

**A STUDY ON KNOWLEDGE AND ADOPTION OF
POTATO GROWERS IN HASSAN DISTRICT OF
KARNATAKA STATE**

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DEPARTMENT OF AGRICULTURAL EXTENSION

UNIVERSITY OF AGRICULTURAL SCIENCES

BENGALURU

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**A STUDY ON KNOWLEDGE AND ADOPTION OF
POTATO GROWERS IN HASSAN DISTRICT OF
KARNATAKA STATE**

**SHILPA, C.N
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**Thesis submitted to the
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in partial fulfillment of the requirements
for the award of the degree of
*Master of Science (Agriculture)***

in

AGRICULTURAL EXTENSION

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Affectionately Dedicated to

My Beloved Parents

Nagaraju, Kamalaxi,

Brother, Sisters and my Friend

**DEPARTMENT OF AGRICULTURAL EXTENSION
UNIVERSITY OF AGRICULTURAL SCIENCES
GKVK, BENGALURU- 560065**

CERTIFICATE

*This is to certify that the thesis entitled “**A Study on Knowledge and Adoption of Potato Growers in Hassan District of Karnataka State.**” submitted by miss. **SHILPA, C.N.** in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE IN AGRICULTURAL EXTENSION** to the university of agricultural sciences, GKVK, Bengaluru is a record of research work done by her during the period of her study in this university under my guidance and supervision and the thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar titles.*

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“A study on knowledge and adoption of potato growers in Hassan district of Karnataka state”

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THESIS ABSTRACT

The present study was conducted in Hassan district of Karnataka during 2009-10 to analyze the knowledge and adoption of recommended potato cultivation practices among farmers, to enlist the marketing channels utilized by potato growers and to understand the constraints in the production, marketing and storage of potato. The findings revealed that majority (45.55%) of the potato growers had medium overall knowledge followed by high (32.22%) and low (22.23%). Cent per cent of the potato growers had correct knowledge about the practices like recommended variety, row to row spacing and nitrogen top dressing after planting. Further, more than 90.00 per cent of farmers had correct knowledge regarding earthing up, name of the pest and disease attacked, height of ridges, plant to plant spacing, suitable month for sowing and seed rate per acre. Majority (44.45%) of potato farmers had medium adoption level. Whereas, 34.44 per cent and 21.11 per cent of the respondents belonged to high and low adoption category, respectively. Cent per cent of potato growers adopted practice like improved seed. About 65.00 to 70.00 per cent of farmers had fully adopted the practices like plant protection against disease and seed rate per acre. Education, age, extension contact, extension participation mass media participation and risk orientation of potato growers were significantly associated with their knowledge level. Age, education, extension participation, social participation, mass media participation and risk orientation of potato growers were significantly associated with their adoption level. Majority (55.57%) of the farmers marketed their product through APMC, 22.23 per cent of the farmers sold their product through village merchant and 11.12 per cent of farmers marketed their product through wholesalers. The constraints perceived by the potato growers in the production of potato were high cost of seed material, untimely availability of seed material, high cost of fertilizers, lack of technical guidance, more pest attack, more disease incidence, high cost of plant protection chemical. The constraints perceived by the potato growers in the marketing of potato were high cost of transportation, fluctuation in market price, distant market places, and high commission charges. The constraints perceived by the potato growers in respect of storage of potato were non-availability of cold storage, high cost of storage, distant storage facilities, no cold storage facility in APMC, less capacity of cold storage and no loan facility for the stored potato.

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**ಹಾಸನ ಜಿಲ್ಲೆ ಆಲೂಗಡ್ಡೆ ಬೆಳೆಗಾರರಲ್ಲಿ ಶಿಫಾರಸ್ಸು ಮಾಡಿದ ಬೇಸಾಯ ಕ್ರಮದ ಅರಿವು ಮತ್ತು
ಅಳವಡಿಕೆ - ಒಂದು ಅಧ್ಯಯನ**

ಶಿಲ್ಪ ಸಿ.ಎನ್

ಪ್ರಬಂಧ ಸಾರಾಂಶ

ಹಾಸನ ಜಿಲ್ಲೆಯ ಆಲೂಗಡ್ಡೆ ಬೆಳೆಗಾರರಲ್ಲಿ ಶಿಫಾರಸ್ಸು, ಮಾಡಿದ ಬೇಸಾಯ ಕ್ರಮದ ಜ್ಞಾನ ಮತ್ತು ಅವರು ಅಳವಡಿಸಿದ ಕೃಷಿ ಪದ್ಧತಿ, ಮಾರುಕಟ್ಟೆ ಮಾರ್ಗೋಪಾಯಗಳು ಹಾಗೂ ಅವರು ಎದುರಿಸುವ ಸವಾಲುಗಳನ್ನು ವಿಶ್ಲೇಷಿಸುವ ಉದ್ದೇಶದಿಂದ ಪ್ರಸ್ತುತ ಅಧ್ಯಯನವನ್ನು ೨೦೦೬-೧೦ ನೇ ಸಾಲಿನಲ್ಲಿ ಕೈಗೊಳ್ಳಲಾಯಿತು. ಹೆಚ್ಚಿನ ಬೆಳೆಗಾರರು (ಶೇ ೪೫.೫೫) ಶಿಫಾರಸ್ಸು, ಮಾಡಿದ ಕೃಷಿ ಪದ್ಧತಿಯಲ್ಲಿ ಸಾಮಾನ್ಯ ಮಟ್ಟದ ತಿಳುವಳಿಕೆ ಹೊಂದಿದ್ದು, ಶೇ ೩೨.೨೨ ರಷ್ಟು ಬೆಳೆಗಾರರು ಅತ್ಯುತ್ತಮ ಮಟ್ಟದ ಜ್ಞಾನವನ್ನೂ, ಶೇ ೨೨.೨೨ ರಷ್ಟು ಕೃಷಕರು ಅತಿ ಕಡಿಮೆ ತಿಳುವಳಿಕೆಯನ್ನು ಹೊಂದಿರುವುದಾಗಿ ಅಧ್ಯಯನದ ಮೂಲಕ ತಿಳಿದುಬಂದಿತು. ಶಿಫಾರಸ್ಸು ಮಾಡಿದ ತಳಿ, ಸಾಲುಗಳ ನಡುವೆ ಭರಬೇಕಾದ ಅಂತರ ಹಾಗೂ ಸಾರಜನಕದ ಪೂರೈಕೆ ಕುರಿತು ಸಾಮಾನ್ಯವಾಗಿ ಎಲ್ಲಾ ಕೃಷಕರು ತಿಳಿದುಕೊಂಡಿರುವ ಅಂಶ ಗಮನಕ್ಕೆ ಬಂದಿತು. ಶೇಕಡಾ ೬೦ ಕ್ಕೂ ಹೆಚ್ಚು ಬೆಳೆಗಾರರು ಭೂ ಸಿದ್ಧತೆ, ಕೀಟ ಹಾಗೂ ರೋಗ ಬಾಧೆ, ಬದುಕಿನ ಎತ್ತರ, ಲಿಡ್‌ಗಳ ನಡುವಿನ ಅಂತರ, ಚಿತ್ರನೆಯ ಕಾಲ ಹಾಗೂ ಬೀಜದ ಪ್ರಮಾಣ ಕುರಿತು ಸರಿಯಾದ ತಿಳುವಳಿಕೆ ಹೊಂದಿರುವುದಾಗಿ ತಿಳಿದು ಬಂದಿತು. ಹೆಚ್ಚಿನ ಬೆಳೆಗಾರರು (ಶೇ ೪೪.೪೫) ಸುಧಾರಿತ ಪದ್ಧತಿಯ ಮಾದರಿಯಲ್ಲಿ ಮಧ್ಯಮ ಲೀತಿಯ ಅಳವಡಿಕೆಯನ್ನು ಹೊಂದಿದ್ದಾಗಿಯೂ ಮತ್ತು ಶೇ ೩೪.೪೪ ರಷ್ಟು ಬೆಳೆಗಾರರಲ್ಲಿ ಅತ್ಯುತ್ತಮವಾದ ಅಳವಡಿಕೆ ಹಾಗೂ ಶೇ ೨೧.೧೧ ಕೃಷಕರಲ್ಲಿ ಅತಿ ಕಡಿಮೆ ಮಟ್ಟದಲ್ಲಿ ಕಂಡುಬಂದಿತು. ಪ್ರತಿಶತ ೧೦೦ ರಷ್ಟು ಬೆಳೆಗಾರರು ಸುಧಾರಿತ ತಳಿಯನ್ನು ಬಳಸುತ್ತಿರುವುದು ತಿಳಿದುಬಂದಿತು. ಸುಮಾರು ಶೇ ೩೫ ರಿಂದ ೭೦ ರಷ್ಟು ಬೆಳೆಗಾರರು ಬೆಳೆಯ ರೋಗ ರಕ್ಷಣಾ ವ್ಯವಸ್ಥೆ ಹಾಗೂ ಸರಿಯಾದ ಬೀಜ ಪ್ರಮಾಣ ಉಪಯೋಗಿಸುತ್ತಿದ್ದಾರೆ ಎಂಬುದು ಅಧ್ಯಯನದ ಮೂಲಕ ತಿಳಿಯಲಾಯಿತು. ವಯಸ್ಸು, ವಿಧ್ಯಾಭ್ಯಾಸ, ವಿಸ್ತರಣಾ ಭೇದ, ವಿಸ್ತರಣಾ ಚಟುವಟಿಕೆಯಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆ, ಸಮೂಹ ಮಾಧ್ಯಮದಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆ, ಹಾಗೂ ಶ್ರಮ ತೆಗೆದುಕೊಳ್ಳುವುದು ಜ್ಞಾನದ ಜೊತೆಗೆ ಪ್ರಾಮುಖ್ಯವಾದ ಸಂಬಂಧಹೊಂದಿದೆ. ವಯಸ್ಸು, ವಿಧ್ಯಾಭ್ಯಾಸ, ವಿಸ್ತರಣಾ ಭೇದ, ವಿಸ್ತರಣಾ ಚಟುವಟಿಕೆಯಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆ, ಸಮೂಹ ಮಾಧ್ಯಮದಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆ, ಸಮೂಹದಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆ ಹಾಗೂ ಶ್ರಮ ತೆಗೆದುಕೊಳ್ಳುವುದು ಅಳವಡಿಕೆಯ ಜೊತೆಗೆ ಪ್ರಾಮುಖ್ಯವಾದ ಸಂಬಂಧಹೊಂದಿದೆ. ಹೆಚ್ಚಿನ ಬೆಳೆಗಾರರು (ಶೇ ೫೫.೫೭) ಕೃಷಿ ಮಾರುಕಟ್ಟೆ ಸಮಿತಿಗಳ ಮೂಲಕವೂ, ಶೇ ೨೨.೨೨ ಬೆಳೆಗಾರರು ಸ್ಥಳೀಯ ವ್ಯಾಪಾರಿಗಳ ಮೂಲಕವೂ ಮತ್ತು ಶೇ ೧೧.೧೨ ಬೆಳೆಗಾರರು ಸಗಟು ವ್ಯಾಪಾರಿಗಳ ಮೂಲಕ ತಮ್ಮ ಉತ್ಪಾದನೆಯನ್ನು ಮಾರಾಟಮಾಡಿರುವುದು ಕಂಡುಬಂದಿತು. ರೈತರು ಎದುರಿಸುತ್ತಿರುವ ತೊಂದರೆಗಳೆಂದರೆ ದುಬಾರಿಯಾದ ಬೀಜ ಹಾಗೂ ಗೊಬ್ಬರ, ಸರಿಯಾದ ಸಮಯಕ್ಕೆ ಬೀಜಗಳು ದೊರೆಯದಿರುವುದು, ಮಾರ್ಗದರ್ಶನದ ಕೊರತೆ, ಹೆಚ್ಚಿನ ಕೀಟ-ರೋಗ ಬಾಧೆ ಮತ್ತು ಬೆಳೆ ರಕ್ಷಣಾ ರಸಾಯನಿಕಗಳ ಹೆಚ್ಚಿನ ಬೆಲೆ ಇವು ಉತ್ಪಾದನೆಯಲ್ಲಿ ಕಂಡುಬಂದ ಪ್ರಮುಖ ತೊಂದರೆಗಳು. ಬೆಳೆ ಮಾರಾಟಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ, ದುಬಾರಿ ಸಾಗಾಣಿಕೆ ವೆಚ್ಚ, ಮಾರುಕಟ್ಟೆ ಸಮೀಪವಿಲ್ಲದಿರುವುದು ಮತ್ತು ಹೆಚ್ಚಿನ ಕಮಿಷನ್ ದರ ಇವೇ ಮೊದಲಾದವುಗಳು ಬೆಳೆಗಾರರು ಎದುರಿಸುತ್ತಿರುವ ಕೆಲ ಸವಾಲುಗಳು ಇದಲ್ಲದೆ ಉತ್ಪಾದನೆಯನ್ನು ದಾಸ್ತಾನು ಮಾಡುವಲ್ಲಿ ಶೀತಲ ಕೇಂದ್ರಗಳ ಅಲಭ್ಯತೆ, ದಾಸ್ತಾನು ಮಾಡಲು ವಿಧಿಸುವ ಹೆಚ್ಚಿನ ಶುಲ್ಕ, ಕೃಷಿ ಮಾರುಕಟ್ಟೆಗಳಲ್ಲಿ ಶೀತಲ ಕೇಂದ್ರಗಳ ಸೌಲಭ್ಯ ಇಲ್ಲದಿರುವಿಕೆ ಹಾಗೂ ದಾಸ್ತಾನು ಮಾಡಿದ ಉತ್ಪಾದನೆ ಆಧಾರದ ಮೇಲೆ ಸಾಲ ಸೌಲಭ್ಯ ದೊರಕದಿರುವುದು, ಇವೇ ಮುಂತಾದವು ಮುಖ್ಯವಾಗಿ ರೈತರು ಎದುರಿಸುತ್ತಿರುವ ತೊಡಕುಗಳು.

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(ಡಿ. ನಂಜಪ್ಪ)
ಪ್ರಧಾನ ಮಾರ್ಗದರ್ಶಕರು

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INTRODUCTION

I. INTRODUCTION

Potato crop plays an important role in the world's food economy. It contains important nutritive constituents' viz. carbohydrates, proteins, minerals and vitamins. The potato crop gives more yields per unit area than cereals and that too in a much shorter period.

The Indian sub-continent is endorsed with salubrious climate, which provides for growing vegetables throughout the year. Vegetables play an important role in balanced nutrition as they are rich sources of carbohydrates, proteins, vitamins and minerals. Per capita consumption of the vegetables in India is 170 gm per day as against the recommended 280g per day per person. To meet the required standard of consumption, we need to produce approximately 0.3 million tonnes of vegetables a day.

Vegetables provide more income per unit area of land. Vegetable cultivation among small land holders has always been a source of supplementary income, besides providing gainful employment through intensive cultivation. Thus vegetable growers are normally more prosperous than those who grow only cereals.

Currently, in India the vegetables are being grown 6.23 million ha accounting for the production of 66.58 million tonnes, which is the second highest in the world next to China. Among the major vegetable crops grown, potato occupied 1.4 million hectares with a net production of 24 million tonnes.

Potato is grown in almost all the states of India. The major potato growing states in the country are Uttar Pradesh, West Bengal and Bihar. Uttar Pradesh is accounted for 9.53 million tonnes of country's

production. Realizing the importance of potato cultivation in India, the Government of India set up Central Potato Research Institute (CPRI) at Patna in 1949. Since then, CPRI has been conducting and coordinating the research and acting as a clearing home for information on all aspects of the crop in the country. Apart from this, the State Agricultural Universities and the other state and central government organizations have been contributing to the research and extension education aspects of the crop.

Potato is a high yielding and short duration crop. Due to high protein-calories ratio and short vegetative cycle, potatoes yield substantially more. Potato has high flexibility for adjusting planting and harvesting times. The Indo-Gangetic plains account for nearly 90 per cent potato production in India. Depending on the market rate and arrivals, harvest can be done well before crop maturity or even delayed. Yield keeps on increasing though slowly if the crop is retained in the field even after maturity. Potato is a labour oriented crop. It generates employment and also provides food security. Nearly 250 man days are required for one hectare cultivation of potato. There is enormous potential for employment in processing industry, and also in storage, transportation, retailing and marketing of fresh and processed potatoes. Potato is considered as a balanced and nutritive food. As per CPRI's projection, India shall achieve 49 million tones of potato production from 2 million ha by 2020.

Recent gluts may discourage potato farmers for enhancing potato cultivation/production. Storage is necessary by taking into consideration the semi-perishable nature of potato and India is facing a shortage of about one million tonne storage capacity. The recent establishment of Agri-Export Zones is an indication that India is planning to export potato on a long term basis. India's achievement so

far has not been commendable as it exports only 0.5 per cent of its potato production. Indian potato faces export competition from the countries like Iran, Pakistan, Germany and China. Therefore, efforts are needed to organize potato marketing not only for exports but also for home consumption to sustain potato development in the country.

India has emerged as the third largest potato producer after China and Russia. Potato being a short duration crop gave ample and economical tuber yield in 70-100 days. Karnataka stands in eighth position among the potato growing state in the country. In Karnataka, more than 70 per cent of the potato production is contributed by Hassan district alone. Potato being a short duration crop, flexibility in growing period makes it highly amenable to adjust the cropping systems.

Potato is a major food crop in India occupying 4th position in area (13.13 million ha) and third in production (23.61mt). In Karnataka, potato is mainly cultivated under rainfed situation in Hassan district with an area of 55,791 ha accounting to more than 2/3rd of the state.

In Karnataka, the area and production of potato increased from 34,738 ha and 6,21,810 tonnes in 1991-92 to 55,791 ha and 5,26,737 tonnes respectively in 2009. The major potato growing districts are Belgaum, Hassan, Kolar, Chikkaballapur, Chikkamagalur, and Bangalore (Rural). Among these, Hassan district stands second in area and production with the crop grown mainly in kharif season. In the district, Hassan taluk dominates with an area of 11,890 ha. The Belur taluk and Arkalgud taluk together constitutes an area of 2,670 ha and production of 784.69 tonnes.

Statement of the problem

The results of research have shown that, if all the improved practices are followed by farmers, potato yields could be increased up to 7.5 to 10 tonnes per ha. It is clearly shown that there is a wide gap between actual potato yield obtained by farmers and the possible yield. The possible reasons for this wide variation might be due to the lack of knowledge and non-adoption of all the recommended practices by the potato farmers.

The productivity decline in potato in Karnataka might be attributed to improper nutrient management practiced by farmers and also poor soil fertility status. Hence, an understanding of knowledge level and adoption behaviour of farmers regarding the package of practices followed by the farmers is of greater significance for the development of suitable strategies. Based on this assumption, the proposed research problem is aimed to evaluate the existing knowledge and the level of adoption besides constraints faced by farmers in production, marketing and storage aspects of potato.

The basic objective of the problem is sustaining the yield of potato at reasonable level. The generated information would also be useful to adopt suitable extension methodologies for efficient transfer of technologies.

Therefore, the study was undertaken with the following specific objectives;

1. To study the Knowledge and Adoption level of potato growers with respect to recommended potato cultivation practices.

2. To find out the association between selected personal, socio-economic and psychological characteristics of the respondents and their knowledge and adoption.
3. To assess the marketing channels employed by potato growers.
4. To ascertain the constraints perceived by the potato growers.

Scope of the Study

The knowledge about the farmers and their adoption of improved cultivation practices of potato crop will throw light on the educational efforts being made by the development departments concerned and other related agencies. Further, if there were to be any problem faced by the farmers, it becomes the agenda for the concerned to take up the necessary arrangements to address the same. If there were to be any of the personal characteristics of the farmers found to be related with either the knowledge or the adoption of improved practices, then it becomes a point for consideration in giving importance to such of those characteristics.

This study would be of great help in assessing the knowledge level and factors influencing the level of adoption of recommended practices enlisting and problems faced by the farmers during cultivation, storage and marketing of the produce. The results of this study will be useful for planners, administrators, policy makers, NGO's extension functionaries and other input agencies involved in promotion of potato cultivation in formulation of policies and strategies to boost the production of potato. This would also enable the marketing institutions like APMC, Directorate of Marketing and Inspection, Karnataka State Agricultural Marketing Board, etc to orient their programmes to suit farmers' needs and interest.

Limitations of the study

Due to the limitation of time, financial resources and physical facilities available to the student researcher, the study was restricted only to Hassan district. In spite of certain practical limitations, every effort was made by the student researcher to keep the study as objective as possible by deliberately following all the norms of scientific research, well-structured interview schedule, pre-testing and objective measurement. Since this study was conducted in Hassan district of Karnataka state, the findings of the study can't be generalized for the entire state. However, it represents a greater extent of the state, since the district stands second in its area and production.

Presentation of the study

This thesis has been divided into eight chapters. The first chapter deals with "Introduction" covering the status of potato in India and Karnataka, problems, objectives, scope and limitations of the study. The second chapter is devoted to "Review of Literature" relating to the recent investigation. The third chapter consists of Methodology adopted in measuring the dependent and independent variables, selection of respondents, research design used and statistical tools employed to analyze the data. "Results and Discussion" are presented in fourth and fifth chapters respectively. "Summary" and "References" are presented in sixth and seventh chapters respectively followed by appendices.

***REVIEW OF
LITERATURE***

II. REVIEW OF LITERATURE

A review of the existing literature relevant to the study area helps the researchers to design the theoretical frame of the study and also to assess the nature and quantum of studies already undertaken in that particular area of research. In the light of the objectives of the study, the relevant literature reviewed are presented under the following headings.

1. To study the Knowledge and Adoption level of potato growers with respect to recommended potato cultivation practices.
2. To find out the association between selected personal, socio-economic and psychological characteristics of the respondents and their Knowledge and adoption.
3. To assess the marketing channels employed by potato growers.
4. To ascertain the constraints perceived by the potato growers.

2.1 TO STUDY THE KNOWLEDGE AND ADOPTION LEVEL OF POTATO GROWERS WITH RESPECT TO RECOMMENDED POTATO CULTIVATION PRACTICES.

2.1.1 Knowledge level of potato growers with respect to recommended potato cultivation practices.

Sundaraj (1978) a conducted a study in Bangalore district. The results revealed that 56 per cent of farmers had medium overall knowledge level, 19 and 25 per cent had high and low knowledge respectively, with regard to recommended practices of tomato.

Mundwa and Patil (1987) conducted a study in Bhal area of Gujarat state reported that 75.33 per cent of the respondents possessed medium level of knowledge while only 14 per cent had high level of knowledge and 10.67 per cent of respondents had low level of knowledge.

Prameelamma (1990) conducted a study in Kurnool district of Andhra Pradesh reported that all the three categories of respondents did not have complete knowledge about plant protection measures, time of application of chemical fertilizers, seed treatment and chemical weed control in paddy crop.

Hanchinal *et al.* (1991) carried out a study in Dharwad taluk in their study indicated that majority of the potato growers had full adoption of practices like variety (99.00%), seed rate (87.00%) and time of sowing (84.00%). The same trend was observed in case of partial adoption of disease control (84.00%) and pest control (82.00%) followed by partial adoption of about 45.00 per cent of cultivation practices like spacing, compost and chemical fertilizers doses.

Puranik and Verma (1992) noticed the knowledge index of 100 in disease and pest control by chemicals in case of sweet potato growers in Wardha district of Maharashtra.

Ravishankar (1995) conducted a study in Chikkamagalur district. He observed that 40 per cent of the potato farmers had medium knowledge level followed by 34 per cent and 28 per cent with high and low knowledge levels respectively with regard to recommended cultivation practices.

Basavaprabhu (1995) conducted a study in Bangalore north district of Karnataka state reported that a majority of the vegetable growers had medium to high level of knowledge (20 to 40 percent) and 20 per cent of the respondents had low level of knowledge with respect to improved cultivation practices.

Ravishankar and Katteppa (1997) conducted a study in Karnataka state in their study on adoption behaviour of potato growers noticed that cent per cent of the potato growers fully adopted the practice of improved seed. The practices which had adopted partially by potato farmers were recommended seed rate (81.66%), seed treatment (30.00%), optimum spacing (60.00%), FYM (56.66%), use of insecticide (28.33%) and use of fungicide (24.16%).

Kubde *et al.* (2000) conducted a study in Pune district of Maharashtra and reported that large majority of the potato growers had complete knowledge about recommended varieties, time of sowing (95.50 %), soil type required for cultivation of potato (79.00 %), seed rate (67.50 %), name of pests of potato and their control measures (54.00 %).

