per SES scale developed by Pareek and Trivedi (1965).
3.7.2 Accessibility of various sources of information

The methodology adopted to know the accessibility of various sources of information was simple ranking system. Each respondent was asked to mention from which source, he got the information regarding recommended plant protection measures in kharif paddy in order of accessibility viz., always, sometimes and never. Afterwards the rank mean value was then calculated by giving arbitrary score 2, 1 and 0 respectively.

\[
\text{Total score} = \frac{\text{Mean score}}{\text{No. of respondents}}
\]

The sources of information were grouped into three categories.

(a) Formal sources of information
(b) Informal sources of information
(c) Mass media
3.7.3 Measurement of knowledge

To measure the knowledge of respondents about the recommended practices, a teacher made scale based on scale developed by Jha and Singh (1970) was administered in the study. The knowledge index was calculated for each respondents with the help of formula given below:

\[
\frac{X_1 + X_2 + \ldots + X_n}{N} \times 100
\]

Where,

\(K_i = \text{knowledge index}\)

\(X_1 + X_2 + \ldots + X_n = \text{Total number of correct answer}\)

\(N = \text{Total No. of items in the test}\)

The respondents were grouped into three levels of knowledge by using following formula:

1. **Low level of knowledge**: \(< \bar{X} - \text{S.D.}\)

2. **Midium level of knowledge**: In between lower and upper limit
   \((\text{between } < \bar{X} - \text{S.D. to } > \bar{X} + \text{S.D.})\)

3. **High level of knowledge**: \(> X + \text{S.D.}\)
3.7.4测量采用程度

为了测量overall extent of adoption of recommended plant protection practices in kharif paddy by respondents, a simple adoption scale developed by Sengupta (1967) was used in present study.

Adoption (A.Q.) = \frac{\text{Number of practices used}}{\text{Number of recommended practices}} \times 100

The A.Q. was calculated for each respondent. Later on, all the respondents were classified into three levels of extent of adoption by using the following formula.

1. Low level of knowledge : < X - S.D.
2. Midium level of knowledge : In between lower and upper limit (between < X - S.D. to > X + S.D.)
3. High level of knowledge : > X + S.D.

To measure the practiceswise adoption of recommended plant protection practices of kharif paddy crop, the practiceswise responses were classified into different suitable groups. Afterwards, frequencies and percentage were counted and calculated for making comparisons.
3.7.5 Constraints experienced by the respondents in adoption of recommended plant protection measures in kharif rice crop

To measure the constraints in adoption of recommended plant protection measures in kharif paddy, a simple ranking technique was applied. Each adopter was asked to mention his constraints in adoption, in order of degree of difficulties. Constraints experienced by them were measured with the help of four points rating scale. Mean score was calculated by dividing the total score by the number of respondents and then ranked according to their mean score. Rating scales are given below:

<table>
<thead>
<tr>
<th>Degree of constraints</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Very much</td>
<td>3</td>
</tr>
<tr>
<td>(ii) Much</td>
<td>2</td>
</tr>
<tr>
<td>(iii) Less</td>
<td>1</td>
</tr>
<tr>
<td>(iv) Not at all</td>
<td>0</td>
</tr>
</tbody>
</table>

3.7.6 Suggestions to overcome constraints experienced by the respondents in adoption of plant protection measures of kharif paddy

Considering the constraints faced by the kharif paddy growers and to overcome the same in cultivating kharif paddy successfully, respondents were asked to give their valuable suggestions. The suggestions offered were ranked on
the basis of number of respondents reported for the respective suggestions.

3.7.7 **Measurement of relationship between different independent and dependent variables**

To identify relationship between dependent and independent variables viz., age, education, land holding, annual income, knowledge of plant protection measures with their adoption, the Pearson product moment method (Garret, 1967), of computing correlation co-efficient was used in the present study which provides generally accepted means for measuring relationship.

The correlation of co-efficient gives two kinds of informations (1) an indication of the magnitude of the relationship and (2) information about the direction of relationship whether positive or negative. For computing Pearson product moment correlation of co-efficient following formula was used:

\[
 r = \frac{\Sigma XY - \Sigma X \cdot \Sigma Y / n}{\sqrt{(\Sigma X^2 - (\Sigma X)^2/n) (\Sigma Y^2 - (\Sigma Y)^2/n)}}
\]

Where,

- \( r \) = Correlation co-efficient between X and Y
- \( X \) = Variable X
- \( Y \) = Variable Y
- \( n \) = Number of observations
FINDINGS
AND
DISCUSSION
CHAPTER - IV

FINDINGS AND DISCUSSION

This chapter deals with the findings and discussion of the study in detail. The data collected through interview schedule were classified, tabulated, analysed, presented interpreted and discussed in a systemic way. The appropriate statistical tests were applied wherever necessary. The facts and findings of the study have been presented under the following heads.

4.1 Personal, social and economic characteristics of the respondents.

4.2 Sources of information utilized by the farmers in adoption of recommended plant protection measures in kharif paddy.

4.3 Knowledge level of the farmers regarding recommended plant protection measures in kharif paddy.

4.4 Extent of adoption of recommended plant protection measures by the kharif paddy growers.

4.5 Relationship between personal, social and economic characteristics of the farmers with the knowledge level regarding recommended plant protection measures in kharif paddy.
4.6 Relationship between knowledge level of the farmers and extent of adoption plant protection practices of kharif paddy.

4.7 Constraints experienced by the kharif paddy growers in adoption of recommended plant protection measures.

4.8 Suggestions to overcome constraints experienced by the kharif paddy growers in adoption of recommended plant protection measures.

4.1 PERSONAL, SOCIAL AND ECONOMIC CHARACTERISTICS OF THE RESPONDENTS ABOUT RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY

Adoption is viewed as a complex process which is influenced by various personal and socio-economic characteristics of the paddy cultivator like age, education, caste, social participation, occupation, land holding and annual income. These characteristics are considered as important factors in adoption of agriculture innovations. In this study these characteristics have been studied and results are presented as under.

4.1.1 Personal characteristics

4.1.1.1 Age

Age is the factor which may have some influence on adoption of recommended plant protection measures. The
respondents were asked to indicate their age in completed years. To study this factor, the respondents were grouped into three categories viz., (i) group of upto 30 years, (ii) between 31 to 50 years and (iii) above 50 years. The data collected from the respondents about their age are presented in Table 2.

**TABLE 2**

DISTRIBUTION THE RESPONDENTS ACCORDING TO THEIR AGE  
(N = 180)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Age group</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Upto 30 years</td>
<td>16</td>
<td>8.89</td>
</tr>
<tr>
<td>2.</td>
<td>31 to 50 years</td>
<td>94</td>
<td>52.22</td>
</tr>
<tr>
<td>3.</td>
<td>Above 50 years</td>
<td>70</td>
<td>38.89</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>180</td>
<td>100.00</td>
</tr>
</tbody>
</table>

The data presented in Table 2 indicate that majority of the respondents (52.22 per cent) were in age group of 31 to 50 years followed by 38.89 per cent were in the age group of above 50 years while, only 8.89 per cent respondents were in the age group of upto 30 years.

Hence, it can be seen that majority of the respondents were in the middle age group. The probable reason for this might be that the farmers of middle age group have better experience and interest than the other age
groups. The other reason may be parental occupation have been taken up by middle age group, whereas old one have not been capable of doing farming and young ones are not capable of taking responsibility.

This findings is similar to the findings reported by Bhatol (1987), Puranik et al. (1992) and Patel (1993).

4.1.1.2 Education

Education plays an important role in understanding new innovations. To study the influence of education on adoption, the information about formal education received by them was collected and the respondents were classified into five categories i.e. (i) illiterate (can not read and write), (ii) Primary education (1st to 10th standard), (iii) Secondary education (8th to 10th standard), (iv) Higher secondary education (11th and 12th standard) and College level and above education. The data regarding education are presented in Table 3.

