ADOPTION OF INTEGRATED PEST MANAGEMENT PRACTICES BY CHILLI GROWERS

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B.Sc. (Agriculture)

MASTER OF SCIENCE

AGRICULTURE

IN

(EXTENSION EDUCATION)

DEPARTMENT OF EXTENSION EDUCATION

COLLEGE OF AGRICULTURE, LATUR

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PARBHANI - 431402 (M.S.) INDIA

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BY

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B.Sc. (Agriculture)

A thesis submitted to

Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani

In partial fulfilment of the requirement for the degree of

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PARBHANI – 431402 (M.S.) INDIA

2022

DECLARATION BY THE CANDIDATE

I hereby declare that the thesis entitled, **"Adoption of integrated pest management practices by Chilli growers"** submitted by me is based on the actual work carried out by me under the guidance and supervision of **Dnyaneshwar Dalsing Suradkar.** The extent of information derived from the existing literature have been duly cited and referenced. The existing research work or it's any part is not submitted anywhere else for the award of any degree or diploma.

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Place: Latur

Date:23 /01 /2023

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"If four things are followed having a great aim, acquiring knowledge, hard work, and perseverance then anything can be achieved."

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Place: Latur

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(Deshmukh Kiran Pundalik)

2020A/74ML

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ABBREVIATIONS

%	:Per cent
@	: At the rate
/	: Per
Agri.	: Agriculture
AVRDC	: Asian Vegetable Research and Development Center
Agril.	: Agricultural
B.D.O.	: Block Development Office
Cm.	: Centimetre
DOI	: Digital Object Identifier
DAS	: Days after sowing
DAT	: Days after transplanting
EC	: Encumbrance Certificate
Educ.	: Education
El al.	: Et alia (and other)
Etc.	: Etcetera
ETL	: Economic Threshold Level
ETO	: Extension Training Officer
Extn.	: Extension
FAO	: Food and Agriculture organization
FFS	: Farmers Field Schools
Fig.	: Figure
FYM	: Farm Yard Manure
GDP	: Gross Domestic Product
g/kg	: Grams per kilo gram
Gms	: Grams
Govt.	: Government
GOI	: Government of India
ha.	: Hectare
http	: Hyper Text Transfer Protocol
IPM	: Integrated Pest Management
i.e.	: That is

Int.	: International
J.	: Journal
KVK	: Krishi Vigyan Kendra
Kg	: Kilogram Lit
L	: Litre
Ml	: Milli liter
M.Sc.	: Master of Science
Mt.	: M eter
Ppm	: Parts Per Million
Rs.	: Rupees
S.D.	: Standard Deviation
Sl. No.	: Serial Number
Std.	: Standard
UNCED	: United Nations Conference on Environment Development
Unpub	: Unpublished
UT	: Union Territory
Viz.	: Namely

ABSTRACT

THESIS ABSTRACT

1. Title of the Thesis	:	Adoption of Integrated Pest Management Practices by Chilli Growers
2. Full Name of Candidate	:	Deshmukh Kiran Pundalik
3. Full name of the Research guide	:	Dnyaneshwar Dalsing Suradkar
4. Department	:	Extension Education
5. College	:	College of Agriculture, Latur
6. Degree to be awarded	:	Master of Science Agriculture

ABSTRACT

The present study was conducted in Kuhi, Bhiwapur and Mouda tehshils of Nagpur district from Vidarbha region of Maharashtra State in 2021-22, with an objective to study "Adoption of integrated pest management practices by Chilli growers". Total 120 respondents were selected for the study. Ex- post facto research design was used for the study.

A number of profile characteristics were selected as an independent variable to find out of Chilli growers of the area. It is revealed from the study of "Adoption of integrated pest management practices by Chilli growers" in Vidarbha resign that, majority of the respondents were possessing medium farming experience 60.84 per cent, while 25.84 per cent of the respondents had primary school level of education. Majority of the respondents were in semi medium size of land holding category 40.83 per cent having area under Chilli crop (70.00%), annual income group (68.34%), social participation (65.83%), mass media exposure (66.67%), extension contacts (71.64%). Majority 72.50 per cent of the respondents had medium level of risk orientation, economic motivation (65.00%) and knowledge (67.50%).

It was noticed that the majority 64.16 per cent of Chilli growers were found in medium adoption of integrated pest management practices followed by 19.17 per cent and 16.67 per cent of the Chilli growers were found in high and low adoption respectively.

Regarding association between profile of Chilli growers and adoption of IPM practices it was concluded that, area under Chilli crop had positive and significant relationship with adoption of integrated pest management practices whereas farming experience, education, land holding, annual income, social participation, mass media exposure, extension contacts, risk orientation, economic motivation and knowledge had positively and highly significant relationship with adoption of IPM practices.

Major constrains faced by Chilli growers were lack of proper information about natural enemies**,** lack of technical guidance from extension functionary about IPM practices, high cost of pesticide, non-availability of neem cake at local level, high wages of labour, lack of knowing about manure and fertilizer management, lack of knowledge about using recommended of chemical and non-availability of pesticide in village, lack of knowledge about identification of pests non-availability of skill labour, lack of knowledge about resistant variety, lack of knowledge about recommended IPM practices, inadequate source of finance and non-availability of water for spraying.

Majority of Chilli growers suggestion that as training on IPM should be imparted, seed of improved varieties should be available to the farmer at local level, regular availability of neem cake at village level and light trap, pheromone trap, biological control measures should be available in time, timely supply of essential inputs should be provided, cost of seeds, fertilizers, pesticides etc. should be less, suitable implements should be made available for field sanitation and deep ploughing and appropriate pesticides should be given on right time.

Keywords: Adoption, Integrated pest management practices, Knowledge, Vidarbha region, Nagpur district

CHAPTER - I
INTRODUCTION

CHAPTER- I

INTRODUCTION

Agriculture is an important part of Indian economy. Over 70 per cent of the rural households depend on agriculture. It contributes 16.10 per cent (2020-21) to the total gross domestic product. The performance of the agriculture sector has always had a large impact on the trend of India's gross domestic product and provides approximately 52 per cent of the total number of jobs available in India. Agriculture is the primary source of livelihood for about 58 per cent of India's population. In India out of the total geographical area of 329 million hectare; the net sown area is about 142 million hectares. India produces 51 major crops, which provides food to nearly one billion people and sustain 56 per cent population. Indian agriculture contributes to 1/6th of the export earnings of India. India is the second largest producer of fruits and vegetable in the word after China. In India, about 55-60 per cent of the total population depends on agriculture and allied activities.

Horticulture crops constitute a significant portion of the total agriculture produce in India. They cover a wide cultivation area and contribute about 28 per cent of the Gross Domestic Product (GDP). These crops account for 37 per cent of the total exports of agriculture commodities from India. Horticulture crops perform a vital role in the Indian economy by generating employment, providing raw material to various food processing industries, and higher farm profitability due to higher production and export earnings from foreign exchange. According to the data perceived by the government of India for 2018-19, horticulture crops in India are being cultivated in 25 million hectares, which is about 8 per cent of India's total cropped area. The annual horticulture produce is estimated around 314 million tonnes, which includes 185 million tons of vegetable in 2018-19. Among the vegetables, India ranks second in the production of potato, onion, cauliflower, chilli and cabbage. (Source: https://ncert.nic.in).

Chilli originated is from Mexico and it brought by Portuguese from Brazil in 1985 in Goa. Since then, it has rapidly spread throughout all over country and commonly known as red pepper. In the world Chilli cultivated on area of 1776 lakh hectares, having the production 7182 lakh tones. The top 8 Chilli producing countries

are India, China, Ethiopia, Myanmar, Mexico, Vietnam, Peru and Pakistan. India accounted for more than 85.00 per cent of world production in 2019, the lions share taken by India with 56.00 per cent (source: FAO).

India is known as the "The home of spices". India ranks 1st in Chilli production followed by China in the world. Chilli belongs to genus Capsicum under Solanaceae family. It can grow in tropical and sub-tropical regions and requires warm humid climate. It is important spice crop used in every Indian cuisine due to its colour, pungency, taste, appealing odour and flavours. Chilli fruits are rich source of Vitamin A, C and E. In India Chilli grown in almost all states of the country. The production of vegetables in India largely depend on the small and marginal farmer and productivity is below the level as prevailing in other countries. In India, Chilli is grown in almost all the state throughout the country. The important states growing Chilli in terms of production metric tonnes are Andhra Pradesh is the largest producer of Chilli in India and contributes about 26% to the total area under Chilli, followed by Maharashtra (15%), Karnataka (11%), Odisha (11%), Madhya Pradesh (7%), other states contributing nearly 22% to the total area under Chilli. Generally, Chilli arrivals from all over India hit the market from mid-October to May end.

Geographical area of Maharashtra is 307.58 lakh ha. Among that gross cropped area is 225.56 lakh ha and net cropped area is 174.73 lakh ha. In Maharashtra, there are 9 Agro-climatic zone. Vidarbha region cover MD-moderate Rainfall zone. In Maharashtra, Chilli is grown on area of 99.50 hectares contributing the production of 44.60 tones with productivity of 0.46 tonnes per hectares (National Horticultural Board, 2019-20). In Maharashtra, major Chilli growing district are Nanded, Jalgaon, Dhule, Solapur, Nagpur, Amravati, Chandrapur, and Osmanabad districts. (Indian spices board).

In Vidarbha region of Maharashtra the total area under Chilli crop is 0.6 lakh ha and yield of Chilli per ha is 882 kg, while total production is 52,920 tonnes during year 2017. In Nagpur district Bhiwapur, Kuhi and Mouda tehsils are having more area under Chilli cultivation. Total area under Chilli cultivation is about 14100 hectares contributing the production of 20090 tonnes. Although the demand for Chilli is rising for export and domestic consumption, the country current Chilli production and

productivity are insufficient, according for only one- fourth to one third of the requires amount.

However inappropriate use of chemical pesticides creates problem of ecological imbalance, environmental pollution, health hazard etc. The development of pesticides resistance also contributed to loss of beneficial insect and microorganisms; even the fertility of soil is adversely affected due to repeated applications of pesticides thus excess use of pesticides and its residues has created numerous side effects therefore the pest has to be managed through ecologically safe and environmentally sound and economically viable technologies. The pest control started since long back use of pesticide has increased over the year India used 54.133 tonnes of pesticides in 1999-2000 of all the pesticides out of which insecticides have dominating share of 65 per cent.

Pest management is an essential part of any crop producing operation, as it aims to prevent pest. These adverse effects were the base to develop integrated pest management (IPM), an approach where to control pest emphasizes are given on non-chemical or organic ways and chemicals are only applied when the pest infestation is severe. IPM has involved completely technical tactic to a more holistic view of the agriculture production scheme that associates the long term sustainability of agriculture production with socio economic and environmental issue, including public health (World Bank, 2003).

In recent years, however cultivation of this vegetable has become increasingly costly and hazardous to farmers as well as consumers. This is due to the increase in use of chemical pesticides due to Chilli plant infected by numerous insect pests that attack Chilli at its various growth stages. It is often infected by a group of either sucking or boring pests. The major pest of Chilli is the sap sucking insects and which include thrips, aphids and whiteflies and the boring insects, mainly the fruit borers. Mites which are non-insects also pose major problem. The most obvious pest damage on the leaves and fruits and causes losses to them and reduce the production of Chilli. So, it is necessary to control the pest attack by using Integrated Pest Management technology. Integrated Pest Management can reduce the human and environmental exposure to hazardous condition. It also helps in lowering the overall cost of pesticide application.

The IPM approach promoted by the Government of India (GOI), since 1985 is an eco-friendly strategy of pest control by exploiting the role of natural agents, forces in harmony with other pest management better and with the role aim to effect minimum disturbance to environment cultural control, use of natural enemies and plant resistance are basically compatible and supportive tactics in the IPM strategy. The Government of India is also a signatory to the agenda of 21"United Nations Conference on Environment Development (UNCED) 1992, which has also approved and accepted IPM to reduce the use of insecticide in agriculture.

The Integrated Pest Management (IPM) concept is being promoted through 26 Central Integrated Pest Management Centres (IPMCs) located in 22 States and one Union Territory (UT). Aiming at human resource development, these centres are imparting training to extent on functionaries and farmers in IPM skills by conducting Farmers Field Schools (FFS) and IPM demonstrations. In addition, these centres are engaged in mass production and field releases of bio-control agents. Besides these centres for forewarning and undertaking timely control measures are also doing the monitoring of pest and diseases. During 1994 to 2001, 6734 farmers field schools (FFS) are conducted and training was imparted to 28460 Agricultural Extension Officers and 2,03,032 farmers in IPM skills. About 1100 master trainers in IPM have also been trained by conducting 33 seasons long training on cotton, rice, vegetables, pulses, oilseeds etc. The field-based training to farmers have created an awareness about the IPM concept and empowered them for taking then own decision in adopting the plant protection methods with need-based pesticide use considered the increasing degradation of environment and insecticidal residue in farm produce. As a result of implementation of IPM programmes, there has been a significant reduction in the consumption of pesticides from 67,357 tonnes during 1994-95 to 46,196 tonnes (Technical grade) during 1999-2000. However, there seems no effective and strong mechanism at place to provide a regular service to the farmers on day-to-day basis, in terms of forecasting forewarning the likely outbreak/infestation of pests and suggesting them to take appropriate preventive control measures, with adequate back up to supply the biocontrol agents for field use. Strengthening of IPM infrastructure especially for surveillance and forecasting the outbreak of insects and disease and production/ multiplication of biocontrol agents for field use is the need to be given adequate

attention. Besides, unless the reliable methods of forecasting are developed and biocontrol agents are made available on demand farmers would not adopt IPM in true spirit. In this approach, greater emphasis is laid on use of bio-pesticides, pheromones traps and biological agents to kept pest population below Economic Threshold Level (ETL) (Anonymous, 2001). The Government of Maharashtra has introduced Integrated Pest Management Programme since 1995 through Training and Visit System in Maharashtra State. Under National Horticulture Mission in Maharashtra 50.00 per cent or Rs. 1000/ha for Integrated Pest Management in vegetables as a subsidy up to 4.00 ha for one farmer was given. Integrated Pest Management is the integrated use of pest control strategies in a way that it not only reduces pest population to satisfactory level but is sustainable and non-polluting.

The chemical pesticides are helpful beyond doubt in increasing crop productivity by suppressing level of insect pests. However, indiscriminate use of pesticides has adverse ecological and socio-economic effects. Pesticides can cause pest resurgence by killing the natural enemies of the targeted insect pests. Pests also become resistance to chemical pesticide and significantly increase crop losses. Continued use of pesticides build up high levels of toxic residues in food, ground water and air. Several important cash crops are now being tested for pesticide residues before being accepted as import items by several countries. This excessive application of chemical pesticide also increases per unit cost of production. This knowledge has led to a shift towards eco-friendly technologies in pest management.

All above problems demand new way of thinking of non-toxic, cost effective and indigenous traditional method of plant protection which includes culture, mechanical, and biological practices. This are not all together new concept. These practices were used by farmers prior to the existence of modern chemicals. However modern chemical invaded on these traditional practices and the use of indigenous technical knowledge started declining. There is a new approach of managing the insect pest commonly known as “Integrated Pest Management”. These practices are easy to practice, non-toxic to higher animals, friendly to useful insects, maintain the ecosystem and environment friendly.

Integrated Pest Management is the integrated use of pest control strategies in a way that not only reduces pest population to satisfactory level but is sustainable and

non-polluting. IPM strategies focus on an appropriate mixture of eco-friendly practices. It includes eco-friendly practices which are grouped as cultural, mechanical, biological and chemical.

1.1. Need for study

The field extension research is necessary to know the extent of adoption of integrated pest management practices and to access the constraints faced by farmer in adoption of IPM practices.

Plant protection is an important component of successful crop production; however, the excessive use of pesticides leads to problems of chemical residues in food, environmental pollution, soil pollution and putting human life in danger. In order to avoid this and to restore ecological balance it in most compatible manner with least use of chemical which is the principle of Integrated Pest Management practices.

Integrated Pest Management practices emphasizes not only on the reduction in use of pesticide and control the level of pest causing economic injury but also to facilitate the use of cultural, mechanical, chemical and biological method of pest control.

Thus, it implies that farmers need to learn principle of new IPM practices and acquire the maximum knowledge and skill necessary to make self-decision based on specific farm condition and discourage the discriminate use of pesticides. Therefore, the present study entitled, adoption of IPM practices by the Chilli will be selected with the certain objectives.

1.2. Scope of the study

The finding of present study would help to understand the extent of adoption of IPM practices by the Chilli growers. The finding of the study would also help to understand the constraints faced by them in adopting various IPM practices. The finding will provide useful guidelines for planning extension education strategies by the extension workers for increasing awareness and adoption of integrated pest management practices in Chilli.

1.3. Objectives of the study

1. To study the profile of Chilli growers
2. To study the adoption regarding integrated pest management practices by the Chilli growers

3. To examine the relationship between the profile of Chilli growers with their adoption of integrated pest management practices
4. To identify the constraints faced by the Chilli growers in adoption of integrated pest management practices and invite their suggestions to overcome it

1.4. Limitation of the study

1. The research study was required to be completed during the limited period of time and therefore limited objectives were considered.
2. The study was confined to the Chilli growers of Kuhi, Bhiwapur and Mouda talukas of Nagpur district, hence, the generalizations based on the finding may be applicable only to this area or in similar situation.
3. The finding of the study is based on the opinions expressed by the respondents. Hence the objectivity of the data would thus be limited to the extent of readiness and honesty of the respondents to furnish their real responses and opinions.
4. The study was restricted to the IPM technology in Chilli only.

1.5. Layout of study

There are five chapters in the thesis. The first chapter "Introduction" deals with the purpose of the study of specific objectives, scope, need and limitation 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. The third chapter "Materials and methods" deals with the followed in the study. The fourth chapter deals with the presentation of "Results and Discussion". The last chapter constitutes summary, conclusion and implication" of the study. The literature cited in the body presentation has been given under the head "Literature Cited". The interview schedule and other material are appended at the end.

CHAPTER - II

REVIEW OF LITERATURE

CHAPTER – II

REVIEW OF LITERATURE

Any scientific research required a thorough review of the literature. It is a research study guideline. This analysis aims to look into the main parts of the adoption of Chilli producers recommended Integrated pest management practices. There is reference to the current research constraint that come directly and indirectly from research papers, previous thesis, journals, surveys and books. Collected references are arranged as per the objectives of research constraint with objectives.

1. The profile of Chilli growers
2. Adoption regarding integrated pest management practices by the Chilli growers
3. Relationship between the profile of Chilli growers with their adoption of integrated pest management practices

`4. Constraints faced by the Chilli growers in adoption of integrated pest management practices and invite their suggestions to overcome it

2.1. Profile of chilli growers

2.1.1. Farming experience

Mandlik (2012) revealed that, about 55.84 per cent of respondents were from medium categories of farm experience. There were 22.50 per cent of the respondents from low categories of farm experience. As much as 21.66 per cent of the respondents were high categories of farm experience.

Meena (2014) observed that, 55.84 per cent of pigeon pea growers were from medium farming experience followed by low 24.16 per cent and high 20.00 per cent farming experience.

Sharma *et al.* (2014) observed that, majority of potato growers belonged to the medium range of farm experience (5 to 9 years) 66.67 per cent, followed by 21 .11 per cent of them in high ranges of farm experience (above 9 year) and the remaining 12.22 per cent of them having low range of farm experience (below 5 year).

Tekale (2015) revealed that, great majority of vegetable growers 73.00 per cent had more than 20 years of experience in cultivation of crop. Whereas nearly one fourth of vegetable growers 27.00 per cent had 10.01 to 20.00 years of experience in cultivation of crop.

Bansod (2016) revealed that, 58.34 per cent of the respondents had medium farming experience whereas, 26.66 per cent growers had up to 3-year experience and 15.00 per cent of the growers had above 6-year experience.

Mahalaxmi (2016) reveals that, 47.50 per cent of the respondents belonged to high farming experience category followed by medium 28.33 per cent and low 24.17 per cent of farming experience category.

Nigade (2016) observed that, 48.34 per cent of the respondents were from medium categories of farming experience. Followed by 26.66 per cent of the respondents had low farming experience and 25.00 per cent of the respondents had high farming experience.

Akshitha (2017) inferred that, the average farming experience of farmers was 33 years. Whereas, 43.63 per cent of farmers had more than 38 years of farming experience and 36.36 per cent of farmers had 28-38 years. Only 20.00 per cent who had less than 28 years of experience in farming.