Vinod Gupta *et al.* (2001) conducted a study in Jammu and data pertaining to overall knowledge of farmers about improved cultivation practices of rice indicated that 62.00 per cent of the respondents had medium level of knowledge followed by 20.67 per cent and 17.33 per cent had high and low level of knowledge respectively.

Ramachandra (2002) conducted a study in Kolar district of Karnataka revealed that thirty seven per cent of farmers had high level of knowledge of nutrient management practices. Therefore, it is not a matter of satisfaction because there are still 63 per cent of the farmers in medium and low level of knowledge.

Shinde, (2002) conducted a study in Trichirapalli district of Tamil Nadu data pertaining to overall knowledge of farmers about improved cultivation practices of groundnut indicated that 65.65 per cent of respondents had medium level of knowledge. About one seventh (17.22%) each of groundnut growers were having low and high knowledge level.

Puspendra Singh Naruka and Sangram Singh (2003) conducted a study in Kota region of Rajasthan. Their data revealed that 59.46 per cent of big farmers possessed medium knowledge level about improved soybean cultivation practices. About 24.32 per cent farmers had low knowledge level, where as 16.22 per cent of soybean growers had high knowledge level about improved soybean cultivation practices.

The findings revealed that 65.96 per cent of small farmers had medium knowledge level, while 21.27 per cent farmers had low knowledge level, where as only 12.77 per cent soybean growers had high knowledge level.

Further, the study revealed that 63.64 per cent of marginal farmers had medium knowledge level, while 21.21 per cent farmers had low knowledge level, and 15.15 per cent soybean growers had high knowledge level.

Ramesh and Santha Govind (2003) carried out a study in Pudukottai district found that majority (60.00%) of the respondents belonged to high knowledge category, followed by medium (35.00%) and low (5.00%) knowledge level.

Kishor Babu *et al.* (2007) undertook a study in Ranga Reddy district of Andhra Pradesh which indicated that 70.00 per cent of the

small farmers had medium knowledge and 30.00 per cent had high knowledge. Among the medium farmers, 60.00 per cent had medium knowledge and 40.00 per cent had high knowledge. Among the big farmers 73.33 per cent had high level of knowledge and 26.27 per cent had medium knowledge.

Sasidhar Reddy *et al.* (2007) conducted a study in Chittoor district of Andhra Pradesh. The results revealed that majority 66.00 per cent of the respondents had medium knowledge followed by high (18.67%) and low (15.33%) level of knowledge about recommended practices of tomato cultivation.

Pottappa (2008) conducted a study in Chikkaballapure district which revealed that majority of farmers (65.00 %) were under medium overall knowledge category whereas, 21.67 and 13.34 per cent of them belonged to low and high overall knowledge category, respectively.

Venkatesh Gandhi *et al.* (2008) conducted a study in two taluks of kolar district to assess the knowledge level of vegetable growers with respect to IPM practices of tomato crop farming. It was observed that 36.67 per cent of farmers had high knowledge level of integrated pest management practices of tomato crop cultivation. The study also revealed that 33.33 per cent farmers had medium knowledge level of integrated pest management practices of tomato crop cultivation. Further, it also revealed that 30 per cent of farmers had low knowledge level of integrated pest management practices of tomato crop cultivation.

Pankaja *et al.* (2009) conducted a study in Shimoga district of Karnataka state and found that 41.70 per cent of farmers had medium knowledge in contrast to 35.00 and 23.3 per cent of farmers belonging to low and high categories respectively.

Vinay Kumar *al el.* (2009) conducted a study in Bangalore rural district of South Karnataka and Belgaum district of North Karnataka to assess the overall knowledge level of the rose growers about improved cultivation practices. The result indicated that almost equal number of the rose growers had high (43.33%) and medium (42.50%) level of knowledge and (14.17%) of them had low level knowledge.

Sathasivam *al el.* (2009) conducted a study in Bhuvanagiri block of Cuddalore district. The results revealed that majority of respondents (43.34%) were found to have medium level of knowledge about bio-fertilizers followed by low (33.33 %) and high (23.33%) level of knowledge.

2.1.2 Adoption level of potato growers with respect to recommended potato cultivation practices.

Chole et al. (1978) reported that 70 per cent of the farmers had adopted improved varieties, in which 19 per cent of farmers had high, 27 per cent had medium and 24 per cent had low level of knowledge.

Jagadal (1989) conducted a study in Belgaum district of Karnataka State and reported that more than 75 per cent of the farmers know about the occurrence of pests (90.83 per cent) and disease (88.33 per cent) on cabbage crop.

Ajay Kumar (1989) in a study on adoption behavior of grape growers in Ranga Reddy district of Andhra Pradesh depicted that there were more or less equal number of farmers in high (34%) and medium(36%) categories of overall adoption of improved grape cultivation practices followed by low adoption level.

Nikhade and Potdar (1989) conducted a study on adoption behavior in Jalgon district of Maharashtra indicated that 80% of banana growers were fully using recommended variety, spacing, and square method of planting and time of harvesting.

Hanchinal *et al.* (1991) revealed that 17.00 per cent of the potato growers of Dharwad taluk completely adopted plant protection practices, while 82.00 per cent of the potato growers partially adopted and negligible per cent of farmers had not adopted plant protection practices.

Thakur *et al.*(1991) indicated that Yavatmal district of Maharashtra state reported that among the mango growers majority of farmers planted varieties like Langra (59.64%), Dashahari(51.35%) and only few (27.73%) mango growers had planted Keshri varieties. Majority of the respondents had planted mangoes on 0.5 to 1.0 ha area. Nearly three fourth of farmers planted on medium types of soil.

Lianbika and Nikhade (1993) conducted a study in Mizoram reported that cent per cent of the pine apple growers used recommended improved variety, recommended time of planting. Correct seed rate (recommended number of suckers per hectare) was used by 60 per cent respondents. Fourty per cent of respondents used recommended spacing. Adoption of other practices such as use of seed treatment, manuring and plant protection measures were found to be very poor among pine apple growers.

Shylaja *et al.* (1993) in their study on the adoption production technology and constraints in banana production in Trivendrum district of Kerala revealed that the adoption was very low for all the recommended practices expect for preparation of suckers (83 per cent).

The extent of adoption of application of organic manures and irrigation were 28.8 per cent and 48.1 per cent respectively and the recommended fertilizer dose was not adopted by any of the farmers.

Pandya and Vekari (1994) conducted a study on adoption behaviour of banana growers in Surat district of Gujarat and reported that more than half (52 per cent) of the banana growers had medium level of adoption followed by 28 per cent of high and 20 per cent of low categories.

Ravishankar (1995) conducted a study in Chikkamagalur district. It was observed that majority of the potato growers had medium (43 %) adoption level followed by high (30 %) and 27 per cent of them belonged to the low adoption level.

Vijay Kumar (1997) conducted a study on adoption of improved cultivation practices among rose growers in Bangalore South taluk of Bangalore urban district. He reported that almost all the rose growers had adopted the practices like time of harvesting (cent per cent) and variety (93per cent). Great majority of the rose growers had used recommended weedicides to control weeds (81 per cent).

Kushwaha and Pande (1998) conducted a study on potato growers in Panna district of Madhya Pradesh and revealed that the potato growers had low adoption behaviour 63.34 per cent, While 23.23 per cent farmers had medium adoption behavior and 13.33 per cent of farmers had high adoption category.

Vijay Kumar and Narayan Gowda (1999) conducted a study on rose growers in Bangalore district of Karnataka state and found that, majority (57 per cent) of the farmers had adoption sources ranging

between 16 to 19 and 36 per cent of them had scores ranging from 10 to 13. The maximum score was indicating that the adoption level was above average level.

Kubde *et al.* (2000) in their study conducted in Pune district of Maharashtra reported that majority of the potato growers had partially adopted recommended spacing (97.00 %), followed by application of plant protection measures (82.00%), manures (64.00 %) and fertilizers (55.50 %).

Ramachandra (2002) conducted a study in Kolar district of Karnataka revealed that adoption behaviour of farmers with respect to nutrient management practices about 40 per cent and 26.60 per cent and 33.30 per cent of nutrient management practices in cabbage-potato cropping system.

Bhagwat and Gohad (2003) undertook a study in Morshi taluk of Amravati district of Maharashtra and found that the majority of the respondents (53.33%) were medium adopters, where as 26.00 and 20.66 per cent were found in low and high adopter category respectively.

Zagade *et al.* (2003) conducted a study in Sindhudurga of Konkan region. The result revealed that 54.00 per cent of the respondents had medium adoption level, while 29.50 per cent of the respondents had no adoption. Only 10.50 per cent and 6.00 per cent of the respondents had high and low adoption level respectively.

Bhagwan Singh (2004) conducted a study in arid zone of Rajasthan. Findings of the study revealed that 33.33 per cent farmers were low adoption category, While, 33.34 per cent of farmers were in

medium adoption category. Whereas, 66.66 per cent of farmers were under high adoption category.

Gurprit Singh Dhillon and Kuldip Kumar (2004) conducted a study in Mentha growing area of the Punjab state. The maximum number of respondents (44.17%) were observed to have medium extent of adoption in terms of area under the crop (36.67% and 19.17%) were found to have low and high extent of adoption respectively.

Pottappa (2008) study was conducted in Chikkaballapure district which showed that majority (60.00 %) of the respondents belonged to medium adoption category, whereas, 23.34 and 16.67 per cent of the respondents belonged to low and high adoption categories, respectively.

Shivamurthy *et al.* (2008) conducted a study in Srinivaspur taluk of Kolar district of Karnataka. The results revealed that 46.7 per cent of big farmers belonged to high adoption category when compared to 35 per cent of small farmers. Further, 28.3 per cent small farmers belonged to low adoption category when compared to 23.3 per cent of big farmers.

Ramakrishna Rao *et al.* (2008) conducted a study in Alleppey district of Kerala state to analyze the adoption level of sustainable practices in coconut and banana intercropping by farmers. The result revealed that 51.7 per cent of small farmers were found in medium adoption level followed by low adoption (28.3%) and high adoption level (20%). Further, it was found that 53.3 per cent of big farmers had high level of adoption, where as 26.7 per cent and 20 per cent had low and medium adoption levels.

Vinay Kumar *et al.* (2009) conducted a study in Bangalore rural district of southern Karnataka and Belgaum district of northern

Karnataka during the year 2004-05 to know the adoption of improved cultivation practices by rose growers. The result indicated that almost half of the rose growers (49.17%) had high adoption level of recommended practices. Whereas 34.17 and 16.67 per cent of rose growers had medium and low adoption level respectively.

Vishvanath Hiremath *et al.* (2009) conducted a study in Kolar district of Karnataka result revealed that half (50%) of respondents were under medium adopter category while 29.2 per cent of the farmers were under high adopter category and only 20.8 per cent of them were under low adopter category.

Varadaraju *et al.* (2009) conducted a study in Chintamani taluk of Chikkaballapura district of Karnataka state. The results revealed that 40 per cent of the tomato growers had low level of adoption where as 35 per cent and 25 per cent of tomato growers respectively had medium and high level of adoption of improved cultivation practices.

2.2 ASSOCIATION BETWEEN SELECTED PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS OF THE RESPONDENTS AND THEIR KNOWLEDGE AND ADOPTION LEVEL.

2.2.1 Association between selected personal, socio-economic and psychological characteristics of the respondents and their knowledge level.

Kantharaj (1989) conducted a study in Hassan district of Karnataka indicated that education and extension participation had positive and significant relationship with knowledge level of coffee

growers. He also observed a significant relation between education and mass media use of cardamom growers and their knowledge level.

Satheesh (1990) conducted a study in Kanakapura taluk and revealed that education, land holding, mass media participation, extension participation and source of information had positive and significant relationship with knowledge level of chawki rearing practices.

Chandra Naik (1993) conducted a study in Shimoga district observed that there was a positive and significant relationship between the knowledge level of rice growers and their social participation and mass media participation.

Chandran (1997) conducted a study in Ernakulum district of Kerala state. The results revealed that age, land holding and economic motivation had non-significant relationship with the knowledge level and but highly significant relationship with the education level.

Ramesh and Santha Govind (2003) carried out a study in Pudukottai district found that variables like age, education, occupation, annual income, family size, farming experience, social participation, extension contact, mass media use and information source utilization were found to be significant in their relationship with the knowledge level of the respondents.

Tarde *et al.* (2006) conducted a study in Solapur district of Maharashtra data which revealed that characteristics viz land holding and risk orientation of the farmers had significant relationship with their level of knowledge regarding pomegranate cultivation, while the characteristics viz education, extension participation, cosmopolitaness and scientific orientation had highly significant relationship with their

level of knowledge. The characteristics viz, age and social participation did not have any significant association with their level of knowledge.

Pottappa (2008) conducted a study in Chikkaballapure district found that Age, Education, Land holding and Mass media participation of potato growers were significantly related to their knowledge level at 5 per cent level of significance. And, other characters namely Family size, Annual income, Extension contact, Extension participation, Social participation, Economic motivation, Innovativeness were not related to their knowledge level.

Venkatesh Gandhi *et al.* (2008) conducted a study in Kolar district found relationship of independent variables with IPM knowledge level of respondents. The variables namely, like scientific orientation exhibited positive and not significant relationship with the knowledge level of farmers on IPM practices in tomato crop production. As the scientific orientation increases the knowledge level of farmers about IPM also increases. However, observed that the other variables namely age, education, land holding, mass media use, extension participation and innovation proneness did not show significant relationship with knowledge level.

Pankaja *et al.* (2009) conducted a study in Shimoga district of Karnataka state found that age, education, family dependency ratio, social participation, innovation proneness, level of aspiration and management orientation of vanilla growers were significantly related to their knowledge level. Whereas, other characters namely land holding, annual income, cosmopolitaness, farming experience, deferred gratification and achievement motivation were not significantly related to the knowledge level.

Majority of the studies reported a positive and significant relationship between many of the personal, socio-economic and psychological variables and knowledge level of respondents. While, few studies indicated non-significant relationship which, however, requires further confirmation.

2.2.2 Association between selected personal, socio-economic and psychological characteristics of the respondents and their adoption level.

Siddalingappa (1978) conducted a study in Hassan district reported that adoption behaviour of potato farmers was significantly associated with their education, land holding, income, social participation and mass media participation. However, age was not associated with adoption behaviour of potato farmers.

Geetakutty (1982) observed that there was highly significant relationship between farm size, social participation and utilization of information source with adoption level.

Ramesh Babu (1987) conducted a study in Bangalore and Kolar districts indicated that adoption behaviour of the grape growers with respect to recommended practices of grape cultivation was found to be significantly associated with the economic motivation, management orientation, risk orientation and extension participation.

Kantharaju (1989) conducted a study in Hassan district of Karnataka reported that extension participation was positively and significantly related with the adoption level of improved practices of coffee growers. The characteristics of education, family income, mass media use, cosmopolitanism and achievement motivation had non-

significant relation with adoption behaviour of coffee growers. In the case of cardamom growers the mass media had a negative and significant relation with adoption behaviour.

Sathesh (1990) conducted a study in Kanakapura taluk and found that education, land holding, mass media participation and source of information had positive and significant relationship with adoption of chawki rearing practices.

Hanchinal *et al.* (1991) conducted a study in Dharwad taluk reported that educational level and size of land holding had significant association with adoption level.

Chandra Naik (1993) conducted a study in Shimoga district revealed that mass media participation and cosmopolitaness had significant association with the adoption level of rice cultivation.

Saikrishna (1998) conducted a study in Raichur district data indicated that education and annual income had positively significant relationship with the adoption. Age showed the non-significant relationship with the adoption level.

Ankulwar (2001) carried out a study in Latur district of Marathwada region of Maharashtra state data indicated that variables like education, annual income, land holding social participation, socio-economic status, source information, risk orientation and economic motivation were found to be positively and significantly related with adoption of the recommended package of practices of sunflower growers. Whereas age had established negative and significant relationship with adoption the adoption.

Shrivastav (2002) conducted a study in Gujarat found that out of five variables only age had a positive and significant relationship with the adoption. Size of land holding showed negative relationship with the adoption level of chilly growers.

Bhagwat and Gohad (2003) undertaken a study in Morshi taluk of Amravati district of Maharashtra found that out of nine independent variables except age all the eight variables (education, land holding, farming experience, socio-economic status, social participation, extension contact, and scientific orientation and risk preference) were found positively significant with adoption of dry land cotton cultivation technologies. Age of the respondents was having non-significant relationship with adoption of dry land cotton cultivation technologies.

Gurprit Singh Dhillon and Kuldeep Kumar (2004) conducted a study in Mentha growing area of the Punjab state found that age and risk orientation had significant and positive correlation with the level of adoption. Risk orientation was positively and significantly related to the extent and level of adoption. Education was found to be negatively and significantly correlated to the extent of adoption.

Pottappa (2008) conducted a study in Chikkaballapur district reveals that education, extension participation and mass Media participation of potato farmers were significantly related to their extent of adoption level of potato farmers at 0.05 level and land holding, annual income were significant at 0.01 level. Whereas the other characteristics namely age, family income, extension contact, social participation, economic motivation and innovativeness were not significantly related.

Ramesh and Santha govind (2008) taken up a study in pudukottai district observed from this study educational status, annual income,

farm size, livestock possession, social participation, extension agency contact, mass media exposure and information source utilization showed positive and significant relationship with the extent of adoption of organic farming practices.

Varadaraju *et al.* (2009) conducted a study in Chintamani taluk of Chikkaballapura district of Karnataka state found that age, socio-economic status, farm size, family size, farm power asset and social participation had non-significant relationship with the adoption level of improved tomato cultivation practices. While, mass media use had a significant relationship with the adoption level. A highly significant relationship was observed between adoption level and mass media participation and extension participation of tomato growers.

Vishvanath Hiremath *et al.* (2009) conducted a study in Kolar district of Karnataka indicated that characters like education, innovative proneness, family income and extension contact had significant relationship with their overall adoption behaviour of vegetable growers. However, other characters did not possess (age, farming experience, family size, family type, social participation and mass media participation) significant relationship with the adoption behaviour of eco-friendly technologies of tomato and cabbage growers.

2.3 MARKETING CHANNELS USED BY FARMERS

Kulkarni (1989) in his study on economics on production and marketing of grapes in Bijapur district, Karnataka identified marketing channels, they were:

- 1) Producer – commission agent cum wholesaler – retailers – consumers.
- 2) Producer – pre-harvest contractors – retailers – consumers.

The study revealed that selling through commission agents in the market was profitable compared to sale to pre-harvest contractors.

Raju and Venkateshwaralu (1989) studied “ marketing of banana in Guntur district of Andhra Pradesh .” and found three types of marketing channels in banana marketing viz.,

Producer – Pre-harvest contractor

Producer - Pre-harvest contractor – Commission agent

Producer – Retailer

Among these channels channel I is commonly known as contract sale and channel three is known as direct sale. Among these three channels the channel-I was widely used or adopted by farmers (65%) followed by channel-II (32%) and channel-III (2%).

Karisomangoudar (1990) conducted a study on Economics of production and marketing of rainfed onion in Gadag taluk of Dharwad district of Karnataka state and identified the following marketing channels in Gadag and Hubli

Gadag:

- a) Producer – village level trader – wholesaler – retailer – consumer.
- b) Producer – wholesaler – cart vendor – consumer.
- c) Producer – commission agent – wholesaler – retailer – consumer.

Hubli:

- a) Producer – village level trader – wholesaler – trader cum retailer – consumer.
- b) Producer – commission agent –wholesaler–cart vendor – consumer.
- c) Producer – wholesaler - retailer – consumer.

And also he found that producers share of the consumer rupee in marketing of onion varied among. In channels I, II and III producers net share was 43.26, 61.85 and 64.36 per cent in Gadag market. It could be seen that farmers in first channel got the lowest net price when

compared to second and third channels in Gadag. In channels IV, V and VI producers' net share was 43.50, 63.28 and 63.18 per cent in Hubli market.

Raikar (1990) in his study on investment in production and marketing of cashew nut in Karnataka identified six channels of trade namely: (i) grower - itinerant trader - processor; (ii) grower - pre-harvest contractor - itinerant trader - processor; (iii) grower - village merchant - processor; (iv) grower - trader - processor; (v) grower - processor and (vi) grower - commission agent - trader - processor. The results further revealed that the price received by the producer from the pre-harvest contractor was very low.

Koujalagi and Kunnal (1991) made an attempt to identify the marketing channels of pomegranate in Bijapur district of Karnataka. They have identified two channels:

Channel 1: Producer - pre-harvest contractor - commission agent cum wholesaler - retailer - consumer.

Channel 2: Producer - commission agent cum wholesaler - retailer - consumer.

Shivamurthy (1991) conducted a study on arecanut and cardamom growers in Shimoga district of Karnataka state and reported that the majority of the cardamom growers sold their produce to the village traders (61.67%) followed by growers society (55.00%) and commission agents (32.50%).

Gummagolmath (1994) studied the marketing margins and price spread in the marketing of mango in Dharwad district. The results revealed that producer's share in consumer's rupee was 65.70 per cent in Channel-I (Producer - Commission agent - Retailer - Consumer) and

it was 58.40 per cent in Channel-II (Producer Pre-harvest contractor cum Wholesaler – Retailer – Consumer).

Senthilnathan and Srinivasan (1994) identified the following channels of banana marketing in Tiruchirapalli district of Tamil Nadu.

Channel I: Farmer – pre-harvest contractor – secondary Wholesaler

Channel II: Farmer – pre-harvest contractor – commission agent
– wholesaler – retailer – consumer

Channel III: Farmer – regulated market wholesaler – retailer – Consumer

Channel IV: Farmer – regulated market – secondary wholesaler

Among these, Channels I and IV were dropped for the study because of the involvement of secondary wholesalers in marketing which was very limited. It was found that Channel III was relatively efficient than that of Channel II. Since the share of the producer in consumer's rupee was higher.

Singh (1996) studied price spread of citrus fruits in the mid hill of Jammu and Kashmir. The results revealed the producer's share in consumer's rupee was 35.71 per cent in Channel – I (Producer –pre-harvest contractor – retailer – consumer) and 81.25 per cent in Channel II (Producer – retailer – consumer).

Khunt and Desai (1996) in their study on economic feasibility and marketing of perennial vegetable in South Gujarat reported that the vegetable growers preferred the following channels for marketing of vegetables.

Channel I Producer – Co-operative society – Retailer – Consumer

Channel II Producer – Private trader - Retailer – Consumer

The producer's share of consumer price was quite low due to large portion taken by retailers, which indicates low marketing efficiency.

Venkataramana and Srinivas Gowda (1996) reported the following marketing channels for marketing of tomato in Kolar district.

Channel I (near by market):

Producer – Commission agent – Retailer – Consumer

Channel II (near by market):

Producer – Commission agent – Cart vendor – Consumer

Channel III (distant market, Bangalore):

Producer – Commission agent – Street hawker – Consumer

Chandran (1997) found that majority (70.96 %) of the tapioca growers sold their produce to the consumer through the middle men and 16.66 per cent marketed their produce through the channel of middleman – processing unit – trader – consumer. A meager 1.67 per cent sold their produce to the consumer through the processing unit and no responders sold the produce directly to the consumer.

Durga (1999) reported two channels while studying on public intervention in the marketing of vegetables, the case study of Rytu Bazaars in Vishakhapatnam.

Producer – Wholesaler – Retailer – Consumer

Producer – Consumer (Rytu Bazaars).

More (1999) in his study on economics of production and marketing of banana in Maharashtra state identified two important channels through which banana from the study area passed from the commission agent – cum – wholesaler – retailer – consumer and producer – commission agent – distant market.

Sajini Balakrishna *et al.*, (2000) in his study on marketing of banana in Thissur district, Kerala, the primary data were collected to

analyze and identify the marketing channels, marketing cost and margin. Six different marketing channels were identified.

Producer – Commission agent – Wholesaler – Retailer – Consumer

Producer – KHDP – wholesaler - Retailer – Consumer

Producer– wholesaler– Consumer

Producer –Retailer – Consumer

Producer – Processing unit

Siddagangaiah (2000) reported that the analysis of marketing channels for potato showed that Chikkaballapur was important marketing center for potato producers of Chikkaballapur area. About 42.86 per cent of the production was sold in Chikkaballapur market through commission agents, 20.09 per cent to village level traders and 32.35 per cent was sold to wholesalers in Chikkaballapur market.

Lokesh and Chandrakanth (2003) conducted a study in Karnataka reported that 80 per cent of the turmeric rhizomes were sold to the commission agents from Erode market in Tamil Nadu and got less price than the farmers, who sold their produce directly at Erode regulated market.