The data presented in Table 3 shows that, nearly half (43.89 per cent) of the respondents educated upto primary level followed by 17.79 per cent were illiterate, while 16.11 per cent and 11.67 per cent respondents were educated upto secondary and higher secondary level respectively,. Only 10.54 per cent of them were gained college level education.
TABLE 3

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR LEVEL OF EDUCATION

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Level of education</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Illiterate</td>
<td>32</td>
<td>17.79</td>
</tr>
<tr>
<td>2.</td>
<td>Primary</td>
<td>79</td>
<td>43.89</td>
</tr>
<tr>
<td>3.</td>
<td>Secondary</td>
<td>29</td>
<td>16.11</td>
</tr>
<tr>
<td>4.</td>
<td>Higher secondary</td>
<td>21</td>
<td>11.67</td>
</tr>
<tr>
<td>5.</td>
<td>College level and above</td>
<td>19</td>
<td>10.54</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>180</td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

It is obvious from the Table 3 that, nearly half of the respondents having primary education. The possible reason might be that interest of the respondents toward education and facilities upto primary school education available in most of the villages of Lunawada and Santrampur talukas.

This findings is in line with those reported by Joshi (1979) and Patel (1990).
4.1.2 Social characteristics

4.1.2.1 Caste

To find out the influence of caste, the respondents were grouped into three categories viz., (i) higher caste (Baniya, Patel, Brahmin and Rajput), (ii) middle caste (Thakor, Koli Patel, Bharwad, Luhar, Kadia etc.) and (iii) lower caste (Schedule Caste and Schedule Tribe). The data regarding caste are presented in Table 4.

TABLE 4

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR CASTE

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Caste status</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Higher caste</td>
<td>149</td>
<td>82.79</td>
</tr>
<tr>
<td>2.</td>
<td>Middle caste</td>
<td>9</td>
<td>5.00</td>
</tr>
<tr>
<td>3.</td>
<td>Lower caste</td>
<td>22</td>
<td>12.21</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>180</td>
<td>100.00</td>
</tr>
</tbody>
</table>

The data in Table 4 indicate that, most of the respondents (82.79 per cent) belonged to higher caste group. Whereas, only 5.00 per cent respondents were from middle caste group and 12.21 per cent of them were lower caste group.
It is observed from Table 4 that a great majority of the respondents were from higher caste group. The probable reason for higher per cent of higher caste was that above mentioned caste was dominant in the area under study.

This findings is in the line with the findings of Lavania (1989) and Deswal (1993).

4.1.2.2 Social participation

Membership of a respondent in various organization indicates his social participation status in his farming community. The farmer's participation in the institutions like Gram Panchayat, Co-op. Societies, Milk Union, Extension activities etc., play an important role in bringing awareness and change in their attitude towards ongoing programmes of socio-economic development.

The respondents according to their social participation classified into four groups,

(i) No membership in any organization
(ii) Membership in one organization
(iii) Membership in more than one organization
(iv) Position holding

The data regarding social participation are presented in Table 5.
TABLE 5
DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR SOCIAL PARTICIPATION
(N = 180)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Social participation</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>No membership in any organization</td>
<td>74</td>
<td>41.11</td>
</tr>
<tr>
<td>2.</td>
<td>Membership in one organization</td>
<td>61</td>
<td>33.89</td>
</tr>
<tr>
<td>3.</td>
<td>Membership in more than one organization</td>
<td>29</td>
<td>16.11</td>
</tr>
<tr>
<td>4.</td>
<td>Position holding</td>
<td>16</td>
<td>8.89</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>180</td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

The data presented in Table 5 indicate that, nearly half (41.11 per cent) of the respondents had 'no membership' in any organization, followed by 33.89 per cent respondents were having 'membership in one organization' while, 16.11 per cent of the respondents were 'members in more than one organization' and only 8.89 per cent of them were 'position holder'.

It is obvious from the Table 5 that, 58.89 per cent of the respondents had membership in various organizations. The probable reason for membership may be that, the most profit oriented and popular village organization is Milk producer's Co-operative Society, which meets the needs of the farmers and hence some farmer are its members to obtain profit.
About 41.11 per cent of the respondents had no membership in any organization. The probable reason of this might be that these farmers found more engagement in their agricultural operation and business activities.

This findings is partially supported by the findings of Patel (1989), Deswal (1993) and Patel (1993).

4.1.3 Economic characteristics

4.1.3.1 Size of land holding

Land holding is an important factor, which determine the economic condition of the farmer. The information were collected from the respondents about their land and classified into three groups viz., (1) upto 2.0 hectares, (ii) 2.01 to 4.0 hectares and (iii) above 4.0 hectares. The data in this regard are presented in Table 6.

TABLE 6

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR SIZE OF LAND HOLDING

(N = 180)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Size of land holding</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Upto 2.0 hectares</td>
<td>72</td>
<td>40.00</td>
</tr>
<tr>
<td>2.</td>
<td>2.01 to 4.0 hectares</td>
<td>65</td>
<td>36.11</td>
</tr>
<tr>
<td>3.</td>
<td>Above 4.00 hectares</td>
<td>43</td>
<td>23.89</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>180</td>
<td>100.00</td>
</tr>
</tbody>
</table>
The data presented in Table 6 revealed that, 40.00 per cent of the respondents having land holding upto 2.0 hectares followed by 36.11 per cent of them had land holding between 2.01 to 4.0 hectares. While, 23.89 per cent had land holding above 4.01 hectares.

From the above discussion it is clear that 40.00 per cent of the respondents are consider to be small size of holding may be due to fact that there may be fragmentation of land among the members of the family and large size of family.

This findings is partially supported by the findings of Patel (1981) and Kalra (1983).

4.1.3.2 Occupation

The occupation of the respondents has been considered as one of the important factor contributing to the annual income and cosmopolitaness of the persons. In respect to this aspect respondents were asked about their occupation and classified into four groups viz., (i) Farming only, (ii) farming and animal husbandary, (iii) farming and service and (iv) farming and business. The data regarding this respect are presented in Table 7.
### TABLE 7
**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR OCCUPATION**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Occupation</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Farming only</td>
<td>32</td>
<td>17.79</td>
</tr>
<tr>
<td>2.</td>
<td>Farming and Animal husbandary</td>
<td>108</td>
<td>60.00</td>
</tr>
<tr>
<td>3.</td>
<td>Farming and Service</td>
<td>27</td>
<td>15.00</td>
</tr>
<tr>
<td>4.</td>
<td>Farming and Business</td>
<td>13</td>
<td>7.21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>180</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

The data presented in Table 7, reveal that, majority of the respondents (60.00 per cent) were "farming and animal husbandary" as their main occupation. While, only 17.79 per cent of the respondents were doing "farming only", 15.00 per cent respondents doing "farming and service" and 7.21 per cent of the respondents doing "farming and business work".

The result indicates that, majority of the respondents (60.00 per cent) are doing "farming and animal husbandary" and 17.79 per cent of the respondents doing "only farming". The probable reason might be that, majority of the respondents were educated up to only primary and secondary level. This condition might have been prevented
them to undertake other activity or job to supplement their income. It is also possible that there might be less opportunities for getting other jobs in the villages where the respondents were carrying out farming. The possible reason for that might be that, the respondents having large size of land holding and they were satisfy with their income from farming and farming and animal husbandry.

This findings is in line with those reported by Bahtol (1987) and Patel (1993).

4.1.3.3 Annual income

The adoption of new agricultural technology requires more inputs. Hence, farmer has to spend more money in buying different inputs. Therefore, annual income of the farmer is an important characteristics in adoption or rejection of new practices. According to annual income the respondents were grouped into three classes viz., (i) low income group (upto Rs. 10,000/-), (ii) medium income group (Rs. 10,001/- to Rs. 20,000/-), (iii) high income group (above Rs. 20,000/-).

The data in this regard are presented in Table 8.
TABLE 8

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR ANNUAL INCOME

(N = 180)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Annual income</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Upto Rs. 10,000/-</td>
<td>13</td>
<td>7.22</td>
</tr>
<tr>
<td>2.</td>
<td>Rs. 10,001/- to 20,000/-</td>
<td>61</td>
<td>33.89</td>
</tr>
<tr>
<td>3.</td>
<td>Above Rs. 20,000/-</td>
<td>106</td>
<td>58.89</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>180</td>
<td>100.00</td>
</tr>
</tbody>
</table>

The data presented in Table 8 shows that, majority of the respondents (58.89 per cent) belonged to higher income group (above Rs. 20,000/-). While, 33.89 per cent of the respondents belonged to annual income between Rs. 10,001/- to Rs. 20,000/- and 7.22 per cent of them belonged from income group of upto Rs. 10,000/- (low income group). The result indicates that more than half of the total respondents had annual income above Rs. 20,000/-. The possible reason may be that majority of the respondents have intensive farming as they have adequate irrigation facilities and also due to mixed farming (farming accompanied with animal husbandary), they get additional income from the sale of milk and also from doing services and business work.
This finding is in concurrence with that reported by Vasoya et al. (1983), Thakkar (1986) and Deswal (1993).

