"KNOWLEDGE AND ADOPTION OF RATOON MANAGEMENT PRACTICES BY THE SUGARCANE GROWERS"

By

Mr.Pedhekar Raghu Devram.

(Reg. No.13/306)

A Thesis submitted to the
MAHATMA PHULE KRISHI VIDYAPEETH
RAHURI-413 722, DIST. AHMEDNAGAR,
MAHARASHTRA STATE, INDIA

In partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE (AGRICULTURE)

In

AGRICULTURAL EXTENSION

EXTENSION EDUCATION SECTION
COLLEGE OF AGRICULTURE,
KOLHAPUR – 416 004

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CANDIDATE'S DECLARATION

I hereby declare that this thesis or part
There of has not been submitted by
me or other person to any other
University or Institute
for a Degree or
Diploma.

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Date : / /2015

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CERTIFICATE

This is to certify that the thesis entitled, **"KNOWLEDGE AND ADOPTION OF RATOON MANAGEMENT PRACTICES BY THE SUGARCANE GROWERS"** submitted to the Faculty of Agriculture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar, Maharashtra State in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (AGRICULTURE)** in **AGRICULTURAL EXTENSION** is a record of a bonafide research work carried out by **PEDHEKAR RAGHU DEVRAM** under my guidance and supervision and that no part of the thesis has been submitted for any other degree, diploma or publication in other form.

The assistance and help received during the course of this investigation and sources of literature referred to have been duly acknowledged.

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Place: Kolhapur

Date: / / 2015 *(Pedhekar .R.D)*

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LIST OF ABBREVIATIONS

Rs	Rupee (s)
%	Per cent
@	At the rate of
Agri.	Agriculture
Agril.	Agricultural
Avg	Avrage
Cm	Centi meter
DAS	Days after sowing
e.g.	For example
et al.	Et alli (and other)
etc.	Et cetra
Extn.	Extension
Fig .	Figure (s)
FYM	Farm Yard Manure
G	Gram (s)
Govt.	Government
ha.	Hectare (S)
i .e.	Id est . (That is)
J.	Journal
KCC	Kisan Call Center
KVK	Krishi Vidyan Kendra
No.	Number
^{o}C	Degree Celsius
R	Pearson correlation Coefficient Value
Res.	Research
SD	Standard deviation
Std	Standard
GOI	Government of India
SAU	State Agricultural University
JDAO	Joint Directorate of Agriculture

ABSTRACT

KNOWLEDGE AND ADOPTION OF RATOON MANAGEMENT PRACTICES BY THE SUGARCANE GROWERS.

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Department : Agricultural Extension

Sugarcane (*Saccharum officinarum L.*) is one of the important crops fulfilling 60 per cent of the sucrose requirement. It is considered as a cash crop and plays the main role in the rural economy of the Maharashtra. Sugarcane is very economically, socially and politically sensitive crop.

Sugarcane also supports two important rural and cottage industries *viz*., *Gur (Jaggery)* and *khandsari* industry. By-products like molasses is the main raw material for alcohol and alcohol based industries. Sugarcane bagasse is the chief source of power in sugarcane mills. Another by-product press mud contains considerable amount of plant nutrients. It is also used in paper industries as well as fuel purpose. Hence, the present investigation was conducted with the objective to study knowledge and adoption of ratoon management practices by sugarcane growers .To find out the

relationship between selected characteristics with knowledge and adoption and constraints faced by sugarcane growers and obtain their suggestions.

The study was purposively conducted in Kolhapur district because of the higher ratoon sugarcane area in the district. To have compact area two tahsils i.e. Karveer area under sugarcane 21,740 ha and out of these area under ratoon 6780 ha, Hatkanangale area under sugarcane 18,349 ha and out of these area under ratoon 5910 ha, were purposively selected from Kolhapur district. 12 villages were selected from these two tahsils on the basis of maximum number of sugarcane respondents and thus,10 respondents from each village .Hence, in all 120 sugarcane growers purposely selected and personally interviewed .The collected data was statistically analysed and presented.

The research findings revealed that majority (70.00 percent) of the respondents belonged middle age group, (40.00 per cent) of the respondent had received secondary education. It was observed that (43.00 per cent) of the respondent belonged small size land holding between1.01 to 2.00 ha, Majority (71.67 per cent) of respondents have medium size of family.

It was observed that most of the sugarcane growers (51.67 per cent) had annual income between Rs.1,50,001 to 3,00,000. It was observed that majority (72.50 per cent) of the respondents had medium source of information. It was observed that three fourth (75.00 per cent) of the respondents had medium social participation. It was observed that the majority of the respondent (94.16 per cent) of the respondent grow paddy crop in Kharif season. Followed by (92.50 per cent) of the respondent grow wheat crop in rabbi season, (35.00 per cent) of the respondents grow maize crop in summer season. All the respondent grow sugarcane crop in annual habitat.

It was observed that the majority (68.33 per cent) of the respondent had medium knowledge and (69.17 per cent) of the respondents had medium adoption about ratoon management practices.

Sugarcane growers characteristics *viz.,* education, land holding, size of family, annual income, source of information, social participation and cropping pattern had

Shown positive and significant correlation, while age show the negative correlation with knowledge.

While, education, land holding, size of family, annual income, source of information, social participation and cropping pattern had shown positive and significant correlation, while age show the negative correlation with adoption.

The respondents faced the constraint of labour shortage at the time of farm operation. Other constraints are lack of knowledge about pest control poor, high cost of fertilizer, insecticide, lack of knowledge about biological pest control, Irregular supply of electricity, inconsistency in the market price, lack of knowledge about drip irrigation, unavailability of finance, high labour cost and high cost of micronutrient. Majority of the respondents suggested conduct demonstration on white grub pest management on farmer field, awareness of trash management practice in ratoon sugarcane is needed. resistant variety should be developed in respect of pest and disease control, the timely technical advice should be made by concerned extension personnel, Technical information of latest and advanced technologies should be provide through print and electronic media. More credit facility by sugar factory and commercial bank for modernization and mechanization of the sugarcane farming, Demonstration of improved varieties should be conducted on farmer field, regular supply of electricity, close linkage between university scientist and farmer and Implement and appliance should be made available to farmer in time.

1. INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is an important commercial crop of the world and is cultivated in about seventy five countries, the leading countries being India, Brazil, Cuba, Mexico and Thailand. The sugar industry plays an important role in the agricultural economy of India. Today sugarcane cultivation and sugar industry stands as supporting pillars of Indian economy. India occupies the second rank in production of sugarcane in the world. The area under sugarcane in India is 5.06 million hectares during the year 2013-14 and cane production of 342.20 million tonnes and productivity is 69.37 Metric tonnes per ha. Sugar production 2013-2014 year is estimated to be around 26.6 million tonnes. India's annual consumption of sugar is around 28.00 million tonnes. As per the latest data from the ministry of agriculture, sugarcane has already been planted in around 4.9 million hectares of land. (Directorate of Economics and Statistics, Department of Agriculture and Co-operation, GOI 2014-2015).

Sugarcane also plays an important role in agriculture economy of the state. Maharashtra is second largest sugarcane producing state in country after Uttar Pradesh in area and after Tamil Nadu in productivity (80 t/ha) nearly 79.6 per cent (8.35 lakh ha) area of state comes under western Maharashtra with production (87.50 t/ha). Kolhapur, Sangali, Ahmednagar, Satara, Solapur and Pune are the major sugarcane growing District in Maharashtra. Kolhapur district is considered as the core district in western Maharashtra for cultivation of sugarcane. It leads productivity as it cover (1,41,264 ha) of total area in state, and under the ratoon crop area (54,126ha) In Kolhapur district production of sugarcane in Karveer, Kagal, Hatkanangale, Shirol and Shahuwadi tahsil is more and area under sugarcane cultivation is also more. Karveer tahsil has area (21,797ha) under sugarcane cultivation and out of these (6780 ha) area under ratoon Hatkanangale (18,349ha) and out of these (5910 ha) area under ratoon and Kagal (20,206ha) covered under sugarcane cultivation and out of these (6230 ha) area under ratoon. Sugarcane is being long duration crop, hence high water requirement (340-350 ha.cm) (Annual report 2013-2014 JDOA, Kolhapur District)

Ratooning of cane is very essential for increasing the benefit to the farmer. Ratooning saves expenses as land preparation, planting material cost, seed treatment cost and planting expenses. For this proper management of ratoon crop is necessary. In India the potential of ratoon crop is always under estimated hence yield of ratoon is low.

Preferly cane harvested before February is generally advised for ratooning. After harvesting the trash is collected and spread in furrow. Then stubble shaving is completed.

Sugarcane ratoon occupies about (50-55 per cent) of the total cane area in India. However, its contribution to total cane production varies from (30-35 per cent) only. There is an average gap of (20-22 per cent) between plant and ratoon yield especially in subtropical states of India. In major cane growing Countries two or more ratoon crops are common. In India only one or some time two ratoon are taken in spite of the experimental finding that ratoon are quite profitable.

Benefits of ratoon

Ratoon are economical by (25-30 percent) in operational cost beacause of saving in seed material and preparatory tillage. Since, ratoon mature earlier than plant cane, they can be harvested easily and the field will be available for crops in intensive cropping system. Early supply of cane is assured because of short duration of ratoon sugarcane. Ratoon often give better quality cane with improved sugar recovery. Cost of production per tonne of ratoon crop is less than the plant cane. Generally, early maturing varieties are poor ratooner than mid-late or late varieties.

Time of ratoon initiation

Moderate temperature (25-30^{0}C) is most conductive for stubble sprouting. In tropical belt, December-March harvested crop gives best ratoon. Where as in subtropical belt, spring harvested crop (February-March) gives good ratoon. Piece-meal harvesting thought the crushing season (November-May) should be discouraged. Harvesting the plant crop close to ground level is most important for good ratooning. Above the ground level harvesting not only affect the succeeding crop yield but also the plant cane yield. Ratooning of sugarcane is one of the important method of reducing cost of production through elimination of seed cost and preparatory cultivation charges. Ratoon crop in general mature earlier than the plant crop.

Sugarcane in Maharashtra

Nearly 79.2 per cent (5.63 lakh ha.) area of the state total sugarcane area comes under Western Maharashtra with production 87.50t/ha which is higher than the total state production. Kolhapur, Sangli, Ahmednagar Satara, Solapur and Pune are the major sugarcane growing districts in western Maharashtra.

Sugarcane is major cash crop of western Maharashtra. The Kolhapur is major Sugarcane growing District of Maharashtra state. The total cultivable area of Kolhapur is (4,76,000 ha). The area under Sugarcane crop in Kolhapur is (1,41,264 ha) and area

under ratoon (54,126 ha) in year 2013-14. In agriculture ,the contribution made by Agricultural university not only help to increase production and productivity of food crop but also help in achieving socio economic upliftment of Maharashtra state. State Agricultural University in Maharashtra have generated number of farm full innovation for last 30 years. MPKV has released many improved varities of sugarcane crops grown in state.

Maharashtra ranks second in the production (11.40 per cent) highest sugar recovery in India. In Maharashtra area under sugarcane was 5.63 lakh hectares (15.80 per cent) with production of 8.00 lakh tonnes during year 2013 (Anonymous 2014). In Kolhapur region area under sugarcane was (2,62,500 ha) and yield was 101 tonne / ha (2014) (Source – MPKV, Rahuri *Krishi darshni* 2014)

1.1 Objectives of the study

The present study entitled 'knowledge and adoption of ratoon management practices by the sugarcane growers' was carried with the following objective.

1. To study personal and socio-economic characteristics of the sugarcane growers.
2. To study the knowledge and adoption of the ratoon management practices followed by sugarcane growers.
3. To study the correlation between independent and dependent variables.
4. To study the constraints faced by sugarcane growers and to obtain the suggestions to overcome the constraints.

1.2 Scope and importance of study

The present study was conducted in Kolhapur district keeping in view the large area under ratoon sugarcane and high susceptibility to pests and diseases resulting into low yield.

The finding of study would help to understand the knowledge and adoption level of the sugarcane growers about sugarcane ratoon management practices. The study would also be useful to know the constraints faced by the sugarcane growers in adoption of ratoon management practices.

1.3 Hypothesis

The following hypothesis were developed for testing empirically on the basis of past researches and objectives of the present study.

1. There exists a relationship between personal, socio-economic characteristics of the sugarcane growers and constraints faced by them while following the ratoon management practices in sugarcane.

2. There exist a relationship between knowledge and adoption of ratoon management practices followed by sugarcane growers and their personal-social character.

1.4 Limitations of study

The study suffers from the following limitations,

1. The study has been conducted in only Kolhapur district. As it is student research, time, money and other resources do not permit to cover large area.
2. The findings of this study are based on the opinion expressed by the respondents. Therefore, its objectivity would be limited to the opinion expressed by them.
3. The findings emerging out of this study would only be applicable in the areas with similar socio-economic and agro-economic conditions.

1.5 Layout of thesis

The thesis comprises of six chapters. The first chapter Introduction deals with the purpose of the study of specific objectives as well as importance and limitations of the study. The second chapter Review of Literature gives brief account of relevant work done in the past on the topic of present investigation. Chapter third deals with the Methodology followed in the study. The fourth chapter deals with the presentation of Results and Discussion. The fifth chapter constitutes Summary, Conclusions and Implications of the study. The last chapter literature cited in the body of presentation has been given under the head Literature Cited. The interview schedule and other material are appended at the end.

2. REVIEW OF LITERATURE

This chapter deals with the comprehensive review of literature, which is directly or indirectly relevant to the objectives of the study. Comprehensive review of literature is an essential part of any scientific investigation. Its main functions are to determine the previous work done, assist in delineation of problem area which provide basis of theoretical framework, provide an insight into methods and procedure to be used and operational definitions of major concepts to help in interpretation of findings.

Considering the objectives the review of literature of present investigation has been presented under following subheads.

2.1. To study personal and socio-economic characteristics of the sugarcane growers.

2.2. To study the knowledge and adoption of the ratoon management practices followed by sugarcane growers.

2.3. To study the correlation between independent and dependent variables.

2.4. To study the constraints faced by sugarcane growers and to obtain the suggestions to overcome the constraints.

2.1 Personal and socio-economic characteristics of sugarcane growers.

2.1.1 Age

Gurav (2000) in this study entitled observed that majority 54.90 per cent of sugarcane growers adopting drip irrigation belonged to middle age group, followed by 26.47 per cent and 18.63 per cent of them belonging to younger and old age groups, respectively.

Thorat *et al.* (2004) in their study observed that 39.44 per cent of the sugarcane growers were of middle age group, followed by 32.22 per cent were of old age group and 28.34 per cent were of young age group.

Shaikh *et al.* (2004) found that two fifth 40.32 per cent of the respondents were from middle age group, followed by old age group (34.68 per cent) and only 25.00 per cent belonged to young age group.

Solanki *et al.* (2004) reported that 56.44 per cent of the sugarcane growers were above 45 age group, followed by 30.69 per cent of growers between 31 to 45 age group.

Ramesh *P.et al.* (2005) reported that most of the respondents (40.00 per cent) were young age group, followed by middle age group 33.00 per cent and old (27.00 per cent) age categories.

Sasane *et al.* (2008) observed that the sugarcane growers belonged to the old age group of above 56 years 41.67 per cent, followed by middle age group 36.66 per cent and young age group 21.67 per cent.

Vijay kumar *et al.* (2008) revealed that a majority 64.29 per cent of the respondent paddy grower were in the middle age group (36 to 50) year category.

2.1.2 Education

Gurav (2000) revealed that most of sugarcane growers had acquired secondary 41.77 per cent and higher secondary 27.45 per cent level of education, 14.70 per cent had the education of college level, whereas, very few 6.86 per cent were illiterate.

Thorat *et al.* (2004) observed that 36.67 per cent of sugarcane growers were having secondary school education, followed by higher secondary education (22.22 per cent).

Shaikh *et al.* (2004) observed that 20.00 per cent of the respondents had primary and higher secondary education. The percentage of the graduate respondents was 27.42 per cent.

Solanki *et al.* (2004) reported that about 48.00 per cent of the sugarcane growers had secondary education (8^{th} to 12^{th} standard), followed by 24.75 per cent had primary education.

Ramesh *P. et al.* (2005) reported that more than two-fifth 45.00 per cent of the respondent were illiterate, followed by primary education 31.00 per cent, middle education 10.00 per cent, secondary education 8.00 per cent, higher secondary education 5 .00 per cent and Only 1.00 per cent respondent had collegiate education.

Sasane *et al.* (2008) observed that more than 50.00 per cent of the sugarcane growers had secondary and higher secondary education.

Vijay kumar *et al.* (2008) reported about one-third 33.81 per cent of the respondents were educated up to secondary school level.

2.1.3 Land holding

Gurav (2000) observed that nearly half of the respondents 48.03 per cent had medium size of land holding, whereas, 29.41 per cent and 22.54 per cent respondents had large and small size farms, respectively.

Shaikh *et al.* (2004) found that majority 56.45 per cent of the respondents were having medium land holding of 2.01 to 5.00 ha. Followed by small farmers 25.81 per cent.

Solanki *et al.* (2004) reported that majority 62.37 per cent sugarcane growers had land holding up to 1 ha. Followed by 26.74 per cent of growers had land holding of 1 to 2 ha.

Thorat *et al.* (2004) observed that majority of sugarcane growers (86.11 per cent) had large size of land holding, followed by medium land holding (10.00 per cent).

Sasane *et al.* (2008) observed that majority 58.33 per cent of sugarcane growers had land holding in between 1.01 to 2.00 ha.

2.1.4 Size of family

Gurav (2000) reported that 70.58 per cent and 29.41 per cent of the respondents were from small size and large size families, respectively.

Shaikh *et al.* (2004) observed that 44.36 per cent of the respondents had medium family size, followed by small family size (37.90 per cent).

Solanki *et al.* (2004) found that 42.00 per cent of sugarcane growers had small family size of up to 4 members in their family, followed by 90.00 per cent had medium family size of 4-6 members in their family.

Ramesh *P. et al*. (2005) reported that, majority (61.00 per cent) of the respondents belonged to nuclear family type, while the remaining (39.00 per cent) had joint family type.

Sasane *et al.* (2008) reported that a majority of sugarcane growers (90.83 per cent) had small sized families, followed by medium (9.17 per cent) sized families.

Vijay kumar *et al*. (2008) reported that majority of the respondent paddy growers (67.14 per cent) had medium size of family (6 to 8 members).

2.1.5 Annual Income

Shaikh *et al.* (2004) observed that about 63.00 per cent of the sugarcane growers had annual income less than Rs. 1 lakh, followed by 29.00 per cent had annual income between Rs. 1,00,000 to Rs. 2,00,000.

Thorat *et al.* (2004) reported that about 42.00 per cent of sugarcane growers were having income of Rs. 50,001 to Rs.1,00,000, followed by 29.00 per cent were having income of Rs. 1,00,001 to Rs.1,50,000.

Sasane *et al.* (2008) observed that more than two-fifth 41.66 per cent of the respondents had obtained annual income less than Rs. 50.000 and about 35.00 per cent of the respondents obtained annual income more than Rs. 1.50.000.

2.1.6 Sources of Information

Kharde (1994) concluded that friends, neighbours, relatives were improved sources of information and most used (49.34 per cent) by sugarcane growers.

Jadhav (1995) reported that farmers are mainly dependent on neighbours, progressive farmers and relatives for getting information regarding improved practices of sugarcane cultivation.

Thorat *et al.* (2004) observed that 68.89 per cent of farmers always obtained information from friends and relatives, followed by Agricultural Assistants of university (43.89 per cent) and university scientists (38.89 per cent).

Sasane *et al.* (2008) observed that majority 63.33 per cent of sugarcane growers were always obtaining information through Agricultural Assistants of Agricultural University.

2.1.7 Social participation

Kharde (1994) reported that 67.34 per cent of sugarcane growers constituted the medium social participation category, followed by 24.00 per cent belonging to low social participation category and 8.66 per cent to high social participation category.

Shaikh *et al.* (2004) found that (46.77 per cent) of the respondents had medium social participation, followed by 28.23 per cent had low social participation.

Ramesh *P.et al*.(2005) reported that more than three fourth (78.00 per cent) of the respondents had medium level social participation, followed by (13.00 per cent) of respondents with low social participation and (9.00 per cent) of respondents under high social participation.

Sasane *et al.* (2008) observed that large majority (97.50 per cent) of respondents were members of co-operative society, co-operative sugar factories (95.83 per cent) and milk development institution (94.17 per cent).

Vijay kumar *et al*. (2008) reported More than half (55.71 per cent) of the respondent paddy growers had medium social participation.

2.1.8 Cropping pattern

Pallavi (2003) indicated that a majority (82.35 per cent) of the respondents were growing paddy, followed by groundnut (76.47 per cent), gram (44.70 per cent), jowar (40 per cent) and wheat (39.41 per cent).

Balasubramani *et al.* (2004) revealed that a majority of the respondents (86.67 per cent) practiced a single season of cropping pattern, while 13.33 per cent of the respondents practiced more than one season cropping pattern.

Ramesh *P. et al*. (2005) reported that half (51.00 per cent) of the respondents fall under low category of cropping pattern, whereas only 12.00 per cent belonged to higher category, while 37.00 per cent of the respondents fall under medium category of cropping pattern this might be due to the non- availability of irrigation.

Vijay Kumar (2008) found that a majority of paddy growers 81.43 per cent followed fair cropping pattern, while 10.00 per cent of them followed good cropping pattern. Only 8.57 per cent of them had poor cropping pattern.

2.2 Knowledge of the sugarcane growers about recommended sugarcane ratoon management practices.

Kashem and Hossain (1992) revealed that two-third (67.00 per cent) of sugarcane growers had high agricultural knowledge.

Shaikh *et al.* (2004) revealed that 47.58 per cent of the respondents had medium knowledge, followed by 29.03 per cent of them had low knowledge. Less than three-fifth 23.39 per cent of respondents had high knowledge.

Maraddi *et al.* (2007) observed that more than half of the respondents (53.33 per cent) belonged to medium knowledge category, while 32.77 per cent had low knowledge about selected sustainable cultivation practices, which indicates there is a need to focus attention to ensure that this cumulative group of medium and low knowledge categories (86.00 per cent) posses accurate knowledge of selected sustainable cultivation practices.

2.3 Adoption of the sugarcane grower about recommended sugarcane ratoon management practices.

Bhatkar *et al.* (1997) indicated that majority (64.00 per cent) of the sugarcane growers were medium in adoption of recommended practices of sugarcane crop. One-fifth (20.67 per cent) of sugarcane growers had high adoption, whereas, 15.33 per cent had low adoption.