Moulasab (2004) in his study on mango growers of North Karnataka reported that, 58.50 per cent of the fruits were sold to wholesalers, followed by 28.33 per cent of the farmers to per-harvest contractors and only 7.67 per cent of the farmers sold their fruits with the help of retailers.

Sunil Kumar (2004) in his study on tomato growers in Belgaum district of Karnataka reported that, majority of the farmers (65.30 per cent) sold their produce through middle man.

Pottappa (2008) conducted a study in Chikkaballapure district result showed that the Majority (41.67%) of the farmers followed the

marketing channel namely Producer- pre-harvest contractor- Consumer, More than 20.0 percent of the farmers followed the channels like Farmer – Trader – Retailer - Consumer and Producer - Commission Agent - Wholesaler – Retailer - Consumer, and about 13.34 percent of the farmers followed Producer - Village level trader - Wholesaler – Retailer - Consumer, further, nearly one percent of the farmers followed the channels like Producer - Wholesaler - Retailer - Consumer and Farmer - Village level trader - Trader - Processor - Retailer.

Raghavendra *et al.* (2008) conducted a study in Belgaum District of Karnataka result revealed that majority of the farmers marketed their product through commission agent (83.30%). Whereas, very few percentage of the farmers sold their product by self marketing and expressed inadequate local markets (16.60%). Further, majority suggested to establish exclusive market for cauliflower (68.30%) and storage facilities (71.60%), fluctuation in the price (81.60%), exploitation by the middle men (71.66%), poor transportation facilities (36.60%) were the marketing problems.

The above studies imply that cultivation of crops is quite profitable under good management practices and the marketing channels are mostly through commission agents, wholesalers and middlemen.

2.3 CONSTRAINTS IN PRODUCTION, STORAGE AND MARKETING PRACTICES

Singh and Gupta (1983) reported that marketing cost per quintal of potato in Farrukhabad potato mandi came to Rs. 6.97 during 1971-72. The highest marketing cost was due to transport charges which

accounted for 57.14 per cent to the total marketing cost, followed by bardana charges amounting to 21.43 per cent, loading and unloading charges 11.43 per cent, commission 5.71 per cent and mandi charges 4.29 per cent.

Lokhandae and Wangikar (1991) conducted a study on grape growers in Osmanbad district of Maharashtra and reported that non-availability of improved cuttings in time, less resistance to diseases and high cost of fertilizers were the major constraints.

Hemakumari (1992) reported that the major problems in the production and marketing of chrysanthemum flowers in East Godavari district of Andhra Pradesh were the lack of technical knowledge about the package of practices and non – existence of regulated market in the nearby places.

Hiremath (1993) conducted a study in Bijapur district, Karnataka identified the problems relating to production and marketing of lime. The absence of processing facility, cold storage facility and fluctuations in prices were the major problems expressed by cent per cent of the farmers.

Gummagolmath (1994) studied the marketing margins and price spread in the marketing of mango in Dharwad district revealed that the problem of alternative bearing, non-availability of labour, price fluctuation, high commission and existence of under-dealing between the wholesaler and commission agents were the main constraints in mango cultivation.

Vedini (1994) studied the major problems in the production in jasmine production in Mysore district as, inadequacy of financial

resources, lack of technical know-how, non-availability of labour and incidence of pest and diseases. High commission charges, inadequate transport facilities and high cost of transportation were the major problems in marketing.

Srinivasareddy (1995) conducted a study in Kolar district of Karnataka on mango growers and reported that problems faced by mango growers were more pest and disease incidence, high cost of fertilizers, high cost of plant protection chemicals, non-availability of labours, lack of technical guidance, and occurrence of rain during harvest and problem of weed.

Bonny (1996) surveyed the constraints in commercial production of vegetables in Panachery and Puthur, Kerala and reported that increased cost of plant protection chemicals was perceived as the most important factor by the respondents followed by inadequate market facilities, poor storage and other post-harvest facilities, insufficient capital and high labour costs.

Govinda Reddy *et al.* (1997) identified the problems of mango growers in Srinivasapur region of Karnataka. The major constraints faced by them were lack of technical know-how, lack of awareness on drip irrigation technology, non-availability of credit and labour, high cost of inputs, high incidence of pests and diseases and non-availability of quality grafts. The major constraints in mango exports were lack of nearby processing units, storage facilities, pre-cooling units, knowledge in chemical treatments of units, regulated markets and improved harvest. Other problems were exploitation by middle men, lack of grading etc.

Jairath (1997) in his study on operational efficiency in fruits and vegetable market in Jaipur examined the effect of operational efficiency on marketing efficiency. The study revealed that the system of sale was by open auction, yet a very small portion of produce was sold by this method. This was mainly because of non-participation of sufficient number of traders in the auction and lack of adequate space for display and handling of produce.

Patel *et al.* (1997) in their study on marketing efficiency of Anand vegetable market in Gujarat reported that lack of storage facilities, delay in payment of sale proceeds, high cold storage charges, monopoly of few middlemen and need of timely problems faced by the cabbage and cauliflower growers.

Chengappa *et al.* (1998) conducted a study in Karnataka state highlighted the major production constraints in cut flower production, which comprised of high cost of inputs, irregular supply of electricity, high incidence of pests and diseases, lack of knowledge of recommended practices, lack of infrastructural facilities, scarcity of trained labour and non-availability of quality planting materials. The problems identified in the marketing related to absence of organized markets, high commission charges, price fluctuation, high cost of transportation and high handling charges.

Shrivastava *et al.* (1998) conducted on chilly growers in Kheda district of Gujarat, reported that incidence of more pest and disease, high cost of pesticides and non-availability of plant protection equipment and inadequacy of labour were problems faced by 96.67, 98.33, 36.67 and 30.00 per cent respondents, respectively.

Ravi Shankar and Katteppa (1998) in their study on potato in Chikkamagalur district of Karnataka state reported that, the farmers faced the problems like lack of technical guidance, more pests and diseases incidence, less storage facilities, high cost of transportation and high commission charges.

Anilkumar and Arora (1999) in their study on post-harvest management of vegetables in Uttar Pradesh hills found that non-availability of cold storage, highly perishable nature of the vegetables, low market demand at the time of storage, and hence non-profitability of storing vegetables were the major problems perceived by farmers in vegetable storage. Problem of high fluctuation in market price, followed by high transportation cost (62.53 per cent) labour shortage and high wages (55.53 per cent) and lack of irrigation facilities and power shortage (46.66 per cent).

Radhakrishnan *et al.* (1999) conducted a study on constraints faced by mango growers. The study revealed that the foremost problems faced by the mango growers were high cost of inputs *i.e.*, grafts, fertilizers and pesticides, more than three-fourths (78.30%) expressed this problem. High cost of inputs was a major economical constraint among the growers followed by more incidences of pests and diseases.

Ravishankar and Katteppa (2000) conducted a study on potato growers in Chikmagalore district of Karnataka State. They reported that 94.16 per cent respondents faced the problems of lack of technical guidance. More pests, more diseases, high cost of fertilizers, high cost of plant protection chemicals and non-availability of fertilizers in time were the problems faced by 90.00, 83.33, 85.00, 81.66 and 68.33 per cent of the respondents, respectively.

Waman and Patil (2000) conducted a study on onion growers in Nasik district of Maharashtra revealed that difficulty in identifying pests and disease (54.66%) and non-curable nature of onion diseases with pesticides (42.00%) were the major problems.

Kadam *et al.*(2001) conducted a study on sweet orange growers in Kandahar and Nanded district of Maharashtra State data indicated that the important constraints faced by majority of sweet growers in adopting cultivation practices and marketing of the produce were high cost of transportation charges (87.50%), high cost of plant protection chemicals (79.37%), pruning is expensive (75.62%) and non-availability of skilled labours during pruning (74.37%). Due to improper pruning there is chance of causing injury to plant (71.87%), no adequate water for irrigation (72.50%), lack of transport facility (65.00%), and low price of produce if given on lease basis (70.62%). Lack of knowledge about pruning method (60.00%) were major constraints faced by sweet orange growers.

Sadaphal *et al.* (2001) conducted a study in Raigad district of Maharashtra state. The data indicated that majority of the respondents (99.00%) had faced the constraints while marketing the white onion. All (100%) the respondents reported the problems namely “could not get reasonable price”. While, 45.45 per cent had reported the problem non-availability of transport facilities.

Tarde *et al.* (2003) conducted a study in Pune district. The constraints faced by the vegetable growers were fluctuation in market rates (69.56% & 91.36%), lack of market facility in the village and nearby village (63.04% % 60.87%). Nearly one-half (47.83% & 46.65%) of the tomato growers and brinjal growers respectively expressed that marketing facilities were at long distance, while 69.56% & 28.26% of the

tomato and brinjal growers stated that there was monopoly of middle men in the market.

Girase *et al.* (2004) conducted a study in Nagpur district of Maharashtra data indicated that majority (89.33 per cent) of the respondents expressed that lack of knowledge about Trichocards, chrysopa, heromer traps. BT and neem seed oil was the major constraints in adoption of Bio-control pest management practices. Similarly, 80.66% cotton growers suffered from non-availability of technical labour for insecticides spraying. While, 72.00 per cent had reported lack of knowledge about exact concentration of insecticides and pesticides.

Sunil Kumar (2004) in his study on tomato growers in Belgaum district of Karnataka reported that, majority of the farmers (75.83 per cent) faced the problem of technical knowledge and guidance about improved cultivation practices as well as post-harvest technology.

Nagesha (2005) in his study on entrepreneurial behavior of vegetable seed producing farmers in Haveri district of Karnataka reported that all the respondents (100%) were facing problem of high incidence of pest and diseases followed by high cost for fertilizers, chemicals and insecticides, high wages of labour, non-availability of skilled labour and lack of transportation and storage facilities with 87.5, 80.8, 62.5 and 16.14 per cent are the problems faced by respondents, respectively.

Tarde *et al.* (2005) conducted a study in Pune district result revealed that nearly three fifth (59.77%) of the respondents motivated by literature and mass media fluctuation in market (82.75%), lack of knowledge about recommended doses and time of application (78.16%), non-availability of proper storage facilities (75.86%), non-availability of

manures (74.17%) and lack of knowledge about post harvest technology (71.26%) were the major problems faced by the flower growers.

Tarde *et al.* (2006) conducted a study in Solapur district of Maharashtra result Majority of the farmers surveyed faced the problems like difficulty in taking out during rainy (77.1%) and summer season (74.3%), long distance of market (90.3%), non-remunerative price for fruits (88.00%) and fluctuations in price of fruits (84.5%). Therefore majority (90.3%) of the farmers suggested that proper provision be made for obtaining remunerative prices. More than two third of the respondents suggested that commission rates of middlemen should be reasonable (70.3%).

Maraddi (2008) research was conducted in Belgaum and Bagalkot district of Karnataka findings revealed that cent per cent of respondents perceived constraints of high cost of complex fertilizers and non-availability of required quantity of FYM followed by high wooly aphid incidence, non-availability of labour and high labour charges and irregular supply of electricity. Majority of respondents (62.77%) belonged to medium technological gap followed by high technological gap category (28.8%).

Nagaraja *et al.* (2008) conducted a study in Bhadra command area Karnataka found that most of the sugar cane growers to the extent of 92.48 per cent faced the problems of high cost of fertilizers followed by delayed release of crop loans by banks and financial institutions (91.65%).

Varadaraju *et al.* (2009) conducted a study in Chintamani taluk of Chikkaballapura district of Karnataka state found that cent per cent of tomato growers had the problems of fluctuation in market price for their

produce, over 60 per cent of tomato growers faced problems such as lack of technical know-how (81%), inadequate and untimely supply of inputs (75%) and exploitation by middle men (61%). The other problems faced by less than one third of the tomato growers were high wage rate (32%), lack of storage facilities (25%) and high transportation cost.

From the above review, it could be inferred that lack of technical know-how, high cost of inputs and labour, non-availability of quality inputs and labour in time and marketing constraints were the major problems faced by the framing community.

***MATERIAL AND
METHODS***

III. METHODOLOGY

The present research study was conducted in Hassan district of Karnataka state during the year 2009-10. The material and methods used in this study were presented under following headings.

1. Locale of the study
2. Selections of villages and the respondents
3. Research design
3. Methods used for measurement of dependent variables
4. Methods used for measurement of independent variables
5. Instruments used for data collection
6. Statistical methods used for data analysis

3.1 LOCALE OF THE STUDY

Hassan is typical transitional belt with diversified agro-climatic conditions. Situation like dry (Southern Dry zone- Channarayapatna, Central Dry zone- Arasikere), transition (Southern transition zone- Hassan, Arakalgud, Holenarasipur, Alur, and Belur) and hilly (Western Ghats-Sakaleshur) conditions are prevailing in the district. The district of Hassan comes under zone of 7 of the Agriculture zone of Karnataka state. This zone receives high rain fall ranging from 1300 to 3800 mm. The characteristic feature is receipt of torrential rains in short spell. Red clay loamy soils are the predominant soil types of the area. The crop of potato is grown mainly as a rainfed crop during the Kharif season.

HASSAN DISTRICT MAP

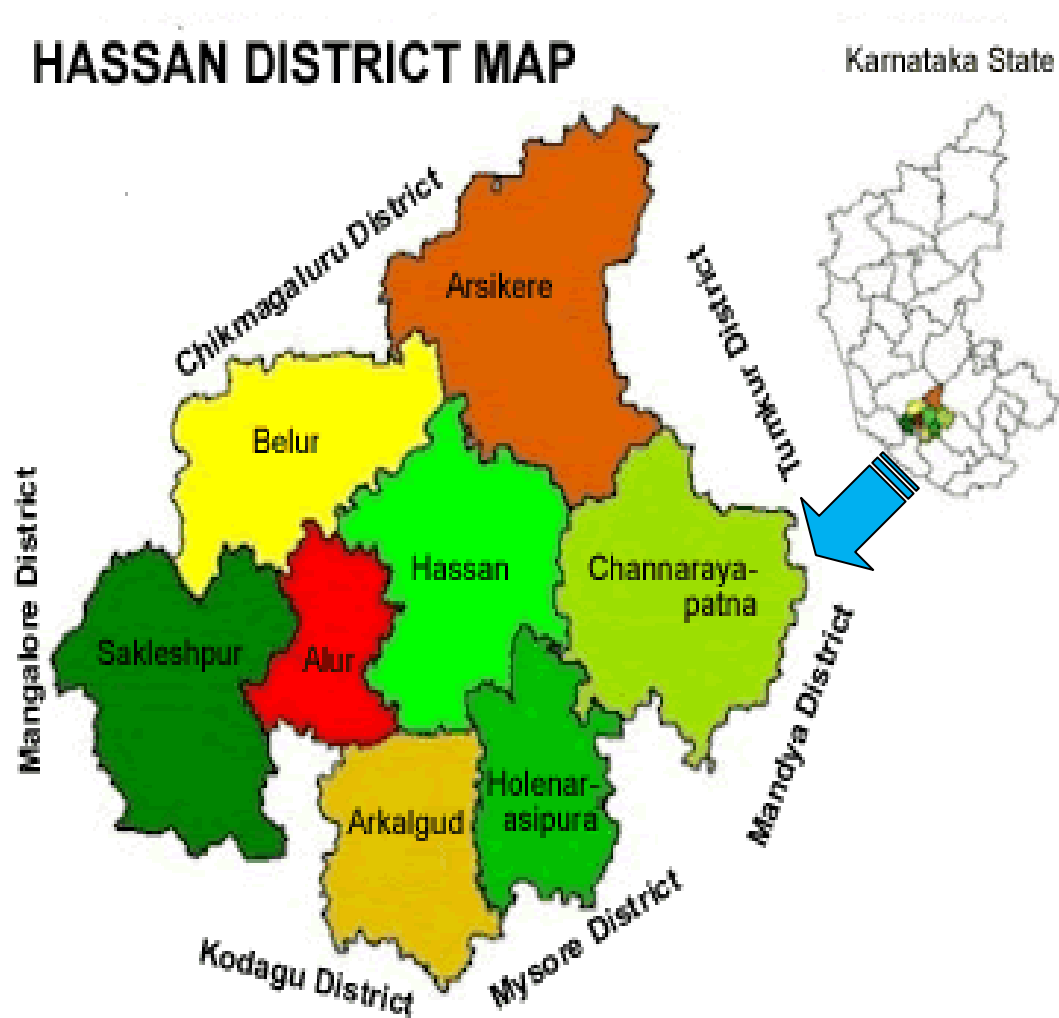


Fig.1: Map of Hassan district showing the taluks selected for the study

The other crops of the district are Coconut, Arecanut, Ragi, Maize, Paddy, sugarcane and other vegetables.

The study was conducted in Hassan, Belur and Arakalgud Taluks of Hassan district of Karnataka state. These taluks were selected purposively, since these taluks have maximum area under potato crop among seven taluks of Hassan district.

3.2 RESEARCH DESIGN

The research design adopted for this study was ex-post-facto technique, since the phenomenon has already occurred. Ex-post-facto research is the most systematic empirical enquiry in which the researcher does not have control over independent variable as their manifestation has already occurred. Thus, inferences about relation among variables were made without direct intervention from concomitant variation of independent and dependent variables.

3.3 SELECTIONS OF VILLAGES AND THE RESPONDENTS

3.3.1 Selection of villages

The study was carried out in Hassan district of Karnataka state. Three taluks were selected from the district. Five villages were randomly selected from each taluk (Totally 15 villages).

Name of the taluks	Selected villages	No. of respondents
Hassan	Aldhalli	Big farmers (10)
	Bellenalli	Small farmers (10)
	Byadaralli	Marginal farmers (10)
	Jagaravalli	
	Ragimuddenalli	
Belur	Hagare	
	Harovalli	Big farmers (10)
	Iebbedu	Small farmers (10)
	Madhihalli	Marginal farmers (10)
	Kallikarjuna pura	
Arakalgudu	Bettadalli	
	Bychanalli	Big farmers (10)
	Chikkagavanalli	Small farmers (10)
	Doddagavanalli	Marginal farmers (10)
	Goravanahalli	

3.3.2 Selection of the respondents

Three taluks were selected purposively since these had major area under potato cultivation. These were Hassan, Belur, and Arakalgudu. From each selected taluk 30 respondents were selected. Again from each taluk 10 big, 10 small and 10 marginal farmers were randomly selected. Thus the total sample for the study was 90 farmers from three taluks.

3.4 MEASUREMENT OF DEPENDENT VARIABLE

3.4.1 DEPENDENT VARIABLES USED IN THE STUDY

<u>Variable</u>	<u>Measurement</u>
1. Knowledge	Scale of Anastasi (1961)
2. Adoption	Scale of Sengupta (1967)

3.4.1.1 KNOWLEDGE

This refers to the factual information possessed by a farmer regarding recommended practices of potato cultivation.

The “Teacher made test” suggested by Anastasi (1961) employed to measure the knowledge level of respondents. All the important operations of potato cultivation were listed in consultation with the experts. A total number of 25 recommended practices were selected based on judgment of specialists. The questions were carefully formed by referring to the package of practice of University of Agricultural Sciences, Bangalore. The responses elicited from the farmers were quantified by giving one score to correct answer and zero to wrong answer.

$$\text{Knowledge index} = \frac{\text{Number of correct responses}}{\text{Total number of knowledge items}} \times 100$$

Based on the total scores, the respondents were grouped into three categories as low, medium, and high using mean and standard deviation as a measure of check.

Category	Criteria	Mean score
Low	Less than (mean - ½ SD)	(<69.3)
Medium	Between (mean ± ½ SD)	(69.3-77.6)
High	More than (mean +½ SD)	(> 77.6)

3.4.1.2 ADOPTION

It refers to the adoption of all the recommended practices of potato cultivation by the farmers as recommended in the package of practice published by university of Agricultural Sciences, Bangalore. The procedure suggested by Sengupta (1967) for calculation of adoption quotient was utilized to measure the general adoption level of the respondents. Accordingly, the following formula was used to calculate the overall adoption level.

$$\text{Adoption index} = \frac{\text{Adoption score obtained by the respondents}}{\text{Maximum adoption score one could get}} \times 100$$

Thus after computing the adoption index the respondents were grouped into low, medium and high categories by taking mean and standard deviation.

Category	Criteria	Mean score
Low	Less than (mean - ½ SD)	(<49.92)
Medium	Between (mean ± ½ SD)	(49.92-59.82)
High	More than (mean +½ SD)	(>59.82)

The partial adoption technique suggested by Supe (1973) was followed with necessary modifications for scoring the practices followed by respondents.

In the present study adoption referred to the acceptance and practice of some or all the recommended practices of potato crop by the respondent. The score for each individual practices adopted were arrived at viewing relative importance of the items in consultation with specialists of UAS Bangalore. Thus, the maximum score that one could get was 18 and minimum score is zero depending upon the total score(s) obtained by each respondents.

The following scores were given for full, partial and non-adoption of the recommended practices. The maximum score allotted for each practice was

<u>Items</u>	<u>Score</u>
Full adoption	2
Partial adoption	1
No adoption	0

3.5 MEASUREMENT OF INDEPENDENT VARIABLES

- 1) Age - Schedule is developed
- 2) Education - Trivedi (1963)
- 3) Family size - Hosamani (1993)
- 4) Farming experience - Schedule is developed
- 5) Annual income - Sangappa (1996)
- 6) Extension contact - Pamadi (1980)
- 7) Extension Participation - Kullayi Reddy (1983)
- 8) Social participation - Kullayi Reddy (1983)
- 9) Mass media participation - Meti (1990) and Kiran Kumari (1991)
- 10) Economic motivation - Supe (1969)
- 11) Innovativeness - Moulik and Rao's (1965)
- 12) Risk orientation - Supe (1969)
- 13) Marketing channels - Schedule is developed

3.5.1 AGE:

The respondents were categorized into young, middle and old and it is done for the purpose of analyzing their socio-economic characters. Categorization of age was done as follows.

Category	Scores
Young	<37
Middle	37-45
Old	>45

3.5.2 EDUCATION:

The respondents asked to state their formal educational level. The procedure followed by Trivedi (1963) was used with slight modification. The respondents were categorized based on their education level attained as below.

Category	Score
Illiterate	0
Can read	1
Can read and write	2
Primary school	3
Middle school	4
High school	5
Graduation and above	6

Considering the above scoring pattern, the individual score for each respondent was arrived at and they were classified into three categories taking mean and standard deviation as a measure of check.

Category	Criteria	Mean Score
Low	Less than (Mean - $\frac{1}{2}$ SD)	<2.61
Medium	Between (Mean $\pm \frac{1}{2}$ SD)	2.61-4.59
High	More than (Mean $\pm \frac{1}{2}$ SD)	>4.59

3.5.3 FAMILY SIZE:

Family size of the respondents was operationalized as total number of members residing in the family of the respondent. The size of the

family was categorized as small, medium, and large. The procedure followed by Hosamani (1993) was adopted to categories the variables.

Category	No. of Members
Small	1-4 members
Medium	5-8 members
Large	>9 members

The results were expressed in frequency and percentage.

3.5.4. FARMING EXPERIENCE:

This was operationalized as the number of completed years of experience in farming based on mean and standard deviation. These variables are categorized as low, medium and high.

Category	Criteria	Mean Score
Low	Less than (Mean - $\frac{1}{2}$ SD)	<15.2
Medium	Between (Mean \pm $\frac{1}{2}$ SD)	15.2-24.26
High	More than (Mean \pm $\frac{1}{2}$ SD)	> 24.26

3.5.5 ANNUAL INCOME:

The income per annum of the respondent was arrived at by adding the income from agriculture and other subsidiary income. The subsidiary income was defined as one which comprised of income from all sources other than agriculture. The respondents were classified based on the income per annum into three categories taking mean and standard deviation as a measure of check. Similar procedure was followed by Sangappa (1996) with some modification.

category	Criteria	Mean Score
Low	Less than (Mean - ½ SD)	<8741
Medium	Between (Mean ± ½ SD)	8741 to 21092
High	More than (Mean + ½ SD)	>21092

3.5.6 EXTENSION CONTACT:

It refers to the contact with extension functionaries viz., Agricultural Assistants (A.A), Assistants Agricultural officer (A.A.O), Assistant Director of Horticulture (A.D.H), Subject Matter Specialist (S.M.S), etc. by a farmer with extension agency to secure information on innovation. The extension contact of the farmers was obtained by asking them to indicate who are the change agents he has contacted previously and how frequently. The maximum score of 24 and minimum score of 0.