4.2 SOURCES OF INFORMATION UTILISED BY THE RESPONDENTS REGARDING RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY

The adoption of an innovation is viewed as a process and requires some sort of information at different stages. The farmers who are keeping frequent visits with extension agencies can obtain more knowledge about latest technology. The preference and selection of a particular source may vary from person to person.

In order to study various sources and media of information as felt by the kharif paddy growers for getting technical advice about plant protection practices, the respondents were asked to provide information about sources from which they have been able to collect information regarding seed treatment, insect pests, diseases and their control measures etc.

In the present study, sources of information have been divided into three groups viz., (i) formal sources, (ii) informal sources and (iii) mass media sources.

The responses obtained were tabulated and data presented in Table 9 and depicted graphically in Fig. 2.
The data presented in Table 9 revealed that village level worker (91.67 per cent) was the most utilized source of information, followed by insecticide/pesticide sale depot (86.11 per cent) and television (82.78 per cent).

Among formal sources of information service co-operative society (81.67 per cent) was another major source of information, followed by Agricultural Extension Officer (57.77 per cent) and subject matter specialist (52.78 per cent). Agril. University, Krishi Vigyan Kendra, Farmer's Training Centre and Agril. Research Stations were utilized by 50.00, 32.78, 30.00 and 20.00 per cent respondents, respectively.

Among the informal sources of information friends utilized by 80.00 per cent while Neighbour, Relatives, Progressive farmers and Local leaders were utilized by 75.00, 73.88, 72.78 and 22.78 per cent of the respondents, respectively.
## TABLE 9

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR UTILIZATION OF SOURCES OF INFORMATION**

(N = 180)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Sources of information</th>
<th>Mean Number</th>
<th>Per cent</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Formal sources</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Village level worker</td>
<td>1.69</td>
<td>165</td>
<td>91.67 I</td>
</tr>
<tr>
<td>2.</td>
<td>Agril. Extension officer</td>
<td>0.65</td>
<td>104</td>
<td>54.77 XI</td>
</tr>
<tr>
<td>3.</td>
<td>Subject matter specialist</td>
<td>0.60</td>
<td>95</td>
<td>52.78 XII</td>
</tr>
<tr>
<td>4.</td>
<td>Agricultural University</td>
<td>0.50</td>
<td>90</td>
<td>50.00 XIV</td>
</tr>
<tr>
<td>5.</td>
<td>Krishi Vigyan Kendra</td>
<td>0.33</td>
<td>59</td>
<td>32.78 XVI</td>
</tr>
<tr>
<td>6.</td>
<td>Farmer's Training Centre</td>
<td>0.30</td>
<td>54</td>
<td>30.00 XVII</td>
</tr>
<tr>
<td>7.</td>
<td>Agril. Research Station</td>
<td>0.20</td>
<td>36</td>
<td>20.00 XX</td>
</tr>
<tr>
<td>8.</td>
<td>Service Co-op. Society</td>
<td>1.09</td>
<td>147</td>
<td>81.67 IV</td>
</tr>
<tr>
<td>9.</td>
<td>Insecticide/pesticide sale depot</td>
<td>1.20</td>
<td>155</td>
<td>86.11 II</td>
</tr>
</tbody>
</table>

B. Informal sources

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Neighbour</td>
<td>0.99</td>
<td>135</td>
<td>75.00 VII</td>
</tr>
<tr>
<td>2.</td>
<td>Friends</td>
<td>1.05</td>
<td>144</td>
<td>80.00 V</td>
</tr>
<tr>
<td>3.</td>
<td>Relatives</td>
<td>0.80</td>
<td>133</td>
<td>73.88 VIII</td>
</tr>
<tr>
<td>4.</td>
<td>Progressive farmers</td>
<td>0.79</td>
<td>131</td>
<td>72.78 IX</td>
</tr>
<tr>
<td>5.</td>
<td>Local leaders</td>
<td>0.23</td>
<td>41</td>
<td>22.78 XIX</td>
</tr>
</tbody>
</table>

C. Mass media

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Radio</td>
<td>1.00</td>
<td>140</td>
<td>77.78 VI</td>
</tr>
<tr>
<td>2.</td>
<td>Television</td>
<td>1.11</td>
<td>149</td>
<td>82.78 III</td>
</tr>
<tr>
<td>3.</td>
<td>News paper</td>
<td>0.70</td>
<td>126</td>
<td>70.00 X</td>
</tr>
<tr>
<td>4.</td>
<td>Printed matter</td>
<td>0.40</td>
<td>72</td>
<td>40.00 XV</td>
</tr>
<tr>
<td>5.</td>
<td>Exhibition</td>
<td>0.18</td>
<td>32</td>
<td>18.00 XXII</td>
</tr>
<tr>
<td>6.</td>
<td>Farmer's day</td>
<td>0.31</td>
<td>56</td>
<td>31.00 XVII</td>
</tr>
<tr>
<td>7.</td>
<td>Demonstration plot</td>
<td>0.19</td>
<td>34</td>
<td>19.00 XXI</td>
</tr>
<tr>
<td>8.</td>
<td>Educational tour</td>
<td>0.52</td>
<td>94</td>
<td>52.00 XIII</td>
</tr>
</tbody>
</table>
FIG. 2: SOURCES OF INFORMATION UTILIZED BY THE RESPONDENTS IN ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY
In case of mass media, sources another important sources utilized by farmers were Radio (77.78 per cent) and Newspaper (70.00 per cent) followed by Education tour (52.00 per cent). Printed matter (40.00 per cent), Farmer's day (31.00 per cent), Demonstration plot (19.00 per cent) and Exhibition (18.00 per cent).

Village level worker is most utilized sources of information by the farmers. The probable reason is that the village level worker is the backbone of Training and Visit system. He is equipped with latest information, easily accessible and well aware of rural life.

This findings is in line with the findings of Kamble et al. (1987), Thakar et al. (1991) and Girase et al. (1992-92).

4.3 KNOWLEDGE LEVEL OF THE RESPONDENTS REGARDING RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY

Knowledge level of the cultivator is very important for the adoption of any new agricultural technology. If cultivators are aware of new agricultural technology, they utilized it when needs arise. Here an attempt has been made to study the knowledge level of the respondents regarding recommended plant protection measures in kharif paddy crop. The knowledge level of the cultivators were worked out by using knowledge scale developed by Jha and Singh (1970).
On the basis of measurement of knowledge, the respondents were categorized into three groups viz., (i) low level of knowledge, (ii) medium level of knowledge and (iii) high level of knowledge based on their mean knowledge score ($\bar{X}$) and standard deviation (S.D.). The data regarding there are presented in Table 10 and depicted graphically in Fig.3.

**TABLE 10**

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR LEVEL OF KNOWLEDGE REGARDING RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Category</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low (below 54.51 score)</td>
<td>11</td>
<td>6.11</td>
</tr>
<tr>
<td>2</td>
<td>Medium (between 54.51 to 72.36 score)</td>
<td>142</td>
<td>78.89</td>
</tr>
<tr>
<td>3</td>
<td>High (above 72.36 score)</td>
<td>27</td>
<td>15.00</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>180</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

Mean ($\bar{X}$) = 63.4350                                  S.D. = 8.9213

The data presented in the Table 10 show that, more than three-fourth (78.89 per cent) of the respondents were having medium level of knowledge regarding plant protection measures in kharif paddy, followed by 15.00 per cent having
FIG. 3: DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR LEVEL OF KNOWLEDGE ABOUT RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY
high level of knowledge and only 6.11 per cent were having low level of knowledge.

It is evident from the above data that, majority of the kharif paddy cultivators had medium level of knowledge regarding recommended plant protection measures. This may be due to reason that majority of the respondents had below secondary level of education.