Neethi and Sailaja (2018) observed that, majority 48.33 per cent of the respondent were grouped under medium farming experience followed by high 28.33 per cent and low 23.33 per cent respectively.

2.1.2. Education

Mandlik (2012) observed that, 14.16 per cent of respondents were educated up to college level, 23.33 per cent of the respondents were educated up to higher secondary school (11 to 12^{th} std.), 24.16 per cent of the respondents were secondary school (8 to 10^{th} std.), 25.83 per cent of the respondents were educated up to primary level (1 to 7^{th} std.), while 10.83 per cent respondents were illiterate.

Shojaei *et al.* (2013) conducted a study on investigating barriers to adoption of integrated pest management technologies and revealed that, the majority 35.00 per cent of farmers studied primary school.

Dhenge *et al*. (2014) conducted a study on knowledge level of farmers about integrated pest management practices of paddy in Maharashtra state and revealed that, more than one third 35.00 per cent respondents were educated up to primary school followed by illiterate 21.67 per cent, college 19.17 per cent, high school 15.83per cent and middle school 8.33 per cent.

Mankar *et al.* (2014-15) stated that, 32.84 per cent of the farmers were found educated up to 8 to 10^{th} standard of education, followed by nearly one fifth 19.17 per

cent of them were found educated up to primary school, 18.34 per cent found educated up to higher secondary school, 15.17 per cent and 11.18 per cent who have passed middle school and above 12^{th} std. education respectively.

Sowjanya and Kumari (2015) conducted a study on socio-economic impact assessment of integrated crop management in chilli growing areas and reported that, the total literacy of the IPM farmers was 93.33 percent.

Monika (2015) concluded that, majority of respondents were educated till middle level school.

Mahalaxmi (2016) found that, 28.33 per cent of the respondents were educated up to high school followed by middle school 22.50 per cent, primary school 20.00 per cent and pre university 12.50 per cent.9.17 per cent of them were illiterate and only 7.50 per cent were graduated.

Bansod (2016) revealed that, 35.84 per cent of the respondents were educated up to higher secondary and graduation level it was followed by high school 35.00 per cent, whereas, the percentage of growers who had middle school, primary school and illiterate were 11.66, 10.00, 7.50 respectively.

Patidar (2017) indicates that, 29.17 per cent was found be in to primary education level category, 25.83 per cent had high school and above level, 24.17 per cent were up to middle level and remaining 20.83 per cent were illiterate standard.

Neethi and Sailaja (2018) revealed that, more than one third of the respondents were illiterate i.e., 38.33 per cent followed by primary school 15.00 per cent, middle school 14.17 per cent, high school 10.00 per cent, under graduation 2.50 per cent and post graduation and above 1.67 per cent.

Aglawe (2019) concluded that, majority 57.50 per cent of the IPM cotton growers were educated up to secondary education level i.e., V to X standard followed by 15.83 per cent of them were educated up to higher secondary education level i.e., XI to XII, while 11.67 per cent and 9.17 per cent were educated up to graduate and primary education level I to IV standard respectively. Only 07.50 per cent of IPM cotton growers were illiterate.

Jha and Das (2019) observed that, 47.92 per cent of the respondents had educated up to secondary level followed by 22.29 per cent having education up to middle school, 16.67 per cent of them had education up to higher secondary level, 06.25 per cent of them had education of graduation level and above, 04.17 per cent of

them had education up to primary level and 02.08 per cent of them had no formal education.

Sayed (2020) conducted that, the maximum vegetable growers 30.84 per cent were up to primary education level, 25.00 per cent was found to be in up to middle education level category, 25.83 per cent had high school/ higher secondary education level category 10.83 per cent were illiterate and 7.5 per cent was found to be graduate and above.

Pendam (2021) observed that, more than one third 35.83 per cent of the growers has educational level up to secondary school, while 27.05 per cent growers received higher secondary school education and primary school and graduation both has 14.17 per cent education, followed by 05.00 per cent growers were illiterate, whereas 03.33 per cent of them were post graduate and above.

2.1.3. Land holding

Mandlik (2012) stated that, 15.83 per cent of respondents were small farmers followed by 60.83 per cent of respondents were medium farmers 23.33 per cent of the respondents were from big farmers respectively.

Kale *et al.* (2014) observed that, majority 36.67 per cent of respondents belonged to semi medium category of land holding followed by small and medium category of land holding.

Mankar *et al.* (2014-15) stated that, 31.84 per cent of the respondents possessing small (1.01 to 2.00 ha.) category of land holding, followed by 24.50 percent of the respondents were possessing semi medium category of land holding, 20.84 per cent possessing medium category of land holding, 16.66 per cent possessing marginal category of land holding and very less i.e., 06.16 per cent holding large category of land holding.

Tekale (2015) found that, nearly equal proportion of vegetables growers 38.00 to 34.00 per cent belonged to small (1.01 to 2.00ha) and semi medium (2.01 to 4.00ha) land holding, followed by over one fifth vegetable growers 22.00 per cent possessed medium (2.01 to 4.00ha) land holding. Less percentage growers 4.00 per cent belongs to small land holding (above 10.00ha).

Mahalaxmi (2016) indicate that, 33.33 per cent of the respondents had medium land holding followed by semi medium 30.83 per cent, small 20.00 per cent and

marginal 11.67 per cent of land holding. A merge 4.60 per cent of them had big land holding.

Bansod (2016) observed that, 62.50 per cent of the respondents possessed semi medium size land holding ranging from 2.01 to 4 ha. It followed by 17.50 per cent in small category of land holding possessing land from 1.01 to 2 ha. And 11.67 per cent of respondents belong to medium land holding i.e., 4.01 to 10 ha. Whereas 8.33 per cent respondents belong to marginal land holding.

Patidar (2017) revealed that, 45.00 per cent of the respondents had medium land holding, 30.00 per cent had large and remaining 25.00 per cent had small land holding.

Reddy *et al.* (2017) observed that, 29.34 per cent of respondents were from semi medium land holding, followed by 28.67 per cent of respondents were having small land holding, followed by 23.33 per cent were having marginal land holding, followed by 18.00 per cent having medium category and 0.66 per cent pf the respondents having large category of land holding.

Aglawe (2019) revealed that, majority 59.17 per cent of the IPM cotton growers were having semi medium land holding i.e., 2.1 to 4.0 ha. Whereas, 13.33 per cent of IPM cotton growers were small land holding 1.1 to 2.0 ha and 10.00 per cent of IPM cotton growers were having medium 4.1 to 10.00 ha and marginal land holding upto 1.0ha and only 7.50 per cent of IPM cotton growers having big i.e. 10.01 ha and above land holding.

Jha and Das (2019) observed that, 45.83 per cent of them belonged to marginal category of farmers followed by semi medium land holding size comprising 27.08 per cent of the respondents, small category comprising 18.75 per cent of the respondents and medium category of land holding comprising 08.33 per cent of the respondents.

Kumar *et al.* (2020) observed that, 46.67 per cent chilli growers had marginal size of land holding, followed by 36.66 per cent had small sized land holding and 11.25 per cent chilli growers had medium and large sized land holding.

Sayed (2020) conclude show that, the maximum vegetable growers 40.00 per cent of respondent had marginal size of land holding, 31.67 per cent of respondents had small size of land holding, 16.66 per cent of respondents had large size of land holding.

Pendam (2021) revealed that, slightly less than half 47.50 per cent of the chilli growers were possessing up to 1.00 ha land belongs to marginal farmer category while

35.83 per cent of the growers were possessing up to 1.01 to 2.00 ha of land and belongs to small farmers category, 12.50 per cent of the chilli growers belonged to medium farmers category 2.01 to 4.00 ha whereas, 04.17 per cent chilli growers included under large farmers category 4.01 to 10.01 ha.

2.1.4. Area under Chilli crop

Tekale (2015) revealed that, great majority of vegetable growers 73.00 per cent had more than 20 years of experience in cultivation of crop. Whereas nearly one fourth of vegetable growers 23.00 per cent had 10-to-20-year experience in cultivation of crop.

Anuse (2016) observed that, 67.5 per cent of the sugarcane growers had an area up to 1 ha. under sugarcane cultivation followed by 23.34 per cent of the sugarcane growers had area between 1.01 to 2.00 ha. and 9.16 per cent of the sugarcane growers had area above 2.00 ha area under sugarcane cultivation.

Bansod (2016) observed that, majority of the growers 65.00 per cent put area under brinjal crop ranging from 0.6 to 0.8 ha. Followed by 19.16 per cent of the growers having area up to 0.5 ha. Whereas 15.84 per cent of the brinjal growers found in the category of above 1.8 ha.

Akshitha (2017) showed that, majority 65.38 per cent of the farmers had 1-2 acres of land under coconut cultivation followed by 32.72 per cent who had less than 1 acre. Around 10.90 per cent of farmers had more than 2 acres of area under cultivation.

Aglawe (2019) observed that, majority 52.50 per cent of the IPM cotton growers were having small area 1.1 to 2.0 ha. under cotton crop. Whereas, 29.17 per cent of IPM cotton growers were having semi medium area 2.1 to 4.0 ha. Under cotton crop and 9.17 per cent and 8.33 per cent of IPM cotton growers were having marginal upto 1.0 ha. And medium area 4.1 to 10.1 ha. Under cotton crop.

Sayed (2020) reveals that, 22.50 per cent of respondents had small size of are under vegetable crop, followed by 65.83 per cent of respondents had medium area under vegetable crop 11.67 per cent of respondent had large area under vegetable crop.

2.1.5. Annual income

Mandlik (2012) indicated that, 54.83 per cent of the respondents had low annual income up to Rs.40, 970/-. However, 11.67 per cent of respondents had high

income i.e., above Rs.1, 85,969/-. While 34.17 per cent of the respondents were from medium annual income category i.e., from Rs.40, 971 to 1, 85,969.

Mankar *et al.* (2014-15) stated that, 34.33 per cent of the respondents were having annual income up to Rs.50, 000/-, 27.16 per cent having above Rs.50, 001 to Rs.1, 00,000/- annual income whereas 05.34 per cent of them having annual income in the range of above Rs.2, 00,000/-. It was followed by 12.83 per cent having annual income in the range of Rs.1,00,001 to Rs.1,50,001/- and 10.34 per cent having their annual income in the range of Rs.1,50,001 to Rs.2,00,000/-

Tekade (2015) revealed that, majority of vegetable growers 52.00 per cent had low medium annual income (Rs.75, 000/- to Rs.1,50, 000/-). The 16.00 to 14.00 per cent of vegetable growers' income Rs.1, 50,000/- to Rs.2, 25,000/- respectively. Only 12.00 per cent respondents had medium annual income (Rs.2, 25,000/- to Rs.3, 00,000/) whereas, merger vegetable growers (06.00%) had high annual income (above Rs.3, 00,000/-).

Alam *et al.* (2016) observed that, more than half 55.00 per cent of respondents had low income, followed by 25.00 per cent of respondents had medium income and 20.00 per cent of respondents had high income.

Bansod (2016) observed that, 70.85 per cent respondents had their annual income above Rs.2,00,000/-, followed by 10.83 per cent respondents in the category of Rs. 1,50,001/- to 2,00,000/-. While 9.16 per cent of the respondent had their annual income of Rs.50, 001/- to Rs.1, 00,000/-. Whereas 8.33 and 0.83 per cent of the respondents had annual income between Rs.1, 00,000/- to Rs.1, 50,000/- and up to Rs.50, 000/- respectively.

Mahalaxmi (2016) found that, 55.83 per cent of the respondents belonged to medium income category followed by low 27.50 per cent and high 16.67 per cent income category.

Patidar (2017) indicate that, 38.33 per cent belonged to medium annual income group, 31.67 per cent belonged to low annual income group and remaining 30.00 per cent belonged to high annual income group.

Kumar *et al.* (2020) observed that, 56.67 per cent of the chilli growers were having medium income level, followed by 26.67 per cent were having high income level and 16.67 per cent were having low income level.

Thakur *et al.* (2020) revealed that, 32.50 per cent of chilli growers having annual income between Rs. 35,001 to Rs. 60,000, followed by 30.00 per cent were having annual income up to Rs. 35,000, followed by 28.33 per cent were having more than Rs. 1,00,000 and 9.17 per cent were having annual income between Rs. 60,001 to Rs. 1,00,000.

Sayed (2020) revealed that, majority of vegetable growers 2.5 per cent of respondents belonged to below line group, 48.33 per cent of respondent belonged to low annual income group, 40 per cent of respondents belonged to medium annual income group remaining 9.17 per cent of respondents belonged to high annual income group.

Pendam (2021) noticed that, majority 65.83 per cent of the chilli growers had medium annual income Rs. 1,10,389 to Rs. 3,07,078 followed by 20.00 per cent growers had low annual income category up to Rs. 1,10,388 and only few 14.17 per cent respondents belonged to high annual income category above Rs. 3,07,078 per year. **2.1.6. Social participation**

Mandlik (2012) noticed from that, 20.00 per cent of respondents were having low level of social participation followed by medium level of social participation 62.50 per cent. While 17.50 per cent of the respondents were having high level of social participation.

Bansod (2016) observed that, more than half of the respondents 58.34 per cent were included in medium category of social participation. It was followed by high 21.66 per cent and 20.00 per cent of low level of social participation.

Patidar (2017) reveals that, 38.33 per cent had low social participation followed by 31.67 per cent had medium and 30.00 per cent had high social participation.

Aglawe (2019) data presented that, more than half i.e. 63.33 per cent of the IPM cotton growers had medium social participation, followed by 21.67 per cent of them had high social participation and remaining 15.00 per cent of them had low social participation.

Jha and Das (2019) observed that, 77.08 per cent of the chilli growers had low level of social participation, followed by 20.83 per cent of them having medium level of social participation and 02.08 per cent of them has high level of social participation.

Thakur *et al.* (2020) concluded that, 50.00 per cent respondents had no membership in any organization, followed by 20.83 per cent respondents were having

membership in one organization, 15.83 per cent were belonged to executive /office bearer category and 13.33 per cent of the respondents had membership in two or more than two organization.

Pendam (2021) seen that, majority 64.17 per cent of chilli growers had medium category of social participation, while 19.16 per cent chilli growers had low social participation and 16.67 per cent had high social participation.

2.1.7. Mass media exposure

Kerketta (2015) reported that, majority 70.00 per cent of the respondents had medium utilization of mass media exposure followed by, 20.84 per cent of the respondents had low utilization of mass media exposure and only 09.16 per cent of the respondent had high utilization of mass media exposure.

Singh (2015) shows that, 34.55 per cent had low mass media exposure followed by 64.54 per cent had medium and only 00.91 per cent had high mass media exposure.

Mahalaxmi (2016) depicts that, 45.83 per cent of respondents belonged to medium mass media exposure category followed by high 29.17 per cent and low 25.00 per cent mass media exposure.

Paditar (2017) depicts that, 42.50 per cent had low mass media exposure, 34.67 percent had large, while remaining 23.33 per cent were medium mass media exposure.

Sayed (2020) study depicts that, 46.67 per cent of respondents had low mass media exposure, 33.33 per cent of respondents had medium and 20.00 per cent of respondents had high mass media exposure respectively.

2.1.8. Extension contacts

Mandlik (2012) observed that, 10.84 per cent of the respondents had low level of extension contact. Whereas, 75.00 per cent respondents had medium level of extension contact followed by 14.16 per cent of the respondents having high level of extension contact.

Tekade (2015) observed that, half of vegetable growers (50.00%) had medium level of extension contact with extension personal of different organization, whereas 28.00 and 22.00 percent of vegetable growers had low and high level of extension contact respectively.

Mahalaxmi (2016) study depicts that, 38.33 per cent of the respondents belonged to medium extension contact, followed by high 35.00 per cent and low 26.67 per cent extension contact category.

Patidar (2017) shows that, 41.67 per cent were had low extension contacts, followed by 31.66 per cent had high extension contact and 26.67 per cent respondents had medium extension contact.

Aglawe (2019) observed that, 65.83 per cent of the IPM cotton growers were having medium level of extension contact. While 21.67 per cent and 12.50 per cent of them were having high and low level of extension contact.

Sayed (2020) study depicts that, the majority of vegetable growers 43.33 per cent of respondents had low extension contact, 30.00 per cent of respondents had medium extension contact and 26.67 per cent of respondents had high extension contact.

2.1.9. Risk orientation

Mandlik (2012) observed that, 71.67 per cent of respondents had medium risk orientation, whereas 20.83 per cent of respondents had low risk orientation followed by 7.50 per cent of the respondents having high risk orientation.

Tekade (2015) observed that, majority of respondents (72.00%) had medium level of risk orientation followed by 15.00 and 13.00 percent of respondents has low and high-risk orientation respectively.

Bansod (2016) observed that, majority of respondents 75.00 per cent were observed in medium level of risk preference followed by 14.16 per cent had low level of risk orientation and 10.84 per cent of respondents were high level of risk orientation.

Mahalaxmi (2016) observed that, 42.50 per cent of the respondents belonged to high-risk orientation category, followed by medium 40.00 per cent and low 17.50 per cent risk orientation category.

Aglawe (2019) noticed that, 60.68 per cent of the IPM cotton growers were having medium risk orientation. While, 20.83 per cent and 18.34 per cent of them had high and low risk orientation, respectively.

Sayed (2020) observed that, majority of vegetable growers 30.00 per cent of respondents had low risk orientation, 41.67 per cent of respondents had medium risk orientation and remaining 28.33 per cent of respondent had high risk orientation respectively.

2.1.10. Economic motivation

Mandlik (2012) observed that, majority of respondents 74.17 per cent had medium level of economic motivation, whereas 11.67 and 14.16 per cent of the respondents had low level and high level of economic motivation respectively.

Dhodia *et al.* (2014) found that, majority (69.00 per cent) of respondents were having medium economic motivation, followed by 20.00 per cent of the respondents had low level economic motivation and 11.00 per cent with high level of economic motivation.

Bansod (2016) reported that, majority of the respondents 63.34 per cent had medium level of economic motivation, followed by 20.00 per cent respondents who were high in economic motivation. Only 16.66 per cent of respondents had low level of economic motivation.

Nigade (2016) revealed that, 58.34 per cent of the respondents had medium level of economic level of economic motivation, followed by 25.83 per cent and 15.83 per cent of the respondents had low and high level of economic motivation respectively.

Akshitha (2017) observed that, majority 54.55 per cent of the farmers belonged to medium economic motivation category. Whereas, considerable percentage 21.82 per cent and 23.63 per cent of farmers were distributed among low and high economic motivation categories respectively.

Reddy (2017) observed that, 55.33 per cent of the respondents had medium category of economic motivation, followed by 29.34 per cent respondents had low category of economic motivation and 15.33 per cent respondents had high category of economic motivation.

Aglawe (2019) noted that, 67.50 per cent of the IPM cotton growers were having medium economic motivation. While 27.50 per cent and 5.00 per cent of them had high and low economic motivation, respectively.

Sayed (2020) depicts that, 14.17 per cent of respondents belonged to low economic motivation group, 56.67 per cent of respondents belonged to medium economic motivation group and remaining 29.16 per cent of respondents belonged to high economic group.

Waghmare (2020), observed that, the majority (70.83 %) of the respondents had a medium level of economic motivation followed by 23.33 per cent of the respondents

had a low level of economic motivation and 5.84 per cent of the respondents had a high level of economic motivation.

Pendam (2021) noticed that, majority 65.00 per cent of the chilli growers had medium economic motivation while 20.00 per cent of the chilli growers were belong low economic motivation and 15.00 per cent of the chilli growers were having high economic motivation.

2.1.11. Knowledge

Mandlik (2012) observed that, majority 67.50 per cent of respondents had possessed medium level of knowledge followed by 11.67 per cent had low and 20.83 per cent had high level of knowledge about IPM technology of pigeon pea growers.

Sharma *et al.* (2014) revealed that, majority of potato growers had medium range of knowledge (53.33%) followed by 34.44 per cent of them with low range of knowledge and the remaining 12.22 per cent of them having high knowledge about the high yielding variety seed of potato cultivation.

Mankar *et al.* (2014-15) observed that, 25.00 per cent in high knowledge category and only 12.16 per cent of the respondents were observed in low category of knowledge level.

Bansod (2016) indicated that, over three fourth of respondents 85.84 per cent belonged to medium category of knowledge level. High level knowledge possessed by 10.00 per cent of the respondents whereas, 4.16 per cent of respondents were include in low level of knowledge. Mahalaxmi (2016) reveals that more than one third 40.00 per cent of the respondents belonged to high knowledge category followed by medium 32.50 per cent and low 27.50 per cent knowledge category with respect to IPM practice in chilli.