Hadole and Dakhore (2003) noticed that most (93.33 per cent) of the respondents had medium adoption of recommended practices of sugarcane crop, followed by 6.00 per cent and 0.67 per cent respondents had high and low adoption, respectively.

Shaikh *et al.* (2004) revealed that nearly half (49.19 per cent) of the respondents had medium adoption, followed by 41.94 per cent of them had low adoption. Only 8.87 per cent of the respondents had high adoption.

Solanki *et al.* (2004) observed that majority of the sugarcane growers adopted recommended practices like FYM/compost, used chemical fertilizers as per recommendations proper water management practices and other practices up to the harvesting.

2.4 Relationship between selected independent variables and Knowledge of the sugarcane growers about ratoon management practices.

2.4.1 Age and Knowledge

Bhatkar *et al.* (1997) reported that age does not have significant correlation with knowledge of sugarcane growers.

Patil (2003) reported that age of the goat keepers was found to be negatively significant relationship with their knowledge about goat management practices

Pharate (2007) Age of the dairy farmers was found to have negatively significant relationship with their knowledge about improved dairy management practices.

Doddamani *et al.* (2011) reported that age were found to be non-significantly associated with knowledge of land reclamation practices.

2.4.2 Education and knowledge

Bhatkar *et al.* (1997) showed that education do not have significant correlation with knowledge of sugarcane growers.

Maraddi *et al.* (2007) observed that positive and significant relationship between education and knowledge of sugarcane growers.

Wadkar (2007) stated that education exhibited positive and highly significant relationship with the knowledge of farmers.

Dighe *et. al.* (2010) found that the farmers with higher education tend to posses more extent of knowledge about soil and water conservation practices.

2.4.3 Land holding and knowledge

Bhatkar *et al.* (1997) reported that land holding do not have significant correlation with knowledge of sugarcane growers.

Bhosale (2004) found that size of land holding had positive and significant

relationship with knowledge of pomegranate growers.

Dhapke (2004) observed that the respondents with larger farm size possess more knowledge about soil and rain water management technology.

Doddamani *et al.* (2011) reported that Land holding was found to be non-significantly associated with knowledge of land reclamation practices.

2.4.4 Size of family and knowledge

Bhosale (2000) reported that family size of the goat keeper and their knowledge levels were non-significantly co-related with each other.

Patil (2003) observed that family size of the goat keepers and their knowledge level were non-significantly correlated with each other.

Dafale (2004) found that family size was negatively in relationship with knowledge.

2.4.5 Annual income and knowledge

Bhatkar *et al.* (1997) observed that annual income does not have significant correlation with knowledge of sugarcane growers.

Bhosale (2004) reported that relationship between knowledge and annual income of pomegranate growers was significant.

Dighe *et. al.* (2010) found that the farmers with more annual income tend to posses more extent of knowledge about soil and water conservation practices.

2.4.6 Sources of information and knowledge

Bhatkar *et al.* (1997) observed that sources of information do not have significant correlation with knowledge of sugarcane growers.

Patil (2003) was observed that use of information sources by goat keepers was positively related with their knowledge level.

Bhosale (2004) reported that relationship between source of information and knowledge was significant.

2.4.7 Social participation and knowledge

Bhatkar *et al.* (1997) observed that social participation was found to possess significant and positive relationship with knowledge of recommended practices of sugarcane cultivation.

Hadole and Dakhore (2003) reported that social participation was positively and significantly related with knowledge of sugarcane cultivation practices.

2.4.8 Cropping pattern and knowledge

Doddmanni *et al.* (2011) reported that cropping pattern was found to be non-significantly associated with knowledge of land reclamation practices.

2.5 Relationship between selected independent variables and adoption of the sugarcane growers about ratoon management practices.

2.5.1 Age and adoption

Hadole *et al.* (2003) showed that age do not show any influence on adoption of improved practices of sugarcane.

Haldole *et al.* (2005) observed that age of farmers was non-significantly related with adoption of recommended sugarcane production technology.

Doddmanni *et al.* (2011) reported that age were found to be non-significantly associated with adoption of land reclamation practices of saline and waterlogged soil .

2.5.2 Education and adoption

Deshpande *et al*. (1998) reported that there was non-significant relationship between education of the farmers with their time of adoption of agricultural innovations.

Rathod (2005) observed that education had positive impact on adoption behaviour regarding improved production technology for sugarcane.

Khare *et al.* (2013) found that education was positively and significantly correlated with the adoption of improved gram cultivation practices.

2.5.3 Land holding and adoption

Bhatkar *et al.* (1997) reported that land holding does not have significant correlation with knowledge of sugarcane growers.

Hadole *et al.* (2005) observed that land holding was positively and significantly related with adoption of recommended sugarcane production technology.

Khare *et al.* (2013) found that land holding were positively and significantly correlated with the adoption of improved gram cultivation practices

2.5.4 Size of family and adoption

Supe *et al.* (1990) concluded that size of family had no association with acceptance of technology of jawar practices.

Bhosale (2000) reported that their family size had non-significant relationship with adoption level.

Patil (2003) observed that family size had non-significant relationship with adoption level.

Dhapke (2004) found that family size had positive relationship with adoption of

soil and water conservation practices.

2.5.5 Annual income and adoption

Deshpande *et al*. (1998) reported that annual income of the farmers was significantly associated with time of adoption of agricultural innovations.

Suryawanshi (2002) reported that annual income had positive relationship with adoption of soil and water conservation practices.

Hadole *et al.* (2005) reported that annual income was positively related with adoption of recommended sugarcane production technology.

Deshmukh (2006) stated that annual income of pigeon pea growers had positive and significant relationship with the adoption of farmers.

2.5.6 Sources of information and adoption

Hadole *et al.* (2005) reported that source of information was positively related with adoption of recommended sugarcane technology.

Jadhav (2008) found that positive and significant relationship of use of sources of information with the extent of adoption of mango post harvest technology.

Khare *et al.* (2013) found that source of information were positively and significantly correlated with the adoption of improved gram cultivation practices.

2.5.7 Social participation and adoption

Hadole and Dakhore (2003) reported that social participation was positively and significantly related with adoption of sugarcane cultivation practices.

Hadole *et al.* (2005) reported that social participation and extension contact were positively and significantly related with adoption of sugarcane production technology.

2.5.8 Cropping pattern and adoption

Doddamani *et al*. (2011) reported that cropping pattern were found to be non-significantly associated with adoption of reclamation Practices of saline and water logged soils.

Khare *et al.* (2013) reported that cropping pattern was found to be non-significantly related with adoption respondent.

2.6 Constraints faced by the sugarcane ratoon growers:

Kharde (1994) found that problems like high cost of fertilizers (74.00 per cent), shortage of labour for farm operations (73.33 per cent), irregular supply of canal irrigation water (70.00 per cent), high cost of sugarcane setts (63.34 per cent) were highly perceived. He also observed the problems like improved implements are not economical for small land holding (60.67 per cent), don't feel need for sett treatment (57.34 per cent)

and late harvesting of sugarcane by the sugar factory (22.67 per cent) were low perceived.

Shaikh *et al.* (2004) revealed that a large majority of sugarcane growing farmers faced problems like non-availability of predators (82.26 per cent), no use of sugarcane as a fodder (77.42 per cent), insecticides are costly (73.39 per cent), interculturing is difficult in old crop (64.52 per cent) and no technical knowledge about spraying of insecticides (62.90 per cent).

Thorat *et al.* (2004) observed that high cost of micro-nutrients (66.67 per cent), lack of knowledge (50.00 per cent) and non-availability of different micro-nutrients (33.33 per cent), were the major constraints reported by the respondents regarding its use to the sugarcane crop.

Solanki *et al.* (2004) found that majority (84.16 per cent) of the sugarcane growers faced problem of irregular supply of electricity, followed by high cost of inputs (64.35 per cent).

Mande and Thombre (2009) observed the problems like irregular supply of electricity, low prices offered by sugar factories and harvesting schedule not followed properly by sugar factories in adoption of sugarcane cultivation practices.

2.7 Suggestions made by the respondents

Shaikh *et al*. (2004) observed that a large majority (87.90 per cent) of the farmers suggested that drought resistance variety should be developed. Nearly two third (68.55 per cent) of sugarcane growing farmers suggested predator cards should be made available, setts of resistance variety should be supplied by sugar factory /Agril. University (66.94 per cent), sugar factory should supply the predators (63.71 per cent) and spraying of insecticides by sugar factory on large scale area (59.68 per cent). Half (50.00 per cent) the farmers suggested that group discussion between scientists and farmers should be organized and more literature should be provided.

Thorat *et al*. (2004) concluded that most (89.44 per cent) of the respondents suggested that technical information in respect of latest technologies should be given to the farmers, followed by demonstrations of improved varieties be conducted on farmers field (57.22 per cent), planting material of improved varieties be made available (85.55 per cent) and low cost technology of sugarcane cultivation be generated by the University (53.89 per cent) and there should be close linkage between scientists and farmers (37.22 per cent).

Solanki *et al*. (2004) revealed that 62.37 per cent ratoon sugarcane growers suggested that prices of inputs should be reduced, about 54.00 per cent suggested that improved implements should be made available to the growers in time.

Sasane *et al.* (2008) observed the suggestions of sugarcane growing farmers regarding reasonable cost of electricity, cent per cent subsidy for drip irrigation and technical knowledge about drip irrigation system.

3. METHODOLOGY

This chapter deals with the description of procedure followed by carrying out the investigation .It contain tools and technique employed for data collection. The sampling procedure adopted as well as devices used for analysis of data are also explained. This chapter also incorporates the explication process for measurement of independent and dependent variable under study .The methodology adopted for study described in this chapter under nine subheads as given below sections.

3.1 Locale of the research study

3.2 Research design

3.3 Sampling plan

3.4 Preparation of interview schedule

3.5 Pre –testing of interview schedule

3.6 Instruments and methods used for data collection

3.7 Variable and their empirical measurement

3.8 Statistical techniques used for analysis of data

3.9 Definitions

3.1 Locale of the Research study

The present study was conducted in purposively selected Hatkanangale and Karveer tahsils of eastern parts of Kolhapur district. Reason behind selection of these tahsils was that the large number of respondents adopted more sugarcane ratoon on higher side than other. As well as these tahsils has more irrigation facility and large area under sugarcane crop cultivation. This tahsils are situated adjacent to each other at eastern and north-east side of the district. The northern boundary of these tahsil is surrounded by Sangli district. The western sides by Gaganbawada tahsil. The north-east side and south-west side of these tahsils surrounded by Panhala and Bhudargdh respectively, South side of Karveer tahsil is surrounded by Kagal tahsil.

3.1.1 Geographical Location

The Kolhapur district situated in the extreme southern part of Maharashtra State. It lies between 150^0 43’ north to 170^0 17’ north latitude and 730^0 40’ east to 740^0 42’ east longitude. It is surrounded by Sangli district to the north, Belgaum district of Karnataka state to the east and south, and Ratnagiri and Sindhudurga districts to the west. The Kolhapur district comprises 7685 sq. km area and administratively divided into 12 tahsils.

3.1.2 Area and population

Kolhapur district cover total geographical area of 7,76,500 ha. Which is 2.5 per cent of the Maharashtra State. Total population of Kolhapur district was 35,23,162 out of which 18,07,470 were male and 17,15,692 were female. Among the total population 33.00 per cent were urban and 67.00 per cent were rural. The population density were 5041 for urban and 347 for rural. Out of district population educated male were 91.30 per cent and 74.20 per cent were female. The literacy percentage is 82.90.

Total area of selected Karveer and Hatkanangale tahsils is 669.88 sq. km and 614.88 sq. km respectively. Hatkanangale taluka comprises 63 villages and Karveer tahsil comprises 130 villages. The population of Karveer is 10,37,713 and population of Hatkanangale tahsil is 8,07,751. (Source: Socio-economic review and district statistical abstract of Kolhapur district, Government of Maharashtra, Mumbai.)

3.1.3 Soil

The soils of Kolhapur district can be divided into three major geographical regions. The Western region comprises of hilly region with red soils covering the areas of Shahuwadi, Radhanagari, Gaganbawada, Bhudargad, Ajra and Chandgad tahsils. The middle region is the area of fertile soils comprising Karveer and Kagal tahsils and the eastern region is made up of medium soil comprising Hatkanangale and Shirol tahsils. The area along rivers Bhogawati, Kumbhi, Kasari, Panchaganga, Hiranyakeshi and Vedganga are fertile with alluvial soils.

3.1.4 Climate

The Western region of Kolhapur district covers the Sahyadri ranges with dense forests. Maximum rainfall is received in this area and hence, there exists a cool climate. Rainfall decreases from west to east. Hence rainfall is more in Gaganbawada, Radhanagari, Chandgad and Ajra tahsils. Rainfall is scares in eastern tahsils like Shirol and Hatkanangale. Average rainfall of kolhapur district in 2014 was 1837.30 mm. Actual rainfalls of 1552.60 mm and 85 percentage of rainfall was received. Total rainy days were 73. Maximum temperature of the district was recorded to be 37^0C and minimum temperature was 11^0C**.**

3.1.5 Rivers

This is one of the important sources of irrigation in Kolhapur district. The major rivers in Kolhapur district are Krishna, Warana, Panchaganga, Dudhaganga, Vedganga, Hiranyakeshi and Ghatprabha. A river Tilari is flowing at South-West end of the district.

3.1.6 (A) Land utilization pattern of Kolhapur district

To have a brief idea about the mode of agriculture in the district,the land utilization pattern in respect of Kolhapur for the year 2012-2013 is given below

Sr.No.	Particulars	Area('00'ha)
1	Total geographical area	7765
2	Forests	1469
3	Barren and uncultivable land	438
4	Land under non-agriculture use	382
5	Cultivable waste land	369
6	Permanent pastures and other grazing land	414
7	Land under trees, crops and grooves	72
8	Current fallow	107
9	Other fallow	208
10	Net area sown	4390
11	Area sown more than once	6730
12	Total cropped area	4390

3.1.6 (B) Land utilization pattern of selected tahsils

Sr. No.	Particulars	Hatkanangale	Karveer
1	Total geographical area (ha)	60937	67113
2	Area under forest (ha)	1433	804
3	Land put to non- agricultural purpose (a+ b) (ha)	5906	8025
A	Non-agricultural land (ha)	5108	5853
B	Barren/uncultivated land(ha)	798	2172
4	Gross cultivated area (a + b) (ha)	60005	63369
A	Net sown area (ha)	48992	47152
B	Area sown more than once (ha)	11013	16217
5	Total cultivable land (ha)	50010	48926

3.1.7 (A) Cropping pattern of Kolhapur district

The details of cropping pattern of Kolhapur district for the year 2012-2013 is given below.

Sr. No.	Crops	Area(ha)	Percentage of Maharashtra (%)
A	**Cereals**		
1	Rice	87441	5.75
2	Finger millet	17525	14.98
3	Kharif Jowar	5414	0.71
4	Maize	1739	0.25
5	Other cereals	2076	3.84
	Total cereals	**114195**	**3.03**
B	**Pulses**		
1	Tur	1577	0.15
2	Green gram	1328	0.32
3	Black gram	1554	0.45
4	Other pulses	2029	3.12
	Total pulses	**6488**	0.34
	Total food grains	**120683**	**2.13**
C	**Oilseeds**		
1	Groundnut	40822	21.37
2	Sesamum	474	1.63
3	Soybean	45187	1.40
4	Other oil seeds	334	1.86
	Total oil seeds	**86817**	**2.48**
D	**Cash crops**		
1	Sugarcane	141768	15.13

(Source: Socio-economic review and district statistical abstract of Kolhapur district, Government of Maharashtra, Mumbai.)

3.1.7 (B) Cropping pattern of selected tahsils

Area under various crops grown in selected research site is presented below. (

area ha)

Sr. No		Crop	Hatkanangale	Karveer
A		**Cereal**		
	1	Paddy	2770	1089
	2	Wheat	130	60
	3	Sorghum	3570	980
	4	Maize	290	170
	5	Nachani	-	40
B		**Pulses**		
	1	Gram	340	300
	2	Tur	190	310
C		**Oilseeds**		
	1	Groundnut	8420	3594
	2	Sunflower	10	25
	3	Soybean	13298	3367
D		**Cash Crop**		
	1	Sugarcane	18349	21797

Source Annual Report Joint Director of Agriculture Kolhapur Division (2014).

3. 1. 8 . Area under irrigation of the selected research site

Irrigation statistics of the selected research site is given below. (area ha)

Sr. No.	Particulars	Hatkanangale	Karveer
1	Total area under irrigation	20434	19362
2	Total area under cultivation	60005	63369
3	Percent area under irrigation to area under cultivation	34.05	30.60

3.1.9 Transport and communication facilities

In Kolhapur district buses and railway are the significant means of transportation. The state transport buses, corporation buses, trucks, tempos, private jeeps, autos are the major means of transportation.

Total road length 9299 kms, and railway track length of 35.67 kms. National Highway No.4 (Pune - Bangalore) passes through the Kolhapur district.

Post offices (560) and landline telephone facilities (150269) are available in almost all the villages. The Radio and television means of communication are also spreading in the district.

3.1.10 Other facilities

The educational institutes, primary schools, secondary schools-, hospitals, nationalized banks, credit cooperatives, cold storage facilities, cooperative dairy societies, lift irrigation societies, *Nagri sahkari path sanstha*, M*ahila mandals*, *Bachat gat*, fair price shops and medical stores are operating in the district.

3.2 Research Design

The present investigation was conducted to ascertain the knowledge and adoption of ratoon management practices by the sugarcane growers. Therefore Ex post facto design of social research used for the present investigation.

3.3 Sampling plan

Sampling is method of selecting fraction of population in such a way that the selected sample represents the whole population.

3.3.1 Selection of tahsils

Kolhapur district comprises of 12 tahsils and in the first stage, out of 12 tahsils, 2 tahsils namely Hatkanangale and Karveer were selected purposively as major sugarcane grown tahsils.

3.3.2 Selection of the villages

The study was conducted in purposively selected Hatkanangale tahsil area under sugarcane 18,349 ha and out of these area under ratoon (5910 ha) and Karveer tahsil area under sugarcane 21,797 ha and out of these area under ratoon (6780 ha) of eastern parts of Kolhapur district. The list of villages of each tahsils was obtained from Agricultural Assistants. Out of these tahsil, six villages from each tahsils were selected by simple random sampling method. (Appendix . I)

3.3.3 Selection of respondents

The list of farmers from selected villages were obtained from Agricultural Assistants .In order to get representation of small, medium and large ratoon sugarcane growing farmers from each village were selected by purposively, Thus 120 sugarcane ratoon growers were selected from 12 villages.

3.4 Preparation of interview schedule

The basic instrument used for study was interview schedule. The data were collected by personal interview so as to get valid and complete responses. Keeping the objective of the study in view an interview schedule was developed, and was personally administered.

3.5 Pre-testing of interview schedule

The pre-testing of interview schedule is necessary on the part of researcher. It identifies mistakes, ambiguities and shortfalls. It also helps in achieving clarity, reliability and validity of the interview schedule. The pre-testing of interview schedule was done on 10 farmers of non-sampled area. Considering the experiences of pre-testing, language of few questing was appropriately modified to increase clarity of questions included in the interview schedule. The interview schedule was then finalized and required number of copies was prepared for data collection.

3.6 Procedure for data collection

A structured interview schedule was used to collect the information through personal interview method. The respondents were contacted during their leisure time, mostly at their homes. The objective and importance of study were explained to them for getting accurate information. They were assured that the information collected would be used only for study purpose without disclosing their identity. The data were collected from 120 sugarcane ratoon growers. The information collected from 120 sugarcane ratoon growers through personal interview schedule was through primary and secondary tables. The data of qualitative from were converted into quantitative form by using score method.

Computation of score was done for each of the independent and dependent variables.

3.7 Categorization of variables and their empirical measures

1 - Independent variables

3.7.1.1 Age

Age of sugarcane growers was measured as revealed by the respondents themselves in the form of number of years completed as on date of interview. The chronological age of sugarcane ratoon growers was considered and then sugarcane growers were classified into following categories.

Sr.No.	Age (year)	Category
1.	Up to 35 years	Young age
2.	36 to 56 years	Middle age
3.	57 and above years	Old age
	Mean = 46.27	**S.D = 11.05**

3.7.1.2 Education

Education was operationalized as formal schooling completed by an

individual sugarcane growers. It was measured in terms of standard in formal school passed by the sugarcane growers and considered the score as such. Following categories are formed by classifying the sugarcane growers on the basis of their education. given by the govt of Maharashtra

Sr. No.	Education	Standard
1.	Illiterate	No formal Education.
2.	Primary education	(I^{st} to VII^{th} standard)
3.	Secondary education	($VIII^{th}$ to X^{th} standard)
4.	Higher Secondary education	(XI^{th} to XII^{th} standard)
5	Graduation and above	Degree and Post- Graduation

3.7.1.3 Size of Land Holding

Land holding is one of the factors that influence the use of improved technologies. Persons operating large farms are likely to put in more efforts to use new technologies for improving their farms. A small land holding doesn't encourage sugarcane growers to go for utilization of improved farm implements which they considered as risk. In present study, land holding was operationally defined as an area possessed and operated by sugarcane ratoon growers. They were grouped into five categories based on the existing norms of land holding in Maharashtra state.

Sr. No.	Category	Land (ha)
1.	Marginal	Upto 1.00
2.	Small	1.01 to 2.00
3.	Semi –Medium	2.01 to 4.00
4.	Medium	4.01 to 10 .00
5	Large	10.01 and above

3.7.1.4 Family size

It was operationalized as the total number of members living together in a family of sugarcane grower, under a common roof having blood relations and sharing common food. Adopted members residing permanently with family were also included each family member having one score. According to the total score obtained by the sugarcane growers they were classified in to following three categories by using formula Mean ± SD.

Sr. No.	Category	Family member
1.	Small	Up to 3 members
2.	Medium	4 to 9 members
3.	Big	10 and above members
	Mean = 6.50	**S.D = 3.35**

3.7.1.5 Annual income

It refers to total income in year of all family members of the sugarcane ratoon growers from all the sources. This includes agricultural income and the income from other subsidiary occupations such as dairy, poultry, goat or sheep keeping, business and service.

The minimum annual income of the sugarcane ratoon growers was Rs.50, 000 while the maximum annual income of the sugarcane ratoon growers was Rs. 5,00,000 .