The variable was operationalized as the frequency with which a farmer comes in contact with the extension workers in a specified period of time. The procedure followed by Pamadi (1980) and kullayi Reddy (1983) was used with some modifications.

Sl.No	Extension personnel/ functionaries	Once in a week	Once in a 15 days	Once in a month	Never
1	Argil. Asst.	3	2	1	0
2	A.A.O	3	2	1	0
3	A.O.	3	2	1	0
4	A.D.A	3	2	1	0
5	A.D.H	3	2	1	0
6	KVK- SMS	3	2	1	0
7	University scientist	3	2	1	0
8	Others (specify)	3	2	1	0

Based on the scores obtained the respondents were grouped in to three categories using mean and Standard Deviation as a measure of check.

Category	Criteria	Mean Score
Low	Less than (mean- ½ SD)	< 3.01
Medium	Between (mean ± ½ SD)	3.01-4.13
High	More than (mean + ½ SD)	> 4.13

The responses obtained were expressed in frequency and percentage.

3.5.7 EXTENSION PARTICIPATION:

It refers to the extent of participation of the respondent in different extension activities viz., Field days, demonstrations, Training programmes, meeting and others. This variable was quantified by following the procedure suggested by Kullayi Reddy (1983) with slight modification. The extension activities were listed and respondents were asked to indicate their extent of participation in each one of them. The maximum score of 18 and minimum score of 0. The scoring procedure followed was as follows.

Sl.No	Activities	Participation		
		Regular	Occasionally	Never
1	Group Meeting	2	1	0
2	Demonstrations	2	1	0
3	Field Visits	2	1	0
4	Training programmes	2	1	0
5	Field days	2	1	0
6	Krishi Melas	2	1	0
7	Exhibitions	2	1	0
8	Educational tours	2	1	0
9	Any other(specify)	2	1	0

Based on the scores obtained the respondents were grouped in to three categories using mean and Standard Deviation as a measure of check.

Category	Criteria	Mean Score
Low	Less than (mean- ½ SD)	< 4.44
Medium	Between (mean ± ½ SD)	4.44-5.86
High	More than (mean + ½ SD)	> 5.86

The responses obtained were expressed in frequency and percentage.

3.5.8. SOCIAL PARTICIPATION:

The quantification of this variable was done by following procedure developed by Trivedi (1963), Byrareddy (1971) and Desai (1975) with slight modification in the items and weightages used. The respondents were provided with a list of institutions and were asked to delineate their extent of participation in each of them. Based on the membership or position, appropriate scores were assigned and the respondents were categorized into low, medium and high based on the mean and standard deviation as a measure of check.

The scoring pattern for the attendance at the meetings of organization is as follows.

Position of Respondents	Score
Office bearer of an organization	2
Member of an organization	1
Not a Member of an organization	0

Item	Score
Regular	2
Occasional	1
Never	0

Category	Criteria	Mean Score
Low	Less than (mean- $\frac{1}{2}$ SD)	< 6.18
Medium	Between (mean \pm $\frac{1}{2}$ SD)	6.18-7.94
High	More than (mean + $\frac{1}{2}$ SD)	> 7.94

3.5.9 MASS MEDIA PARTICIPATION:

It referred to the exposure of the respondents to different mass communication media and participation in the related activities such as listening to radio, viewing television and reading news paper, Agricultural Journals. Further, the respondents were asked to indicate their frequency of participation in different programmes of television and radio. The responses were expressed in frequency and percentage.

The variable was quantified on the basis of procedure followed by Meti (1990) and Kiran Kumari (1991).

Subscription	Score
Subscriber	1
Non-subscriber	0

Habit	Score
Regular	2
Occasional	1
Never	0

Based on the score obtained the respondents were grouped into three categories using mean and standard deviation.

Category	Criteria	Mean Score
Low	Less than (mean- ½ SD)	< 10.54
Medium	Between (mean ± ½ SD)	10.54-12.14
High	More than (mean + ½ SD)	> 12.14

3.5.10 ECONOMIC MOTIVATION:

Economic motivation refers to the extent to which an individual is oriented towards achievement of the maximum economic ends such as maximization of farm profit.

This variable was measured by using scale developed by Supe (1969). It consists of 5 point continuum of response, (strongly agree, agree, undecided, disagree and strongly disagree) was followed in this study. The scale consists of six statements of which the first four and sixth statements were positive while the fifth one is negative. A scores of 5,4,3,2,1 order was assigned for the positive response and the scoring procedure was reversed in the case of negative statement. The scores obtained on each statement were cumulated to obtain the total score of a respondent on this variable. The maximum score obtained by any respondent was 30 and minimum 6.

By the following the above scoring pattern, the total economic motivation score of the respondent was obtained and they were categorized into three groups considering the mean and Standard Deviation as a measure of check.

Category	Criteria	Mean Score
Low	Less than (mean- ½ SD)	< 21.43
Medium	Between (mean ± ½ SD)	21.43-22.77
High	More than (mean + ½ SD)	> 22.77

3.5.11 INNOVATIVENESS:

This refers to the behaviour pattern of an individual who has interest in and desire to seek changes in farming techniques and to introduce such changes into his operations when practicable and feasible. This variable is quantified using Moulik and Rao's (1965) "Forced Choice Method" of self rating procedure with regard to innovation proneness.

The scale consists of three sets of statements. Each set of statements contained three short statements with scores of 2 and 1 indicating "most liked" and "least liked" of innovative proneness. The minimum and maximum possible scores ranged from 1 to 18. Based on the scores obtained, the respondents were grouped into three categories using mean and S.D. as a measure of check.

Category	Criteria	Mean Score
Low	Less than (mean- ½ SD)	<12.29
Medium	Between (mean ± ½ SD)	12.29-13.91
High	More than (mean + ½ SD)	> 13.91

3.5.12 RISK ORIENTATION:

The risk orientation of the respondents was measured with the help of risk preference scale developed by supe (1969). This scale consists of five items and there were scored on a five point scale ranging from strongly agree to strongly disagree. There were four positive items and one negative item in the scale. The scoring for positive items were Strongly Agree-5, Agree-4, Undecided-3, Disagree-2 and Strongly Disagree-1. For the negative items, the reverse order of scoring was followed. The above scoring procedure was used by supe (1969) assuming that greater the total scores of a subject on any one of the five dimensions, the more positive his attitude or greater value is placed in that dimension. The minimum and maximum possible scores ranged from 1 to 25.

After obtaining the risk orientation score for each of the respondents, they were differentiated into three categories taking mean and standard deviation as the points of discrimination.

Category	Criteria	Mean Score
Low	Less than (mean- $\frac{1}{2}$ SD)	<20.45
Medium	Between (mean \pm $\frac{1}{2}$ SD)	20.45-22.95
High	More than (mean + $\frac{1}{2}$ SD)	> 22.95

3.5.13 MARKETING PATTERNS/ CHANNELS FOLLOWED BY THE FARMERS IN MARKETING OF POTATO

The respondents were asked to indicate when and where they sell their produce. The responses thus obtained were expressed in frequency and percentage.

The following marketing channels were listed to assess the farmers responses in potato marketing. They are,

APMC

Local market

Whole salers

Commission agent

Village merchant

In order to know the marketing patterns followed by the farmers in marketing of potato, a schedule was developed listing the marketing channels. Then, the responses were collected about the marketing patterns they are followed and presented in percentage.

3.6 INSTRUMENTS USED FOR DATA COLLECTION

A structured schedule was prepared with the help of experts in the field of Agricultural Extension, which included subject matter content of potato cultivation and all the items under each of the variables selected for the study. Data collection was done by personal interview method with the help of the schedule. The data collection was done during the month of February 2010.

3.7 STATISTICAL METHODS USED FOR DATA ANALYSIS

The statistical tools and tests such as frequency, percentage, mean, and correlation coefficient were used wherever found appropriate and the data was analyzed systematically to draw valid inferences.

(i) Frequency

A simple frequency distribution was also used to identify the number of growers distributed on different groups.

(ii) Percentage

Percentage was used to make the simple comparison of different groups.

(iii) Mean

Mean, a measure of central tendency, was used to classify the potato growers based on the variation in independent variables.

(iv) Chi-square test

The test was used to measure the association between the dependent and independent variable among the respondents.

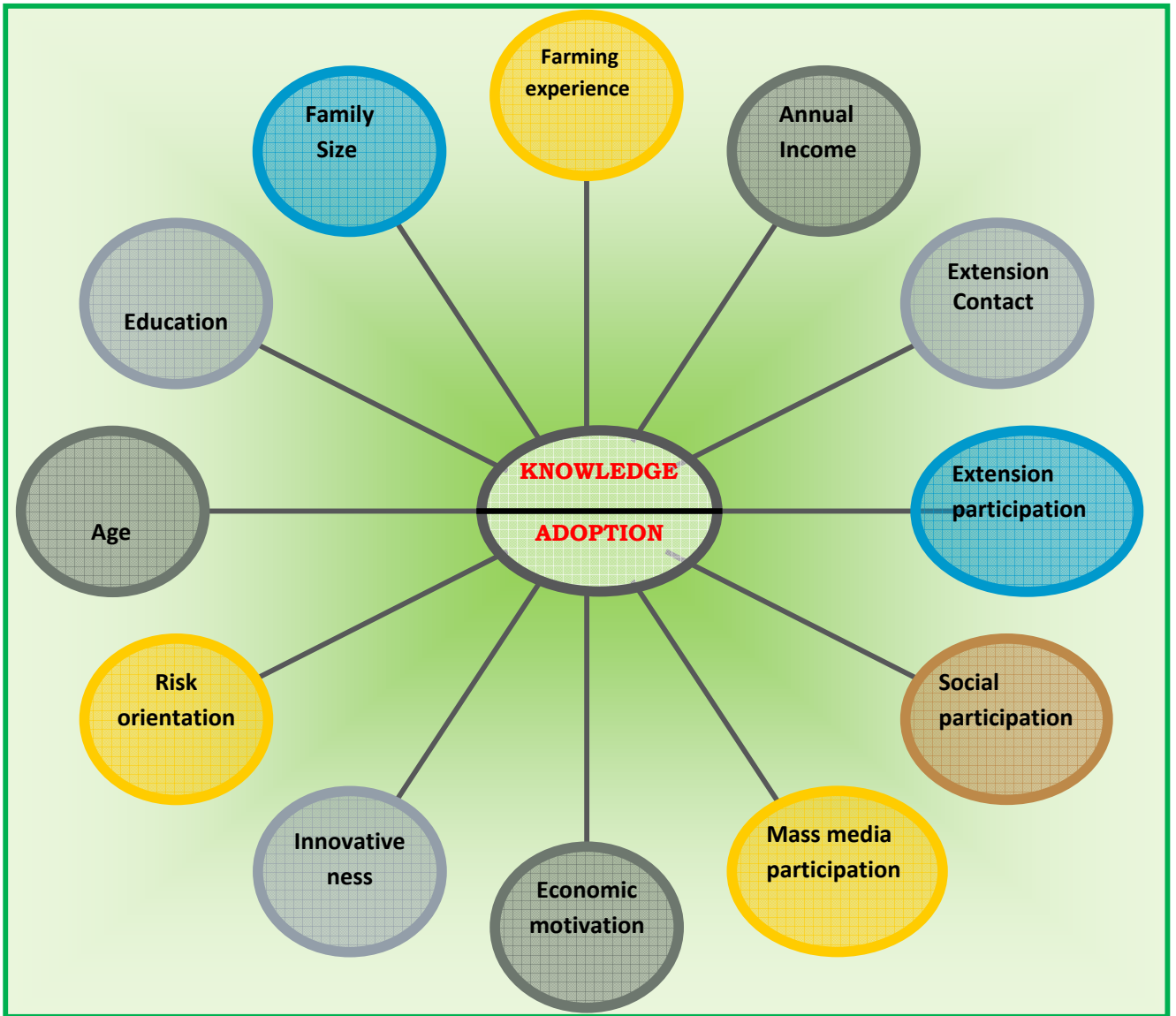


Fig 2: Conceptual model of the study

RESULTS

IV. RESULTS

In this chapter, the results of the study are presented under the following headings. Keeping in this view the major objectives of the study.

1. To study the Knowledge and Adoption level of potato growers with respect to recommended potato cultivation practices.
2. To find out the association between selected personal, socio-economic and psychological characteristics of the respondents and their Knowledge and adoption.
3. To assess the marketing channels employed by potato growers.
4. To ascertain the constraints perceived by the potato growers.

4.1 THE KNOWLEDGE AND ADOPTION LEVEL OF POTATO GROWERS WITH RESPECT TO RECOMMENDED POTATO CULTIVATION PRACTICES

4.1.1 Overall Knowledge level of potato growers with respect to recommended potato cultivation practices.

Data in Table1 and Fig: 3 revealed that 45.55 per cent of potato growers belonged to medium category in respect of the knowledge on improved practices followed by the group belonging to high category (32.22 %) only 22.23 per cent of them belonged to the low category, respectively.

4.1.1.1 Knowledge level of potato growers with respect to selected recommended potato cultivation practices

Table 1: Overall Knowledge level of the respondents with respect to recommended potato cultivation practices

(n=90)

Sl.No	Category	Frequency	Per cent
1	Low (<69.3)	20	22.23
2	Medium (69.3-77.6)	41	45.55
3	High (> 77.6)	29	32.22

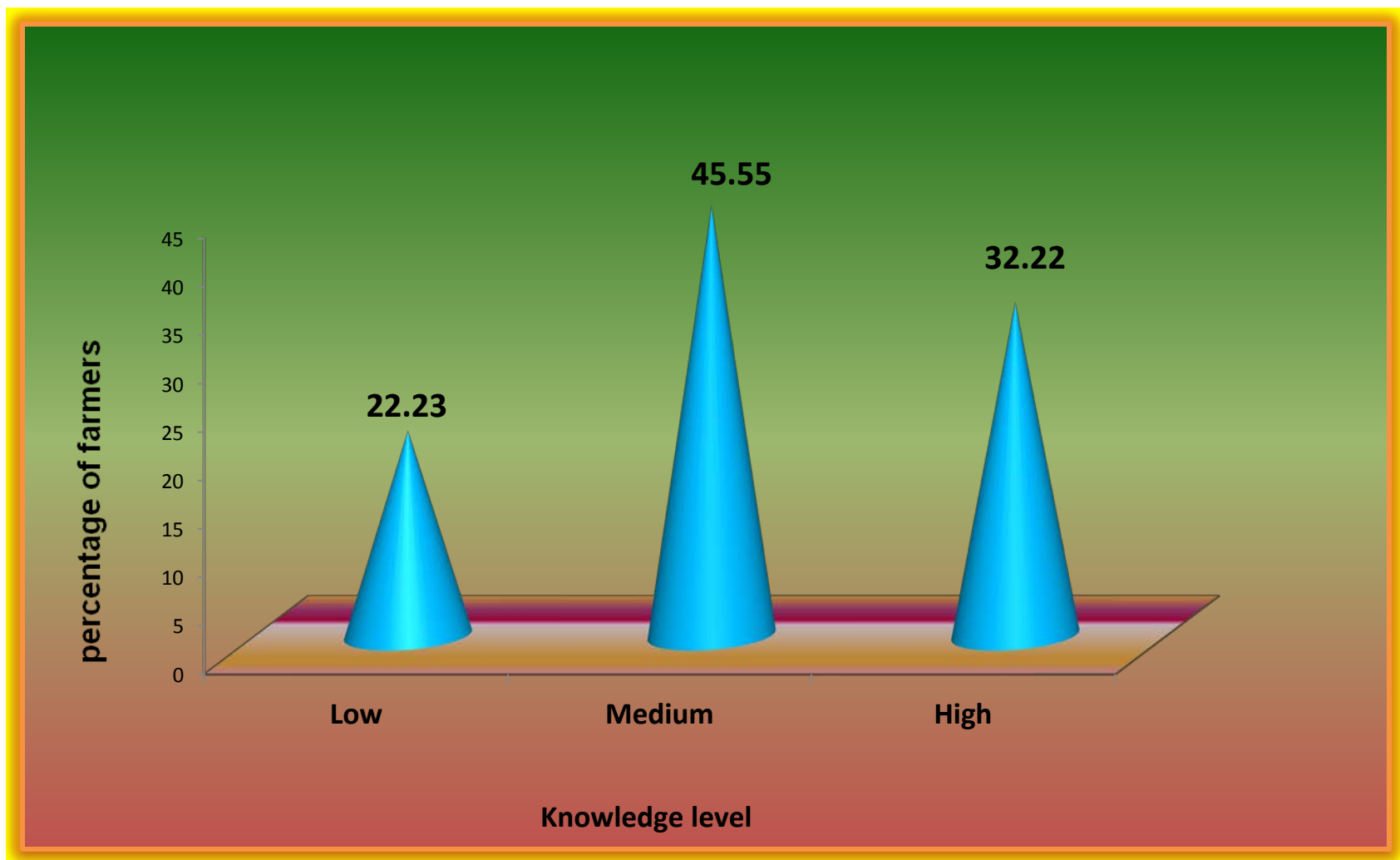


Fig. 3: Overall Knowledge level of the respondents with respect to recommended potato cultivation practices

To gain further insight into the details of knowledge on selected recommended potato cultivation practices, the data regarding specific knowledge of improved practices of potato are presented in Table 2 and Fig: 4.

An examination of Table 2 reveals that cent per cent of the potato growers had correct knowledge about the practices like recommended variety, row to row spacing and nitrogen top dressing after planting. Further 95.00 to 99.00 per cent of potato growers had correct knowledge about the practices like earthing up after planting, name of the pest or disease attacked height of ridges, plant to plant spacing, suitable month for sowing and post harvest practices.

More than 90.0 to 94.00 per cent of the potato growers had correct knowledge about practices like appropriate time of harvesting, number of eyes in cut tubers, duration of recommended varieties, seed rate per acre, irrigation requirement and number of pre- sowing ploughings. Findings revealed that 83.34 per cent of potato growers had correct knowledge on appropriate weight of seed size tubers.

Majority of the potato growers had correct knowledge about recommended dose of FYM, nitrogen, phosphorus and potash application and chemicals used for controlling pest and diseases and yield per acre and 17.77 per cent of the farmers had correct knowledge of chemical used for seed treatment. Cent per cent of potato growers had incorrect knowledge about bio-control agents used for controlling pest and diseases and chemicals used for controlling termites.

Table 2: Knowledge of the potato growers with respect to individual recommended cultivation practices

(n=90)

Sl. No.	Recommended cultivation practices	Correct knowledge	
		No.	Per cent
1	Recommended variety	90	100.0
2	Row to row spacing	90	100.0
3	Nitrogen top dressing after planting	90	100.0
4	Earthing up after planting	89	98.88
5	Name of the pest or disease attacked	88	97.77
6	Height of ridges	88	97.77
7	Plant to plant spacing	88	97.77
8	Suitable month for sowing	87	96.66
9	Post harvest practices	86	95.55
10	Appropriate time of harvesting	84	93.33
11	Number of eyes in cut tubers	84	93.33
12	Duration of recommended varieties	82	91.11
13	Seed rate	82	91.11
14	Irrigation requirement	81	90.00
15	Number of pre-sowing ploughings	81	90.00
16	Appropriate weight of seed size tubers	75	83.34
17	FYM	57	63.33
18	Chemicals used for controlling pest and disease	56	62.22
19	Yield	50	55.55
20	Phosphorus dosage	47	52.22
21	Potash dosage	46	51.11
22	Nitrogen dosage	45	50.00
23	Chemical used for seed treatment	16	17.77
24	Chemicals used for controlling termites	0	0.00
25	Bio-control agents used for controlling pest and disease	0	0.00

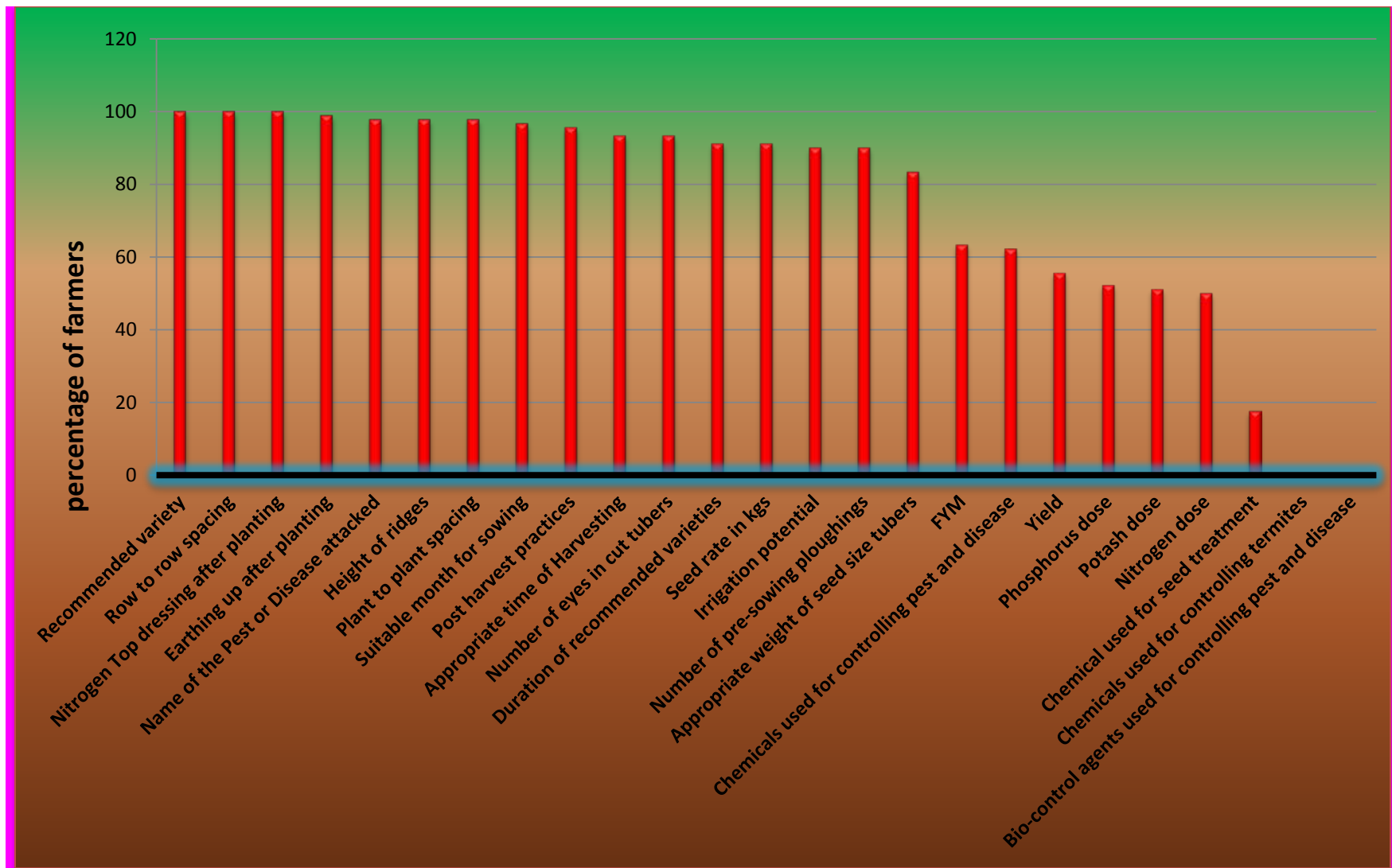


Fig. 4: Knowledge of potato growers in individual recommended cultivation practices

4.1.2 Overall adoption behaviour of respondents with respect to recommended potato cultivation practices

The data from Table 3 and Fig: 5 revealed that 44.45 per cent of potato farmers had medium adoption level. Whereas, 34.44 and 21.11 per cent of the respondents belonged to high and low adoption categories, respectively.

4.1.2.1 Adoption behaviour of potato growers with respect to selected recommended potato cultivation practices

The result of Table 4 and Fig: 6 represent different level of adoption behaviour such as full adoption, partial adoption and non-adoption, as per individual recommended potato cultivation practices. The results are presented practice wise in the following paragraphs.

Cent per cent of potato farmers adopted fully the practices like improved seed. More than 60.0 per cent of the farmers had fully adopted the practices like seed rate per acre and plant protection against diseases. More than 30.0 per cent of the farmers had fully adopted the practices like spacing between the plant to plant and spacing between row to row, application of organic fertilizers and inorganic fertilizers. About 15 per cent of farmers had fully adopted the seed treatment and plant protection against the pest.