Reddy (2017) revealed that, 53.34 per cent of the respondents having medium level of knowledge followed by 32.66 per cent had high level of knowledge and 14.00 per cent had low level of knowledge about recommended package of practices of chilli.

Patidar (2017) reveals that, 48.83 per cent had low knowledge level, followed by 30.00 per cent had high and 29.17 per cent had medium knowledge.

Sayed (2020) reveals that, 20.83 per cent in low level knowledge group whereas, 36.67 per cent vegetable growers were observed in the medium knowledge

level group and remaining 42.50 per cent respondents possessed high level of knowledge about integrated pest management practice in vegetable growers.

Pendam (2021) observed that, majority 73.33 per cent of the chilli growers had medium level of knowledge followed by 15.83 per cent chilli growers possessed low level of knowledge and only 10.84 per cent were under high level of knowledge.

2.2. Adoption of chilli growers about IPM practices

Singh and Narain (2014) found that, their adoption level was also poor and only limited to culture practices. Finding also shows large gap between Knowledge and Adoption in respect to IPM practices. So, it is an urgent need of skill-oriented training to Tomato growers regarding IPM practices for Higher and safer Tomato Production.

Al-Zyoud F.A. (2014) found that, the majority of the respondents 68 per cent have never heard about IPM and not sure what IPM is, and only 2.5 per cent were regularly using IPM lack of grower's information and knowledge about IPM 73 per cent has first priority IPM adoption. Date on how often growers monitor pests, most common methods for pest monitoring, testing soil, keeping records, reasons of using chemical control and knowledge of pesticides side effects are herein presented. The results showed that a number of cultural and mechanical control techniques are commonly utilized by growers.

Singh (2015) shows that, 47.27 per cent had low adoption level, of IPM practices followed by 47.27 per cent had medium and only 05.46 per cent had high adoption level of integrated Pest Management Practices.

Anuse (2016) revealed that, 75.83 per cent of the sugarcane growers had the medium adoption level group while, 12.50 per cent and 11.67 per cent of them had high and low adoption level of integrated trash management technology respectively.

Bansod (2016) reveals that, about 64.16 per cent of respondents were include under medium category of adoption level of integrated pest management practices, followed by high level of adoption 30.00 per cent and only 5.84 per cent of the farmers were found in low level of adoption of integrated pest management practices.

Mahalaxmi (2016) revealed that, 37.50 per cent of the respondents belonged to medium adoption category followed by low 36.67 per cent and high 25.83 per cent adoption category.

Akshitha (2017) depicts that, 40.00 per cent of the farmers belonged to medium level of adoption. Whereas, 32.73 per cent of the farmers were in high adoption category and 27.27 per cent of farmers belonged to low adoption of IPM practices in coconut.

Patidar (2017) shows that, 42.50 per cent had medium adoption level, followed by 30.83 per cent had low and only 26.66 per cent had high adoption level of chilli production technology.

Sayed (2020) reveals that, the majority of respondents 49.16 fell in medium level of adoption whereas, 16.67 per cent vegetable growers were observed in high adoption level group and remaining 34.17 per cent respondents possessed low level of adoption of integrated pest management practices of vegetable cultivation.

2.3. Relationship between adoption of Integrated Pest Management practices and profile of Chilli growers

2.3.1. **Adoption and farming experience**

Mandlik (2012) observed that, farming experience was found to be negative and highly significant with adoption of integrated pest management technology in pigeon pea.

Bansod (2016) observed that, there was positive and significant relationship between farming experience of respondents and adoption of integrated pest management by brinjal growers.

Dhepe (2014) showed that, positive and highly significant relationship between farming experience and adoption of black gram farmers.

Meena (2014) observed that, positive and highly significant relationship between farming experience and adoption level of pigeon pea.

Akshitha (2017) depicts that, there was positive and non-significant relationship between farming experience of respondent and adoption of integrated pest management by coconut growers.

2.3.2. Adoption and education

Dhepe (2014) showed that, education had positive and highly significant relationship with adoption level of black gram farmers.

Meena (2014) observed that, education had positive and significant relationship with adoption level of pigeon pea.

Kerketta (2015) observed that, education had positive and significant relationship with adoption of IPM practices.

Singh (2015) concluded that, there was positive and significant association between education level of soybean growers and their adoption level of integrated pest management practices.

Kurhade (2015) indicates that, the relationship between education and adoption of IPM technology in Brinjal growers was positively significant.

Bansod (2016) observed that, there was positive and significant relationship between education of respondents and adoption of integrated pest management by brinjal growers.

Patidar (2017) concluded that, there was positive and significant association between education and adoption of chilli production technology.

Sayed (2020) revealed that, there was positive and significant association between education vegetable growers and their adoption level of integrated pest management practices.

2.3.3. Adoption and land holding

Dhepe (2014) showed that, there was positive and highly significant relationship between land holding and adoption of black gram farmers.

Meena (2014) observed that, positive and highly significant relationship between land holding and adoption level of pigeon pea.

Kerketta (2015) found that, land holding had positive and highly significant relationship with adoption of IPM practices by chickpea growers.

Singh (2015) concluded that, there was positive and non significant association between land holding of soybean growers and their adoption level of integrated pest management practices.

Kurhade (2015) indicates that, the relationship between land holding and adoption of IPM technology in Brinjal growers was positively significant.

Bansod (2016) observed that, there was positive and significant relationship between land holding of respondents and adoption of integrated pest management by brinjal growers.

Patidar (2017) concluded that, there was positive and significant association between land holding and adoption of chilli production technology.

Sayed (2020) revealed that, there was significant association between land holding of vegetable growers and their adoption level of integrated pest management practices.

2.3.4. Adoption and area under chilli crop

Kurhade (2015) indicates that, the relationship between area under brinjal crop and adoption of IPM technology in Brinjal growers was positively significant.

Bansod (2016) observed that, there was positive and highly significant relationship between area under brinjal crop of respondents and adoption of integrated pest management by brinjal growers.

Akshitha (2017) depicts that, there was positive and non-significant relationship between area under coconut crop of respondent and adoption of integrated pest management by coconut growers.

Sayed (2020) revealed that, there was positive and highly significant relationship between area under vegetable and adoption of IPM practices.

2.3.5. Adoption and annual income

Dhepe (2014) showed that, there was positive and highly significant relationship between annual income and adoption of black gram farmers.

Meena (2014) observed that, positive and highly significant relationship between annual income and adoption level of pigeon pea.

Singh (2015) concluded that, there was positive and highly significant association between annual income of soybean growers and their adoption level of integrated pest management practices.

Kurhade (2015) indicates that, the relationship between social participation and adoption of IPM technology in Brinjal growers was positive and highly significant.

Kerkutte (2015) observed that, annual income had positive and highly significant nature of relationship with adoption of integrated pest management practices by chickpea growers.

Bansod (2016) observed that, there was positive and significant relationship between annual income of respondents and adoption of integrated pest management by brinjal growers.

Patidar (2017) concluded that, there was significant association between annual income and adoption of chilli production technology.

Sayed (2020) revealed that, there was positive and significant association between annual income of vegetable growers and their adoption level of integrated pest management practices.

2.3.6. Adoption and social participation

Bansod (2016) observed that, there was positive and highly significant relationship between social participation of respondents and adoption of integrated pest management by brinjal growers.

Kerketta (2015) revealed that, there was positive and significant association between social participation of chickpea growers and their adoption level of integrated pest management practices.

Kurhade (2015) indicates that, the relationship between social participation and adoption of IPM technology in Brinjal growers was positive and highly significant.

Akshitha (2017) depicts that, there was positive and significant relationship between social participation of respondent and adoption of integrated pest management by coconut growers.

Patidar (2017) concluded that, there was positive and non significant association between social participation and adoption of chilli production technology.

2.3.7. Adoption and mass media exposure

Singh (2015) concluded that, there was significant association between mass media exposure of soybean growers and their adoption level of integrated pest management practices.

Bansod (2016) observed that, there was significant relationship between mass media exposure of respondents and adoption of integrated pest management by brinjal growers.

Patidar (2017) concluded that, there was negative and significant association between mass media exposure and adoption of chilli production technology.

Akshitha (2017) depicts that, there was positive and significant relationship between mass media exposure of respondent and adoption of integrated pest management by coconut growers.

Sayed (2020) revealed that, there was negative and non significant association between mass media exposure and their adoption level of integrated pest management practices.

2.3.8. Adoption and extension contact

Meena (2014) observed that, extension contact had positive and highly significant relationship with their adoption level of pigeon pea.

Kerkutte (2015) found that, extension contact had positive and highly significant relationship with adoption of integrated pest management practices by chickpea growers.

Singh (2015) concluded that, there was positive and significant association between extension contact of soybean growers and their adoption level of integrated pest management practices.

Bansod (2016) observed that, there was positive and highly significant relationship between extension contact of respondents and adoption of integrated pest management by brinjal growers.

Patidar (2017) concluded that, there was positive and non significant association between extension contact and adoption of chilli production technology.

Sayed (2020) revealed that, there was negative and non significant relationship between adoption and extension contact.

2.3.9. Adoption and risk orientation

Mandlik (2012) noticed that, risk orientation of the farmers had positive and non-significant relation with adoption of IMP practices.

Dhepe (2014) showed that, there was positive and highly significant relationship between risk orientation and adoption of black gram farmers.

Meena (2014) observed that, there was positive and significant relationship between risk orientation and adoption level of pigeon pea.

Bansod (2016) observed that, there was positive and highly significant relationship between risk orientation of respondents and adoption of integrated pest management by Chilli growers.

Sayed (2020) revealed that, there was negative and non significant association between risk orientation of vegetable growers and their adoption level of integrated pest management practices.

2.3.10. Adoption and economic motivation

Singh (2015) concluded that, there was negative and significant association between economic motivation of soybean growers and their adoption level of integrated pest management practices.

Bansod (2016) observed that, there was positive and significant relationship between economic motivation of respondents and adoption of integrated pest management by brinjal growers.

Akshitha (2017) depicts that, there was positive and significant relationship between economical motivation of respondent and adoption of integrated pest management by coconut growers.

Sayed (2020) revealed that, there was positive and significant association between economic motivation of vegetable growers and their adoption level of integrated pest management practices.

2.3.11. Adoption and knowledge

Singh (2015) concluded that, there was positive and significant association between knowledge of soybean growers and their adoption level of integrated pest management practices.

Kurhade (2015) revealed that, there was positive and significant relation between knowledge and adoption of IPM technology in Brinjal.

Kerkutte (2015) noticed that, knowledge had positive and highly significant relationship with adoption of IPM practices.

Bansod (2016) observed that, there was positive and highly significant relationship between knowledge of respondents and adoption of integrated pest management by brinjal growers.

Patidar (2017) concluded that, there was positive and significant association between age and adoption of Chilli production technology.

Mahalaxshmi (2016) noticed that, knowledge had positive and significant relationship with adoption of IPM practices.

Sayed (2020) revealed that, there waspositive and highly significant association between knowledge of vegetable growers and their adoption level of integrated pest management practices.

2.4. Constraints faced by Chilli growers and ascertain their suggestions to overcome it 2.4.1. Constraints

Bansod (2016) in case of technical constraints, respondents faced with constraints like lack of technical guidance from extension functionary 61.66 per cent lack of knowledge about fertilizer management 55.83 per cent, lack of knowledge about bio control method 54.16 per cent, problem in identification of disease and pest

49.16 per cent, lack of knowledge about resistant varieties 43.33 per cent, lack of knowledge about recommended IPM practices 41.66 per cent.

Mahalaxmi (2016) found that, a high percent 73.33 per cent of Chilli growers highlighted the constraint of non-availability of labours at the time of harvesting followed by problem of IPM practices are difficult to noticed the pest management 69.16 per cent, non-availability of bio agents timely viz. pseudomonas, NPV 66.66 per cent, lack of low-cost formulation and preparation of bioagents with available local resources 65.00 per cent, lack of technical knowledge regarding used of pheromone traps and bioagents 62.50 per cent.

Patidar (2017) found that, the major constraint to adopting recommended chilli cultivation practices by Chilli growers were incidences of more pest and diseases 78.33 per cent, high cost of pesticides 75.00 per cent, non-availability of fertilizer and pesticides 71.66 per cent, inadequacy of labour at the time of picking 66.66 per cent, complicated techniques of seed treatments 64.16 per cent.

Reddy *et al.* (2017) revealed that, constraints faced by the chilli farmers in Bhiwapur panchayat samiti of Nagpur district, during the seed sowing the constraints are lack of proper knowledge about the seed treatment 46.66 per cent, seeds of improved varieties are closely 82.66 per cent, non-availability of improved seeds in time 76.66 per cent and lack of knowledge about improved varieties 20.00 per cent.

Reddy (2017) revealed that, the time of plant protection measures the constraints were less knowledge about disease and pest identification 56.00 per cent, lack proper knowledge about insecticide 58.00 per cent majority of respondents were 86.66 per cent, less knowledge about correct quantity and does of insecticides, 64.00 per cent were non availability of fertilizer and insecticides in time.

Akshitha (2017) inferred about constraints faced by coconut farmers in adoption of IPM practices. Lack of availability of bio agent 100.00 per cent was the prime constraints in adoption of IPM. Inadequate knowledge about plant protection measures by using chemical pesticides 81.81 per cent was the second major constraint and inadequate financial support 72.73 per cent, lack of availability of traps 71.81 per cent and inadequate technical supports 50.91 per cent were the other constraints in adoption of IPM practices faced by coconut farmers

Sayed (2020) revealed that, majority of respondents 50.00 fell in medium level of constraint group whereas, 29.17 per cent vegetable growers were observed in the

level of constraint group and remaining 20.83 per cent respondents possessed low level of constraints about Integrated Pest Management in vegetable cultivation

2.4.2. Suggestions

Kurhade (2015) observed that, 89.16 per cent of the respondents suggested that pest resistance varieties should be developed, 86.66 per cent respondents suggested that pesticides should be made available at reasonable prices, 85.00 per cent of respondent suggested that literature about IPM technology in Brinjal should be available in local language with illustration, 83.33 per cent of respondent suggested that the demonstration should be arranged for identifying insect and pest, 69.16 per cent of the respondent suggest that demonstration should be arranged specially for the women for identifying the alternate host weed.

Bansod (2016) revealed that, in case of technical suggestion 95.83 per cent farmers suggested guidance to aware the people through booklets to identify of friendly insect, 62.50 per cent technical guidance seed treatment 51.66 per cent demonstration regarding installation of pheromone traps,43.33 per cent information should be given regarding pest and disease resistance varieties.

Reddy *et al.* (2017) suggested that, the sufficient technical staff is needed to guide the farmers about improved varieties at the time of beginning of crop season. Extension functionaries have to educate the farmers about package practices of chilli through training program and various activities such as group discussion, field visit etc.

Sayed (2020) indicated that, subsidy should be provided by government for adoption of IPM technologies, training on IPM practices should be imparted, more number of demonstrations on IPM should be organized on farmers field, were important suggestions offered by the respondents.

CHAPTER - III

MATERIALS AND METHODS

CHAPTER – III

MATERIALS AND METHODS

The materials and methods chapter discusses the study's location and methodology. Researchers must use appropriate materials, methods and procedures to arrive at a relevant result from a scientific investigation of any research problem. The sampling procedures used as well as the data analysis devices, are also explained. The measurement of dependent and independent variables is also covered in this chapter.

This chapter addresses where and how research was conducted, how to established an interview schedule, tactics for selecting respondents, quantitative data qualifying and the creation of primary and secondary tables, all with the perspective in mind. This chapter outlines the approach utilized to attain these goals within the headings listed below:

3.1 Location of the study

3.2 Method of sampling

3.3 Research design

3.4 Tools and technique used in the data collection

3.5 Techniques of measurement

3.6 Scoring techniques and categorization of the variable

3.7 Statistical tools used for analysis of the data

3.1 Location of the study

The current research was carried out in Maharashtra's Vidarbha region. Maharashtra's Vidarbha region is divided into eleven districts. Maharashtra's overall geographical area is 3,07,713 km^2, while Vidarbha's total geographical area is 97,321 km^2. The current study was conducted in the Kuhi, Bhiwapur and Mouda talukas of Nagpur district in Vidarbha region on the basis of a higher area under Chilli crop production.

3.2. Method of sampling

3.2.1. Selection of district

The present investigation was carried out in purposely selected Nagpur district of Vidarbha region of Maharashtra state on the basis of considerable area under Chilli crop.

3.2.2. Selection of talukas

Out of 14 talukas of Nagpur district the Kuhi, Bhiwapur and Mouda were selected. on the basis of more area under Chilli crop.

3.2.3 Selection of villages

From each selected talukas, four villages were randomly selected. Thus, the total 12 villages were selected for the study.

3.2.4. Selection of the Chilli growers

Ten Chilli growers selected randomly from each selected village. In this way, a total number of 120 Chilli growers were considered as respondents for the study. These selections were done by using simple random sampling method.

Table 3.1: List of selected village and number of Chilli growers in each village

Sl. No.	District	Tehshils	Name of village	No. of chilli growers
1.	Nagpur	Kuhi	1. Rajola	10
			2. Ambadi	10
			3. Veltur	10
			4. Mendha	10
		Bhiwapur	1. Bhiwapur	10
			2. Mandwa	10
			3. Indapur	10
			4. Wani	10
		Mouda	1. Nerla	10
			2. Dhanla	10
			3. Salwa	10
			4. Dhani	10
Total	**1**	**3**	**12**	**120**

3.3. Research design

The current study used a one-shot survey with an Ex-post-facto research approach to determine the adoption of Integrated Pest Management strategies by Chilli growers. Ex-post-facto study describes the current condition as a result of previously

FIG. 3.1: MAP SHOWING NAGPUR DISTRICT OF MAHARASHTRA STATE

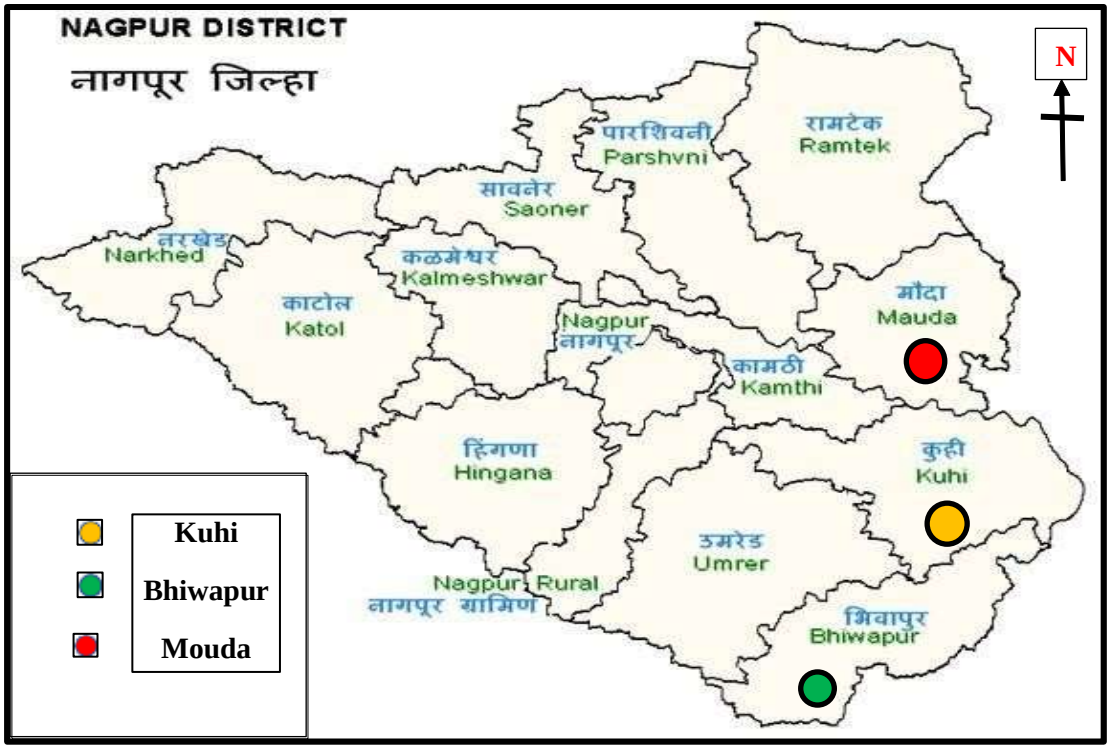

FIG. 3.2: MAP SHOWING KUHI, BHIWAPUR AND MOUDA TEHSHILS OF NAGPUR DISTRICT

acting causative elements, with the goal of tracking back in time to some presumed cause complex that began working at earlier data.