The sugarcane ratoon growers were categorized into three groups by using the following formula

$$\text{Range} = \frac{\text{Maximum income} - \text{Minimum income}}{\text{Number of category (3)}}$$

The first group (low) was calculated with above formula and lowest income i.e. Rs. 50,000/- was added in it. The total of first group plus the range were calculated for medium group and the total income at second group plus range were considered to have third high income group.

Sr .No.	Category	Annual income (Rs)
1.	Low	Upto 1,50,000 /-
2.	Medium	1,50,001 to 3,00,000 /-
3.	High	Above 3,00,001 /-
	Maximum = 5, 00,000 Rs	**Minimum = 50,000 Rs**

3.7.1.6 Sources of information

The actual sources of information used by the sugarcane ratoon growers for getting the information and guidance about ratoon management practices were studied. All possible information sources about sugarcane were listed out. From these sources 25 important sources were selected in consultation with specialists and extension personnel. The sources were then classified into three categories *viz.*, individual, group and mass sources. The sugarcane ratoon growers were asked to the frequency of their visit.

Further these sources of information were grouped as regularly used, occasionally used and not used. The numerical scores were then assigned to these categories. A score of two was assigned to regularly used, one to occasionally used and zero to not used response category. The scores of all the 25 information sources were then added together to arrive at the information sources score of a particular sugarcane ratoon growers. On the basis of actual obtained score the sugarcane growers were grouped into three categories as mentioned below.

Sr. No.	Category	Score
1.	Low	Upto 33
2.	Medium	34 to 44
3.	High	45 and above
	Mean = 38.57	**S.D. = 5.52**

3.7.1.7 Social participation

Social participation was designed as the participation of the sugarcane growers in social institution as a member. Each of the sugarcane growers was assigned a score one if he was a member of each social organization. The sugarcane growers were categorized as below by using Mean ± SD

Sr. No.	Category	Score
1.	Low	Up to 5
2.	Medium	6 to 8
3.	High	9 and above
	Mean = 7.08	**S.D = 1.36**

3.7.1.8 Cropping pattern

Cropping pattern means the area under various crops at a point of time in a unit area. The sugarcane growers follow the different cropping pattern on their field. They grow crops like paddy, soybean, groundnut and nachni in *kharif* season, wheat, sorghum and gram mostly in *rabi* season and maize in *summer* season and sugarcane as a main crop which is annual in habitat. Such a different kind of cropping pattern is measured by frequency distribution method.

The average rainfall of district is 1900 mm and so also all other source of irrigation possess by the sugarcane growers. Thus, they cultivate different kind of crops on their field in a whole year. They sown cereals, pulses, oilseed crops and cash crops etc. on their farm. Thus there is different cropping pattern with sugarcane ratoon growers.

3.7.2 Dependent variables

Dependent variables are those which vary with independent variables for the present study, the dependent variable is as follow.

3.7.2.1 Knowledge

It was the body of information possessed by sugarcane growers in respect of ratoon management practices. Score '2' was assigned for knowing the expected answer perfectly, score '1' was assigned for knowing the expected answer partially and score '0' was assigned for lack of knowledge about the expected answer of respected ratoon management practices. Mean was 83.4 and standard Deviation was 6.21, accordingly total score of the sugarcane growers were grouped using formula mean ± SD in to three group viz .

Sr. No.	Category	Score
1.	Low	Up to 77
2.	Medium	78 to 90
3.	High	91 and above
	Mean = 83.4	**S.D = 6.21**

3.7.2.2 Adoption

Adoption is a mental process through which an individual passes from first hearing about an innovation to final adoption, score '2' was assigned for each expected answer of respective practice, if it was completely adopted. If it was partially adopted score '1' was given and '0' score was assigned if it was not adopted. Mean was 53.13 and standard deviation was 7.60. All sugarcane growers were grouped by using formula mean ± SD in to three categories *viz*.

Sr. No.	Category	Score
1.	Low	Up to 45
2.	Medium	46 to 60
3.	High	61 and above

Mean = 53.13 S.D. = 7.60.

3.8

Statistical techniques used for data analysis

The statistical tools used in the present study for analysis of data, are given below.

3.8.1 Frequency and percentage

Frequency and percentage were used for making simple comparisons. The frequency of the particular category was multiplied by hundred and divided by total number of sugarcane growers to get percentage.

3.8.2 Mean

Mean of sample was calculated by summing all the individual score and dividing it by number of cases. The formula is

$$\overline{X} = \frac{\sum X}{N}$$

Where,

$\overline{X}$ = Arithmetic mean

$\sum X$ = Sum of sugarcane growers score

N = Number of cases

3.8.3 Standard deviation

Standard deviation is a measure of variability calculated around mean. It was denoted by Greek letter δ (sigma) and calculated with the following formula.

$$\delta = (S.D.) = \sqrt{\frac{N\sum X^2 - (\sum X)^2}{N}}$$

Where,

$\delta = (S.D.)$ = Standard deviation

$\sum X^2$ = Sum of square of 'X' series

$(\sum X)\ 2$ = Square of summation 'X' series

N = Number of sugarcane growers

3.8.4 Karl Pearson's coefficients of correlation analysis

This technique was used to find out the relationship between two variables. Following formula was used for computation of 'r' value.

$$r = \frac{\sum XY - \frac{(\sum X) - (\sum Y)}{n}}{\sqrt{\frac{[(\sum X^2 - (\sum X)^2]}{n} \times \frac{[(\sum Y^2 - (\sum Y)^2]}{n}}}$$

Where,

N = Number of observations.

r = Coefficient of correlation

X = Score of independent variables

Y = Score of dependent variable

3.8.5 Multiple regression analysis

This analysis was done to know the combined effect of all the independent variables in explaining the variables in the variation in the dependent variable. Thus, the influence of independent variables on the dependent variables was found out. The equation used was

$$Y = a + b_1x_1 + b_2x_2 \ldots\ldots\ldots\ldots + b_n x_n$$

Where,

Y : Dependent variable

X_1 : Independent variable

b_1 : Partial regression coefficient.

a : Constant

n : Total number of variables

3.8.6 X^2 Test

The X^2 test (pronounced as chi –square test) is one of the simplest and most widely used non- parametric test in statistical work .

$$X^2 = \sum (O-E)^2 / E$$

Where, O = refers to the observed frequency
E = refers to the expected frequency

3.9 Operational definitions of the important terms used

1. **Age:**

   Chronological age of the sugarcane growers at the time of data collection expressed in years**.**

2. **Education:**

   Number of school grades completed by Sugarcane ratoon growers

3. **Size of land holding:**

   It refers to number of hectares of land owned, cultivated and managed by sugarcane growers.

4. **Size of family:**

   Total number of member in family.

5. **Annual income:**

   It refers to the total annual income in rupees obtained from Agricultural and other sources by sugarcane growers.

6. **Social participation:**

   It refers to participation of sugarcane growers in formal and informal organizations.

7. **Sources of information:**

   It refers to the use of sources of agricultural Information for various recommended cultivation Practices by sugarcane growers.

8. **Cropping pattern:**

   It means the area under various crops at a point of time in a unit.

9. **Yield**:

   Yield obtained from the sugarcane crop in a tones / ha in year.

10. **Knowledge**:

    The term knowledge refers to the extent of information known by the sugarcane growers about the ratoon management practices.

11. Adoption:

The term adoption refers to the continuous use of technology by the respondent ratoon sugarcane growers under study.

4. RESULTS AND DISCUSSION

This chapter deals with the presentation of analysis and interpretation of data with the view to draw meaningful conclusions by use of the appropriate statistical tests. The results of the various aspects under study are discussed considering the findings of the past studies and rationales are provided wherever needed. In general, this chapter presents the findings of the study under the followings section.

4.1 Personal, socio-economic and psychological characteristics of respondent.

4.2 Knowledge and adoption of the ratoon management practices by sugarcane growers.

4.3 Correlation between independent and dependent variables.

4.4 Constraints faced by the respondent and suggestions to overcome them.

4.1 Socio-economic profile of respondents

4.1.1 Age

Age denotes chronologically completed years by the sugarcane growers. Age influence the behavior of an individual by exposing him/her to varied situations a number of times. It also shows maturity and rationality of an individual in decision making. The classification of the sugarcane growers according to their age is presented in Table 1 and fig.2.

Table 1 .Classification of the respondents according to their age

Sr. No.	Age	Respondent (N =120)	
		Number	Percentage
1	Young (Up to 35 year)	21	17.50
2	Middle (36 to 56 years)	84	70.00
3	Old (57 and above years)	15	12.50
	Avg age 46 Total	**120**	**100**

The data in Table 1 and fig.2 revealed that more than two third (70.00 per cent) of the sugarcane growers were from middle age group of 36 to 56 years, followed by (17.50 per cent) of the sugarcane growers belonged to the young age i.e. up to 35 years. Only (12.50 per cent) belonged old age group above 57 years. In the present finding the minimum and maximum age of the sugarcane growers sugarcane growers were found to be 29 and 70 respectively. The average age of the sugarcane growers was 46 years. The middle age person having more awareness about improved ratoon management practices as compared old and young year sugarcane growers, the problem of less experience and

lack of knowledge regarding improved ratoon management practices .Which may face by the young and old age groups respectively. The less number of young aged person show the lack of interest about ratoon management practices.

The middle age groups of sugarcane growers are adopt various new technology on their farm, such as the drip irrigation, attain the various type of Agril.Exhibition as compared to young and old age group.

These findings are similar with Sasane *et al.* (2008) and Vijay kumar *et al* (2008). These finding are dissimilar to with Gurav (2000), Thorat *et al.*(2004) and shaikh *et al.* (2004) .

4.1.2 Education

Formal education enhances comprehensibility and skill of an individual. An educated individual is more prone to analyze the cause and effect relationship of different phenomena. This also leads to improve skill of an individual in problem solving. The information regarding education of the sugarcane growers is presented in Table 2 and fig 3.

Table 2 . Classification of the respondents according to their education

Sr. No.	Education	Respondents (N= 120)	
		Number	Percentage
1	Illiterate	1	0.83
2	Primary education (I^{st} to VII^{th} standard)	11	9.17
3	Secondary education ($VIII^{th}$ to X^{th} standard)	48	40.00
4	Higher Secondary education (XI^{th} to XII^{th} standard)	28	23.33
5	Graduation and above	32	26.67
Avg (std) secondary	**Total**	**120**	**100.00**

It was observed from the Table 2 and fig.3 that two fifth (40.00 per cent) of the sugarcane growers had received secondary education, followed by (26.67 per cent) sugarcane growers had completed graduation education. Only (23.33 per cent) of the sugarcane growers were higher secondary education and (9.17 per cent) had primary education, where as (0.83 per cent) were illiterate. The average education is secondary.

The result show that ratoon management preferred by secondary and graduation educated holders may due to their lack of interest to done job which may not be related to

their degree subject, Now educated people also divert towards the ratoon management practices because more return form this in term of per rupee investment and low risk. The result show that the most of the secondary educated person engaged in the sugarcane cultivation they manage all the type of farm operation and they gives the proper idea to worker how to work carried out.

These findings are in the line with Gurav (2000), Thorat *et al*. (2004) sasane *et al.(*2008) and Solanki *et al* (2004).and Dissimilar to Shaikh *et al.*(2004) , Ramesh P. *et al.* (2005) and Vijay kumar *et al.* (2008).

4.1.3 Size of land holding

Land holding is assumed as an important variable that influences perception behavior of the sugarcane growers. The results obtained have been presented in Table 3.

Table 3 . Classification of the respondents according to their land holding

Sr. No.	**Size of land holding**	**Respondent N =120**	
		Number	**Percentage**
1	Marginal (Upto 1 ha.)	42	35.00
2	Small (1.01 to 2 ha.)	52	43.34
3	Semi medium (2.01to 4 ha.)	21	17.50
4	Medium (4.01 ha to 10 ha.)	5	4.16
5	Large 10.01 ha and above	-	-
Avg land holding small Total		**120**	**100 .00**

It was observed from table 3 and fig 4 that (43.34 per cent) of the sugarcane growers belonged to small land holding between 1.01 to 2.00 ha. It was followed by (35.00 per cent) of sugarcane growers belonging to category of marginal land holding possessing land up to 1.00 ha. And (17.50 per cent) of the sugarcane growers belonging to semi- medium land holding between 2.01 to 4 .00 ha. Only (4.16 per cent) sugarcane growers had medium land holding between 4.01 to 10.00 ha.

The small size of the land holding is not too large to manage or too small to afford to the family needs. Medium size of land holding is manageable and the sugarcane growers can adopt new technologies or improved practices recommendations for increasing the level of productivity.

It is concluded that maximum percentage of the sugarcane growers were found to be in small size of land holding category.

These findings are similar with Shaikh *et al.*(2004) and dissimilar to Gurav (2000), Solanki *et al.* (2004), Thorat *et al.* (2004) and Sasane *et al.* (2008).

4.1.4 Size of family

The size of family might influence the adoption behavior of the sugarcane growers. The information pertaining to the size of family of the sugarcane growers is presented in Table 4 .

Table 4. Classification of the respondents according to their size of family

Sr .No.	Category	Respondent (N =120)	
		Number	Percentage
1	Small (Up to 3)	16	13.33
2	Medium (4 to 9)	86	71.67
3	Large (10 and above)	18	15.00
Avg medium family (6)	**Total**	**120**	**100.00**

From Table 4 and fig. 5 it was observed that majority (71.67 per cent) of the sugarcane growers had medium size of family, followed by (15.00 per cent) of the sugarcane growers had large size of family. Only 13.33 per cent of them had small size of family.

The average six number of member are found in medium type of joint family. This might be due to forward outlook of the sugarcane growers about family planning there by keeping medium family size another reason social change. Medium size family member each and every gives there proper time which is needed for improved ratoon management practices. Thus the medium type of family are help full in various type of farm operation such as planting, intercultural operation are carried out in short period as compared to small size of family .

These observations are similar with the findings of Vijay kumar *et al.* (2008) and dissimilar with Gurav (2000), Shaikh *et al.* (2004), and Solanki *et al.* (2004).

4.1.5 Annual Income

Annual income is a major determinant of the economic status of an individual. Better financial position of an individual provides him a chance to take risk in trying out improved crop production technology. He can also afford to spend more on items required in connection with the new farming techniques. Thus, annual income motivates and influences farmers to adopt more new agricultural techniques. The classification of the sugarcane growers according to their annual income is presented in Table 5 and fig.6.

Table 5 . Classification of the respondents according to their Annual Income

Sr. No.	Annual Income (Rs.)	Respondent (N=120)	
		Number	Percentage
1	Low (up to Rs 1,50,000 /-	48	40.00
2	Medium (Rs 1,50,001 /- to 3,00,000 /-)	62	51.67
3	High (Rs 3,00,001 /- and above)	10	8.33
Avg annual income 2,25,000/- Total		**120**	**100.00**

Maximum = 5,00,000. Rs **Minimum = 50,000 Rs**

The observations from the Table 5 and fig.6 revealed that more than half (51.67 per cent) of the sugarcane growers were found in medium annual income. Followed by (40.00 per cent) sugarcane growers have low annual income. Only 8.33 per cent sugarcane growers were found in high annual income. The above finding leads to conclude that majority of the sugarcane respondents had an annual income between Rs 1,50,001 /- to 3,00,000 /- . The average annual income is Rs 2,25,000 /-. The data revealed that maximum sugarcane ratoon growers had medium income from this cash crop. The sugarcane growers having small size of land hence those indicate the majority medium group of annual income

This finding is similar in conformity with Thorat *et al.* (2004) and Sasane *et al.* (2008) .dissimilar to Shaikh *et al.* (2004).

4.1.6 Sources of information

The information regarding the different sources of information used by the sugarcane growers were collected, tabulated and analyzed. The results are presented in Table 6

Table 6. Classification of the respondents according to their sources of information

Sr. No.	Category	Respondent (N=120)	
		Number	Percentage
1	Low Up to 33	20	16.67
2	Medium 34 to 44	87	72.50
3	High 45 and above	13	10.83
Avg medium (39)	**Total**	**120**	**100.00**

It was observed from Table 6 and fig. 7 majority (72.50 per cent) of the sugarcane growers were using medium sources of information, followed by (16.67 per cent) and (10.83 per cent) of them had used low and high sources of information respectively. The average source of information score is 39.

The sources such as Progressive farmer, Agril assistant, Agril extension officer, Agril university scientist, KVK subject matter specialist, group discussion, *Krishi melawa,* new paper, Agril University publication, Agril. Bulletin used source of information large number of sugarcane growers.

These observations are similar with Kharde (1994) and Ramesh P. *et al.(*2005) and Sasane *et al.* (2008) and dissimilar to Shaikh *et al.* (2004).

4.1.7 Social Participation

It refers to the degree of participation of the sugarcane growers in formal and informal organizations in or around the village. It brings an individual in close contact with other members of the social organizations. This provides an opportunity to exchange the ideas, information and experiences with others. The information pertaining to the social participation of the sugarcane growers was collected, tabulated and analyzed. The results are presented in Table 7 and fig 8.

Table 7. Classification of the respondents according to their social participation

Sr. No.	Category	Respondent (N =120)	
		Number	**Percentage**
1	Low Upto 5	17	14.16
2	Medium 6 to 8	90	75.00
3	High 9 and above	13	10.84
Avg Medium	**7** **Total**	**120**	**100.00**

It was observed from Table 7 and fig. 8 that majority (75.00 per cent) of the sugarcane growers had medium social participation, followed by (14.16 per cent) of them having low social participation. Only (10.84 per cent) of the sugarcane growers had high social participation. The average social participation score is 7.

The maximum number of sugarcane growers are participated in various type of organization such as co-operative sugar factory, co- operative bank, *Krishi vidyan mandal,* farmer group and dairy group.

These findings are in accordance with Kharde (1994) and Ramesh P.*et al*.(2005) and dissimilar with Sasane *et al* (2008), Shaikh *et al.* (2004) and Vijay kumar *et al.* (2008).

4.1.8 Cropping pattern

Cropping pattern means the area under various crops at a point of time in an unit area. The sugarcane growers followed the different cropping pattern on their field. The average rainfall of district is 1900 mm and so also all other source of irrigation possess by the sugarcane grower. Thus, they cultivate different kind of crops on their field in a whole year. They sown cereals, pulses, oilseed crops, cash crops etc. on their farm. There are different cropping patterns with sugarcane growers.

The area under particular crop and average yield of that crop from that particular villagers given under Table No. 8.

Table 8. Classification of the respondent according to their cropping pattern

Sr. No.		Crop	Respondents N = 120					
			Number	percentage	Total Area Under Crop (ha)	Average Area (ha)	Total Yield (qtls)	Average Productivity (qt / ha)
1		***Kharif***						
	1	Paddy	113	94.16	12.45	0.11	487.3	39.14
	2	Groundnut	67	55.83	7.6	0.11	150.8	19.84
	3	Soybean	71	59.16	9.45	0.13	189.5	20.05
	4	Nachni	4	3.33	0.40	0.10	8.25	20.62
2		***Rabi***						
	1	Wheat	111	92.50	12.8	0.11	489.9	38.27
	2	Gram	53	44.16	5.6	0.10	166.6	29.75
	3	Sorghum	50	41.66	5.65	0.11	221.8	39.25
	4	Sunflower	17	14.16	1.85	0.10	32.35	17.48
3		***Summer***						
	I	Maize	45	35.00	4.2	0.09	147.7	35.16
4		**Annual**						
	1	Sugarcane	120	100.00	142.5	1.18	13862.7	97.28
	2	Ratoon	120	100.00	52.59	0.43	3936	74.84
5		**Fruit**						
	I	Banana	9	7.50	4	0.44	206.8	52.15

The analysis presented in Table 8 and fig.9 revealed that, in *kharif* season the sugarcane growers mostly grown paddy, groundnut soybean crops. Majority (94.16 per cent) of sugarcane growers cultivate paddy crop in *kharif* season, followed by (59.16 per cent), (55.83 per cent) and (3.33 per cent) cultivate soybean, groundnut and Nachani crops respectively. In *Rabi* season (92.50 per cent) of the sugarcane growers grow wheat crop, followed by (44.16 per cent) and (41.66 per cent) of the sugarcane growers cultivate

gram and sorghum respectively. In *summer* season maize crops were cultivated by (35.00 per cent) sugarcane growers.

The average productivity of paddy crop in that particular research area was 39.14 qtls/ha. Similarly 20.05 qtls/ ha and 19.84 qtls/ ha. were the productivity of soybean and groundnut crops respectively. Average productivity of *rabi* crops i.e. sorghum, wheat and gram were 39.25 qtls/ha, 38.2 qtls/ha and 29.75 qtls/ha respectively. Average productivity of *summer* maize is 35.16 qtls/ha. The average productivity of sugarcane is 97.28 tonnes ha, and ratoon sugarcane 74.84 tonnes ha.

These observations are similar conformity Pallavi (2003) and Balasubramani *et al.* (2004) and dissimilar to Ramesh P.*et al*.(2005) .

Table 9. Classification of the respondents according to their season under sugarcane crop

Sr. No.	Season	Suru	Adasali	Pre-seasonal	Ratoon
1	Respondent	4 (3.33)	88 (73.33)	25 (20.83)	120 (100)
2	Total Area (ha)	1.3	68.7	20.8	52.59
3	Total Production (Tonnes)	99.5	7872	1992.5	3936
4	Productivity (Tonnes /ha)	76.53	114.58	95.79	74.84

From Table 9 fig. 10 it was concluded that all sugarcane growers cultivate sugarcane crop. The ratoon (100.00 cent), Adasali (73.33 per cent), (20.83per cent) and (3.33per cent) pre-seasonal and suru season sugarcane crop cultivated respectively. Season wise sugarcane productivity is Adasali (114.58 tonnes / ha), pre-seasonal (95.79tonnes / ha), suru (76.53 tonnes /ha) and ratoon 74.85 (tones s/ha).

Table 10 . Classification of the respondents according to variety wise area under sugarcane

Sr. No.	Variety	CO- 86032	Phule – 0265	Both
1	Respondent	99 (82.50)	69 (57.50)	44 (36.66)
2	Total Area (ha)	78.2	62	38.8
3	Average area (ha)	0.78	0.89	0.88
4	Total Production Tonnes	7765.5	6470	3752

5	Productivity (Tonnes/ha)	99.30	104.35	96.70

From Table 10 and fig. 11 it was concluded that the variety CO-86032 was mostly preferred variety by the sugarcane growers (82.50 per cent), followed by variety Phule - 0265 (57.50 per cent). The average productivity is CO- 86032 (99.30 tonnes /ha) and Phule -0265 (104.35 tonnes/ha).