This findings is in line with findings reported by Nasir (1989), Suryanarayana (1990) and Deswal (1993).

4.3.1 Practicewise knowledge of recommended plant protection measures of the respondents in kharif paddy

Here an attempt has been made to analyse the knowledge aspects of various recommended plant protection measures of kharif paddy of the respondents. The data in this regard are presented in Table 11.

1. Seed treatment

Data presented in Table 11 revealed that majority of the respondents (66.67 per cent) having knowledge of seed treatment in kharif paddy.

2. Recognition of insect pests

Majority of the respondents (87.22 per cent) could see the appearance of insect pests and damage caused by them.
3. Recognition of diseases

Majority of the respondents (80.00 per cent) could see the appearance of diseases in their field and also damage caused by them.

TABLE 11

PRACTICEWISE KNOWLEDGE OF PLANT PROTECTION MEASURES OF THE RESPONDENTS IN KHARIF PADDY

(N = 180)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Practice</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Seed treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Having knowledge</td>
<td>120</td>
<td>66.67</td>
</tr>
<tr>
<td></td>
<td>Not having knowledge</td>
<td>60</td>
<td>33.33</td>
</tr>
<tr>
<td>2.</td>
<td>Recognition of insect pests</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Appearance recognised</td>
<td>157</td>
<td>87.22</td>
</tr>
<tr>
<td></td>
<td>Appearance not recognised</td>
<td>23</td>
<td>12.78</td>
</tr>
<tr>
<td>3.</td>
<td>Recognition of diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Appearance recognised</td>
<td>144</td>
<td>80.00</td>
</tr>
<tr>
<td></td>
<td>Appearance not recognised</td>
<td>36</td>
<td>20.00</td>
</tr>
<tr>
<td>4.</td>
<td>Controlling insect pests</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Having knowledge</td>
<td>135</td>
<td>75.00</td>
</tr>
<tr>
<td></td>
<td>Not having knowledge</td>
<td>45</td>
<td>25.00</td>
</tr>
<tr>
<td>5.</td>
<td>Controlling disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Having knowledge</td>
<td>120</td>
<td>66.67</td>
</tr>
<tr>
<td></td>
<td>Not having knowledge</td>
<td>60</td>
<td>33.33</td>
</tr>
</tbody>
</table>
4. **Controlling insect pests**

Three-fourth of the respondents (75.00 per cent) were having knowledge regarding methods of controlling the particular insect pests.

5. **Majority diseases**

Majority of the respondents (71.67 per cent) were having knowledge regarding controlling the diseases.

4.4 **EXTENT OF ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES BY KHARIF PADDY GROWERS**

The 'adoption process' is the mental process through which an individual passes from first hearing about an innovation to final adoption, while 'adoption' is a decision to continue use of an innovation.

With a view to find out the extent of adoption of recommended plant protection measures in kharif paddy crop, the respondents were asked to give information about the recommended plant protection measures adopted by them. Adoption level of cultivator was worked out by simple adoption scale developed by Sengupta (1967). The respondents were categorized into three groups viz., low, medium and high adoption on the basis of their mean (\( \bar{X} \)) and standard deviation (S.D.). The data were presented in Table 12 and depicted graphically in Fig. 4.
TABLE 12

DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR EXTENT OF ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY

\( (N = 180) \)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Category</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Low (below 45.39)</td>
<td>16</td>
<td>8.89</td>
</tr>
<tr>
<td>2</td>
<td>Medium (45.39 to 65.83)</td>
<td>144</td>
<td>80.00</td>
</tr>
<tr>
<td>3</td>
<td>High (above 65.83)</td>
<td>20</td>
<td>11.11</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>180</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Mean \( \bar{X} \) = 55.6100  \quad S.D. = 10.2187

A perusal of the data in table 12 indicates that, majority of the respondents (80.00 per cent) were having medium extent of adoption of recommended plant protection measures in kharif paddy followed by 11.11 per cent having high extent of adoption and 9.00 per cent were having low extent of adoption, respectively.

The probable reason for majority of the respondents being in medium level of adoption may be medium level of education, high cost of insecticides/pesticides, lack of knowledge and technical guidance etc.

This finding is in conformity with the findings of Singh (1984) and Deswal (1993).
FIG. 4: DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR EXTENT OF ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY
4.4.1 Practicewise adoption of recommended plant protection measures by the respondents in kharif paddy

In addition, to the adoption, an effort has been made to find out practicewise adoption of recommended plant protection measures in kharif paddy. A brief account of practicewise adoption has been enlisted in Table 13.

### TABLE 13
PRACTICEWISE ADOPTION OF PLANT PROTECTION MEASURES BY THE RESPONDENTS IN KHARIF PADDY

(N = 180)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Practice adopted</th>
<th>Number</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Seed treatments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adopted</td>
<td>99</td>
<td>55.00</td>
<td></td>
</tr>
<tr>
<td>Not adopted</td>
<td>81</td>
<td>45.00</td>
<td></td>
</tr>
<tr>
<td>2. Plant protection measures against insect pests</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adopted</td>
<td>126</td>
<td>70.00</td>
<td></td>
</tr>
<tr>
<td>Not adopted</td>
<td>54</td>
<td>30.00</td>
<td></td>
</tr>
<tr>
<td>3. Plant protection measures against diseases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adopted</td>
<td>112</td>
<td>62.22</td>
<td></td>
</tr>
<tr>
<td>Not adopted</td>
<td>68</td>
<td>37.78</td>
<td></td>
</tr>
<tr>
<td>4. Kinds of insecticide preferred</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Granular form</td>
<td>135</td>
<td>75.00</td>
<td></td>
</tr>
<tr>
<td>Liquid form</td>
<td>45</td>
<td>25.00</td>
<td></td>
</tr>
<tr>
<td>5. Safety measures in plant protection practices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adopted</td>
<td>86</td>
<td>47.78</td>
<td></td>
</tr>
<tr>
<td>Not adopted</td>
<td>94</td>
<td>52.22</td>
<td></td>
</tr>
</tbody>
</table>
1. **Seed treatment**

Data presented in Table 13 reveal that, nearly half (55.00 per cent) of the respondents adopted seed treatments in kharif paddy.

2. **Recommended plant protection measures against insect pests**

The majority of the respondents (70.00 per cent) adopt recommended plant protection measures against insect pests, while 30.00 per cent did not adopt recommended plant protection measures against insect pests in kharif paddy.

3. **Recommended plant protection measures against disease**

The majority of the respondents (62.22 per cent) adopted recommended plant protection measures against diseases, while 37.78 per cent did not adopt recommended plant protection measures against diseases in kharif paddy.

4. **Preference of insecticides**

The majority of the respondents preferred granular forms of insecticides (75.00 per cent) while 25.00 per cent preferred liquid form of insecticides.
5. **Safety measures in plant protection practices**

Nearly half (47.78 per cent) of the respondents adopted safety measures while performing plant protection practices in kharif paddy.

4.5 **RELATIONSHIP BETWEEN SELECTED PERSONAL, SOCIAL AND ECONOMIC CHARACTERISTICS OF THE RESPONDENTS AND THEIR EXTENT OF ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY**

To study relationship between personal and socio-economic characteristics and the adoption of recommended plant protection measures is of great importance. The different personal, social and economic characteristics studied were age, education, caste, social participation, land holding, occupation and annual income. These different factors play an important role in deciding the adoption or rejection of an innovation. A scientific approach has been undertaken to study these characteristics and establishment of relationship with extent of adoption of recommended plant protection measures in kharif paddy with computation of correlation coefficient.

The data in this regard are presented in Table 14 and depicted graphically in Fig. 5.
TABLE 14

CORRELATION BETWEEN SELECTED PERSONAL, SOCIAL AND ECONOMIC CHARACTERISTICS OF THE RESPONDENTS AND THEIR EXTENT OF ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Characteristics of the respondents</th>
<th>Correlation co-efficient 'r' value with adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Age</td>
<td>-0.09428</td>
</tr>
<tr>
<td>2.</td>
<td>Education</td>
<td>0.71805*</td>
</tr>
<tr>
<td>3.</td>
<td>Caste</td>
<td>-0.02870</td>
</tr>
<tr>
<td>4.</td>
<td>Social participation</td>
<td>0.18776</td>
</tr>
<tr>
<td>5.</td>
<td>Land holding</td>
<td>0.27360*</td>
</tr>
<tr>
<td>6.</td>
<td>Occupation</td>
<td>-0.12510</td>
</tr>
<tr>
<td>7.</td>
<td>Annual income</td>
<td>0.26521*</td>
</tr>
</tbody>
</table>

* Significant at 5 per cent probability level.