3.4. Tools and techniques used in the data collection.

3.4.1. Preparation of interview schedule

In accordance with the study objectives, the interview schedule was created with pertinent questions. The interview schedule included details regarding Chilli growers' socio-personal and psychological characteristics, such as farming experience, education, land ownership, area under Chilli crop, and annual revenue. Social participation, mass media exposure, extension contacts and risk orientation are all communication and psychological qualities. In part A, we discuss economic incentive and knowledge and adoption was the dependent variable in Section B of the schedule. Finally, information regarding the Chilli growers' constraints or problems was framed in an interview schedule. When putting together the interview schedule, careful attention was paid to avoid questions with various meanings and remarks that contradicted one another. The language of the questions was kept simple, i.e., Marathi, the native language.

The information was gathered through personal interviews with the use of an interview schedule, in which all 120 respondents were contacted and the necessary information was received.

3.4.2. Pre-testing of interview schedule

The interview schedule was pre-tested with a group of ten farmers who were not related to the sample group for accuracy, simplicity, and practicability. Taking into account the results of the pre-testing, related questions were grouped together to ensure uniformity in responses. A couple questions' wording was changed to make them easier to comprehend and to elicit accurate responses. After that, a sufficient number of copies of the interview schedule were created and used for data collecting.

3.4.3. Collection of data

The information was gathered by contacting the selected farmers on a one-on one basis. Farmers were approached at their homes or on their farms, whatever was more convenient for them. Sarpanch and Gramsevak were enlisted for an easy and swift approach with the farmer. Farmers were briefed on the study's objectives prior to going out and gathering data. Data was collected using the pre-tested interview schedule. The data was gathered from 120 respondent.

Plate no. 3.1 Data collection by personally interviewing the Chilli growers of Kuhi tehsil of Nagpur district

Plate no. 3.2 Data collection by personally interviewing the Chilli growers of Bhiwapur tehsil of Nagpur district

Plate no. 3.3 Data collection by personally interviewing the Chilli growers of Mouda tehsil of Nagpur district

3.5. Techniques of measurement

Table 3.2: Variables and their empirical measurements

Sl. No.	Variables	Empirical Measurement
A.	**Independent variables**	
1.	Farming experience	Actual year spent in farming at the time of interview.
2.	Education	Formal education obtained by the respondent.
3.	Land holding	Classification as per state Gov. of Maharashtra.
4.	Area under Chilli crop	Schedule was developed
5.	Annual income	Total income of the farmers through all resources during a year.
6.	Social participation	Scale developed by Nirban (2004) was used.
7.	Mass media exposure	Scale developed by Nirban (2004) with slight modification was used.
8.	Extension contacts	Scale developed by Nirban (2004) with slight modification was used.
9.	Risk orientation	The scale developed by Supe (2007) with slight modification
10.	Economic motivation	The scale developed by Supe (2007) was used.
11.	Knowledge	Schedule was developed
B.	**Dependent variable**	
1.	Adoption of IPM practices by Chilli growers	Schedule was developed

3.6. Scoring techniques and categorization of the variable

3.6.1. Independent variables

The personal characteristics of the Chilli growers were Farming experience, education, land holding, area under Chilli crop, annual income. communication characteristics and psychological characteristic were social participation, mass media exposure, extension contact, risk orientation. economic motivation and knowledge.

Measurements procedures adopted to measure these variables are given below.

3.6.1.1. Farming experience

The number of years spent farming as a profession was defined as farming experience. The total score acquired by respondents was divided into three groups based on the mean and standard deviation as shown below.

N=120

Sl. No.	Experience in year	Score
1.	Low	Up to 10 years
2.	Medium	11 to 24 years
3.	High	Above 24 years
Mean= 17.69	**S.D.= 7.07**	

3.6.1.2. Education

The respondents' education is defined as the amount of formal education they have had. The respondents were divided into various categories and scoring methods based on their level of education, as shown below.

N=120

Sl. No.	Category	Score
1.	Illiterate (No education)	0
2.	Primary School (1 to 7^{th} std.)	1
3.	Secondary School (8^{th} to 10^{th} std.)	2
4.	Higher Secondary School (11^{th} to 12^{th} std.)	3
5.	Graduation & Post graduation	4

3.6.1.3. Land holding

It refers to the total amount of land owned by the respondents in hectares. It comprises all of the respondents' irrigated and rainfed land. The Maharashtra Government classified land holdings into the following categories.

N=120

Sl. No.	Category	Land holding (ha)
1.	Marginal	(Up to 1 ha)
2.	Small	(1.01 to 2 ha)
3.	Semi-medium	(2.01 to 4 ha)
4.	Medium	(4.01 to 10 ha)
5.	Large	(Above 10 ha)

3.6.1.4. Area under Chilli crop

It refers to the total crop area in hectors in which the respondents grow chilli. The respondents were divided into four groups based on their mean and standard deviation: low medium and high

N=120

Sl. No.	Category	Land holding (ha.)
1.	Low	Up to 0.64
2.	Medium	0.65 to 2.00
3.	High	Above 2.00
Mean= 1.37	**S.D.= 0.72**	

3.6.1.5. Annual income

This refers to the total income earned during the year from the farm and nonfarm sources. The gross family income as reported by the Chilli growers was taken into consideration to measure this variable. The categories were made on the basis of using Mean ± Standard deviation as under.

N=120

Sl. No.	Categories	Annual income (Rs.)
1.	Low	Up to Rs. 94109
2.	Medium	94109 to 454432
3.	High	above 454433
Mean= 274270		**S.D.= 180161**

3.6.1.6. Social participation

Social participation is defined as respondents involved in the activities of formal or informal organization as member or office bearer.

A scale developed by Nirban (2004) was used to measure social participation of the respondents. This scale consists of 10 organizations. Each of the respondents was assigned one score if he would be a member in organization and score of two for the respondent who is the office bearer of an organization. Further, a score of two for regular participation, while one and zero score for 'occasional and never/no' participation, respectively. Thus, the cumulative score is obtained for each respondent and finally, they can be grouped in three categories namely low', 'medium' and 'high considering the mean and standard deviation.

On the basis of total score obtained. The respondents were grouped into following categories by using Mean ± Standard Deviation formula.

N=120

Sl. No.	Categories	Score
1.	Low	Up to 5
2.	Medium	6 to 11
3.	High	Above 11
Mean= 8.41		**S.D.= 3.24**

3.6.1.7. Mass media exposure

A scale developed by Nirban (2004) studies mass media exposure in the following manner. Score is allotted to the respondents for receiving knowledge about integrated pest management technology from each of the selected mass media. The score of the two (2) for always, receiving while one (1) and zero (0) for sometimes and never receiving information about integrated pest management technology respectively. Thus, cumulative score in obtained by summing up the scores by the respondents for all the mass media listed in the schedule. Likewise, the mass media exposure for all the respondents is worked out and they are classified into different categories namely low, medium and high by using mean and standard deviation.

N=120

Sl. No.	Categories	Score
1.	Low	Up to 6
2.	Medium	7 to 10
3.	High	Above 10
Mean= 8.20		**S.D.= 2.12**

3.6.1.8. Extension contacts

It was operationally defined as the various extension contact made by respondents with formal and informal extension agencies for seeking information regarding Integrated Pest Management practices. Scoring was done on the basis of the frequency of contact. The score for different frequencies of contact was assigned as once in a week (6 score), once in a fortnight (5 score), once in a month (4 score), once in a three month (3 score), once in a six month (2 score), once in a year (1 score). Based on total, cumulative score of the respondents, they can be classified into different categories namely, low, medium and high by using mean and standard deviation.

N=120

Sl. No.	Categories	Score
1.	Low	Up to 18
2.	Medium	19 to 28
3.	High	Above 28
Mean= 23.38		**S.D.= 5.72**

3.6.1.9. Risk orientation

It is the degree to which farmers accept the risk and uncertainties and have nerve enough to face the agriculture problems.

It was measured with the help of risk orientation scale developed by Supe (2007). It is made up of six statements of which two statements were negative and four statements were positive. The responses for each statement were judged on a five-point continuum viz. strongly agree, agree, undecided, disagree and strongly disagree with the score of 5, 4, 3, 2 and 1 for positive statements and 1, 2, 3, 4, and 5 for negative statements, respectively. Maximum and minimum score on this scale were 30 and 6.

In addition the respondents were divided into three classes by calculating the mean and standard deviation.

N=120

Sl. No.	Categories	Score
1.	Low	Up to 16
2.	Medium	17 to 26
3.	High	Above 26
Mean= 21.42		**S.D.= 5.00**

3.6.1.10. Economic motivation

Economic motivation is considered to be the route of maximizing agricultural profits.

It is measured according to the scale of the economic motivation developed by Supe (2007). It is made up of six statements of which two statements were negative and four statements were positive. The responses for each statement were judged on a five-point continuum viz. strongly agree, agree, undecided, disagree and strongly disagree with the score of 5, 4, 3, 2 and 1 for positive statements and 1, 2, 3, 4, and 5 for negative statements, respectively. Maximum and minimum score on this scale were 30 and 6. In addition the respondents were divided into three classes by calculating the mean and standard deviation.

N=120

Sl. No.	Categories	Score
1.	Low	Up to 15
2.	Medium	16 to 25
3.	High	Above 25
Mean=21.04		**S.D.= 5.17**

3.6.1.11. Knowledge

Knowledge has classified into three types, that is 'awareness knowledge', 'how to knowledge' and ‘Principal knowledge' In the present study, knowledge means awareness knowledge of chilli growers about Integrated Pest Management practices of major insect pest

It has been operationally defined as the information possessed by the chilli growers about Integrated Pest Management practices. A teacher made knowledge test used to measure knowledge level of the respondents about integrated pest management practices of chilli crop.

A list of knowledge items was developed in consultation with plant protection scientists, research articles and scientific publications and questions related to knowledge item were finalized. The correctness of the answer was judged against pre-determined answers and was given a score of 2 for complete answer, 1 for partial answer and 0 for no answer. The sum score of all the items of test for a particular respondent indicates his knowledge level about integrated pest management practices of chilli crop. On the basis of equal interval method, the respondents will be categorized into three groups viz. low, medium and high.

N=120

Sl. No.	Categories	Score
1.	Low	Up to 7
2.	Medium	8 to 12
3.	High	above12
Mean = 10.09		**S.D.= 2.68**

3.6.2. Dependent variable

3.6.2.1. Adoption of IPM practices

It is mental process through which an individual pass from fixed hearing about an innovation to final adoption (Rogers, 1962). Same procedure was followed as given in measuring knowledge of respondents. This adoption test was administrated to the participant farmers and their responses were elicited on three-point continuum i.e., completely adopted, partially adopted and not adopted. The same test was administrated to the non IPM Chilli growers (control group) and their responses were also elicited on the same continuum. The sum of scores of all the items of the adoption test administered to the respondent from both the categories i.e., IPM and non IPM farmers was computed which indicated the adoption score for that particular respondent in the both the categories i.e., IPM and non IPM farmers. This adoption score was converted into adoption index with the help of formula as below.

$$\text{Adoption Index} = \frac{\text{Sum of adoption score obtained}}{\text{Sum of obtainable adoption score}} \times 100$$

N=120

Sl. No.	Category	Score
1.	Low	Up to 52
2.	Medium	53 to 84
3.	High	Above 84
Mean = 68.30		**S.D.= 16.11**

3.6.3.1. Constraints

The meaning of word constraints is confinement, restriction of liberty or compulsion of circumstances or compulsion put upon the behaviour.

Reading (1971) defined constraints is use of force to influence or prevent as action or quality or state of being compelled to do or not to do something.

In the context of present study, it has been operationally defined as the difficultly faced by Chilli growers in Integrated Pest Management practices. The efforts were made to identify the constraints faced the respondents in Integrated Pest Management practices of Chilli crop. The chilli growers were asked to identify the difficulties.

3.6.3.2. Suggestions

Suggestions were also obtained by asking questions to overcome the constraints faced by them in adoption of IPM technology for the pest management in Chilli. The frequency and percentages were worked out.

3.7. Statistical analysis of data

Data collected were both qualitative as well as quantitative. The quantitative data has been interpreted in the form of degree of achievement like low, medium and high etc. and quantitative data were tabulated on the basis of approved categorization method as described earlier. The following statistical techniques were used in the study

1. Percentage
2. Mean
3. Standard deviation
4. Correlation of coefficient

5. Multiple regression

3.7.1. Percentage

The term 'percentage' means a fraction whose denomination is 100 and the numeration of the fraction is called percentage. For calculating percentage, frequency was multiplied by 100 and divided by total respondents.

$$P = X / N \times 100$$

Where,

P = Percentage

X = Frequency of respondents

N = Total number of respondents

3.7.2. Mean

Mean was obtained by dividing the sum of the scores by the total number of respondents, according to the following formula

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

Where,

$\overline{X}$ = Arithmetic mean

$\sum Xi$ = Sum of each individual score

N = Number of observations

3.7.3. 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.

$$S.D. = \sqrt{\frac{\sum(xi - \bar{x})^2}{N}}$$

Where,

S.D. = Standard deviation

Xi = Score of i^{th} respondents

$\bar{x}$ = Mean

N = Number of Chilli growers

3.7.4. Karl Pearson's coefficient of correlation

This technique was used to find out the relationship between two variables (*viz.*, independent and dependent). The following formula was used for the computation of 'r' value. The formula is as follows,

$$r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}} = \frac{\sum (x - \bar{x})\,(y - \bar{y})}{\sqrt{\sum (x - \bar{x})^2 \sum (y - \bar{y})^2}}$$

Where,

r = Co-efficient of correlation

x =Independent variable

y =Dependent variable

3.7.5. Multiple regression analysis

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

$$Y = a + b_1x_1 + b_2x_2 + \ldots\ldots\ldots + b_nx_n + \mu$$

Where,

Y= Dependent Variable

x_1= Independent Variable

b_1=Regression coefficient

a= Constant

n=Total number of variables

μ= Error terms

CHAPTER - IV

RESULTS AND DISCUSSION

CHAPTER-IV

RESULTS AND DISCUSSION

The information pertaining to this study was collected from respondents by means of interview with the help of structured schedules. The data were classified, tabulated and analyzed in the light of the objectives of the study. The findings derived after analyzing the information have been presented under the following main head and discussed in succeeding pages.

1. Profile of Chilli growers
2. Adoption regarding integrated pest management practices by the Chilli growers
3. Relationship between the profile of Chilli growers with their adoption of integrated pest management practices
4. Constraints faced by the Chilli growers in adoption of integrated pest management practices and invite their suggestions to overcome it

4.1. Profile of Chilli growers

The study of personal, socio-economical, communicational and psychological characteristic was made with reference to farming experience, education, land holding, area under Chilli crop, annual income, social participation, mass media exposure, extension contact, risk orientation, economic motivation and knowledge. The result pertaining to the characteristics have been presented under following subheads.

4.1.1. Farming experience

The number of years spent farming as a profession was defined as farming experience.

The finding regarding farming experience is presented in table 4.1 and diagrammatically depicted in figure 4.1.

Table 4.1: Distribution of the Chilli growers according to their farming experience

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	Percentage
1	Low	23	19.16
2	Medium	73	60.84
3	High	24	20.00
	Total	**120**	**100.00**

It is clear from the Table 4.1 shows that majority (60.84%) of the respondents had medium farming experience while 20.00 per cent of the respondents belongs to high level of farming experience and 19.16 per cent of them belong to high farming experience.

It is concluded that majority of the respondents had medium level of farming experience. Majority of Chilli growers belongs to medium age group and they might have started farming in their early age itself.

These findings are supported by Mandlik (2012), Meena (2014), Sharma *et al.* (2014), Bansod (2016), Nigade (2016) and Neethi and Sailaja (2018).

4.1.2. Education

Education is operationally defined as the formal schooling undergone by the respondents. Education refers to formal education obtained by the respondents. The data of the respondents has been evaluated and present below.

The finding regarding presented in table 4.2 and diagrammatically depicted in figure 4.2.

Table 4.2: Distribution of the Chilli growers according to their level of education

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	Percentage
1	Illiterate	10	08.34
2	Primary school	31	25.84
3	Secondary school	29	24.16
4	Higher secondary school	29	24.16
5	Graduation and post-graduation	21	17.50
	Total	**120**	**100.00**

Table 4.2 shows that slightly more than one fourth (25.84%) of the respondents had completed primary school. 24.16 per cent of the respondents had completed secondary school education and 24.16 per cent of them received higher secondary education followed by 17.50 per cent of them had education up to graduation level, whereas 8.34 per cent of them were illiterate, as villages facilitate education institutes up to secondary school. For higher education villagers had to go to urban area which arises problems like transporting, need of more money etc.

Education is the key to success and plays a vital role in inspiring individual and motivating others to learn about recent IPM practices and to be more interested in this field. It helps to obtain data from farm literature, which could have helped to increase the level of knowledge and promote Integrated Pest Management.

The findings are similar as with Bansod (2016), Aglawe (2019) and Pendam (2021).

4.1.3. Land holding

It refers to the number of hectares of land owned and operate by the respondents. The Chilli growers were grouped in five categories according to standard classification made by Maharashtra State Government as fallows.

The findings regarding land holding are presented in table 4.3 and diagrammatically depicted in fig no. 4.3.

Table 4.3: Distribution of the Chilli growers according to their Land holding

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	Percentage
1	Marginal	13	10.84
2	Small	43	35.83
3	Semi medium	49	40.83
4	Medium	8	06.66
5	Big	7	05.84
	Total	**120**	**100.00**

The data in Table 4.3 clearly showed that less than half (40.83%) of the respondents were possessing 2.01 to 4.00 ha of land and belonged to semi medium land owner's category while 35.83 per cent of the respondents were possessing up to 1.01 to 2,00 ha of land and belonged to small land owners category and 10.84 per cent of the respondents belonged to marginal land owners category up to 1.00 ha whereas, 06.66 per cent respondents included under medium Chilli growers category 4.01 to 10.1 ha. Only 5.84 per cent of the Chilli growers were possessing land 10.01 ha and above and belonged to large land owner's category.