Majority of the potato growers had partially adopted practices like application of inorganic fertilizers and organic fertilizers and spacing between the plant to plant and spacing between row to row. About one third of the farmers had partially adopted the practice of seed rate per acre and about one fourth of farmers had partially adopted the practices

Table3: Overall Adoption of level respondents with respect to recommended potato cultivation practices by the growers

(n=90)

Sl.No	Category	Frequency	Per cent
1	Low (<49.92)	19	21.11
2	Medium (49.92-59.82)	40	44.45
3	High (>59.82)	31	34.44

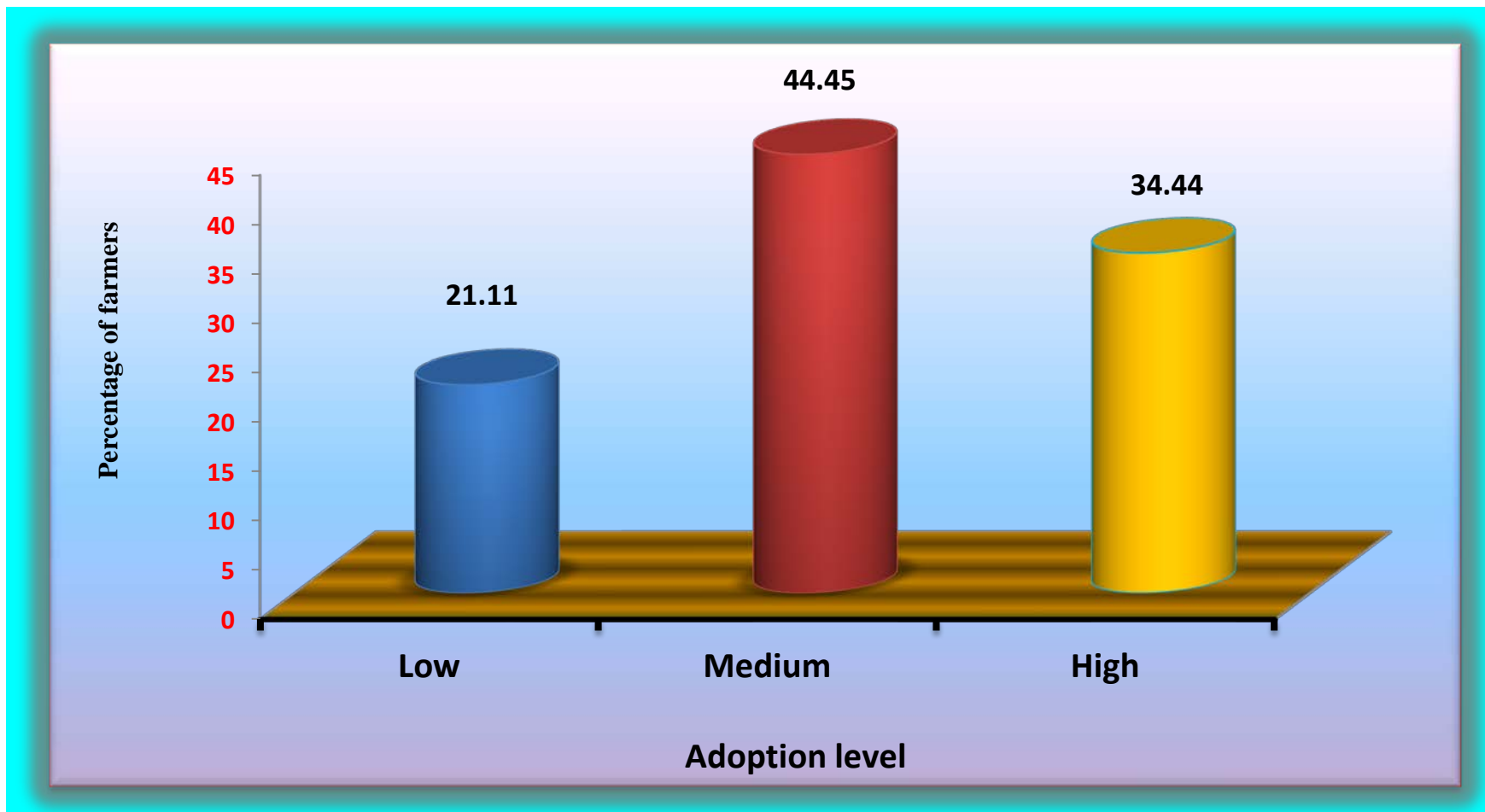


Fig. 5: Overall Adoption level of respondents with respect to recommended potato cultivation practices

**Table 4: Adoption of individual recommended cultivation practices
by the potato growers**

(n=90)

Sl.No	Recommended cultivation practices	Full Adoption		Partial Adoption		Non-Adoption	
		No.	%	No.	%	No.	%
1	Improved seed	90	100.0	--	--	--	--
2	Seed rate	62	68.88	28	31.12	--	--
3	Seed treatment	13	14.44	6	6.67	70	78.89
4	Spacing	44	48.88	46	51.12	--	--
5	Organic manures	29	32.22	61	67.78	--	--
6	Chemical fertilizers	30	33.33	51	56.67	9	10
7	Bio-pesticides / Bio-Extracts	--	--	--	--	90	100.0
8	Plant protection against pests	12	13.33	23	25.55	55	61.12
9	Plant protection against diseases	58	64.44	21	23.33	11	12.23

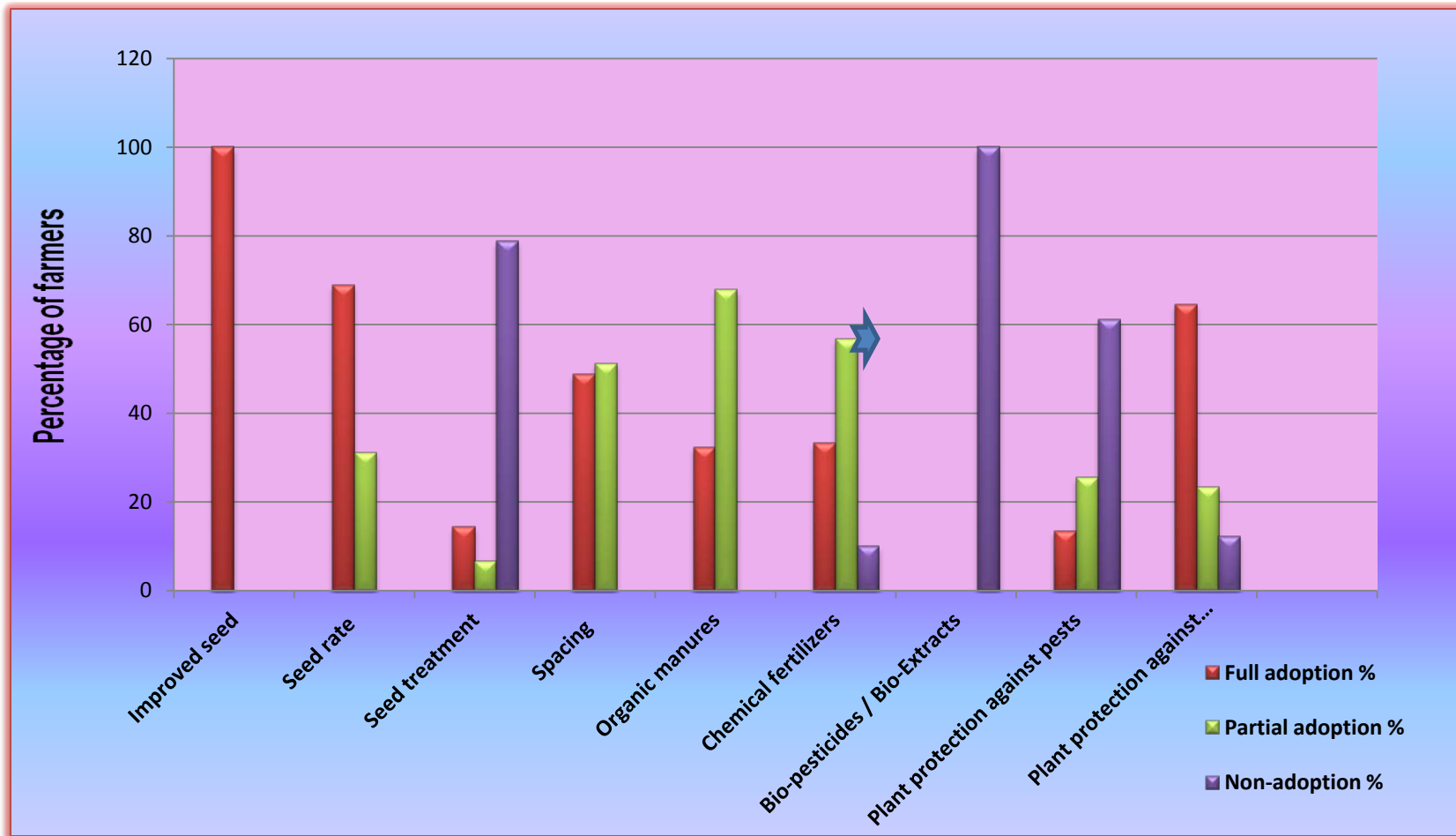


Fig. 6: Adoption of individual recommended cultivation practices by the potato growers

like plant protection against pest and diseases. Only about 7 per cent of potato growers were partially adopted seed treatment.

The practices like application of bio-pesticides or bio- extracts had not been adopted by the cent per cent of the potato growers.

4.1.3 Overall Knowledge level of the Big, Small, and Marginal farmers with respect to recommended potato cultivation practices

Data in Table 5 reveals that data revealed that 46.66 per cent of big farmers possessed high knowledge level about improved potato cultivation practices. About 33.34 per cent farmers had medium knowledge level, where 20.00 per cent potato growers had low knowledge level about improved potato cultivation practices.

The findings revealed that 46.66 per cent of small farmers had medium knowledge level, while 30.00 per cent farmers had high knowledge level, where as only 23.34 per cent potato growers had low knowledge level.

Further, revealed that 43.33 per cent of marginal farmers had low knowledge level, while 36.67 per cent farmers had medium knowledge level, and 20.00 per cent of potato growers had low knowledge level.

4.1.4 Knowledge level of the Big, Small and Marginal potato Growers with respect to individual recommended potato cultivation practices

Data on specific knowledge of farmers regarding recommended practices of potato cultivation are presented in Table 6. Cent per cent of big, small and marginal farmers had correct knowledge regarding row to row spacing, recommended variety, earthing up after planting, nitrogen

Table5: Overall Knowledge level of the Big, Small, and Marginal Farmers with respect to recommended potato cultivation practices

(n=90)

Sl.No	Extent of knowledge	Big farmers (n=30)		Small farmers (n=30)		Marginal farmers (n=30)	
		No.	%	No.	%	No.	%
1	Low	6	20.00	7	23.34	13	43.33
2	Medium	10	33.34	14	46.66	11	36.67
3	High	14	46.66	9	30.00	6	20.00
	Total	30	100.0	30	100.0	30	100.0

Table6: Knowledge level of the Big, Small and Marginal potato Growers with respect to individual recommended potato cultivation practices

(n=90)

Sl. No	Recommended cultivation practices	Big farmers correct knowledge		Recommended cultivation practices	Small farmers correct knowledge		Recommended cultivation practices	Marginal farmers correct knowledge	
		No	%		No	%		No	%
1	Row to row spacing	30	100.0	Row to row spacing	30	100.0	Row to row spacing	30	100.0
2	Recommended variety	30	100.0	Recommended variety	30	100.0	Recommended variety	30	100.0
3	Name of the Pest or Disease attacked	30	100.0	Name of the Pest or Disease attacked	30	100.0	Name of the Pest or Disease attacked	30	100.0
4	Earthing up after planting	30	100.0	Earthing up after planting	30	100.0	Earthing up after planting	30	100.0
5	Nitrogen top dressing after planting	30	100.0	Nitrogen Top dressing after planting	29	100.0	Nitrogen Top dressing after planting	30	100.0
6	Plant to plant spacing	30	100.0	Height of ridges	29	96.66	Plant to plant spacing	30	100.0
7	Number of eyes in cut tubers	30	100.0	Plant to plant spacing	29	96.66	Number of eyes in cut tubers	29	96.66
8	Height of ridges	30	100.0	Number of pre-sowing ploughings	29	96.66	Height of ridges	29	96.66
9	Appropriate time of Harvesting	30	100.0	Suitable month for sowing	28	93.33	Post harvest practices	29	96.66
10	Post harvest practices	30	100.0	Duration of recommended varieties	28	93.33	Suitable month for sowing	28	93.34
11	Suitable month for sowing	28	93.34	Post harvest practices	27	90.00	Irrigation requirement	28	93.37
12	Duration of recommended varieties	28	93.34	Irrigation requirement	26	86.66	Appropriate time of Harvesting	28	93.37
13	Irrigation requirement	27	90.00	Appropriate time of Harvesting	26	86.66	Number of pre-sowing ploughings	26	86.67

14	Number of pre-sowing ploughings	26	86.67	Number of eyes in cut tubers	25	83.33	Duration of recommended varieties	26	86.67
15	Chemicals used for controlling pest and disease	26	86.67	Appropriate weight of seed tubers	22	73.34	Seed rate	18	60.00
16	Yield	25	83.34	Seed rate	19	63.33	Chemicals used for controlling pest and disease	17	56.67
17	Seed rate	20	66.67	Phosphorus dosage	17	56.66	Appropriate weight of seed tubers	13	43.37
18	Nitrogen dosage	19	63.34	Potash dosage	17	56.66	Yield	13	43.37
19	Appropriate weight of seed tubers	18	60.00	Nitrogen dosage	16	53.33	Nitrogen dosage	12	40.00
20	Potash dosage	18	60.00	Yield	15	50.00	Phosphorus dosage	11	36.67
21	FYM	17	56.67	Chemicals used for controlling pest and disease	13	43.33	Potash dosage	11	36.67
22	Phosphorus dosage	16	53.34	FYM	12	40.00	FYM	10	33.34
23	Chemical used for seed treatment	6	20.00	Chemical used for seed treatment	5	16.67	Chemical used for seed treatment	5	16.67
24	Chemicals used for controlling termites	--	--	Chemicals used for controlling termites	--	--	Chemicals used for controlling termites	---	--
25	Bio-control agents used for controlling pest and disease	--	--	Bio-control agents used for controlling pest and disease	--	--	Bio-control agents used for controlling pest and disease	--	

top dressing after planting and name of the pest and disease attacked. And cent per cent of big farmers had correct knowledge about the practices like plant to plant spacing, number of eyes in cut tubers, height of ridges, appropriate time of harvesting and post harvest practices. More than 90 per cent of big farmers had correct knowledge about the practices like suitable month for sowing, duration of recommended varieties and irrigation requirement.

Findings revealed that 86.67 per cent of big farmers had correct knowledge regarding number of pre-sowing ploughings and chemicals used for controlling pest and disease. More than three fourth of big farmers had correct knowledge regarding yield per acre. More than 60 per cent of big farmers had correct knowledge about the practices like seed rate per acre, nitrogen dosage, appropriate weight of seed tubers and potash dosage. Whereas, half of the big farmers had correct knowledge regarding FYM application and phosphorous dosage and only 20 per cent of big farmers had correct knowledge about the chemical used for seed treatment.

More than 90 per cent of small farmers had correct knowledge about the practices like height of ridges, plant to plant spacing, number of pre-sowing ploughings, suitable month for sowing, duration of recommended varieties and post harvest practices. Findings revealed that 86.66 per cent of small farmers had correct knowledge regarding irrigation requirement and appropriate time of harvesting and 83.33 per cent of them had correct knowledge about number of eyes in cut tubers.

Nearly three fourth (73.34%) of small farmers had correct knowledge regarding appropriate weight of seed tubers. More than half of the small farmers had correct knowledge regarding seed rate per acre, phosphorous dosage, potash dosage, nitrogen dosage and yield per acre.

More than one fourth of small farmers had correct knowledge about the practices like chemical used for controlling of pest and diseases and application FYM and only 16.67 per cent of small farmers had correct knowledge regarding chemical used for seed treatment.

Cent per cent of marginal farmers had correct knowledge regarding row to row spacing, recommended variety, name of the pest and disease attacked, earthing up after planting, nitrogen top dressing after planting and plant to plant spacing. More than 90 per cent of marginal farmers had correct knowledge about the practices like number of eyes in cut tubers, height of ridges, post harvest practices, appropriate time of harvesting, irrigation requirement and suitable month for sowing. Findings revealed that 86.67 per cent of marginal farmers had correct knowledge about the practices like number of pre-sowing ploughings and duration of recommended varieties.

More than half of the marginal farmers had correct knowledge regarding seed rate per acre and Chemicals used for controlling pest and disease. More than one fourth of marginal farmers had correct knowledge about the practices like appropriate weight of seed tubers, yield per acre, nitrogen dosage, phosphorus dosage, potash dosage and FYM application and only 16.67 per cent of marginal farmers had correct knowledge regarding chemical used for seed treatment.

Cent per cent of big, small and marginal farmers had incorrect knowledge about bio-control agents used for controlling pests and diseases and Chemicals used for controlling termites.

4.1.5 Adoption level of Big, Small and Marginal farmers with respect to recommended potato cultivation practices

Data in Table 7 reveals that data revealed that 50.00 per cent of big farmers possessed high adoption level about improved potato cultivation practices. 30.00 per cent farmers had medium adoption level, where 20.00 per cent potato growers had low adoption level about improved potato cultivation practices.

The findings revealed that 40.00 per cent of small farmers had medium adoption level, while 33.34 per cent farmers had low adoption level, where as only 26.66 per cent potato growers had low adoption level.

Further, revealed that 40.00 per cent of marginal farmers had low adoption level, while 36.66 per cent farmers had medium adoption level, and 23.34 per cent of potato growers had low adoption level.

4.1.6 Adoption level of the Big, Small and Marginal potato Growers with respect to individual recommended potato cultivation practices

Data on specific adoption of farmers regarding recommended practices of potato cultivation are presented in Table 8. Cent per cent of big, small and marginal farmers had fully adopted the practice of improved seed. Regarding practice which were not adopted by cent per cent of big, small and marginal farmers were application of bio-pesticides / bio-Extracts.

Findings revealed that big (83.33%), small (76.67%) and marginal (46.67%) farmers had fully adopted the practice of seed rate per acre. Whereas, big (16.67%), small (23.33%) and marginal (53.33%) had partially adopted the practice of use of seed rate per acre.

Table7: Overall Adoption level of Big, Small and Marginal farmers with respect to recommended potato cultivation practices.

(n=90)

SL.NO	Extent of Adoption	Big farmers (n=30)		Small farmers (n=30)		Marginal farmers (n=30)	
		No.	%	No.	%	No.	%
1	Low	6	20.00	10	33.34	12	40.00
2	Medium	9	30.00	12	40.00	11	36.66
3	High	15	50.00	8	26.66	7	23.34
	Total	30	100.0	30	100.0	30	100.0

Table8: Adoption level of big small and marginal farmers with respect to individual practices of potato crop

(n=90)

Sl.No.	Recommended cultivation practices	Big farmers			Small farmers			Marginal farmers		
		Full	Partial	NA	Full	Partial	NA	Full	Partial	NA
1	Improved seed	30 (100.0)	--	--	30 (100.0)	--	--	30 (100.0)	--	--
2	Seed rate	25 (83.33)	5 (16.67)	--	23 (76.67)	7 (23.33)	--	14 (46.67)	16 (53.33)	--
3	Seed treatment	9 (30.00)	2 (6.67)	19 (63.33)	1 (3.33)	4 (13.33)	25 (83.34)	3 (10.00)	--	27 (90.00)
4	Spacing	19 (63.33)	11 (36.67)	--	11 (36.67)	19 (63.33)	--	14 (46.67)	16 (53.33)	--
5	Organic manures	9 (30.00)	21 (70.00)	--	11 (36.67)	19 (63.33)	--	9 (30.00)	21 (70.00)	--
6	Chemical fertilizers	9 (30.00)	21 (70.00)	--	9 (30.00)	16 (53.33)	5 (16.67)	12 (40.00)	14 (46.66)	4 (13.34)
7	Bio-pesticides / Bio-Extracts	--	--	30 (100.0)	--	--	30 (100.0)	--	--	30 (100.0)
8	Plant protection against pests	6 (20.00)	9 (30.00)	15 (50.00)	4 (13.34)	3 (10.00)	23 (76.66)	3 (10.00)	10 (33.34)	16 (53.33)
9	Plant protection against diseases	21 (70.00)	9 (30.00)	--	20 (66.66)	6 (20.00)	4 (13.34)	17 (56.66)	6 (20.00)	7 (23.34)

Regarding seed treatment only 30 per cent of big farmers had adopted fully. Whereas, 3.33 and 10.00 per cent of small farmers and marginal farmers had fully adopted the seed treatment. Whereas, (6.67%) of big farmers and (13.33%) of small farmers had partially adopted. With regards to row to row spacing and plant to plant spacing, 63.33 per cent of big farmers, 36.67 per cent of small farmers and 46.67 per cent of marginal farmers had adopted fully. Whereas big farmers (36.67%), small farmers (63.33%), and marginal farmers (53.33%) had partially adopted row to row spacing and plant to plant spacing while planting.

A glance at Table 8 also shows, 30.00 per cent of big farmers, 36.67 per cent of small farmers and 30.00 per cent of marginal farmers had fully adopted the practice of application of organic manure. Whereas, majority of 70.00 per cent of big, 63.33 per cent of small and 70.00 per cent of marginal farmers had partially adopted the practice of application of organic manure.

Regarding application of chemical fertilizers, 30.00 per cent of big farmers, 30.00 per cent of small farmers and 40.00 per cent of marginal farmers had fully adopted. Whereas, majority of 70.00 per cent of big, 53.33 per cent of small and 46.66 per cent of marginal farmers had partially adopted the practice of application of chemical fertilizers.

The big (20.00%), small (10.00%) and marginal (13.34%) farmers had fully adopted the practice of chemicals used for controlling of pest. Whereas, 30.00 per cent of big, 13.34 per cent small and 10.00 per cent of marginal farmers had partially adopted. Further, 50.00 per cent of big, 76.66 per cent small and 53.33 per cent of marginal farmers had not adopted the practice of chemicals used for controlling of pest.

A greater majority of big (70.00%), small (66.66%) and marginal (56.66%) farmers had fully adopted the practice of chemicals used for controlling of diseases. Whereas, 30.00 per cent of big, 20.00 per cent small and 20.00 per cent of marginal farmers had partially adopted. Further, 13.34 per cent small and 23.34 per cent of marginal farmers had not adopted the practice of chemicals used for controlling of diseases.

4.2 ASSOCIATION BETWEEN SELECTED PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS OF THE RESPONDENTS AND THEIR KNOWLEDGE AND ADOPTION

4.2.1 Personal, socio-economic and psychological characteristics of potato farmers

An examination of Table 9 projects the profile of the potato farmers.

Age:

It is seen from the Table 13 that 58.89 per cent of the potato farmers belonged to old age group followed by young (21.11%) and middle (20%) age group.

Education:

It was found that majority (64.45 %) of the respondents belonged to medium education category followed by 21.11 per cent of them belonging to low education category; whereas, 14.44 per cent were in the high category of education.

Family size:

It was seen from the Table 9 that majority (58.89%) of the respondents belonged to medium family size followed by 34.45 per cent of them belonging to small family size, whereas, only 6.66 per cent were in the high family size.

Farming Experience:

The farming of the respondents indicated that 41.12 per cent belonged to medium category followed by 31.11 per cent high category and 27.77 per cent were under low farming experience in nature.

Annual Income:

It could be seen from the Table 13 that 94.45 per cent of the potato farmers belonged to medium income per annum followed by low (3.33 %) and high (2.22%) income group.

Extension contact:

Majority (70.00%) of the respondents had medium extension contact, whereas 17.77 and 12.23 per cent of the potato growers had high and low extension contact, respectively.

Extension participation:

Majority of the potato farmers (63.34%) of the respondents had medium extension participation, whereas 25.55 and 11.11 per cent of the potato growers had low and high extension participation, respectively.

Social participation:

The Social participation indicates that majority (57.78%) of the respondents belonged to medium level of social participation followed by 23.33 per cent high category and 18.89 per cent belonged to low level of social participation.

Mass media participation

Majority (51.11%) of the respondents had high level of mass media participation, 37.77 per cent had medium and 11.12 per cent had low levels of mass media participation.

Economic motivation

More than one fourth (44.45 %) of the potato growers belonged to medium Economic motivation category followed by 43.33 and 12.22 per cent of them having high and low economic motivation, respectively.

Innovativeness:

Innovativeness of the respondents indicated that more than half (58.89%) of the respondents belonged to medium group followed by 22.23 per cent of them low and 18.88 per cent of them had high innovative in nature.