4.5.1 Personal characteristics

4.5.1.1 Age and adoption

The data presented in Table 14 clearly indicate that age of the respondents had non-significant relationship with extent of adoption of recommended plant protection measures in kharif paddy. Hence, the hypothesis is accepted. The probable reason for non-significant result might be that, majority of farmers belonged to such type of families.
FIG. 5: RELATIONSHIP BETWEEN SELECTED PERSONAL AND SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS AND ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES OF KHARIF PADDY
in which the head of the family has responsibility to deal with financial problems and majority of cases were middle or old aged who used to take decision for adoption of plant protection practices of kharif paddy cultivation.

The findings is in confirmity with those reported by Ansari (1982) and Sakharkar et al. (1992).

4.5.1.2 Education and adoption

The data presented in Table 14 indicate that extent of adoption of recommended plant protection measures in kharif paddy had positive and significant relationship with education \( (r = 0.71805) \). It means with increase in education level, the adoption level increased. Thus, hypothesis stated in null form that "There is no relation between education and extent of adoption of plant protection practices by the respondents" is rejected.

The possible reason for significant result might be that, the educated farmers had greater reception power than low educated and illiterate farmers.

This findings is in line with the findings reported by Patel (1982), Patel (1987) and Patil and Waghdhare (1989).
4.5.2 **Social characteristics**

4.5.2.1 **Caste and adoption**

The data presented in Table 14 clearly reveal that extent of adoption of recommended plant protection measures in kharif paddy had non-significant \( r = -0.02870 \) relationship with caste status, hence null hypothesis is accepted. Means there is no relationship between caste and extent of adoption of recommended plant protection measures by kharif paddy growers.

This findings is in concurrence with those reported by Joshi (1979) and Patel (1987).

4.5.2.2 **Social participation and adoption**

Data shown in Table 14 indicated that extent of adoption of recommended plant protection measures in kharif paddy has non-significant relationship with social participation \( r = 0.18776 \). So null hypothesis is accepted.

This findings is similar to the findings reported by Tripathi (1985) and Thakkar (1986).

4.5.3 **Economic characteristics**

4.5.3.1 **Size of land holding and adoption**

A perusal of data in Table 14 indicate that, extent of adoption of recommended plant protection measures
in kharif paddy with the size of land holding had significant relationship. \((r = 0.27360)\). Therefore, the null hypothesis is rejected.

It means, farm size is important factor in adoption of improved agricultural technology. With increase in size of land holding, adoption level also increase. The possible reason for this might be better economic position of the respondents to meet the expenditure as well as capacity to take risk in investment of capital for adoption of recommended plant protection measures in kharif paddy.

This findings is in consonance with the findings reported by Reddy and Reddy (1988) and Anonymous (1992).

4.5.3.2 Occupation and adoption

Data presented in Table 14 revealed that occupation had non-significant relationship with extent of adoption of recommended plant protection measures by kharif paddy growers \((r = -0.12510)\). Thus, the null hypothesis is accepted.

This findings is in confirmity with those reported by Patel (1981), Patel (1989) and Deswal (1993).

4.5.3.3 Annual income and adoption

A persual of data in Table 14 indicated that annual income of the respondents had significant
relationship with the extent of adoption of recommended plant protection measures by the kharif paddy growers. \( r = 0.26521 \). Therefore, the null hypothesis is rejected.

It means with increase in level of income, adoption level also increases. The possible reason for this might be that more requirement of finance in adoption of recommended plant protection measures in kharif paddy.

This findings is supported by findings of Thakkar (1986), Bhatol (1987) and Patel (1989).

4.6 RELATIONSHIP BETWEEN KNOWLEDGE LEVEL OF THE RESPONDENTS AND THEIR EXTENT OF ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY

Decision to adopt or reject an innovation depends to a large extent on the amount of knowledge gained about the innovation by the users. To confirm the statistical association between knowledge level of kharif paddy growers and their extent of adoption of recommended plant protection measures, the coefficient of correlation was computed. The data in this regard are presented in Table 15.
### TABLE 15

**CORRELATION OF EXTENT OF ADOPTION WITH THE KNOWLEDGE OF RECOMMENDED PLANT PROTECTION MEASURES OF KHARIF PADDY GROWERS**

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Co-efficient of correlation 'r' value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge level and adoption</td>
<td>0.87238*</td>
</tr>
</tbody>
</table>

* Significant at 5 per cent probability level.

**Independent variable = Knowledge level of kharif paddy growers regarding plant protection measures.**

**Dependent variable = Level of adoption of kharif paddy growers regarding plant protection measures.**

The data presented in Table 15 indicates that, there was significant relationship between knowledge level of paddy cultivators and their adoption of recommended plant protection measures. Thus, null hypothesis is rejected. It clearly shows that with increase in knowledge level of the respondents, adoption level also increases. Thus, knowledge level play vital role in adoption of recommended plant protection measures in kharif paddy.

The probable reason for this might be that, those who are having better knowledge will select economically
feasible technology and will adopt the same very quickly. The respondents having less knowledge will always lacking behind the high level knowledge of farmers.

This findings is similar to those reported by Sethy et al. (1984), Jaiswal (1985) and Deswal (1993).

4.7 CONSTRAINTS FACED BY THE PADDY GROWERS IN ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES

Constraints means difficulties faced by the paddy cultivators in the adoption of recommended plant protection measures. The respondents were asked to express the constraints faced by them in adoption of recommended plant protection measures in paddy. Constraints were measured with the help of four point rating scale: Very much (VM), Much (M), Less (L) and Not at all (NAA) with score value of 3, 2, 1 and 0, respectively. Thereafter constraint wise total score were worked out and finally the rank position were given according to total rank score obtained. The data in this regards are presented in Table 16 and depicted graphically in Fig. 6.
### TABLE 16

**DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR LEVEL OF CONSTRAINTS IN ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Constraints</th>
<th>Number</th>
<th>Per cent</th>
<th>Mean Rank</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High cost of chemicals</td>
<td>153</td>
<td>85.00</td>
<td>2.25</td>
<td>I</td>
</tr>
<tr>
<td>2</td>
<td>Lack of knowledge regarding dose</td>
<td>130</td>
<td>72.22</td>
<td>1.92</td>
<td>III</td>
</tr>
<tr>
<td>3</td>
<td>Lack of time</td>
<td>90</td>
<td>50.00</td>
<td>1.38</td>
<td>VII</td>
</tr>
<tr>
<td>4</td>
<td>Chemicals not available at time</td>
<td>99</td>
<td>55.00</td>
<td>1.51</td>
<td>VI</td>
</tr>
<tr>
<td>5</td>
<td>Inferior chemicals quality</td>
<td>117</td>
<td>65.00</td>
<td>1.71</td>
<td>V</td>
</tr>
<tr>
<td>6</td>
<td>Spraying not effective due to standing water</td>
<td>138</td>
<td>76.67</td>
<td>2.08</td>
<td>II</td>
</tr>
<tr>
<td>7</td>
<td>Non availability of plant protection appliances in time</td>
<td>74</td>
<td>41.11</td>
<td>1.05</td>
<td>VIII</td>
</tr>
<tr>
<td>8</td>
<td>Non availability of resistant variety</td>
<td>122</td>
<td>67.78</td>
<td>1.80</td>
<td>IV</td>
</tr>
<tr>
<td>9</td>
<td>Others</td>
<td>45</td>
<td>25.00</td>
<td>0.58</td>
<td>IX</td>
</tr>
</tbody>
</table>
FIG. 6: DISTRIBUTION OF THE RESPONDENTS ACCORDING TO THEIR LEVEL OF CONSTRAINTS IN ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES IN KHARIF PADDY
It was evident from the Table 16 that, 'high cost of chemicals' (85.00 per cent), 'spraying not effective due to standing water' (76.67 per cent), 'lack of knowledge regarding dose (72.22 per cent) and 'non availability of resistant variety' (67.78 per cent) were major constraints as experienced by majority of the respondents, followed by 'Inferior chemicals quality' (65.00 per cent), 'chemicals not available in time' (55.00 per cent) and 'non availability of plant protection appliances in time' (41.11 per cent).