It is concluded that the majority (86.66%) of the Chilli growers were belonged to marginal to semi medium category of the land holding. This is might be due to increasing population on land and another reason that land was divided among

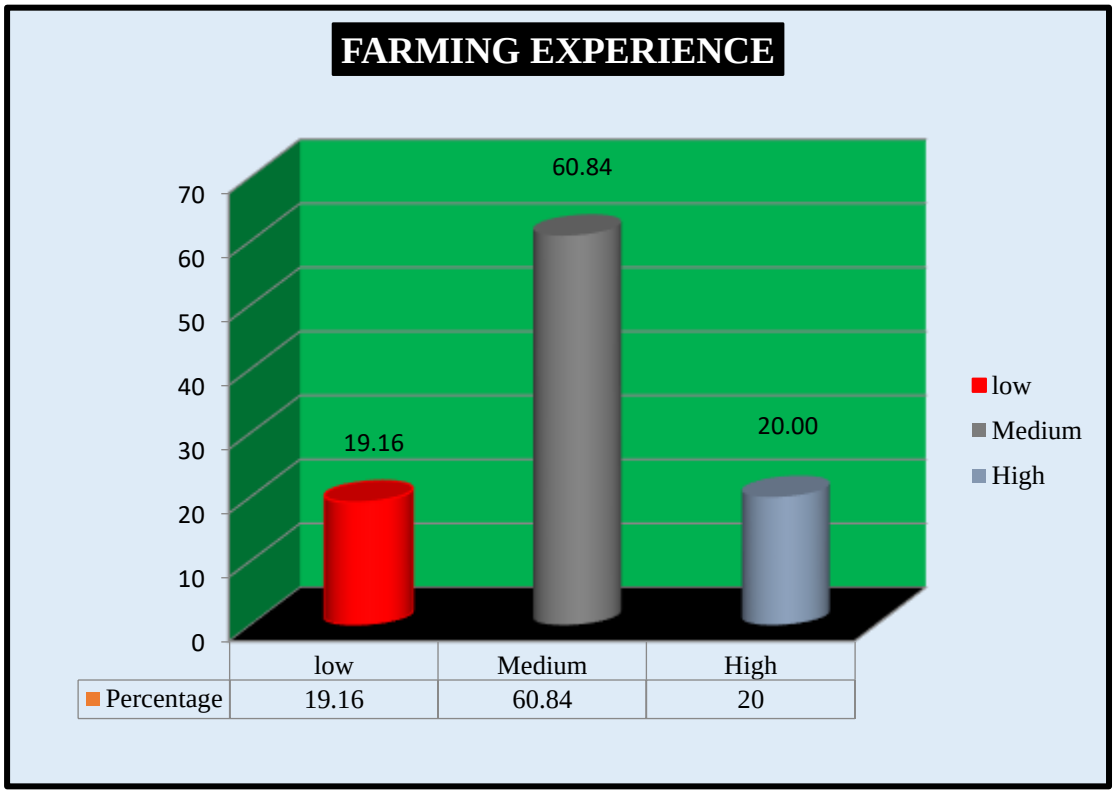

Fig 4.1: Distribution of Chilli growers according to Farming experience

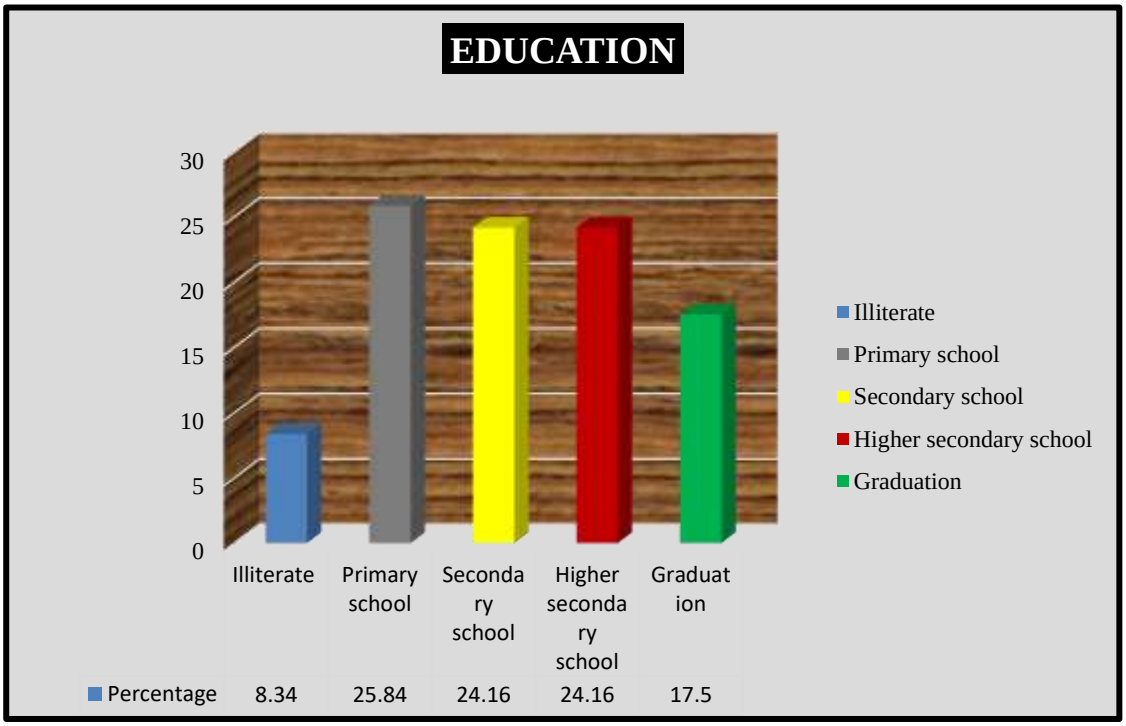

Fig 4.2: Distribution of Chilli growers according to Education

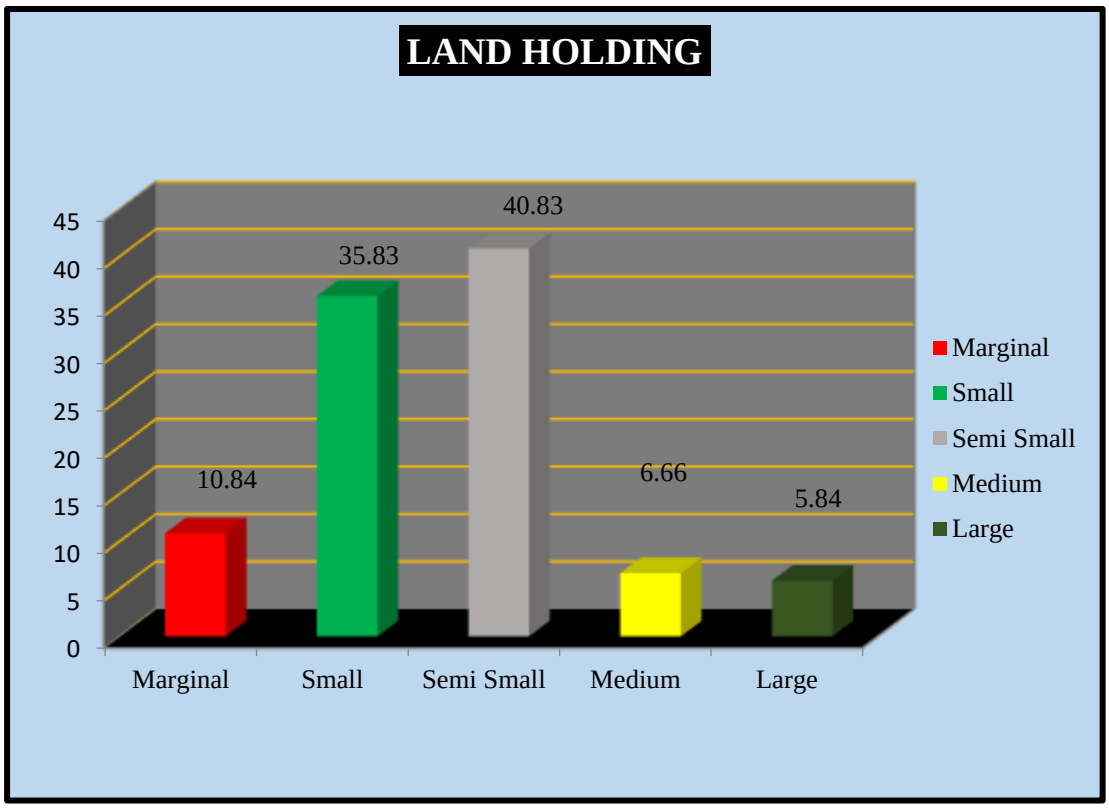

Fig 4.3 : Distribution of Chilli growers according to Land holding

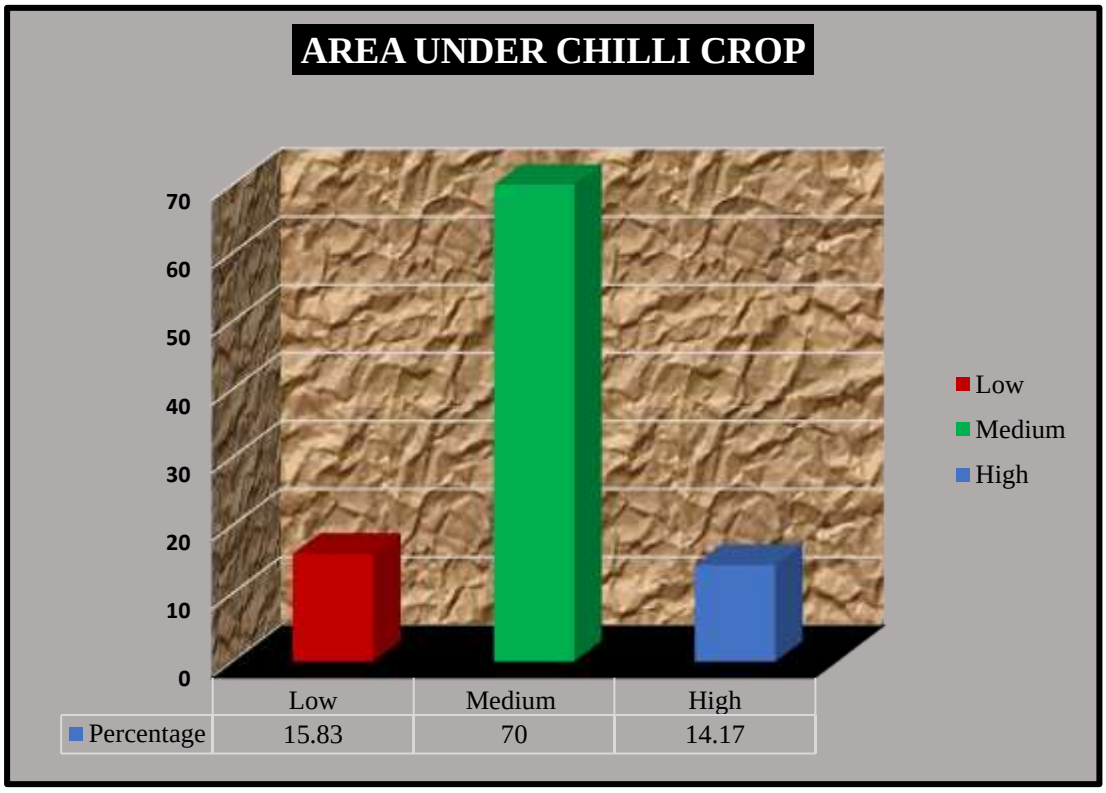

Fig 4.4 : Distribution of Chilli growers according to Area under Chilli crop

individuals because of separation of families. More the fragmentation more the decrease in the farm size. So that per head possession land had decreased.

The findings of the study were similar as that of Kale *et al.* (2014), Mahalaxmi (2016), Aglawe (2019) and Pendam (2021).

4.1.4. Area under Chilli crop

The area under crop defined as number of hectares of land is used for Chilli cultivation of the total land area possessed by the Chilli growers.

The findings regarding area under Chilli crop of Chilli growers is presented in table 4.4 and diagrammatically depicted in fig. no. 4.4

Table 4.4: Distribution of the Chilli growers according to their area under Chilli crop

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	Percentage
1	Low	19	15.83
2	Medium	84	70.00
3	High	17	14.17
	Total	**120**	**100.00**

The data in Table 4.4 show that majority (70.00%) of the Chilli growers had medium area under Chilli crop, followed by 15.83 per cent and 14.17 per cent of the respondents had low and high area under Chilli cultivation respectively.

It is concluded that most of the respondents (70.00%) had medium area under Chilli crop. This is might be due to Chilli is most profitable spices as compare to other spice.

These findings were similar to the findings of Sayed (2020).

4.1.5. Annual income

Annual income refers to the income earned by an individual in one year. Here annual income includes quantum of money derived or earned throughout the year from farm and other related resources from respondents and his family members.

The data with regard to annual income of Chilli growers and its family members is presented in Table 4.5 and diagrammatically depicted in fig. 4.5.

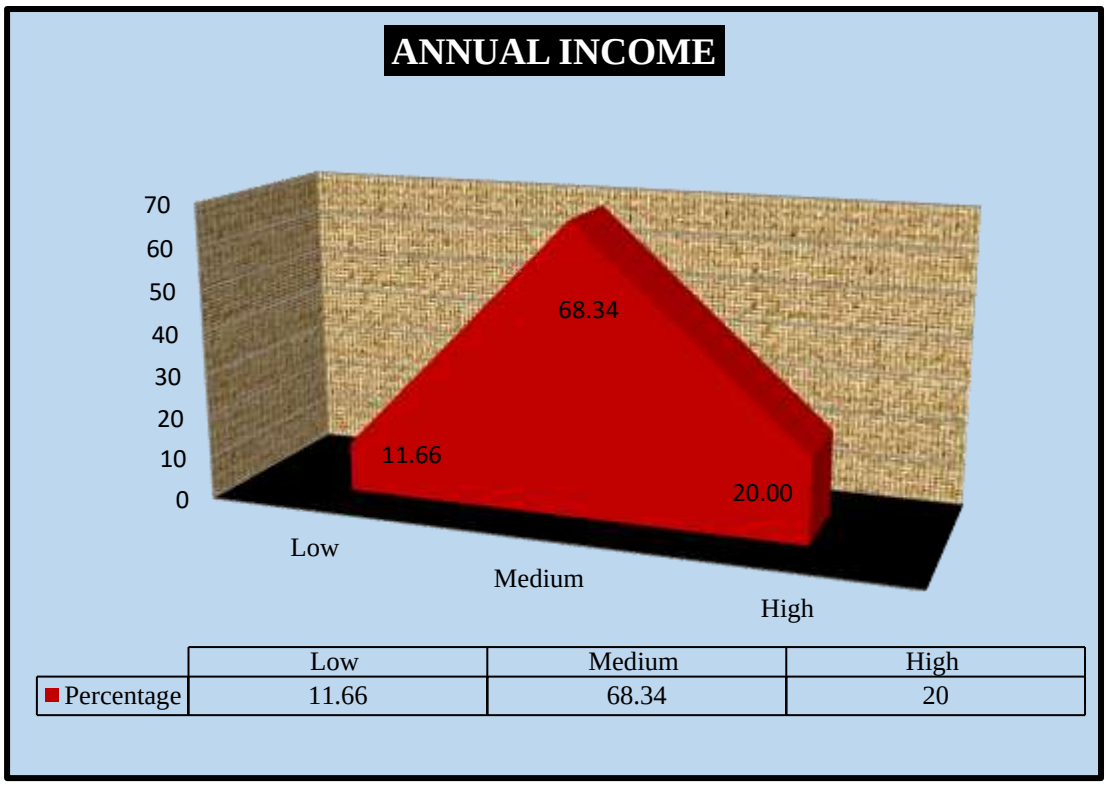

Fig 4.5 : Distribution of Chilli growers according to Annual income

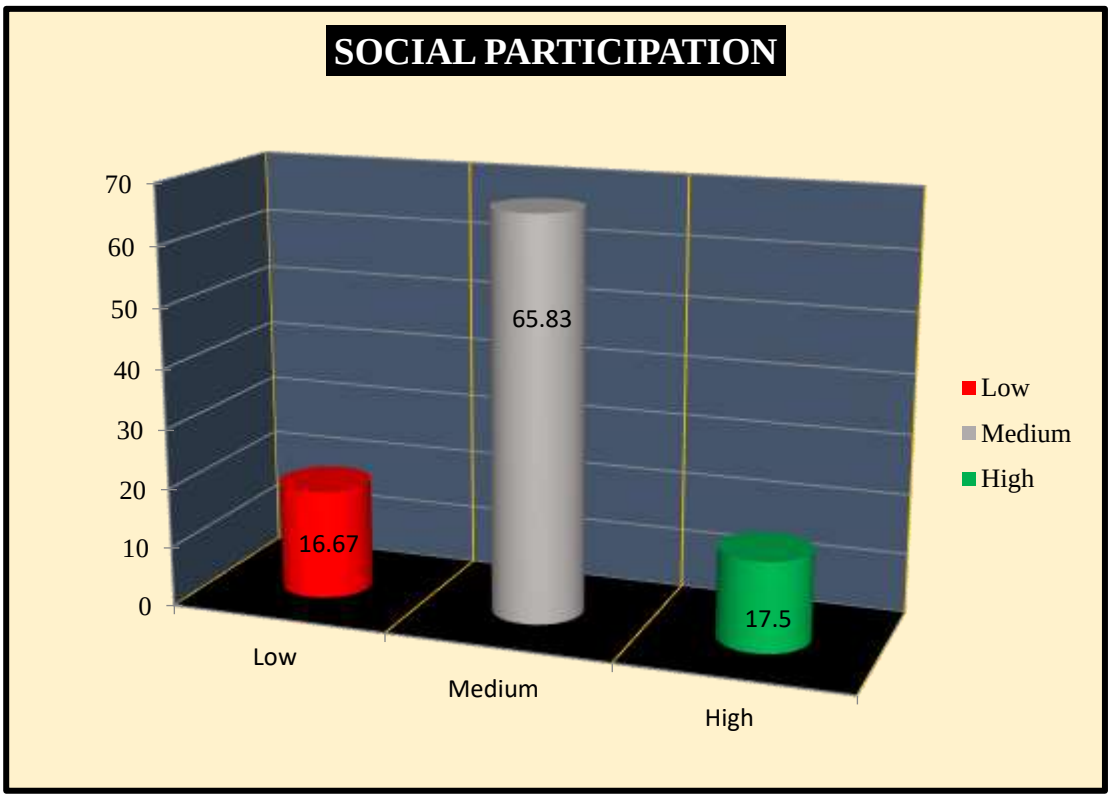

Fig 4.6 : Distribution of Chilli growers according to Social participation

Table 4.5: Distribution of the Chilli growers according to their annual income

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	**Percentage**
1	Low	14	11.66
2	Medium	82	68.34
3	High	24	20.00
	Total	**120**	**100.00**

It was elucidated from table 4.5 showed that more than three fifth (68.34%) of Chilli growers had medium annual income (Rs. 94109/- to Rs. 454432/-) followed by 20.00 per cent of them fall in had high annual income category (above Rs. 454432/-) and only few 11.66 per cent of Chilli growers belonged to low-income category (up to Rs. 94109/-) per year.

The reasons must be that most of the Chilli growers are based on agriculture and they have marginal land holding so they are having limited source of income that's why majority of Chilli growers belongs to medium annual income category.

The findings of the study were similar as that of Mahalaxmi (2016), Patidar (2017) and Pendam (2021).

4.1.6. Social participation

Social participation is defined as Chilli growers involved in the activities of formal or informal organization a member or office bearer. Social participation shows the interest of Chilli growers to participate in various activities. Social participation is an important aspect to show the social condition of Chilli growers.

The findings regarding social participation are presented in table 4.6 and diagrammatically depicted in fig. no. 4.6

Table 4.6: Distribution of the Chilli growers according to their social participation

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	**Percentage**
1	Low	20	16.67
2	Medium	79	65.83
3	High	21	17.50
	Total	**120**	**100.00**

Table 4.6 revealed that majority (65.83 %) of the Chilli growers had medium level of social participation, while 17.50 per cent of the Chilli growers had high social participation and 16.67 per cent of them had low social participation.

The majority (83.33%) of Chilli growers were from medium to high category of social participation. The most likely cause is that Chilli growers having lack of higher education and hence lack of interest in participating in groups and the most likely reason is that Chilli growers are always involved in farming operation and have little free time to participate in other social organizations.

The results were supported by Mandlik (2012), Bansod (2016), Aglawe (2019) and Pendam (2021).

4.1.7. Mass media exposure

Mass media exposure refers to access to media content from both traditional media and their affiliates on the internet such as newspaper and television and their web and mobile application.

The data with regard to mass media exposure of Chilli growers are presented in Table 4.7 and diagrammatically depicted in fig. no. 4.7

Table 4.7: Distribution of the Chilli growers according to their mass media exposure

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	Percentage
1	Low	22	18.33
2	Medium	80	66.67
3	High	18	15.00
	Total	**120**	**100.00**

Table 4.7: shows that out of total respondents, 66.67 per cent of respondents had medium mass media exposure, 18.33 per cent of respondents had low mass media exposure and 15.00 per cent of respondents had high mass media exposure. Thus, this conclusion depicts that the majority of Chilli growers 66.67 per cent belong to medium category of mass media exposure.

The results were supported by Kerketta (2015), Singh (2015) and Mahalaxmi (2016).