The majority sugarcane growers grow CO-86032 variety, followed by Phule -02365 variety and both respectively.

4.2.1 Knowledge

It refers to the knowledge of the sugarcane growers about the different improved sugarcane ratoon management practices. Knowledge plays a key role in maximization of the profit by adopting new improved technology. The information regarding the knowledge of sugarcane ratoon management practices was collected and analysed. The Classification of sugarcane growers according to their overall knowledge is presented in Table 11.

Table 11. Classification of respondents according to their overall knowledge

Sr. No.	**Knowledge**	**Respondent (N =120)**	
		Number	**Percentage**
1	Low (Upto 77)	18	15.00
2	Medium (78 to 90)	82	68.33
3	High (91 and above)	20	16.67
Avg medium 84	**Total**	**120**	**100.00**

The Table 11 and fig.12 observed that the majority (68.33 per cent) sugarcane growers had medium knowledge, followed by (16.67 per cent) had high knowledge and only 15.00 per cent had low knowledge. The average score of knowledge is 84.

Those table indicate that the large number of sugarcane growers knowledge about the various recommended practices such as removal trash on cutted shoot and buds which is pressed in furrow, cutting of extra remaining shoot at ground level with the help of sharp cutting knife, application of mixture of 50 Kg Urea,50 Kg SSP per acre on trash with decomposing culture for proper decomposing of trash and spraying of 10 gm bavistin in 10 lit water on cutted shoot and bud.

These findings are similar with Maraddi *et al.* (2007) and dissimilar to

Kashem and Hossain (1992) and Shaikh *et al*. (2004).

Table 12. Classification of respondents according to their knowledge about specific management practices.

Sr .No		Components	Knowledge (N =120)		
			Complete	Partial	No
1		**Type of Soil**			
	I	Medium deep (90 cm) and well-drained soil with pH 6-8.5	108 (90.00)	12 (10.00)	
2		**Season**			
	A	Adasali 15 Jul -15 Aug	104 (86.67)	16 (13.33)	-
	B	Pre-seasonal 15 Oct- 15 Nov	78 (65.00)	42 (35.00)	-
	C	Suru 15 Jan -15 Feb	58 (48.13)	62 (51.87)	-
3		**Improved variety**			
	1	CO - 86032 (Nira)	118 (98.35)	2 (1.65)	-
	2	CO - 94012 (Phule savitry)	72 (60.00)	48 (40.00)	-
	3	Phule-0265	109 (90.84)	11 (9.16)	-
	4	COM- 92005	59 (49.17)	56 (46.67)	5 (4.16)
	5	CO- 7527	3 (2.50)	74 (61.67)	43 (35.83)
	6	COM -88121 (Krishna)	26 (21.67)	59 (49.17)	35 (29.16)
	7	CO -740	2 (1.67)	50 (41.67)	68 (56.66)
	8	CO -7125	1 (0.83)	43 (35.83)	76 (63.34)
	9	VSI -434	-	46 (38.33)	74 (61.67)
	10	CO – VSI- 9805	1 (0.83)	46 (38.33)	73 (60.84)
4		**Planting Method**			
	1	Ridges and furrow –medium soil (90 cm) heavy Soil (120 cm)	110 (91.67)	10 (8.33)	-
	2	Border –Pair row method (75 to 150 cm), (90 to 180 cm)	99 (82.50)	21 (17.50)	-
5		**Planting material**			
	1	Single eye bud -25000	116 (96.67)	4 (3.33)	-
	2	Double eye bud -45000 -60000	69 (57.50)	51 (42.50)	-
6		**Sett Treatment**			

	1	Acetobactor (10 kg /100 lit water)	117 (97.50)	3 (2.50)	-
	2	Phosphate solublizing bacteria (1.25 kg /100 lit water)	96 (80.00)	24 (20 .00)	-
7		**Fertilizer management**			
A		**Organic fertilizer (ha)**			
	1	vermicompost 5 tonne /ha ,Presmud cake 6 tonne /ha Compost 7.5 tonne /ha	66 (55.00)	53 (44.17)	1 (0.83)
	2	Suru FYM 20 ton /ha	37 (30.83)	82 (68.54)	1 (0.83)
	3	Pre-seasonal FYM 25 ton / ha	64 (53.33)	55 (45.84)	1 (0.83)
	4	Adasali FYM 30 ton /ha	88 (73.34)	32 (26.66)	-
B		**Green manuring fertilizer**			
	1	Sun hemp -50 kg /ha	18 (15.00)	99 (82.50)	3 (2.50)
	2	Dhaincha – 50 kg /ha 45 day after sowing	13 (10.83)	84 (70 .00)	23 (19.17)
C		**Inorganic fertilizer**			
	1	Adasali (kg /ha) 400: 170 :170 kg NPK /ha	113 (94.17)	7 (5.83)	-
	2	Pre-seasonal 340 :170 :170 (kg NPK / ha)	106 (88.33)	14 (11.17)	-
	3	Suru 250 :115 :115 (kg NPK / ha)	98 (81.17)	22 (18.33)	-
	4	Ratoon 250 :115 : 115 (kg NPK / ha)	116 (96.67)	4 (3.33)	-
D		**Micro nutrient management**			
		Ferrous sulphate 10 kg , zinc sulphate 8 kg ,magnase sulphate 4 kg ,borax 2 kg all the micro nutrient mix with FYM 10 -15 *ghamela*	116 (96.67)	4 (3.33)	-
E		**Planting Time**	120 (100.00)	-	-
8		**Ratoon management**			
	1	Removal of trash on cutted shoots and buds which is pressed in furrow.	120 (100.00)	-	-
	2	Application of mixture of 50 kg Urea, 50 kg SSP per acre on trash with decomposing culture for proper decomposing of trash .	99 (82.50)	21 (17.50)	-
	3	Cutting of extra remaining shoot at ground level with sharp cutting knife.	120 (100 .00)	-	-
	4	Application of second fertilizer dose 135 DAS opposite site to first dose with the help of fertilizer gun.	110 (91.66)	10 (8.34)	-

	5	Spraying of 10 gm bavistin in 10 lit water on cutted shoot and buds.	119 (99.17)	1 (0.83)	-
9		**Pest management**			
	1	White grub –Application of 1 lit choloropyriphos in 400 lit of water per acre at well drained condition.	120 (100.00)	-	-
	2	Conservation of conabathra, micromus, difa etc are natural enemies for wooly aphids.	13 (10.83)	104 (86.67)	3 (2.50)
	3	White fly –spraying of malathion 50 % SL @ 20 ml in 10 lit water for control white fly.	57 (47.50)	62 (51.67)	1 (0.83)
	4	Spraying of methyl dematon 25 % SL @ 20 ml or malathion 50 % SL @ 20 ml for control of mealy bug on tender leaves and shoots .	52 (43.33)	64 (53.34)	4 (3.33)
10		**Disease management**			
	1	Smut disease –set treatment with 0.1 % bavistin.	119 (99.17)	1 (0.83)	-
	2	Rust disease –Application of zyrum 0.5 % (50 gm in 100 lit water)	4 (3.33)	111 (92.50)	5 (4.17)
	3	Red rot disease - Hot water treatment 50^{C} for 2 hours.	7 (5.83)	96 (80.00)	17 (14.17)
11		**Water management**			
	1	Flood irrigation	120 (100.00)	-	-
	2	Ridges and furrow method	120 (100.00)	-	-
	3	Drip irrigation method	120 (100.00)	-	-
12		**Recommended variety**			
	1	CO -86032	119 (99.17)	1 (0.83)	-
	2	Phule – 0265	118 (98.34)	2 (1.66)	-
13		**No. of Ratoon cultivated**			
	1	1 -2	118 (98.34)	2 (1.66)	-
	2	3	1 (0.83)	-	119 (99.17)
14		**Yield per hector**			
	1	100 -120 tonnes	114 (95.00)	6 (5.00)	-
	2	80 – 100 tonnes	1 (98.34)	2 (1.66)	-

4.2.1 Knowledge

Knowledge is the awareness of sugarcane growers about recommended ratoon management practices of is given below.

4.2.1.1 Soil

It was observed that large majority (90.00 per cent) of the sugarcane growers had complete knowledge and (10.00 per cent) of the sugarcane growers had partial knowledge about medium and well drained soil.

4.2.1.2 Season of planting

It was observed from Table 12 that the majority (86.67 per cent) sugarcane growers and few (13.33 per cent) complete and partial knowledge about sugarcane planting seasons Adsali. The sugarcane growers majority (65.00 per cent) had complete knowledge about sugarcane planting seasons pre-seasonal. The sugarcane growers nearly half (48.13 per cent) and more than half (51.87 per cent) had complete and partial knowledge about sugarcane planting seasons suru.

4.2.1.3 Improved varieties

Regarding variety Co-86032 large majority (98.35 per cent) of the sugarcane growers had complete knowledge about sugarcane varieties. Regarding variety Co-94012 two fifth (60.00 per cent) of the sugarcane growers had complete knowledge about sugarcane varieties. Regarding variety Phule- 0265 large majority (90.84 per cent) of the sugarcane growers had complete knowledge about sugarcane varieties.

It is concluded that the majority of sugarcane growers CO-86032, followed by Phule-0265 and CO-94012 those variety are easily available and high yielding variety recommended by the MPKV, Rahuri .

4.2.1.4 Planting method

It was observed that large majority (91.67 per cent) of the sugarcane growers had complete knowledge about ridges and furrows method of sugarcane planting. It was observed that majority (82.50 per cent) of the sugarcane growers had complete knowledge about Border–pair row method of sugarcane planting.

It is concluded that majority sugarcane growers knowledge about ridges and furrow method, followed border pair method .Those are the common planting methods gives the high plant population.

4.2.1.5 Planting material

It was observed that large majority (96.67 per cent) of the sugarcane growers had complete knowledge about single eye bud. It was observed that mare than

half (57.50 per cent) of the sugarcane growers had complete knowledge about Double eye bud.

It is concluded that the majority of the sugarcane growers knowledge single eye bud, followed by double eye bud sett used as planting material.

4.2.1.6 Sett treatment

It was observed that large majority (97.50 per cent) of the sugarcane growers had complete knowledge about biofertilizers and acetobactor sett treatment. It was observed that majority (80.00 per cent) cent) of the sugarcane growers had complete knowledge about biofertilizers Phosphate solublizing bacteria sett treatment.

It is concluded that the majority of the sugarcane growers knowledge about acetobactor, followed by PSB. Those are the common sett treatment are used for the high germination .

4.2.1.7 Fertilizer management

A. Organic fertilizer

It was observed that more than half (55.00 per cent) of the sugarcane growers had complete knowledge about quantity of Vermicompost, press mud cake compost used in sugarcane, planting. It was observed that majority (68.53 per cent) of the sugarcane growers had partial knowledge about quantity of Suru sugarcane FYM used in planting. It was observed that more than half (53.34 per cent) of the sugarcane growers had complete knowledge about quantity of Pre-seasonal sugarcane FYM used in planting. It was observed that majority (73.33 per cent) of the sugarcane growers had complete knowledge about quantity of Adasali sugarcane FYM used in planting.

It is concluded that the majority of the respondent had knowledge of Vermicompost, followed by the FYM. Those are organic manure used in the time of land preparation.

B . Green manuring fertilizer

It was observed that majority four fifth (82.50 per cent) of the sugarcane growers had partial knowledge about Sun hemp crop used in planting. It was observed that majority (70.00 per cent) of the sugarcane growers had partial knowledge about Dhaincha crop used as green manure crop.

It is concluded the majority of the sugarcane growers had knowledge about Sun hemp, followed by Dhaincha those are usefull for the green manuring purpose and increase the fertility as well as water holding capacity of soil.

C. Inorganic fertilizer

It was observed that large majority (94.16 per cent) of the sugarcane growers had complete knowledge about application of recommended fertilizers doses of adsali sugarcane. It was observed that majority (88.34 per cent) of the sugarcane growers had complete knowledge about application of recommended fertilizers doses of Pre-seasonal sugarcane. It was observed that majority four fifth (81.67 per cent) of the sugarcane growers had complete knowledge about application of recommended fertilizers doses of Suru sugarcane. It was observed that large majority (96.67 per cent) of the sugarcane growers had complete knowledge about application of recommended fertilizers doses of Ratoon sugarcane.

It is concluded that majority of sugarcane growers had complete knowledge about recommended fertilizer doses of sugarcane crop.

D. Micronutrients

It was observed that large majority (96.67 per cent) of the sugarcane growers had complete knowledge about different nutrient i.e ferrous sulphate, zinc sulphate Magnese sulphate and Borax recommended micronutrient to control deficiency.

E. Planting Time

It was observed that all (100.00 per cent) of the sugarcane growers had complete knowledge about planting time in various seasons.

4.2.1.8 Ratoon management

It was observed that all (100.00 per cent) sugarcane growers had complete knowledge about removal of trash on cutted shoots and buds which is pressed in furrow. It was observed that majority (82.50 per cent) sugarcane growers had complete knowledge about Application of mixture of Urea 50 kg, 5o kg SSP per acre on trash with decomposing culture for proper decomposing of trash respectively. It was observed that (100.00 per cent) sugarcane growers had complete knowledge cutting of extra remaining shoots at ground level with sharp cutting knife. It was observed that large majority (91.67 per cent) sugarcane growers had complete knowledge about application of second fertilizer dose 135 days after sowing opposite side to first dose with the help of fertilizer crowbar. It was observed that large majority (99.17 per cent) sugarcane growers had complete knowledge about Spraying of 10 gm bavistin in 10 liter water on cutted shoot and buds.

It is concluded that the majority of the sugarcane growers complete knowledge about recommended ratoon management practices.

4.2.1.9 Pest management

It was observed that all (100.00 per cent) of the sugarcane growers had complete knowledge about White grub pest management. It was observed that majority (86.66 per cent) of the sugarcane growers had partial knowledge about wooly aphid pest management. It was observed that more than half (51.66 per cent) the sugarcane growers had partial knowledge about White fly pest management. It was observed that more than two fifth (43.33 per cent) and more than half (53.34 per cent) of the sugarcane growers had complete and partial knowledge about Mealy bug pest management respectively.

It is concluded that the majority of the sugarcane growers had knowledge about white grub pest management, followed by wooly aphid and white fly pest of sugarcane crop management, respectively.

4.2.1.10 Disease management

It was observed that large majority (99.17 per cent) sugarcane growers had complete knowledge about Smut disease management. It was observed that large majority (92.50 per cent) of sugarcane growers had partial knowledge about Rust disease management. It was observed that majority (80.00 per cent) sugarcane growers had partial knowledge about Red rot disease management.

4.2.1.11 Water management

It was observed that all (100.00 per cent) of the sugarcane growers had complete knowledge about Flood irrigation, Ridges and furrow method and Drip irrigation water management.

4.2.1.12 Recommended variety

It was observed that large majority (99.17 per cent) of sugarcane growers had complete knowledge about CO-86032 recommended variety. It was observed that large majority (98.34 per cent) of sugarcane growers had complete knowledge about Phule-0265 recommended variety.

The recommended variety of sugarcane crop are easily available at the proper planting time and they are favorable to climatic condition.

4.2.1.13 No of Ratoon cultivated

It was observed that large majority (98.34 per cent) of sugarcane growers had complete knowledge about one-two ratoon cultivated. It was observed that nearly all (99.17 per cent) of sugarcane growers had no knowledge about three ratoon cultivated.

It is concluded that the majority of the sugarcane growers complete knowledge about one –two ratoon cultivation.

4.2.1.14 Yield per hectors

It was observed that large majority (95.00 per cent) of sugarcane growers had complete knowledge about 100-120 tonnes yield per hector obtained in time proper management of crop. It was observed that large majority (98.34 per cent) of sugarcane growers had complete knowledge about 80-100 tonnes yield per hector obtained.

It is concluded that the majority of the sugarcane growers gives the 100 - 120 tonnes yield per ha.

4.2.2 Adoption

Adoption refers to the complete or partial use of improved sugarcane ratoon practices. The classification of sugarcane growers as per their overall adoption of sugarcane ratoon management practices is given in table 13.

Table 13. Classification of respondents according to their overall adoption

Sr. No.	Adoption	Respondent (N =120)	
		Number	Percentage
1	Low (Upto 45)	20	16.67
2	Medium (46 to 60)	83	69.17
3	High (61 and above)	17	14.16
Avg medium 53	**Total**	**120**	**100.00**

The above Table 13 and fig. 13 revealed that majority (72.50 per cent) sugarcane growers had medium adoption, while, (16.67 per cent) and (10.83 per cent) of the sugarcane growers had low and high of adoption, respectively.

It is concluded that the majority of the sugarcane growers medium group, followed by low and high adoption. The average majority of the medium group is 53.

This finding similar with Bhatkar *et. al.* (1997) and dissimilar to Hadole and Dakare (2003),Shaikh *et al* 2004 and. Solanki *et al.* (2004)

Table 14. Classification of respondents according to their adoption about specific management practices.

Sr .No		Components	Adoption (N =120)		
			Complete	Partial	No
1		**Type of soil**			
	I	Medium deep (90 cm) and well-drained soil with pH 6-8.5	45 (37.50)	75 (62.50)	-
2		**Season**			
	1	Adasali 15 Jul -15 Aug	91	24	5

			(75.84)	(20.00)	(4.16)
	2	Pre-seasonal 15 Oct- 15 Nov	29 (24.16)	65 (54.17)	26 (21.67)
	3	Suru 15 Jan -15 Feb	4 (3.33)	57 (47.50)	59 (49.17)
3		**Improved variety**			
	1	CO - 86032 (Nira)	94 (78.33)	16 (13.33)	10 (8.34)
	2	CO - 94012 (Phule Savitry)	10 (8.33)	58 (48.34)	52 (43.33)
	3	Phule-0265	69 (57.50)	31 (25.84)	20 (16.66)
	4	COM- 92005	9 (7.50)	32 (26.67)	79 (65.83)
	5	CO- 7527	-	5 (4.16)	115 (95.84)
	6	COM -88121 (Krishna)	1 (0.83)	10 (8.34)	109 (90.83)
	7	CO -740	1 (0.83)	2 (1.17)	117 (97.50)
	8	CO -7125	-	3 (2.50)	117 (97.50)
	9	VSI -434	-	2 (1.66)	118 (98.34)
	10	CO – VSI- 9805	-	1 (0.83)	119 (99.17)
4		**Sowing Method**			
	1	Ridges and furrow –medium soil (90 cm) heavy Soil (120 cm)	45 (37.50)	73 (60.83)	2 (1.67)
	2	Border –Pair row method (75 to 150 cm), (90 to 180 cm)	27 (22.50)	69 (57.50)	24 (20.00)
5		**Planting material**			
	1	Single eye bud -25000	74 (61.67)	42 (35.00)	4 (3.33)
	2	Double eye bud -45000 -60000	26 (21.67)	78 (65.00)	16 (13.33)
6		**Sett Treatment**			
	1	Acetobactor (10 kg /100 lit water)	80 (66.67)	36 (30.00)	4 (3.33)
	2	Phosphate solublizing bacteria (1.25 kg /100 lit water)	43 (35.83)	65 (54.17)	12 (10.00)
7		**Fertilizer management**			
A		**Organic fertilizer (ha)**			
	1	Vermicompost 5 tonne /ha ,Presmud cake 6 tonne /ha Compost 7.5 tonne / ha	17 (14.17)	78 (65.00)	25 (20.83)
	2	Suru FYM 20 ton /ha	11 (9.17)	67 (55.83)	42 (35.00)
	3	Pre-seasonal FYM 25 ton / ha	29	43	48

			(24.17)	(35.83)	(40.00)
	4	Adasali FYM 30 ton /ha	49 (40.83)	30 (25.00)	41 (34.16)
B		**Green manuring fertilizer**			
	1	Sun hemp -50 kg /ha	4 (3.33)	63 (52.50)	53 (44.17)
	2	Dhaincha – 50 kg /ha 45 day after sowing	7 (5.84)	22 (18.33)	91 (75.83)
C		**Inorganic fertilizer**			
	1	Adasali (kg /ha) 400: 170 :170 (kg NPK /ha)	42 (35.00)	64 (53.33)	14 (11.67)
	2	Pre-seasonal 340 :170 :170 (kg NPK / ha)	36 (30.00)	83 (69.17)	1 (0.83)
	3	Suru 250 :115 :115 (kg NPK / ha)	10 (8.34)	91 (75.83)	19 (15.83)
	4	Ratoon 250 :115 : 115 (kg NPK / ha)	83 (69.16)	37 (30.83)	-
D		**Micro nutrient management**			
	I	Ferrous sulphate 10 kg , Zinc sulphate 8 kg ,Magnase sulphate 4 kg ,Borax 2 kg all the micro nutrient mix with FYM 10 -15 *ghamela* .	72 (60.00)	48 (40.00)	-
E		**Planting Time**	79 (65.83)	41 (34.17)	-
8		**Ratoon management**			
	1	Removal of trash on cutted shoots and buds which is pressed in furrow .	81 (67.50)	39 (32.50)	-
	2	Application of mixture of 50 kg Urea ,50 kg SSP per acre on trash with decomposing culture for proper decomposing of trash .	30 (25.00)	90 (75.00)	-
	3	Cutting of extra remaining shoot at ground level with sharp cutting knife.	108 (90.00)	12 (10.00)	-
	4	Application of second fertilizer dose 135 DAS opposite site to first dose with the help of fertilizer gun.	52 (43.33)	65 (54.17)	3 (2.50)
	5	Spraying of 10 gm bavistin in 10 lit water on cutted shoot and buds.	100 (83.33)	20 (16.67)	-
9		**Pest management**			
	1	White grub –Application of 1 lit choloropyriphos in 400 lit of water per acre at well drained condition.	113 (94.17)	7 (5.83)	-
	2	Conservation of conabathra ,micromus ,difa etc are natural enemies for wooly aphids .	5 (4.16)	33 (27.50)	82 (68.34)
	3	White fly –spraying of malathion 50 % SL @ 20 ml in 10 lit water for control white fly .	9 (7.50)	52 (43.33)	59 (49.17)
	4	Spraying of methyl dematon 25 % SL	15	42	63

		@ 20 ml or malathion 50 % SL @ 20 ml for control of mealy bug on tender leaves and shoots .	(15.50)	(35.00)	(52.50)
10		**Disease management**			
	1	Smut disease –set treatment with 0.1 % bavistin .	112 (93.33)	8 (6.67)	-
	2	Rust disease –Application of zyrum 0.5 % (50 gm in 100 lit water)	-	18 (15.00)	102 (85.00)
	3	Red rot disease - Hot water treatment 50 ^{C} for 2 hours.	1 (0.83)	13 (10.84)	106 (88.33)
11		**Water management**			
	1	Flood irrigation	-	-	120 (100.00)
	2	Ridges and furrow method	81 (67.50)	39 (32.50)	-
	3	Drip irrigation method	27 (22.50)	26 (21.67)	67 (55.83)
12		**Recommended variety**			
	1	CO -86032	91 (75.83)	2 (24.17)	-
	2	Phule – 0265	43 (35.83)	74 (61.67)	3 (2.50)
13		**No of Ratoon cultivated**			
	1	1 -2	67 (55.83)	53 (44.17)	-
	2	3	-	1 (0.83)	119 (99.17)
14		**Yield per hacter**			
	1	100 -120	55 (45.83)	43 (35.84)	22 (18.33)
	2	80 – 100	64 (55.33)	55 (45.84)	1 (0.83)

4.2.2.1Soil

It was observed that nearly two fifth (37.50 per cent) of the sugarcane growers had complete adoption and majority (62.50 per cent) of the sugarcane growers had partial adoption about medium and well drained soil respectively.