Hence, it can be concluded that main constraints experienced by the respondents in adoption of recommended plant protection measures in kharif paddy are

(i) High cost of chemicals
(ii) Spraying not effective due to standing water
(iii) Lack of knowledge regarding dose and
(iv) Non availability of resistant variety

4.8 SUGGESTIONS POINTED OUT BY THE RESPONDENTS TO OVERCOME THE CONSTRAINTS EXPERIENCED BY THEM

An attempt was made to ascertain the suggestions from the paddy growers to overcome various constraints faced by them in adoption of recommended plant protection measures. The respondents were requested to offer their
valuable suggestions about the problems and difficulties faced by them in adopting recommended plant protection measures. The suggestions as ascertained are presented in Table 17.

**TABLE 17**

**SUGGESTIONS POINTED OUT BY THE PADDY GROWERS TO OVERCOME THE CONSTRAINTS FACED BY THEM IN ADOPTION OF RECOMMENDED PLANT PROTECTION MEASURES**

(\(N = 180\))

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Suggestions</th>
<th>Number</th>
<th>Per cent</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regular visit by V.L.W.</td>
<td>112</td>
<td>62.22</td>
<td>V</td>
</tr>
<tr>
<td>2</td>
<td>Technical guidance should be given well in advance before starting of the paddy season</td>
<td>126</td>
<td>70.00</td>
<td>III</td>
</tr>
<tr>
<td>3</td>
<td>Interest free loan</td>
<td>86</td>
<td>47.78</td>
<td>VII</td>
</tr>
<tr>
<td>4</td>
<td>Subsidy on plant protection chemicals</td>
<td>153</td>
<td>85.00</td>
<td>II</td>
</tr>
<tr>
<td>5</td>
<td>Reasonable price of plant protection chemicals</td>
<td>162</td>
<td>90.00</td>
<td>I</td>
</tr>
<tr>
<td>6</td>
<td>Paddy price should be fixed on the basis of net profit</td>
<td>117</td>
<td>65.00</td>
<td>IV</td>
</tr>
<tr>
<td>7</td>
<td>Resistant variety should be available</td>
<td>99</td>
<td>55.00</td>
<td>VI</td>
</tr>
</tbody>
</table>

It was evident from the Table 17 that, 'Reasonable price of plant protection chemicals' (90.00 per cent) was
the main suggestions given by the great majority of the respondents and ranked first. Others were 'subsidy on the plant protection chemicals' (85.00 per cent), 'Technical guidance should be given well in advance before paddy season (70.00 per cent), 'paddy price should be fixed on the basis of net profit' (65.00 per cent), 'Regular visit by village level worker' (62.22 per cent), 'Resistant variety should be available' (55.00 per cent) and 'Interest free loan' (47.78 per cent) ranked II, III, IV, V, VI and VII respectively.

Hence, it can be deducted that main suggestions given by the respondents to overcome the constraints faced by them in adopting recommended plant protection measures were,

(i) Reasonable price of plant protection chemicals,

(ii) Subsidy on plant protection chemicals,

(iii) Technical guidance should be given well in advance before start of paddy season and

(iv) Paddy price should be fixed on the basis of net profit.
SUMMARY
AND
CONCLUSIONS
This chapter deals with a brief description of the study in regards to summary, major findings, conclusions, suggestions for action and suggestions for future research.

The introduction of high yielding dwarf varieties, use of chemical fertilizers and multiple cropping pattern have enhanced food production but at the same time have also aggravated the pest and disease problem in paddy. Even with the advancement of improved plant protection technology and introduction of effective pesticides and fungicides, has not reached to the farmers field satisfactorily. Adoption of plant protection measures in paddy has not achieved the desired level. To assess this situation practically, "A study on adoption behaviour of kharif paddy growers in relation to recommended plant protection measures in Panchmahals district of Gujarat state" was undertaken.

5.1 SUMMARY

5.1.1 Objectives of the study

1. To study the selected personal, social and economic characteristics of the kharif paddy growers.
2. To study the sources of information utilised by the kharif paddy growers.

3. To find out the level of knowledge of kharif paddy growers pertaining to recommended plant protection measures.

4. To study the extent of adoption of recommended plant protection measures by the kharif paddy growers.

5. To find out the relationship between personal, social and economic characteristics of the kharif paddy growers and their extent of adoption of recommended plant protection measures.

6. To ascertain the relationship between knowledge level and adoption level of kharif paddy growers regarding plant protection measures.

7. To study the constraints faced by the kharif paddy growers in adoption of recommended plant protection measures.

8. To point out the suggestions of kharif paddy growers to overcome the constraints.

5.1.2 Hypotheses of the study

1. There is no relationship between personal, social and economic characteristics of kharif paddy growers and
the extent of adoption of recommended plant protection measures.

2. There is no relationship between level of knowledge and level of adoption of recommended plant protection measures of kharif paddy growers.

5.1.3 **Review of literature**

Keeping in view the objectives of the study the available literature was reviewed which has been classified under following heads.

1. Personal, social and economic characteristics of the respondents.

2. Sources of information utilized by the respondents.

3. Knowledge level of respondents regarding recommended plant protection measures.

4. Extent of adoption of recommended plant protection measures by the respondents.

5. Relationship between personal, social and economic characteristics with their knowledge level of recommended plant protection measures.

6. Relationship between knowledge level and adoption of the respondents.
7. Constraints faced by the respondents in adoption of plant protection measures in kharif paddy.

8. Suggestions to overcome contraints faced by respondents in adoption of plant protection measures.

5.1.4 Methodology

The present study was carried out in Lunawada and Santrampur talukas of Panchmahals district of Gujarat state. Kharif paddy cultivators who adopt the plant protection measures were the respondents for the study. Among the villages growing paddy crop, 10 villages (5 villages from each talukas) were selected randomly. From each selected villages, 20 per cent of its population were selected randomly. This study consists of total 180 respondents. All the selected kharif paddy cultivators were personally interviewed.

The tool of the study was interview schedule. Cultivators were personally interviewed by the investigator himself.

To know the socio-economic status of the respondents a scale developed by Pareek and Trivedi (1965) was used with some modifications. Measurement of knowledge about plant protection measures in kharif paddy was done by using a teacher made test based on the scale developed by Jha and Singh (1970). Measurement of adoption was done by
using scale developed by Sengupta (1967). A simple ranking technique was applied to measure the sources of information and constraints in adoption of plant protection measures in kharif paddy growers.

Coefficient of correlation was computed to measure the relationship of different independent and dependent variables with extent of adoption.

5.2 MAJOR FINDINGS

5.2.1 Personal, social and economic characteristics of kharif paddy growers

1. Majority of the respondents (52.22 per cent) belonged to middle age group followed by 38.89 per cent of them who belonged to old age group.

2. Majority of the respondents (17.79 per cent illiterate, 43.89 per cent primary level and 16.11 per cent secondary level of education) belonged to below secondary level of education.

3. Majority of the respondents (82.79 per cent) were from higher caste status.

4. Nearly half (41.11 per cent) of the respondents had no membership, while 33.89 per cent of the respondents had membership in one organization.
5. About 40.00 per cent of the respondents possessed their land holding upto 2.0 hectares, while 36.11 per cent possessed 2.01 to 4.0 hectares of land holding.

6. More than half (60.00 per cent) of the respondents had 'farming and animal husbandary' as their main occupation.

7. More than half (58.89 per cent) of the respondents had their annual income above Rs. 20,000/- followed by 33.89 per cent of them who had annual income Rs. 10,000/- to Rs. 20,000/.

5.2.2 Sources of information

Village level worker was found most consulted source of information in adoption of plant protection measures in kharif paddy followed by insecticide/pesticide sale depot and television. Co-operative Society, friends and radio also utilized to a good extent.

5.2.3 Knowledge level of kharif paddy growers regarding recommended plant protection measures

1. Majority of the respondents (78.89 per cent) were found in medium level of knowledge, followed by high level of knowledge (15.00 per cent)
2. **Practicewise knowledge of plant protection measures in kharif paddy**

(a) Majority of the respondents (66.67 per cent) were aware about seed treatment.