Risk orientation:

Majority of the potato growers (80.00%) had medium level of risk orientation followed by high (14.44%) and low (5.56%) level of risk orientation.

Table 9: Personal, socio-economic and psychological characteristics of potato farmers.

(n=90)

Characters	Category	Frequency	Per cent
Age	Young (<37)	19	21.11
	Middle (37-45)	18	20.00
	Old (>45)	53	58.89
Educational Status	Low (<2.61)	19	21.11
	Medium (2.61-4.59)	58	64.45
	High (>4.59)	13	14.44
Family size	Small (1-4)	31	34.45
	Medium (5-8)	53	58.89
	Large (>9)	6	6.66
Farming Experience	Low (<15.2)	25	27.77
	Medium (15.2-24.26)	37	41.12
	High (>24.26)	28	31.11
Annual Income	Low (<8741)	3	3.33
	Medium(8741-21092)	85	94.45
	High(>21092)	2	2.22
Extension contact	Low(<3.01)	11	12.23
	Medium(3.01-4.13)	63	70.00
	High (>4.13)	16	17.77

Continued.....

Extension participation	Low (<4.44)	23	25.55
	Medium(4.44-5.86)	57	63.34
	High(>5.86)	10	11.11
Social participation	Low(<6.18)	17	18.89
	Medium(6.18-7.94)	52	57.78
	High(>7.94)	21	23.33
Mass media participation	Low(<10.54)	10	11.12
	Medium(10.54-12.14)	34	37.77
	High(>12.14)	46	51.11
Economic motivation	Low(<21.43)	11	12.22
	Medium(21.43-22.77)	40	44.45
	High(>22.77)	39	43.33
Innovativeness	Low(<12.29)	20	22.23
	Medium(12.29-13.91)	53	58.89
	High(>13.91)	17	18.88
Risk orientation	Low(<20.45)	5	5.56
	Medium(20.45-22.95)	72	80
	High(>22.95)	13	14.44

4.2.2 The Association between selected personal, socio-economic and psychological characteristics of the respondents and their Knowledge level

The Table 10 shows that out of 12 independent variables, 3 variables namely education, mass media participation and risk orientation of potato growers were significantly associated with their knowledge level of potato farmers at 0.01 level % and age, extension contact, extension participation of potato growers were significant association with their knowledge level at 0.05 level %. And, family size, farming experience, annual income, social participation, economic motivation and innovativeness were not associated with their knowledge level.

4.2.3 The Association between selected personal, socio-economic and psychological characteristics of the respondents and their adoption level

The Table 11 shows that out of 12 independent variables, one variable namely social participation of potato growers was significantly associated with their adoption level of potato farmers at 0.01 % level and age, education, extension participation, risk orientation and mass media participation of potato growers were significantly associated with their adoption level at 0.05 level %. And other characteristics namely family size, farming experience, annual income, extension contact, innovativeness and economic motivation were not associated with their adoption level.

Table 10: Association between selected personal, socio- economic and Psychological characteristics of the respondents and their Knowledge level

(n=90)

Sl .No.	Variables	Chi-square value	Contingency Coefficient (C)
1	Age	11.0363*	0.3302
2	Education	17.2169**	0.4007
3	Family size	7.2009 ^{NS}	0.2721
4	Farming experience	8.9892 ^{NS}	0.3013
5	Annual income	5.6939 ^{NS}	0.0595
6	Extension contact	13.1105*	0.3565
7	Extension participation	10.5524*	0.3239
8	Social participation	6.3337 ^{NS}	0.2563
9	Mass media participation	20.5990**	0.4315
10	Economic motivation	4.7596 ^{NS}	0.2241
11	Innovativeness	7.8343 ^{NS}	0.2829
12	Risk orientation	19.7834**	0.4245

* Significant at 5 % level

** Significant at 1 % level

NS = Non-Significant

Table 11: Association between selected personal, socio-economic and psychological characteristics of the respondents adoption level

(n=90)

Sl .No.	Variables	Chi-square value	Contingency Coefficient (C)
1	Age	9.8725*	0.3143
2	Education	9.4713*	0.3085
3	Family size	3.9100 ^{NS}	0.2040
4	Farming experience	7.8265 ^{NS}	0.2828
5	Annual income	2.1739 ^{NS}	0.1535
6	Extension contact	7.7508 ^{NS}	0.2815
7	Extension participation	10.3870*	0.3216
8	Social participation	16.9875**	0.3984
9	Mass media participation	14.6590*	0.3742
10	Economic motivation	2.3981 ^{NS}	0.1606
11	Innovativeness	2.9727 ^{NS}	0.1610
12	Risk orientation	9.6284*	0.3156

* Significant at 5 % level

** Significant at 1 % level

NS = Non-Significant

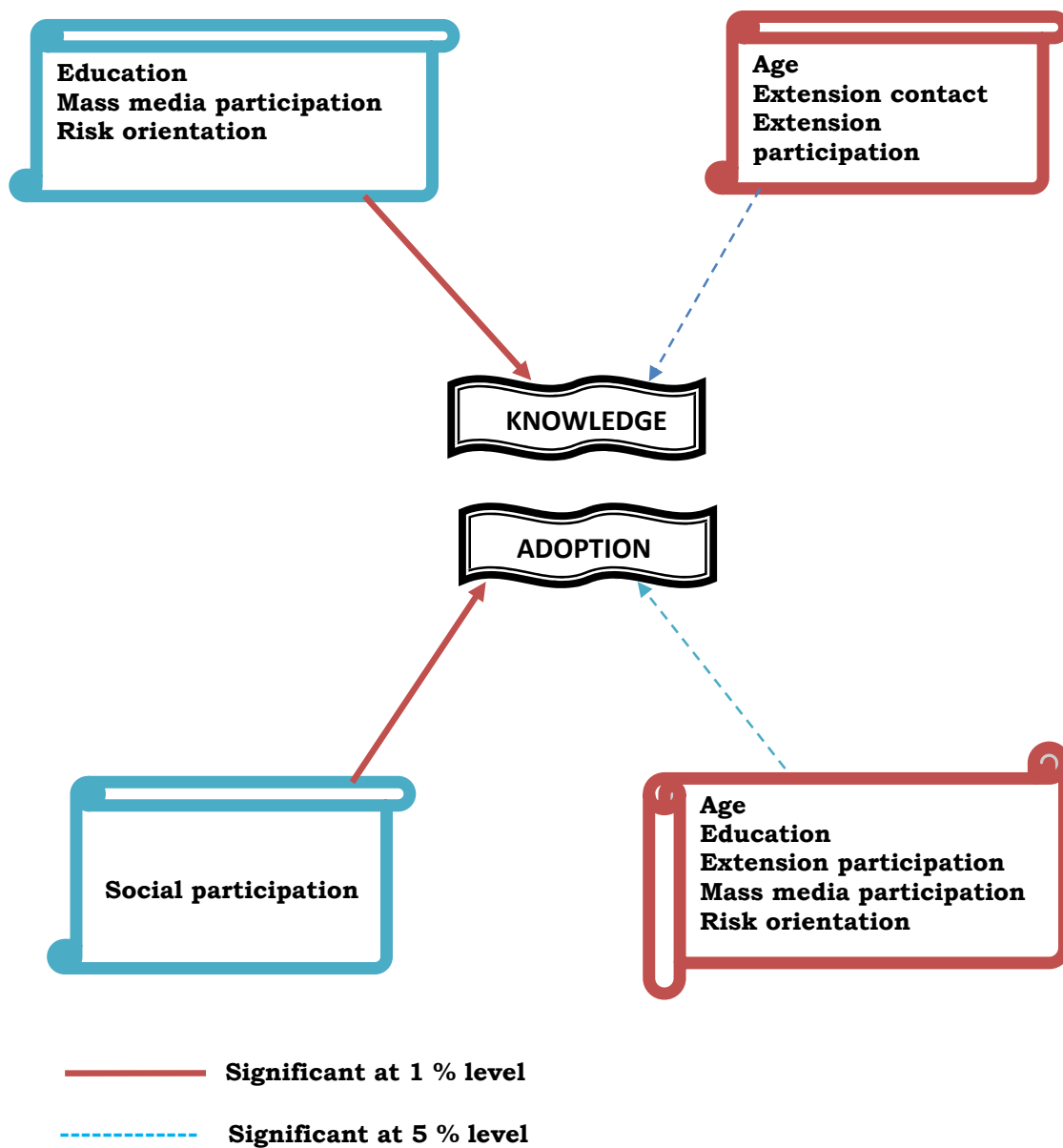


Fig.7: Empirical model of the study showing association between Knowledge, Adoption and Independent variables

4.3 MARKETING CHANNELS EMPLOYED BY THE FARMERS IN MARKETING OF POTATO

The data regarding marketing channels followed by farmers in marketing of potato is presented in the Table 12. The table shows that the Majority (55.57%) of the farmers marketed their product through APMC, 22.23 per cent farmers sold their product through village merchant and 11.12 per cent of farmers marketed their product through Wholesalers. Whereas, very few farmers sold their product through local market (7.78 %) and commission agent (3.34 %).

4.4 CONSTRAINTS PERCEIVED BY FARMERS IN THE PRODUCTION, STORAGE AND MARKETING OF POTATO

4.4.1 Constraints perceived by farmers in the Production of potato

Table 13 reveals the constraints that cent per cent of the farmers facing the problems of high cost of seed material, , untimely availability of seed material (97.78%), high cost of fertilizers (96.67%), lack of technical guidance (94.45%), more pests attack (92.23%), more diseases incidence (88.89%), high cost of plant protection chemicals (86.67%), non-availability of loan on time(75.56%), timely non-availability of labour (66.67%), timely unavailability of irrigation (58.89%), timely non-availability of sowing implements(57.78%), non-availability of agricultural implements (55.56%) and non-preparation of land on time (50.00%).

Table 12: Marketing Channels employed by the potato growers

(n=90)

Sl.No.	Marketing channels	Frequency	Per cent	Rank
1	APMC	50	55.57	I
2	Village merchant	20	22.23	II
3	Whole salers	10	11.12	III
4	Commission agent	7	7.78	IV
5	Local market	3	3.34	V

Table 13: Constraints as perceived by farmers in potato cultivation**(n=90)**

Sl. No.	Constraints	Frequency	Per cent	Ranks
1	High cost of seed material	90	100.0	I
2	Untimely availability of seed material	88	97.78	II
3	High cost of fertilizers	87	96.67	III
4	Lack of technical guidance	85	94.45	IV
5	More pests attack	83	92.23	V
6	More diseases incidence	80	88.89	VI
7	High cost of plant protection chemicals	78	86.67	VII
8	Non-availability of Loan on time	68	75.56	VIII
9	Timely Non-availability of Labour	60	66.67	IX
10	Timely unavailability of Irrigation	53	58.89	X
11	Timely Non-availability of sowing implements	52	57.78	XI
12	Non-availability of agricultural Implements	50	55.56	XII
13	non-preparation of land on time	45	50.00	XIII

4.4.2 Constraints perceived by the farmers in the Marketing of Potato

Table 14 represents that the constraints faced by the potato farmers in marketing of potato such as the cent percent of the farmers given first preference to high cost of transportation, fluctuation in market prices (94.45%), market places are far away (88.89%), commission agent charge is more (86.67%), delayed cash payment from the traders (83.34%), high hamali charges (80.00%) and malpractice in weighment (66.67%).

4.4.3 Constraints perceived by farmers in the Storage of potato

Table 15 indicates that the facts relating to the constraints perceived by farmers on storage of potato such as the cent per cent of the farmers given first preference to the non-availability of cold storage facilities, high cost of storage (98.89%), storage facilities are located far away from village (96.67%), no cold storage facility in APMC (95.56%), capacity of cold storage is less (87.78%), and no loan facility for the stored potato (77.78%).

Table 14: Constraints as perceived by the farmers in Marketing of potato

(n=90)

Sl.No.	Constraints	Frequency	Per cent	Ranks
1	High cost of transportation	90	100.0	I
2	Fluctuation in market prices	85	94.45	II
3	Market places are far away	80	88.89	III
4	Commission agent charge is more	78	86.67	IV
5	Delayed cash payment from the traders	75	83.34	V
6	High Hamali charges	72	80.00	VI
7	Malpractices in weighing	60	66.67	VII

Table 15: Constraints as perceived by the farmers in Storage of potato

(n=90)

Sl.No	Constraints	Frequency	Per cent	Rank
1	Non-availability of cold storage facilities	90	100.0	I
2	High cost of storage	89	98.89	II
3	Storage facilities are located far away from village	87	96.67	III
4	No cold storage facility in APMC	86	95.56	IV
5	Capacity of cold storage is less	79	87.78	V
6	No loan facility for the stored potato	70	77.78	VI

DISCUSSION

V. DISCUSSION

The results of the present study are discussed in this chapter under the following headings.

1. To study the Knowledge and Adoption level of potato growers with respect to recommended potato cultivation practices.
2. To find out the association between selected personal, socio-economic and psychological characteristics of the respondents and their Knowledge and adoption.
3. To assess the marketing channels employed by potato growers.
4. To ascertain the constraints perceived by the potato growers.

5.1 THE KNOWLEDGE AND ADOPTION LEVEL OF POTATO GROWERS WITH RESPECT TO RECOMMENDED POTATO CULTIVATION PRACTICES

5.1.1 Overall Knowledge level of potato growers with respect to recommended potato cultivation practices.

Knowledge level on recommended practices of potato cultivation as seen from Table 1 indicated that majority of potato growers had medium level of knowledge followed by high and low levels. These potato growers might not have been exposed to the improved technology and as a result, only less per cent of them possess high knowledge with regard to improved practices.

An appraisal of results in Table 2 indicated the fact that more than 90 per cent of the potato growers had correct knowledge about the practice like recommended variety and row to row spacing, earthing up after planting, height of ridges, plant to plant spacing, name of the pest

or disease attacked, suitable month for sowing number of eyes in cut tubers, number of pre- sowing ploughings, duration of recommended varieties, Seed rate, Irrigation potential, appropriate time of harvesting and post harvest practices.

Further, majority of the potato growers had correct knowledge about recommended dose of FYM, nitrogen, phosphorus and potash and chemicals used for controlling pest and diseases and yield per acre. This awareness could be attributed to the fact that potato being a commercial crop having the potentiality of higher returns to farmers. Added to this fact, it could also be mentioned that the farmers of the study area are involved in cultivating the crop since long time and this experience must have also added to their present level of awareness.

Majority of the potato farmers did not have proper knowledge with regard to practice like chemical used for seed treatment, application FYM, nitrogen dose, phosphorus dose, potash dose, chemicals used for controlling pest and disease and yield. This might be due to the fact that these technologies are complex in nature and are comparatively difficult to understand. Further, the extension participation, mass media participation and extension contact of these farmers and also not up to the required level.

Cent per cent of the farmers don't have knowledge about chemicals used for controlling termites and bio-control agents used for controlling pests and diseases. This is due to lack of awareness, extension contact, extension participation and mass media participation. Being, relatively a latest extension agency has made a special effort in educating the farmers about importance of use of bio-control agents in controlling pest and diseases an one side and on another side even the potato growers

have not established given contact with extension agency not took part in extension activities carried out.

The findings are in conformity with the findings of past studies of Ravishankar (1995), Kubde *et al.* (2000), Vinod Gupta *et al.* (2001), Shinde, (2002), Puspendra Singh Naruka and Sangram, Singh (2003), Ramesh and santha govind (2003), Sasidhar Reddy *et al.* (2007), Pottappa (2008), Venkatesh Gandhi *et al.* (2008), Vinay Kumar *et al.* (2009) and Sathasivam *et al.* (2009).

5.1.2 Overall adoption level of potato growers with respect to recommended potato cultivation practices

Adoption of improved potato production practices by potato growers are presented in the Tables 3 and 4. About 44.45 per cent of potato farmers had medium adoption level. Whereas, 34.44 and 21.11 per cent of the respondents belonged to high and low adoption categories, respectively. The improved practices of potato such as use of improved varieties had adopted cent per cent of the respondents and majority of potato growers had adopted seed rate per acre and plant protection against diseases by 60 per cent. Majority of the potato growers were have partially adopted the practices such as spacing between plant to plant and row to row, application of chemical fertilizers and organic manures. The considerable proportions of the potato growers have not adopted the practices such as seed treatment and none of them have adopted the bio-pesticide/bio-extract.

It could be visualized that the simple technologies are relatively adopted to a greater extent as compared to complex technologies. Lack of knowledge about recommended quantity of chemicals for control of pests

and diseases, use of recommended dose of chemical fertilizers may be the reason for partial adoption of these technologies. Besides, a bio-control agent was not at all used by any of the respondents surveyed. Complexity of an innovation, high cost of inputs and environmental factors might have influenced the farmers for limited adoption of practices like fertilizer dose and use of recommended plant protection chemicals.

One of the possible reasons for partial adoption of disease and pest control measures might be due to the high cost as perceived by farmers in the study. Non-availability of adequate quantity of farm yard manure and also its high cost might be the reasons for partial adoption of by the potato growers.

These findings are in conformity with the findings of Ravishankar (1995), Bhagwat and Gohad (2003), Zagade *et al.* (2003), Bhagwan Singh (2004), Gurprit Singh Dhillon and Kuldeep Kumar (2004), Pottappa (2008), Shivamurthy *et al.* (2008), Vishvanath Hiremath *et al.* (2009) and Varadaraju *et al.* (2009).

5.1.3 Overall Knowledge level of the Big, Small, and Marginal farmers with respect to recommended potato cultivation practices

There was a difference between big, small and marginal farmers in their overall knowledge with regard to improved potato cultivation practices (Table5). A good number (46.66%) of big farmers possessed high level of knowledge. Small farmers possessed medium knowledge level (46.66%) and marginal farmers had low level of knowledge (43.33%).

A further analysis was made to assess the knowledge level of big, small and marginal farmers on different cultivation practices of potato. it

is evident that a majority of the respondents in all the groups were aware of the practices like row to row spacing, recommended variety, earthing up after planting, nitrogen top dressing after planting, name of the pest or disease attacked, number of pre-sowing ploughings, appropriate weight of seed size tubers, number of eyes in cut tubers, suitable month for sowing, recommended variety, duration of recommended varieties, height of ridges, plant to plant spacing, irrigation availability, appropriate time of harvesting and post harvest practices (Table 6).

The trend of findings indicates that the practices which are simple, easy to remember, low cost and less difficult are known to both small and marginal farmers irrespective of their land holding. On the other hand big farmers had high knowledge regarding practices which are complex and of more technical nature. This may be due to the reason that small and marginal farmers had low education and low extension participation. These findings are in conformity with the study of Nagaraj (1996) and Puspendra Singh Naruka and Sangram Singh (2003).

5.1.4 Adoption level Big, Small and Marginal farmers with respect to recommended potato cultivation practices

There was difference between big, small and marginal farmers in their overall adoption with regard to improved potato cultivation practices (Table7). About half of the big farmers (50.00%) had high level of adoption of improved cultivation practices of potato. whereas, small farmers had medium level (40.00%) of adoption and marginal farmers had low level (40.00%) of adoption of cultivation practices of potato crop.. However, compared to small and marginal farmers, more number of big farmers belonged to high adoption category.

The difference in adoption of different improved cultivation practices of potato by big, small and marginal farmers is presented in Table 8. The cent per cent of big, small and marginal potato farmers had used improved seed fully. The reason for this might be due to the simplicity and low cost involved in adopting the practice and also variety might have influenced in increasing the yield significantly.

The present findings are in conformity with the findings of Nagaraj (1996) and Puspendra Singh Naruka and Sangram Singh (2003).

A majority of small and marginal farmers were partial and non adopters with regard to seed treatment, seed rate, spacing, application of organic manure, chemical fertilizers and plant protection against pest and diseases. The possible reasons for non-adoption the practice might be lack of proper knowledge, time consuming and non-availability of inputs. This finding is in conformity with the findings of Anonymous (1994), Nagaraj (1996) and Puspendra Singh Naruka and Sangram Singh (2003).

Regarding use of bio-pesticides / bio-extracts cent per cent of big, small and marginal farmers had not adopted the practice. The reasons for non-adoption are lack of knowledge, timely non-availability and finance problem. The finding is in agreement with the findings of Anonymous (1994), Nagaraj (1996) and Puspendra Singh Naruka and Sangram Singh (2003).

5.2 ASSOCIATION BETWEEN SELECTED PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS OF THE RESPONDENTS AND THEIR KNOWLEDGE AND ADOPTION

5.2.1 Personal, socio-economic and psychological characteristics of potato farmers

Majority of the respondents belonged to old age (58.89 %), with medium level of education (64.45%), medium family size (58.89 %), medium annual income (94.45%), medium extension contact (70.00%), medium extension participation (63.34%), medium social participation (57.78%), high mass media participation (51.11%), medium innovativeness (58.89%) and medium risk orientation (80.00 %). About half of farmers had medium farming experience (41.12%) and medium economic motivation (44.45%).

5.2.2 The Association between selected personal, socio-economic and psychological characteristics of the respondents and their Knowledge level

A close observation of data in Table 10 reveals a significant association between independent variables such as age, education, extension contact, extension participation, mass media participation and risk orientation and the knowledge level of potato growers. The possible reasons for significant association between age and knowledge level might be that majority of the farmers belongs to old (>45) age. Further, it is a universal phenomenon that age increases the experience in their profession/vocations also keeps increasing.

Similar findings were reported by several researchers like Chandran (1997), Ramesh and Santha Govind (2003), Pottappa (2008) and Pankaja *et al.* (2009).

The possible reason for highly significant association between education and knowledge level of potato growers is not difficult to understand because education helps an individual in acquisition of knowledge, broadening the vision and motivating towards higher accomplishments.

Similar findings were reported by several researchers like Ramesh and Santha Govind (2003), Tarde *et al.* (2006), Pottappa (2008), Venkatesh Gandhi *et al.* (2008) and Pankaja *et al.* (2009).

There was significant association between extension contact and knowledge level of potato farmers. It is natural those who had contacted extension agency have better knowledge about improved cultivation practices of potato. It is possible to discuss with extension worker and gain more knowledge. This is in conformity with the result of Ramesh and Santha Govind (2003).

Extension participation of potato farmers was significantly associated with their knowledge level. Extension activities conducted in the area have direct effect on gain in the knowledge level about improved practices of potato cultivation.

The findings of Tarde *et al.* (2006) are in conformity with the present findings.

Further, Table 10 had shown a highly significant association between mass media participation of potato growers and their knowledge level. This might be due to fact that advent of mass media provides enormous opportunities for repeated exposure of farmers to new technology and motivating them for further action. Hence, those farmers who had higher exposure to mass media had exhibited higher knowledge level.

This result was also observed by Chandra Naik (1993), Ravishankar (1995), Dhamodaran and Vasanth Kumar (2001), Veda Murthy (2002), Ramesh and Santha Govind (2003), Shashidhara (2003), Sunil Kumar (2004) and Pottappa (2008).

There was a significant association between risk orientation and knowledge level of potato farmers. Risk orientation is expressed as the degree to which a farmer is oriented to take risk and has courage to face uncertainties in any enterprises. A farmer who is having this particular trait normally will have better knowledge. This might be the probable reason for the existence of this type of relationship.

Similar findings were reported by several researchers like Ravishankar (1995) and Nagaraj (1996),

5.2.3. The Association between selected personal, socio-economic and psychological characteristics of the respondents and their adoption level

The association between selected personal, socio-economic and psychological characteristics of potato growers their adoption levels are presented in Table 11. As the data indicates variables like age, education, extension participation, social participation, mass media participation and risk orientation had significant relationship with adoption of potato practices.

There was a significant difference between the age and adoption level of potato growers. The probable reason that the old age farmers had strong attitude based on previous experience and changing such attitude very fast. Therefore the old farmers might have responded quickly to new practices.

The findings of the study are in fine with Nagaraj (1996), Ramachandra (2002), Shrivastav (2002), Gurprit Singh Dhillon and Kuldip Kumar (2004).

Education of potato growers has significant association with their adoption level of recommended practices of potato crop. This might be due to fact that formal education would help in widening their mental horizon and facilities learning by developing a favourable attitude towards adoption of new farm practices. It is also true that rationality in decision-making is a function of one's educational level and for adoption of any innovation, decision making is a key component.

The present findings of the study are in conformity with findings reported by Saikrishna (1998), Ankulwar (2001), Bhagwat and Gohad (2003), Pottappa (2008), Ramesh and Santha govind (2008) and Vishvanath Hiremath *et al.* (2009).