4.2.2.2 Season of planting

It was observed that majority (75.84 per cent) of the sugarcane growers had complete adoption about sugarcane planting seasons adsali. It was observed that more than half (54.17 per cent) of the sugarcane growers had partial adoption about sugarcane planting seasons Pre-seasonal. It was observed that nearly half (47.50 per cent) of the sugarcane growers and nearly half (49.17 per cent) of the sugarcane growers had partial and no adoption about sugarcane planting seasons Suru respectively.

It is concluded that the majority of sugarcane growers adoption adsali and per-seasonal, followed by Suru season of planting.

4.2.2.3 Improved varieties

Regarding variety Co-86032 majority (78.34 per cent) of the sugarcane growers had complete adoption about sugarcane varieties. Regarding variety Co-94012 nearly half (48.34 per cent) and more than two fifth (43.33 per cent) of the sugarcane growers had partial and no adoption about sugarcane varieties respectively. Regarding variety is Phule-0265 nearly two third (57.50 per cent) of the sugarcane growers had complete adoption about sugarcane varieties. Regarding variety is COM-92005 majority (65.83 per cent) of the sugarcane growers had no adoption about sugarcane varieties. Regarding variety is CO-7527 large majority (95.83 per cent) of the sugarcane growers had partial adoption about sugarcane varieties.

It is concluded that the majority of the sugarcane growers had adopted improved variety such as CO-86032 and Phule -0265, followed by CO-94012 improved variety of sugarcane, those are the recommended variety of sugarcane released by the MPKV, Rahuri university .

4.2.2.4 Planting method

It was observed that two third (60.83 per cent) of the sugarcane growers had partial adoption about ridges and furrows method of sugarcane planting. It was observed that more than two than (57.50 per cent) of the sugarcane growers had partial adoption about Border–pair row method of sugarcane planting.

It is concluded that the majority of the sugarcane growers adopted ridges and furrow method, followed by border pair row method.

4.2.2.5 Planting material

It was observed that majority (61.67 per cent) of the sugarcane growers had complete and no adoption about single eye bud set. It was observed that majority (65.00 per cent) of the sugarcane growers had complete adoption about Double eye bud set.

It is concluded that the majority of the sugarcane growers adopted by the single eye bud, followed by double eye bud sugarcane sett used as planting material.

4.2.2.6 Sett treatment

It was observed that two third majority (66.67 per cent) of the sugarcane growers had complete adoption about Acetobactor sett treatment.It was observed that more than half (54.17 per cent) of the sugarcane growers had partial adoption about

Phosphate solublizing bacteria sett treatment.

It is concluded that the majority of sugarcane growers had adopted acetobactor, followed by phosphate solublizing bacteria those are the common biofertilizers are used as sett treatment for the proper germination.

4.2.2.7 Fertilizer management

A. Organic fertilizer

A. It was observed that majority (65.00 per cent) of the sugarcane growers had partial adoption about quantity of vermicompost, pressmud cake compost used in sugarcane planting. It was observed that more than half (55.84 per cent) of the sugarcane growers had partial adoption about quantity of Suru sugarcane FYM used in planting. It was observed that (35.84 per cent) and two third (40.00 per cent) of the sugarcane growers had partial and no adoption about quantity of Pre-seasonal sugarcane FYM used in planting respectively.

It is concluded that the majority of the sugarcane growers had adopted FYM, followed by Vermicompost used as organic fertilizer for the purpose of maintaining the fertility of soil.

B . Green manuring fertilizer

It was observed that more than half (52.50 per cent) and more than two fifth (44.17 per cent) of the sugarcane growers had partial and no adoption about Sun hemp crop used in planting respectively. It was observed that majority (75.83 per cent) of the sugarcane growers had no adoption about Dhaincha crop used in green manuring.

It is concluded that the majority of the sugarcane growers adopted Sun hemp, followed by Dhaincha used as green manuring for purpose of maintaining the fertility of soil

C. Inorganic fertilizer

It was observed that more than half (53.00 per cent) of the sugarcane growers had partial adoption about application of recommended fertilizers doses of adsali sugarcane. It was observed that majority (69.17 per cent) of the sugarcane growers had partial adoption about application of recommended fertilizers doses of Pre- seasonal sugarcane. It was observed that majority (75.84 per cent) of the sugarcane growers had partial adoption about application of recommended fertilizers doses of Suru sugarcane. It was observed that majority (69.16 per cent) of the sugarcane growers had complete adoption about application of recommended fertilizers doses of ratoon sugarcane.

It is concluded that the majority of the sugarcane growers adopted completely recommended fertilizer dose adasali, followed by ratoon and pre- seasonal.

D . Micronutrients

It was observed that two fifth (60.00 per cent) of the sugarcane growers complete adoption about different nutrient i.e ferrous sulphate , zinc sulphate Manganese sulphate and Borax recommended micronutrient to control deficiency.

E. Planting Time

It was observed that majority (65.84 per cent) of the sugarcane growers had complete adoption about planting time in various seasons.

4.2.2.8 Ratoon management

It was observed that majority (67.50 per cent) sugarcane growers had complete adoption about removal of trash on cutted shoots and buds which is pressed in furrow. It was observed that majority (75.00 per cent) sugarcane growers had partial adoption about application of mixture of Urea 50 kg, 50 kg SSP per acre on trash with decomposing culture for proper decomposing of trash . It was observed large majority (90.00 per cent) sugarcane growers had complete adoption cutting of extra remaining shoots at ground level with the help of sharp cutting knife. It was observed that (43.34 per cent) and more than half (51.16 per cent) sugarcane growers had complete and partial adoption about application of second fertilizer dose 135 days after sowing opposite side to first dose with the help of fertilizer crowbar. It was observed that majority (83.33 per cent) sugarcane growers had complete adoption about Spraying of 10 gm bavistin in 10 liter water on cutted shoot and buds.

It is concluded that the majority of the sugarcane growers adopted the recommended ratoon management practices. Those are save cost of planting material and primary tillage operation

4.2.2.9 Pest management

It was observed that large majority (94.16 per cent) of the sugarcane growers had complete adoption about White grub pest management. It was observed that majority (68.34 per cent) of the sugarcane growers had no adoption about wooly aphid pest management. It was observed that nearly half (49.16 per cent) of the sugarcane growers had no adoption about White fly pest management. It was observed that two fifth (62.50 per cent) of the sugarcane growers had no adoption about Mealy bug pest management.

It is concluded that majority of the sugarcane growers had adopted various

insecticide for control of white grub pest, followed by wooly aphids and white fly pest of sugarcane.

4.2.2.10 Disease management

It was observed that large majority (93.33 per cent) of sugarcane growers had complete adoption about Smut disease management. It was observed that majority (85.00 per cent) of sugarcane growers had no adoption about Rust disease management. It was observed that majority (88.33 per cent) of the sugarcane growers had no adoption about Red rot disease management.

It is concluded that majority of the sugarcane growers adopted various method to control of smut disease, followed by rust and red rot disease of the sugarcane .

4.2.2.11 Water management

It was observed that all (100.00 per cent) of the sugarcane growers had no adoption about Flood irrigation. It was observed that majority (67.50 per cent) of the sugarcane growers had complete adoption about, Ridges and furrow method. It was observed that more than half (55.84 per cent) of the sugarcane growers had no adoption about Drip irrigation management.

It is concluded that majority of the sugarcane growers adopted irrigation method ridges and furrow method, followed by drip irrigation method those are help in saving irrigation.

4.2.2.12 Recommended variety

It was observed that majority (75.84 per cent) of sugarcane growers had complete adoption about CO-86032 recommended variety of sugarcane. It was observed that more than two fifth (61.66 per cent) of sugarcane growers had complete adoption about Phule-0265 recommended variety sugarcane.

It is concluded that majority of the sugarcane growers adoption recommended variety of sugarcane, CO-86032, followed by Phule -0265.

4.2.2.13 No of Ratoon cultivated

It was observed that more than half (55.84 per cent) of sugarcane growers had complete adoption about one-two ratoon cultivated. It was observed that nearly all (99.17 per cent) of sugarcane growers had no adoption about three ratoon cultivated. It is concluded that majority of the sugarcane growers 1-2 ratoon cultivated.

4.2.2.14 Yield per hector

It was observed that more than two fifth (45.84 per cent) of sugarcane growers had complete adoption about 100-120 tonnes yield per hector obtained. It was observed that more than half (55.34 per cent) of sugarcane growers had complete adoption about 80-100 tonnes yield per hector obtained. It is concluded that the majority of the sugarcane growers obtained yield 80-100 tonnes /ha.

4.3 Relationship between selected personal, socio-economic, psychological, communication, knowledge and adoption of Sugarcane growers.

4.3.1 Relationship of personal and socio-economic characteristics of sugarcane growers with their knowledge.

An attempt was made to find out the nature of relationship between the selected independent variable of the sugarcane growers with their knowledge. To ascertain the relationship, coefficient of correlation (r) was worked out. The data on this respect is present in Table 15

Table 15. Relationship between the selected independent variables and knowledge

Sr. No.	Independent variables	Knowledge
		Correlation Coefficient (r)
1.	Age	0.0032NS
2.	Education	0.2242*
3.	land holding	0.1884*
4.	Size of family	0.2225*
5.	Annual Income	0.2252*
6.	Source of information	0.4799**
7.	Social participation	0.4451**
8.	Cropping pattern	0.2034*

**** = Significant at 1 per cent level of probability**

*** = Significant at 5 per cent level of probability**

NS = Non-significant

4.3.1.1 Age and knowledge

Table 15 indicated that age of sugarcane growers was found non significant relationship with their knowledge about ratoon management practices (r=0.0032). This

indicated that, the knowledge of the sugarcane ratoon growers was not influenced by the age of the respondents hence hypothesis is rejected.

4.3.1.2 Education and knowledge

Table 15 observed that education of sugarcane growers highly significant and positively related with their knowledge about ratoon management practices (r=0.2242). It observed that higher the education higher the knowledge of sugarcane ratoon growers. Thus, the hypothesis that education of the sugarcane ratoon growers is related to their knowledge is accepted.

4.3.1.3 Land holding and knowledge

Table 15 found that land holding of sugarcane growers significant and positively related with their knowledge about ratoon management practices (r=0.1884). This found that the knowledge of the sugarcane ratoon growers was influenced by the land holding of the hence the sugarcane ratoon growers hypothesis is accepted.

4.3.1.4 Size of family and knowledge

Table 15 clearly showed that family size of sugarcane growers significant and positively related with their knowledge about ratoon management practices (r=0.2225). Observed that the knowledge of the sugarcane ratoon growers was influenced by the family size of the sugarcane ratoon growers hence hypothesis is accepted.

4.3.1.5 Annual income and knowledge

Table 15 indicated that annual income of sugarcane growers significant and positively related with their knowledge about ratoon management practices (r=0.2252). It may be due to fact that as knowledge increases, sugarcane ratoon growers adopt more improved sugarcane ratoon management practices, so the annual income increases. Thus, hypothesis that annual income is related to knowledge is accepted.

4.3.1.6 Source of information and knowledge

Table 15 revealed that use of source of information of sugarcane growers highly significant and positively related with their knowledge about ratoon management practices (r=0.4799). It revealed that higher the use sources of information higher the knowledge of sugarcane ratoon growers. Thus, the hypothesis that source of information of the related sugarcane ratoon growers to their knowledge is accepted.

4.3.1.7 Social participation and knowledge

Table 15 found that social participation of sugarcane growers highly significant and positively related with their knowledge about ratoon management practices (r=0.4451).This finding may be due to the fact that sugarcane ratoon growers

who participated more in formal and informal organization, develop broader outlook. Thereby, come across with the new innovations. Thus, the hypothesis that social participation is related to knowledge is accepted.

4.3.1.8 Cropping pattern and knowledge

Table 15 showed that cropping pattern of sugarcane growers highly significant and positively related with their knowledge about ratoon management practices (r=0.2034). This indicated that the knowledge of the sugarcane ratoon growers was influenced by the cropping pattern of the sugarcane ratoon growers hence the hypothesis is accepted.

4.3.2 Relationship of personal and socio-economic characteristics of sugarcane growers with their adoption

In the present study an attempt was made to find out the nature of relationship between the selected independent variable of the sugarcane growers with their adoption. To ascertain the relationship, coefficient of correlation (r) was worked out. The data on this respect is present in Table 16.

Table 16. Relationship between the selected independent variables and adoption

Sr. No.	Independent variables	Adoption
		Correlation Coefficient (r)
1.	Age	-0.0480NS
2.	Education	0.2672**
3.	land holding	0.3014**
4.	Size of family	0.1852*
5.	Annual Income	0.3007**
6.	Source of information	0.5244**
7.	Social participation	0.3838**
8.	Cropping pattern	0.2701**

** = Significant at 1 percent level of probability

1 = Significant at 5 percent level of probability

NS = Non-significant

4.3.2.1 Age and adoption

Table 16 indicated that age of sugarcane growers was found non significant and negatively relationship with their adoption about ratoon management practices (r=-0.0480). Table observed that the adoption was not influenced by the age of the sugarcane ratoon growers. Thus, the hypothesis that the age of the respondent is not related to their adoption is rejected.

4.3.2.2 Education and adoption

Table 16 observed that education of sugarcane growers highly significant and positively related with their adoption about ratoon management practices (r=0.2672). It is therefore concluded that the higher the education, more was the adoption, as higher education brings about the desirable changes in the sugarcane ratoon growers adoption. Thus, the hypothesis that education of the sugarcane ratoon growers related to their adoption is accepted.

4.3.2.3 Land holding and adoption

Table 16 found that land holding of sugarcane growers highly significant and positively related with their adoption about ratoon management practices (r=0.3014). It indicated that larger the land holding, more was the adoption. A large sized land holding inspires the sugarcane ratoon growers in acquiring more advanced technologies on farm. Thus, the hypothesis that land holding of the sugarcane ratoon growers related to their adoption is accepted.

4.3.2.4 Size of family and adoption

Table 16 clearly showed that family size of sugarcane growers significant and positively related with their adoption about ratoon management practices (r=0.1852).This revealed adoption of the sugarcane ratoon growers was influenced by the size of family of the respondent hence the hypothesis is accepted.

4.3.2.5 Annual income and adoption

Table 16 observed that annual income of sugarcane growers highly significant and positively related with their adoption about ratoon management practices (r=0.3007). The sugarcane ratoon growers with economic position might have invested more amount on inputs needed for the adoption of improved sugarcane ratoon management practices. The hypothesis that the annual income of the sugarcane growers related to their adoption is accepted.

4.3.2.6 Source of information and adoption

Table 16 indicated that use of source of information of sugarcane growers highly significant and positively related with their adoption about ratoon management practices (r=0.5244). Thus, the hypothesis that source of information of the sugarcane ratoon growers related to their adoption is accepted.

4.3.2.7 Social participation and adoption

Table 16 observed that social participation of sugarcane growers highly significant and positively related with their adoption about ratoon management practices (r=0.3838). It is related that, social participation develops a broader outlook of the sugarcane ratoon growers leading to higher contacts with the outside world. Thus, they might be aware about the improved sugarcane ratoon management practices. Thus, the hypothesis that social participation of the sugarcane ratoon growers related to their adoption is accepted.

4.3.2.8 Cropping pattern and adoption

Table 16 showed that cropping pattern of sugarcane growers highly significant and positively related with their adoption about ratoon management practices (r=0.2701). This indicated that the adoption of the sugarcane ratoon growers was influenced by the cropping pattern of the sugarcane ratoon growers hence the hypothesis is accepted.

4.3.3 Multiple regression analysis of dependent variable with knowledge

The result of multiple regression analysis reported in table 17 that the result revealed that variables i.e. age, education, annual income, and cropping pattern contributed non significant towards the variation in knowledge held by the respondents about recommended ratoon management practices. Among the remaining variables age, land holding, size of family, source of information and social participation are significant at 1 per cent level of significance.

The data further indicated that, all the independent variables taken together, accounted for 57.56 per cent variation in the knowledge of the respondents as could be seen from the calculated ‘F’ value 6.78

Table 17. Multiple regression analysis of knowledge of sugarcane growers about ratoon management practices

Sr. No.	Independent variable	Coefficient of regression 'b'
1	Age	0.0456 NS
2	Education	-0.0954NS
3	Land holding	0.7755**
4	Size of Family	0.3204**
5	Annual income	-0.090 NS
6	Source of information	0.4198**
7	Social participation	1.4019**
8	Cropping pattern	-0.3311**

R^2=0.3314, F-value = 6.87

* Significant at 5 per cent level of probability

** Significant at 1 per cent level of probability

Total variation of independent variable with dependent variable = 57.56

4.3.4 Multiple regression analysis of dependent variable with adoption

The data presented in table 18, revealed that out of eight independent variables studied *viz*, education, annual income, and cropping pattern is found to be non significant with adoption of recommended ratoon management practices. The variables age is significant at 1 per cent level of significance and land holding, size of family, source of information and social participation is significant at 5 per cent level of significance.

It could further indicated that all the eight independent variables jointly explained the variation to the extent of 58.49 per cent in adoption of the recommended cultivation practices, and calculated 'F' value was 7.21

Table 18. Multiple regression analysis of adoption of sugarcane growers about ratoon management practices

Sr. No.	Independent variable	Coefficient of regression 'b'
1	Age	0.0099NS
2	Education	-0.1584**
3	Land holding	1.7309**
4	Size of Family	0.2462**
5	Annual income	-0.014 NS
6	Source of information	0.6173**
7	Social participation	0.9658**
8	Cropping pattern	0.0886NS

R^2= 0.3421 F= 7.21

* = Significant at 5 per cent level of probability

** = Significant at 1 per cent level of probability

NS = Non Significant

Total variation independent variable with dependent variable = 58.59

4.3.5 Association between Independent variables and Dependent variable

Association between Independent variables and Knowledge

X^2 Test

The X^2 test (pronounced as chi –square test) is one of the simplest and most widely used non- parametric test in statistical work .

$X^2 = \sum (O-E)^2 / E$

Where, O = refers to the observed frequency

E = refers to the expected frequency

Association between Independent variables and Knowledge

Observed table Age

Knowledge	Young	Middle	Old	Total
Low	6	9	3	18
Medium	3	23	4	82
High	1	1	1	20
Total	21	84	15	120

$(O-E)^2$/ E Table

Knowledge	Young	Middle	Old
Low	2.57	1.02	0.25
Medium	0.78	0.75	1.03
High	0.071	0.64	2.5

D.F = 4 $\sum (O-E)^2 / E$ = 9.64 , T cal = 9.64 , T tab 5% = 9.49

Result - the calculate value X^2 is greater than the table value at 5% level of significance the hypothesis is rejected Hence there is significance.

Observed table Education

Knowledge	Illiterate	Primary	Secondary	Higher secondary	Graduation	Total
Low	1	3	6	3	5	18
Medium	0	1	35	22	24	82
High	0	7	7	3	3	20
Total	1	11	48	28	32	120

$(O-E)^2$ / E table

Knowledge	Illiterate	Primary	Secondary	Higher secondary	Graduation
Low	4.81	1.10	0.2	0.34	0.0083
Medium	0.68	5.64	0.14	0.42	0.20
High	0.16	14.56	0.125	0.59	1.02

D.F = 8 , $\sum(O-E)^2/E$ =24.39 , T cal = 24.39 , T tab 5% =15.50

Result - the calculate value X^2 is greater than the table value at 5% level of significance the hypothesis is rejected Hence there is significance .

Observed table Land holding

Knowledge	Marginal	Small	Semi-Medium	Medium	Large	Total
Low	6	8	3	1	0	18
Medium	32	39	9	2	0	82
High	4	5	9	2	0	20
Total	42	52	21	5	0	120

(O-E) 2 /E table

Knowledge	Marginal	Small	Semi-Medium	Medium	Large
Low	0.0142	0.005	0.007	0.0833	0
Medium	0.3794	0.3388	1.9945	0.583	0
High	1.2857	1.5568	8.6428	1.63	0

D.F = 8 , $\sum =(O-E)^2 /E$ =16.52 , T cal = 16.52 , T tab 5 % = 15.50

Result - the calculate value X^2 is greater than the table value at 5% level of significance the hypothesis is rejected Hence there is significance .

Observed Table Size of Family

Knowledge	Low	Medium	High	Total
Low	4	8	6	18
Medium	6	66	10	82
High	6	12	2	20
Total	16	86	18	120

$(O-E)^2$ /E Table

Knowledge	Low	Medium	High
Low	1.06	1.86	4.03
Medium	2.22	0.88	0.43
High	4.16	0.37	0.33

D.F= 4 , $\sum =(O-E)^2 /E$ = 15.38 , T cal = 15.38 , T tab 5% level = 9.49

Result - the calculate value X^2 is greater than the table value at 5% level of significance the hypothesis is rejected Hence there is significance .

4.4 Constraints faced by the sugarcane growers in adoption of recommended sugarcane Ratoon management practices.

Constraints refer to the difficulties or causes which prohibit farmers to adopt sugarcane Ratoon management practices. Due to the differences in economic status, social standing and such other factors, the respondent have to face some constraints in adoption of ratoon management practices. These constraints are given in the Table 19.