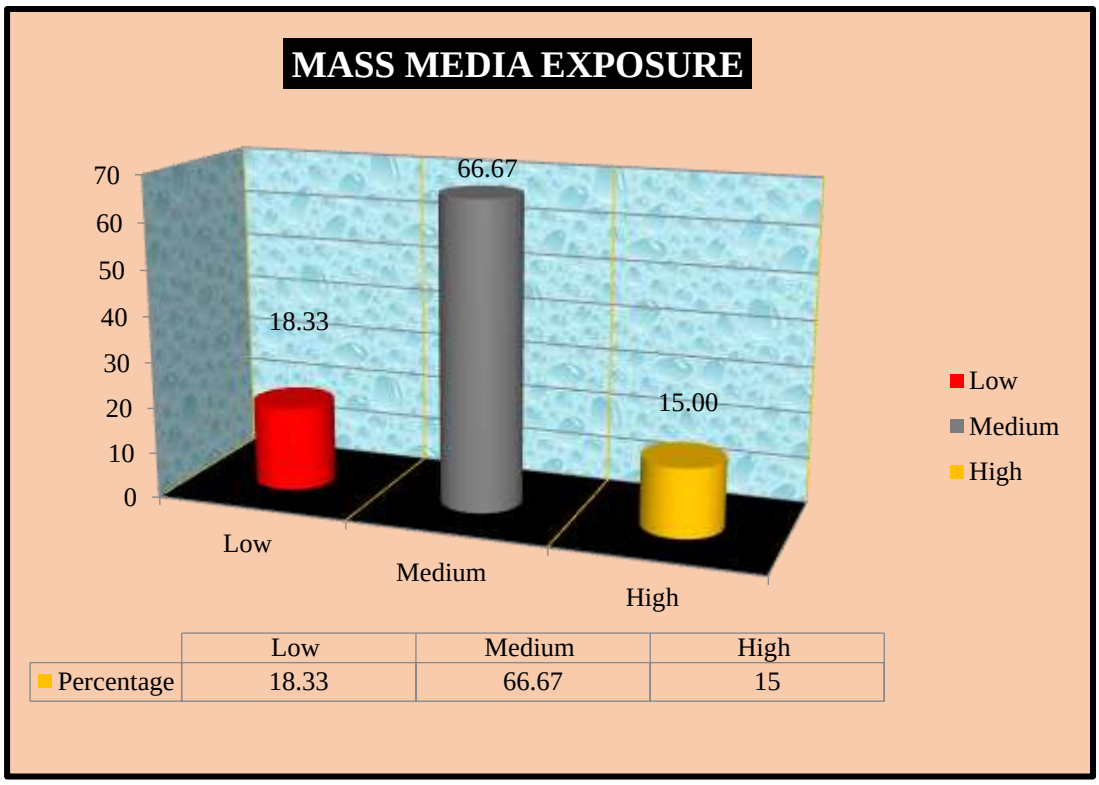

Fig 4.7 : Distribution of Chilli growers according to Mass media exposure

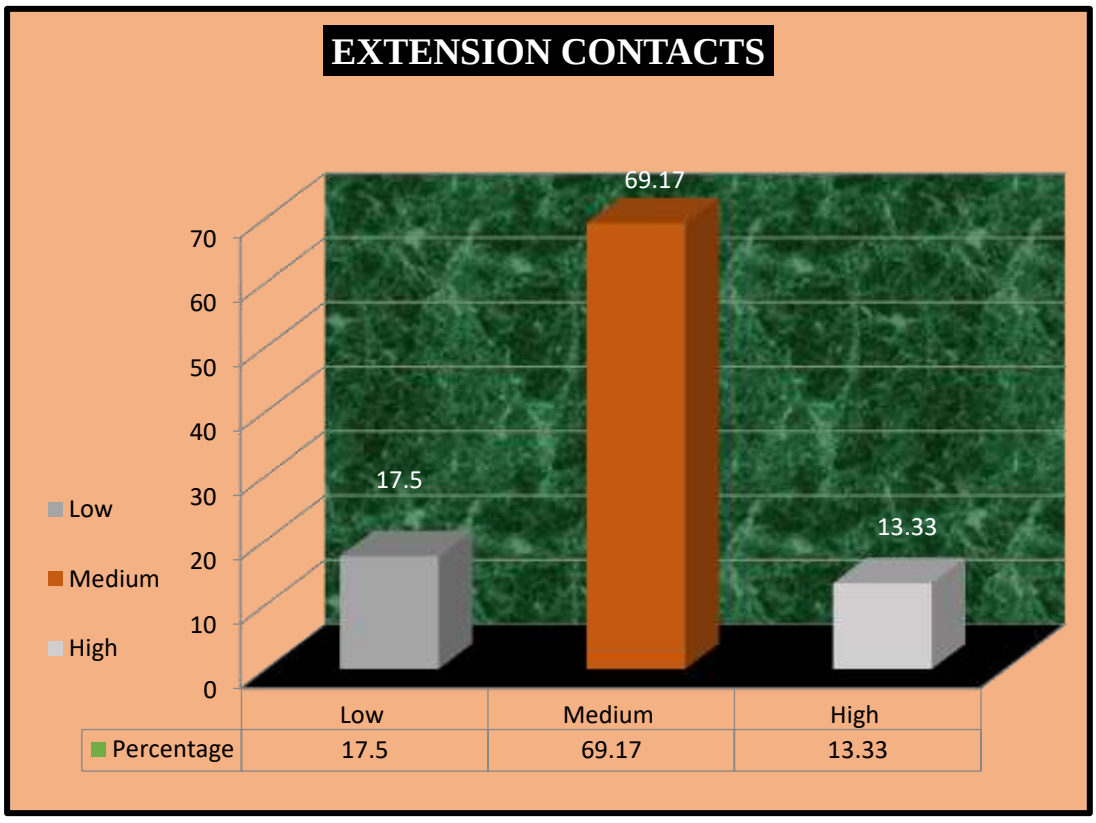

Fig 4.8 : Distribution of Chilli growers according to Extension contacts

4.1.8. Extension contacts

Extension contacts means Chilli growers contacts with various local level officers. An effective extension contact helps Chilli growers to gain new knowledge, information and to learn the new technology to solve their problem on local levels.

The data with regard to extension contact of Chilli growers are presented in Table 4.8 and diagrammatically depicted in fig. no. 4.8.

Table 4.8: Distribution of the Chilli growers according to their extension contact

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	**Percentage**
1	Low	21	17.50
2	Medium	83	69.17
3	High	16	13.33
	Total	**120**	**100.00**

It was elucidated from table 4.8 that, majority (69.17%) of the Chilli growers had medium extension contact while 13.33 per cent of the Chilli growers were belonged to high level of extension contact and 17.50 per cent of the Chilli growers were having low extension contact.

It could be therefore found that most (82.50%) of the respondents had medium to high level of extension contact. This might be due to their interest in extension activities which directly helps them to gather information on recent innovation and IPM practices which help them to seek information from extension experts, subject matter specialists, etc. this in turn help to increase their knowledge level and adoption behaviour.

The results were supported by finding of Mandlik (2012), Tekale (2015), Mahalaxmi (2016) and Aglawe (2019).

4.1.9. Risk orientation

Risk orientation is the ability of a person to face uncertainty. Risk orientation in the present study referred to the degree to which a respondent has orientation towards risks and uncertainty due to changing climatic condition and has the courage to adopt integrated pest management practices in Chilli crop.

The data with regard to risk orientation of Chilli growers presented in table 4.9 and diagrammatically depicted in fig. 4.9.

Table 4.9: Distribution of the Chilli growers according to their risk orientation

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	**Percentage**
1	Low	19	15.83
2	Medium	87	72.50
3	High	14	11.67
	Total	**120**	**100.00**

It was apparent from Table 4.9 that majority (72.50%) of the Chilli growers were having medium level of risk orientation whereas, 15.84 per cent and 11.66 per cent belonged to high to low-risk orientation category, respectively.

It is concluded that majority (88.34%) of the Chilli growers had medium to low-risk orientation category. The Chilli growers who were having readiness to make much economic earning from small unit, they were prepared to take risks. Due to this caused the Chilli growers under study were found in the medium risk orientation category.

This finding is in confirmatory with the finding of Mandlik (2012), Tekale (2015) and Aglawe (2019).

4.1.10. Economic motivation

It is an occupational success in terms of profit maximization and relative value individual places on economic ends. Economic motivation refers to the extent to which Chilli growers are oriented towards the achievement of the maximum economic ends such as maximization of profits in farming.

The data regards to economic motivation are presented in table 4.10.

Table 4.10: Distribution of the Chilli growers according to their economic motivation

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	**Percentage**
1	Low	17	14.16
2	Medium	78	65.00
3	High	25	20.84
	Total	**120**	**100.00**

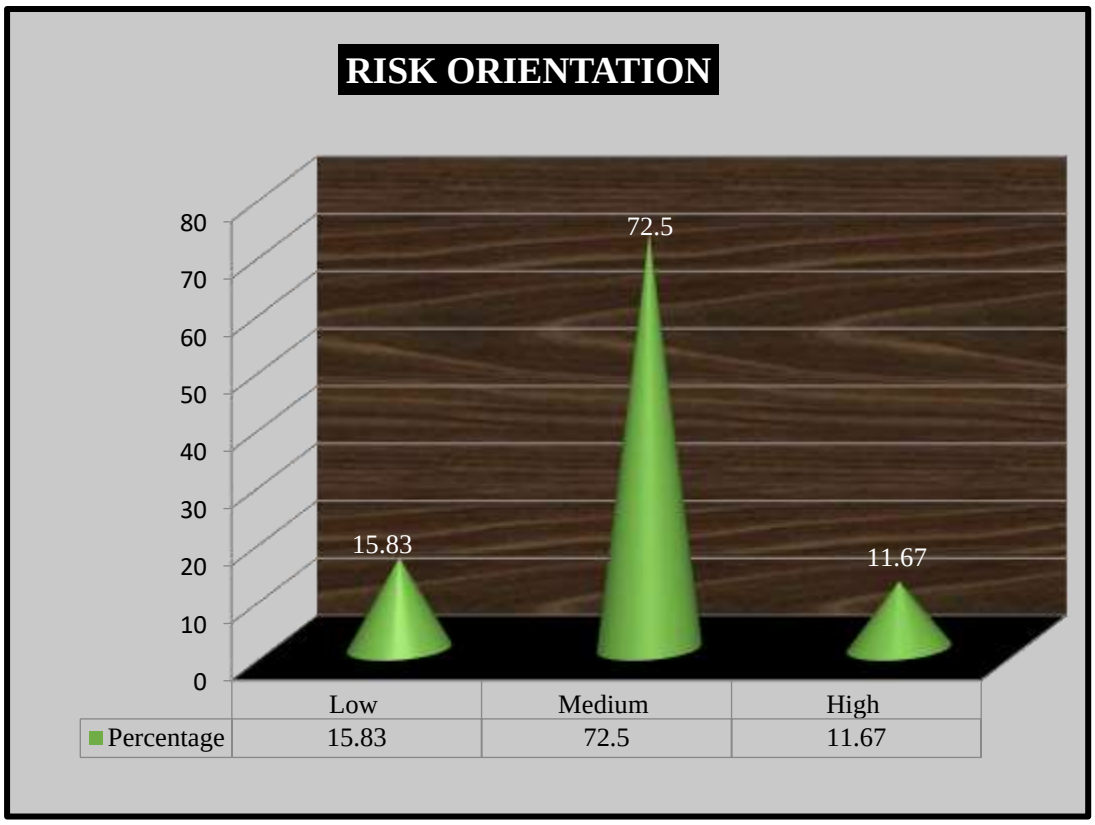

Fig 4.9: Distribution of Chilli growers according to Risk orientation

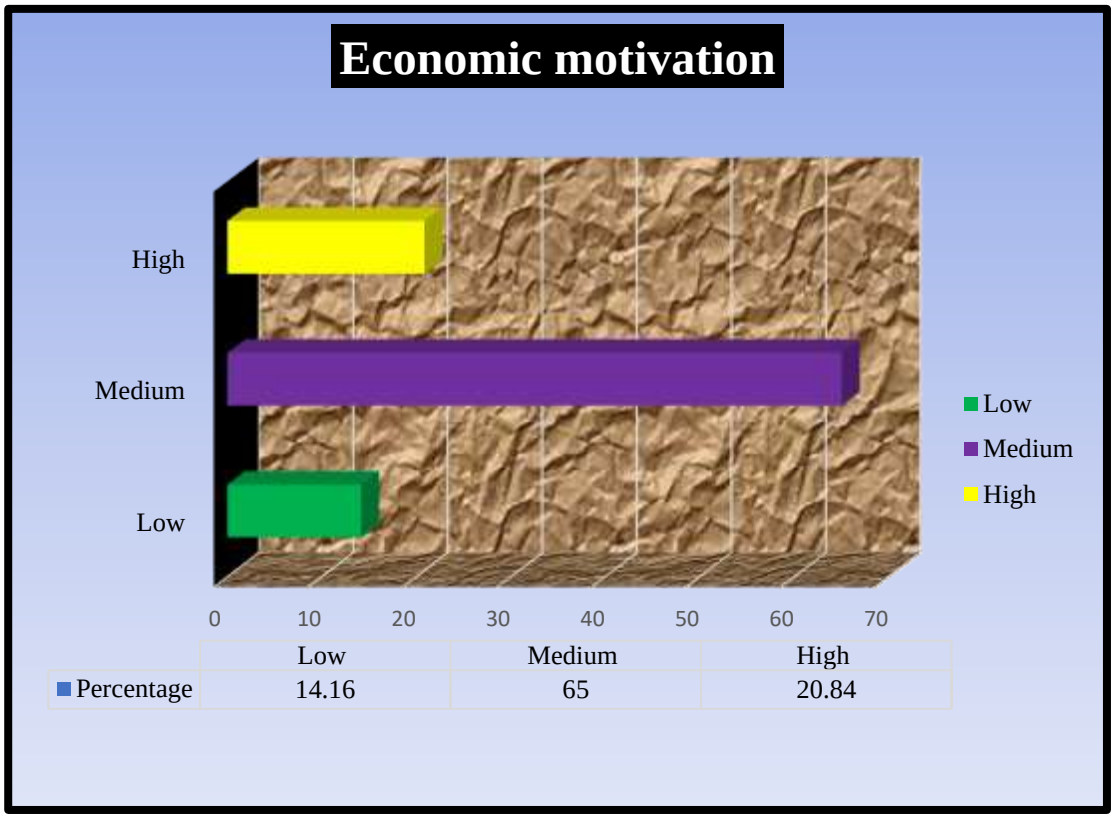

Fig 4.10 : Distribution of Chilli growers according to Economic motivation

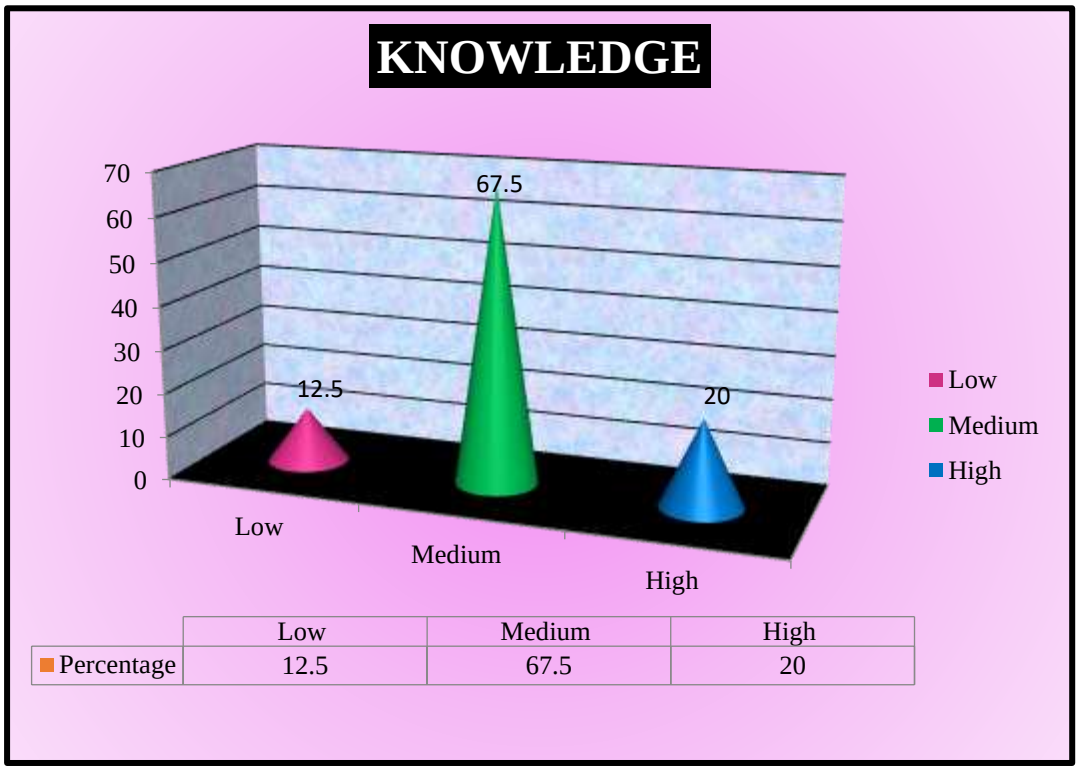

Fig 4.11: Distribution of Chilli growers according to Knowledge

It was elucidated from Table 4.10 majority (65.00%) of the Chilli growers were belonged to medium level of economic motivation, followed by 20.84 per cent and 14.16 per cent of them had high and low level of economic motivation, respectively.

The result concluded that majority (85.84%) of the Chilli growers had a medium to high level of economic motivation. As the modernization of the world, needs of Chilli growers is increasing for which they want to be economically more stable eventually leading to grow their level of economic motivation.

The results were supporting by the finding of Mandlik (2012), Dhodia *et. al.* (2014), Reddy *et al*. (2017) and Pendam (2021).

4.1.11. Knowledge

Knowledge is an awareness or understanding of something, such as facts information or skill which acquired through experience or education by perceiving or learning. Here knowledge level of Chilli growers about Integrated Pest Management practices of the Chilli growers were categorized in three categories. The data in this regard is in Table 4.11 and diagrammatically depicted in fig. 4.11.

Table 4.11: Distribution of the Chilli growers according to their knowledge

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	Percentage
1	Low	15	12.50
2	Medium	81	67.50
3	High	24	20.00
	Total	**120**	**100.00**

The Table 4.11 showed that majority (67.50%) of the Chilli growers were having medium level of knowledge about IPM practices on Chilli crop followed by 20.00 per cent were having high level of knowledge of Chilli IPM practices. Only 12.50 per cent of the respondents were having low level of knowledge.

The above result indicated that knowledge about Chilli IPM practices is ranging from low to medium category of knowledge.

The knowledge is depending on information source used and contact with the extension agencies, if information source and extension contact are more then knowledge level of Chilli growers ultimately increases.

The results were supported by Mandlik (2012), Sharma *et.al* (2014), Bansod (2016), Reddy (2017) and Pendam (2021).

4.2.1. Adoption

Adoption shows the present state of actual use of Integrated Pest Management practices of Chilli crop by the farmers.

Adoption of various Integrated Pest Management practices connecting with Chilli growing by the respondents were further ascertained and practice wise information have been reported in Table 4.12.

Table 4.12 Distribution of the respondents according to their adoption about Integrated Pest Management practices by Chilli growers

Sl. No.	Recommended practices	Adoption (n=120)					
		Complete		Partial		No	
	IPM	Feq.	%	Feq.	%	Feq.	%
1	**Cultural Methods**						
a.	Summer Ploughing	120	100	00	00	00	00
b.	Burning of crop residue in the field	66	55.00	31	25.83	23	19.17
c.	Used of recommended/ resistants varieties (Hirkani AKC-460), Bhiwapuri, Jayanti, Phule Jyoti, Pusa Jwala, Hisar shakti, Pant c-1, Arka Harita)	50	41.67	50	41.67	20	16.66
d.	Optimum Spacing (60cmX60cm/60cmX45cm)	45	37.50	45	37.50	30	25.00
e.	Integrated use of Manure and Fertilizer	46	38.34	42	35.00	32	26.66
2	**Mechanical method**						
a.	Collection and destruction of infested plant parts and fallen fruits (at regular interval)	08	6.67	19	15.83	93	77.50

b.	Erection of yellow sticky traps for sucking pest @15-20 /ha	12	10.00	56	46.67	52	43.33
c.	Use of pheromone traps for fruits borer@10-12/ha	25	20.83	62	51.67	33	27.50
d.	Destroyed the caterpillar or egg mass through hand picking	09	07.50	51	42.50	60	50.00
3	**Biological methods**						
a.	Used plant products:						
b.	1.Neem oil (@2%at the early infestation stage of sucking pest and fruit borer)	22	18.33	77	64.17	21	17.50
c.	2.Neem seed kernel Extract (@5% for both sucking pest and fruit borer)	09	07.50	98	81.67	13	10.83
d.	Use of Parasite/ Parasitoids	04	03.33	19	15.84	97	80.83
4	**Chemical methods**						
a.	Soil application of insecticides (Drenching of seed bed with copper oxy-chloride /Bavastin/Formaldehyde to control damping off.)	14	11.67	77	64.17	29	24.16
b.	Treating seeds with biofertilizers (Azatobactor/ Azospirillium @ 200gm in 200 ml rice water for 500gm seeds)	12	10.00	54	45.00	54	45.00
c.	Seed treatment (Thiram / Captan / Bavistin @ 3gm / kg)	09	07.50	45	37.50	66	55.00
d.	Spraying of insecticides						

	1.Control of sucking Pests (Thrips, Mites, Jassids, Aphids, White flies -spraying of Metasystox @1.5ml/liter of water followed by Metathion @ 1ml/liter of water.)	60	50.00	30	25.00	30	25.00
	2. Control of Fruit borer (Spraying of Methyl Dematon 25% @8ml in 10 lit. of water.)	56	46.67	47	39.17	17	14.16
	3. Control of Caterpillar (Semilooper, Tobacco leaf eating caterpillar -Spraying of Choloropyriphos20 EC @ 25 ml in 10 lit. of water.)	68	56.66	30	25.00	22	18.34

Percentage of respondents were worked out for knowing adoption of Chilli grower regarding IPM, which is shown in Table 4.12, 100 per cent of respondents had fully adopted the summer ploughing. While more than half (55.00%) of respondents were follow burning of crop residue in the field while 19.17 per cent of the respondents did not follow burning of crop residue and 25.83 per cent of the respondents partial follow the burning of crop residue in the field.