(b) Majority of the respondents (87.22 per cent) could see the appearance of insect pests.

(c) Majority of the respondents (80.00 per cent) could see the appearance of diseases in their field.

(d) Three fourth (75.00 per cent) of the respondents having knowledge regarding controlling the insect pests.

(e) Majority of the respondents (71.67 per cent) had knowledge regarding controlling the diseases.

5.2.4 **Extent of adoption of recommended plant protection measures in kharif paddy**

1. Majority of the respondents (80.00 per cent) were found in medium adoption category.

2. **Practicewise adoption of plant protection measures in kharif paddy**

(a) Majority of the respondents (55.00 per cent) adopted seed treatment.

(b) Majority of the respondents (70.00 per cent) had controlled insect pests in their field.
(c) Majority of the respondents (62.22 per cent) adopted plant protection measures against diseases.

(d) Majority of the respondents (75.00 per cent) preferred granular insecticides.

(e) Nearly half (47.78 per cent) of the respondents adopted safety measures while performing plant protection practices in kharif paddy.

5.2.5 Relationship between selected personal, social and economic characteristics with knowledge level of recommended plant protection measures in kharif paddy

It was found that education ($r = 0.71805$), land holding ($r = 0.2736$) and annual income ($r = 0.26521$) were found significantly related with knowledge level of plant protection measures in kharif paddy. Rest of independent variables like age, caste, social participation and occupation were found non-significant with the knowledge level about plant protection measures in kharif rice crop.

5.2.6 Relationship between knowledge level with extent of adoption of recommended plant protection measures of kharif paddy growers

Extent of adoption of plant protection measures was found significantly related with the level of knowledge regarding recommended plant protection measures in kharif paddy ($r = 0.87238$ at 5 per cent probability level). Thus, with increased in knowledge level adoption level also increased.
5.2.7 Constraints experienced by paddy growers in adoption of recommended plant protection measures

Major constraints faced by the respondents were as under:

(i) High cost of chemicals.
(ii) Spraying not effective due to standing water.
(iii) Lack of knowledge regarding dose.
(iv) Non availability of resistant variety.

5.2.8 Suggestions to overcome constraints faced by paddy growers in adoption of plant protection measures

Major suggestions given by the respondents were as under:

(i) Reasonable price of plant protection chemicals.
(ii) Subsidy on plant protection chemicals.
(iii) Technical guidance should be given well in advance before start of paddy season.
(iv) Paddy price should be fixed on the basis of net profit.

5.3 CONCLUSIONS

The conclusions derived from the findings of the study are summarised as under:

1. Out of total, 55.22 per cent of the respondents had middle age group.
2. About 43.89 per cent of the respondents belonged to primary level of education.

3. Majority of the respondents (82.79 per cent) were from higher caste status.

4. Nearly half (41.11 per cent) of the respondents had no membership in any organization.

5. About 40.00 per cent of the respondents possessed their land holding upto 2.0 hectares.

6. Majority of the respondents (60.00 per cent) had 'farming and animal husbandry' as their main occupation.

7. Majority of the respondents (58.89 per cent) had their annual income above Rs. 20,000/-.

8. Among the various sources of information village level workers, Insecticides/pesticide sale depot and Television were mainly utilized by respondents.

9. Majority of the respondents (78.89 per cent) were found in medium level of knowledge.

10. Majority of the respondents were aware of appearance of insect pests and diseases, controlling insect pests and diseases and seed treatment.
11. Majority of the respondents (80.00 per cent were found in medium category of adoption.

12. Majority of the adopters adopted seed treatment, controlling insect pests and diseases and preferred granular insecticide while performing plant protection measures in kharif paddy.

13. Among various personal, social and economic characteristics of the respondents: education, land holding and annual income were found significantly related with knowledge level.

14. Knowledge level was significantly related with extent of adoption of recommended plant protection measures in kharif paddy.

15. The main constraints faced by the respondents in adoption of recommended plant protection measures were: high cost of chemicals, spraying not effective due to standing water, lack of knowledge regarding dose and non availability of resistant variety.

16. Major suggestion pointed out by the respondents to overcome the constraints in adoption of recommended plant protection measures were: reasonable price on plant protection, chemicals, subsidy on plant
protection chemicals, technical guidance should be given well in advance before start of paddy season and paddy price should be fixed on the basis of net profit.

5.4 SUGGESTIONS FOR ACTION

1. The findings of this study revealed that nearly half of respondents were from middle age group and up to primary levels of education and hence such type of farmers may be approached in accelerating adoption of recommended plant protection technology in kharif paddy.

2. In this investigation, it was observed that nearly half of respondents had no membership in any organization and having small size of land holding. Hence, efforts should be made to encourage such type of farmers.

3. The study revealed that majority of paddy cultivators had not utilized sources of informations satisfactorily. Hence, all the possible efforts should be made by extension agencies to increase extension contact with paddy cultivators. It will help in increasing adoption of plant protection measures by cultivators.

4. Village level worker was the only main source of information, hence efforts should be made to increase credibility of other sources and media available to paddy cultivator.
5. Nomenclature of insecticide and fungicides should be made easy and complexity in recommendation be avoided.

6. At the time of insect-pests and disease appearance in epidemic form, regular visits should be done by subject matter specialist who should suggest cultivators to utilize proper plant protection measures to be saved from heavy losses.

7. Procurement price of paddy should be increased to such a level which can motivate farmers for paddy cultivation and will adopt the recommended plant protection measures.

8. Efforts should be made to overcome the major constraints like high cost of plant protection chemicals, lack of knowledge regarding dose and non-availability of resistant variety.

5.5 SUGGESTIONS FOR FUTURE RESEARCH

In light of the findings of the study, following studies can be taken explore more in the area of transfer of recommended plant protection measures.

1. This study was carried out under certain limitations of time and resources with limited area under study. So in order to support the present investigation, similar
research may be conducted by including more variables and with large sample. So that the results will be strengthened.

2. Similar investigation may be conducted in other paddy growing area of the state, so that results of this study can be strengthened.

3. Similar investigation may be conducted on other crops to find out the constraints in transfer of recommended plant protection measures for those crop.
REFERENCES
REFERENCES


APPENDICES
# DISTRIBUTION AREA, PRODUCTION AND YIELD Kg. PER HECTARE OF KHARIF PADDY OF GUJARAT STATE

<table>
<thead>
<tr>
<th>Name of District</th>
<th>Area ('00 ha.)</th>
<th>Production ('00 tonnes)</th>
<th>Average yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ahmedabad</td>
<td>626</td>
<td>903</td>
<td>1442</td>
</tr>
<tr>
<td>2. Banaskantha</td>
<td>1</td>
<td>*</td>
<td>863</td>
</tr>
<tr>
<td>3. Vadodara</td>
<td>588</td>
<td>431</td>
<td>733</td>
</tr>
<tr>
<td>4. Bharuch</td>
<td>197</td>
<td>132</td>
<td>670</td>
</tr>
<tr>
<td>5. Valsad</td>
<td>1003</td>
<td>2144</td>
<td>2138</td>
</tr>
<tr>
<td>6. Dang</td>
<td>81</td>
<td>79</td>
<td>971</td>
</tr>
<tr>
<td>7. Gandhinagar</td>
<td>60</td>
<td>127</td>
<td>2113</td>
</tr>
<tr>
<td>8. Kheda</td>
<td>1218</td>
<td>2128</td>
<td>1747</td>
</tr>
<tr>
<td>9. Mehsana</td>
<td>107</td>
<td>154</td>
<td>1439</td>
</tr>
<tr>
<td>10. Panchmahals</td>
<td>1103</td>
<td>520</td>
<td>471</td>
</tr>
<tr>
<td>11. Sabarkantha</td>
<td>170</td>
<td>267</td>
<td>1571</td>
</tr>
<tr>
<td>12. Surat</td>
<td>811</td>
<td>1478</td>
<td>1822</td>
</tr>
<tr>
<td>13. Amreli</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>14. Bhavnagar</td>
<td>4</td>
<td>7</td>
<td>1866</td>
</tr>
<tr>
<td>15. Jamnagar</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>16. Junagadh</td>
<td>1</td>
<td>3</td>
<td>1866</td>
</tr>
<tr>
<td>17. Kutch</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>18. Rajkot</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>19. Surendranagar</td>
<td>8</td>
<td>13</td>
<td>1625</td>
</tr>
</tbody>
</table>