Table 19 . Constraints faced by the sugarcane growers in adoption of ratoon management practices

Sr. No.	Constraints	Respondent	Percent	Rank
1	Labour shortage at the time of harvesting	71	59.16	II
2	High labour cost .	20	16.66	X
3	High cost of fertilizer and insecticide.	36	30.00	IV
4	Irregular supply of electricity.	27	22.50	VI
5	Inconsistency in the market price of sugarcane.	24	20.00	VIII
6	Lack of knowledge about White grub pest control	87	72.50	I
7	Lack of knowledge about recommended fertilizer dose .	26	21.66	VII
8	Lack of knowledge about biological pest control .	30	25.00	V
9	High cost of micronutrient	18	15.00	XI
10	Unavailability of finance	21	17.50	IX
	Lack of knowledge about Drip irrigation technology	45	37.50	III

1**. Labour shortage**

Nearly three- fifth (59.16 per cent) of the sugarcane growers stated labour shortage which are required for various operations for sugarcane cultivation is major.

2. High labour Cost

Few (16.66 per cent) of the sugarcane growers stated high labour cost which are required for various operation for sugarcane cultivation .

3 .High cost of fertilizer, insecticide and pesticide .

It was observed about (30.00 per cent) of the sugarcane growers stated high cost of fertilizer and insecticide those are required for various for various

sugarcane cultivation practices.

4 .Irregular supply of electricity.

It was observed that one- fifth (22.50 per cent) of the sugarcane growers stated the irregular supply of electricity which are required for the irrigation management practices of the sugarcane cultivation high amount of irrigation required for sugarcane cultivation.

5. Inconsistency in the market price of sugarcane.

It was observed that one – fifth (20.00 per cent) of the sugarcane growers stated difference between various sugarcane factory give the various market price.

6. Lack of knowledge about pest control.

It was observed that majority (72.50 per cent) the sugarcane growers were unaware about pest control.

7. Lack of knowledge about recommended fertilizer dose.

It was observed that one- fifth (21.66 per cent) of the sugarcane growers had lack of knowledge regarding recommended doses of fertilizers.

8 . Lack of knowledge about Biological pest control.

It was observed that few (25.00 per cent) of the sugarcane growers had lack of knowledge about biological pest control.

9 .High cost of Micronutrient

It was observed few (15.00 per cent) of the sugarcane growers the most important problem towards the use of micronutrients was, high cost of micronutrients.

10. Unavailability of finance

It was observed that (17.50 per cent) of the sugarcane growers stated unavailability of finance.

11 .Lack of knowledge about drip irrigation.

It was observed that (37.50 per cent) of the sugarcane growers lack of knowledge about drip irrigation technology.

4.5 Suggestions made by the sugarcane growers to overcome the constraints

Considering, the constraints faced by sugarcane growers in adoption of recommended ratoon management practices of sugarcane cultivation, respondent made some suggestions to overcome the constraints are presented in Table 20.

Table 20 indicate that a large majority (63.33 per cent) of respondent

suggested to conduct demonstration on white grub pest control on farmer field, followed by (48.33 per cent) suggested that awareness of trash management practices in ratoon sugarcane is needed. (40.00 per cent) suggested that resistant variety should be developed.

Table 20. Suggestions made by the farmers to overcome constraints

Sr. No.	Suggestions made by the respondent	No of respondent (N =120)	Per cent	Rank
1	Awarness of trash management practices in ratoon sugarcane is needed.	58	48.33	II
2	Availability of fertilizer, insecticide, pesticide at subsidized rate.	27	22.50	VIII
3	Regular supply of electricity.	21	17.50	IX
4	Rendering more credit facility by sugar factory and commercial bank for modernization and mechanization of the sugarcane farming.	31	25.83	VI
5	Demonstration of improved varieties be conducted on farmer field.	29	24.16	VII
6	Technical information in respect of latest and advanced technologies provides print and electronic media should be given through group discussion and farmer rallies to the farmer.	41	34.16	V
7	Resistant variety should be developed in respect of pest and diseases.	48	40.00	III
8	There should be close linkage between University scientist and farmer.	20	16.66	X
9	Timely technical advice should be made in time by Agril Assistant, Agriculture Officer Agril. Department and Extension Officer, ZP about transfer of technology	47	39.16	IV
10	Implement and appliance should be made	12	10.00	XI

	available to farmer in time			
11	Conduct Demonstration of white grub pest management on farmer field.	76	63.33	I

Nearly two-fifth (39.16 per cent) of the sugarcane growers suggested that timely technical advice should be made in time by Agril Assistant and Agriculture Officer (Agriculture Department) and Extension Officer, *Zilla Parishad* about transfer of technology, 34.16 per cent of them suggested that Technical information in respect of latest and advanced technologies should be provided through print and electronic media. Printed material should be provided in group discussion and farmer rallies to the farmer .The data also reveals that, 25.83 per cent of the sugarcane growers suggested that more credit facility by sugar factory and commercial bank for modernization and mechanization of the sugarcane farming.

Demonstration of improved varieties, Availability of fertilizer and insecticide at subsidized rate, regular supply of electricity, linkage between University scientist and farmer and implement and appliance should be made available in time were the other suggestions from (10.00 to 25.00 per cent)

5. SUMMARY, CONCLUSIONS AND IMPLICATIONS

This chapter deals with summary of the findings of the study and implications for the future line of action and research.

5.1 Summary

The present investigation "Knowledge and Adoption of ratoon management practices by the sugarcane growers from Hatkanangale and Karveer tahsils of Kolhapur district was designed and conducted .

The study was under taken with following objectives.

Objectives of the study

1. To study personal and socio-economic characteristics of the sugarcane growers.
2. To study the knowledge and adoption of the ratoon management practices followed by sugarcane growers.
3. To study the correlation between independent and dependent variables.
4. To study the constraints faced by sugarcane growers and to obtain the suggestions to overcome the constraints.

5.1.1 Personal, socioe-conomic, psychological, and communication characteristics of the sugarcane ratoon growers.

The majority (70.00 per cent) of the sugarcane growers belonged to the middle age group, followed by 17.50 per cent young age group.

Two fifth (40.00 per cent) of the sugarcane growers had secondary education, followed by college education (26.67 per cent). Only (0.83 per cent) were illiterate.

Regarding land holding (43.34 per cent) of the sugarcane growers belonged to small size of land holding, followed by (35.00 per cent) marginal size land holding.

The majority (71.67 per cent) of the sugarcane growers had medium size of family, are one- half (51.67 per cent) of the sugarcane growers had annual income between Rs.1,50,001 /- to 3,00,000 /-. Majority (72.50 per cent) of sugarcane growers had medium source of information and More than three fourth (75.00 per cent) of the sugarcane growers had medium social participation.

The study revealed that (94.16 per cent) of the sugarcane growers cultivate paddy crop in *kharif* season, (92.50 per cent) wheat crop in *rabi* season and (35.00 per cent) maize crop grow in *summer* season.

5.1.2 Knowledge of the sugarcane growers about Ratoon management practices.

It is observed that more than two-third (68.33 per cent) of the sugarcane growers had medium knowledge about recommended sugarcane ratoon management practices, followed by (16.67 per cent) had high and (15.00 per cent) had low knowledge about recommended sugarcane ratoon management practices.

5.1.3 Adoption of the sugarcane growers about Ratoon management practices.

It was observed that, majority (69.17 per cent) of the sugarcane growers had medium adoption about recommended sugarcane ratoon management practices, followed by (16.67 per cent) had low and (14.16 per cent) had high adoption about recommended ratoon management practices.

5.2 Relationship between selected personal, socio-economic, psychological, and communication characteristics and dependent variables.

5.2.1 Relationship between selected personal, socio-economic, psychological, and communication characteristics and knowledge

The sugarcane growers characteristics *viz*. education, size of land holding, annual income, size of family, source of information, social participation and cropping pattern are positively correlated and statistically highly significant relationship with knowledge of sugarcane ratoon management practices, while age exhibited negative significant relationship with knowledge.

5.2.2 Relationship between selected personal, socio- economic, psychological, and communication characteristics and adoption

The sugarcane growers characteristics *viz.* education, size of land holding, annual income, family size, sources of information, social participation and cropping pattern are exhibited positively correlated and statistically highly significant relationship with adoption of ratoon management practices, while age exhibited negatively significant relationship with adoption.

5.3 Constraints faced by respondent sugarcane growers

It is indicated that more than half 59.16 per cent of the sugarcane growers stated the constraint of labour shortage at the time of farm operation. Other constraints 72.50 per cent of the sugarcane growers are lack of knowledge about white grub pest control, 30.00 per cent high cost of fertilizer and insecticide, 25.00 per cent lack of

knowledge about biological pest control, 22.50 per cent irregular supply of electricity, 20.00 per cent inconsistency in the market price and 17.50 per cent lack of knowledge about drip irrigation technology.

5.4 Suggestions made by sugarcane growers to overcome constraints.

Majority 63.33 per cent of the sugarcane growers suggested conduct demonstration on white grub pest management on farmers field, followed by 48.33 per cent of the sugarcane growers awareness of trash management practice in ratoon sugarcane is needed. Other suggestions 40.00 per cent of the sugarcane growers suggested resistant variety should be released in respect of pest and disease control, 39.19 per cent of the sugarcane growers suggested the timely technical advice should be made by concerned extension personnel about transfer of technology, 34.16 per cent of the sugarcane growers Technical information of latest and advanced technologies should be provide through print and electronic media, 25.83 per cent of the sugarcane growers suggested rendering more credit facility by sugar factory and commercial bank for modernization and mechanization of the sugarcane farming, 24.16 per cent sugarcane growers suggested demonstration of improved varieties be conducted on farmer field, 17.50 per cent sugarcane growers suggested regular supply of electricity, 16.66 per cent respondent close linkage between university scientist and farmer and 10.00 per cent of the sugarcane growers suggested Implement and appliance should be made available to farmer in time .

5.5 Conclusions

The sugarcane growers largely belonged to middle age group having education up to secondary. Majority of the sugarcane ratoon growers had possessed small size of land holding. It also revealed that a majority of the sugarcane growers were found in medium Size of family, annual income, sources of information, social participation, knowledge and adoption. All of the respondents grow sugarcane crop in annual habitat, followed by 94.16 per cent paddy crop grow in *kharif* season.

The data indicated that the sugarcane growers faced the constraints of labour shortage at the time of farm operation, lack of knowledge about pest control, high cost of fertilizer and insecticide, lack of knowledge about biological pest control, irregular supply of electricity, lack of knowledge about recommended fertilizer dose, unavailability of finance, drip irrigation technology, high labour cost and high cost of micronutrient.

The suggestion made by the sugarcane growers are conduct the

demonstration on white grub pest management on farmers field, awareness of trash management practices in ratoon sugarcane is needed, resistant variety should be released in respect of pest and disease, Timely technical advice should be made concerned extension personnel about transfer of technology, more credit facility by sugar factory and commercial bank for modernization and mechanization of the sugarcane farming, Result demonstration of improved varieties conducting on farmer field, Availability of fertilizer and insecticide at subsidized rate, regular supply of electricity, close linkage between university scientist and farmer Implement and appliance should be made available to farmer in time .

5.6 Implications

Implications emanated from the finding of the present study Ratoon management practices by sugarcane growers are reported in this section. The implications are presented into two parts. The first part is related with the implications for action, while the second part deals with the implications for future research work. Based on the findings of the present study the following suggestions in the form of implications are offered.

A. Action implication

1. Less percent growers adopted practices like soil analysis, green manuring, micronutrients, single eye bud setts, use of drip irrigations system, use of neemcake in urea, Integrated pest management, Integrated disease management, etc. effort should be made by the State Agricultural Departments and co-operative sugar factories to trained the growers to adopt sugarcane practices.

2. The study indicated the partial knowledge of the respondents regarding fertilizer management practices, interculturing operations, use of bio-fertilizers etc. Hence, extension functionaries Agriculture Department need to be focus on these various aspects of ratoon sugarcane management practices through Front line demonstration, method demonstration and result demonstration.

3. One of the very important suggestions on technological aspect has been obtained regarding creating awareness of trash management practices in ratoon sugarcane. This calls for conducting method and result demonstrations on farmers fields on a large scale. The ratoon sugarcane growers need to be made aware of various inputs and implements required for profitable cultivation of this crop.

4. The study pointed out that still majority of the sugarcane growers burn the trash after harvesting. Further application of fertilizers to ratoon sugarcane by use of crowbar

need to be enhanced. These two crucial aspects of ratoon sugarcane need to be dissemination through mass media for the benefit of sugarcane growers. The farmers knowledge and skills on trash management and use of crowbar for fertilizer application can be increased through method demonstrations, crowbar should be provided through *Zilla Parishad* and agriculture department.

B. Research implications

1. Research on low cost technology of Sugarcane cultivation should be under taken by the universities to minimize the cost of cultivation.
2. The personal, psychological and socio-economic factors which contribute towards high and low agricultural productivity may be studied to a greater depth.
3. This study would also be useful as a benchmark for further probe into the studies of similar type.
4. To cover wide range of factors of human behavior of the farmers in transfer of technology further interdisciplinary research is necessary.

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APPENDICES

APPENDIX- I

List of selected Sugarcane growers

Sr.No.	Name of farmer	Village	Tahsil	Mobile No.
1	Mr. Mohite Anandrao Yashvant	Chavare	Hatkanangale	9421283370
2	Mr. Patil Vikas Rajaram	Chavare	Hatkanangale	9975687272
3	Mr. Bhosale Nivrutti Rangrao	Chavare	Hatkanangale	9921871271
4	Mr. Chavan Babasaheb Hindurao	Chavare	Hatkanangale	9730689265
5	Mr. Patil Dynaneshwar Bapu	Chavare	Hatkanangale	7798534940
6	Mr. Patil Rajaram Dada	Chavare	Hatkanangale	9552310031
7	Mr.Mohite Shamrao Yashvant	Chavare	Hatkanangale	9766947248
8	Mr. Patil Balasaheb Bapu	Chavare	Hatkanangale	-
9	Mr. Pachimbare Vasant Vithu	Chavare	Hatkanangale	-
10	Mr. Patil Dhanaji Bapu	Chavare	Hatkanangale	-
11	Mr. Patil Hindurao Shamrao	Ghunaki	Hatkanangale	9922357188
12	Mr. Bude Somanath Vishwnath	Ghunaki	Hatkanangale	9975868113
13	Mr. Jangam Kalmayya Shankar	Ghunaki	Hatkanangale	9890668254
14	Mr. Mohite Narayan Shripati	Ghunaki	Hatkanangale	9860805743
15	Mr. Mohite Sambhaji Pandurang	Ghunaki	Hatkanangale	9403781025
16	Mr. Jangam Shivling Shankar	Ghunaki	Hatkanangale	9960599037
17	Mr. Dhanagar Ramchandra Ganpati	Ghunaki	Hatkanangale	9766950027
18	Mr. Shinde Tukaram Krushna	Ghunaki	Hatkanangale	9975845656
19	Mr. Mohite Balasaheb Pandurang	Ghunaki	Hatkanangale	9561202323
20	Mr. Mohite Shamrao Baburao	Ghunaki	Hatkanangale	9975916152
21	Mr. Sandip Yashvant Mali	Kinni	Hatkanangale	9096583420
22	Mr. Vaibhav Maruti Kumbhar	Kinni	Hatkanangale	9923092020
23	Mr. Desai Jitendra Bhau	Kinni	Hatkanangale	9922831955
24	Mr.Gurav Madhukar Bal	Kinni	Hatkanangale	9890161787
25	Mr. Patil Rahul Dhanpal	Kinni	Hatkanangale	9890531060
26	Mr. Patil Shantinath Annasaheb	Kinni	Hatkanangale	9096916108
27	Mr.Patil Vijay Annasaheb	Kinni	Hatkanangale	9403786936
28	Mr. Mohite Hambirarao Shankarao	Kinni	Hatkanangale	9765022922
29	Mr.Havaldar Sachin Rangrao	Kinni	Hatkanangale	9881302186
30	Mr.Patil Hemant Mahavir	Kinni	Hatkanangale	9923092020
31	Mr.Magdhum Anasso Bandu	Wathar	Hatkanangale	9049809313
32	Mr.Shinde Uttam Shankar	Wathar	Hatkanangale	9503267461
33	Mr. Mhasake Ananda Bhikaji	Wathar	Hatkanangale	9766o72366
34	Mr. Pawar Sharad Baburao	Wathar	Hatkanangale	9766435713
35	Mr. Mhasake Parshuram Bhikaji	Wathar	Hatkanangale	7588698585
36	Mr. Shinde Ramrao Devappa	Wathar	Hatkanangale	9475558203
37	Mr. Shinde Sarjerao Devappa	Wathar	Hatkanangale	8007545144
38	Mr.Shinde Sunil Tukaram	Wathar	Hatkanangale	9096140130

39	Mr.Patil Sandeep Ganpati	Wathar	Hatkanangale	7276021919
40	Mr.Jadhav Deelip Ramchandra	Wathar	Hatkanangale	9890594326
41	Mr.Todkar Babaso Rajaram	Malle	Hatkanangale	8275919850
42	Mr.Sayad Salim Babu	Malle	Hatkanangale	8275919848
43	Mr.Patil Shamrao Shankar	Malle	Hatkanangale	9405575936
44	Mr.Patil Diliprao Dinkararao	Malle	Hatkanangale	9822544471
45	Mr.Patil Milind Keshev	Malle	Hatkanangale	7745091400
46	Mr.Narote Prakash Baba	Malle	Hatkanangale	9158771610
47	Mr.Patil Vijaysingh Dyandev	Malle	Hatkanangale	9175981040
48	Mr.Patil Ananadrao Ganpati	Malle	Hatkanangale	9822801132
49	Mr. Swami Suresh Shivappa	Malle	Hatkanangale	9421200029
50	Mr. Patil Madhukar Atamaram	Malle	Hatkanangale	8275915850
51	Mr. Mali Dinkar Gangaram	Chakok	Hatkanangale	7588270303
52	Mr .Patil Manohar Surendra	Chakok	Hatkanangale	7588171776
53	Mr. Chakokakar Ballaso Tukaram	Chakok	Hatkanangale	9404430437
54	Mr. Choughule Prakash Dhanapa	Chakok	Hatkanangale	7057949409
55	Mr. Kadam Pandurang Tukaram	Chakok	Hatkanangale	02302485422
56	Mr. Patil Nana Ganpati	Chakok	Hatkanangale	-
57	Mr. Mali Balkrishna Babarao	Chakok	Hatkanangale	-
58	Mr. Mulik Pritam Bhimrao	Chakok	Hatkanangale	9049690388
59	Mr. Patil Daddaso Vilas	Chakok	Hatkanangale	8806898789
60	Mr. Patil Bhimgonda Paygonda	Chakok	Hatkanangale	9175114022
61	Mr. Patil Ananda Balvant	Kothali	Karveer	9623318798
62	Mr.Sittape Namdev Datatray	Kothali	Karveer	8411033031
63	Mr. Sittape Pandurang Datatray	Kothali	Karveer	9561136558
64	Mr. Patil Sharad Keraba	Kothali	Karveer	9405557274
65	Mr. Patil Baburao Krishna	Kothali	Karveer	9767495144
66	Mr. Amate Gajanan Hari	Kothali	Karveer	9421441989
67	Mr. Amate Hindurao Shamrao	Kothali	Karveer	9561998110
68	Mr. Patil Dagadu Dinkar	Kothali	Karveer	9423843048
69	Mr. Patil Dinkar Shripati	Kothali	Karveer	9049470953
70	Mr. Amate Vilas Bapu	Kothali	Karveer	9637727959
71	Mr. Divase Namdev Tukaram	Savarvadi	Karveer	02312366006
72	Mr. Khot Ballaso Akaram	Savarvadi	Karveer	9075894424
73	Mr. Jhadhv Dhanaji Maruti	Savarvadi	Karveer	8407981852
74	Mr. Kandale Nagesh Ravaji	Savarvadi	Karveer	9860671663
75	Mr. Khot Shubhas Vishnu	Savarvadi	Karveer	9403552144
76	Mr. Durgule Shankar Laxman	Savarvadi	Karveer	8275756268
77	Mr. Khot Sarjerao Bapu	Savarvadi	Karveer	9689261018
78	Mr. Khot Bajirap Akaram	Savarvadi	Karveer	9545587566
79	Mr. Khot Namdev Akaram	Savarvadi	Karveer	9075894421
80	Mr. Londhe Babaso Dinkar	Savarvadi	Karveer	-

81	Mr. Yadav Mahesh Gajanan	Gadegoundvadi	Karveer	8275450019
82	Mr. Metale Babaso Vishvas	Gadegoundvadi	Karveer	9011508500
83	Mr. Devkar Balasaheb Vishnu	Gadegoundvadi	Karveer	9823348700
84	Mr. Metale Sayaji Nanaso	Gadegoundvadi	Karveer	8698443498
85	Mr. Metale Ajit Raghunath	Gadegoundvadi	Karveer	9158872462
86	Mr. Patil Shamrao Sakharam	Gadegoundvadi	Karveer	7588697661
87	Mr. Patil Umesh Mahipati	Gadegoundvadi	Karveer	9403231500
88	Mr. Mulik Bhimrao Baburao	Gadegoundvadi	Karveer	9421287800
89	Mr. Metale Tanaji Pandurang	Gadegoundvadi	Karveer	8007809899
90	Mr. Devkar Prakash Ananda	Gadegoundvadi	Karveer	9764630680
91	Mr. Patil Ashok Ramrao	Kasaba -beed	Karveer	9421203783
92	Mr. Surywansi Pandurang Yashvant	Kasaba -beed	Karveer	8275150769
93	Mr. Misal Raghunath Bapu	Kasaba -beed	Karveer	-
94	Mr. Panare Sachin Maruti	Kasaba -beed	Karveer	9421218370
95	Mr. Patil Pradeep Dinkar	Kasaba -beed	Karveer	8805358811
96	Mr. Beedkar Mahadev Lahu	Kasaba -beed	Karveer	9421175211
97	Mr. Magadhum Satappa Sadashiv	Kasaba -beed	Karveer	9403552184
98	Mr. Patil Randhir Tukaram	Kasaba -beed	Karveer	9145561404
99	Mr. Yadhav Shivaji Santaram	Kasaba -beed	Karveer	9921153253
100	Mr. Varute Suraj Eknath	Kasaba -beed	Karveer	9421587127
101	Mr. Jadhav Sandeep Rangarao	Kalambe	Karveer	9657181881
102	Mr. Patil Sukhadev Ananda	Kalambe	Karveer	9404112104
103	Mr. Desai Balaso Rajaram	Kalambe	Karveer	9673416360
104	Mr. Choughule Mahadev Balu	Kalambe	Karveer	8698063625
105	Mr. Patil Ashok Bapu	Kalambe	Karveer	9421197372
106	Mr. Chavhan Ekanath Bapu	Kalambe	Karveer	7875564864
107	Mr. Patil Vilas Nivruti	Kalambe	Karveer	-
108	Mr. Patil Ananda Dyandev	Kalambe	Karveer	9403236140
109	Mr. Patil Shivaji Vishnu	Kalambe	Karveer	9765383045
110	Mr. Patil Sagar Akaram	Kalambe	Karveer	-
111	Mr. Dhanavade Sarjerao Sambhaji	Mudshingee	Karveer	9420933499
112	Mr. Choughule Pramod Kallappa	Mudshingee	Karveer	9545950999
113	Mr. Choughule Sanjay Raghunath	Mudshingee	Karveer	9096177705
114	Mr. Dalavi Dileep Govind	Mudshingee	Karveer	9404954445
115	Mr. Patil Pandeeth Bapurao	Mudshingee	Karveer	7755939200
116	Mr. Patil Shambhaji Bapurao	Mudshingee	Karveer	0231615128
117	Mr. Yedekar Santosh Ramchandra	Mudshingee	Karveer	9096196171
118	Mr. Mali Chandrakant Shivram	Mudshingee	Karveer	9970343296
119	Mr. Dhanavade Appasaheb Shambhaji	Mudshingee	Karveer	9860545017
120	Mr . Yedekar Sanjay Shamrao	Mudshingee	Karveer	9850169763

APPENDIX- II
Questionnaire
COLLEGE OF AGRICULTURE, KOLHAPUR
EXTENSION EDUCATION SECTION

Research Title : "Knowledge and adoption of ratoon management practices by the sugarcane growers."