As far use of recommended and resistance varieties is concerned it was observed that there was full and partially adoption of varieties 41.67 per cent of the respondents and 16.66 per cent did not use any seed of resistance variety, while each 37.50 per cent of respondents had fully and partially adopted the recommended spacing, while 25.00 per cent of the respondents did not sow their crop in recommended spacing.

It was noticed that, 38.34 per cent of the respondents fully adopted Integrated use of Manure and Fertilizer, as against 35.00 per cent of the respondents were adopted partially and 26.66 per cent of them did not use integrated manure and fertilizer.

It was observed that, 77.50 per cent of the respondents didn't adopt the mechanical method of integrated pest management practices like collection and

destruction of infested plant parts and fallen fruits (at regular interval) while 15.83 per cent of the respondents partially adopted it and 6.67 per cent respondents completely adopt.

It is also found that, 43.33 per cent and 27.50 per cent of the respondents not adopted the integrated pest management practices like erection of yellow sticky traps for sucking pest and pheromone traps for fruits borer and 46.67 per cent and 51.67 per cent of the respondents had partially erected of yellow sticky traps and pheromone traps and 10.00 per cent and 20.83 per cent of the respondents had fully erected yellow sticky trap for control sucking pest and pheromone trap for control fruit borer.

It was observed that only 07.50 per cent of the respondents had fully adopted destroyed the caterpillar or egg mass through hand picking as against 42.50 per cent of the respondents were partially adopted destroyed the caterpillar or egg mass through hand picking and 50.00 per cent of the respondents didn't adopt the mechanical method of integrated pest management practices like destroyed the caterpillar or egg mass through hand picking.

It was observed that,18.33 per cent of the respondents completely used Neem oil (@ 2% at the early infestation stage of sucking pest and fruit borer, 64.17 per cent of the respondents were partially and 17.50 per cent of the respondents did not used neem oil. Very less 07.50 per cent number of the respondents were fully use Neem Seed Kernel Extract (@5% for both sucking pest and fruit borer, 81.67 per cent of the respondents were partially used NSKE and 10.83 per cent Chilli growers did not used NSKE it all (80.83%) Majority of the respondents did not used of Parasite/ Parasitoids. Only 15.84 per cent of the respondents had partially used of Parasite/ Parasitoids, only few respondents fully used parasite/ parasitoids for control pest.

It was observed that only 7.50 per cent of the respondents treated the seed with Thiram, 37.50 per cent of the respondents done it partially and 55.00 per cent and37.50 per cent of the respondents did not treat the seed with Thiram and partially treat the seed of with Thiram. Ten per cent of the respondents were fully used biofertilizers (Azatobactor/ Azospirillium @ 200 gm in 200 ml rice water for 500gm seeds) biofertilizer treatise seed while 45.00 per cent had partially used azotobacter for seed treatment and 45.00 per cent members not followed any seed treatment. 11.67 per cent of the respondents followed soil application of insecticides (Drenching of seed bed with copper oxy-c chloride /Bavastin/Formaldehyde to control damping off.) while 64.17

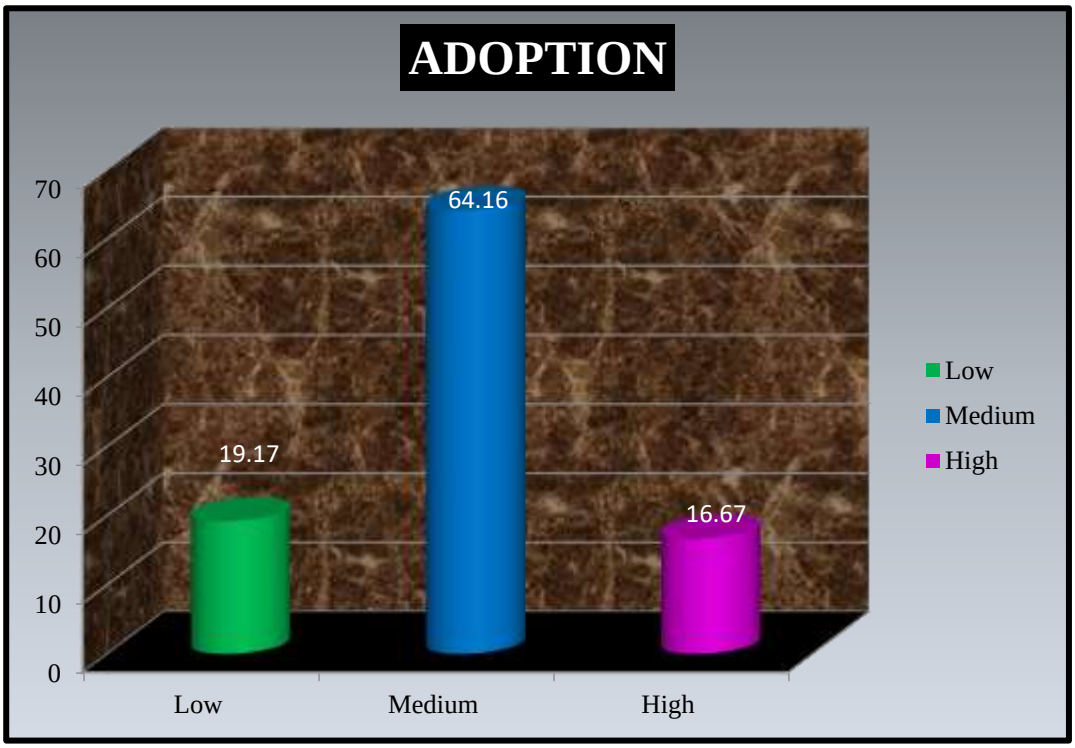

Fig 4.12: Distribution of Chilli growers according to Adoption

per cent of the respondents were used partially and 24.16 per cent of the respondents did not used soil application of insecticide.

It was observed that 50.00 per cent of the respondents had fully adopted Spraying of insecticide (control of sucking pest) and each 25.00 per cent of the respondents had sprayed partially and did not sprayed at all. Further it was noticed that 46.67 per cent of the respondents did follow completely spraying of methyl Demeton 25% @ 8 ml in 10 lit. of water, 39.17 per cent of the respondent followed it partially and 14.16 per cent of the respondent did not follow. In case of the spraying Choloropyriphos20 EC @ 25 ml in 10 lit. of water to control caterpillar, 25.00 per cent of the respondents did followed partially whereas 18.34 per cent of the respondents didn't follow it at all.

Table 4.13: Distribution of the Chilli growers according to their adoption

Sl. No.	Category	Chilli growers (n=120)	
		Frequency	**Percentage**
1	Low	23	19.17
2	Medium	77	64.16
3	High	20	16.67
	Total	**120**	**100.00**

Table 4.13 revealed that about 64.16 per cent of respondents were found under medium category of adoption level of Integrated Pest Management practices, followed by low level of adoption (19.17%) and only 16.67 per cent of the farmers were found to high level of adoption of Integrated Pest Management practices.

This finding is in conformity with the findings of Anuse (2016), Bansod (2016), Patidar (2017) and Sayed (2020).

4.3. The relationship of profile of Chilli growers with their adoption of integrated pest management practices.

In the present investigation an attempt was made to find out the relationship between profile of Chilli growers with Adoption of Integrated pest management practices. The study on the relationship between selected dependent and independent variable was one of the objectives in present investigation.

4.3.1. Correlation with adoption

Correlation coefficient was computed to ascertain the relationship between adoption and independent variable.

The results are furnished in Table 4.14.

Table no. 4.14 Relationship between adoption and profile of Chilli growers

Sr. No.	Independent variable	Correlation coefficient (r)
1	Farming experience	0.333**
2	Education	0.491**
3	Land holding	0.255*
4	Area under Chilli crop	0.207*
5	Annual income	0.315**
6	Social participation	0.420**
7	Mass media exposure	0.351**
8	Extension contacts	0.316**
9	Risk orientation	0.287**
10	Economic motivation	0.301**
11	Knowledge	0.459**

Note: **=Significant at 0.01 per cent level of probability.

*=Significant at 0.05 per cent level of probability.

NS= non-significant

It was observed from table 4.14 that out of eleven independent variable result of correlation (r) showed that the independent variables namely farming experience, education, land holding, area under Chilli crop, Annual income, Social Participation, Mass media exposure, extension contact, economic motivation, risk orientation and knowledge are positively significant related with the adoption of integrated pest management by Chilli growers.

4.3.1.1. Farming experience and Adoption

Data in table no. 4.14 showed that farming experience and adoption in adoption of integrated pest management practices by Chilli crop had positive and highly significant relationship.

This showed that more the experience in farming increases the level of adoption. This might be due to more experience in farming increases knowledge, skills and adoption of integrated pest management practices.

These findings are supported by Mandlik (2012), Meena (2014), Sharma *et.al* (2014) and Neethi and Sailaja (2018).

4.3.1.2. Education and Adoption

Data in table no. 4.14 shows that education had positive and highly significant correlation with adoption of integrated pest management practices in Chilli.

This means that well educated Chilli growers show more adoptability in adoption of integrated pest management practices in Chilli. Education makes man believe in science and technology and thereby modernize his way of thinking and acting.

The findings are similar as with Bansod (2016), Aglawe (2019) and Pendam (2021).

4.3.1.3. Land holding and Adoption

The data presented in table no. 4.14 showed that land holding had positive and significant relationship with adoption of integrated pest management practices in Chilli Crop.

This means that more the land holding more the adoption of integrated pest management practices in Chilli. This might be due to the ability of semi-medium to medium Chilli growers to adopt integrated pest management practices in Chilli crop on large scale because of more land holding and more annual income.

The findings of the study were similar as that of Kale *et al.* (2014), Mahalaxmi (2016), Aglawe (2019) and Pendam (2021).

4.3.1.4. Area under Chilli crop and Adoption

Data in table no. 4.14 indicates that area under Chilli crop was positively and significantly correlated with adoption of integrated pest management practices in Chilli crop.

This means that higher the area under Chilli crop higher the adoption of integrated pest management practices in Chilli crop. Large area under Chilli crop allows growers to invest in IPM technology which is affordable to the Chilli grower which resulted in high adoption.

These findings were similar to the findings of Adsul (2016) and Sayed (2020).

4.3.1.5. Annual income and Adoption

Regarding the data presented in table no. 4.14 it is stated that annual income had positive and highly significant correlation with adoption of integrated pest management practices in Chilli crop.

This means that as the annual income is high the adoption of integrated pest management practices in Chilli crop is high. The reason might be that the high annual income increases the ability of the Chilli growers to afford the new technology on large scale which leads to increase in adoption.

The findings of the study were similar as that of Kumar *et al.* (2019) and Pendam (2021).

4.3.1.6. Social participation and Adoption

Results presented in table no. 4.14 denote that social participation had positive and highly significant correlation with adoption of integrated pest management practices in Chilli crop.

The probable reason might be that the respondents being farmers are always engaged in farming and now a day there is lot of problem faced by the farmer in farming. So, they try to overcome this problem through social participation. They participate only when the subject is of their importance and interest. Therefore, most of the respondents were noticed medium social participation.

The results were supported by Kurhade (2011) and Bansod (2016).

4.3.1.7. Mass media exposure and Adoption

Results presented in table no. 4.14 denote that mass media exposure had positive and highly significant correlation with adoption of integrated pest management practices in Chilli crop.

This means that the mass media exposure has high level of adoption of integrated pest management practices in Chilli crop. Mass media exposure of Chilli growers would have enabled them to increase their knowledge and adoption of integrated pest management practices in Chilli crop which resulted in increasing of adoption.

4.3.1.8. Extension contacts and Adoption

Results presented in table no. 4.14 denote that extension contact had positive and highly significant correlation with adoption of integrated pest management practices in Chilli crop.

This means that Chilli growers having regular contact with extension agencies have high level of adoption of integrated pest management practices in Chilli crop. Better extension contact of Chilli growers would have enabled them to increase their knowledge and adoption of integrated pest management practices in Chilli crop which resulted in increasing of adoption.

The results were supported by finding of Mandlik (2012), Tekale (2015) and Bansod (2016).

4.3.1.9. Risk orientation and adoption

Data in table no. 4.14 increase in that risk orientation had positive and highly significant relation with adoption of integrated pest management practices in Chilli crop.

This means that higher the risk orientation higher the adoption of integrated pest management practices in Chilli crop. Higher level of risk-taking ability of Chilli growers would have drove them towards the adoption of new integrated pest management practices in Chilli crop.

This finding is in confirmatory with the finding of Mandlik (2012), Tekale (2015) and Bansod (2016).

4.3.1.10. Economic motivation and adoption

Data in table no. 4.14 increases in that economic motivation had positive and highly significant relation with adoption of integrated pest management practices in Chilli crop.

This means that higher the economic motivation higher the adoption of integrated pest management practices in Chilli crop. This might be due to the motivation to earn more money for better livelihood attract Chlli growers toward adoption of integrated pest management in Chilli crop.

The results were supporting by the finding of Pimpalkar (2015) and Bandos (2016).

4.3.1.11. Knowledge and adoption

Results presented in table no. 4.14 denote that knowledge had positive and highly significant correlation with adoption of integrated pest management practices in Chilli crop.

This means that increase in knowledge of Chilli growers about integrated pest management in Chilli increase the adoption of integrated pest management practices in Chilli crop. Therefore, it could be concluded that knowledge of IPM practices of crop can be good source of motivation.

The results were supported by Mandlik (2012), Bansod (2016) and Reddy (2017).

4.3.2. Multiple regression analysis between profile of Chilli growers and adoption of Integrated pest management practices.

Multiple regression analysis was done foe deciding the commitment of independent variables with adoption of integrated pest management practices and the information, hence got, have been outfitted in Table 4.14.

Table no. 4.15 Multiple regression analysis of independent variables with adoption of integrated pest management practices.

Sr. No.	Independent variable	Regression Coefficient (Bi)	Standard Error (SE)	't' value
1	Farming experience	0.107	0.075	1.424 ^{NS}
2	Education	1.396	0.346	4.028**
3	Land holding	0.356	0.200	1.778 ^{NS}
4	Area under Chilli crop	0.303	0.687	0.441^{NS}
5	Annual income	1.350	02.86	0.473^{NS}
6	Social participation	0.333	0.150	2.219*
7	Mass media exposure	0.242	0.222	1.092 ^{NS}
8	Extension contacts	0.095	0.086	1.112 ^{NS}
9	Risk orientation	-0.124	0.114	-1.094 ^{NS}
10	Economic motivation	0.051	0.093	0.549 ^{NS}
11	Knowledge	0.779	0.150	5.175**

Note: **=Significant at 0.01 per cent level of probability.

*=Significant at 0.05 per cent level of probability.

NS- Non-significant

R^2= 0.53

F=11.34

It very well may be seen From Table 4.15 it is indicated that selected independent variables have explained variation in integrated pest management practices by Chilli growers to the extent of 53.60 per cent. The coefficient of determination (R^2) of the independent variable was 0.536. it was seen that, among independent variables only one variable viz. social participation was positively significant and two variables viz. education and knowledge were discovered to be positively and highly significant, the commitment of the other seven independent variables specific farming experience,

land holding, area under Chilli crop, annual income, mass media exposure, extension contacts and economic motivation were discovered to be positively non-significant and only one independent variable viz. risk orientation was discovered to be negative and non-significant.

4.4. The constraints faced by Chilli growers in adoption of integrated pest management practices in Chilli

4.16 Distribution of the respondents according to the constraints face in adoption of integrated pest management practices in Chilli.

N=120

Sl. No.	Constraints	Frequency	percentage	Rank
A	**Technical constraints**			
1.	Lack of knowledge about recommended IPM practices	50	41.67%	X
2.	Lack of knowledge about manure and fertilizer management	67	55.83%	V
3.	Lack of knowledge about resistant variety	52	43.33%	IX
4.	Lack of knowledge about identification of pests	59	49.16%	VIII
5.	Lack of technical guidance from extension functionary about IPM practices	74	61.66%	II
6.	Lack of knowledge about using recommended dose of chemical	65	54.16%	VI
B	**Financial**			
1.	High cost of pesticide	74	61.66%	II
2.	Inadequate source of finance	48	40.00%	XI
C	**Service and supply problem**			
1.	Non availability of pesticide in village	60	50.00%	VII
2.	Non availability of neem cake at local level	70	58.33%	III

D.	**Any other**			
1.	Natural calamities	108	90.00%	I
2.	Non availability of water for spraying	40	33.33%	XII
3.	Non availability of skilled labour	58	48.33%	IX
4.	High wages of labour	69	57.50%	IV

Based on various types of difficulties faced by the respondents, the constraints are presented below.

It is depicted from Table 4.16 that in case of technical constraints, respondents faced constraints like. lack of technical guidance from extension functionaries (61 .66%), lack of knowledge about fertilizer management (55.83%), lack of knowledge about using recommended dose of chemical (54.16%), problem in identification of disease and pest (49.16%), lack of knowledge about resistant varieties (43.33%), lack of knowledge about recommended IPM technology (41.67%).

In case of financial constraints, about 61.66 per cent of respondents had expressed problem of high cost of pesticide, followed by 40.00 per cent respondents had problem of inadequate source of finance.

In case of services and supply constraints, about 50.00 per cent of the respondents has problem in non-availability of pesticides in village and followed by 58.33 per cent of the respondents has problem of non-availability of neem cake at local level.

In case of any other constraints majority of the respondents faced with problem like, natural calamities (90.00%) whereas high wages of labour (57.50%), non-availability of skilled labour (48.33%) and non-availability of water for spraying was expressed by (33.33%) of the respondents.

Similar findings were recorded by Bansod (2016).

Table no. 4.17 Suggestion given by farmers to overcome the constraints during IPM practices by Chilli growers

N=120

Sl. No.	Suggestions	Frequency	Percentage	Rank
1	Training on IPM practices should be imparted	110	91.67%	I
2	Timely supply of essential inputs should be provided	75	62.50%	V
3	Seeds of improved varieties should be made available to the farmers at local market	85	70.83%	II
4	Light trap, pheromone trap, biological control measures should be made available in time	76	63.33%	IV
5	Regular availability of neem cake at village level	77	64.16%	III
6	Suitable implements should be made available for filed sanitation and deep ploughing	65	54.16%	VII
7	Appropriate pesticides should be given on right time	62	51.66%	VIII
8	Cost of seeds, fertilizers, pesticides etc. should be less	74	61.66%	VI

The suggestion expressed by the Chilli growers while adopting the Integrated Pest Management practices were collected and presented in Table 4.17.

It is seen from Table 16 that in suggestion, 91.67 per cent farmers suggested guidance to training on IPM practices should be imparted, 62.50 per cent timely supply of essential inputs should be provided, 70.83 per cent Seeds of improved varieties should be available to the farmers at local market, 63.33 per cent demonstration regarding installation of light trap, pheromone trap, biological control measures should

be available in time, 64.16 per cent of the respondents said regular availability of neem cake at village level is needed.

As regard to suggestion 54.16 per cent of the respondent suggested Suitable implements should be made available for filed sanitation and deep ploughing, 51.66 per cent of the respondents suggested appropriate pesticides should be given on right time 61.66 per cent of respondents suggested Cost of seeds, fertilizers, pesticides etc. should be less.

A close look at the suggestions made by the respondents reveal that such suggestions have been made by the Chilli growers which would raise their adoption level.

CHAPTER - V

SUMMARY AND CONCLUSION

CHAPTER-V

SUMMARY AND CONCLUSION

The goal of IPM is to control population of the pest below level that result in economic damage. Ideally, this is achieved through the integration of all suitable control techniques in a compatible manner Integrated Pest Management is one of such systematic approach which emphasizes not only the reduction in use of pesticides and keeping below the level of pest causing economic injury but also it facilitates the use of cultural, mechanical, biological and chemical methods of control in an integrated manner and restores ecological balance for sustainable agriculture.