Extension participation of potato growers had a significant association with their adoption of recommended practices of potato crop. The participation in extension activities provide the opportunities for contrived experiences and serve as reinforcement in gaining knowledge about agricultural innovations leading to quick decision to adopt innovations.

The present findings of the study are in conformity with the findings reported by Ravishankar (1995), Mamatha and Hiremath (2000), Ramachandra (2002), Pottappa (2008) and Varadaraju *et al.* (2009).

Social participation of the potato farmers was found significantly associated to their adoption level. Social participation normally develops

more personal contacts with outsiders who might have influenced farmers to adopt improved cultivation practices of potato.

The present findings of the study are in conformity with the findings reported by Nagaraj (1996), Ankulwar (2001), Bhagwat and Gohad (2003) and Ramesh and Santha govind (2008).

There was significant association between mass media use and adoption level of potato growers. It is natural that mass media carry more information on improved methods of potato cultivation. Farmers who have exposed adequately to mass media might have influenced by it.

The present findings of the study are in conformity with the findings reported by Ravishankar (1995), Nagaraj (1996), Dhamodaran and Vasanth Kumar (2001), Veda Murthy (2002), Ramachandra (2002) and Sunil Kumar (2004).

There was significant association between risk orientation and adoption level of potato growers. It is quite natural that farmers who are willing to take risk and able to face the circumstances in adoption of recommended practices would do well than the others. Farmers might have taken high risk in adoption of potato practices. Hence this type of relation exists.

The findings of the study is supported by the findings of Ramesh Babu (1987), Ankulwar (2001) Bhagwat and Gohad (2003) and Gurprit Singh Dhillon and Kuldeep Kumar (2004).

5.3 THE MARKETING CHANNELS EMPLOYED BY POTATO GROWERS

The Table 12 reveals that the majority (55.57%) of the potato growers were used the APMC as the most important marketing channel for selling their produce. Some of the farmers sold their produce to village merchant, wholesalers, commission agent and local market. The possible reason for selling potato to APMC is due to fact that there is no commission charges and malpractices. And also selling to village merchant is due to reason that they buy potato from the farmers at their residences on immediate payment which will avoid payment of transportation charges and commission charges.

These findings are in conformity with the findings of Shivamurthy (1991), Senthilnathan and Srinivasan (1994), Khunt and Desai (1996), Venkataramana and Srinivas Gowda (1996), Chandran (1997), More (1999), Siddagangaiah(2000), Lokesh and Chandrakanth (2003) and Sunil Kumar (2004), Pottappa (2008) and Raghavendra *et al.* (2008) .

5.4 CONSTRAINTS PERCEIVED BY FARMERS IN THE PRODUCTION, STORAGE AND MARKETING OF POTATO

5.4.1 Constraints perceived by farmers in the Production of potato

A perusal of table 13 revealed the constraints in production of potato in the order of importance. The constraints were high cost of seed material, untimely availability of seed material, high cost of fertilizers, lack of technical guidance, more pests attack, more diseases incidence, high cost of plant protection chemicals, non-availability of loan on time, timely non-availability of labour, timely unavailability of irrigation, timely non-availability of sowing implements, non-availability of agricultural implements and non-preparation of land on time.

The heavy demand for the seed material like Kufri Jyothi, Kufri Chandramuki, has made the availability scarce. Untimely availability of seed material to farmers at the time of sowing and the seed material has to be imported from other states like Uttaranchal, Uttar Pradesh and Haryana. High cost of chemical fertilizers is another major problem. Lack of technical guidance regarding appropriate weight of seed size tubers, cut seed tuber eyes, recommended seed rate, seed treatment, recommended quantity of chemicals and chemical fertilizers are all problems. The diseases like early blight, late blight, bacterial wilt and root-knot nematodes are the most common in potato crop which cause more damage in all the stages of the crop. The insects like leaf hoppers, leaf roller, cutworms, tuber worm, aphids and root grubs are common in the crop.

5.4.2 Constraints perceived by farmers in the Marketing of potato

Marketing constraints as perceived by the potato growers are presented in the order of importance in Table 14. The constraints perceived by the potato growers in the marketing of potato were high cost of transportation, fluctuation in market prices, market places are far away, more commission agent charge, delayed cash payment from the traders, high hamali charges and malpractice in weighing.

The main aim of farmer is to produce more and get better price for their produce. But, unfortunately, as the supply of product increases, the demand price of that particular produce decreases and vice versa as a result of which a lot of fluctuations in the market price occurs. Hence, the fluctuation in the market price has been found to be a major problem in the marketing of potato by the potato growers.

The other problems like more commission charges and hamali charges, delay in cash payment and cheating in weighing needs the attention of the agencies involved in marketing of potato. The problem of transportation cost is high and markets are far away also need the due consideration of the Government and other marketing organizations.

5.4.3 Constraints perceived by farmers in the storage of potato

Storage constraints perceived by the potato growers in order of importance presented in Table 15. The constraints perceived by the potato growers in respect of storage of potato were non-availability of cold storage facilities, high cost of storage, storage facilities are located far away from village, no cold storage facility in APMC, capacity of cold storage is less, and no loan facility for the stored potato.

The findings are conform with the findings of past researchers such as Hemakumari (1992), Hiremath (1993), Gummagolmath (1994), Senthilnathan and Srinivasan (1994), Vedini (1994), Srinivasareddy (1995), Patel *et al.* (1997), Vijaya Kumar (1997), Chengappa *et al.* (1998), Ravi Shankar and Katteppa (1998), Radhakrishnan *et al.* (1999), Waman and Patil (2000), Sunil Kumar (2004), Nagesha (2005), Tarde *et al.* (2006), Maraddi (2008), Nagaraja *et al.* (2008) and Varadaraju *et al.* (2009).

SUMMARY

VI. SUMMARY

Potato is one of the important commercial vegetable crops in India. The tuber contains important nutritive constituent's viz., carbohydrates, protein, minerals and vitamins. Realizing the importance of potato cultivation in India, the Government of India set up the Central Potato Research Institute (CPRI) in Patna in 1949. Since then, CPRI has been conducting and co-coordinating the research and acting as a clearing house for information on all aspects of the crop in the country. During 2004 India produced 25 million tonnes of potato in an area of 14 lakh hectares. Karnataka's contribution to the total area was 5.15 per cent with a production of 6.25 per cent. In Karnataka, the area and production of potato increased from 34,738 ha and 6,21,810 ton in 1991-92 to 55,791 ha and 5,26,737 tonnes respectively in 2009. The productivity and production of the potato crop is mainly indicated by the potato growers knowledge and adoption level. Therefore a study was undertaken to assess these aspects in detail with the following objectives.

1. To study the Knowledge and Adoption level of potato growers with respect to recommended potato cultivation practices
2. To find out the association between selected personal, socio-economic and psychological characteristics of the respondents and their Knowledge and Adoption
3. To assess the marketing channels employed by potato growers
4. To ascertain the constraints perceived by the potato growers

The study was conducted in Hassan district of Karnataka state covering 3 taluks. In each taluk 10 big farmers, 10 small farmers and 10 marginal farmers were selected, thus making 90 respondents as the sample for the present study.

Totally 12 characteristics of potato growers (independent variables) viz. age, education, family size, farming experience, annual income, extension contact, extension participation, social participation, mass media participation, economic motivation, innovativeness and risk orientation were selected for studying the association with their knowledge and adoption level. These variables were measured by using appropriate scales and scoring procedures. The data was collected by personal interview method with the help of a pre-tested structural schedule. The data was tabulated and subjected to simple percentage analysis, Mean, Standard Deviation and chi-square test.

FINDINGS

1. Majority of potato growers had medium (45.55%) overall knowledge level followed by high (32.22%) and low (22.23%) about the cultivation practices of potato crop.
2. The cent per cent of the potato growers had knowledge about the practices like recommended variety and row to row spacing.
3. About 95.00 to 99.00 per cent of potato growers had knowledge about the practices like earthing up after planting, height of ridges, plant to plant spacing, name of the pest or disease attacked, suitable month for sowing and post harvest practices.
4. More than 90.0 to 94.00 per cent of the potato growers had correct knowledge about practices like number of eyes in cut tubers, number of pre- sowing ploughings, duration of recommended varieties, seed rate, irrigation potential and appropriate time of harvesting. About 83.34 per cent of potato growers had correct knowledge on appropriate weight of seed size tubers.

5. Majority of the potato growers had correct knowledge about recommended dose of FYM, nitrogen, phosphorus and potash and chemicals used for controlling pest and diseases and yield per acre and only 17.77 per cent of the farmers had correct knowledge of chemical used for seed treatment. Cent per cent of potato growers had incorrect knowledge about bio-control agents used for controlling pest and diseases and chemicals used for controlling termites.

6. Majority of the potato growers had medium 44.45 per cent adoption level. Whereas, 34.44 and 21.11 per cent of the respondents belonged to high and low adoption categories, respectively.

7. Cent per cent of potato farmers adopted fully the practices like improved seed. More than 60.0 per cent of the farmers had fully adopted the practices like seed rate per acre and plant protection against diseases. More than 30.0 per cent of the farmers had fully adopted the practices like; spacing between the plant to plant and spacing between row to row, application of organic fertilizers and inorganic fertilizers. About 15 per cent of farmers had fully adopted the seed treatment and plant protection against the pest.

8. Majority of the potato growers had partially adopted practices like application of inorganic fertilizers and organic fertilizers and spacing between the plant to plant and spacing between rows to row. About one third of farmers had partially adopted the practice of seed rate per acre and about one fourth of farmers had partially adopted the practices like plant protection against pest and diseases. Only about 7 per cent of potato growers had partially adopted seed treatment. The practices like application of bio-pesticides or bio- extracts were not adopted by cent per cent of the potato growers.

9. There was a difference between big, small and marginal farmers in their overall knowledge regarding improved cultivation practices of potato. A good number (46.66%) of big farmers possessed high level of knowledge. Small farmers possessed medium knowledge level (46.66%) and marginal farmers had low level of knowledge (43.33%).

10. Cent per cent of big, small and marginal farmers had correct knowledge regarding row to row spacing, recommended variety, earthing up after planting, nitrogen top dressing after planting and name of the pest and disease attacked. Cent per cent of big, small and marginal farmers had incorrect knowledge about bio-control agents used for controlling pests and diseases Chemicals used for controlling termites.

11. About half of the big farmers (50.00%) had high level of adoption of improved cultivation practices of potato. Whereas, small farmers had medium level (40.00%) of adoption and marginal farmers had low level (40.00%) of adoption of cultivation practices of potato crop. The recommended practices of potato cultivation such as improved seed was adopted by the cent per cent of big, small and marginal potato farmers. Regarding use of bio-pesticides / bio-extracts cent per cent of big, small and marginal farmers had not adopted the practice.

12. Majority of the respondents belonged to old age (58.89 %), with medium level of education (64.45%), medium family size (58.89 %), medium annual income (94.45%), medium extension contact (70.00%), medium extension participation (63.34%), medium social participation (57.78%), high mass media participation (51.11%), medium innovativeness (58.89%) and medium risk orientation (80.00 %). About half of the farmers had medium farming experience (41.12%) and medium economic motivation (44.45%).

13. Selected characteristics of potato growers *viz.*, education, mass media participation and risk orientation of potato growers were significantly associated with their knowledge level of potato farmers at 0.01 level and age, extension contact, extension participation of potato growers were significant association with their knowledge level at 0.05 level.

14. Social participation of potato growers were significantly associated with their adoption level at 0.01 level and age, education, extension participation, risk orientation and mass media participation of potato growers were significantly associated with their adoption level at 0.05 level.

15. APMC and village merchant were the most important marketing channels used by the potato growers followed by wholesalers, commission agent and local market.

16. The constraints perceived by the potato growers in the production of potato were high cost of seed material, untimely availability of seed material, high cost of fertilizers, lack of technical guidance, more pests attack, more disease incidence, high cost of plant protection chemical, non-availability of loan on time, timely non-availability of labour, timely unavailability of irrigation, timely non-availability of sowing implements, non-availability of agricultural implements and non-preparation of land on time.

17. The constraints perceived by the potato growers in the marketing of potato were high cost of transportation, fluctuation in market price, market places are far away, more commission agent charge, delayed cash payment from the traders, high hamali charges and malpractice in weighment.

18. The constraints perceived by the potato growers in respect of storage of potato were non-availability of cold storage, high cost of storage, storage facilities are located far away from village, no cold storage facility in APMC, capacity of cold storage is less, and no loan facility for the stored potato.

Implication and Recommendations

The findings of the present study have brought to sharp focus certain implication and recommendation.

1. Efforts in updating the knowledge of potato growers in respect of many of the recommended practices are required on the part of extension agencies in view of the fact that only a small majority of the farmers were found to have the high overall knowledge.

2. It looks essential on the part of the government to establish cold storage facilities at appropriate locations and provide the same at the reasonable cost to the user farmers.

Limitations of the study

Due to limitation of time and other resources of the student researcher, the present study was conducted in only three taluks of Hassan district. The sample size was small, therefore, the findings have limited generalization on the adoption status of improved practices of potato. Studies of this nature in other areas could be of much help in drawing more valid generalizations.

The findings of the present study will be useful to the Department of Horticulture, Karnataka state in strengthening the extension strategy. It might also be useful for research workers in future who would conduct research on diffusion and adoption of improved technology in potato crops.

REFERENCES

VII. REFERENCES

ANONYMOUS, 1994, Karnataka at a Glance, Directorate of Economics and Statistics, Govt. of Karnataka, Bangalore.

AJAY KUMAR, P., 1989, A Study on Adoption Behavior and Information Consultancy Pattern of Grape Growers in Rangareddy District of Andhra Pradesh. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.

*ANASTASI, A., 1961, *Psychological Testing*. Macmillan Company, New York, pp.428-436.

ANIL KUMAR AND ARORA, V. P. S., 1999, Post-Harvest Management of Vegetables in Uttar Pradesh Hills. *Indian Journal of Agricultural Marketing*, **13** (2) : 6-14.

ANKULWAR, B.N., JONDHALE, S.G. AND RANGARI, P.V., 2001, Extent of Adoption of Recommended Package of Practices of Sunflower by the Farmers. *Maharashtra Journal of Extension Education*, **22** : 96-99.

BASAVAPRABHU, V. J., 1995, Knowledge and Adoption Behavior in Respect of Integrated Pest Management Practices of Tomato and Cabbage by the Vegetable Growers Bangalore North District. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Science, Bangalore.

* **Originals not seen**

- BHAGWAN SINGH, 2004, Adoption of Sesame Production Technology in Arid Zone of Rajasthan. *Asian Journal of Extension Education*, **22** : 181-187.
- BHAGWAT, M.R AND GOHAD, V.V., 2003, Adoption of Dry Land Cotton Cultivation Technology by the Farmers. *Maharashtra Journal of Extension Education*, **22** (2) :108-110.
- BONNY, P. B., 1996, Constraints in Commercial Production of Vegetables. *Journal of Tropical Agriculture*, **34** (2) : 159-160.
- BYRA REDDY, H.N., 1971, A Study on Differential Characteristics of Adopters and Non-Adopters of Fertilizers of Rainfed Ragi in Bangalore North Taluk. *M.sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Science, Bangalore.
- CHANDRA NAIK, S., 1993, Integrated Programme for Rice Development- its Impact on the Knowledge and Adoption Behaviour of Beneficiary and Non-Beneficiaries in Shimoga District. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Science, Bangalore.
- CHANDRAN, B., 1997, A Study on Knowledge and Adoption of Farmers Cultivating Tapioca In Ernakulum District of Kerala State. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.
- CHENGAPPA, P.G., NETHRA, N.N. AND REDDY, D.M.G., 1998, Cut Flower Industry in Karnataka: Analysis of Trade Constraints. *Research Report*, University of Agricultural Sciences, Bangalore.

- CHOLE, B.R., SANGLE, G.K. AND CHOUKIDAR, L.B., 1978, Use of Information Source and Adoption Of Improved Wheat Varieties. *Research Bulletin of Marathwada Agricultural University*, **2** (9) : 115-117.
- DESAI, A.R., 1975, A Study on the Adoption of Recommended Potato Cultivation Practices and Information Sources Consulted by Potato Farmers to Belgaum Taluk, Karnataka state. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Science, Bangalore.
- DHAMODARAN, T. AND VASANTHA KUMAR, J., 2001, Relationship between Selected Characteristics of Registered Sugarcane Growers and their Extent of Adoption of Improved Sugarcane Cultivation Practices. *Journal of Extension Education*, **12** (2) : 3138-3143.
- DURGA, C., 1999, Public Intervention in Marketing of Vegetables: The Case of Rytu Bazars in Vishakhapatnam. *Indian journal of Agricultural marketing*, **13** (2) : 137-143.
- GEETAKUTTY, P.S., 1982, An Analysis of Adoption of Recommended Rice Cultivation Practices in Relation to the Understanding of Principles and Knowledge of Proceeding by Farmers and Extension Workers. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Science Bangalore.
- GIRASE, C.P., KALANTRI, L.B. AND TEKALE, V.S., 2004, Constraints Faced by the Farmers in the Adoption of Recommended Package of Practices of Cotton. *Asian Journal of Extension Education*, **23** : 157-160.

- GOVINDA REDDY, D.M., SRINIVAS GOWDA, M.V., SRINIVAS REDDY, M.V. AND PRASANNA KUMAR, G.T., 1997, Constraints in Production and Marketing of Mangoes: A Case Study in Srinivaspur Region. *Bihar Journal of Agricultural Marketing*, **5** (2) : 234-237.
- GUMMAGOLMATH, K.C., 1994, Economics of Production and Marketing of Mango in Dharwad District Karnataka. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.
- GURPRIT SINGH DHILLON AND KULDIP KUMAR, 2004, Adoption of Improved Menthe Cultivation. *Indian Journal of Extension Education*, **40** : 40-43.
- HANCHINAL, S.N., MANJUNATH, L. AND CHANDARGI, D.M., 1991, Adoption Pattern of Recommended Cultivation Practices of Potato Crop. *Maharashtra Journal of Extension Education*, **10** (1) : 53-60.
- HEMAKUMARI, V., 1992, Production and Marketing of Chrysanthemum Flower in East Godavari District of Andhra Pradesh: An Economic Analysis. *Agricultural Economics Research Review*, **9** : 111-112.
- HIREMATH, G.M., 1993, Economics of Production and Marketing of Lime in Bijapur District, Karnataka, *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.
- HOSMANI, B. VIJAYA., 1993, A Study on Knowledge of General Health Practices of Rural Women and their Communication Behaviour in Baiahongal Karnataka State. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.

- JAGADAL, H.K., 1989, A Study on Knowledge and Adoption of Recommended Cultivation Practices of Cabbage Growing Farmers of Belgaum District, Karnataka State. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.
- JAIRATH, M. S., 1997, Operational Efficiency in Fruits and Vegetable Market: A Case Study. *Indian Journal of Agricultural Marketing*, **11** (1-2) : 92-93.
- KADAM, R.P., WANGIKAR, S.D.AND BHOSLE, P.B., 2001, Production and Marketing Constraints Faced by Sweet Orange Growers. *Maharashtra Journal of Extension Education*, **20** : 66-68.
- KANTHARAJU, 1989, A Study on Adoption of Improved Practices of Coffee and Cardamom by Small Farmers in Hassan District of Karnataka. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Science Bangalore.
- KARISOMANAGOUDAR, R.S., 1990, Economics of Production and Marketing of Rainfed Onion in Gadag Taluk of Dharwad District, Karnataka State. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.
- KHUNT, K. A. AND DESAI, D. B., 1996, Economics Feasibility and Marketing of Perennial Vegetables in South Gujarat. *Financing Agriculture*, **28** (1) : 9-14.
- KIRANKUMARI, N.S., 1991, A Study on Knowledge and Adoption of Nutritional Practices by the Rural Beneficiaries of Integration Child

Development Scheme in Dharwad District Karnataka. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.

KISHOR BABU, B., PRABHAKAR, B. AND RAGUPATHI REDDY, G. 2007, Knowledge of Vegetable Marketing. *J.Res.ANGRAU*, **35** (2) : 97-98.

KOUJALAGI, C.B. AND KUNNAL, L.B., 1991, Marketing of Pomegranate Fruits. *Indian Journal of Agricultural Marketing*, **5** (2) : 185-189.

KUBDE, V.R., BHOPLI, S.R. AND TEKALE, V.S., 2000, Knowledge and Adoption of Cultivation and Storage Practices of Potato. *Maharashtra Journal of Extension Education*, **19** : 293-298.

KULLAYI REDDY, G., 1983, A Study on Management Orientation, Training Efficiency and Consultancy Pattern of Rainfed Groundnut Growers in Kolar District Of Karnataka State. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Science, Bangalore.

KULKARNI, S. N., 1989, Production and Marketing of Grapes in Bijapur District, Karnataka. *M.Sc. (Agric.) Thesis (Unpub)*, University of Agricultural Sciences, Dharwad.

KUSHWAHA, C.L. AND PANDE, A.K., 1998, Differential Attributes of Potato Growers in Relation to their Adoption Behaviour. *Madhya Journal of Extension Education*, **1** : 54-56.

LIANBIKA, B. AND NIKHADE, D., 1993, Adoption Behaviour of Pineapple Growers in Mizoram. *Maharashtra Journal of Extension Education*, **7** : 25-29.

- LOKESH, G.B. AND CHANDRAKANTH, M.G., 2003, Economics of Production, Marketing and Processing of Turmeric in Karnataka. *Indian Journal of Arecanut, Spices and Medicinal Plants*, **5** (2) : 55-60.
- LOKHANDAE, V.D. AND WANGIKAR, S.D., 1991, Constraints in the Adoption of Selected Scientific Grape Technology. *Maharashtra Journal of Extension Education*, **10** (2) : 138-139.
- MAMATHA, T.G. AND HIREMATH, G.K., 2000, Farm Women Participation in Socio-Economic Organizations and Extension Activities in Tumkur District of Karnataka State. *Karnataka journal of Agricultural sciences*, **13** : 483-485.
- MARADDI, G.N., 2008, Constraints Perceived and Suggestions Expressed by Sugarcane Growers in Adoption of Sustainable Cultivation Practices. *Mysore Journal of Agricultural Sciences*, **42** (3) : 522-525.
- METI, S.K., 1990, Attitude Towards Improved Farm Implements and their Extent of Use by the Farmers of Dharwad District. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.
- MORE, S.S., 1999, Economics of Production and Marketing of Banana in Maharashtra State. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.
- MOULASAB, I., 2004, A Study on Knowledge and Adoption of Improved Cultivation Practices by Mango Growers of North Karnataka. *M.Sc.*

(Agri.) Thesis (Unpub.), University of Agricultural Sciences, Dharwad.

MOULIK, T.K. AND RAO'S. C.C.C., 1965, Self-Rating Scale for Farmers. In: *Measurement in Extension Research*.

MUNDWA, A.B.AND PATIL, H.L., 1987, Rainfed Wheat Growers Knowledge about the Rainfed Wheat in Bhal Area of Gujarat State. *Maharashtra Journal of Extension Education*, **6** : 111-116.

NAGARAJ, K.H., 1996, Knowledge and Adoption Pattern of Improved Cultivation Practices of Groundnut among Big and Small Farmers of Pavadada Taluk in Tumkur District. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.

NAGARAJA, M.V., SHASHIKUMAR, S. AND VENKATESHALU, 2008, Extent of Adoption of Recommended Sugarcane Cultivation Practices and Constraints Faced by the Farmers of Bhadra Command Area Karnataka. *Mysore Journal of Agricultural Sciences*, **42** (2) : 340-343.

NAGESHA, P.N., 2005, Study on Entrepreneurial Behaviour of Vegetable Seed Producing Farmers of Haveri District. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.

NIKHADE, D.M. AND POTDAR, N.K., 1989, Adoption Behaviour of Banana Growers. *Maharashtra Journal of Extension Education*, **13** : 289-290.

- PAMADI, B.M., 1980, A Study on Adoption Behaviour Consultancy Pattern of Groundnut Growers in Dharwad District, Karnataka State. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.
- PANDYA, R.D. AND VEKARIA, R.S., 1994, Knowledge and Adoption Behaviour of Banana Growers. *Maharashtra Journal of Extension, Education*, **13** : 131-134.
- PANKAJA, H.K., KRISHNAMURTHY, B. AND VINAY KUMAR, R., 2009, Correlates the Knowledge Level of Vanilla Growers on Cultivation Practices of Vanilla. *Mysore Journal of Agricultural Sciences*, **43** (1) : 143-146.
- PATEL, G. N., PATEL, R. M., PATEL, H. A., KHATRA, R. G. AND GONDALIA, V. K., 1997, Marketing Efficiency – A Case of Anand Vegetable Market. *Indian Journal of Agricultural Marketing*, **11** (1&2) : 87-88.
- POTTAPPA, K., 2008, Knowledge and Adoption of Potato Growers in Chikkaballapur District A Study. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.
- PRAMEELAMMA, V., 1990, A Study on Knowledge and Participation of Rural Women in Agricultural Operations with Respect to Paddy Crop in Kurnool District of Andhra Pradesh. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.