Name of the Researcher : Mr. Pedhekar R. D.

Name of the Research Guide : Prof .N.N. Tale Assistant Professor of Agril. Extension

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Part -I

1. Name of the Farmer : ----------

2. Address : Village ---------- Tahsil ---------- Dist – Kolhapur

3. Age : ---------- Year Mobile No ----------

4. Education : ---------- Std.

5. Total land holding :

Sr. No	Type of land	Area (ha.)
1	Unirrigated	
2	Irrigated	
3	Fallow	
	Total	

6. Size of family:

Male	Female	Children	Total

7. Annual gross income: Rs

1	Agriculture	
2	Dairy	
3	Goat farming	
4	Self business	
5	Service	
6	Other	
	Total	

8. Total area under Sugarcane – (ha) (2013-2014)

Suru	
Adasali	
Pre- Seasonal	
Ratoon	

9. Average Yield - Tonne / ha

Suru	
Adasali	
Pre- Seasonal	
Ratoon	

10. Source of information

Sr.No	Source	Regularly used	Occasionally used	Not used
A	**Individual**			
1	Progressive farmer			
2	Friends			
3	Neighbour			
4	Relative			
5	Gramsevak			
6	Agril. Assistant			
7	Agril. Officer			
8	Agril. Extension Officer			
9	Agril University Scientist			
10	KVK Subject matter Specialist			
11	Other			
B	**Group**			
1	Meeting			
2	Group discussion			
3	Demonstration			
4	Educational tours			
5	*Krishi Melava*			
C	**Mass Media**			
1	News paper			
2	Radio			
3	T.V			
4	Agril .University Agril related publication			
5	Agril .Exhibition			
6	Group discussion			
7	Training class			
8	Kisan Call Centre			
9	Internet			

11. Social participation:

Sr.No	Organization Name	Member		Post	
		Yes	No	Yes	No
1	*Zilla Parishad*				
2	*Panchayat Samittee*				
3	*Grampanchayat*				
4	Co- operative Society				
5	Co- operative sugar factory				
6	Co-operative Bank				
7	*Sheti mandal*				
8	Dairy society				
9	Agril. market produce committee				
10	*Mahila mandal*				
11	Educational society				
12	*Bhajani mandal*				
13	*Krishi Vidyan mandal*				
14	Farmer forum				
15	Shelf Help Group				

12. Cropping pattern:

Sr.No	Season	Crop	Variety	Total Area (ha)	Production qtls	Productivity /ha
1	*Kharif*					
2	*Rabbi*					
3	*Summer*					
4	*Annual*					

Part- II

13. Classification of respondents according to their experience, knowledge and adoption about ratoon management practices.

Sr	Components	Knowledge	Adoption

.No			Complete	Partial	No	Complete	Partial	No
1		**Type of Soil**						
	i	Medium deep (90 cm) and well-drained soil with pH 6-8.5						
2		**Season**						
	A	Adasali 15 Jul -15 Aug						
	B	Pre-seasonal 15 Oct- 15 Nov						
	C	Suru 15 Jan -15 Feb						
3		**Improved variety**						
	1	CO - 86032 (Nira)						
	2	CO - 94012 (Phule savitri						
	3	Phule-0265						
	4	COM- 92005						
	5	CO- 7527						
	6	COM -88121 (Krishna)						
	7	CO -740						
	8	CO -7125						
	9	VSI -434	-					
	10	CO – VSI- 9805						
4		**Planting Method**						
	1	Ridges and furrow –medium soil (90 cm) heavy Soil (120 cm)						
	2	Border –Pair row method (75 to 150 cm), (90 to 180 cm)						
5		**Planting material**						
	1	Single eye bud -25000						
	2	Double eye bud -45000 - 60000						
6		**Sett Treatment**						
	1	Acetobactor (10 kg /100 lit water)						
	2	Phosphate solublizing bacteria (1.25 kg /100 lit water)						
7		**Fertilizer management**						
A		**Organic fertilizer (ha)**						
	1	vermicompost 5 tonne /ha ,Presmud cake 6 tonne /ha Compost 7.5 tonne /ha						
	2	Suru FYM 20 ton /ha						
	3	Pre-seasonal FYM 25 ton / ha						
	4	Adasali FYM 30 ton /ha						
B		**Green manuring fertilizer**						
	1	Sun hemp -50 kg /ha						

	2	Dhaincha – 50 kg /ha 45 day after sowing						
C		**Inorganic fertilizer**						
	1	Adasali (kg /ha) 400: 170 :170 kg NPK /ha						
	2	Pre-seasonal 340 :170 :170 (kg NPK / ha)						
	3	Suru 250 :115 :115 (kg NPK / ha)						
	4	Ratoon 250 :115 : 115 (kg NPK / ha)						
D		**Micro nutrient management**						
I		Ferrous sulphate 10 kg , zinc sulphate 8 kg ,magnase sulphate 4 kg ,borax 2 kg all the micro nutrient mix with FYM 10 -15 *ghamela* .						
E		**Planting Time**						
8		**Ratoon management**						
	1	Removal of trash on cutted shoots and buds which is pressed in furrow.						
	2	Application of mixture of 50 kg Urea,50 kg SSP per acre on trash with decomposing culture for proper decomposing of trash .						
	3	Cutting of extra remaining shoot at ground level with sharp cutting knife.						
	4	Application of second fertilizer dose 135 DAS opposite site to first dose with the help of fertilizer gun.						
	5	Spraying of 10 gm bavistin in 10 lit water on cutted shoot and buds.						
9		**Pest management**						
	1	White grub –Application of 1 lit choloropyriphos in 400 lit of water per acre at well drained condition.						
	2	Conservation of conabathra, micromus,difa etc are natural enemies for wooly aphids .						
	3	White fly –spraying of						

		malathion 50 % SL @ 20 ml in 10 lit water for control white fly .						
	4	Spraying of methyl dematon 25 % SL @ 20 ml or malathion 50 % SL @ 20 ml for control of mealy bug on tender leaves and shoots .						
10		**Disease management**						
	1	Smut disease –set treatment with 0.1 % Bavistin .						
	2	Rust disease –Application of zyrum 0.5 % (50 gm in 100 lit water)						
	3	Red rot disease - Hot water treatment 50^{0} C for 2 hours.						
11		**Water management**						
	i	Flood irrigation						
	ii	Ridges and furrow method						
	iii	Drip irrigation method						
12		**Recommended variety**						
	i	CO -86032						
	ii	Phule – 0265						
13		**No. of Ratoon cultivated**						
	i	1 -2						
	ii	3						
14		**Yield per hacter**						
	i	100 -120 tonnes						
	ii	80 – 100 tonnes						

Part –III

14. Constraint faced by sugarcane ratoon growers about ratoon management practices

1) ----------

2) ----------

3) ----------

4) ----------

5) ----------

15. Suggestions of Sugarcane ratoon growers about ratoon management practices.

1) ----------

2) ----------

3) ----------

4) ----------

5) ----------

7. VITA

Mr. Pedhekar Raghu Devram

A candidate for the degree

In

MASTER OF SCIENCE (AGRICULTURE)

In

AGRICULTURE EXTENSION

2015

Title of Thesis	: "Knowledge and adoption of ratoon management practices by sugarcane growers."
Major field	: Agriculture Extension
Biographical information	**:**
Personal	: Born on 29th July 1990 Son of Shri.Devram Bahiru Pedhekar and Sau. Tarabai Devram Pedhekar.
Mobile No.	: 9637944377
Educational	: Passed Secondary school Certificate Examination from New English school, Taked. Tal. Igatpuri, Dist.Nasik 2007 in Second class : Passed Higher Secondary school Certificate from Government junior College Keli-rumhanwadi,Tal. Akole Dist. Ahmednagar . in 2009 in Second class. : Received Bachlor of Science (Agriculture) Degree from Lokmangal Agriculture College, Wadala. Tal. North Solapur, Dist. Solapur. Under M.P.K.V. Rahuri, in 2013 in Second Class (71.70%).
Address	: At- Bitaka Post- Ekadare Tal – Akole Dist- Ahmednagar - 422601
E-mail id	: raghupedhekar7575@gmail.com

Plate No. 1 Collection of data from sugarcane growers.

Plate No.2 Interviewing sugarcane growers in village.

Plate No. 3 Interacting with sugarcane growers at sugarcane field.

Plate No. 4 Discussing with sugarcane growers.

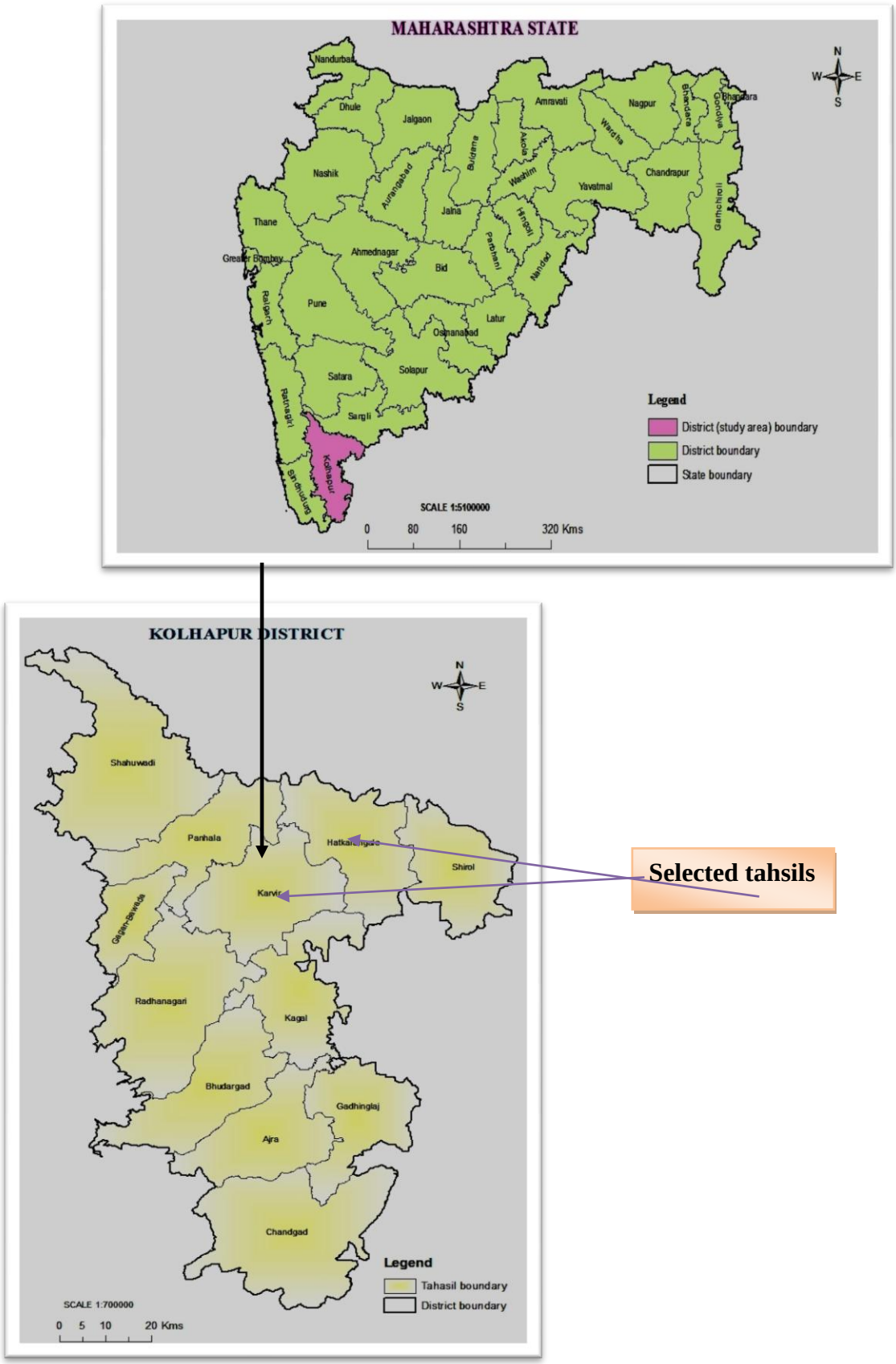

Fig.1 Locale of the study

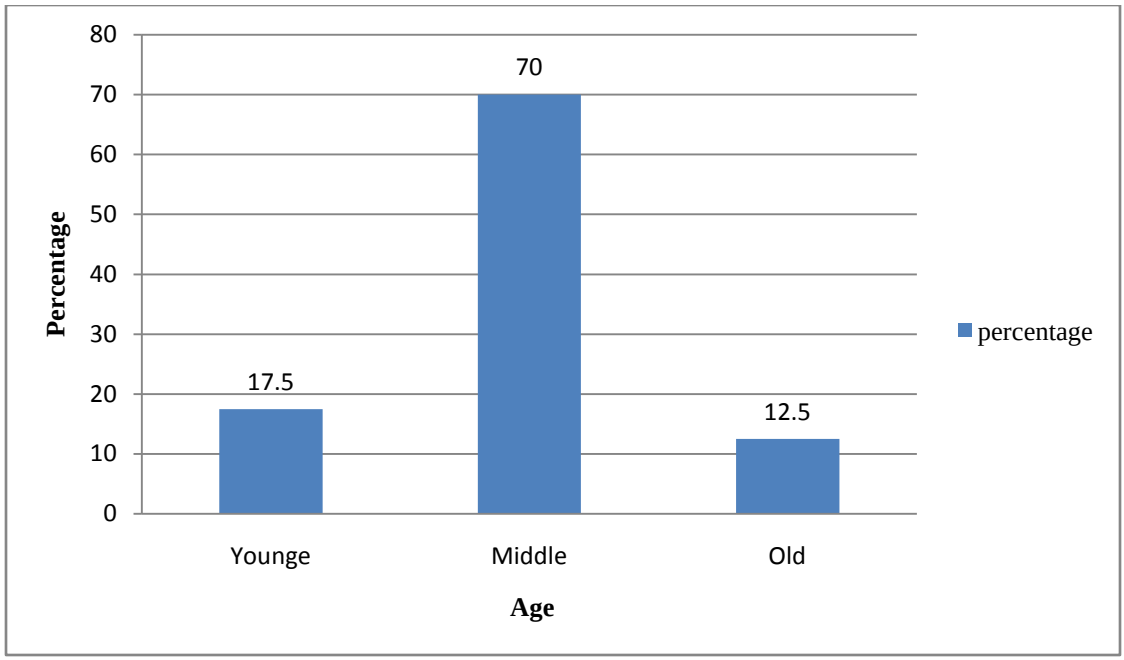

Fig. 2 Classification of the respondents according to their Age

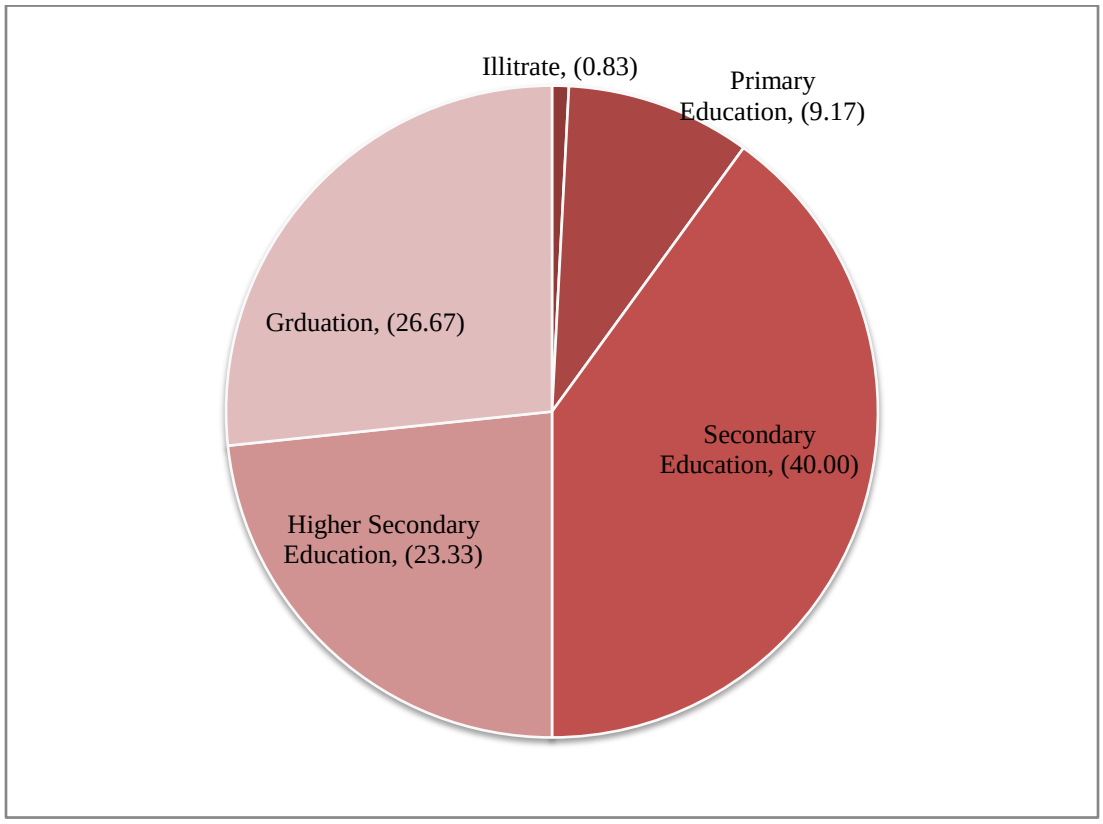

Fig . 3 Classification of the respondents according to their Education

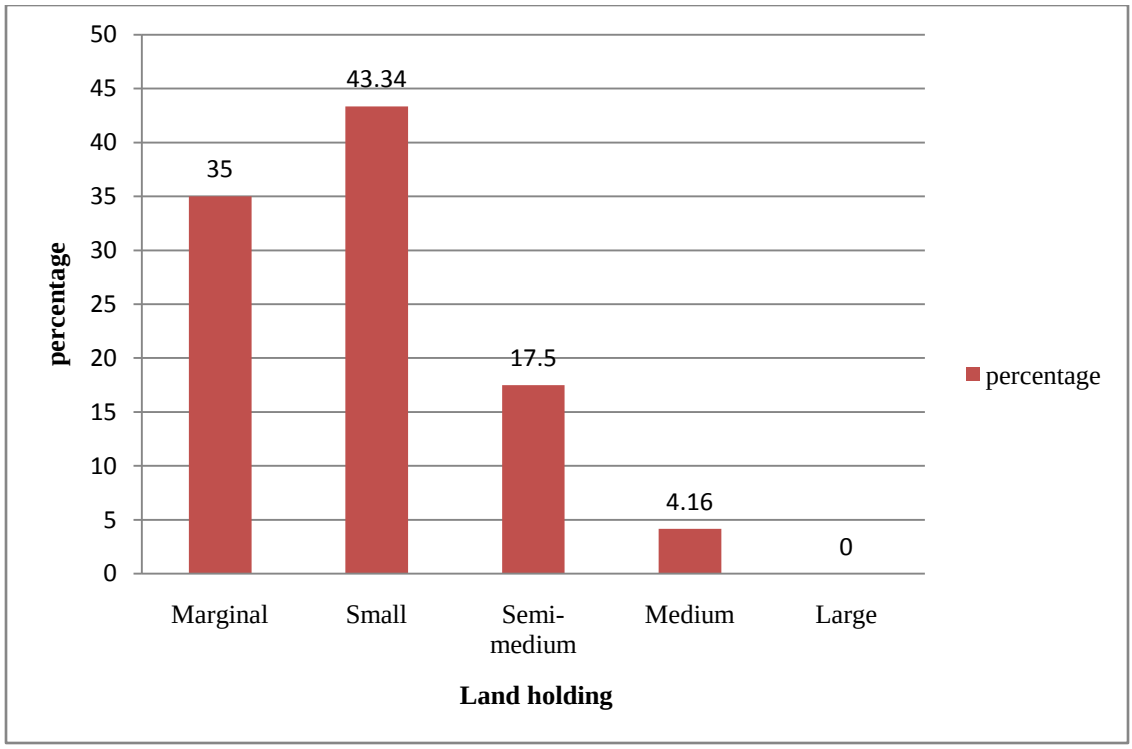

Fig. 4 Classification of the respondents according to their land holding .