The present investigation entitled, "adoption of Integrated pest management practices by Chilli growers." was undertaken with the following specific objectives:

1. The profile of Chilli growers
2. Adoption regarding integrated pest management practices by the Chilli growers
3. Relationship between the profile of Chilli growers with their adoption of integrated pest management practices
4. Constraints faced by the Chilli growers in adoption of integrated pest management practices and invite their suggestions to overcome it

Research methodology

The methodological procedure consisted of measurement of dependents and independent variables, sampling techniques, selection and measurement of variables, tools and techniques of data collection and analysis of data. The present study was carried out in the Nagpur district of Maharashtra State. From the selected district three talukas were selected purposively as these talukas namely Kuhi, Bhiwapur and Mouda were purposively selected. Thus, total twelve villages were selected from three tehsils for the study. From each selected village, ten Chilli growers were selected purposively on the basis of maximum area under Chilli crop as these 120 Chilli growers were selected as Chilli growers for the study. Keeping in view, the objectives of the study, the interview schedule was prepared and Chilli growers were interviewed at their home and for this purpose ex-post factor research design was used.

The objectives were set for the study and eleven independent variables were measured through respective scales and structured scheduled and dependent variable was "Adoption" and it was measured with the help of structured schedule for the

present study. The collected data were analysed by using frequency, percentage, arithmetic mean, standard deviation, correlation coefficient (r) and multiple regression. A simple percentage technique was also applied to materialize the constraints and suggestions.

5.1. Summary

5.1.1. Profile of Chilli growers.

5.1.1.1. Farming experience

It was revealed that majority (60.84%) of the Chilli growers had medium farming experience while, 20.00 per cent Chilli belonged to low level of farming experience and 19.16 per cent belonged to high farming experience.

5.1.1.2. Education

It was found that more than one fourth (25.84%) of the Chilli growers has educational level up to primary school, while 24.16 per cent of them received secondary school and 24.16 per cent has education up to higher secondary school level followed by 17.50 per cent of the respondents were graduate, whereas 08.34 per cent of them were illiterate.

5.1.1.3. Land holding

It was noticed that less than half (40.83%) of the Chilli growers were possessing 2.01 to 4.00 ha of land and belonged to semi medium land owner's category while 35.83 per cent of the Chilli growers were possessing up to 1.01 to 2.00 ha of land and belonged to small land owner's category, and 10.84 per cent of the Chilli growers belonged to marginal land owner's category up to 1.00 ha whereas, 06.66 per cent farmers included under medium farmers category 4.01 to 10.01 ha. Only 5.83 per cent of the Chilli growers were possessing land 10.01 ha above and belonged to big land owner's category.

5.1.1.4. Area under Chilli crop

It was observed that majority (70.00%) of the Chilli growers had medium area under Chilli crop, followed by 15.83 per cent and 14.17 per cent had low and high area under Chilli cultivation, respectively.

5.1.1.5. Annual income

It was found that majority (68.34%) of farmers had medium annual income followed by 20.00 per cent farmers had high annual income category and only few 11.66 per cent Chilli growers belonged to low annual income category per year.

5.1.1.6. Social participation

It was regarding that majority (65.83%) of the Chilli growers were having medium level of risk orientation whereas, 17.50 per cent and 16.67 per cent belonged to high and low risk orientation category respectively.

5.1.1.7. Mass media exposure

It was concluded that two third (66.67%) of the Chilli growers had medium mass media exposure while, 18.33 per cent of the Chilli growers were belonged low level of mass media exposure and 15.00 per cent of the Chilli growers were having high mass media exposure.

5.1.1.8. Extension contacts

It was noticed that majority (69.17%) of the Chilli growers had medium extension contact while, 17.50 per cent of the Chilli growers were belonged low level of extension contact and only 13.33 per cent of the Chilli growers were having high extension contact.

5.1.1.9. Risk orientation

It was found that majority (72.50%) of the Chilli growers were having medium level of risk orientation whereas, 15.83 per cent and 11.67 per cent belonged to low and high-risk orientation category respectively.

5.1.1.10. Economic motivation

It was concluded that nearly two third (65.00%) of the Chilli growers were belonged to medium level economic motivation, followed by 20.84 per cent and 14.16 per cent of high and low level of economic motivation, respectively.

5.1.1.11. Knowledge

It was seen that majority (67.50%) of the Chilli growers were having medium level of knowledge of improved Chilli IPM practices followed by 20.00 per cent were having high level of knowledge of Chilli Integrated Pest management practices and 12.50 per cent of the respondent s was having low level of knowledge.

5.1.2. Adoption of Integrated pest management practices on Chilli crop

It was noticed that the majority (64.16%) of Chilli growers were found in medium adoption of integrated pest management practices followed by 19.17 per cent and 16.67 per cent Chilli growers were found in high and low adoption respectively.

5.1.3. The relationship between profile of Chilli growers and Extent of Adoption of Integrated pest management practices

5.1.3.1. Farming experience and adoption

There was a positive and highly significant correlation between farming experience and adoption.

5.1.3.2. Education and adoption

There was a positive and highly significant correlation between education and adoption.

5.1.3.3. Land holding and adoption

There was a positive and significant correlation between land holding and adoption.

5.1.3.4. Area under Chilli crop and adoption

There was a positive and significant correlation between area under chilli crop and adoption.

5.1.3.5. Annual income and adoption

There was a positive and highly significant correlation between annual income and adoption.

5.1.3.6. Social participation and adoption

There was a positive and highly significant correlation between social participation and adoption.

5.1.3.7. Mass media exposure and adoption

There was a positive and highly significant correlation between mass media exposure and adoption.

5.1.3.8. Extension contacts and adoption

There was a positive and highly significant correlation between extension contacts and adoption.

5.1.3.9. Economic motivation and adoption

There was a positive and highly significant correlation between economic motivation and adoption.

5.1.3.10. Risk orientation and adoption

There was a positive and highly significant correlation between risk orientation and adoption.

5.1.3.11. knowledge and adoption

There was a positive and highly significant correlation between knowledge and adoption.

5.1.4. Multiple regression analysis

5.1.4.1 Multiple regression analysis between profile of Chilli growers and adoption of integrated pest management practices

It was seen that, co-efficient of determination ($R^{2)}$ of the independent variable was 0.53. it implies that, among independent variables only one variable viz. social participation was positively significant and two variables viz. education and knowledge were discovered to be positively and highly significant, the commitment of the other seven independent variables specific farming experience, land holding, area under Chilli crop, annual income, mass media exposure, extension contacts and economic motivation were discovered to be positively non-significant and only one independent variable viz. risk orientation was discovered to be negative and non-significant.

5.1.5. Constraints faced by Chilli growers and invite their suggestion

The major problems faced by the respondents were about natural enemies (90.00%), lack of technical guidance from extension functionary about IPM practices (61.66%), high cost of pesticide (61.66%), non-availability of neem cake at local level (58.33%), high wages of labour (57.50%), lack of knowing about manure and fertilizer management (55.83%), lack of knowledge about using recommended of chemical (54.16%) and non-availability of pesticide in village (50.00%).

In addition to these, lack of knowledge about identification of pests (49.16%), non-availability of skill labour (48.33%), lack of knowledge about resistant variety (43.33%), lack of knowledge about recommended IPM practices (41.67%), inadequate source of finance (40.00%), and non-availability of water for spraying (33.33%).

The suggestion expressed by Chilli growers such as training on IPM should be imparted (91.67%), seed of improved varieties should be available to the farmer at local level (70.83%), regular availability of neem cake at village level (64.16%) and light trap, pheromone trap, biological control measures should be available in time (63.33%).

In addition to this timely supply of essential inputs should be provided (62.50%), cost of seeds, fertilizers, pesticides etc. should be less (61.66%), suitable

implements should be made available for field sanitation and deep ploughing (54.17%) and appropriate pesticides should be given on right time (51.66%).

5.2 CONCLUSION

It was observed that majority of Chilli growers belonged to middle group had medium farming experience, almost all literate, semi medium land holding, medium area under Chilli crop, had medium annual income. Most of the Chilli growers were from social participation, medium mass media exposure, were from, extension contacts had medium risk orientation, medium economic motivation and most of the Chilli growers had medium level of knowledge about Integrated pest management practices. Also clearly observed that, majority of the Chilli growers had medium adoption of IPM practices.

Regarding association between profile of Chilli growers and adoption of integrated pest management practices it was concluded that, area under Chilli crop had positive and significant relationship with adoption of integrated pest management practices whereas farming experience , education, land holding, annual income, social participation, mass media exposure, extension contacts, risk orientation, economic motivation and knowledge had positively and highly significant relationship with adoption of IPM practices.

Major constrained faced by Chilli growers were proper information about natural enemies**,** lack of technical guidance from extension functionary about IPM practices, high cost of pesticide, non-availability of neem cake at local level , high wages of labour, lack of knowing about manure and fertilizer management , lack of knowledge about using recommended of chemical and non-availability of pesticide in village, lack of knowledge about identification of pests non-availability of skill labour, lack of knowledge about resistant variety, lack of knowledge about recommended IPM practices, inadequate source of finance, and non-availability of water for spraying.

Majority of Chilli growers suggestion that as training on IPM should be imparted, seed of improved varieties should be available to the farmer at local level, regular availability of neem cake at village level and light trap, pheromone trap, biological control measures should be available in time, timely supply of essential inputs should be provided, cost of seeds, fertilizers, pesticides etc. should be less, suitable implements should be made available for field sanitation and deep ploughing and appropriate pesticides should be given on right time.

5.3. IMPLICATION

The author hopes that this research study would be highly useful in understanding personal and socio-economic characteristics of the respondents, their knowledge and adoption level about IPM practices and constraints faced by them in adoption of IPM practices and suggestions made by them. The result of the study would provide guideline to policy makers, executers and the extension agents, in popularizing the IPM practices among farmers. On the basis of results of the present study, following implication have been drawn.

5.3.1. Implication for action

1. The study has identified the adoption regarding IPM practices. The extension personal may use these findings for locating the prospective adopters and increase the rate of adoption of IPM practices.
2. The respondents were found to be taking in detail knowledge about judging of pest control, light traps, pheromone traps, about biological control, crop rotations. Therefore, farmers training m IPM practices will be very useful to increase adoption of integrated pest management practices by Chilli.
3. The availability of bio-agents of pest control, pheromone traps, tri-chocerids, biopesticides and fertilizers and pesticides should be made available on large scale at reasonable cost by Department of Agriculture at grass root level.
4. Maximum literature, poster, charts and folders should be published in local language and distributed by Department of Agriculture with consultation of Scientist from Agricultural Universities.
5. The campaign programmes should be organized jointly by Agricultural university and Department of Agriculture for adoption of IPM practices.

5.3.2. Implication for future study

The implication emerged from the present study suggest some measure for future research. They are as follows,

1. The study was conducted in Kuhi, Bhiwapur and Mouda of Nagpur district of Vidarbha region with restricted sample size Therefore, generalization based on this study alone will not be meaningful. It is therefore, implicated that study may be extended to other similar areas of other of Nagpur district.

2. Multi-location studies may be conducted on adoption of Integrated Pest Management practices by the Chilli growers, for generalization of finding on a wide range.

3. This type of study can also be carried out in other horticultural crops. It will help to know the different level of adoption of Integrated Pest Management practices in different horticultural crop.

4. The investigation made it clear that variation in the adoption level of IPM practices was explained by the independent variables selected for the study. The future researcher may try to find out the factors responsible for remaining variation.

5. There is also a wide scope to study some more intrinsic and extrinsic factors that contributes to the adoption of Integrated Pest Management practices by the by Chilli growers.

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APPENDIX

APPENDIX

DEPARTMENT OF EXTENSION EDUCATION

COLLEGE OF AGRICULTURE, LATUR

VASANTRAO NAIK MARATHWADA KRISHI VIDYAPEETH, PARBHANI

INTERVIEW SCHEDULE

RESEARCH TOPIC: ADOPTION OF INTEGRATED PEST MANAGEMENT PRACTICES BY CHILLI GROWERS

Researcher **:Deshmukh K. P.**

Degree Programme **: M.Sc. (Agri.)**

Reg. No **: 2020A/74ML**

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Department of Extension Education

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PART -I

A) <u>Personal Information</u>

1. **Name of the Chilli Growers** **:……**
2. **Village** **:……**
3. **Tehsil** **:……**
4. **District** **:……**
5. **Mobile Number** **:……**

B) <u>Profile of Chilli Growers</u>

1. **Farming experience (Years)** **:……**
2. **Education(std)** **:……**
3. **Land holding (ha.)** **:……**
4. **Area under chilli crop (ha.)** **:……**
5. **Annual income (Rs./annual)** **:……**

6. Social participation (Nirban 2004)

Sl. No.	Organization	Member	Office bearer	Nature of Participation		
				Regular	Occasional	Never
1	Grampanchayat					
2	Co-operative Society					
3	School Committee					
4	Farmers Club					
5	Bhajani Mandal					
6	Women's Club					
7	Panchayat Samiti					
8	Zilla Parishad					
9	Sales Purchase Society					
10	Any other					

7. Mass media exposure (Nirban 2004)

Sl. No.	Mass media	Extent of use		
		Always	Sometimes	Never
1	News Paper			
2	Extension publication			
3	Farm magazine			
4	Agril. Films			
5	Radio			
6	Television			
7	Kisan Call Centre			
8	Internet			

8. Extension contacts (Nirban 2004)

Sl. No.	Extension worker	Frequency of contact					
		Once a week	Once a fortnight	Once a month	Once a quarter	Once a month	Once a year
1	Gramsevak						
2	Agril. Assistant						
3	Agril. Supervisor						
4	Circle Agril.Officer						
5	Taluka Agril. Officer						
6	Agril. Extention Officer						
7	Agril. Officer						
8	Subject matter Specialist						
9	Block Development Officer						
10	Sub-divisional Agril. Officer						
11	Others						

9. Risk orientation (Supe 2007)

Sl. No.	Statements	SA	A	UD	DA	SDA
1	A farmer should rather take more of a chance in making a big profit than to be contented with a smaller, but less risky profit.					
2	A farmer who is willing to take greater risks than the average farmer, usually do better financially.					
3	It is good for a farmer to take risks when he knows his chance to success is fairly high.					
4	Trying an entirely new method in farming by a farmer involves risk, but it is worth doing it.					
5	A farmer should grow large number of crops to avoid greater risks involved in growing one or two crops.					
6	It is better for a farmer not to try new farming method unless most other farmers have used them with success.					

SA= Strongly agree, A = Agree, UD = Undecided, DA = Disagree, SDA = Strongly disagree

10. Economic motivation (Supe 2007)

Sl. No	Statements	Response				
		SA	A	UD	DA	SDA
1	A farmer should work towards larger yield and economic profit.					
2	The most successful farmer is the one who makes the most profit.					
3	A farmer should try any new farming idea which may earn him more money.					
4	A farmer should grow cash crop to increase monetary profits in comparison to growing of food crops for home.					
5	It is difficult for farmer's children to make good start unless they provide them with economic assistance.					
6	A farmer must earn for his living but the most important thing in life cannot be defined in economic terms.					

SA= Strongly agree, A = Agree, UD = Undecided, DA = Disagree, SDA = Strongly disagree

11. Knowledge

Sl. No.	Statements	Knowledge	
		Yes	No
A.	**IPM Practices**		
1.	**Cultural Methods**		
a.	Summer Ploughing		
b.	Burning of crop residue in the field		
c.	Optimum spacing (60cm x 45cm / 60 cm x 60 cm)		
d.	Used of recommended varieties (Hirkani(AKC-460), Bhavapuri, Parbhani Tejas, Jayanti, Phule Jyoti, Parbhani Mirchi, C5, Nandika, Arunim, SVHA8913).		
e.	Integrated use of Manure and Fertilizer		
2.	**Mechanical method**		
a.	Collection and destruction of infested plant parts and fallen fruits (at regular interval)		
b.	Erection of yellow sticky traps for sucking pest @15-20 /ha		
c.	Use of pheromone traps for fruits borer@10-12/ha		
d.	Destroyed the caterpillar or egg mass through hand picking		
3.	**Biological methods**		
a.	Used plant products:		
	1.Neem oil (@2%at the early infestation stage of sucking pest and shoot and fruit borer)		
	2.Neem seed Extract (@5% for both sucking pest and shoot and fruit borer)		
b.	Use of Parasite/ Parasitoids		
4.	**Chemical methods**		
a.	Soil application of insecticides		

	(Drenching of seed bed with copper oxy-chloride /bavastin/formaldehyde to control damping off.)		
b.	Treating seeds with biofertilizers (Azatobactor/ Azospirillium @ 200gm in 200 ml rice water for 500gm seeds)		
c.	Seed treatment (Thiram / Captan / Bavistin @ 3gm / kg.		
d.	Spraying of insecticides		
	1.Control of sucking Pests (Thrips, Mites, Jassids, Aphids, White flies - spraying of Metasystox @1.5ml/liter of water followed by Metathion @ 1ml/liter of water.)		
	2. Control of Fruit borer (Spraying of Methyl Dematon 25% @8ml in 10 lit. of water.)		
	3. Control of Caterpillar (Semilooper, Tobacco leaf eating caterpillar) – spraying of Choloropyriphos20 EC @ 25 ml in 10 lit. of water.		

PART - II

Adoption of Integrated Pest Management Practices by Chilli growers

Sl. No.	Statements	Knowledge		
		Complete	Partial	Nil
A.	**IPM Practices**			
1.	**Cultural Methods**			
a.	Summer Ploughing			
b.	Burning of crop residue in the field			
c.	Optimum spacing (60cm x 45cm / 60 cm x 60 cm)			
d.	Used of recommended varieties (Hirkani(AKC-460), Bhavapuri, Parbhani Tejas, Jayanti, Phule Jyoti, Parbhani Mirchi, C5, Nandika, Arunim, SVHA8913).			
e.	Integrated use of Manure and Fertilizer			
2.	**Mechanical method**			
a.	Collection and destruction of infested plant parts and fallen fruits (at regular interval)			
b.	Erection of yellow sticky traps for sucking pest @15-20 /ha			
c.	Use of pheromone traps for fruits borer@10-12/ha			
d.	Destroyed the caterpillar or egg mass through hand picking			
3.	**Biological methods**			
a.	Used plant products:			
	1.Neem oil (@2%at the early infestation stage of sucking pest and shoot and fruit borer)			

	2.Neem seed Extract (@5% for both sucking pest and shoot and fruit borer)			
b.	Use of Parasite/ Parasitoids			
4.	**Chemical methods**			
a.	Soil application of insecticides (Drenching of seed bed with copper oxy-chloride /bavastin/formaldehyde to control damping off.)			
b.	Treating seeds with biofertilizers (Azatobactor/ Azospirillium @ 200gm in 200 ml rice water for 500gm seeds)			
c.	Seed treatment (Thiram / Captan / Bavistin @ 3gm / kg.			
d.	Spraying of insecticides			
	1.Control of sucking Pests (Thrips, Mites, Jassids, Aphids, White flies -spraying of Metasystox @1.5ml/liter of water followed by Metathion @ 1ml/liter of water.)			
	2. Control of Fruit borer (Spraying of Methyl Dematon 25% @8ml in 10 lit. of water.)			
	3. Control of Caterpillar (Semilooper, Tobacco leaf eating caterpillar) – spraying of Choloropyriphos20 EC @ 25 ml in 10 lit. of water.			

Part - III

A) Constraints faced by the chilli growers during adoption of integrated pest management practices.

Sl. No.	Constraints	Yes	No
A.	**Technical constraints**		
1.	Lack of knowledge about recommended IPM practices		
2.	Lack of knowledge about Fertilizer management		
3.	Lack of knowledge about resistant variety		
4.	Lack of knowledge about identification of pests		
5.	Lack of technical guidance from Extension functionary		
6.	Lack of knowledge about using recommended doses of chemical		
B.	**Financial**		
1	Inadequate source of finance		
2	High cost of pesticide		
C.	**Services and supply problem**		
1	Non availability of pesticide in village		
2	Non availability of neem cake at local level		
D.	**Any other**		
1	Nature calamities		
2	Non availability of water for spraying		
3	Non availability of skilled labours		
4	High wages of labour		

B) Suggestion given by farmers to overcome the constraints during IPM practices by chilli growers

Sl. No.	Suggestions	Yes	No
1	Training on IPM practices should be imparted		
2	Timely supply of essential inputs should be provided		
3	Seeds of improved varieties should be available to the farmers at local market		
4	Light trap, pheromone trap, biological control measures should be available in time		
5	Regular availability of neem cake at village level		
6	Suitable implements should be made available for filed sanitation and deep ploughing		
7	Appropriate pesticides should be given on right time		
8	Cost of seeds, fertilizers, pesticides etc. should be less		

CURRICULUM VITAE

CURRICULUM VITAE

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Academic qualification

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B. Sc. (Agri.)	Ramkrishna Bajaj College of Agriculture,Wardha	Dr. P.D.K.V., Akola	2020	79.00	First

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