**Gujarat State Total** 5978 8386 1403

*Source: Annual Crop Forecast Reports, (1993-94) State Department of Agriculture, Guajrat State, Ahmedabad*
## APPENDIX - II

### TALUKAWISE AREA IN HECTARES UNDER KHARIF PADDY CROP OF PANCHMAHALS DISTRICT

<table>
<thead>
<tr>
<th>Name of Taluka</th>
<th>Area (in hectares)</th>
<th>Drilling</th>
<th>Transplanting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghodhra</td>
<td>7614</td>
<td>4027</td>
<td></td>
</tr>
<tr>
<td>Kalol</td>
<td>3150</td>
<td>1349</td>
<td></td>
</tr>
<tr>
<td>Halol</td>
<td>4315</td>
<td>920</td>
<td></td>
</tr>
<tr>
<td>Jambugoda</td>
<td>615</td>
<td>207</td>
<td></td>
</tr>
<tr>
<td>Sahera</td>
<td>3800</td>
<td>4670</td>
<td></td>
</tr>
<tr>
<td>Lunawada</td>
<td>4000</td>
<td>13,497</td>
<td></td>
</tr>
<tr>
<td>Santrampur</td>
<td>12,000</td>
<td>10,680</td>
<td></td>
</tr>
<tr>
<td>Zalod</td>
<td>6850</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>Dahod</td>
<td>9200</td>
<td>1953</td>
<td></td>
</tr>
<tr>
<td>Limkheda</td>
<td>9068</td>
<td>3795</td>
<td></td>
</tr>
<tr>
<td>Baria</td>
<td>6400</td>
<td>2000</td>
<td></td>
</tr>
</tbody>
</table>

**Total**

67,012 | 44,098

**Source:** Zilla Panchayat Office, Agriculture Department, Panchmahals district, Godhra.
APPENDIX - III

A STUDY ON ADOPTION BEHAVIOUR OF KHARIF PADDY GROWERS
IN RELATION TO RECOMMENDED PLANT PROTECTION MEASURES
IN PANCHMAHALS DISTRICT, GUJARAT STATE

INTERVIEW SCHEDULE

Interview schedule No. : _____ Date : _______
Name of the respondents: ________________________________
Village : _______________________
(Note : " ") mark where as applicable

PART - I

Personal and Socio-economic characteristics :

1. Age : ______ years.
2. Education :
   (i) Illiterate
   (ii) Primary education (upto 7th standard)
   (iii) Secondary education (8th to 10th standard)
   (iv) Higher Secondary education (11th & 12th standard)
   (v) College level education
3. Caste :
   (i) Upper caste (Baniya, Patel, Brahmin, Rajput)
   (ii) Middle caste (Thakor, Kolipatel, Bharwad, Luhar, Kadia)
   (iii) Lower caste (Schedule caste, schedule tribe)

4. Land holding :
   (i) Upto 2.0 hectares
   (ii) 2.01 to 4.0 hectares
   (iii) Above 4.0 hectares

5. OCCUPATION :
   (i) Farming only
   (ii) Farming and Animal husbandary
   (iii) Farming and Service
   (iv) Farming and Business work

6. ANNUAL INCOME :
   (i) Below Rs. 10,000/-
   (ii) Rs. 10,001/- to Rs. 20,000/-
   (iii) Above Rs. 20,000/-

7. SOCIAL PARTICIPATION :
   (i) Gram Panchyat
   (ii) Service Co-operative Society
   (iii) Milk Co-operative Society
   (iv) Taluka Panchyat
   (v) District Panchayat
PART - II

How frequently do you use the following sources of information for recommended plant protection measures in kharif paddy cultivation

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of source</th>
<th>Always</th>
<th>Some Times</th>
<th>Never</th>
</tr>
</thead>
</table>

A. Formal sources
1. Village level worker
2. Agriculture Extension Officer
3. Subject matter specialist
4. Agricultural University
5. Krishi Vigyan Kendra
6. Farmers Training Centre
7. Research Station
8. Service Co-op. Society
9. Insecticide/pesticide sale depot

B. Informal sources
1. Neighbours
2. Friends
3. Relatives
4. Progressive farmers
5. Local leaders
PART – III

Extent of knowledge possessed by the farmers in respect of plant protection measures recommended for kharif paddy
(Note: Tick " " wherever applicable)

Rice nursery:

1. Do you know seed borne diseases are controlled by seed treatment? Yes/No

2. Which fungicides are used in seed treatment? Correct/Incorrect

3. What is recommended dose of fungicide for treating one kg. of paddy seed? Correct/Incorrect

4. Do you know the procedure for treating the seed? Yes/No
5. Which are various insects attacking rice nursery? Correct/Incorrect

6. Do you know the symptoms of damage? Yes/No

7. What is common insect-pest found in nursery? Correct/Incorrect

8. What is common disease appearing in nursery? Correct/Incorrect

9. What is the control measure for a foresaid disease? Correct/Incorrect

Main crop:

10. Can you identify following insect/pests? Yes/No
   a. Rice weevil
   b. Brown hopper
   c. Rice skipper
   d. Leaf folder
   e. Army worm
   f. Stem borer

11. Do you know the stage of attack of following? Yes/No
   a. Rice weevil
   b. Brown hopper
   c. Rice skipper
   d. Leaf folder
   e. Army worm
   f. Stem borer

12. Do you know the control of following insect/pests? Yes/No
   a. Rice weevil
   b. Brown hopper
   c. Rice skipper
   d. Leaf folder
   e. Army worm
   f. Stem borer

13. Do you know the symptoms of damage of followings? Yes/No
   a. Rice weevil
   b. Brown hopper
   c. Rice skipper
   d. Leaf folder
   e. Army worm
   f. Stem borer
14. Which of the pests is most damaging for rice yield?

15. Is there any damage due to rats/crabs in your field? Please give control.

16. Can you identify the following diseases appearing in your rice field?
   1. Bacterial leaf blight
   2. Blast
   3. Brown leaf spot
   4. False smut
   5. Foot rot
   6. Root rot
   7. Zn. deficiency

17. Do you know the control of below mention diseases?

18. Do you know the symptoms of attack of followings?

19. Which of the diseases is most serious for rice crop?

20. Do you know that the climate have any effect on infestation of diseases?

21. Is there any effect of stagnant water on infestation of insect-pest and diseases?

22. Do you know, intensity of crop has some bearing on infestation of pest/diseases?

23. Do you know the name of some plant protection appliances?

24. Do you know that crop rotation can check appearance of some diseases to some extent?
PART - IV

Extent of adoption of recommended plant protection measures by kharif rice growers

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Plant protection practices</th>
<th>Recommended dose/hact.</th>
<th>Actually applied dose/hact.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nursery</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Seed treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Mercury compounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Copper compounds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Insect pests</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Root weevil</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Leaf folder</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Leaf minor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Bacterial leaf blight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Root rot</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Brown spot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Main crop - Insect pests</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Leaf folder</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Skipper</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Root weevil</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>d. Stem borer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>e. Blue bettle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
f. Horned caterpillar

g. Brown hopper

h. White hopper

5. Diseases

a. Bacterial leaf blight

b. False smut

c. Blast

d. Brown leaf spot

e. Neck blast

6. Plant protection appliances adopted

a. Knap sack sprayer

b. Power sprayer

c. Dusters

7. Safety measures adopted

---------------------------------------

X
PART - V

Constraints in adoption of plant protection measures in kharif paddy

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Constraints</th>
<th>VM</th>
<th>M</th>
<th>L</th>
<th>NAA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>High cost of chemicals</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>Lack of knowledge regarding dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lack of time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Chemicals not available in time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Inferior chemical's quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Spraying not effective due to standing water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Non-availability of plant protection appliances in time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Non-availability of resistant variety</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Others (Pl. specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: VM=Very Much; M=Much; L=Less; NAA=Not at all

PART - VI

Suggestions of the paddy growers to overcome contraints

1.
2.
3.
4.
5.
6.
7.
8.