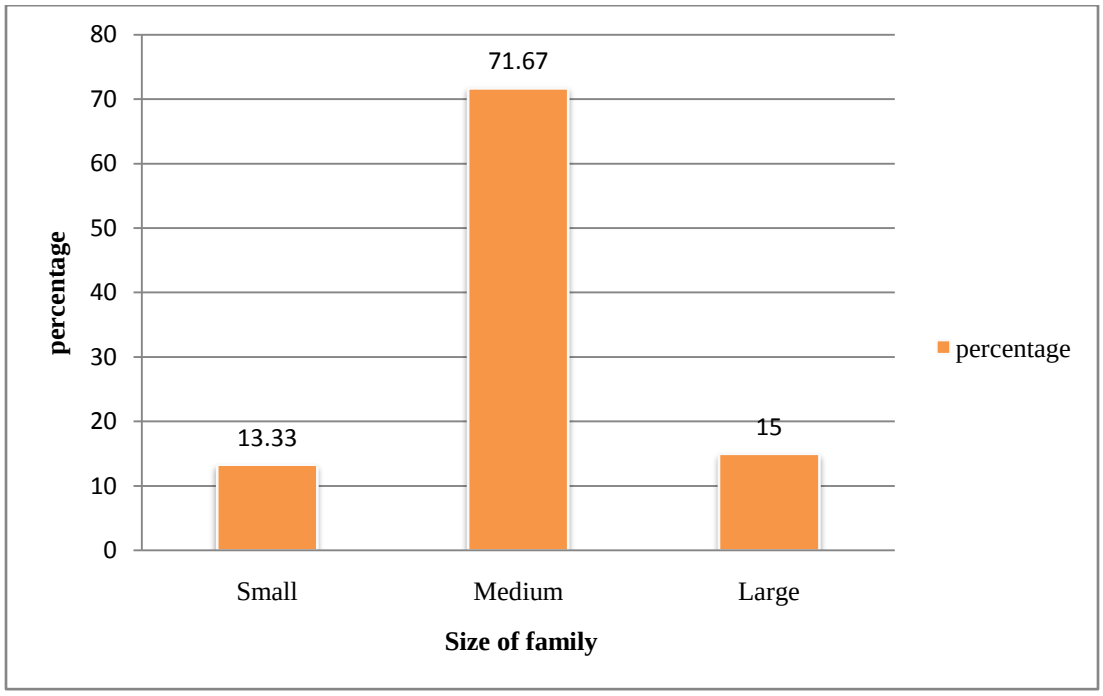

Fig. 5 Classification of the respondents according to their Size of family

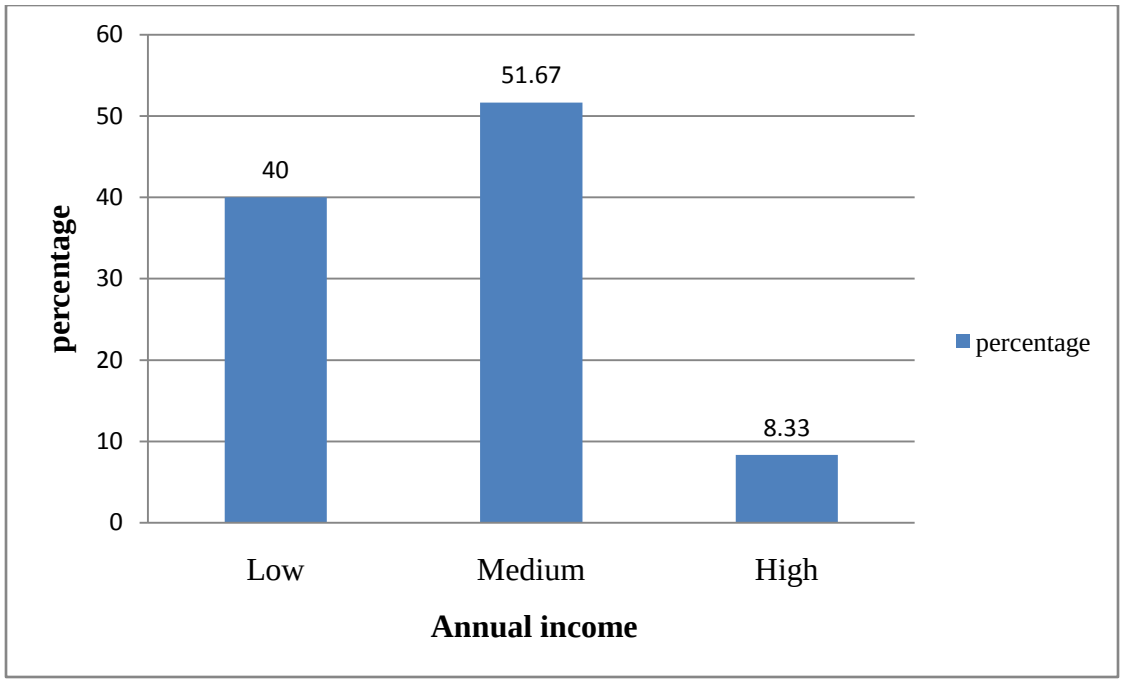

Fig .6 Classification of the respondents according to their Annual Income

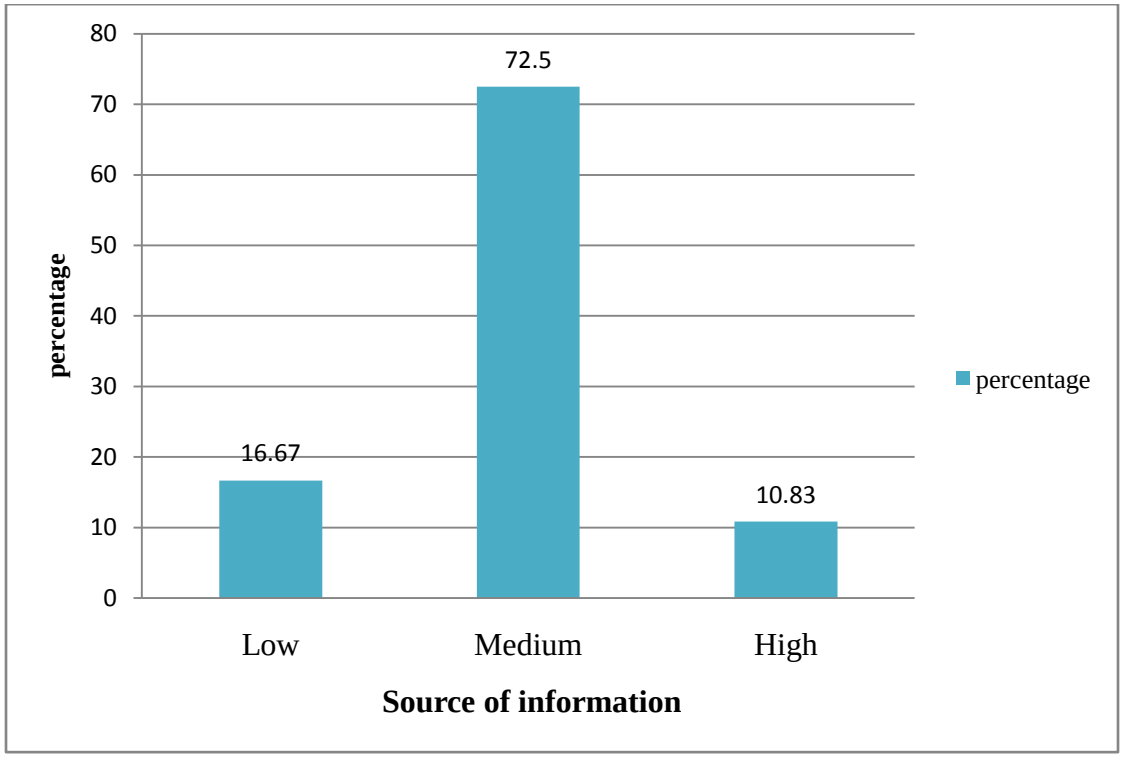

Fig . 7 Classification of the respondents according to their Source of information

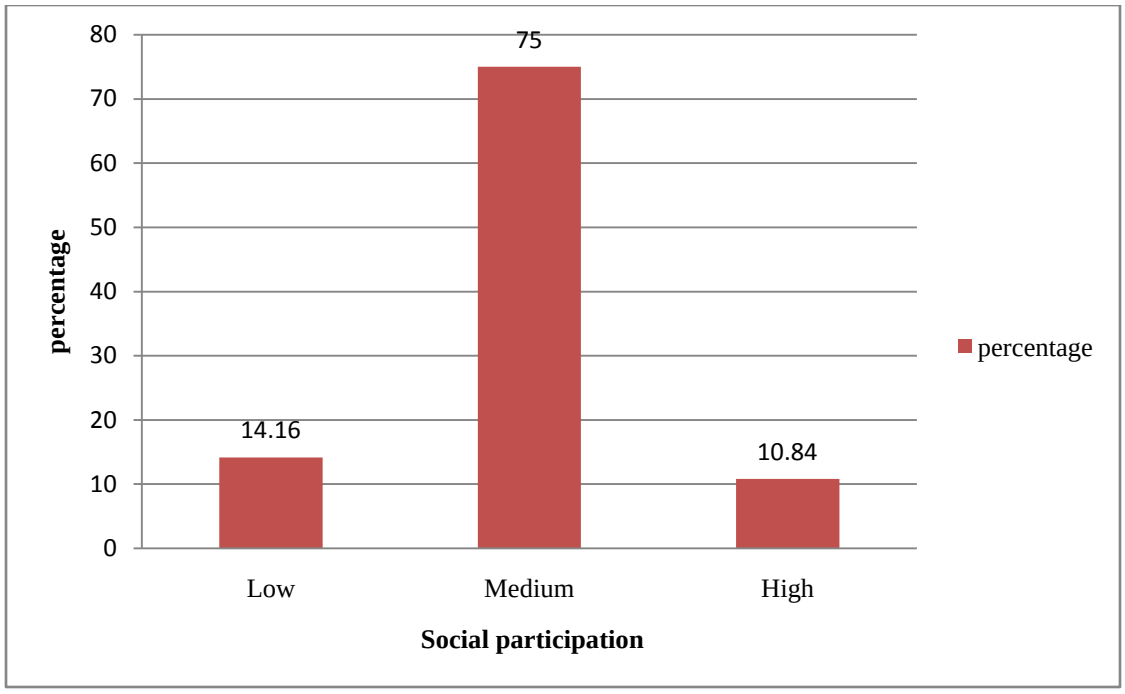

Fig . 8 Classification of the respondents according to their Social participation

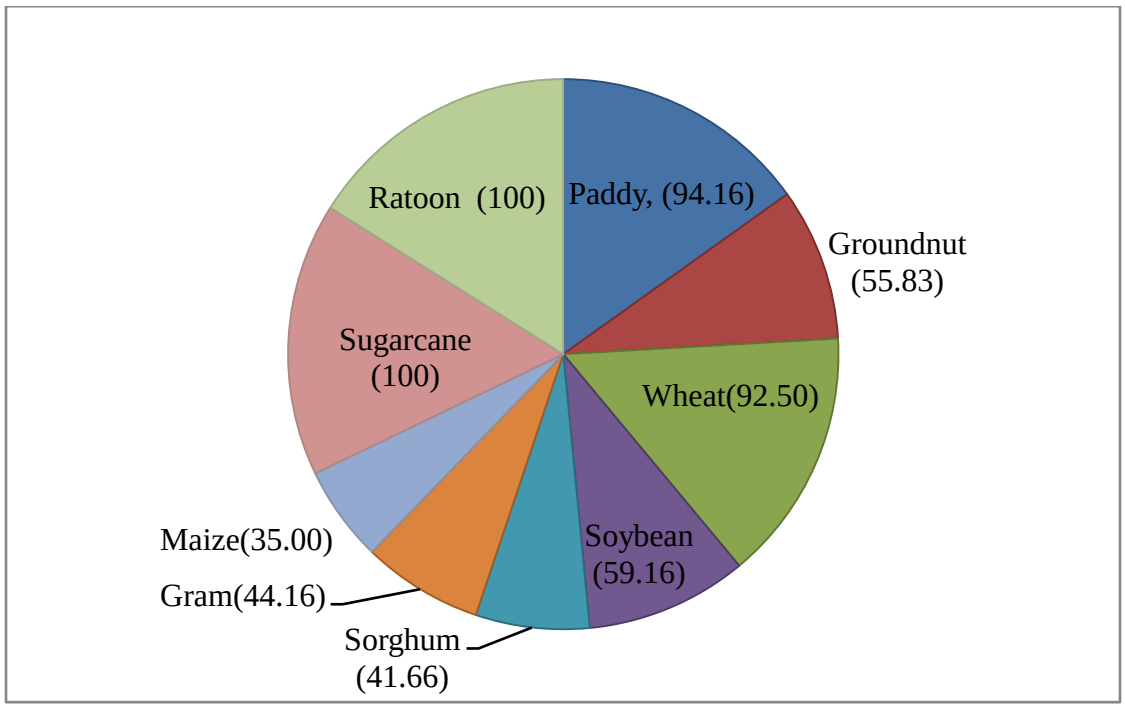

Fig .9 Classification of the respondents according to their cropping pattern

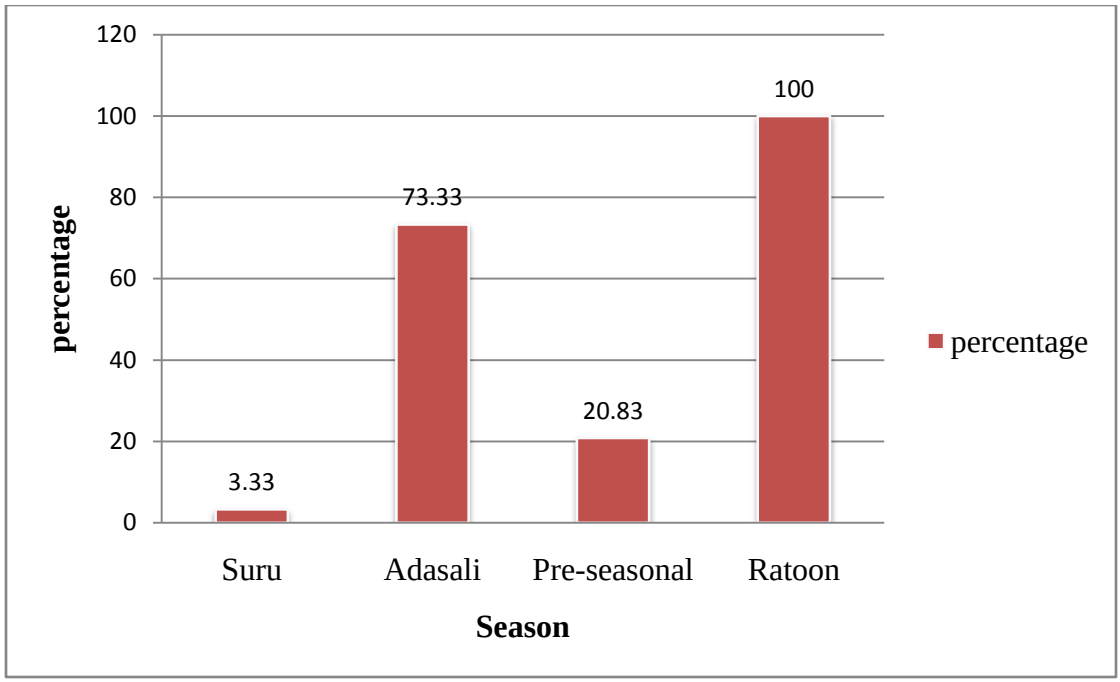

Fig . 10 Classification of the respondents according to their season under Sugarcane crop

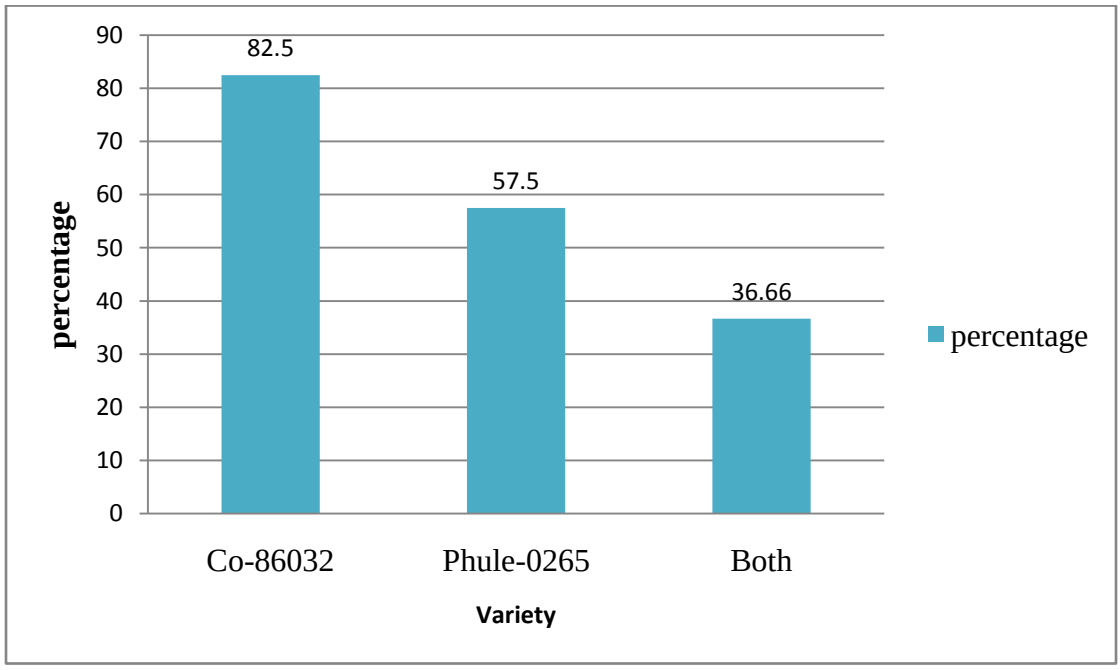

Fig. 11 Classification of the respondents according their variety wise area under Sugarcane

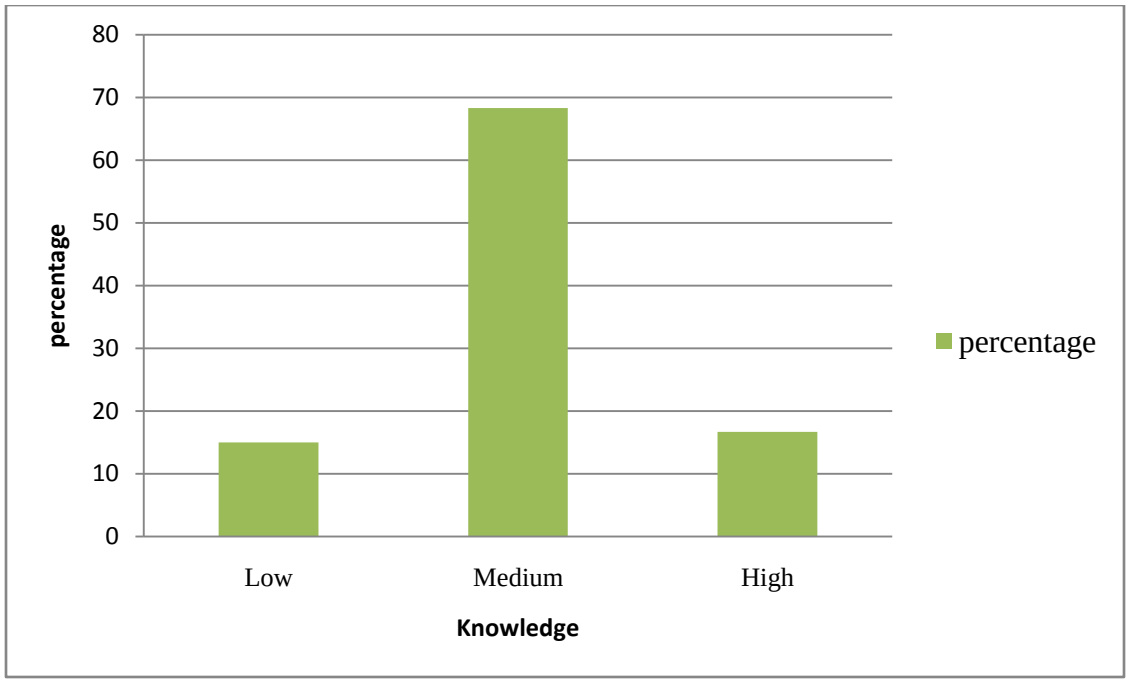

Fig .12 Classification of the respondent according to their overall knowledge

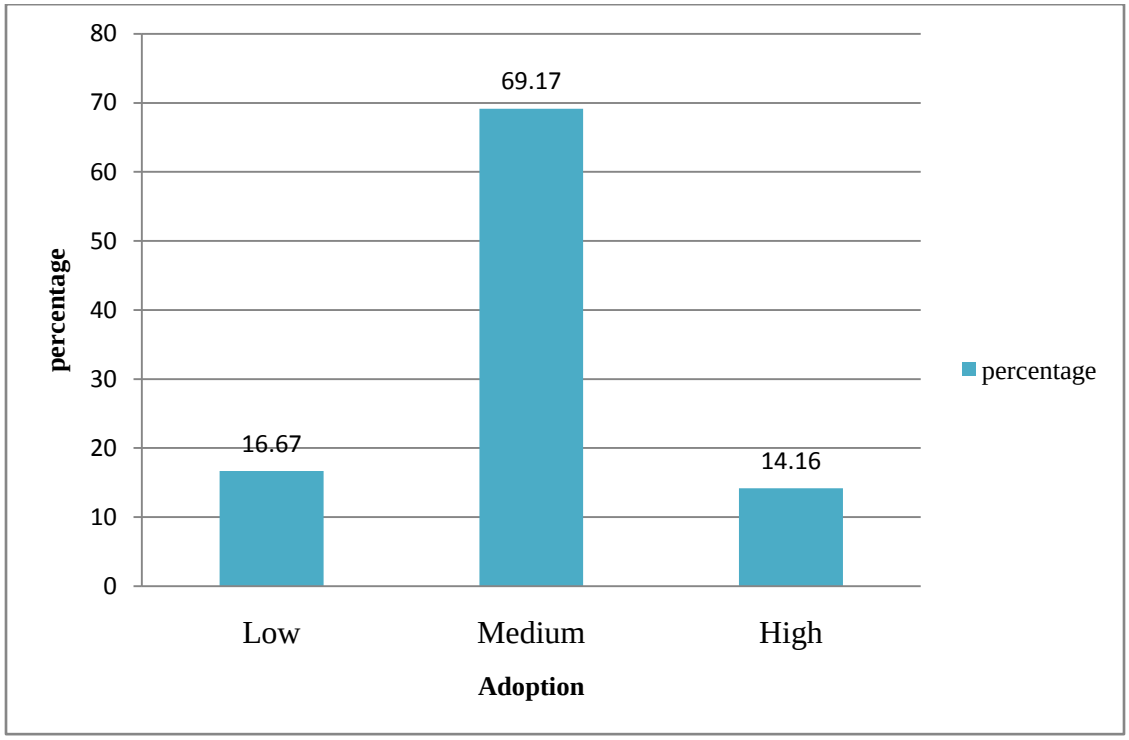

Fig .13 classification of the respondents according to their overall adoption