- PURANIK, R.P. AND VERMA, P.R., 1992, Adoption of Sweet Potato Technology. *Indian journal of Extension Education*, **28** (3&4) : 114-116.
- PUSPENDRA SINGH NARUKA AND SANGRAM SINGH, 2003, A Study on Knowledge Level of Soybean Growers about Improved Soybean Production Technology. *Maharashtra Journal of Extension Education*, **22** : 1-4.
- RADHAKRISHNAN, T., MATHAIYA, K. AND RAVICHANDRAN, V., 1999, Constraints Experienced by Mango Growers. *Journal of Extension Education*, **10** : 2520-2522.
- RAGHAVENDRA, R., NATIKAR, K.V. AND JAHAGIRDAR, 2008, A Study on Marketing Behaviour of Cauliflower in Belgaum District of Karnataka. *Mysore Journal of Agricultural Sciences*, **42** (1) : 92 -96.
- RAIKAR, N.A.1990, Investment in Production and Marketing of Cashew in Karnataka. *M.Sc (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.
- RAJU, V. T. AND VENKATESHVARALU, M., 1989, Marketing of Banana in Guntur District of Andhra Pradesh. *Indian Journal of Agricultural Marketing*, **3** : 35-37.
- RAMACHANDRA, K.V., 2002, Farmers Knowledge Level and Adoption Behaviour about the Nutrient Management in Cabbage-Potato Cropping System in Kolar District of Karnataka. *M.Sc (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.

- RAMAKRISHNA RAO, L., SHIVAMURTHY, M. AND LAKSHMINARAYANA, M.T., 2008, Adoption of Sustainable Coconut and Banana Intercropping Practices: An Analysis. *Mysore Journal of Agricultural Sciences*, 42 (1) : 67-74.
- RAMESH BABU, P., 1987, A Study on Adoption Behaviour and Economic Performance of Grape Growers of Bangalore and Kolar Districts. *M.Sc. (Agriculture) Thesis (Unpub.)*, University of Agricultural Science, Bangalore.
- RAMESH, P. AND SANTHA GOVIND, 2003, Correlates of Knowledge Level of Organic Farmers. *Maharashtra Journal of Extension Education*, **22** (2) : 182-185.
- RAMESH, P. AND SANTHA GOVIND, 2008, Extent of Adoption and Relationship between the Characteristics of Organic Farmers and Their Adoption Level. *Mysore Journal of Agricultural Sciences*, **42** (3) : 526-529.
- RAVISHANKAR, R. L., 1995, A Study on Knowledge Level, Adoption and Constraint Analysis of Potato Farmers in Chickamagalur District, *M.Sc. (Agriculture) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.
- RAVISHANKAR, R.L. AND KATTEPPA, Y., 1997, Adoption of Improved Potato Cultivation Practices in Karnataka. *Journal of Extension Education*, **8** (4) : 1829-1830.
- RAVISHANKAR, R.L. AND KATTEPPA, Y., 2000, Constraints Analysis of Potato Farmers. *Journal of Extension Education*, **11**: 2714-2715.

- SADAPHAL, S.S., SAWANT, P.A AND KELASKAR, A.J., 2001, Constraints Experienced by the White Onion Growers from Raigad District of Maharashtra state. *Maharashtra Journal of Extension Education*, **20** : 69-73.
- SAIKRISHNA, M., 1998, A Study on Knowledge on Paddy Cultivation Practices and Adoption Behaviour of Andhra Migrant Farmers in Raichur District. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Science, Dharwad.
- SAJINI BALAKRISHNA, N. AND JESY THOMAS, 2000, marketing of banana in Thissur district, Kerala. *Plant Horticulture Technology*, **2** (3) : 61-62.
- SANGAPPA, B. BELLIGERI, 1996, A Study on Knowledge, Adoption and Perception of Usefulness of Agro-Forestry Practices by Farmers of Hangal Taluk, Dharwad District. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.
- SASIDHAR REDDY, R., PRASAD, S.V., RAMACHANDRA REDDY, D.AND SASTRY, T.P., 2007, Knowledge and Farming Performance of Tomato Farmers in Chittoor District of Andhra Pradesh. *J.Res.ANGRAU*, **35** (2) : 91-92.
- SATHASIVAM, S. THYAGARAJAN AND PARTHASARATHI, S., 2009, Knowledge Level of Paddy Growers about IPM Biofertilizers Practices. *Journal of Extension Education*, **21** (1) : 4194-4196.
- SATHEESH, D., 1990, A Study on the Knowledge and Adoption Of Chawki Rearing Practices by Silkworm Rearers of Kanakapura

Taluk. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Science, Bangalore.

*SENGUPTA, T., 1967, A Simple Adoption Scale for Selection for High Yielding Varieties Programme on Rice. *Indian Journal of Extension Education*, **3** :107-115.

SENTHILATHAN, S. AND SRINIVASAN, R., 1994, Production and Marketing of Poovan Banana in Trichirapalli District of Tamil Nadu. *Indian Journal of Agricultural Marketing*, **8** (1): 46-53.

SHASHIDHARA, K. K., 2003, A Study on Socio-Economic Profile of Drip Irrigation. *M.Sc. (Agri.) Thesis (Unpub.)*, University Of Agricultural Sciences, Dharwad.

SHINDE, S.B., 2002, Knowledge of Farmers about Improved Cultivation Practices of Groundnut in Satar District. *Maharashtra Journal of Extension Education*, **21** : 90-91.

SHIVAMURTHY, G.R., 1991, A Study on the Knowledge and Adoption Behaviour of Arecanut and Cardamom Growers in Shimoga District of Karnataka State. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.

SHIVAMURTHY, M., RAMAKRISHNA RAO, L. AND LAKSHMINARAYANA, M.T., 2008, Production Techniques Adopted by Mango Growers. *Mysore Journal of Agricultural Sciences*, **42** (2) : 331-336.

* **Originals not seen**

- SHRIVASTAV, K.K., SARKAR, J.D. AND LAKHERA, 2002, Adoption Behaviour of Farmers about Chilli Cultivation Technology. *Maharashtra Journal of Extension Education*, **21** (1) : 58-61.
- SHRIVASTAVA, K. K., PATIL, H. L. AND BARETH, L. S., 1998, Constraints in Adoption of Recommended Ability Production Technology. *Maharashtra Journal of Extension Education*, **27** : 390-393.
- SHYLAJA, S., SHANTHA, A. M. AND BALAKRISHNA ASAN, 1993, An Analysis of the Adoption of Improved Technologies in Banana Production by Farmers of Kerala. *South Indian Horticulture*, **41** (3) : 125-130.
- SIDDAGANGAIAH, 2000, An Analysis of Potato Marketing System-A Case Study of Chikkaballapur APMC. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.
- SIDDALINGAPPA, 1978, A Study on the Adoption Behaviour Pattern of Information Source Consultancy and Value Orientation of Potato Farmers of Hassan District. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Science, Bangalore.
- SINGH, G.N. AND GUPTA, B.K., 1983, Economics of Production Marketing and Storage of Potato in District of Farrukhabad (UP). *Agriculture Marketing*, **26** (2) : 7-13.
- SINGH, R.S., 1996, Marketing Citrus Fruits in Mid Hills of Jammu and Kashmir. *The Bihar Journal of Agricultural Marketing*, **4** (3) : 242-249.

SRINIVASAREDDY, M. V., 1995, A Study on Knowledge and Adoption of Recommended Mango Cultivation Practices among Farmers of Kolar District. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.

SUNDARAJ, A.R., 1978, A Study of Knowledge and Behaviour of Small and Big Farmers Growing Tomato in Bangalore District. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.

SUNIL KUMAR, G.M., 2004, A Study on Farmers' Knowledge and Adoption of Production and Post Harvest Technology in Tomato Crop of Belgaum District in Karnataka. *M.Sc. (Agric.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.

*SUPE, S. V., 1969, Factors Related to Different Degrees of Rationality in Decision-Making among Farmers in Buldana District. *Ph. D. Thesis (Unpub.)*, Indian Agricultural Research Institute, New Delhi.

TARDE, V.J., PHARATE, D.N. AND THORAT, D.R., 2003, Constraints Faced by the Vegetable Growers in Adoption of Improved Technologies of Vegetable Cultivation. *Maharashtra Journal of Extension Education*, **22** : 223-225.

TARDE, V.J., THORAT, D.R. AND PHARATE, D.N., 2005, Problems Faced by the Flowers Grower in Pune District. *J.Maharashtra Agric.Univ.*, **30** (1) : 62-63.

* **Originals not seen**

TARDE, V.J., THORAT, D.R. AND PHARATE, D.N., 2006, Constraints Faced and Suggestions made by the Pomegranate Growers. *J.Maharashtra Agric.Univ.*, **31** (2) : 195-197.

THAKUR, K. K., BHOFLER, S. AND THAKUR, K. D., 1991, Information Sources and Knowledge of Mango Growers. *Maharashtra Journal of Extension Education*, **10** (2) : 262-265.

* TRIVEDI, G.1963, Measurement and Analysis of Socio-Economic Status of Rural Families. *Ph.D.Thesis (Unpub.)*, Indian agricultural Research Institute, New Delhi.

VARADARAJU, G.M., RANGANATH MANGALVEDKAR AND CHANDRE GOWDA, K.N., 2009, Adoption of Production Technologies by Tomato Growers: An Analysis. *Journal of Extension Education*, **21** (3) : 4256-4260.

VEDA MURTHY, H. J., 2002, A Study on the Management of Areca Gardens and Marketing Pattern Preferred by the Arecanut Farmers of Shimoga District in Karnataka. *M.Sc. (Agric.) Thesis (Unpub.)*, University of Agricultural Sciences, Dharwad.

VEDINI, K.H., 1994, Potential Location of Flower Processing Units in Karnataka and Marketing of Jasmine in Mysore City. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.

VENKATARAMANA, M. N. AND SRINIVASA GOWDA, M. V., 1996, Channels and Price Spread in Tomato Marketing- A Study in Kolar District. *Agriculture marketing*, **34** (1) : 42-44.

* **Originals not seen**

- VENKATESH GANDHI, R., HANCHINAL, S.N., KRISHNA, T.V., SHIVAMURTHY, M. AND SHAILAJA HITTALMANI, 2008, Knowledge Level of Vegetable Growers with Respect to IPM Practices of Tomato Crop in Kolar District. *Mysore Journal of Agricultural Sciences*, **43** (3) : 718-721.
- VIJAY KUMAR, C., 1997, A Study on Knowledge and Adoption of Improved Cultivation Practices among Rose Growers. *M.Sc. (Agri.) Thesis (Unpub.)*, University of Agricultural Sciences, Bangalore.
- VIJAYAKUMAR, A.C. AND NARAYANAGOWDA, K., 1999, Adoption of Improved Cultivation Practices among Rose Growers. *Journal of Extension Education*, **10** : 2331-2334.
- VINAY KUMAR, K.V., NATIKAR, M.S., NATARAJU, H.K, ANKAJA AND DHANANJAYA, D., 2009, Knowledge Level of Rose Growers about Improved Cultivation Practices. *Mysore Journal of Agricultural Sciences*, **43** (3) : 327-529.
- VINAY KUMAR, R., NATIKAR, K.V., PANKAJA, H.K., NATARAJU, M.S. AND DHANANJAYA, B., 2009, Study on Adoption of Improved Cultivation Practices by Rose Growers in Karnataka. *Mysore Journal of Agricultural Sciences*, **43** (2) : 340-343.
- VINOD GUPTA, DILIP AND DUNDARSWAMY, B., 2001, Knowledge of the Farmers about Improved Cultivation Practices of Rice in Jammu. *Maharashtra Journal of Extension Education*, **20** : 74-76.

VISHVANATH HIREMATH, SHIVAMURTHY, M., LAKSHMAN REDDY, B.S., KATTEPA, Y. 2009, Adoption Behaviour of Vegetable Growers Regarding Eco-Friendly Technologies in Kolar District of Karnataka. *Mysore Journal of Agricultural Sciences*, **43** (2) : 352-356.

WAMAN, G. K. AND PATIL, P. S., 2000, Production, Storage and Marketing Constraints Faced by Onion Growers. *Maharashtra Journal of Extension Education*, **19** : 104-108.

ZAGADE, P.M., JAWADE, N.D. AND KOKATE, K.D., 2003, Factors Influencing the Adoption of Recommended Crop Protection Measures by the Cashew Growers. *Maharashtra Journal of Extension Education*, **22** : 178-181.

APPENDICES

5. Land Holding:

Types of land owned	Acres	Guntas
Dry land		
Wetland		
Garden land		
Total		

6. Annual Income:

- a) From Agriculture Rs -----b) From Horticulture Rs -----
c) From Subsidiary occupation Rs -----
d) Other sources specify a) Rs -----
b) Rs-----
Total Annual Income Rs-----

7. Extension Contact

Indicate the extent of contact you had with the following extension personnel

Sl. No.	Extension personnel	Once in a week	Once in 15 days	Once in a month	Never
1	Agril. Asst.				
2	A.A.O				
3	A.O.				
4	A.D.A				
5	A.D.H				
6	KVK-SMS				
7	Universityscientists				
8	Others (specify)				

8. Extension Participation

Did you participate in the following Extension activities in the last one year.

Yes/No

If yes, please indicate

Sl. No	Activities	Participation		
		Regularly	Occasionally	Never
1	Training			
2	Discussion meeting			
3	Result demonstration			
4	Method demonstration			
5	Field Visits			
6	Field days			
7	Krishi Melas			
8	Exhibitions			
9	Educational tours			
10	Any other(specify)			

9. Social participation

❖ .Are you a member of any of the following organizations? Yes/ No

If yes, indicate your extent of participation in the following organizations meeting /programmes

Sl. No.	Name of Organizations	members	Office bearer	Extent of Participation		
				Regularly	Occasionally	Never
1	Gram panchayat					
2	Co-operative society					
3	Taluk panchayath					
4	Zilla pariashad					
5	Youth club					
6	PLDB					
7	APMC					
8	Others(specify)					

10. Mass media participation

❖ Are you a subscriber of any Newspaper/Magazine/Journal? Yes/No

If yes, give details.

a) Name of the News paper:

b) Name of the Magazine:

Indicate the extent you are reading the following:

Sl.No.	Types of information	Reading behaviour		
		Regularly	Occasionally	Never
a.	Agricultural News and other articles			
b.	Political news			
c.	General news			
d.	Do you preserve the Agricultural information for future use			

❖ Do you possess Radio? Yes / No

If yes, which of the following you are listening

Sl.No.	Programme	Listening behaviour		
		Regularly	Occasionally	Never
1	Agricultural programmes a)Hints to farmers b)Krishi Ranga			
2	News			
3	General programmes			

Do you possess Television? Yes /No.

If yes, which of the following programme you are viewing

Sl.No.	Programmes	Viewing behaviour		
		Regularly	Occasionally	Never
1	A) Agricultural programmes in DD- 1 a) Grama Mangala b) Krishi Darshan B) Agricultural programmes in ETV /Kasthuri a) b)			
2	News			
3	General programmes a) b)			

11. Economic motivation

Please give your degree of agreement about of the following statement

- a) SA = strongly agree b) A = Agree c) DA = Disagree
d) SD= strongly disagree e) UD= Undecided

Sl. No.	Statements	Degree of agreement				
		SA	A	UD	DA	SDA
1.	A farmer should work toward larger yield and economic profit					
2.	The most successful farmer is one who get the most profit					
3.	A farmer should try new farming ideas which may earn him more money					
4.	A farmer should grow vegetable crops to increase the monitory profit in comparison to growing of cereal crops					
5.	It is difficult for farmers' children to make good start in their enterprise unless he provides them with economic assistance					

12. Innovativeness

Please indicate your degree of liking on hearing the following statements. From among the three statements under each item you hear, indicate the statement you liked most and also indicate the statement you liked least.

Sl.No	Statements	Most liked	Least liked
1.	a) I try to keep myself up to date with information on new farm practices in potato production but that does not mean that I try out all new methods on my farm.		
	b) I feel restless till I try out a new farm practice in potato production that I have heard about.		
	c) They talk of many new farm practices in potato production, these days but who knows whether they are better than the old ones.		
2.	a) From time to time I have heard of several new farm practices in potato production and I have tried out most of them in the last few years.		
	b) Usually I wait to see that what results my neighbours obtain, before I try out the new farm practices in potato production.		
	c) Some how I believe that the traditional ways of farming are the best.		
3.	a) I am cautious about trying in new practices potato production.		
	b) After all our fore – fathers were wise in their farming practices and I do not see any reason for changing these old methods.		
	c) Often new farm practices in potato production are not successful; however, if they are promising I would surely like to adopt them.		

13. Risk orientation

Sl. No.	Statements	Degree of agreement				
		SA	A	UD	DA	SDA
1.	A farmer should grow more number of crops to avoid greater risks involved in growing one or two crops only.					
2.	A farmer should take more of a chance, in making a big profit than to be contented with a smaller profit with less risk.					
3.	A farmer who is willing to take greater risk than the average farmer usually does it better financially.					
4.	It is better for a farmer not to try new farming method unless most other farmers have used those with success.					
5.	Trying an entirely new method for a farmer may involve risk but it may be worth attempting it.					

14. Marketing channels

Please indicate the channels you are using in marketing of potato

Channels

- a) Local market

- b) Village merchant

- c) APMC

d) Commission Agent

e)

PART-B

1. Knowledge level of farmers on potato cultivation

Please indicate a (✓) mark in the most appropriate answer among the alternatives given under each of the following statements.

(1) Please mention the number of pre-sowing ploughings required for the potato crop is

- a) One to two ()
- b) Two to three ()
- c) Three to Four ()
- d) Do not know ()

(2) What is the appropriate weight of seed in potato is

- a) 20 grams ()
- b) 30 grams ()
- c) 40 grams ()
- d) Do not know ()

(3) Number of eyes in seed tuber

- a) One eye ()
- b) One to two eyes ()
- c) Two to three eyes ()
- d) Do not know ()

(4) Please indicate the chemicals used for seed treatment in potato and its quantity.

Name of the chemicals	concentration	quantity/acre of Seed material
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a)

b)

c)

(5) Please indicate the most suitable month for sowing potato crop in kharif

a) March to April ()

b) April to May ()

c) May to June ()

d) Do not know ()

(6) Please indicate the recommended variety of potato for your area

1. _____ 2. _____ 3. _____

(7) Please mention the duration of recommended potato varieties

Sl.no	Varieties	Duration
1		
2		
3		

(8) What is the Potato Seed rate per acre

a) 200 kgs ()

b) 400 kgs ()

c) 800 kgs ()

d) Do not know ()

(9) Please mention the recommended dose of farm yard manure for potato crop per acre

- a) 4 tons ()
- b) 8 tons ()
- c) 10 tons ()
- d) Do not know ()

(10) What is the recommended dose of Nitrogen under rainfed conditions in kg/acre

- a) 30 kgs ()
- b) 40 kgs ()
- c) 75 kgs ()
- d) Do not know ()

(11) What is the recommended dose of phosphorus under rainfed conditions in kg/acre

- a) 10 kgs
- b) 20 kgs ()
- c) 75 kgs ()
- d) Do not know ()

(12) What is the recommended dose of potash under rainfed conditions in kgs / acre

- a) 30 kgs ()
- b) 40 kgs ()
- c) 100 kgs ()
- d) Do not know ()

(13) Please indicate the chemicals used for controlling termites in potato crop in kgs / acre

Name of the chemicals _____

Quantity in kgs /acre _____

(14) Indicate Height of ridges in potato crop

- a) 2 inches ()
- b) 4 inches ()
- c) 6 inches ()
- d) Do not know ()

- (15) Plant to plant spacing in potato crop
- a) 2 inches apart ()
 - b) 5 inches apart ()
 - c) 8 inches apart ()
 - d) Do not know ()
- 16) Indicate row to row spacing in potato crop
- a) 6 inches apart ()
 - b) 12 inches apart ()
 - c) 20 inches ()
 - d) Do not know ()
- (17) Indicate irrigation requirement of potato crop
- a) Once 2 – 4 days ()
 - b) Once 4 – 6 days ()
 - c) Once 6 – 8 days ()
 - d) Do not know ()
- (18) When is Earthing up done after planting
- a) After 2 weeks ()
 - b) After 4 weeks ()
 - c) After 6 weeks ()
 - d) Do not know ()
- (19) Top dress potato crop with remaining 50 per cent of nitrogen after planting
- a) 4 weeks after planting ()
 - b) 8 weeks after planting ()
 - c) 10 weeks after planting ()
 - d) Do not know ()
- (20) Please indicate the name of the pest or disease attacked
- Name of the pest 1. _____ 2. _____ 3. _____
- Name of the disease 1. _____ 2. _____ 3. _____
- Pest: 1.Potato Cut worm 2.white grub 3. Aphids
- Disease: 1.Early blight 2. Late blight

(3) Are you following seed treatment Yes / No
If yes, (a) Name of the chemical used _____
(b) Quantity of chemical used _____

(4) Spacing (a) Distance between rows: _____ cms
(b) Distance between plants in the row: _____ cms

(5) Have you applied a) Organic manures b) Bio-Fertilizers c) Vermi compost
d) Green leaf manure
Yes/No

If yes,
(a) Organic manures a) Quantity applied/acre _____ tonnes
b) Time of application _____
(b) Bio-Fertilizers a) Quantity applied/acre _____ tonnes
b) Time of application _____
(c) Vermi compost a) Quantity applied/acre _____ tonnes
b) Time of application _____
(d) Green leaf manure a) Quantity applied/acre _____ tonnes
b) Time of application _____

(6) Have you applied inorganic fertilizers Yes / No
If yes, indicate the Quantity in kgs/Ac
N basal dose _____ kgs/Ac
N Top dressing _____ kgs/Ac
P₂O₅ basal dose _____ kgs/Ac
K₂O basal dose _____ kgs/Ac

(7) Have you applied Bio-pesticides / Bio-Extracts?

Yes / No

If yes,

Sl.No.	Name of the pest	Type of Bio-pesticide/bio-extract used	Quantity used	Time of application
I				
II				
III				
IV				

(8) Are you following plant protection against insects

Yes/No

If yes,

Sl.No.	Name of the pest	Type of insecticide used	Quantity used	Time of application
I				
II				
III				
IV				

(9) Are you following plant protection against diseases

Yes/No

If yes,

Sl.No.	Name of the disease	Type of fungicide/other chemicals used	Quantity used	Time of application
I				
II				
III				
IV				

3. Constraints in Production, Storage and Marketing of potato

Following are the few problems in cultivating potato. Do you think they are really problems to you? Please tick them and also give them the ranking based on your judgment.

I . Problems in production

Did you have any problem in cultivation of potato

Yes/No

If yes, mention them.

Sl.No.	Problems	Yes/No	Ranks
1	Not possible to prepare the land on time		
2	Untimely availability of seed material		
3	High cost of seed material		
4	Timely non-availability of sowing implements		
5	Timely non-availability of labour		
6	High cost of fertilizers		
7	Non-availability of agricultural implements		
8	More pests attack		
9	More diseases incidence		
10	High cost of plant protection chemicals		
11	Lack of technical guidance		
12	Timely Unavailability of Irrigation		
13	Non-Availability of loan on time		
14	Any other (specify)		

II. Problems in storage

Did you experience any problem in storage of potato Yes/No

If yes, mention them and also rank them if you recognize it as a problem

Sl.No.	Problems	Yes/No	Ranks
1	No cold storage facility in APMC		
2	Storage facilities are located far away from village		
3	No cold storage facilities for the storing of potato for required duration		
4	Storage provision in terms of quantity of potato stored is less		
5	High cost of storage		
6	No loan facility for the stored potato		
7	Any other (specify)		

III. Problems in marketing

Did you experience any problem in marketing of potato Yes/No

If yes, mention them and rank them

Sl.No.	Problems	Yes/No	Ranks
1	Market places are far away		
2	High cost of transportation		
3	Fluctuation in market prices		
4	Commission agent charge is more		
5	High Hamali charges		
6	Delayed cash payment from the traders		
7	Malpractices in weighing		
8	Any other (specify)		